# APPENDIX A.

# SITE HISTORY AND INVESTIGATION RESULTS

This appendix presents the history and investigations results at the Folsom Corporation Yard Landfill (Site) located at 1300 Leidesdorff Street in Folsom, California. From December 1985 through February 2008, the City of Folsom conducted the following investigation and monitoring activities:

- Drilled 12 exploratory borings;
- Installed 11 temporary landfill gas test probes;
- Installed nine groundwater wells for periodic monitoring;
- Installed six landfill gas wells for periodic monitoring;
- Excavated 43 exploratory test pits; and
- Collected over 180 groundwater samples, 150 landfill gas samples, and 20 soil samples for analysis.

The locations of investigation borings, landfill gas test probes, monitoring wells, and test pits are shown on Figure A-1 and logs are provided in Attachment A-1. References cited in this appendix are provided in Section 7.0 of the main report.

**Late 1800s to Early 1900s Gold Dredging**
During the late 1800s to early 1900s, the general area of the Site was dredged for gold.

**1950s to 1970s Sewage Treatment Plant Operations**
In the 1950s, the City constructed a sewage treatment plant at the Site. The plant treated City sewage through the early 1970s. The plant included an aeration pond and settling ponds. The aeration pond measured approximately 200 feet in diameter and 16 feet deep. The settling ponds measured approximately 600 feet long by 200 feet wide and 7 feet deep. The ponds were reportedly lined with a plastic liner covered with a 12-inch thick layer of clay.

**1974 to 1986 Landfill Operations**
In 1974, the landfill operation began within the berms of the former sewage treatment plant ponds and continued through the spring of 1986. During the course of converting the ponds to a landfill, the clay liner was perforated to avoid flooding the landfill in the wet season.

When the landfill was in operation, all vehicles unloading at the Site were owned and operated by the City with City-employed crews. The landfill was open to receive wastes from 7:00 a.m. to 3:30 p.m., Monday through Friday, except on days when inclement weather prohibited access. A paved road led to the Corporation Yard from the City, while a dirt road led to the landfill from the Corporation Yard. The road became impassible during heavy rains. Part of the

Corporation Yard was surrounded by a chain-link fence with two gates leading to the landfill which were locked every night at 3:30 p.m. The only normal vehicular access to the landfill was through the Corporation Yard. The landfill itself was not fenced and was accessible by foot and off-road vehicles.

No formal records were kept on the type or quantity of fill. According to interviews with City employees, waste deposited in the landfill consisted of: construction and demolition debris including earth, asphalt, rock, concrete, wood, and metal items; garden and yard prunings and clippings including tree limbs, stumps, and leaves; and street litter including rocks, glass, and plastic items. Portions of the defunct sewage treatment plant (e.g., the concrete clarifier tank) may have been demolished and placed in the landfill. Employees reported that no hazardous or toxic wastes were placed in the landfill. Public neither dumping nor salvaging activities were allowed. Municipal garbage from the Folsom area was disposed at the County of Sacramento landfill. City employees estimated that the average daily quantity placed in the landfill was 5 to 10 $yds^3$. This amount varied due to the seasonal occurrence of the material placed in the landfill (e.g., construction debris, tree trimmings).

Pushup and compaction occurred two to three times per week. Material used for cover included construction debris, asphalt, and excess construction soil. The cover was compacted in an 18- to 24-inch thick layer. Equipment used for pushup, cover, and compaction consisted of a front-end loader with a 3-yard bucket and a D-7 Cat.

In February 1978, the landfill was permitted by the California Integrated Waste Management Board (CIWMB) Permit No. 34-AC-001 and the California Regional Water Quality Control Board (RWQCB) Waste Discharge Requirements Order No. 78-20. The landfill was monitored by the County of Sacramento Environmental Management Department as the local enforcement agency (LEA).

