GENERAL ELECTRIC COMPANY
OAKLAND PLANT SITE

FINAL PHASE II REPORT
PROBLEM DEFINITION

June 1981

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PHASE II STUDY

FINAL REPORT

GENERAL ELECTRIC COMPANY
OAKLAND, CALIFORNIA, PLANT SITE

JUNE 1981

GENERAL ELECTRIC COMPANY

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GLOSSARY

1. Anisotropy--The condition under which one or more of the hydraulic properties of an aquifer vary according to the direction of flow.

2. Aquifer--A formation, group of formations, or part of a formation that contains sufficient permeable materials to yield significant quantities of water to wells and springs.

3. Aquifer, confined--An aquifer that is overlain by a confining bed. The confining bed has a significantly lower hydraulic conductivity than the aquifer.

4. Aroclor 1016-1262--A group of PCBs manufactured by Monsanto wherein the last two numbers of the Aroclor number signify the amount of chlorine. Aroclor 1016 is an exception to this numbering system since it contains 41 percent chlorine.

5. Aroclor 1260--A PCB manufactured by Monsanto containing 60 percent chlorine.

6. Ballast--Gravel or broken stone placed between and under ties of a railroad to give stability, provide drainage and distribute the load.

7. Bentonite--An expansive clay (expands readily when contacted by water).

8. USC--Unified soil classification system.

9. Discharge area--Areas where water leaves shallow saturated sediments of the site.

10. Drilling log--A record showing types of materials encountered while drilling.

11. Equipotential line--A line in a two-dimensional groundwater flow field such that the total hydraulic head is the same for all points along the line.

12. Equipotential water level contours--Lines of equal water elevations.

13. Flow lines--Lines constructed perpendicular to equipotential water contours represent direction of groundwater flow.

14. Flow net--The set of intersecting equipotential lines and flow lines representing two-dimensional steady flow through porous media.

15. Freon extractable--A substance that can be analyzed by a Freon extractable method, such as hydrocarbons, esters, oils, fats, waxes and fish molecular weight fatty acids.

16. Groundwater--The water contained in interconnected pores located below the water table in an unconfined aquifer or located in a confined aquifer.

17. Groundwater gradient--Change in total head with a change in distance in the given direction which yields the maximum rate decrease in head.

18. Groundwater mound--A mound shaped or ridge-shaped addition to the groundwater body built up by influent seepage.

19. Groundwater velocity--The average rate of movement of a particle of water through the saturated interstitial space between soil particles.

20. Hydraulic continuity--The existence of a continuous flow path for the transport of water between two points in a groundwater system.

21. Hydrograph--A graph that shows some property of groundwater or surface water as a function of time.

22. Impervious structures--Those structures assumed to prevent infiltration of any surface water into the ground (i.e., concrete, asphalt, roofs).

23. Infiltration--The flow of water downward from the land surface into and through the upper soil layers.

24. Perforated interval--Portion of well casing that allows groundwater to enter the well.

25. Lithology--Pertaining to the physical properties of earth materials such as grain size, texture, color and composition.

26. Polychlorinated biphenyls (PCBs)--A generic term applied to certain mixtures of chlorinated organic compounds used inside capacitors or transformers as a dielectric and heat transfer fluid. A PCB is made by substituting chlorine atoms for one or more hydrogen atoms on a biphenyl (two banded benzene rings).

27. Pyranol--A blend of approximately 50 percent trichlorobenzene and 50 percent Aroclor 1260 (PCB).

28. Recharge area--Areas where water enters shallow saturated sediments of the site.

29. Sand lens--A sand body shaped like a lens, pinching out in both directions.

30. Slug test--An aquifer test made by either pouring a small instantaneous charge of water into a well or by withdrawing a slug of water from the well.

31. Sorption--The binding of one substance to another by any mechanism.

32. Specific electrical conductance--The ability of water to transmit an electrical current. It is related to the concentration and charge of ions present in the water.

33. Stratigraphy--The vertical sequence and horizontal distribution of earth materials.

34. Sand stringers--A long, thin body of sand.

35. 10-C oil--A mineral oil used as an insulating fluid in outdoor transformers.

36. Water table--Surface below which earth materials are saturated and have a water pressure equal to atmospheric.

CHAPTER 1

EXECUTIVE SUMMARY

This executive summary is organized to summarize the findings of the Phase II Study as they specifically pertain to the informational requests of Attachment A in Cleanup and Abatement Order 80-011. This order appears in Appendix A-1 herein.

PLANT OPERATIONS

A detailed account of past and present structures and operations is contained in Chapter 2 of this report.

Buildings and Structures

General Electric's Oakland Operation began in 1924 on 24 acres. The original plant consisted of five buildings and two radio towers. From 1924 to 1973 numerous expansions, additions, and demolitions took place as shown on Figure 2-1 of Chapter 2. Transformer manufacturing was discontinued at the Oakland site in 1975. Currently, the site serves as a location for a General Electric (GE) Apparatus Service Shop and a storage facility for various company products.

Storage Tanks and Piping

Figure 2-2 (in report pocket) shows existing, abandoned, removed, and relocated piping and tanks. Figure 2-3 (in pocket) shows details of the tank farm area. Pyranol was stored at only one location on site, northeast of Building 2. Pyranol was piped in only one area on site, between the Pyranol storage tanks and Building 1.

PCB Volumes

Pyranol usage at the Oakland site was about 2,000 gallons per year by the mid-1940s; increasing to about 5,000 gallons per year in the 1950s until 1965. Gradually, usage decreased to zero when the transformer manufacturing plant was closed in 1975. Monsanto Industrial Chemicals Company was the sole supplier of Pyranol.

PCB Loading, Storage and Use

In the early years, Pyranol arrived at the plant in drum quantities; later, tank cars were used. Pyranol was pumped from the tank cars to two 5,000-gallon storage tanks located to the

rear of Building 1. Pyranol was, in turn, transported by buggy and later piped to one of three transformer assembly areas in Building 1.

Liquid and Sludge Phases

Liquids remaining in the tank farm (a cluster of 11 tanks on the site) as of March 14, 1981, are identified on Figure 2-3. Locations and identification of other liquid phases, such as water and liquified propane, are shown on Figure 2-2.

Four on-site sumps (apparently abandoned utility vaults) containing liquid were sampled and analyzed for PCBs. The PCB concentration of sump liquids proved to be no greater than 180 parts per billion (ppb). Sump sediment samples showed a PCB concentration no greater than 62 parts per million (ppm).

On-Site Waste Disposal Practices

In the early 1940s, solid waste accumulated from motor operations was reportedly disposed in a trench dug in the vicinity of Building 17. Additional solid waste from transformer manufacturing was reportedly trench buried in the southwest corner of the property.

Liquid waste, possibly containing 10-C oil and Pyranol, was reportedly drained from a laboratory analysis lab sink near Building 7. Waste oil was also reportedly disposed on site east of Building 17 in the late 1940s.

Off-Site Waste Disposal Practices

Oil wastes generated on site were accumulated in drums and two tanks located in the tank farm. This oil, consisting of 10-C oil and Pyranol, was sold to waste oil disposal vendors, apparently to be burned.

Spills

The majority of oil spills reportedly occurred in the tank farm area due to the frequency of operation and volume of oil handled. Additional oil spills reportedly occurred in the vicinity of the Pyranol storage tanks.

HYDROGEOLOGIC INFORMATION

A detailed account of hydrogeologic information on the site is contained in Chapters 3 and 5 of this report.

Site Drainage

Stormwater runoff from the Oakland site is a combination of overland flow across paved and unpaved areas, flow in swales and flow in underground conduits and open channels. The site can be divided into four drainage areas, with each area containing a site discharge point. Approximately 87 percent of the site drainage area drains to a 24-inch-diameter storm drain located near the southwest corner of the site. Approximately 10 percent of the site drainage area drains overland off the northwest corner of the site. The remaining site area drains to either the 54th Avenue storm drain or to East 14th Street.

Upper Level Groundwater Flow Direction and Velocity

Groundwater flow in the upper level on the site, defined as down to 60 feet, tends to be away in all directions from a groundwater mound identified in the vicinity of the tank farm. A slight vertical downward flow extends to the northeast of the site. The average flow velocity is in the range of 5×10^{-4} and 5×10^{-3} centimeters per second.

Depth to Confined Aquifers

The depth to the nearest confirmed aquifer that is confined is 232 feet below ground. Another confined aquifer is believed to exist at a depth of 133 feet, but this has not been confirmed.

Hydraulic Continuity

The rate of vertical groundwater movement is calculated to be 0.002 feet per day or 30 feet in 40 years. Since PCBs have a strong affinity for soils, the potential for vertical migration of PCBs in shallow soils to deeper confined aquifers is negligible.

Discharge and Recharge Areas

Discharge and recharge areas of the shallow groundwater system are shown on Figures 5-1 and 5-2. Shallow horizontal discharge occurs around most of the site while deeper discharge (to a depth of 60 feet) occurs in a northerly direction.

Groundwater Mound

The source of the groundwater mound is the diked area of the tank farm.

Water Table Aquifer Level Fluctuations

A seasonal water level fluctuation of up to 10 feet is shown in the shallow monitor wells. This fluctuation corresponds to

seasonal rainfall with lowest water levels in December and highest water levels in April. Tidal fluctuations in San Francisco Bay were determined to have negligible effect on on-site water levels.

PREVIOUS ANALYSES

These analyses pertain to work performed in the Phase I and Ib studies that was not reported therein.

Soil Borings

PCB analyses for borings S721 through S725 and well W741 were substituted for soil analyses for borings S527, S529, S530, S531, and S532 and well W529 since soil samples were not taken when drilling the latter holes. PCB analytical results are shown on Figure 4-2.

Well Water Analyses

All well water analyses, except for chlorobenzene, are contained in Appendix E to this report. The chlorobenzene analysis for selected well water samples is in Appendix F.

Soil Sample Blow Count and Depth Data

All blow count and sample depth data for borings done in Phase I and Ib were submitted with the Phase I and Phase Ib reports. If borings were presented with no such information, then samples were not taken.

ADDITIONAL SAMPLING

Vertical Extent of Contamination

The vertical extent of contamination in soil borings performed in Phase I or Ib, which indicated high PCB contamination in the borehole bottom, was caused by drilling multi-case wells W791, W792 and W793.

The depth of PCB contamination was reported in the Phase Ib work at a minimum of 45 feet. In the Phase II work, the drilling technique was changed to decrease the potential for cross contamination. Phase II work utilized multi-cased well construction techniques, which restrict movement of shallow contamination downward when sampling deeper soils. The results under the revised procedure showed PCBs detectable to only 35 feet.

Extent of Contamination

To further define the extent of contamination in soil and groundwater on the site, the following soil borings and monitor wells were drilled and installed:

1. Eighteen shallow soil borings.
2. Fourteen shallow monitor wells.
3. Nine deep monitor wells.
4. Three multi-cased wells.

PCB concentrations in soils measured in Phase II attenuate to nondetectable levels at a depth of 10 feet over most of the site with some exceptions attenuating at 25 feet and one notable soil boring having measurable PCB concentrations to a depth of 35 feet. Figure 4-3 indicates the extent of vertical contamination on site.

Of the 26 groundwater samples analyzed for PCB concentration in Phase II (see Appendix E-4), only five showed detectable concentrations for unfiltered samples. When filtered, all of these samples showed nondetectable concentrations of PCBs.

Monitor Wells

Based on shallow groundwater movement defined in the plan view and cross-sectional flow nets, wells W751A and B, W753A and B, W4A and B, W758A and B, W36A and B, and W2A and B are best candidates for observation wells to monitor the potential for off-site migration of PCBs.

Freon Extractables

Of the 26 groundwater samples analyzed for oil and grease, only 7 showed a concentration above the nondetectable limit of 5 milligrams per liter (mg/l). However, no samples were above 10 mg/l.

Chlorobenzene Soil and Fluid Analyses

The soil analyses for chlorobenzenes collected in the Phase II Study are all less than the detectable limit of 1 ppm. Fluid samples collected showed relatively low concentrations of chlorobenzene except for a sample from well W613 which showed 11.7 mg/l of total chlorobenzenes.

CONCLUSIONS

Significant conclusions of the Phase II Study work are the following:

1. The extent of the oil plume defined in the September 1980 Phase Ib report is confirmed.

2. The concept on which the immediate correction plan design presented to the state in conceptual form on January 20, 1981, is sound.

3. The vertical extent of PCB soil contamination at one location appears to be 35 feet below grade, not 45 feet as logged in Phase Ib work.

4. Detectable concentrations of PCBs were not found in the on-site groundwater.

5. Shallow groundwater movement is shown to occur in all directions horizontally and vertically away from the water level mound near the tank farm.

