Prepared for: ELECTRO-COATINGS, INC.

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Progress Report

Electro-Coatings, Inc.

Emeryville, California

November, 1983

J. H. KLEINFELDER & ASSOCIATES
GEOTECHNICAL CONSULTANTS • MATERIALS TESTING
LAND AND WATER RESOURCES

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November 2, 1983
File: B-1132-4

Attention: Mr. William Moore

Electro-Coatings, Inc.
1605 School Street
Moraga, California 94556

Subject: Transmittal of Conclusions and Progress Report for Emeryville, California Investigation

Dear Bill:

Enclosed is a discussion of Kleinfelder and Associates' conclusions regarding data generated to date at Electro-Coatings Emeryville plant. Also, attached is a report presenting an update of the investigative program conducted to date. Information collected during this latest phase of work has allowed us to address many of the Regional Water Quality Control Board concerns as presented in their December 16, 1982 letter. The following paragraphs present our discussion of each of the Regional Board's concerns:

**1. HOW MANY WATER BEARING ZONES ARE AFFECTED?**

Data generated from exploration of the upper two waterbearing zones in the vicinity of the Electro-Coatings plant indicates that only one water bearing zone, the aquifer above the blue clay, has been contaminated. The waterbearing materials beneath the clay continue to show low levels of both total and hexavalent chromium. Redevelopment and retesting of wells has shown a decrease in chromium levels, which suggests that what little chromium is being detected was introduced during monitoring well construction and is not indicative of aquifer degradation. As all areas drilled around the plant have encountered the blue clay, we believe this zone to be continuous and to be acting as a vertical barrier to contaminant movement.

**2. WHAT IS THE LATERAL EXTENT OF CONTAMINATION IN EACH OF THESE ZONES?**

Plates 4 and 5 in the attached report depict plumes representing the total hexavalent chromium levels in the shallow aquifer. As can be seen, the plumes are evaluated down to the drinking water standard of 0.05 mg/l for chromium. These plates reasonibly show definition of the lateral extent of contamination.

**3. WHAT ARE THE POTENTIAL THREATS TO WATERS (BOTH SURFACE AND GROUNDWATERS) OF THE STATE (IS THERE POTENTIAL FOR LATERAL MIGRATION IN EACH AFFECTED ZONE, AND VERTICAL MIGRATION FROM AN AFFECTED ZONE TO A CLEAN UNDERLYING ZONE?)**

In our November, 1981 proposal, we estimated a shallow aquifer contaminant flow velocity of 0.2-2.0 ft/day. Monitoring well 6, located in the center of the projected plume approximately 700 feet away from the sump area, has shown hexavalent chromium at a level of 0.33 mg/l in one analysis. This suggests that the leading edge of the plume may now be only 700 feet away from the source. Groundwater must therefore be moving much slower than the velocities estimated earlier. No refinement of the velocity calculations has been attempted. Assuming present environmental conditions are not altered, contaminated groundwater will continue to migrate in a west southwesterly direction in the shallow aquifer.

The clay layer beneath the upper aquifer appears to be retarding the movement of chromium downward. As indicated earlier, no significant contamination has been detected below the clay zone. Considering that over 20 borings have been drilled in the vicinity of the plant and those drilled deep enough have encountered what appears to be the same blue clay horizon, we must conclude that the clay is continuous. The continuity of the clay and the apparent low movement of the plume provide a strong indication that deeper usable groundwater is not being threatened.

**4. WHAT ARE THE POTENTIAL USES OF THE AFFECTED ZONES?**

A cursory well canvas was performed to ascertain whether water wells were present within about one mile of the plant and whether they might be utilizing the upper contaminated zone. Well logs fround in the California Department of Water Resource files in Sacramento, all indicate substantial clay in the upper 20 to 40 feet. None of the wells found are perforated in the shallow zone. Hence, there do not appear to be any current uses of the shallow aquifer.

The water quality of the groundwater above and below the blue clay has been assessed. In general the quality of the shallow zone is satisfactory with the exceptions of the total dissolved solids (TDS) which exceed the drinking water standard of 1000 mg/l in many wells both up and downgradient from the site, the pH which fluctuates from a reported low of 2.7 to a high of 12.1, and the known presence of chromium along with the probable

presence of other heavy metals from other industrial activities in the vicinity. These exceptions make the potential use of this shallow aquifer very questionable. The quality of the deep aquifer water exceeds only the secondary drinking water standard of 1600 micromhos specific conductivity. This water should therefore be considered potentially suitable as a potable water supply. Limiting factors affecting the practicability of utilizing this water source are the shallowness of the water relative to current sanitary seal well construction standards and the low permeability characteristics of the aquifer materials.

**5. AT WHAT DEPTH DOES USABLE GROUNDWATER EXIST?**

The groundwater below the blue clay zone would have to be considered usable as described in #4 above. However, the average total depth for the seven water wells known to have been drilled in the area is 250 feet, with the deepest being over 400 feet. Perforation data are absent so no definitive statement can be made about production zones. A cursory analysis of the well logs indicates that what water can be developed comes from sand stringers within the larger clay zones.

**6. DOES THE LEVEL OF CONTAMINATION IN THE SOILS IN THE AREA OF THE FORMER SOURCE POSE A LONG-TERM THREAT TO WATER QUALITY?**

The assumed major source of contamination is the sump at the northeast corner of the building. Wastes allegedly seeped out of a hole in the sump bottom and into the shallow aquifer. This hole was detected and subsequently repaired, which should eliminate any further contamination from this source. Several soil borings were drilled and sampled near the loading dock adjacent to the sump. Levels of chromium in this area ranged from 38.4 mg/kg, a probable backgroundlevel, to 5200 mg/kg. Neither boring 22 or 23 encountered groundwater in the 11.5 feet drilled. Monitoring wells nearby have water levels shallower than 11.5 feet. This suggests the groundwater is locally confined and thus there may be a natural separation between the contaminated soil and the shallow aquifer. Further sampling and analysis will be necessary to determine how much contamination is present and whether this chromium can act as a future source.

The December 16, 1982 Regional Board letter also requests information regarding the direction of flow and gradient of the deeper aquifer. The three wells completed below the blue clay have water levels which suggest a groundwater flow in a northerly direction. While there are three wells for traingulation the lithology and the varying piezometric surfaces causes us to

question the reliability of the direction. Similar water levels have been remeasured in these deeper wells to verify the initial measurements.

With the completion of this latest phase of work, Kleinfelder and Associates is pleased to note that the groundwater contamination has been substantially defined and the soil contamination should be assessed in the near future. We anticipate working with Electro-Coatings staff to prepare a plan to address the issues of groundwater and soil contamination.

We have enjoyed being of service to Flecto-Coatings, Inc., and look forward to finally resolving this issue. Should you have any questions regarding our interpretation of the data or our report, please contact us.

Very truly yours,

J. H. KLEINFELDER AND ASSOCIATES

David C. Mahy
Engineering Manager

Michael L. Siembieda
Project Geologist

DCM:lj

# PROGRESS REPORT
# FLECTRO-COATINGS, INC.
# EMERYVILLE, CALIFORNIA

## TABLE OF CONTENTS

# Progress Report
# Electro-Coatings, Inc.
# Emeryville, California

## I. Introduction

### A. Purpose

The following progress report summarizes work performed to date by J. H. Kleinfelder and Associates at the Flectro Coatings plant in Emeryville, California (see Plate 1).

This report expands and further defines the investigative work performed in earlier studies at the plant site. These reports are used as references to supplement the data and conclusions presented in this report. Refer to Table 1 for a list of prior reports. An abbreviated history of drilling activities at the plant is presented in Table 2.

### B. Scope of Work

The scope of work performed by J. H. Kleinfelder and Associates in this phase of field investigation consisted of:

- Drilling, sampling and completion of two deep monitoring wells,
- Drilling sampling and completion of two shallow monitoring wells,
- Drilling and sampling of two on-site borings,
- Sampling and analyzing groundwater from four new monitoring wells for total chromium, hexavalent chromium and standard mineral. Trivalent chromium was obtained by the difference between total and hexavalent.

- Analyzing of selected soil samples for a total chromium,
- Surveying in relative elevations for new and existing monitoring wells,
- Measuring groundwater levels for new and existing monitoring wells,
- Conducting a well survey in the vicinity of Electro-Coatings Plant,
- Preparing a status report containing our findings and conclusions to date along with recommendations for further work.

### C. Authorization

This work has been performed in accordance with the provisions of Purchase Order Number 2006.011 dated April 8, 1983, and Kleinfelders proposal dated January 20, 1983.

## II. FIELD ACTIVITIES

### A. General

Four monitoring wells (MW-18A through MW-21) and two soil borings (B-22 and B-23) were drilled, installed and sampled during this phase of work (Plate 2). These locations were selected to assist in defining the vertical and lateral extent of chromium in the groundwater and soil. Groundwater levels were measured and relative elevations of monitoring wells were surveyed to better evaluate the groundwater flows in both the shallow and deeper aquifers which are present beneath the site. Augers were cleaned between borings to prevent cross contamination.

B. Deep Monitoring Wells

Two deep monitoring wells (MW-18A and MW-20) were installed to evaluate if chromium is present below a layer of blue clay identified during earlier studies to be present beneath the site. These wells were drilled and completed within the general guidelines of the California Regional Water Control Board, Lower Aquifer Drilling Protocol.

On June 9, 1983, Malcom Drilling of South San Francisco, drilled two borings (18A and 20) with a Texoma 600 drill equipped with a 16" auger to a depth of approximately 27' below ground surface. The borings were visually logged to ensure that they penetrated into the blue clay confining layer. Unused 25 foot long, 10" diameter, 12 guage steel casings were then inserted into the borings. The annulus was then backfilled with a cement/bentonite grout, tremied in place with returns to the surface. A 12 hour period was allowed for the grout to harden. The interior fluid was then removed and the remainder of the borings completed using, J. H. Kleinfelder and Associates, Acker AD-II drill rig using a 8-1/4" hollow stem augers.

C. Shallow Monitoring Wells

Two additional shallow monitoring wells (MW-19 and MW-20) were drilled to help evaluate the lateral extent of chromium in the shallow aquifer above the blue clay. The wells were drilled and completed in general accordance with guide lines for Subsurface Investigation issued by the California Regional Water Control Board.

Monitoring wells 19 and 21 were drilled using J. H. Kleinfelder and Associates, CMF-55 drill rig with 8-1/4" hollow stem augers on June 10, 1983, and June 8, 1983 respectively. Each boring was advanced until it encountered the blue clay layer at a depth of approximately 25 feet.