**1985-1986 Preliminary Geotechnical Investigation**

During December 1985 to January 1986, Brown and Caldwell/Kleinfelder performed a preliminary geotechnical investigation of the landfill (Brown and Caldwell, 1986; Kleinfelder, 1986). The purpose of the investigation was to evaluate general soil conditions and provide preliminary recommendations for Site redevelopment. Seven borings (B-1 through B-7) were drilled to depths from 5 to 15 feet below ground surface (bgs). Three borings were drilled to depths from 21 to 70 feet and were converted to monitoring wells (FCY-1 through FCY-3). Groundwater was encountered at a depth of about 20 feet bgs although some water was perched within the landfill at about 5 feet bgs. The depth of waste in the landfill was estimated at 7 to 11 feet bgs. In addition to the exploratory borings, 11 landfill gas test probes (FG-1 through FG-11) were drilled and temporarily left open to obtain methane samples. As shown in the following table, methane was detected from 0 to 35% in test probes FG-1 through FG-7

collection and control system, an air monitoring schedule, and a quarterly groundwater monitoring schedule were outlined in the closure plan. It was stated that the groundwater monitoring would be conducted on a quarterly basis for the two years following the landfill closure, with annual monitoring continuing for the next five years providing that no significant change in chemical parameters occurred.

**1992 Monitoring and Reporting Program**

In November 1992, a Water Quality Monitoring and Response Program was developed for the Landfill and approved by the RWQCB in June 1993 in response to the requirements of revised Article 5 of Chapter 15 of Division 3 of the California Code of Regulations. Under the program, the installation of three additional groundwater monitoring wells (FCY-4 through FCY-6) and a semi-annual monitoring schedule for general minerals, chemical oxygen demand (COD) and nickel were proposed. In May 2001, groundwater monitoring well FCY-1 was abandoned because it was completed above the typical groundwater elevation and was dry during multiple sampling attempts. Waivers for surface water and vadose zone sampling were requested. A waiver from vadose zone sampling from beneath the Landfill was granted by the RWQCB on June 8, 1993.

**1993 Amendment to Final Closure Plan**

In August 1993, the Final Closure Plan was amended to specify a smaller, single-level parking lot and re-vegetated open space for the landfill (Brown and Caldwell, 1993). In addition, the amendment specified semi-annual surface water sampling using the same monitoring parameters for the groundwater. Six gas monitoring wells were proposed to be installed for a perimeter monitoring network.

In December 1993, a Final Amendment to Final Closure Plan and to Letter of Modification was completed and approved by the County on January 21, 1994 and the California Integrated Waste Management Board (CIWMB) on February 1, 1994. The locations of the previously proposed six gas monitoring wells were amended and a semi-annual gas monitoring schedule was added. A waiver from leachate control and monitoring was requested.

**1994 Investigation**

In January 1994, Brown and Caldwell performed further investigation. During this investigation three additional monitoring wells (FCY-4 through FCY-6) were installed around the perimeter of the landfill and six landfill gas monitoring wells (GAS-1 through GAS-6) were installed through and near the landfill. The semi-annual groundwater sampling of five groundwater monitoring wells (FCY-2 through FCY-6) began mid-1994 (Brown and Caldwell, 1994).

**1996 Landfill Cap Construction**

In July 1996, the landfill cap was constructed that consists of three layers totaling approximately 4 feet:

- 12-inch vegetative soil layer;
- 12-inch clay layer; and
- 24-inch foundation layer.

The northern portion of the landfill cap features a 180-foot by 240-foot parking lot for City employee parking. The landfill cap in this area consists of four layers totaling approximately 4 feet:

- 2.5-inch asphalt concrete Type B;
- 10-inch aggregate base rock Class 2;
- 12-inch clay layer; and
- 24-inch foundation layer.