6. Vertical migration of PCBs in shallow soils to deeper confined aquifers is insignificant.

CHAPTER 2

SITE HISTORY AND PLANT OPERATIONS

This chapter comprises a description of past and present site structures, tanks and piping, PCB uses and handling practices, waste disposal practices and history of chemical spills.

BUILDING AND STRUCTURES

General Electric's (GE) Oakland operation was begun during 1924 on approximately 24 acres at 5441 East 14th Street. The original plant consisted of five buildings and two radio towers.

Original structures included:

1. Building 1, a steel and brick structure 250 feet long and 150 feet wide. It was of high bay construction in the center with lower head room on each side. The front of the building contained office space and had a second-floor mezzanine, 65 by 35 feet. The remainder of the facility contained equipment and facilities for the manufacture of switch-gear, motors, transformers and some maintenance and repair work.

2. Building 6, a steel and brick building containing 8,400 square feet. It housed equipment for manufacturing and insulating copper conductor used in the windings of transformers and motors.

3. Building 5, a brick building of approximately 800 square feet. It housed boilers and associated equipment supplying heat and, later, processed steam for plant operations.

4. Building 3, referred to as the Studio Building containing a broadcasting studio for radio station KGO (which was operated by GE but was independent of operations in Building 1). It was a brick and wood building of two floors containing approximately 4,500 square feet.

5. Building 9, a wood frame building of 2,100 square feet containing a power supply and other electrical equipment to support the radio-broadcasting operation.

6. Transmission Towers, located near the rear of the property to support broadcasting antenna.

7. A Water Tower for fire protection completed the original group of structures comprising GE's East 14th Street operations in the early twenties.

Since that time and until the operation was closed as a manufacturing facility in 1975, numerous expansions, additions and demolitions have taken place. Chronologically, they occurred as described herein. Figure 2-1 (following page 2-2) shows the original structures, additions and demolitions.

Sometime prior to 1927, a wooden building (No. 4) was constructed midway between Buildings 1 and 6. It contained equipment for maintenance facilities, equipment and storage. It was torn down in 1969 and replaced with a new metal building (also No. 4).

Records do not exist, but it is assumed that some time during the mid-1920s an embryonic oil storage system was put in place. It consisted of a single tank at the current tank farm location, plus associated piping. During later years, this initial installation was increased to its current size and complexity.

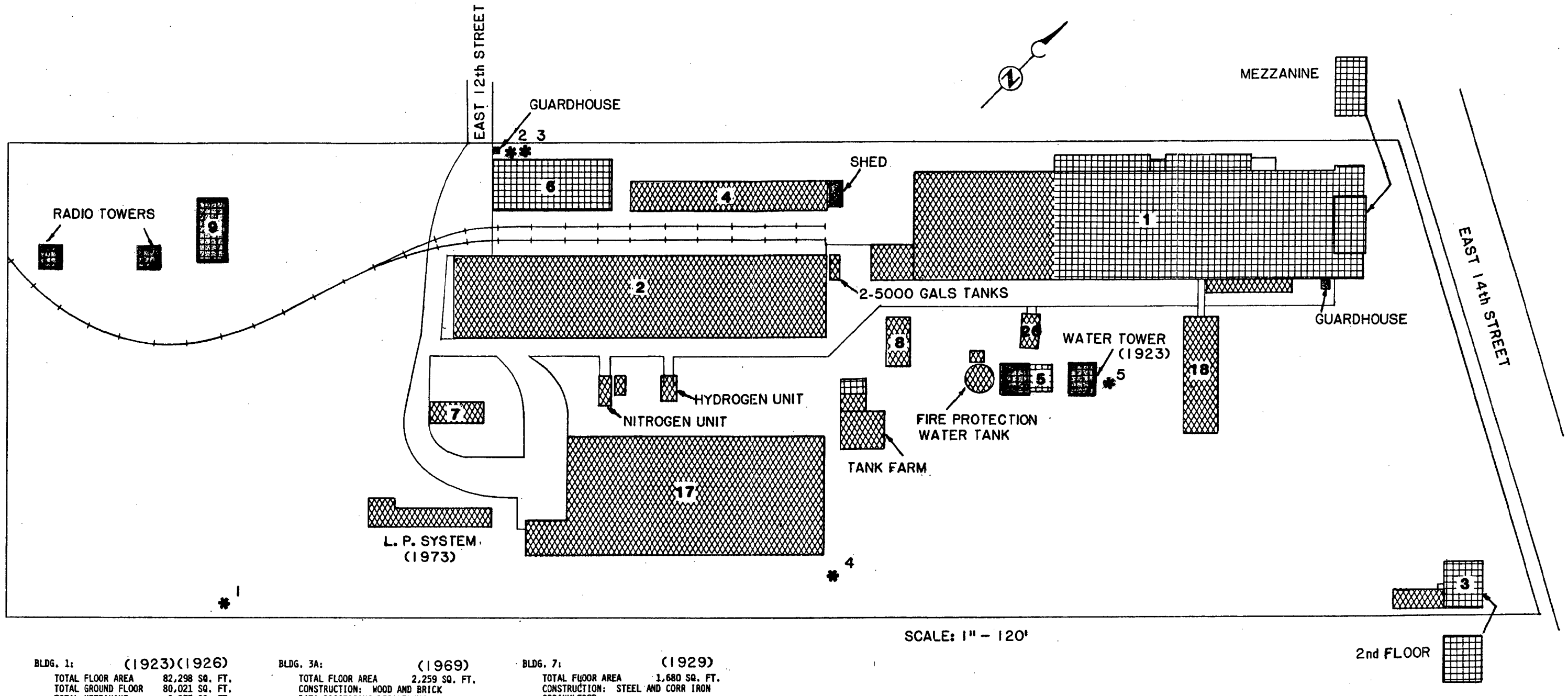
During the late twenties, another wooden building, not identified by number, was constructed immediately to the rear of Building 1. Half of this structure was demolished in 1927 to make room for expanding Building 1. Later, the remainder was moved to the present site of Building 8 for use as a sand blast enclosure.

Little construction activity took place during the early 1930s, apparently reflecting economic conditions existing at the time. It can be assumed, however, that the introduction of Pyranol as a transformer insulator/coolant around that time required oil-storage capacity separate from the 10-C oil system installed in the 1920s. In the early 1930s, two 5,000-gallon oil tanks were installed aboveground immediately at the northeast corner of the present Building 2. They were used exclusively to store Pyranol.

In 1937, Building 2 was erected. It was of steel and brick construction and contained 45,000 square feet and was used for the manufacture of transformers and related support operations. A shed housing controls for nitrogen and hydrogen supplies plus ancillary equipment was constructed at the same time.

Construction activity was limited at the Oakland site during the 1940s and 50s since capacity was adequate to serve western markets. Also, the company's transformer facilities were expanded and started up in other areas.

Some unused structures were demolished or modified for different purposes during this period. The radio towers came down and the power supply building (Building 9) became a storage



BLDG. 1: (1923)(1926)
- TOTAL FLOOR AREA 82,298 SQ. FT.
- TOTAL GROUND FLOOR 80,021 SQ. FT.
- TOTAL MEZZANINE 2,275 SQ. FT.
- CONSTRUCTION: STEEL AND BRICK
- SPRINKLERED
- TRANSFORMER MANUFACTURING

BLDG. 2: (1957)
- TOTAL FLOOR AREA 45,000 SQ. FT.
- CONSTRUCTION: STEEL AND BRICK
- SPRINKLERED
- TRANSFORMER MANUFACTURING
- STORAGE AND MAINTENANCE

BLDG. 3: (1924)
- TOTAL FLOOR AREA 4,562 SQ. FT.
- TOTAL GROUND FLOOR 2,391 SQ. FT.
- TOTAL SECOND FLOOR 2,171 SQ. FT.
- CONSTRUCTION: WOOD AND BRICK
- SPRINKLERED
- OFFICE

BLDG. 3A: (1969)
- TOTAL FLOOR AREA 2,259 SQ. FT.
- CONSTRUCTION: WOOD AND BRICK
- DATA PROCESSING DEPARTMENT

BLDG. 4: (1969)
- TOTAL FLOOR AREA 15,400 SQ. FT.
- CONSTRUCTION: BUTLER
- SPRINKLERED
- STORAGE

BLDG. 5: (1923)
- TOTAL FLOOR AREA 784 SQ. FT.
- CONSTRUCTION: BRICK
- BOILER HOUSE

BLDG. 6: (1924)
- TOTAL FLOOR AREA 2,712 SQ. FT.
- CONSTRUCTION: STEEL AND BRICK
- SPRINKLERED
- STORAGE

BLDG. 20: (1969)
- TOTAL FLOOR AREA 8,000 SQ. FT.
- CONSTRUCTION: METAL
- PAINT STORAGE SHED

BLDG. 7: (1929)
- TOTAL FLOOR AREA 1,680 SQ. FT.
- CONSTRUCTION: STEEL AND CORR IRON
- SPRINKLERED
- ENG LABORATORY AND STORAGE

BLDG. 8: (1973)
- TOTAL FLOOR AREA 1,800 SQ. FT.
- CONSTRUCTION: CEMENT BLOCK
- SPRINKLERED
- CLEANING SHED

BLDG. 9: (FORMERLY KGO POWER HOUSE) DEMOLISHED 1976
- TOTAL FLOOR AREA 2,100 SQ. FT.
- CONSTRUCTION: WOOD FRAME
- AUDITORIUM AND STORAGE

BLDG. 17: (1962)
- TOTAL FLOOR AREA 40,000 SQ. FT.
- CONSTRUCTION: WOOD AND METAL
- WAREHOUSE

BLDG. 18: (1966)
- TOTAL FLOOR AREA 5,600 SQ. FT.
- CONSTRUCTION: WOOD AND METAL
- WAREHOUSE

ORIGINAL

ADDITIONS

DEMOLISHED

* SUMP
(SUMPS SHOWN ARE EXISTING)

DATES IN PARENTHESIS SHOW DATE OF CONSTRUCTION

NOT TO BE RELEASED
CONFIDENTIAL MATERIAL
CONTAINING PROPRIETARY INFORMATION

FIGURE 2-1 SITE STRUCTURES

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area and meeting room. The water tower was removed and replaced with an aboveground water storage tank and pump system. Sheds and small building appurtenances came and went during this period. The oil tank farm's capacity was increased by adding oil tanks and including thinner tanks in the same enlarged, diked enclosure.

In 1962, a storage warehouse of 40,000 square feet was constructed. Its purpose was to accumulate and store transformers to smooth factory load during seasonal demand peaks. This structure also included shipping docks and a packaging area.

During 1966, a 40- by 149-foot metal warehouse was erected alongside Building 1 to house supporting transformer manufacturing operations.

In 1969, old wooden Building 4 was replaced with an enlarged metal one. The new building contained over 15,000 square feet and was used for incoming material storage and distribution. Also in 1969, a small 20- by 40-foot building was erected next to the boiler house to serve as a maintenance material storage warehouse.

The last construction at the Oakland site was during 1973. The old wooden sand blast building (Building 8) was demolished and replaced with a cinder block building. Also in 1973, a stand-by propane system was put in place at the rear of the property in anticipation of the temporary loss of the plant's interruptable gas supply.

The plant ceased operation as a transformer manufacturing facility during 1975. Plans were implemented to convert a portion of the existing buildings into a facility to house the company's Oakland Apparatus Service Shop. Oakland's Apparatus Service Shop began operation in 1976 and occupies Buildings 1, 2, 3, 8 and 18.

The remaining Oakland plant's structures have been converted to storage facilities for various company products. One building (Building 7) has been assigned as a storage area for material and equipment for the Oakland Site Abatement Project.

STORAGE TANKS AND PIPING

A detailed examination of existing, abandoned, relocated and removed tanks and piping was made by site inspection, discussions with present and previous employees and review of site drawings. Figure 2-2 (in pocket) shows existing, abandoned, removed, and relocated piping and tanks. Figure 2-3 (in pocket) shows the tank farm area with a table of tank details as of March 14, 1981. All pipeline locations shown should be considered approximate since

no engineering or construction drawings are available, and no site excavation or metal detection or surveying techniques were employed to verify locations.

In the original plant, Building 1 was provided with all utilities, including a fire protection system with a back-up water supply from an elevated 500-gallon water tank. As the plant expanded, the fire protection system was revised. In about 1953, the 500-gallon elevated water tank was removed and replaced by a 120,000-gallon tank and fire pump house.

The two 5,000-gallon Pyranol tanks were originally located near the northeast corner of Building 2. These tanks were subsequently relocated in 1976 and used for waste oil. The Pyranol piping was consequently abandoned, and during various phases of construction has been partially, if not totally, removed.