D. Soil Borings

Two soil borings (B-22 and B-23) were drilled near the chromium waste pit area to evaluate if significant chromium was present in the soils above the saturated zone. The borings were drilled on July 8, 1983, using J. H. Kleinfelder and Associates, CME-55 drill rig equipped with 8-1/4" hollow stem augers. After completion of the borings, they were backfilled with native materials and capped with a concrete plug approximately one foot thick.

E. Well Installation

Monitoring wells were installed in MW-18A, 19, 20 and 21, after completion of the drilling. Four-inch diameter threaded PVC pipe, plugs and caps were used to construct the wells (see Boring Logs, Plates 7-12, for well construction details). No PVC glue or cement was used in the well construction. Perforated PVC pipe, slotted at 0.020-inch was used for the well screen section. After setting the well casing, the annulus was backfilled with 3-C mesh sand. In the deep wells, bentonite plugs were placed opposite low permeability clay layers to minimize the movement of water from the upper aquifer migrating down to the lower zones. In the shallow wells, bentonite plugs were placed on top of the sand pack to minimize surface infiltration. The wells were finished at the surface with a concrete Christy box, locking steel cap and threaded PVC plug.

Monitoring Well Construction Summary

| Well No. | Total Depth From Ground Surface Feet | Screen Sect. Feet | Bentonite Plug Location Ft. | 10" Steel Casing Location Ft. |
|---|---|---|---|---|
| MW18A | 51.5 | 35-50 | 28-35 | 2-27 |
| MW19 | 26.5 | 10-25 | 1-6 | N.A.* |
| MW20 | 56.5 | 31.5-51.5 | 25-28' | 1.5-26.5 |
| MW21 | 26.5 | 10-25 | 4-7 | N.A.* |

*N.A. - Not Applicable

F. Well Development and Water Sampling

All four monitoring wells installed during this phase of work were developed on June 21, 1983. The wells were developed by means of a peristaltic pump and/or a two inch air activiated piston pump. In addition, on August 9, 1983, MW-20 was redeveloped by means of dual tube air lift pump, equipped with a check valve to prevent the introduction of air into the formation. All four monitoring wells were sampled on June 21, 1983, by means of a Bennett piston, submersible pump. The pump is constructed of stainless steel and teflon materials to minimize sorption affects. Water quality parameters consisting of pH, temperature and conductivity were measured during the purging of the wells to assist in determining when representative formation water samples could be obtained. The samples were collected in an acid rinsed, 250 ml. plastic container and placed in a refrigerated environment prior to delivery to the testing laboratories. Chain of custody forms accompanied all samples.

G. Soil Sampling

Soil samples for chemical analysis were collected from boring 22 and 23. See boring logs (Plate 11 and 12) for sample locations. Soil samples were collected by means of 2" Modified California Sampler specially fabricated to accommodate plastic liners. The sampler was thoroughly cleaned with tap water between sample locations and unused plastic liners were used. After the sampler was removed from the boring, the liners containing the soil samples were removed and capped with plastic caps prior to delivery to the laboratory. Chain of Custody forms accompanied all samples.

H. Groundwater Elevations

To better define the groundwater gradients at the site, a survey was performed on August 9, 1983, to establish a relative elevation between wells. MW-20 was assigned an arbitrary elevation of 100.00' and all other wells (new and old) were surveyed into this datum. Refer to Table 3 for a history of the drilling activities. Depths to groundwater were measured in all existing wells on August 9, 1983, except MW-2, 7 and 13 which could not be located (see Table 2). In addition, a limited remeasurement of groundwater depths was performed on September 2, 1983. Depths were measured to the nearest 10th of a foot using an electronic water level meter manufactured by Slope Indicator, Inc.

I. Well Survey

The well driller reports on file with the California Department of Water Resources were examined to determine if active water wells were present within approximately one mile of the plant. A total of seven water wells are on record. The wells vary from 54 to 408 feet in depth. None of the wells, if still operating, appear to be extracting water from the uppermost zones.

## III. ANALYTIC RESULTS

### A. Groundwater Flow and Gradient - Shallow Aquifers

A groundwater contour map in the shallow aquifer was prepared using water elevation data measured on August 9, 1983 (see Table 3 and Plate 2). Groundwater flow was determined to be in a west/southwesterly direction towards San Francisco Bay. The flow direction established in this report is in slightly different direction than the west direction presented in an earlier report (WCC-1981). A groundwater gradient of approximately one foot per 100 feet or 1% was computed. This gradient closely follows the elevation contours in the area.

It should be noted that the depth to groundwater measured during this phase of study are approximately 3 feet higher than that reported in 1981. Record winter rains for the last two years are assumed to be responsible for this rise.

### B. Groundwater Flow and Gradient - Deep Aquifers

Groundwater elevations were measured in the three deep wells (MW-3, MW-18A and MW-20) open to the lower aquifers (see Table 2). The piezometric surface of MW-20 was approximately 3' higher, MW-18A essentially the same and MW-3A 6' lower than the piezometric surface of the upper aquifer. Examination of the lithology encountered in the deeper wells suggests that they may have penetrated different non-connecting aquifers and hence have different piezometric surfaces.

### C. Groundwater Chemistry - Shallow Aquifers

Groundwater samples from MW-19 and MW-21 were tested for total and hexavalent chromium along with a standard mineral test. Total and hexavalent chromium were below the detection limits of 0.02 mg/l for the MW-19 sample. Total chromium was at the

detection limit and hexavalent was below the detection limit for MW-21. These levels are below the Federal and California drinking standard of 0.05 mg/l.

D. Groundwater Chemistry - Deep Aquifers

Groundwater samples from MW-18A and MW-20 were tested for total and hexavalent chromium along with a standard mineral analysis (see Appendix A). In addition, a duplicate sample from MW-20 was sent to a different laboratory as a quality control check. Results from MW-18A were at the detection limit for total chromium, (0.02 mg/l) and below the detection limit for hexavalent chromium. Initial results for MW-20 were 1.3 mg/l for total and 0.53 mg/l for hexavalent chromium. Because of the relatively high levels reported, the well was redeveloped and sampled again. Levels of 0.09 mg/l for total and 0.04 mg/l for hexavalent were reported. This is approximately a 10 to 15 times decrease in the level of chromium detected. Because of this large decrease, it is assumed that the chromium present was the result of cross contamination from the upper aquifer which possible occured during well construction. The additional development apparently flushed out some of the chromium contamination. It is assumed that additional developing will further reduce the amount of chromium to below significant levels.

E. Soil Chemistry

Four soil samples from B-22 and B-23 were analyzed for total chromium (see Appendix A). A range from 38 to 5200 mg/l was reported.

## IV. CONCLUSIONS

### A. Introduction

The conclusions reached are a result of the information gathered during this phase of work along with information gathered from earlier studies. The major conclusions made are:

- Definition of the horizontal extent of chromium contamination in the shallow aquifer, (see Plates 4 and 5).
- The deep aquifers near the site do not contain significant amounts of chromium,
- Soil contamination by chromium exists in the area of the former waste storage pit,
- Shallow and deeper aquifers do not appear to be interconnected.

### B. Shallow Aquifers

A shallow confined to semi-confined aquifer exists at the site. The aquifer exists at an approximate depth from 10 to 20 feet below ground surface and consists of a wide range of materials from clayey silts to clean sandy gravels. Results of groundwater measurements and pump test data indicate that the aquifer is interconnected within the study area. Chemical tests indicate that a well defined plume exists (see Plates 4 and 5) with the highest concentrations of chromium in the vicinity of the former chromium waste storage pit. The plume becomes more diffused as it moves down gradient with wells 1, 2, 6, 7, 8, 19 and 21 defining areas of uncontaminated waters.

C. Deep Aquifers

A number of confined, nonconnected aquifers exist below the layer of blue clay in the study area. Based on chemical analyses, chromium has not contaminated the lower aquifer(s). Concentrations measured in MW-20 appear to be the result of well construction cross contamination and should be considered as such.

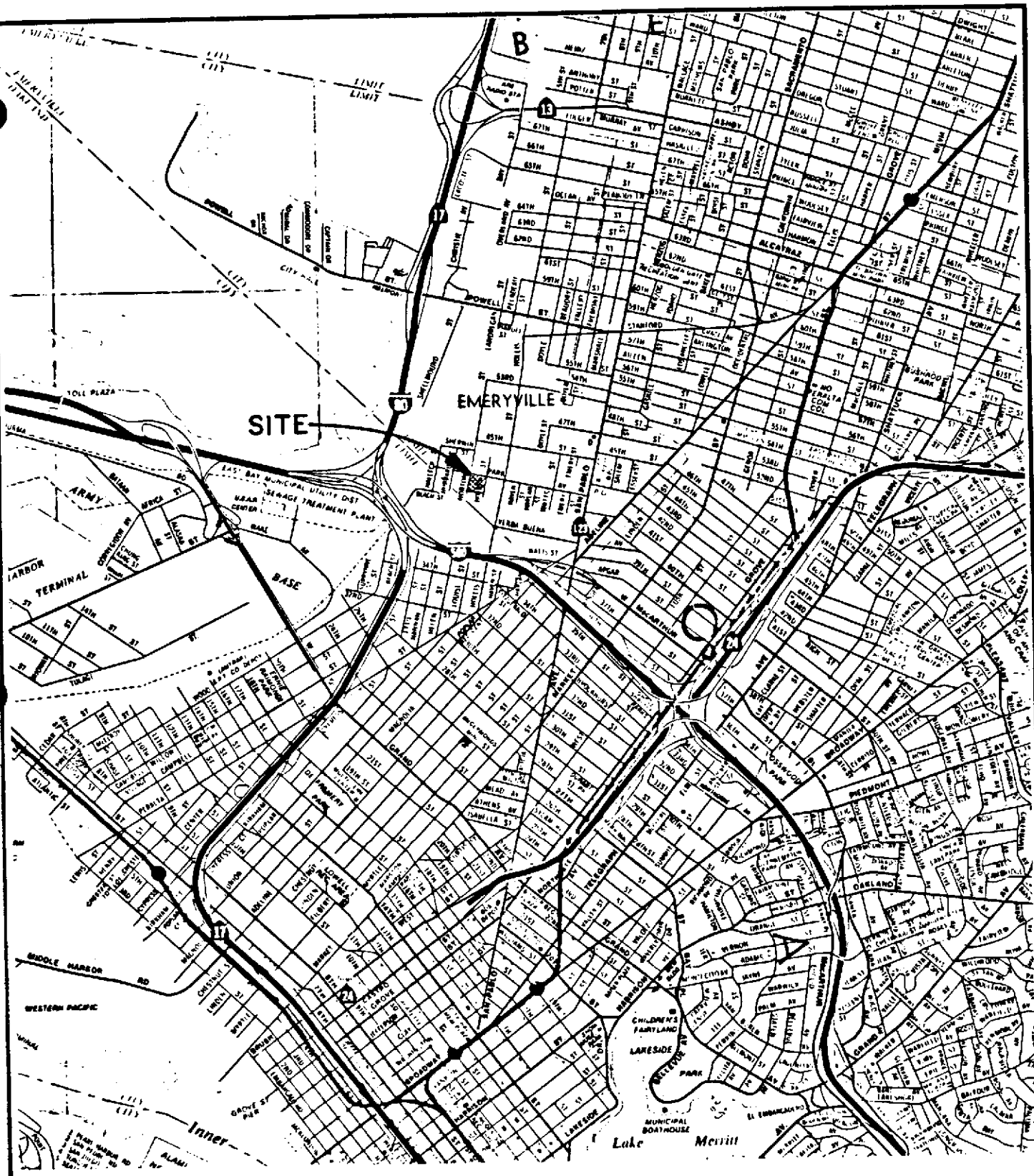
D. Soil Contamination

Significant concentrations of chromium exist in soils in the vicinity of the former chromium waste storage pit. The lateral and vertical extent are not defined.