**2000 Geotechnical Investigation**

In October 2000, Brown and Caldwell/Kleinfelder conducted a geotechnical and environmental evaluation of the landfill as part of a study to evaluate remedial alternatives for the Site (Brown and Caldwell, 2001c; Kleinfelder, 2000). Under this investigation, four large-diameter (3-foot) borings (BA-1 through BA-4) were drilled and 24 test pits (TP-1 through TP-24) were excavated to assess the nature and extent of the fill, determine geotechnical parameters, and provide engineering cost estimates.

It appeared that fill extended past the former wastewater treatment plant lagoons to the north and south. In general, mostly soil fill with construction debris was found throughout. The debris in the main landfill area consisted of green waste and construction debris, the debris in the clarifier area consisted of mostly concrete and asphalt, and the debris in the uncontrolled fill area contained concrete, asphalt, newspapers, carpet and tires. The maximum depth of fill was determined to be 12 feet bgs.

Soil samples were collected from the test pits for chemical analysis of:

- Metals (CAM 17 list);
- Total petroleum hydrocarbons in the diesel range (TPH-d) and motor oil range (TPH-mo);
- Volatile organic compounds (VOCs);
- Semi-volatile organic compounds (VOCs);
- Chlorinated herbicides; and
- Organochlorine pesticides.

Samples were not obtained from the borings as they were used for observation purposes only. Analytical results indicated non-detectable or background levels of all measured constituents with the exception of TPH-d and TPH-mo. The samples were collected in fill that contained debris, some of which contained significant amounts of asphalt. All of the samples exhibited TPH-mo

concentrations ranging from 180 to 2,200 milligrams per kilogram (mg/kg). According to the laboratory, the chromatograms for these samples indicate that they are not typical of motor oil and may be indicative of asphalt.

One soil sample was collected at 3 feet below grade from test pit TP-13 outside the main landfill area and tested for geotechnical properties. The soil material description was brown sandy gravel with clay. The plasticity index was 16 while the liquid limit was 33. Based on plasticity charts for the classification of fine-grained soils, this soil had low plasticity.

Two closure options were evaluated: off-site disposal and segregation/reuse with selected off-site disposal. The total volume of fill was estimated from 50,000 to 70,000 $yds^3$. The approximate volume fill for each area was estimated:

- Clarifier demolition debris – 5,000 to 7,000 $yds^3$;
- Capped landfill – 38,000 to 53,000 $yds^3$; and
- Uncontrolled fill – 7,000 to 10,000 $yds^3$.

**2001 Revised MRP**

A new groundwater monitoring well, FCY-7, was constructed on May 8 and 9, 2001. FCY-7 was installed at the direction of the RWQCB, to provide an upgradient background well. In September 2001, the RWQCB prepared the Revised MRP No. 95-246. In June 2002, FCY-8 and FCY-9 installed. Original location for FCY-9 was abandoned.