Although the supply sources for hydrogen and nitrogen near Building 2 have since been removed, the abandoned underground piping to Building 2 remains in place as near as can be determined.

The oil separator (near the fire water tank) was installed in 1976. During this installation, a 4-inch PVC wastewater line was run from Building 1 to the sump (see Figure 2-2).

The vapor phase tanks formerly located in the east end of Building 1 were removed in December 1973. Consequently, the concrete-lined pit in Building 1, where those tanks were located, was filled with sand and covered with concrete.

The original tank farm was composed of tanks 10, 13 and 14, enclosed by a concrete wall. In 1948, the tank farm was expanded, as shown on Figure 2-3. During this expansion, the 10-C oil thinner lines running to Building 1 (see Figure 2-2) were abandoned.

PCB USAGE

There was some limited use of Pyranol in Oakland prior to the mid-1940s.

The growth of the Pyranol-filled transformer market in the west coincided generally with the growth of industrial and high-density construction in the region, which occurred after World War II. This market was served principally from GE's Pittsfield, Massachusetts, transformer operation. As Oakland's total capacity increased, shifts in managerial philosophy regarding manufacturing efficiencies resulted in different levels of Pyranol manufacture in Oakland over the years. It was always, however, a very small percentage of Oakland's total production.

Table 2-1. Pyranol Usage at Oakland Plant as Reported by Monsanto

Year	Annual shipment, gallons
1954	4,767
1955	-
1956	4,609
1957	4,673
1958	9,209
1959	9,245
1960	5,137
1961	4,911
1962	372
1963	5,231
1964	5,483
1965	184
1966	455
1967	497
1968	859
1969	442
1970	809
1971	502
1972	-
1973	-
1974	491
1975	55

Note: Pyranol consisted of a blend of approximately 50 percent tri-cholorbenzene and 50 percent Aroclor 1260 (PCB).

Monsanto Industrial Chemicals Company of St. Louis, our sole supplier, was able to reconstruct their shipments of Pyranol to the GE Oakland facility from 1954 to 1975. These shipments, as reported by Monsanto, are shown in Table 2-1. Apparently, no records exist prior to 1954. However, we estimate that Oakland GE usage was approximately 2,000 gallons per year by the mid-1940s and extended gradually to the levels reported by Monsanto from 1954 to 1975.

The years where no usage or very little usage is reported can probably be attributed to a recession in the electrical distribution transformer business or units being supplied by the main distribution transformer manufacturing facility at Pittsfield, Massachusetts. It is evident from the Monsanto records that production of Pyranol transformers was terminated at the Oakland facility in 1964, but the facility continued to service in-warranty units until the transformer manufacturing plant was closed in 1975.

After insulating fluids (both 10-C oil and Pyranol) arrived on site in Oakland, they were tested for dielectric strength and impurities. Fluids were then pumped into separate storage tanks. Those failing to meet standards were returned to the supplier. All 10-C oil arrived in 10,000-gallon tank cars. In the early years of low usage, Pyranol arrived in drum quantities and in later years 5,000-gallon cars were the rule.

The 10-C oil was pumped to the tank farm. The tank farm consisted of one tank in the beginning, to a total of 11 tanks when the plant was shut down. Three of these tanks were for Varsol (petroleum-based thinner), which was used in the plant's vapor phase system designed to dry out transformer components prior to final assembly.

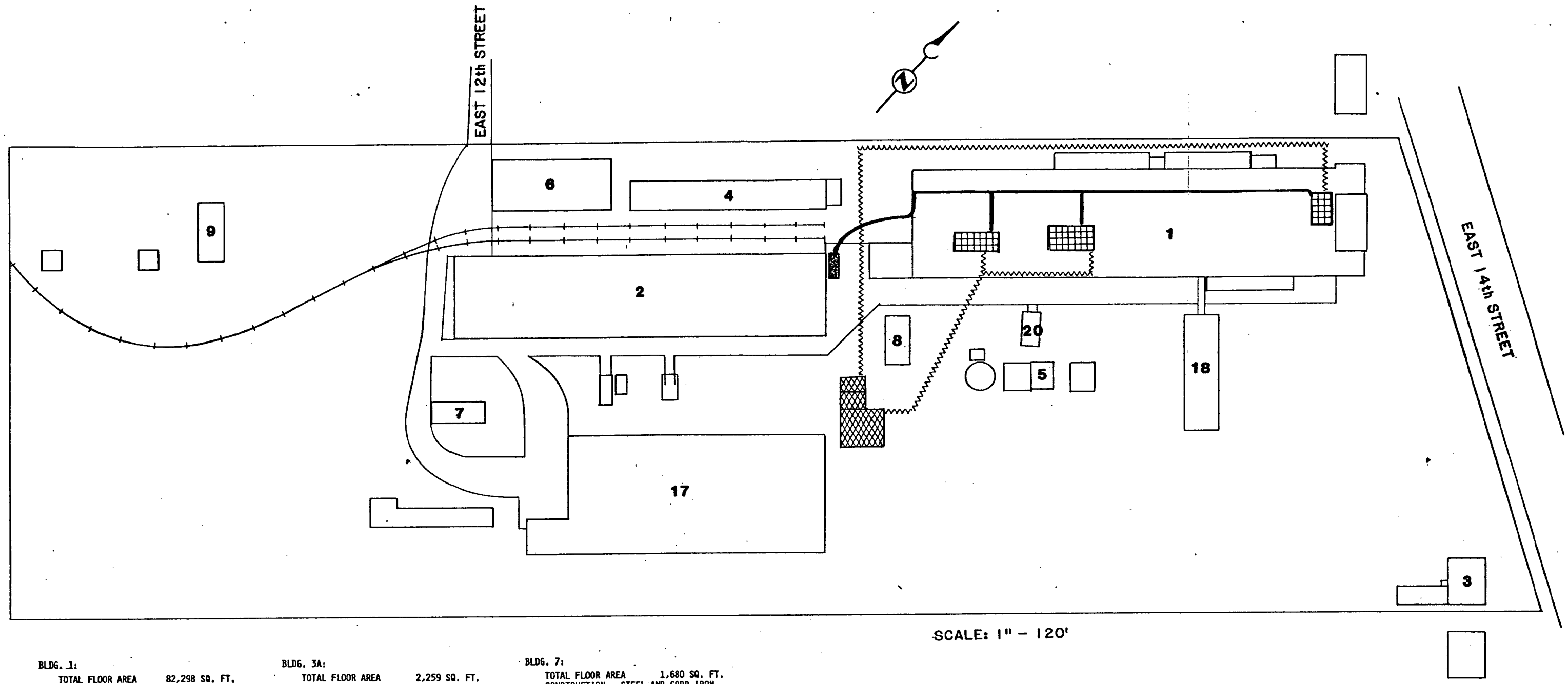
Through 1975, transformer assembly took place in three locations, all in Building 1 (Figure 2-4). Location 1 at the front of the building was the original assembly area. The 10-C oil was pumped to this area through underground piping running from the original tank farm across the rear of Building 1, alongside Building 1 between the building and the property line, and into the building (see map dotted line). Once inside the building, lines were overhead. A return line ran parallel to the input line.

In the late 1940s, the assembly area was relocated to the rear center of the building and new 10-C oil piping installed. By now the tank farm had expanded to 11 tanks and the piping system was installed running from the tank farm, past the boiler house, making a 90-degree turn and entering Building 1 from the left side in a channel in the floor (see Figure 2-4). This pipe cluster also included vapor phase lines.

Sometime during the late 1950s, deaerating equipment was added to the 10-C oil system. It was installed adjoining Building 1 where piping entered the building. The system was repiped to accommodate a deaerating operation. In 1965, the assembly area was again moved (see map, area 3), and aboveground piping in the building was rerouted accordingly.

When the plant closed in 1975, essentially all 10-C oil piping in Building 1 was removed with the exception of a few feet of piping remaining in a floor trench. The deaerator was removed and its metal enclosure torn down. The tank farm and outside the building underground piping are all that remain of the 10-C oil system.

Pyranol was pumped from 5,000-gallon tank cars into two 5,000-gallon storage tanks located to the rear of Building 1. There are indications that Pyranol was originally transported from these storage tanks to assembly area 1 by a "wheeled buggy," sometimes traveling up the road parallel to, and outside of Building 1. Sometime during the early 1940s, underground lines (input and return) were run from the Pyranol storage tanks to the rear of Building 1. Once at the building, the lines ran overhead the full length of the building. Subsequent relocations of the assembly area resulted in shortening these overhead lines consistent with the new locations. Since the plant closed in 1975, the Pyranol tanks have been decomissioned, cleaned and relocated as waste oil storage tanks (not Pyranol). With the exception of approximately 260 feet of 2-inch pipe remaining overhead in the building structure, all Pyranol piping in Building 1 has been removed. Some Pyranol piping may still be buried in the area between Building 2 and the rear of Building 1.



SCALE: 1" – 120'

BLDG. 1:
TOTAL FLOOR AREA 82,298 SQ. FT.
TOTAL GROUND FLOOR 80,021 SQ. FT.
TOTAL MEZZANINE 2,275 SQ. FT.
CONSTRUCTION: STEEL AND BRICK
SPRINKLERED
TRANSFORMER MANUFACTURING

BLDG. 2:
TOTAL FLOOR AREA 45,000 SQ. FT.
CONSTRUCTION: STEEL AND BRICK
SPRINKLERED
TRANSFORMER MANUFACTURING
STORAGE AND MAINTENANCE

BLDG. 3:
TOTAL FLOOR AREA 4,562 SQ. FT.
TOTAL GROUND FLOOR 2,391 SQ. FT.
TOTAL SECOND FLOOR 2,171 SQ. FT.
CONSTRUCTION: WOOD AND BRICK
SPRINKLERED
OFFICE

BLDG. 3A:
TOTAL FLOOR AREA 2,259 SQ. FT.
CONSTRUCTION: WOOD AND BRICK
DATA PROCESSING DEPARTMENT

BLDG. 4:
TOTAL FLOOR AREA 15,400 SQ. FT.
CONSTRUCTION: BUTLER
SPRINKLERED
STORAGE

BLDG. 5:
TOTAL FLOOR AREA 784 SQ. FT.
CONSTRUCTION: BRICK
BOILER HOUSE

BLDG. 6:
TOTAL FLOOR AREA 2,712 SQ. FT.
CONSTRUCTION: STEEL AND BRICK
SPRINKLERED
STORAGE

BLDG. 20:
TOTAL FLOOR AREA 8,000 SQ. FT.
CONSTRUCTION: METAL
PAINT STORAGE SHED

BLDG. 7:
TOTAL FLOOR AREA 1,680 SQ. FT.
CONSTRUCTION: STEEL AND CORR IRON
SPRINKLERED
ENG LABORATORY AND STORAGE

BLDG. 8:
TOTAL FLOOR AREA 1,800 SQ. FT.
CONSTRUCTION: CEMENT BLOCK
SPRINKLERED
CLEANING SHED

BLDG. 9: (FORMERLY KGO POWER HOUSE)
TOTAL FLOOR AREA 2,100 SQ. FT.
CONSTRUCTION: WOOD FRAME
AUDITORIUM AND STORAGE

BLDG. 17:
TOTAL FLOOR AREA 40,000 SQ. FT.
CONSTRUCTION: WOOD AND METAL
WAREHOUSE

BLDG. 18:
TOTAL FLOOR AREA 5,600 SQ. FT.
CONSTRUCTION: WOOD AND METAL
WAREHOUSE

ASSEMBLY AREA

IOC OIL SYSTEM

PYRANOL SYSTEM

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FIGURE 2–4 PCB USAGE

YOS_OAK_03594

WASTE DISPOSAL PRACTICES

No written information or other documentation exists relative to waste disposal practices. All the information which follows is based on hearsay, with the problems of misinterpretation and memory which such a method produces. It should be so regarded.

Over the years, two major types of waste accumulated and required disposal, solids and liquids. Prior to 1940, when Oakland was a multi-product manufacturing facility, motor operations reportedly generated significant solid waste. When this operation was moved to another location, apparently an accumulation of solid waste remained. In the early 1940s, a trench was dug (area 1 of Figure 2-5) in the general vicinity of what is now Building 17 and this waste accumulation was buried.

Additional solid wastes resulting from transformer manufacture were accumulated and trench-buried near the rear of the property (area 2 of Figure 2-5). This probably consisted of bushings and other insulators, insulating paper, and bases for circuit breakers and top changers; material mainly nonmetallic. This waste burial practice ceased in the early to mid-1960s.