## V. RECOMMENDATIONS FOR FUTURE WORK

- Drill and sample 6-8 borings in the vicinity of the former chromium waste pit with soil samples to be taken at 1, 3, 5, 8 and 10' and selected samples analyzed for total chromium to assess the extent of soil contamination,

- Redevelop and resample all existing monitoring wells for total and hexavalent chromium. Use field blanks and duplicates to separate laboratories for quality control.

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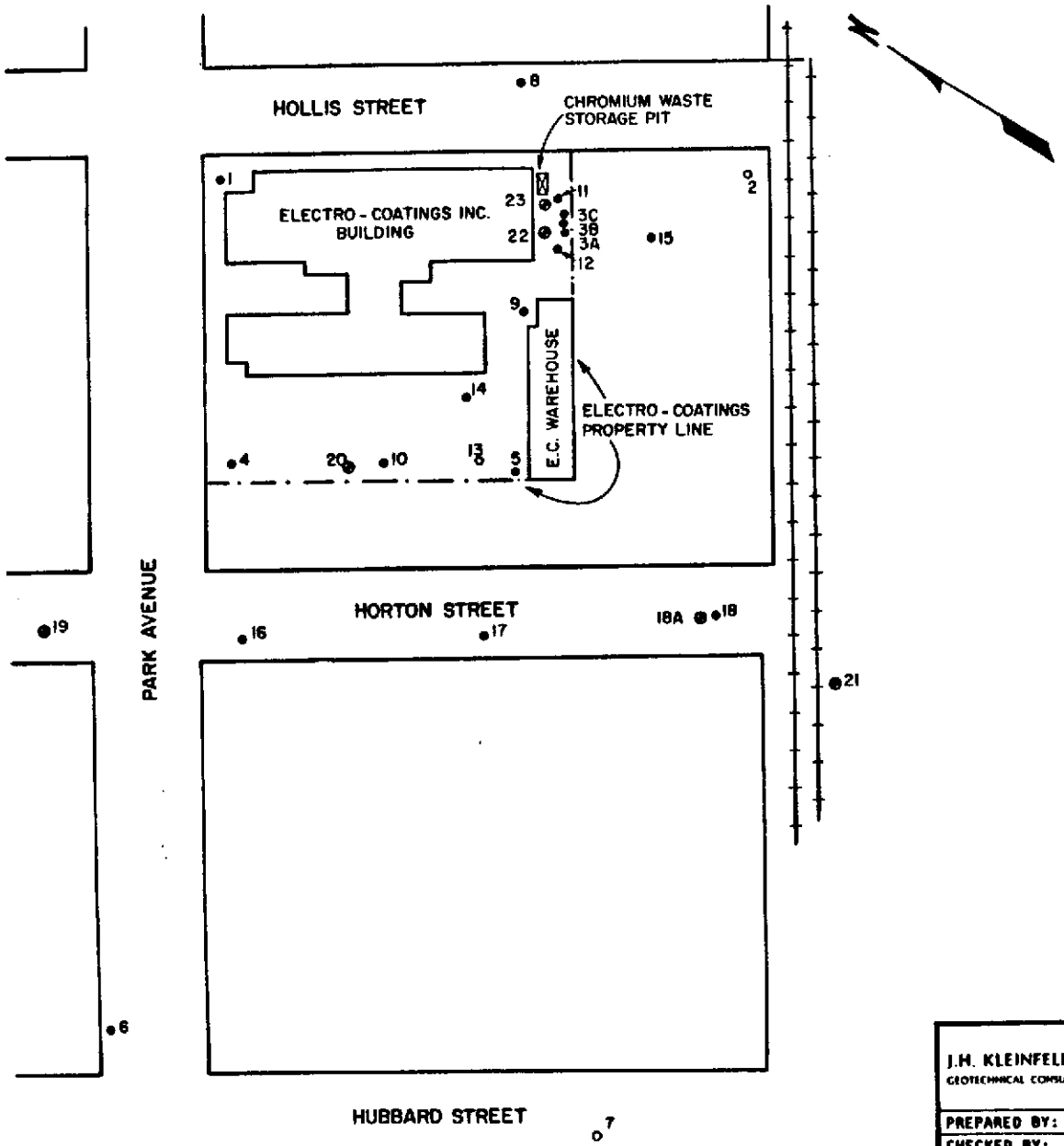
PROJECT NO. B-1132-4

ELECTRO-COATINGS INC.
EMERYVILLE, CALIFORNIA

LOCATION MAP

PLATE
1



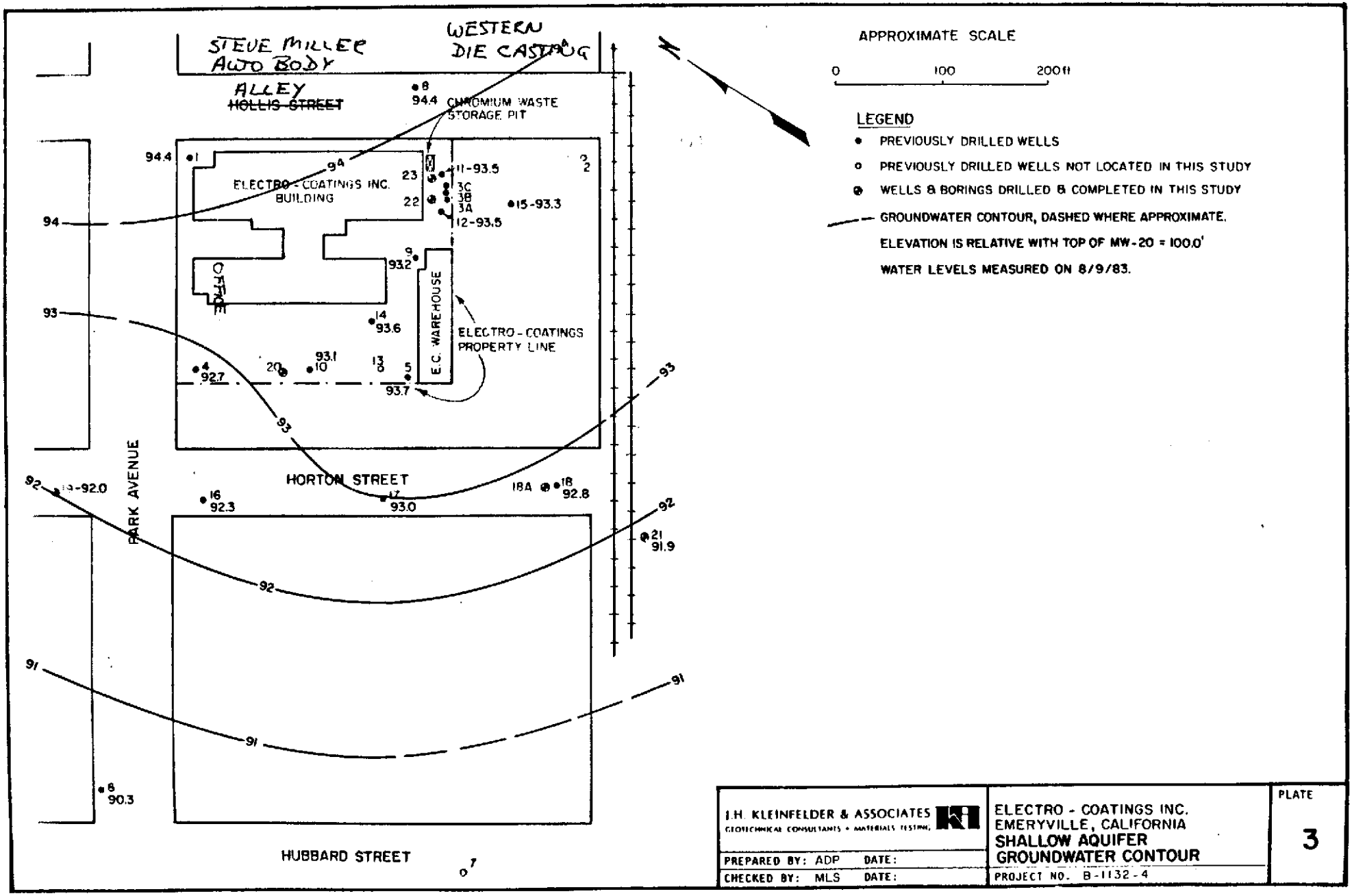

APPROXIMATE SCALE

0 100 200ft

LEGEND

- ● PREVIOUSLY DRILLED WELLS
- ○ PREVIOUSLY DRILLED WELLS NOT LOCATED IN THIS STUDY
- ● WELLS & BORINGS DRILLED & COMPLETED IN THIS STUDY

| | | |
|---|---|---|
| J.H. KLEINFELDER & ASSOCIATES<br>GEOTECHNICAL CONSULTANTS • MATERIALS TESTING | ELECTRO - COATINGS INC.<br>EMERYVILLE, CALIFORNIA<br>SITE PLAN | PLATE<br>2 |
| PREPARED BY: ADP DATE: | | |
| CHECKED BY: MLS DATE: | PROJECT NO. B-1132-4 | |