**2006 Investigation**

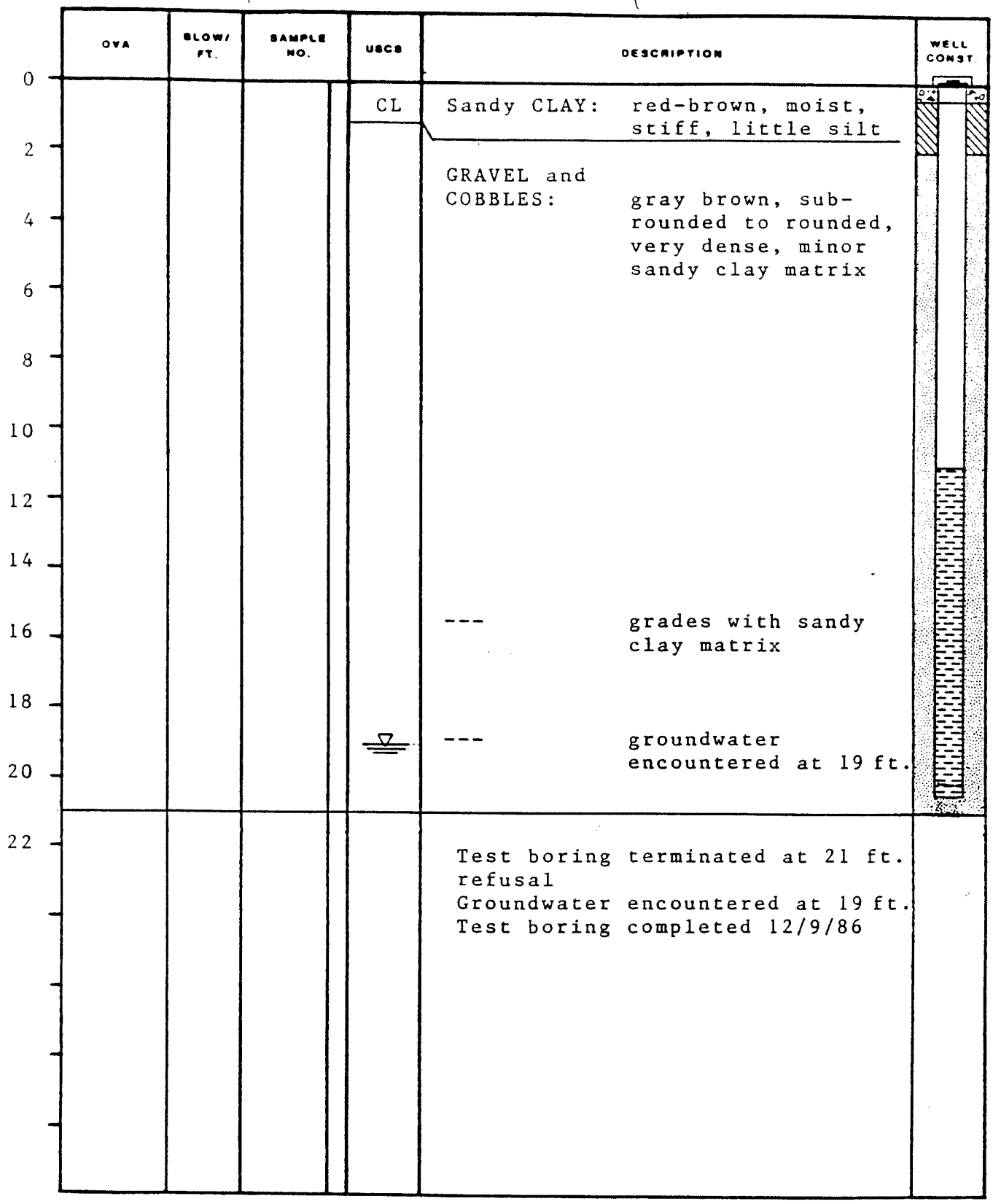
In April 2006, Brown and Caldwell excavated eight test pits (TPA-1 through TPA-8) to further define the extent of fill primarily in the uncontrolled fill area (Brown and Caldwell, 2006). The test pits confirmed that the uncontrolled fill area contains inert household type waste to a depth of 8 feet bgs. Items observed in the test pits included tires, asphalt, concrete, metal, plastic, glass, rubber, and some burn ash. No odors or staining were noted during the field activities.

**2008 Pre-Design Investigation**

In February 2008, Brown and Caldwell conducted a pre-design investigation (Brown and Caldwell, 2008a). The objectives of the investigation were to:

- Provide additional soil and solid waste data that would assist in estimating volumes of material that requiring removal during clean closure; and

- Assess levels of naturally occurring metals within soils outside areas affected by the landfill operations for use in developing cleanup goals for clean closure.