Liquid wastes consisted mainly of 10-C and Pyranol oil, and were low in quantity. Due to the cost of both, extensive filtering systems were in place for reclaiming out-of-specification oil. The tank farm had specialized pumping and valving facilities especially designed for this purpose. Pyranol was reprocessed by filtering from tank to tank through portable filtering equipment.

Two locations apparently were involved in liquid waste disposal. The first, located adjacent to Building 7 (see map, area 3) could have involved small quantities of both 10-C oil and Pyranol that had been brought to the quality control laboratory for testing. Some oil samples may have been dumped into the lab sink, which emptied into a septic tank. After the septic tank collapsed, the sink was allowed to drain outside. Any lost oil would have drained onto the ground. This practice ceased in the early to mid-1960s when 55-gallon drums were provided for test sample disposal.

Other oil wastes were accumulated in two tanks located in the tank farm. Until about the mid-1950s, no attempt was made to keep the small amount of waste Pyranol separate from waste 10-C oil. They were accumulated together and sold to waste oil disposal vendors, apparently to be burned. Around 1955 the vendor requested that the oils be kept separated and we did so.

Attempts were made to procure additional oil disposal information from the last known oil disposal vendor. Records are no longer available.

Sometime in the late 1940s, a trench was dug in the open fields to the left of the boiler house (area 4 of Figure 2-5). Apparently, after unsuccessful attempts to burn 10-C and other waste oil in plant boilers, burial became the disposal practice. Also, some difficulty was encountered in a changeover from one type of Pyranol to another, and this generated more than normal waste oil which was also disposed of in the trench. Waste oil burial practices ceased in the early 1950s when it became plant practice to store waste oil in drums and dispose of it regularly through scrap-oil dealers. There is some indication that a GE policy forbidding oil dumping of any kind was in effect in 1953.

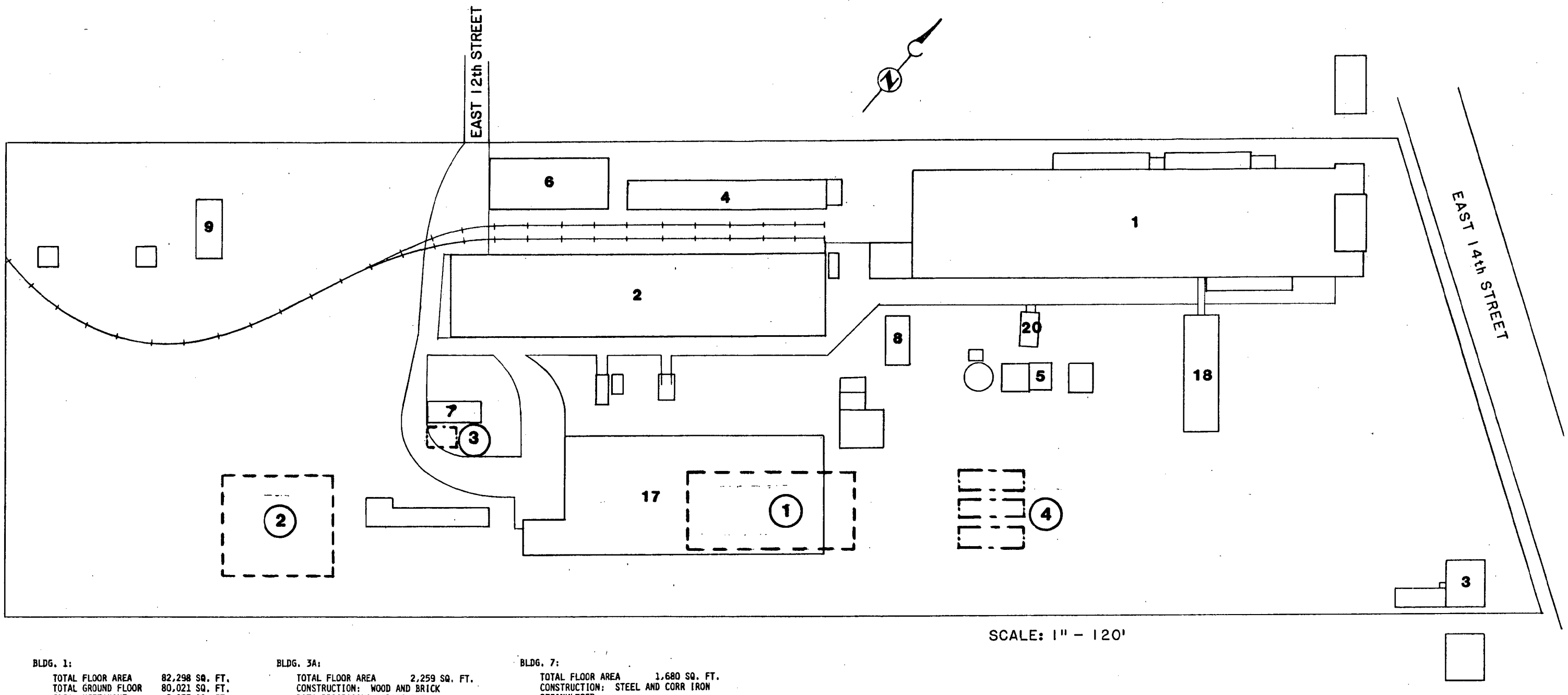
LIQUID SPILLS

Accidental liquid spills, either transformer 10-C oil or Pyranol, are most likely to have occurred at locations where the oil was pumped, filtered, transferred or otherwise handled in significant volumes. These areas are identified on Figure 2-6 as 1, 2 and 3.

Area 1 comprises the tank farm, a diked but unpaved enclosure consisting of three separately diked areas, 11 tanks and associated pumping, mixing and filtering equipment. It was here that the majority of oil spills occurred, due both to the frequency of operation and the volume of oil handled. While pumping from rail cars located in the rain pit next to Building 2, tanks were sometimes accidently allowed to overfill and the excess oil escaped through the atmospheric vents and collected on the ground within the diked area. These overflows were the result of operator inattention and, at times, conflicts between oil handling duties and other work.

There are indications that two or three such spills may have involved a considerable volume of 10-C oil to the extent that it covered the surface within the diked area to a depth of 3 or 4 inches. When this happened, oil was pumped out, reprocessed and pumped back into storage. However, some oil could have been absorbed into the ground below the tank farm. There is some reason to believe that the steel floor plates were installed to allow employees to move about within the enclosed area above spilled oil during cleanup operations.

Facilities in the pump house included filtering equipment, which required constant monitoring while in use. Occasionally during filtering operations, input pressure would exceed limitations of the filters and they would "blow," allowing some oil to spill on the pump house floor. Although this would have been cleared up immediately, over the years some amount of this oil could have escaped and soaked into surrounding soil.



BLDG. 1:

TOTAL FLOOR AREA 82,298 SQ. FT.
TOTAL GROUND FLOOR 80,021 SQ. FT.
TOTAL MEZZANINE 2,275 SQ. FT.
CONSTRUCTION: STEEL AND BRICK
SPRINKLERED
TRANSFORMER MANUFACTURING

BLDG. 2:

TOTAL FLOOR AREA 45,000 SQ. FT.
CONSTRUCTION: STEEL AND BRICK
SPRINKLERED
TRANSFORMER MANUFACTURING
STORAGE AND MAINTENANCE

BLDG. 3:

TOTAL FLOOR AREA 4,562 SQ. FT.
TOTAL GROUND FLOOR 2,391 SQ. FT.
TOTAL SECOND FLOOR 2,171 SQ. FT.
CONSTRUCTION: WOOD AND BRICK
SPRINKLERED
OFFICE

BLDG. 3A:

TOTAL FLOOR AREA 2,259 SQ. FT.
CONSTRUCTION: WOOD AND BRICK
DATA PROCESSING DEPARTMENT

BLDG. 4:

TOTAL FLOOR AREA 15,400 SQ. FT.
CONSTRUCTION: BUTLER
SPRINKLERED
STORAGE

BLDG. 5:

TOTAL FLOOR AREA 784 SQ. FT.
CONSTRUCTION: BRICK
BOILER HOUSE

BLDG. 6:

TOTAL FLOOR AREA 2,712 SQ. FT.
CONSTRUCTION: STEEL AND BRICK
SPRINKLERED
STORAGE

BLDG. 20:

TOTAL FLOOR AREA 8,000 SQ. FT.
CONSTRUCTION: METAL
PAINT STORAGE SHED

BLDG. 7:

TOTAL FLOOR AREA 1,680 SQ. FT.
CONSTRUCTION: STEEL AND CORR IRON
SPRINKLERED
ENG LABORATORY AND STORAGE

BLDG. 8:

TOTAL FLOOR AREA 1,800 SQ. FT.
CONSTRUCTION: CEMENT BLOCK
SPRINKLERED
CLEANING SHED

BLDG. 9: (FORMERLY KGO POWER HOUSE)

TOTAL FLOOR AREA 2,100 SQ. FT.
CONSTRUCTION: WOOD FRAME
AUDITORIUM AND STORAGE

BLDG. 17:

TOTAL FLOOR AREA 40,000 SQ. FT.
CONSTRUCTION: WOOD AND METAL
WAREHOUSE

BLDG. 18:

TOTAL FLOOR AREA 5,600 SQ. FT.
CONSTRUCTION: WOOD AND METAL
WAREHOUSE

LIQUID WASTE

SOLID WASTE

NOT TO BE RELEASED
CONFIDENTIAL MATERIAL
CONTAINING PROPRIETARY INFORMATION

FIGURE 2-5 WASTE DISPOSAL LOCATIONS

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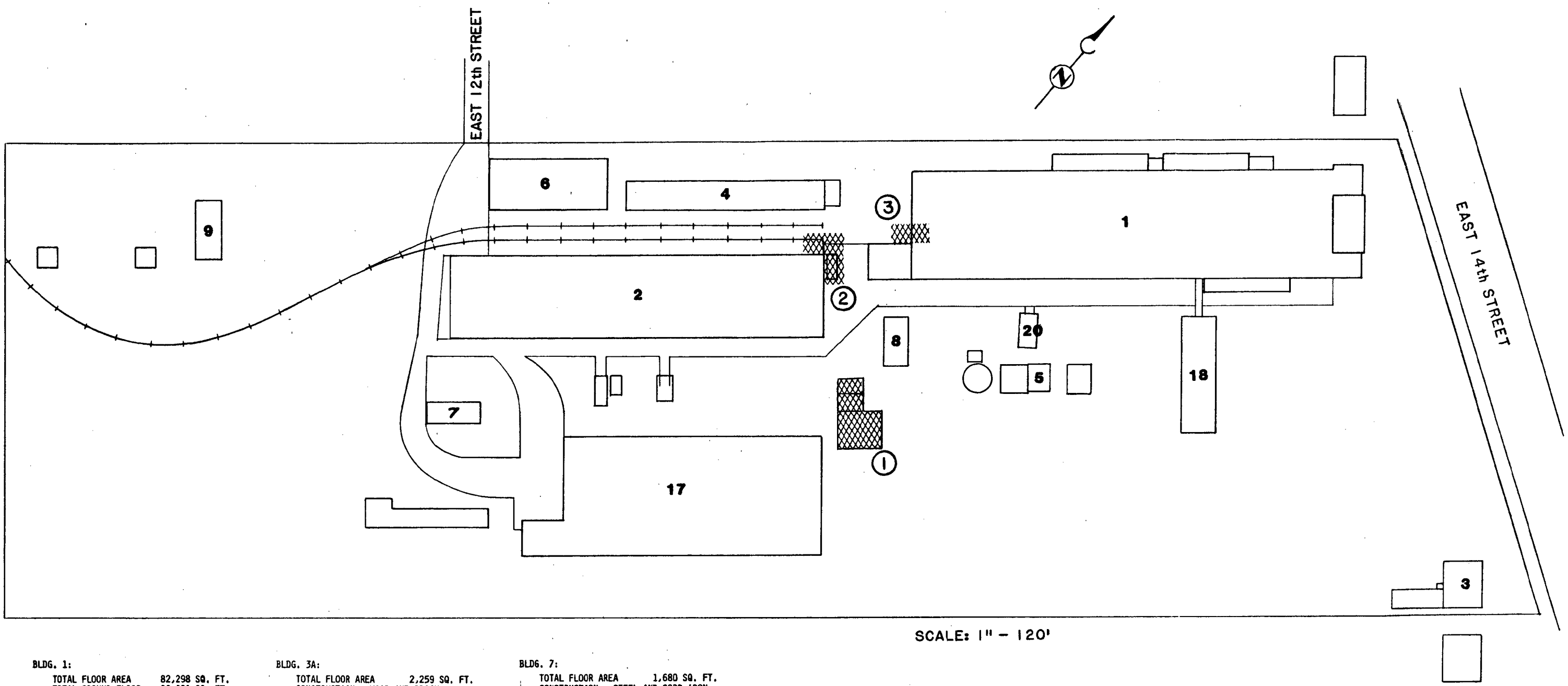