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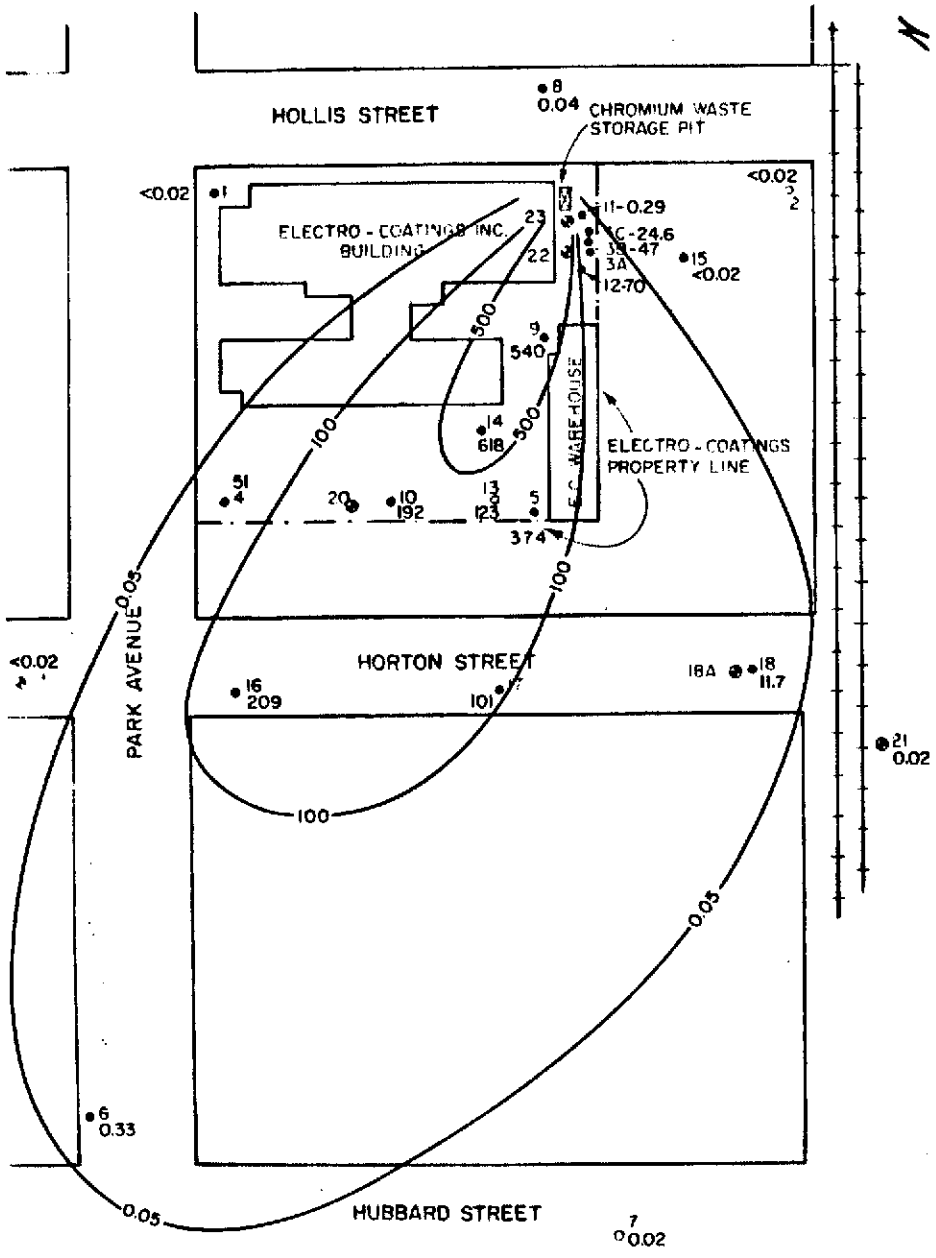
| J.H. KLEINFELDER & ASSOCIATES<br>GEOTECHNICAL CONSULTANTS • MATERIALS TESTING | ELECTRO - COATINGS INC.<br>EMERYVILLE, CALIFORNIA<br>**SHALLOW AQUIFER GROUNDWATER CONTOUR** | PLATE<br>**3** |
| PREPARED BY: ADP DATE: | | |
| CHECKED BY: MLS DATE: | PROJECT NO. B-1132-4 | |




APPROXIMATE SCALE

0 100 200ft

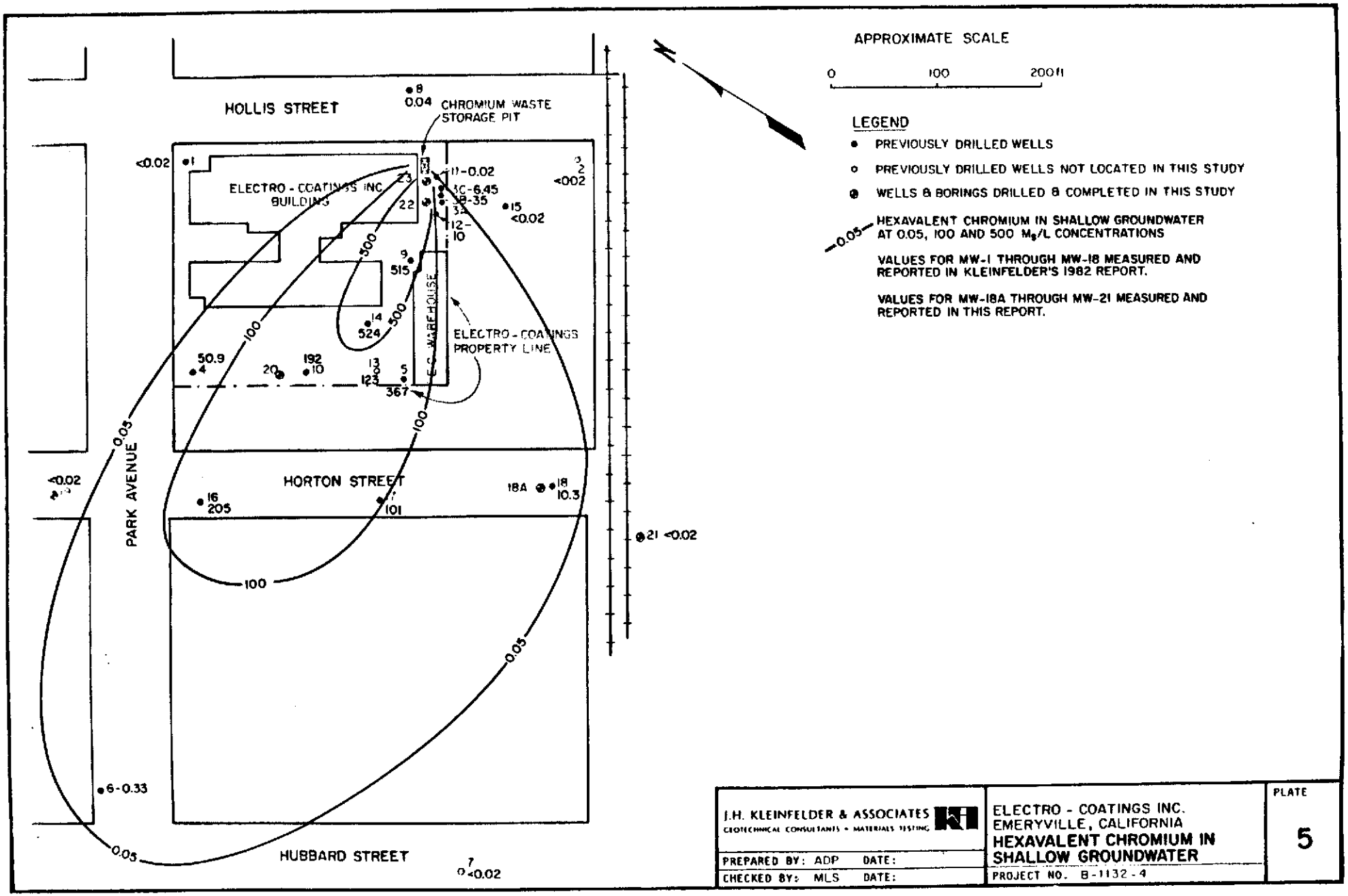
LEGEND

- ● PREVIOUSLY DRILLED WELLS
- ○ PREVIOUSLY DRILLED WELLS NOT LOCATED IN THIS STUDY
- ⊕ WELLS & BORINGS DRILLED & COMPLETED IN THIS STUDY
- 0.05 TOTAL CHROMIUM IN SHALLOW GROUNDWATER AT 0.05, 100 AND 500 $M_g/L$ CONCENTRATIONS

VALUES FOR MW-1 THROUGH MW-18 MEASURED AND REPORTED IN KLEINFELDER'S 1982 REPORT

VALUES FOR MW-18A THROUGH MW-21 MEASURED AND REPORTED IN THIS REPORT.

| | | |
|---|---|---|
| J.H. KLEINFELDER & ASSOCIATES<br>GEOTECHNICAL CONSULTANTS • MATERIALS TESTING | ELECTRO - COATINGS INC.<br>EMERYVILLE, CALIFORNIA<br>**TOTAL CHROMIUM IN SHALLOW GROUNDWATER** | PLATE<br>**4** |
| PREPARED BY: ADP DATE: | | |
| CHECKED BY: MLS DATE: | PROJECT NO. B-1132-4 | |

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| J.H. KLEINFELDER & ASSOCIATES<br>GEOTECHNICAL CONSULTANTS • MATERIALS TESTING | ELECTRO - COATINGS INC.<br>EMERYVILLE, CALIFORNIA<br>**HEXAVALENT CHROMIUM IN SHALLOW GROUNDWATER** | PLATE<br>5 |
| PREPARED BY: ADP DATE: | | |
| CHECKED BY: MLS DATE: | PROJECT NO. B-1132-4 | |

## UNIFIED SOIL CLASSIFICATION SYSTEM

| MAJOR DIVISIONS | | LTR | DESCRIPTION |
|---|---|---|---|
| COARSE GRAINED SOILS | GRAVEL AND GRAVELLY SOILS | GW | Well-graded gravels or gravel sand mixtures, little or no fines. |
| | | GP | Poorly-graded gravels or gravel sand mixture, little or no fines. |
| | | GM | Silty gravels, gravel-sand-clay mixtures. |
| | | GC | Clayey gravels, gravel-sand-clay mixtures. |
| | SAND AND SANDY SOILS | SW | Well-graded sands or gravelly sands, little or no fines. |
| | | SP | Poorly-graded sands or gravelly sands, little or no fines. |
| | | SM | Silty sands, sand-silt mixtures. |
| | | SC | Clayey sands, sand-clay mixtures. |

| MAJOR DIVISIONS | | LTR | DESCRIPTION |
|---|---|---|---|
| FINE GRAINED SOILS | SILTS AND CLAYS LL<50 | ML | Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity. |
| | | CL | Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays. |
| | | OL | Organic silts and organic silt-clays of low plasticity |
| | SILTS AND CLAYS LL>50 | MH | Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts |
| | | CH | Inorganic clays of high plasticity, fat clays. |
| | | OH | Organic clays of medium to high plasticity. |
| HIGHLY ORGANIC SOILS | | Pt | Peat and other highly organic soils. |


Standard penetration split spoon sample


Modified California Sampler


Shelby tube sample


Water level observed in boring

* No recovery

NFWE No free water encountered

NOTE: Blow count represents the number of blows of a 140-pound hammer falling 30 inches per blow required to drive a sampler through the last 12 inches of an 18-inch penetration.