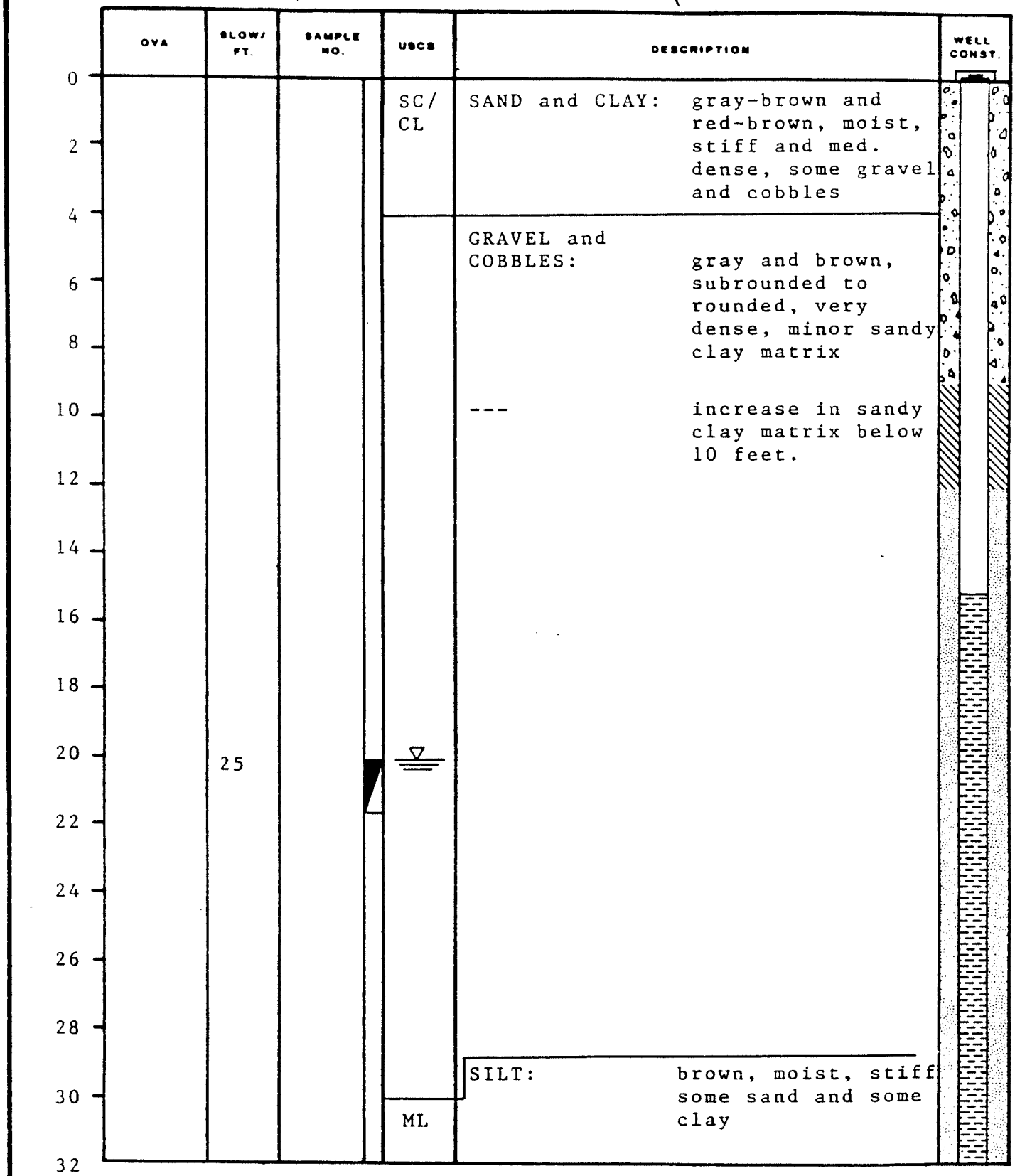

J.H. KLEINFELDER & ASSOCIATES
GEOTECHNICAL CONSULTANTS • MATERIALS TESTING
LAND AND WATER RESOURCES

PROJECT NO. A-2737-1

LOG OF BORING NO. FCY-1

CITY OF FOLSOM CORPORATION YARD

PLATE 3

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LAND AND WATER RESOURCES

PROJECT NO. A-2737-1

LOG OF BORING NO. FCY-2
CITY OF FOLSOM CORPORATION YARD

PLATE
4

| OVA | BLOW/ FT. | SAMPLE NO. | USCS | DESCRIPTION | WELL CONST. |
|---|---|---|---|---|---|
| | | | ML | | |
| | | | | Test boring terminated at 35 ft.<br>Groundwater encountered at 20ft.<br>Test boring completed on 12-11-86 | |