BLDG. 1:
- TOTAL FLOOR AREA 82,298 SQ. FT.
- TOTAL GROUND FLOOR 80,021 SQ. FT.
- TOTAL MEZZANINE 2,275 SQ. FT.
- CONSTRUCTION: STEEL AND BRICK
- SPRINKLERED
- TRANSFORMER MANUFACTURING

BLDG. 2:
- TOTAL FLOOR AREA 45,000 SQ. FT.
- CONSTRUCTION: STEEL AND BRICK
- SPRINKLERED
- TRANSFORMER MANUFACTURING
- STORAGE AND MAINTENANCE

BLDG. 3:
- TOTAL FLOOR AREA 4,562 SQ. FT.
- TOTAL GROUND FLOOR 2,391 SQ. FT.
- TOTAL SECOND FLOOR 2,171 SQ. FT.
- CONSTRUCTION: WOOD AND BRICK
- SPRINKLERED
- OFFICE

BLDG. 3A:
- TOTAL FLOOR AREA 2,259 SQ. FT.
- CONSTRUCTION: WOOD AND BRICK
- DATA PROCESSING DEPARTMENT

BLDG. 4:
- TOTAL FLOOR AREA 15,400 SQ. FT.
- CONSTRUCTION: BUTLER
- SPRINKLERED
- STORAGE

BLDG. 5:
- TOTAL FLOOR AREA 784 SQ. FT.
- CONSTRUCTION: BRICK
- BOILER HOUSE

BLDG. 6:
- TOTAL FLOOR AREA 2,712 SQ. FT.
- CONSTRUCTION: STEEL AND BRICK
- SPRINKLERED
- STORAGE

BLDG. 20:
- TOTAL FLOOR AREA: 8,000 SQ. FT.
- CONSTRUCTION: METAL
- PAINT STORAGE SHED

BLDG. 7:
- TOTAL FLOOR AREA 1,680 SQ. FT.
- CONSTRUCTION: STEEL AND CORR IRON
- SPRINKLERED
- ENG LABORATORY AND STORAGE

BLDG. 8:
- TOTAL FLOOR AREA 1,800 SQ. FT.
- CONSTRUCTION: CEMENT BLOCK
- SPRINKLERED
- CLEANING SHED

BLDG. 9: (FORMERLY KGO POWER HOUSE)
- TOTAL FLOOR AREA 2,100 SQ. FT.
- CONSTRUCTION: WOOD FRAME
- AUDITORIUM AND STORAGE

BLDG. 17:
- TOTAL FLOOR AREA 40,000 SQ. FT.
- CONSTRUCTION: WOOD AND METAL
- WAREHOUSE

BLDG. 18:
- TOTAL FLOOR AREA 5,600 SQ. FT.
- CONSTRUCTION: WOOD AND METAL
- WAREHOUSE

LIKELY SPILL AREAS

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CONFIDENTIAL MATERIAL
CONTAINING PROPRIETARY INFORMATION

FIGURE 2-6 SPILL AREAS

YOS_OAK_03598

Area 2 includes the ground surface in the immediate vicinity of the two 5,000-gallon Pyranol tanks (a small 250-gallon tank was also added in the 1950s). It also includes the forward end of the rail pit where oil cars, both 10-C oil and Pyranol, were unloaded by pumping. With tanks, pumps and rail cars at one location, Pyranol spills due to operator inattention occurred much less frequently.

Area 3 is the least likely area to have accumulated any significant oil, although if it had, it would be Pyranol. Pyranol, of low viscosity, was transported from the east in tank cars which were subjected to low temperature extremes when crossing the Rockies and the Sierras. Sometimes these cars were allowed simply to stand inside the building until the Pyranol warmed up enough to allow pumping. Occasionally, however, a steam line was hooked up to steam coils internal to the rail car and the oil warmed rapidly with processed steam from the plant supply. Although there were no open Pyranol lines or valves involved in this process, a chance did exist for minor drips and leakage.

CHAPTER 3

SITE DRAINAGE

Stormwater runoff from the General Electric Company (GE) property is a combination of overland flow across paved and unpaved areas, flow in swales, and flow in underground conduits and open channels. This chapter describes the movement of stormwater through the property and the existing facilities for collection and discharge of stormwater.

Several sources and/or methods were used to map flow directions and existing facilities. Contour maps, combined with site inspections, were used to define drainage areas and the direction of overland flow. City of Oakland storm drain maps, GE construction drawings and GE employees provided information regarding existing storm drain facilities. Dye testing was performed to verify the flow direction and discharge points of existing, on-site storm drains.

For convenience in discussion, the site has been divided into four major drainage areas (as shown on Figure 3-1 contained in pocket). Each drainage area contains a point where stormwater leaves the property. The largest drainage area, Drainage Area 1, is divided into five sub-areas called 1A, 1B, 1C, 1D and 1E. Sub-areas 1A, 1B and 1C correspond to major divisions of the on-site storm drain system. Sub-area 1D is that part of Drainage Area 1 where runoff is by overland flow or flow through swales. Sub-area 1E encompasses all off-site area estimated to contribute runoff to the GE property. A description of all major drainage areas and sub-areas is given in the following paragraphs. Figure 3-1 shows the drainage areas, flow directions and existing stormwater collection facilities.

Drainage area and sub-area characteristics are summarized in Table 3-1. Concrete, asphalt and roofs are considered to be impervious surfaces.

DRAINAGE AREA 1

Drainage Area 1 is that part of the site (plus off-site areas) that discharges to a City of Oakland storm drain in San Leandro Street via a 24-inch diameter storm drain located approximately 80 feet north of the southwest property corner. Two 15-inch diameter steel pipes and a 12-inch diameter corrugated metal pipe (CMP) discharge to the 24-inch diameter pipe at a junction structure at the property line (see Detail B on Figure 3-1).

Table 3-1. Drainage Area and Sub-area Characteristics

Drainage area number		Area, acres	Impervious area, percent
Area	Sub-area		
1	1A	2.50	95
	1B	1.45	75
	1C	0.57	100
	1D	16.32	35
	1E	1.80[a]	50[a]
	Total	22.60[b]	47[c]
2	-	2.56	20
3	-	0.90	40
4	-	0.064	100
	Total	26.12	-

[a]Estimates only.
[b]Sum of sub-areas.
[c]Weighted average.

The 12-inch diameter CMP is the principal storm drain for Sub-areas 1A, 1B and 1C. The two 15-inch diameter pipes drain Sub-areas 1D and 1E, although presently one of the pipes is completely clogged with dirt and debris.

Sub-area 1A

Sub-area 1A includes the roof area of Building 1 and the paved areas at the east and west ends of the building. The sub-area is drained by two 12-inch diameter storm drains, one on the north side and one on the south side of the building. Roof inlets on Building 1 and catch basins in the paved areas are connected to each storm drain. Flow is to the west end of Building 1 where the two storm drains join and discharge to a shallow triangular concrete gutter that runs parallel to the loading dock on the north side of Building 2.

Sub-area 1B

Sub-area 1B is composed of roof areas on the north side of Building 2, the south side of Buildings 4 and 6, and the loading docks and spur track area between these buildings. Runoff from these areas is collected in the shallow concrete gutter on the north side of Building 2 and by a 5-inch diameter pipe next to the loading dock serving Buildings 4 and 6.

Runoff from the roof of Building 2 is discharged above the concrete gutter by downspouts through the loading dock as shown in Section 1/1 on Figure 3-1. This gutter is covered with sections of steel checkerplate and has very little flow-carrying capacity for most of its length; water flows over the steel plates but is confined between the loading dock and the spur track ballast. At the downstream (west) end of Building 2, the triangular gutter changes to a rectangular channel approximately 12 inches deep as it goes under a service road. On the west side of the service road, the channel is again open (no steel plate covering) for approximately 70 feet; it then goes underground as a 12-inch diameter pipe. This 12-inch diameter pipe joins another pipe of the same size from Sub-area 1C at a concrete junction box

next to the GE spur track. A single 12-inch diameter pipe leaves the junction box and connects to the discharge point of Drainage Area 1, the junction structure at the west property line.

Approximately 75 percent of the roof area on the south side of Building 4 drains by downspout directly to the loading dock and then to the spur track ballast. The other 25 percent drains to Drainage Area 3 on the north side of the building. A 5-inch diameter perforated pipe drains the track ballast and conveys the water to the west. Downspouts from the south half of the roof of Building 6 connect to the 5-inch diameter drain along the tracks. The drain continues west along the spur and then turns south to join the rectangular channel under the service road.

Sub-area 1C

Sub-area 1C is the roof area on the south side of Building 2. Downspouts are connected to a 12-inch diameter pipe carrying runoff to the concrete junction box shown on Figure 3-1. The upper (east) end of this storm drain is connected to a sump outside Building 8. This sump receives overflows from the cooling tower and rinse water collected in a sump inside Building 8.

Sub-area 1D

Sub-area 1D includes all areas on the site contributing runoff by overland flow to the 15-inch diameter steel pipes. This includes the parking lots, paved areas on the south side of Buildings 1 and 2, the roofs of Buildings 5, 7, 8, 17 and 18, and unpaved areas south of the GE spur track. (Some runoff from Sub-area 1D enters the 12-inch diameter CMP from Sub-areas 1A, 1B and 1C at a low area next to the west fence line. A section of the pipe was damaged several years ago and was replaced with a piece of 12-inch diameter steel pipe. Slots were cut in the steel pipe to drain the low area.)

Runoff from Sub-area 1D flows south and away from the buildings, concentrating in a shallow swale along the south property line. Much of the swale is covered with grass, especially in the lower reach. East of Building 17, however, the grass cover is negligible.

Sub-area 1E

Sub-area 1E is the off-site area contributing stormwater to the GE property. An exact configuration of Sub-area 1E was not possible due to not mapping the area south of the GE property; however, site inspections seem to indicate that Sub-area 1E includes part of a large paved parking lot next to the spur track on the south. In addition, this sub-area includes land between the spur track and the main railroad track on the west plus land between the spur track and buildings south of the GE property.

Although runoff from Sub-area 1E may cross the tracks at several points along the spur track, the main drainage point appears to be an 18-inch diameter CMP culvert approximately 150 feet from the southwest corner of the property along the south property line. The spur track embankment tends to act as a dam, directing runoff to the culvert inlet.

It appears that water from the Stokeley-Van Camp property is also periodically discharged onto GE property. The actual entry point of these waters has not been discovered but may be either the 18-inch diameter CMP culvert or a low spot in the spur track opposite the east end of Building 17.

Runoff also enters the GE property at the southwest corner. Runoff is by overland flow from the area between the main tracks and the spur track.

DRAINAGE AREA 2

Drainage Area 2 is the area north of the GE spur track between the Western Pacific railroad tracks and the end of Building 6. Water drains by overland flow and by shallow swales to a depression along the west fence line. Once the depression is filled, stormwater flows north along the main tracks.

DRAINAGE AREA 3

Drainage Area 3 is the area between the north fence line and the north side of Buildings 1, 4 and 6. Downspouts from Buildings 4 and 6 also contribute runoff to Drainage Area 3. Stormwater flows west in a grassy swale along the fence line to the plant entrance at East 12th Street. There the water flows in the gutter to a catch basin at 54th Avenue, connected to the 54th Avenue storm drain.

Some of the runoff from Area 3 may cross over into property adjacent to the site, especially behind Building 1 where the swale along the fence line is poorly defined. However, grass and other vegetation along the fence may minimize this crossover.

As shown on Figure 3-1, there is an abandoned City of Oakland storm drain along the fence line in Area 3. This storm drain (a 5-foot by 2-foot, 8-inch concrete box culvert) was plugged and abandoned after construction of the 54th Avenue storm drain. Prior to construction of the box culvert, there was an open ditch along the fence line that carried stormwater through the property.

DRAINAGE AREA 4

Drainage Area 4 is the roof of the original part of Building 3. Two roof inlets are connected to a common pipe which discharges stormwater at the curb face. The water then flows down East 14th Street to near Seminary Avenue where it empties into the Seminary Creek storm drain.

Later additions to Building 3 have roof downspouts discharging to the ground. The area around the building is part of Sub-area 1D.

CHAPTER 4

PCB DISTRIBUTION AND WATER QUALITY

Samples of soils from all soil borings and monitor wells and samples of fluids from all monitor wells completed during the Phase II field investigation were collected and analyzed for PCB concentration. Testing permitted identification of Aroclors 1016 through 1262, but only Aroclor 1260 was found in measurable quantities. Fluid samples from all Phase II wells were also analyzed for Freon extractables. In addition, a chlorobenzene analysis was performed on selected soil and fluid samples. Information generated during Phase II is combined and presented in this chapter with results from the Phase I and Ib reports. Figure 4-1 (included in pocket) is a site map showing all soil borings and monitor wells completed through all phases of the project.