NOTE: The line separating strata on the logs represent approximate boundaries only. The actual transition may be gradual. No warranty is provided as to the continuity of soil strata between borings. Logs represent the soil section observed at the boring location on the date of drilling only.

J.H. KLEINFELDER & ASSOCIATES
GEOTECHNICAL CONSULTANTS • MATERIALS TESTING

PREPARED BY: DATE:

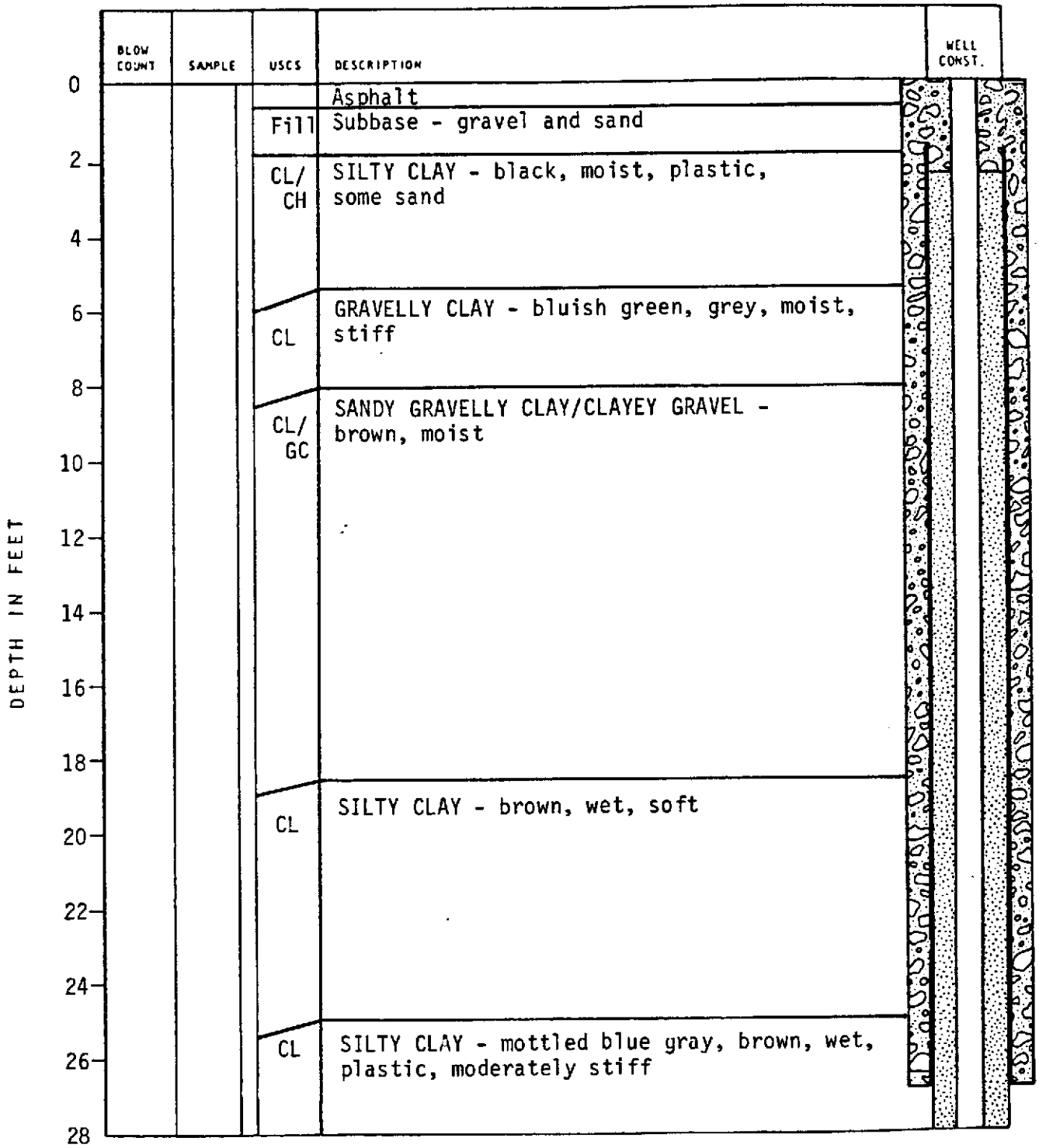
CHECKED BY: DATE:

ELECTRO-COATINGS INC.
EMERYVILLE, CALIFORNIA

**BORING LOG LEGEND**

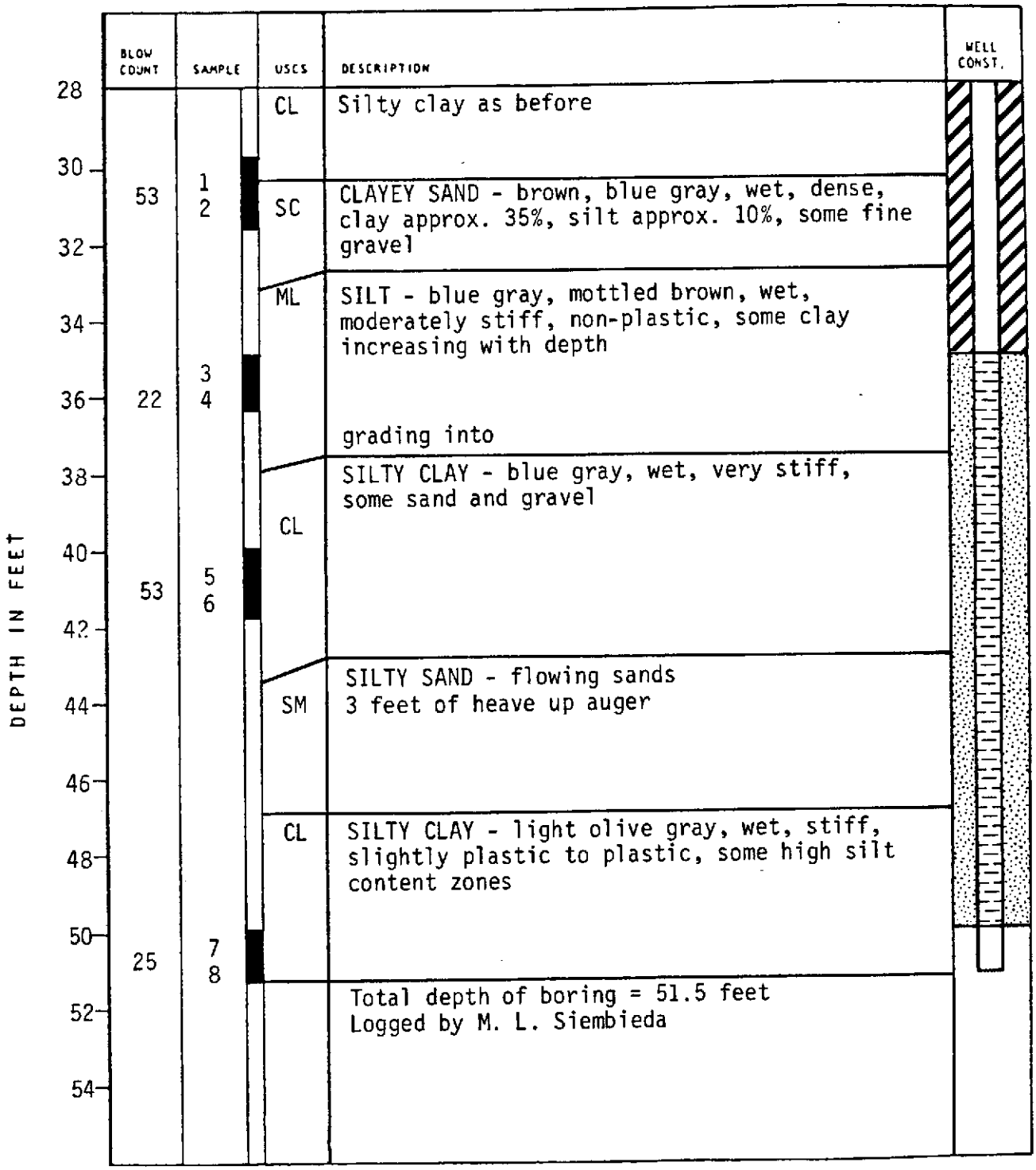
PROJECT NO. B-1132-4

PLATE 6




(1) 16" diameter hole drilled to 27', 10" casing set and annulus backfilled with bentonite/cement grout that was tremied in place.

| | | |
|---|---|---|
| J.H KLEINFELDER & ASSOCIATES<br>GEOTECHNICAL CONSULTANTS • MATERIALS TESTING | ELECTRO-COATINGS INC.<br>EMERYVILLE, CALIFORNIA<br>LOG OF BORING NO. 18A | PLATE<br>7 |
| PREPARED BY: AP DATE: 7/83<br>CHECKED BY: MLS DATE: 7/83 | PROJECT NO. B-1132-4 | |