32

34

36

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LAND AND WATER RESOURCES

PROJECT NO. A-2737-1

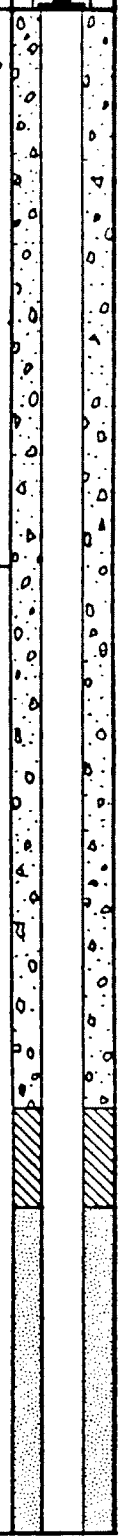
LOG OF BORING NO. FCY-2

CITY OF FOLSOM CORPORATION YARD

PLATE 5

| OVA | BLOW/ FT. | SAMPLE NO. | USCS | DESCRIPTION | WELL CONST. |
|---|---|---|---|---|---|
| | | | ML/ GP | Clayey SILT and GRAVEL: brown and gray, moist, dense, some fine sand | |
| | | | | GRAVEL AND COBBLES: gray and brown, sub-angular to subrounded sand matrix | |
| | | | | --- Increase in sand matrix from 6 to 8 ft | |
| | | | CL | Silty CLAY: light brown, moist, very stiff, trace fine sand | |
| | | | CL | CLAY: gray, moist, stiff some silt, trace fine sand | |