PCB DISTRIBUTION IN SOILS

Soil samples were collected during the drilling of all Phase II soil borings, monitor wells and multi-cased wells. Samples were collected in a drive sampler through hollow-stem augers according to the procedure presented in Appendix B-2. Samples were collected at 5-foot intervals beginning at the ground surface. If a sand or gravel zone was encountered, continuous samples were collected.

Analyses were not performed on all soil samples collected. For the soil borings and shallow monitor wells, the first three samples at 0, 5 and 10 feet were initially analyzed. If these samples had detectable levels of PCBs, additional samples were analyzed until nondetectable limits were found. If the samples from 0 to 10 feet had nondetectable levels of PCBs, no additional samples were analyzed. For deep monitor wells, the first three samples at 25, 30 and 35 feet were initially analyzed and the same procedure described above was used to determine the need for any additional analyses. All soil samples collected from the three multi-cased wells (W791, W792 and W793) and those soil borings and monitor wells near the oil plumes (W735, W757A, W757B, S724, S725, S723 and W741) were analyzed for PCBs. The analytical procedure used on the soil samples and the results of PCB analyses for all soil borings and monitor wells to date are presented in Appendix C.

Results of Previous PCB Soil Analyses

Results of PCB analyses determined during the Phase I and Phase Ib Problem Definition Studies are discussed in two previous reports submitted to the State of California in June 1980 and September 1980. Previous reports show the results by area on the site; the boundaries for Areas I, II and III are shown on Figure 4-2 (included in pocket), which presents all PCB soil analyses performed to date. Figure 4-3 is a color coded map showing soil PCB distribution on site.

Phase I Report Conclusions. In Area I, surface PCB concentrations range from less than 0.1 to 220 parts per million (ppm), with random distribution of the higher contamination levels. Higher PCB levels are restricted to near the surface and generally decrease to nondetectable levels by a depth of 5 feet.

In Area II, surface PCB concentrations range from 0.33 to 1,900 ppm. PCB concentrations generally attenuate with depth, but lenses of oil-saturated soils with very high PCB concentrations are present. Oil contamination exists in soils from shallow to intermediate depths with a greatest observed depth of 25 feet.

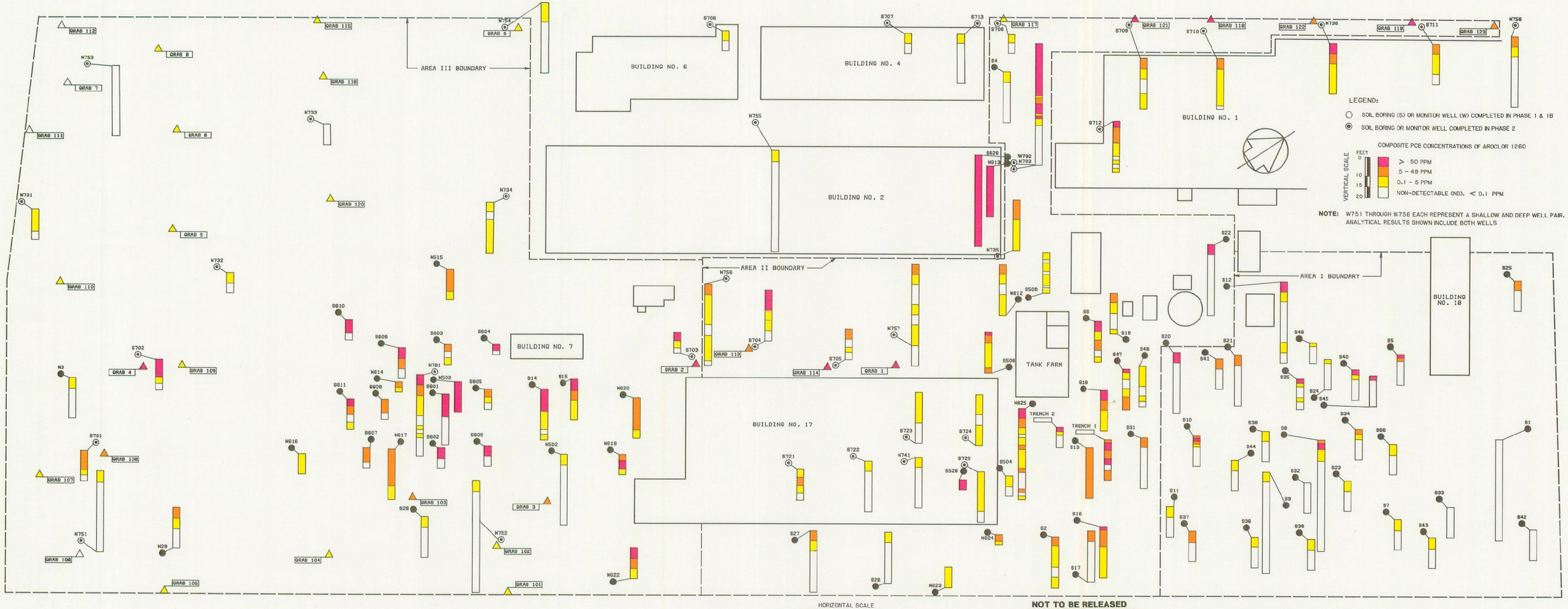
Phase Ib Report Conclusions. In Area II, near surface samples from all unpaved surfaces have PCB concentrations greater than 5 ppm. The areal extent of the subsurface oil plume is estimated as shown on Figure 4-4. The vertical extent of oil contamination was found to be no greater than 32 feet based on the drilling and construction of multi-cased well W625. Measurable concentrations of PCBs were found to extend to a depth of 46 feet at soil boring S626 during the Phase Ib work. Drilling and construction of multi-cased well W792, however, indicated that deeper soil samples in S626 had been contaminated due to the drilling technique used.

The southern portion of Area III, approximately one-fourth of the total Area III, has surface soils with detectable concentration of PCBs. Where found, the depth of detectable PCB concentrations extends to about 2 feet except at well W503, where it extends to a depth of 15 feet.

Results of Phase II PCB Analyses

PCB soil analyses are shown on Figure 4-2. The PCB detection limit for soil samples was 0.05 ppm. Those soil samples which have PCB concentrations greater than 5 ppm are presented in Table 4-1 and in Appendix C-4. During the Phase II investigations, drilling activities were restricted to Areas II and III.

In the western part of the property (Area III), detectable PCB concentrations extend to a maximum depth of 10 feet at soil borings S701 and S702 and monitor well W731. Around Building 7, detectable



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PCB DISTRIBUTION

FIGURE 4 - 3

GC1031 RES 23APR81

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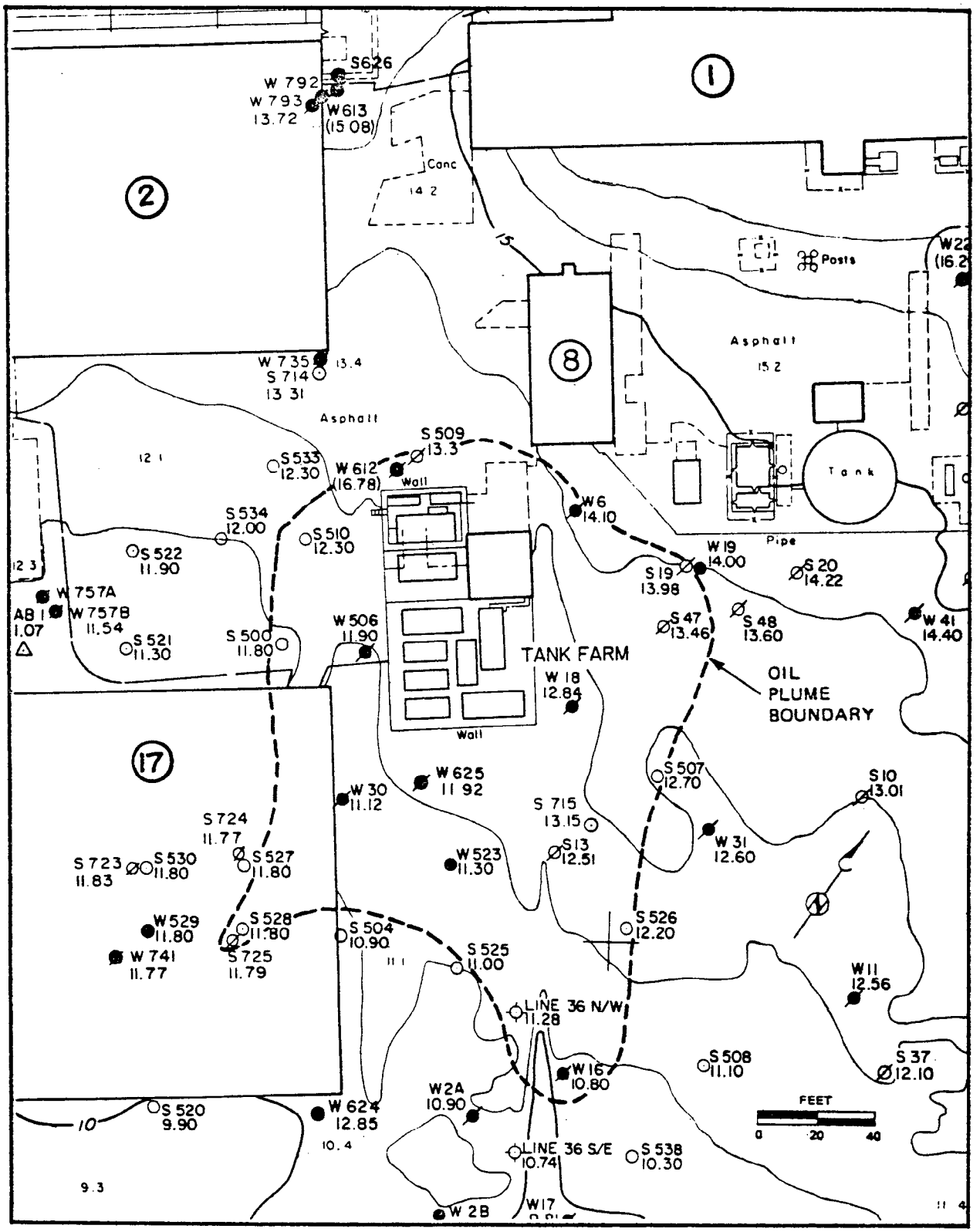


LEGEND

○ S504 SOIL BORING ● W30 MONITOR WELL ⑧ BUILDING NUMBER

Figure 4-4 Locations of Soil Borings and Monitor Wells in the Oil Plume Control Area

PCB concentrations extend to a depth of 20 feet. The highest surface soil concentration of PCBs in Area III found during Phase II was 2,500 ppm, at S702. Concentration levels in S702, however, attenuate to nondetectable levels at a depth of 15 feet.

Table 4-1. Phase II Soil Analyses Greater Than Five Parts per Million PCB (Aroclor 1260)

Boring or well number	Depth, feet	PCB concentration, ppm
S701[a]	0	33
	5	27
S702	0	2,500
	5	640
S703	0	840
S704	0	1,900
	5	110
S705	0	25
S709	0	25
S710	0	24
	5	5
S711	0	21
W736[b]	0	510
	5	11
W757A	0	10
W758A	0	42
W791	0	83
	5	5
W792	1	5,500
	5	4,600
	10	4,600
	11.5	3,800
	15	900
	20	1,400
	25	1,100
	27	11
	30	890
	33	500
	36	210

[a]S = soil boring.
[b]W = monitor wells.

Multi-cased well W791 is a deep monitor well constructed below anticipated shallow contamination. Well W503, which is adjacent to W791, has PCB concentrations of 130 to 400 ppm, to a depth of 15 feet. Analyses from W791 show a concentration of 83 ppm at 0 feet, which attenuates to approximately 5 ppm by 10 feet, and less than 0.12 ppm below 10 feet. The well is completed in a sand zone from 35 to 40 feet; the PCB concentrations in that zone are nondetectable. It should be noted that detectable concentrations equal to 0.12 and 0.05 ppm PCBs were measured at 26 and 32 feet in W791 whereas samples at 20 and 25 feet have nondetectable levels. These samples may have been contaminated in the field during sampling.

Along the northern part of the property (between Buildings 6, 4 and 2 and the border), the maximum concentration of PCBs, 510 ppm, was measured in the surface sample at soil boring W736. In all holes, concentration levels attenuate with depth. Detectable levels extend to a depth of 25 feet at S710, S709 and W736, to a depth of 15 feet at S711 and to a depth of 10 feet at W758A.