J.H. KLEINFELDER & ASSOCIATES
GEOTECHNICAL CONSULTANTS • MATERIALS TESTING

PREPARED BY: AP DATE: 7/83

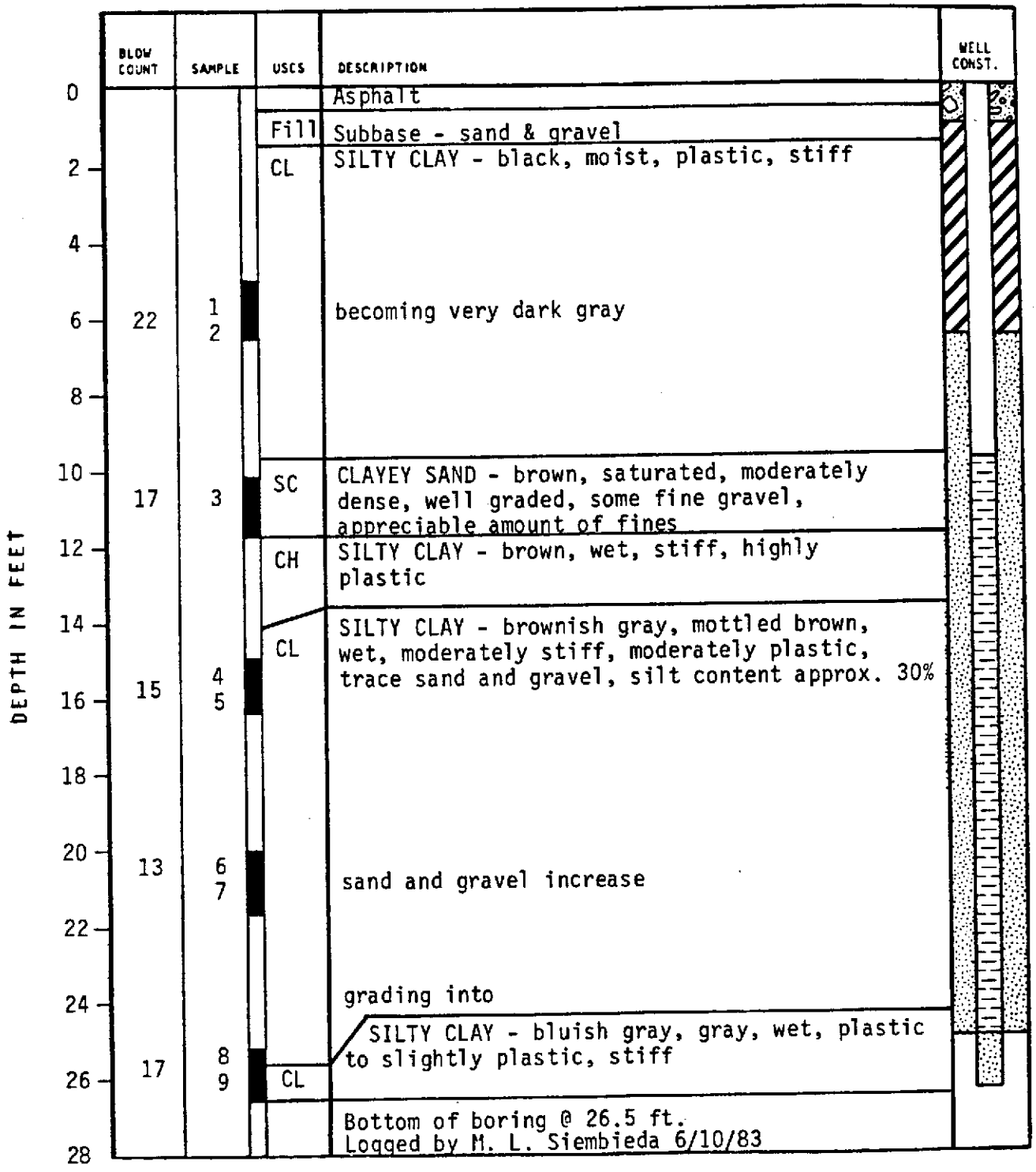
CHECKED BY: MLS DATE: 7/83

ELECTRO-COATINGS INC.
EMERYVILLE, CALIFORNIA

LOG OF BORING NO. 18A

PROJECT NO. B-1132-4

PLATE
7A

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PREPARED BY: AP DATE: 7/83

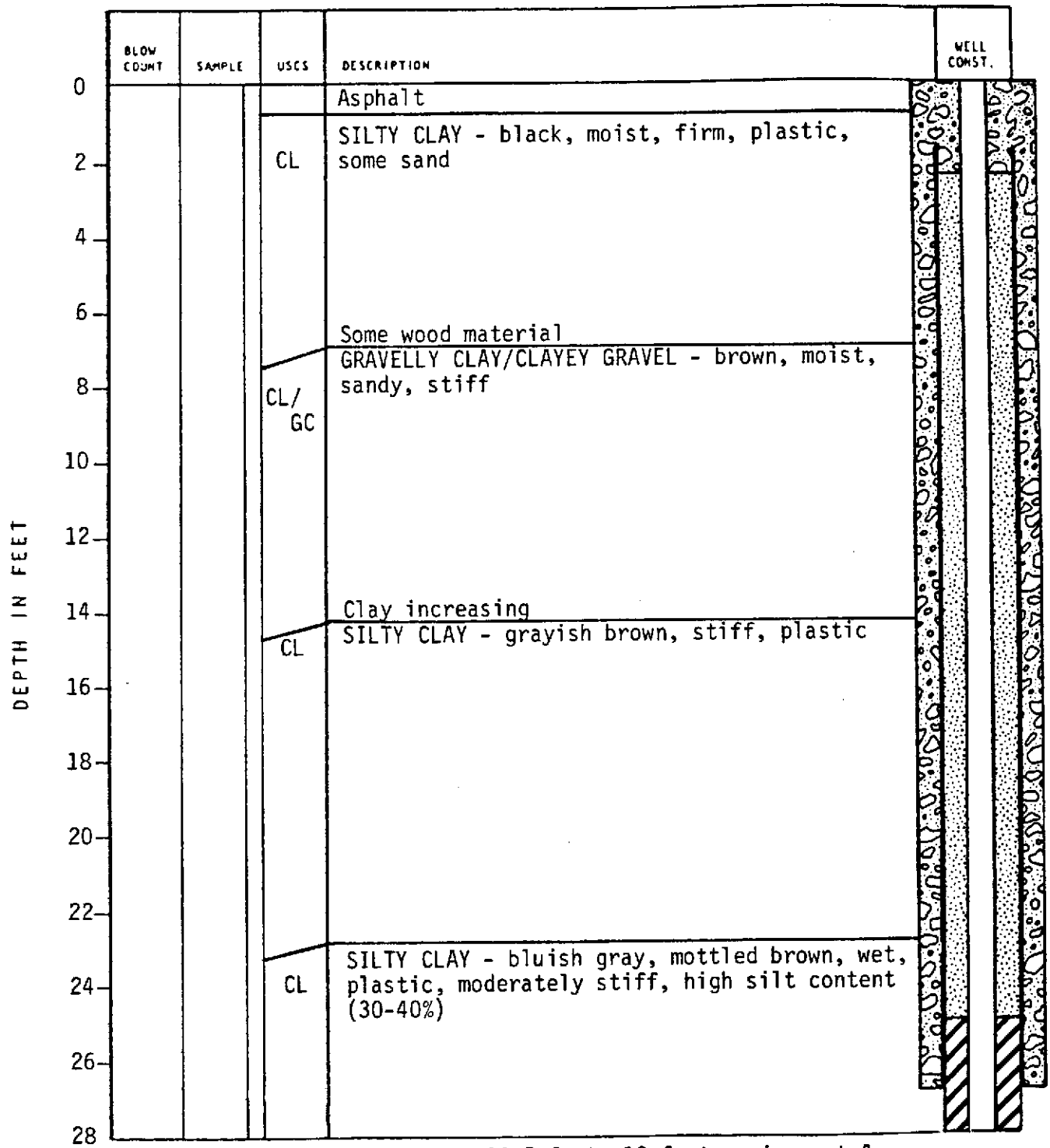
CHECKED BY: MLS DATE: 7/83

ELECTRO-COATINGS INC.
EMERYVILLE, CALIFORNIA

LOG OF BORING NO. 19

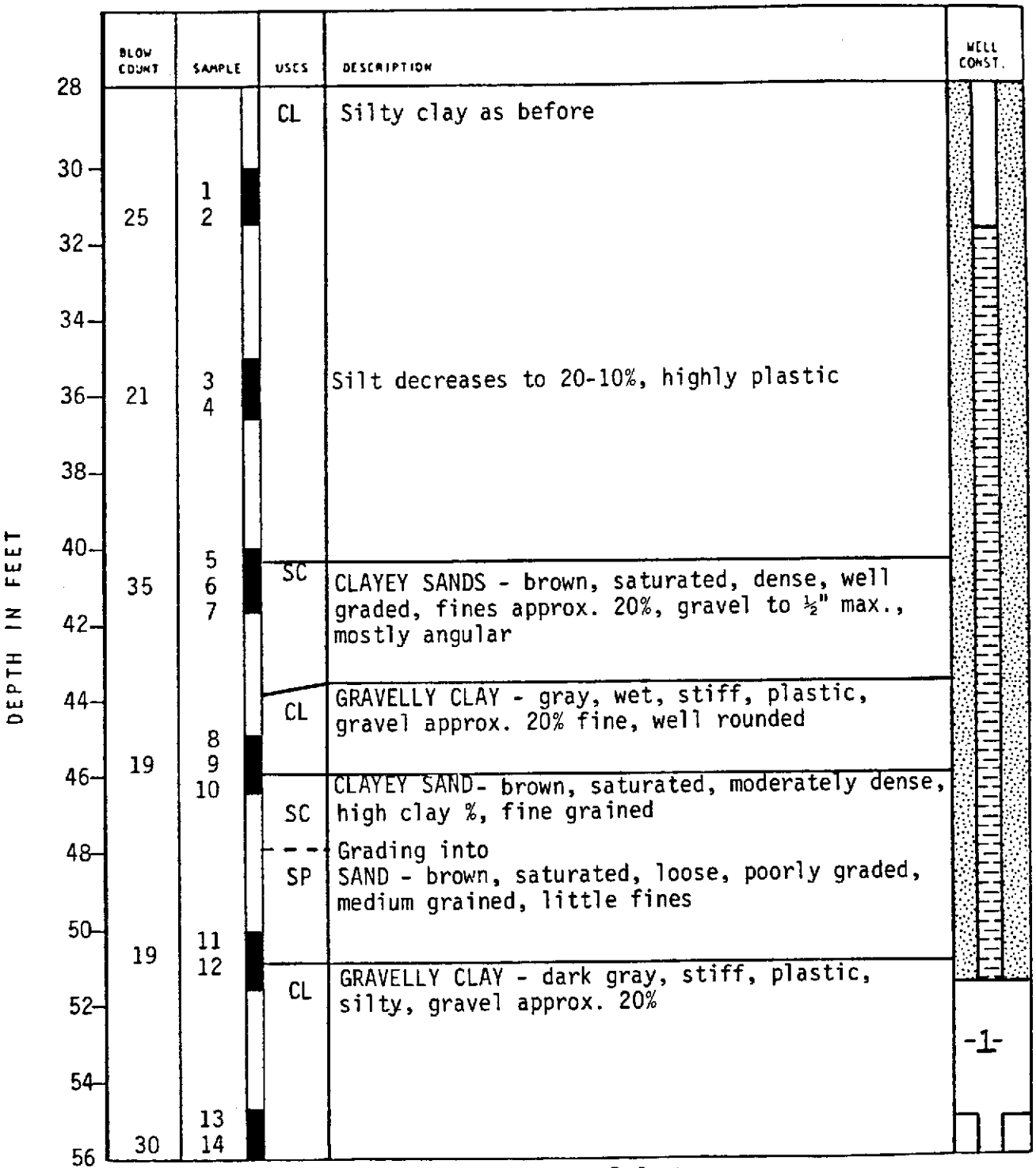
PROJECT NO. B-1132-4

PLATE 8




(1) 16" diameter hole drilled to 26.5 feet, 10 foot casing set & annulus backfilled with bentonite/cement grout that was tremied in place.