0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32



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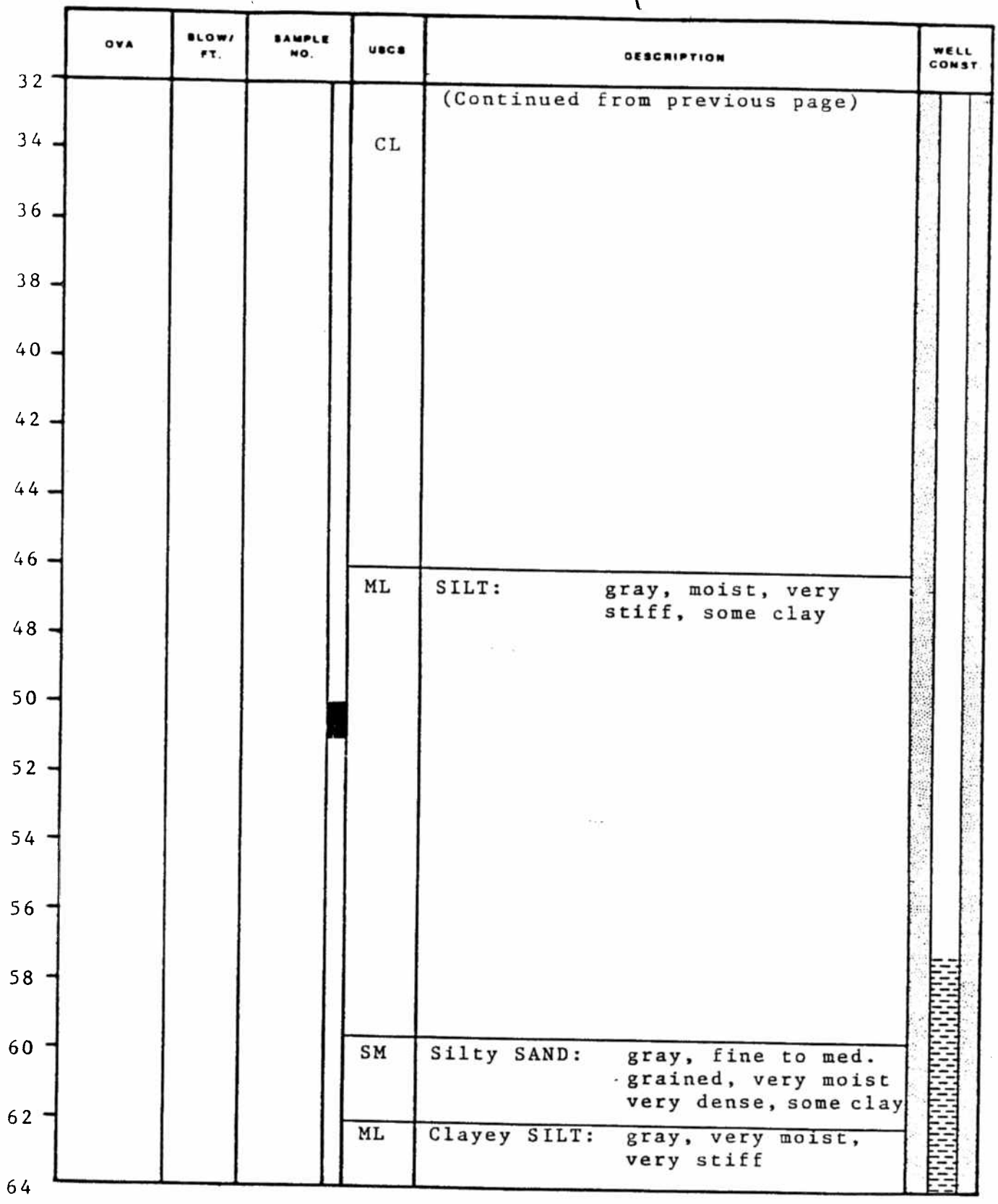
LAND AND WATER RESOURCES

PROJECT NO. A-2737-1

LOG OF BORING NO. FCY-3

CITY OF FOLSOM CORPORATION YARD

PLATE 6

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LAND AND WATER RESOURCES

PROJECT NO. A-2737-1

LOG OF BORING NO. FCY-3

CITY OF FOLSOM CORPORATION YARD

PLATE 7

| | OVA | BLOW/ FT. | SAMPLE NO. | USCS | DESCRIPTION | WELL CONST. |
|---|---|---|---|---|---|---|
| 64 | | | | SC | Clayey SAND: gray, fine to med., saturated dense | |
| 66 | | | | | | |
| 68 | | 50/1" | * | | Silty SANDSTONE: gray, very dense | |
| 70 | | | | | Test boring terminated at 70 ft. Groundwater level not stabilized Test boring completed 12/10/85 | |
| 72 | | | | | | |

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LAND AND WATER RESOURCES

PROJECT NO. A-2737-1

LOG OF BORING NO. FCY-3

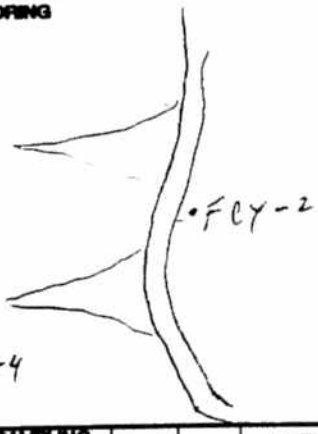
CITY OF FOLSOM CORPORATION YARD

PLATE 8

Brown and Caldwell Consultants

# BOREHOLE/WELL LOG

LOCATION OF BORING




| | |
|---|---|
| CLIENT | Folsom Corp. Yard Landfill |
| LOCATION | Folsom |
| JOB NO. | 6320 |
| BORING NO. | FCY-4 |
| SHEET | 1 OF 2 |