Between Buildings 17 and 2, detectable levels of PCB extend to a depth of 35 feet, but levels are less than 1 ppm below 10 feet.

In soil samples collected inside Building 17, all PCB analyses are less than 5 ppm. Detectable levels were measured only in the surface samples in S722 and W741 and were measured to a depth of 10 feet in S723 and to a depth of 25 feet in S724 and S725.

Table 4-2. Comparison of PCB Soil Analyses

Depth-feet	PCB concentration (Aroclor 1260)[a]		
	Well W613	Boring S626	Well W792
0 - 1	1,300	11,000	5,500
5 - 6	1,100	3,100	4,600
10 - 11	1,000	6,100	4,600
11 - 12	-	-	3,800
15 - 16	520	2,600	900
20 - 21	850	6,500	1,400
25 - 26[b]	5,800	5,100	1,100
26 - 27	-	-	2
27 - 28	-	-	11
30 - 31	-	1,500	890
33 - 34	-	-	500
35 - 36[c]	-	710	210
36 - 37	-	-	1
40 - 41	-	75	1
42 - 43	-	-	ND[d]
45 - 46	-	210	-
50 - 51	-	-	ND[d]

[a]In parts per million.

[b]Depth of Casing No. 1 in well W792.

[c]Depth of Casing No. 2 in well W792.

[d]ND = nondetectable, <0.05 parts per million.

The highest PCB concentrations measured in Phase II are from multi-cased well W792 in Area II near Building 2. Values of 3,800 to 5,500 ppm were measured from the ground surface to a depth of 11.5 feet. Between 15 and 25 feet, concentrations range from 900 to 1,400 ppm. Concentrations decrease from 26 to 28 feet with values of 2 to 11 ppm, and then increase to 500 to 890 ppm, from 30 to 33 feet. Below 33 feet, concentration values decrease to nondetectable levels. These results do not support the analyses from soil boring S626, located less than 5 feet from W791, which show a PCB concentration equal to 210 ppm at a depth of 45 feet. The second surface casing in W792, which extends to a depth of 35 feet, apparently prevented shallower contamination from contaminating the samples below 35 feet. Evidently, high levels of contamination at shallow depths in S626 (drilled in Phase Ib) were transported downward, resulting in moderately high levels below a depth of 35 feet. A comparison of the PCB soil analyses at W792 and S626 is shown in Table 4-2. The results of W792 show that the vertical extent of contamination is a maximum of 35 feet in the vicinity of the multi-cased well.

Results of Phase II drilling confirm the extent of the oil plume shown in the September 1980 report, which is presented on Figure 4-4. Of the drilling done in Phase II, only well W735 had any evidence of free oil. Oil droplets were observed on the tubing used to pump W735; however, no observable thickness of oil was present on the water in the well.

PCB AND FREON EXTRACTABLE FLUID ANALYSES

Fluid samples were collected from monitor wells and multi-cased wells completed during Phase II field investigations. Each well was developed by pumping or bailing in order to clean the sediment accumulated during drilling and remove any stagnant fluids. After each well produced clear, nearly sediment-free water, a sample was collected. A detailed description of the well development and sampling procedure is presented in Appendix D.

Fluid samples were analyzed for concentrations of PCB and oil and grease using the Freon extractable method. If the sample was found to have detectable limits of PCB (over 0.3 parts per billion (ppb), it was then filtered to remove suspended solids and reanalyzed. This procedure was used because PCB is adsorbed onto the fine-grained soil particles which remain in suspension in the fluid samples.

The analytical procedure used to determine the PCB and Freon extractable concentrations and the laboratory results are presented in Appendix E.

PCB fluid analyses and oil and grease analyses done by the Freon extractable method which have been completed to date are presented on Figure 4-5 (contained in pocket). The PCB detection limit for fluids is 0.3 ppb and the Freon extractables detection limit is 5.0 ppm. Analyses of fluid samples which have detectable concentrations of either PCBs or oil and grease are shown in Table 4-3. In this table, wells W2A through W620 were constructed during Phases I and Ib and wells W735 through W793 were constructed during Phase II.

Previous PCB and Freon Extractable Analyses

Results of fluid PCB analyses determined during the Phase I and Phase Ib Problem Definition Studies are discussed in two previous reports dated June 1980 and September 1980. Analyses of PCB and Freon extractables determined during these studies are summarized in Appendix E.

Phase I Report Conclusions. In Area I, only well W35B had a water sample with a detectable concentration of PCB; the concentration reported was 0.33 ppb.

In Area II, oil contamination of the groundwater was found in 13 wells and soil borings. The oil is in saturated fill, shallow sand lenses, and in a semicontinuous sand layer at a depth of approximately 20 feet. PCB concentrations of the oil as great as 6,000 ppm were measured.

Table 4-3. Fluid Analyses With Detectable Levels of PCBs or Freon Extractables

Well number	Total PCBs, ppb	Filtered PCBs,[a] ppb	Freon extractables, ppm
W2A	0.63	-	9
	0.74	ND	-
	1.7	ND	-
	4.4	ND	-
W17	15	-	ND
	2.2	ND	-
	1.4	ND	-
W26	ND	-	8
W27	ND	-	13
W35B	0.33	-	-
	1.9	ND	-
W503	47	-	23
W516	ND	-	10
W524	ND	-	5
W540	ND	-	795
	-	-	65
	-	-	22
	-	-	10
	-	-	6
W541	ND	-	465
W613	430	0.80 (ND)[b]	-
W614	1.4	ND	-
W615	2.1	ND	-
W616	0.50	ND	-
W619	0.52	ND	-
W620	1.0	ND	-
W735	1.8	ND	ND
W736	1.1	ND	8
W751A	ND	-	7
W752A	ND	-	6
W752B	ND	-	10
W756A	0.36	ND	ND
W757A	ND	-	8
W758A	0.43	-	6
W792	1.3	ND	ND
W793	ND	-	7

[a]Sample filtered through Reeve Angel 934 AH 1.25 micron glass fiber filter paper; filtrate analyzed.

[b]Sample filtered first with 1.25 micron, then with 0.45 micron glass fiber filter paper; filtrate analyzed.

Note: Dash (-) indicates not analyzed; ND = not detectable, < 0.3 ppb PCB < 5 ppm Freon extractables.

Phase Ib Report Conclusions. In Area II, only three well samples from W2A, W17 and W613 had detectable concentrations of PCBs. The samples from W2A and W17 were 0.63 and 15 ppb respectively, when filtered; the concentration of the filtrates was nondetectable. The sample from well W613 showed PCBs of 430 ppb micrograms per liter unfiltered and 0.8 ppb when filtered. Samples from well W540 originally showed oil droplets and Freon extractables equal to 795 ppm; however, extensive cleaning and development of the well produced clean samples, indicating the well had been contaminated during drilling and well construction.

In Area III, unfiltered samples from six wells (W503, W614, W615, W616, W619 and W620) had detectable concentrations of PCBs ranging from 0.5 to 47 ppb. All of these six samples had nondetectable concentrations after filtering.

Results of Phase II PCB and Freon Extractable Analyses

Fluid samples were collected from all 26 wells constructed during the Phase II study. As shown in Table 4-3, only ten of these wells have detectable concentrations of PCBs or oil and grease. The concentrations shown are relatively low when compared to the concentration values of samples collected in Phases I and Ib. Unfiltered PCB concentrations range from 0.36 ppb at W756A to 1.8 ppb at W735; unfiltered concentrations are all less than the detectable limit of 0.3 ppb. Oil and grease concentrations range from 6 ppb at W752A to 10 ppm at W752B.

CHLOROBENZENE SOIL AND FLUID ANALYSES

Soil and fluid samples were collected from borings and monitor wells selected by the state. These samples were analyzed for all isomers of dichlorobenzene, trichlorobenzene, and tetrachlorobenzene. The analytical procedure for the soil and fluid analyses for chlorobenzenes and the laboratory results are presented in Appendix F.

Soil samples were collected at 0 feet, 12 1/2 feet and 25 feet from soil boring S714, adjacent to well W735, and at 3 feet, 4 feet and 5 feet from soil boring S715, adjacent to Trench No. 1. These samples were collected in the same manner as described in Appendix B, for the PCB soil samples, except that the ends of the brass tubes were sealed with aluminum foil and then plastic.

The analytical results from the soil samples are presented in Table 4-4. As shown, all six soil samples have nondetectable concentrations of total chlorobenzenes (less than 1.0 part per million).

Table 4-4. Chlorobenzene Analyses of Soil Samples

Soil boring number	Depth, feet	Total chlorobenzene concentration, ppm
S714	3 - 4	ND[a]
	12.5 - 13.5	ND
	25 - 26	ND
S715	3 - 4	ND
	4 - 5	ND
	5 - 6	ND

[a]ND - not detectable, <1.0 ppm.

Fluid samples were collected from monitor wells W612, W613, W614 and W625 after a thorough development by pumping. The samples were collected with a bailer and placed into an air-tight sample jar.

The analytical results from the fluid samples are presented in Table 4-5. As shown, the concentrations range from nondetectable (less than 0.001 ppm) at well W624 to 11.7 ppm at well W613.

ANALYSES OF ON-SITE SUMPS

Table 4-5. Chlorobenzene Analyses of Fluid Samples

Well number	Total concentration chlorobenzene, ppm
W612	0.017
W613	12
W624	-[a]
W625	0.005

[a]Not detectable, 0.001 ppm.

Five on-site sumps were identified by the state for sampling and PCB analysis of fluid and sediment. The locations of these sumps are shown on Figure 2-1. Sumps 1 through 4 were sampled for fluid and sediment but sump 5 was found to be dry, and thus was not sampled. The analytical results are shown on Figure 4-5 and presented in Appendix C-6. The PCB concentrations of the fluid samples range from 1.3 to 180 ppb, while the concentrations of the sediment samples range from 6.8 to 62 ppm.

CHAPTER 5

GROUNDWATER SYSTEM

This section presents information and results which provide a more detailed characterization of the on-site groundwater system. The discussion presented herein is in response to specific information requested within Attachment A of Cleanup and Abatement Order Number 80-011, which is shown in Appendix A-1 to this report. Of the eight items requested under hydrogeologic information in that document, the following six items are discussed in this chapter:

1. Identify the upper level groundwater flow direction and velocity beneath the plant property and immediate vicinity, particularly beneath Buildings 1, 2, 4, 6, and 17.
2. Determine discharge and recharge areas of the water table aquifer(s).
3. Discuss the source and fluctuations of the groundwater mound beneath the tank farm identified in the Phase Ib findings.
4. Determine if there are tidal and/or seasonal fluctuations of the water table aquifer and the extent of any fluctuations.
5. Determine the depth to the confined aquifer(s) under the site.
6. Determine if there is hydraulic continuity between the shallow aquifer and the deepwater aquifer from which local well systems are drawing water.

The work which has been done to answer these questions is described in the Phase II Problem Definition Work Plan included in Appendix A-4 to this report. The above listed six items are discussed in order in the following sections.

UPPER LEVEL GROUNDWATER FLOW DIRECTION AND VELOCITY

The upper level groundwater regime is defined in the work plan (Appendix A-4, page 10) as the saturated soils to a depth of 60 feet. Because the on-site stratigraphy is a complex sequence of silty clay and discontinuous sand and gravel lenses and stringers, the flow directions cannot be accurately determined.

Therefore, the groundwater flow system has been treated as a single, homogeneous layer extending to a depth of 60 feet with anisotropic permeability conditions in the horizontal and vertical directions.

Construction of Flow Nets

In order to determine the groundwater flow directions, two flow nets were constructed, one in plan view to represent horizontal flow and the other in cross section to represent vertical flow. April 1981 water level elevations were used to construct these flow nets because they are the only measurements from the Phase II wells. Also, the April measurements are the highest annual water level elevations and thus exhibit the greatest groundwater gradients and greatest potential for variation in flow direction and velocity.

The plan view flow net was constructed using water level elevations from the shallow wells, which are those wells less than 30 feet deep. These water level elevations were used to construct equipotential water level contours according to standard flow net construction techniques[1]. Flow lines were then constructed based on these contours. The resultant plan view flow net is shown as Figure 5-1.