| | | |
|---|---|---|
| J.H KLEINFELDER & ASSOCIATES<br>GEOTECHNICAL CONSULTANTS • MATERIALS TESTING | ELECTRO-COATINGS INC.<br>EMERYVILLE, CALIFORNIA<br>LOG OF BORING NO. 20 | PLATE<br>9 |
| PREPARED BY: AP DATE: 7/83<br>CHECKED BY: MLS DATE: 7/83 | PROJECT NO. B-1132-4 | |




Bottom of boring @ 56.5 feet
Logged by M.L. Siembieda

(1) 3.5 feet of slough in hole.

J.H. KLEINFELDER & ASSOCIATES
GEOTECHNICAL CONSULTANTS • MATERIALS TESTING

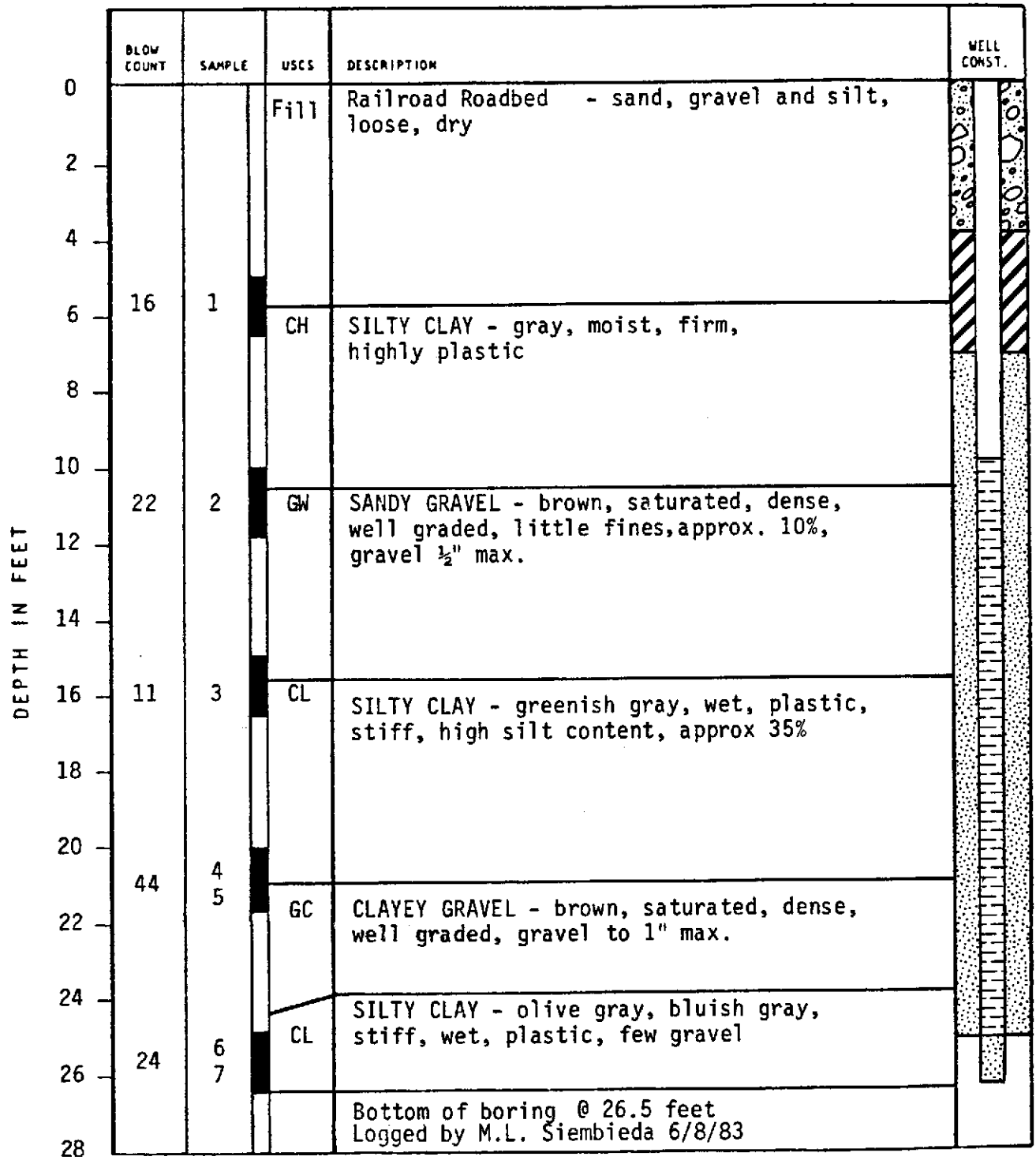
PREPARED BY: AP DATE: 7/83
CHECKED BY: MLS DATE: 7/83