| WATER LEVEL | AT TIME OF DRILLING | SECOND | THIRD | FOURTH |
|---|---|---|---|---|
| TIME | 14:00' | 10.46' | | |
| DATE | 1/21/94 Wrong | 1/21/94 | | |

| DRILLING | START | FINISH |
|---|---|---|
| TIME | 9:05 | 3:00 PM |
| DATE | 1/20/94 | 1/20/94 |

| WELL CONSTR. | START | FINISH |
|---|---|---|
| TIME | 2:00 | 12:30 |
| DATE | 1/20/94 | 1/21/94 |

DRILLING CONTRACTOR Weeks Drilling.

RIG TYPE Schramm - Rotadrill

DRILLING METHOD, FLUID USED Air rotary, casing hammer

SOIL SAMPLING METHOD

SURFACE ELEV.

MONITORING INSTRUMENT Gastech #12145

SURFACE CONDITIONS Rocky.

DESCRIPTION: Group Name, Moisture, Color, Consistency, Density, Other

DRILLER Bob

DATE

CHECKED BY

DATE 1/20/94

LOGGED BY W. McConihe

| WELL CONSTRUCTION: CASING | WELL CONSTRUCTION: ANNULUS | SOIL SAMPLING: SAMPLER TYPE | SOIL SAMPLING: BLOWS/6" INTERVAL | SOIL SAMPLING: INTERVAL SAMPLED | SOIL SAMPLING: RECOVERY | SOIL SAMPLING: ANALYTICAL SAMPLE | DEPTH IN FEET | INSTRUMENT READING (ppm) | ESTIMATED PERCENT: GRAVEL | ESTIMATED PERCENT: SAND | ESTIMATED PERCENT: FINES | MUNSELL COLOR NO. | USCS GROUP SYMBOL | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4' Solid PVC sch. 40 | Bentonite cement grout | | | | | | 0 | | | | | | GP/C | Many volcanic (fine grained) + granitic gravels, cobbles and boulders. Switch to steel casing |
| | Bentonite Pellet | | | | | | 1 | | | | | | | Boring logged from cuttings |
| | | | | | | | 2 | | | | | | | |
| | | | | | | | 3 | | | | | | | |
| | | | | | | | 4 | | | | | | | |
| | | | | | | | 5 | | | | | | | |
| | | | | | | | 6 | | | | | | | |
| | | | | | | | 7 | | | | | | | |
| | | | | | | | 8 | | | | | | | |
| | | | | | | | 9 | | | | | | | |
| | | | | | | | 10 | | | 5 | 95 | 2.5Y 5/4 | CL | Silty clay, damp to very damp, olive brown, firm to stiff moderately plastic, micaceous, some red-brown streaks, logged from cuttings, contacts from driller |
| | | | | | | | 1 | | | | | | GP | Hard boulder @ 12' |
| | | | | | | | 2 | | | | | | | |
| | | | | | | | 3 | | | | | | | |
| | | | | | | | 4 | | | | | | | |
| 4" PVC sch. 40 w/ 0.020" slots | | | | | | | 5 | | | 20 | 80 | 2.5Y 4.5/4 | CL | Clay, damp olive brown, firm, moderately plastic, micaceous some silt, logged from cuttings many sand grains |
| #3 sand | | | | | | | 6 | | | | | | | |
| | | | | | | | 7 | | | | | 10YR 4/1 | | gray brown @ 7' |
| | | | | | | | 8 | | | 30 | 70 | N4/0 | ML | Silt. Clay dome to dry dark gray, stiff, micaceous gray-brown cobbles, very fine sand |
| | | | | | | | 9 | | | | | 10YR 4/2 | | |
| | | | | | | | 10 | | | | | | | |