ELECTRO-COATINGS INC.
EMERYVILLE, CALIFORNIA

LOG OF BORING NO. 20

PROJECT NO. B-1132-4

PLATE
9A




J.H. KLEINFELDER & ASSOCIATES
GEOTECHNICAL CONSULTANTS • MATERIALS TESTING

PREPARED BY: AP DATE: 7/83

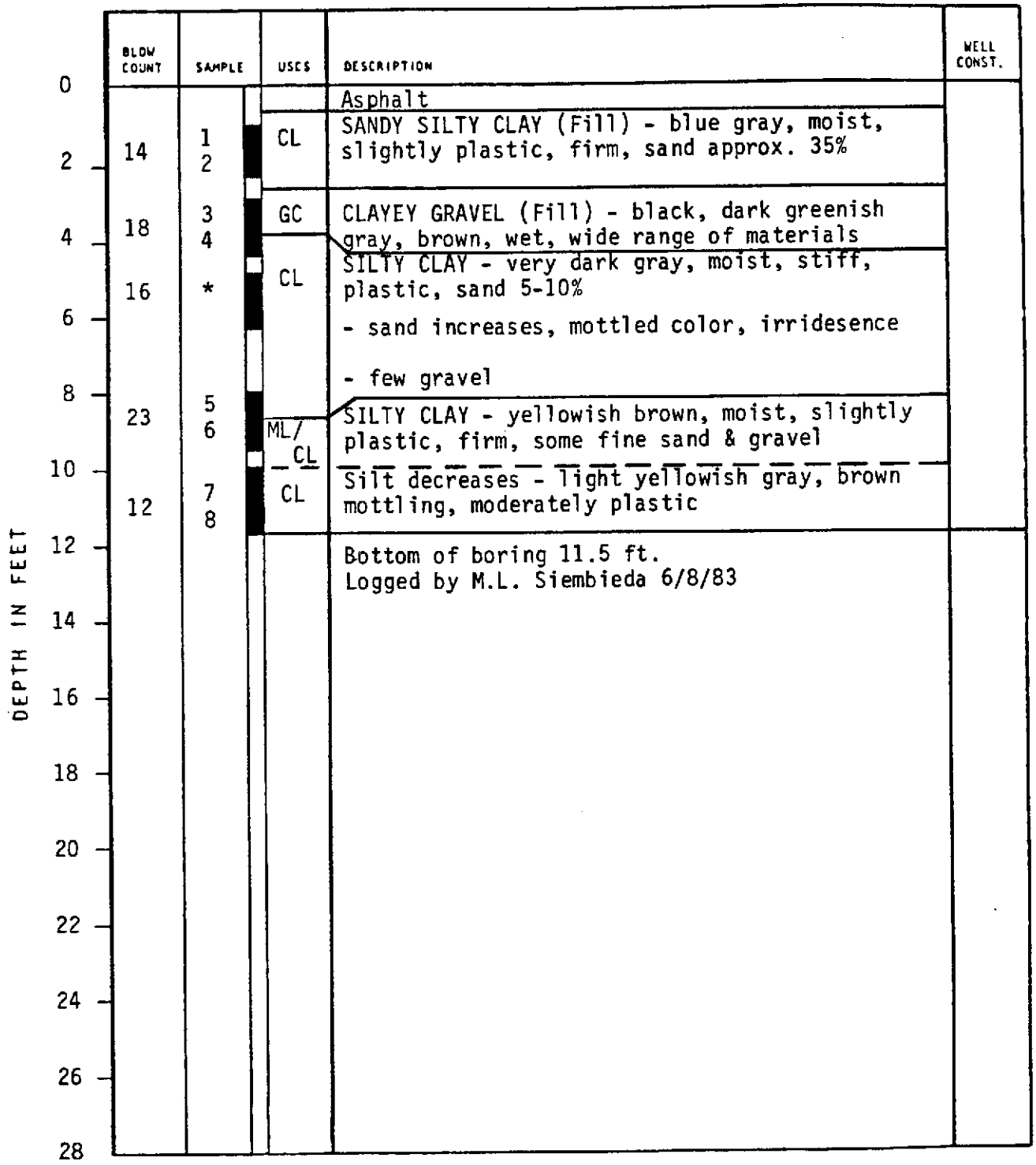
CHECKED BY: MLS DATE: 7/83

ELECTRO-COATINGS INC.
EMERYVILLE, CALIFORNIA

LOG OF BORING NO. 21

PROJECT NO. B-1132-4

PLATE 10




J.H. KLEINFELDER & ASSOCIATES
GEOTECHNICAL CONSULTANTS • MATERIALS TESTING

PREPARED BY: AP DATE: 7/83

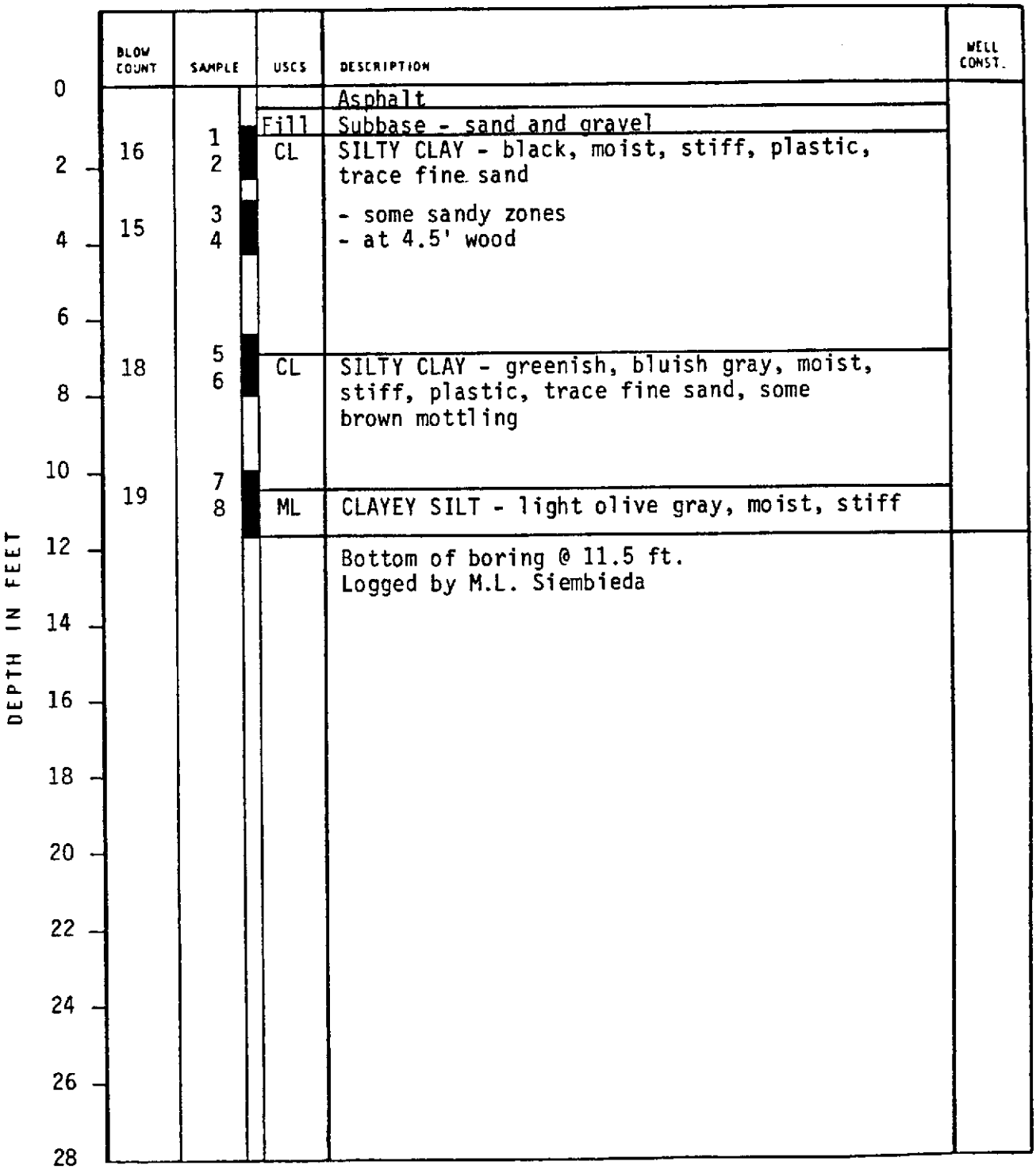
CHECKED BY: MLS DATE: 7/83

ELECTRO-COATINGS INC.
EMERYVILLE, CALIFORNIA

LOG OF BORING NO. 22

PROJECT NO. B-1132-4

PLATE 11




J.H KLEINFELDER & ASSOCIATES
GEOTECHNICAL CONSULTANTS • MATERIALS TESTING

PREPARED BY: AP DATE: 7/83

CHECKED BY: MLS DATE: 7/83

ELECTRO-COATINGS INC.
EMERYVILLE, CALIFORNIA

LOG OF BORING NO. 23

PROJECT NO. B-1132-4

PLATE 12

Anlab
ANALYTICAL LABORATORY
A DIVISION OF DEWANTE & STOWELL

1914 5 STREET, SACRAMENTO, CALIFORNIA 95814 • 916-447-2946

JULY 18, 1983
DATE SAMPLES REC'D: 6-22-83
REPORT #: 260982

KLEINFELDER & ASSOC.
1901 OLYMPIC BLVD.
WALNUT CREEK, CA 94596

ATTN: MIKE SIEMBIEDA



| ANALYSIS | W-MW18A-35[1] 82-2609-1 | W-MW19-20[1] 82-2609-2 | W-MW20-35[1] 82-2609-3 | W-MW21-20[1] 82-2609-4 |
|---|---|---|---|---|
| CHROMIUM, MG/L | 0.02 | <0.02 | 1.30 | 0.02 |
| HEXAVALENT CHROMIUM, MG/L | <0.02 | <0.02 | 0.53 | <0.02 |
| PH | 12.1 | 7.9 | 7.9 | 2.7 |
| ALKALINITY, MG/L AS $CaCO_3$ | 552 | 356 | 98 | < 1 |
| SPEC. COND., UMHO | 2400 | 840 | 520 | 3200 |
| NITRATE, MG/L AS N | 9.32 | 11.9 | 12.8 | 37.8 |
| CHLORIDE, MG/L | 30 | 20 | 30 | 69 |
| SULFATE, MG/L | 41 | 71 | 69 | 1100 |
| CALCIUM, MG/L | 186 | 60 | 42.4 | 222 |
| MAGNESIUM, MG/L | <0.01 | 42.8 | 16.0 | 133 |
| SODIUM, MG/L | 54 | 72 | 42 | 96 |
| POTASSIUM, MG/L | 6.05 | 1.64 | 1.92 | 1.80 |

1 SAMPLES FILTERED THROUGH 0.45 MICRON FILTER PRIOR TO ANALYSIS.

Anlab
ANALYTICAL LABORATORY
A DIVISION OF DEWANTE & STOWELL

1914 S STREET, SACRAMENTO, CALIFORNIA 95814 • 916-447-2946

JULY 18, 1983
REPORT #: 260982

KLEINFELDER & ASSOC.
ATTN: MIKE SIEMBIEDA



| SAMPLE DESCRIPTION | ANLAB ID # | CHROMIUM MG/KG |
|---|---|---|
| S-B22-4-41/2 * | 82-2609-5 | 5200 |
| S-B22-81/2-9 * | 82-2609-6 | 482 |
| S-B23-2-21/2 * | 82-2609-7 | 38.4 |
| S-B23-71/2-8 * | 82-2609-8 | 980 |

* WET WEIGHT.

DATA CERTIFIED BY Ken Nanka

REPORT APPROVED BY Roger Elliott

ANLAB/T. IKESAKI

SS

**GENERAL MINERAL ANALYSIS***

**BROWN AND CALDWELL**
CONSULTING ENGINEERS
**ANALYTICAL SERVICES DIVISION**
1255 POWELL STREET
EMERYVILLE, CA 94608
PHONE (415) 428-2300

Log No. E83-6-191-1

Date Sampled 6-21-83
Date Received 6-21-83
Date Reported 7-5-83

Reported To:
Mr. Michael Siembieda
J.H. Kleinfelder & Associates
1901 Olympic Boulevard, Suite 300
Walnut Creek, California 94596

cc.

Laboratory Director

mple Description JOB #B-1132-4: W-MW20-35

| Anions | Miligrams per liter | Milliequiv. per liter |
|---|---|---|
| Nitrate Nitrogen (as $NO_3$) | 47 | 0.76 |
| L..loride | 37 | 1.04 |
| [illegible] (as $SO_4$) | 85 | 1.77 |
| Bicarbonate (as $HCO_3$) | 110 | 1.80 |
| [illegible]rbonate (as $CO_3$) | 0 | 0 |
| Total Milliequivalents per Liter | | 5.37 |
| **Cations** | **Milligrams per liter** | **Milliequiv. per liter** |
| [illegible]dium | 46 | 2.00 |
| Potassium | 2.0 | 0.05 |
| [illegible]lcium | 43 | 2.15 |
| Magnesium | 14 | 1.15 |
| [illegible]tal Milliequivalents per Liter | | 5.35 |

| Determination | Milligrams per liter |
|---|---|
| Hydroxide Alkalinity (as $CaCO_3$) | 0 |
| Carbonate Alkalinity (as $CaCO_3$) | 0 |
| Bicarbonate Alkalinity (as $CaCO_3$) | 90 |
| Calcium Hardness (as $CaCO_3$) | 107 |
| Magnesium Hardness (as $CaCO_3$) | 57 |
| Total Hardness (as $CaCO_3$) | 164 |
| Iron | 1.3 |
| Manganese | 0.03 |
| Copper | < 0.01 |
| Zinc | 0.05 |
| Foaming Agents (MBAS) | ---- |
| Dissolved Residue, Evaporated @ 180°C | 355 |
| Specific Conductance, micromhos @ 25°C | 489 |

| Determination | Milligrams per liter |
|---|---|
| Chromium, hexavalent | 1.2 |
| Chromium, trivalent | 0.1 |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| pH | 8.2 |

*Conforms to Title 22, California Administrative Code (California Domestic Water Quality and Monitoring Regulations)

mls

Anlab
ANALYTICAL LABORATORY
A DIVISION OF DEWANTE & STOWELL

1914 S STREET, SACRAMENTO, CALIFORNIA 95814 • 916-447-2946

AUGUST 12, 1983
DATE SAMPLE REC'D: 8-11-83
REPORT #: 100108

KLEINFELDER & ASSOC.
1910 OLYMPIC BLVD.
WALNUT CREEK, CA 94596

ATTN: RICHARD ZIPP

| ANALYSIS | B-1132-4<br>W-MW20-40<br>100108-1 |
|---|---|
| TOTAL CHROMIUM, MG/L | 0.09 |
| HEXAVALENT CHROMIUM, MG/L | 0.04 |

DATA CERTIFIED BY Ken Namla

REPORT APPROVED BY Roger Elliott

ANLAB/T. IKESAKI

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