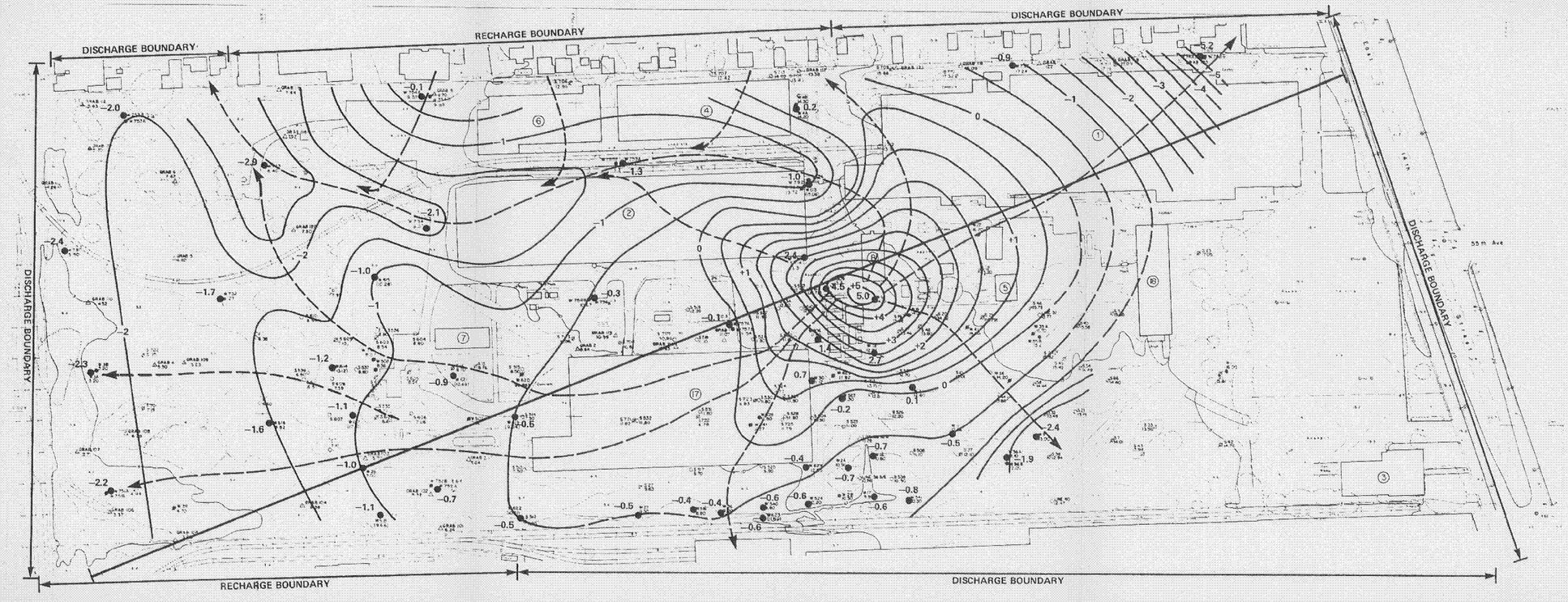
Since the groundwater system exhibits vertical to horizontal anisotropy, cross-sectional flow net construction is more complex than for plan view net. In order to allow construction of flow lines perpendicular to the equipotential contours in cross section, the vertical scale for the flow net must be adjusted by the square root of the ratio of the horizontal to vertical permeability for the homogeneous layer being considered.[2]

Table 5-1. Representative Permeabilities of On-Site Materials

Material type USC designation[a]	Vertical permeability, cm/sec	Horizontal permeability, cm/sec
GP	1×10^{-3}	1×10^{-2}
SW	1×10^{-4}	1×10^{-3}
SP	1×10^{-4}	1×10^{-3}
SM	1×10^{-7}	5×10^{-4}
SC	1×10^{-7}	5×10^{-4}
ML	4×10^{-8}	4×10^{-8}
CH	4×10^{-8}	4×10^{-8}
CL	4×10^{-8}	4×10^{-8}

[a]The Unified Soil Classification (USC) is presented in Appendix B-3.

Average values for horizontal and vertical permeabilities were calculated using the lithologic data from the drilling logs for all on-site soil borings and monitor wells. Representative permeabilities were assigned to each soil type encountered on site using data from field slug tests performed during the Phase Ib work and laboratory permeability tests performed during Phase I work. These representative permeabilities, which are presented in Table 5-1, are substantiated by permeability values presented in several references.[3,4,5]



LEGEND:

-1.0 ● WELL LOCATION AND WATER ELEVATION IN FEET, APRIL 1981

-2 — CONTOUR LINE OF EQUAL WATER LEVEL ELEVATION IN FEET

SHALLOW GROUNDWATER FLOW DIRECTION

LINE OF CROSS-SECTION FOR FIGURE 5-2, CROSS-SECTIONAL FLOW NET

NOTES:

ELEVATIONS BASED ON OAKLAND DATUM = 2.998 FEET BELOW MEAN SEA LEVEL

SHALLOW WELLS ARE LESS THAN 30 FEET TOTAL DEPTH

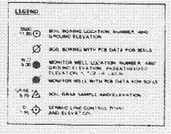


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FIGURE 5 - 1

PLAN VIEW FLOW NET AND SHALLOW GROUNDWATER FLOW REGIME

An average vertical permeability for the site was determined by calculating the average vertical permeability at each well and boring[2] and then averaging all of these values weighted by depth of the particular boring or well. The resultant average vertical permeability for the on-site material from 0 to 60 feet is 5×10^{-8} centimeters per second (cm/sec).

An average horizontal permeability for the site was determined by calculating an average horizontal permeability for specific depth intervals and averaging the layers weighted by thickness of each interval.[2] The resultant average horizontal permeability for the on-site material from 0 to 60 feet is 3×10^{-4} cm/sec.

The square root of the ratio of the horizontal permeability to the vertical permeability is approximately 80 to 1. Thus, the cross-sectional flow net was constructed at a vertical exaggeration of 80 to 1. Water levels were contoured with the position of the well on the cross section plotted at the elevation of the midpoint of the screened interval. Flow lines were then constructed using the equipotential contours to depict variations in the flow direction within the cross-sectional view. For purpose of presentation, the flow net scale was then reduced to a more appropriate vertical exaggeration. The resultant cross-sectional flow net is presented on Figure 5-2. The detail of contouring shown on this figure is extreme because of the construction technique used.

Flow Direction

The horizontal flow directions, for shallow wells less than 30 feet deep, are presented on Figure 5-1 as dashed lines with arrows. As shown, groundwater moves in all directions away from the water level mound centered near the tank farm. Movement is indicated away from the tank farm area in the following directions: to the north under Building 1, to the east near well W9, to the southwest under Building 17, and to the west under Building 2. Groundwater is also shown to move in a southerly direction onto the site from the northwest under Buildings 6 and 4.

The vertical flow direction is presented on Figure 5-2 as dashed lines with arrows. As shown, groundwater moves downward and away from the water level mound at well W612 in the following directions: to the south as nearly horizontal flow at a depth of about 20 feet towards well W751A; downward and to the south at a depth of about 40 feet towards well W752B; and downward towards the north at a depth of about 30 feet towards well W35A, to the south at a depth of 50 feet towards well W757B, and finally to the north at a depth of 55 feet towards well W35B. These flow directions are the only ones indicated by the water level data as originating from near the ground surface. In addition, the flow net shows strong lateral flow at a depth of about 60 feet from south to north. As shown on Figure 5-2, the water levels in the deep wells to the

north and east, W36B, W35B, W1, and W758B, range from -24.6 to -26.3 feet, which are all at least 10 feet lower than the water levels in the other wells on site. Thus, the flow of groundwater is strongly towards these wells.

Flow Velocity

The groundwater velocity has been determined by point dilution testing done during the Phase II Study. A discussion of the methodology for this testing and the reference to the technique are presented in Appendix D-4; the field data are presented in Appendix D-5. The droplet from these tests represent the average velocity of a droplet of water in the saturated interstitial space between soil particles in the material adjacent to the perforated interval of the well. Because of the complex stratigraphy on site, the range in velocity determined at any one particular well may be several orders of magnitude.

Point dilution velocity tests were performed on wells W791, W529, W735, and W41. These wells, located around the periphery of the groundwater mound, were selected to show velocity near the steepest groundwater gradients. Table 5-2 shows the results of the velocity tests and Figure 5-3 shows the velocity and direction of flow at the four wells tested. The resultant velocity determinations range from 2×10^{-5} to 1×10^{-2} cm/sec with average velocities ranging from 5×10^{-4} cm/sec to 5×10^{-3} cm/sec. The velocities around the groundwater mound are higher than the remainder of the site due to the steep groundwater gradient near the tank farm. The groundwater velocities around the mound are equivalent to several feet per day.

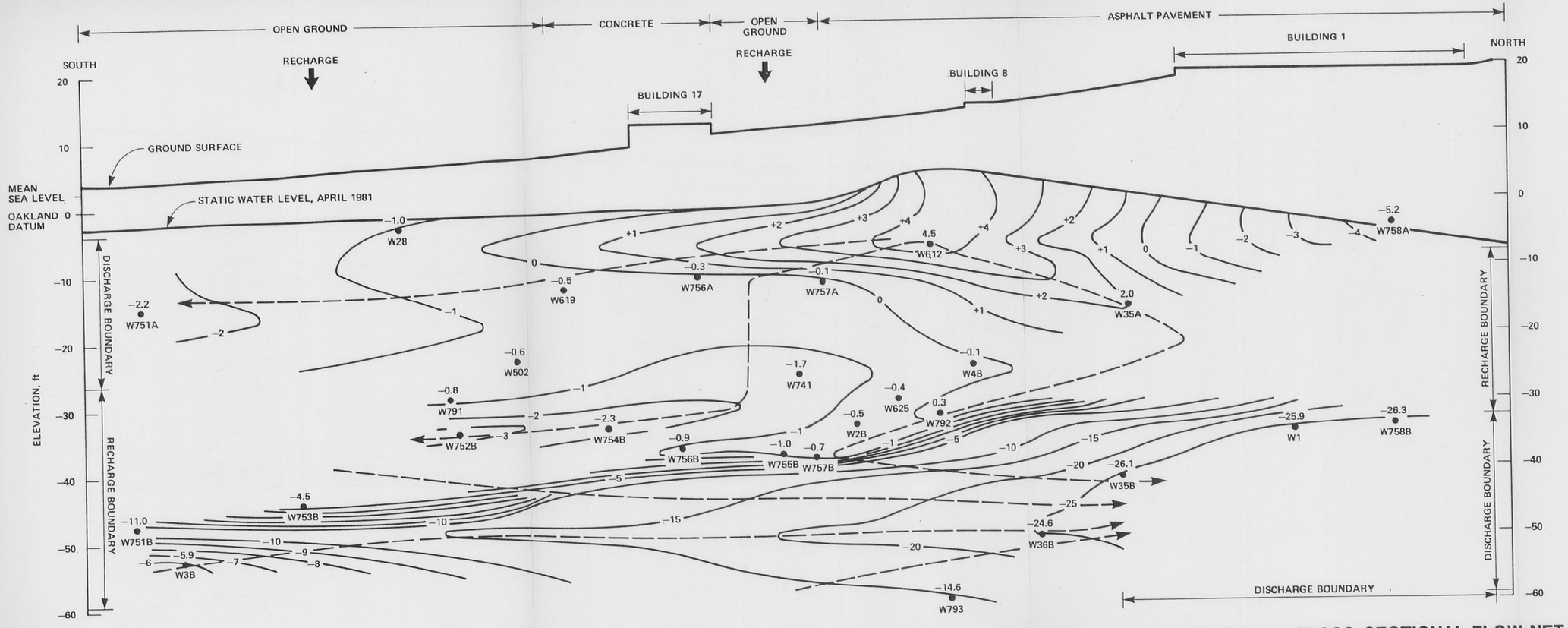
Table 5-2. Results of Point Dilution Testing

Monitor well	Depth of perforated interval, ft	Material at perforated interval (USC Designation)[a]	Velocity, cm/sec
W791	35 - 40	SC/SW	3×10^{-5} - 1×10^{-3}
W735	19 - 24	CL	2×10^{-5} - 6×10^{-3}
W529	15 - 20	CL	2×10^{-5} - 1×10^{-2}
W41	14 - 19	CL	6×10^{-5} - 1×10^{-3}

[a]The Unified Soil Classification (USC) is presented in Appendix B-3.

DISCHARGE AND RECHARGE AREAS

The terms discharge and recharge have been defined for use in this study as areas where groundwater leaves or enters across the boundaries of the site through an envelope defined by the site



LEGEND:

APRIL 1981 WATER LEVEL ELEVATION

MONITOR WELL ELEVATION PLOTTED AT MIDPOINT OF SCREENED INTERVAL

LINE OF EQUAL WATER ELEVATION

DIRECTION OF GROUNDWATER FLOW

NOTE:

ELEVATIONS BASED ON OAKLAND DATUM = 2.998 FEET BELOW MEAN SEA LEVEL

SCALE IN FEET

0 100 200

8 TIMES VERTICAL EXAGGERATION

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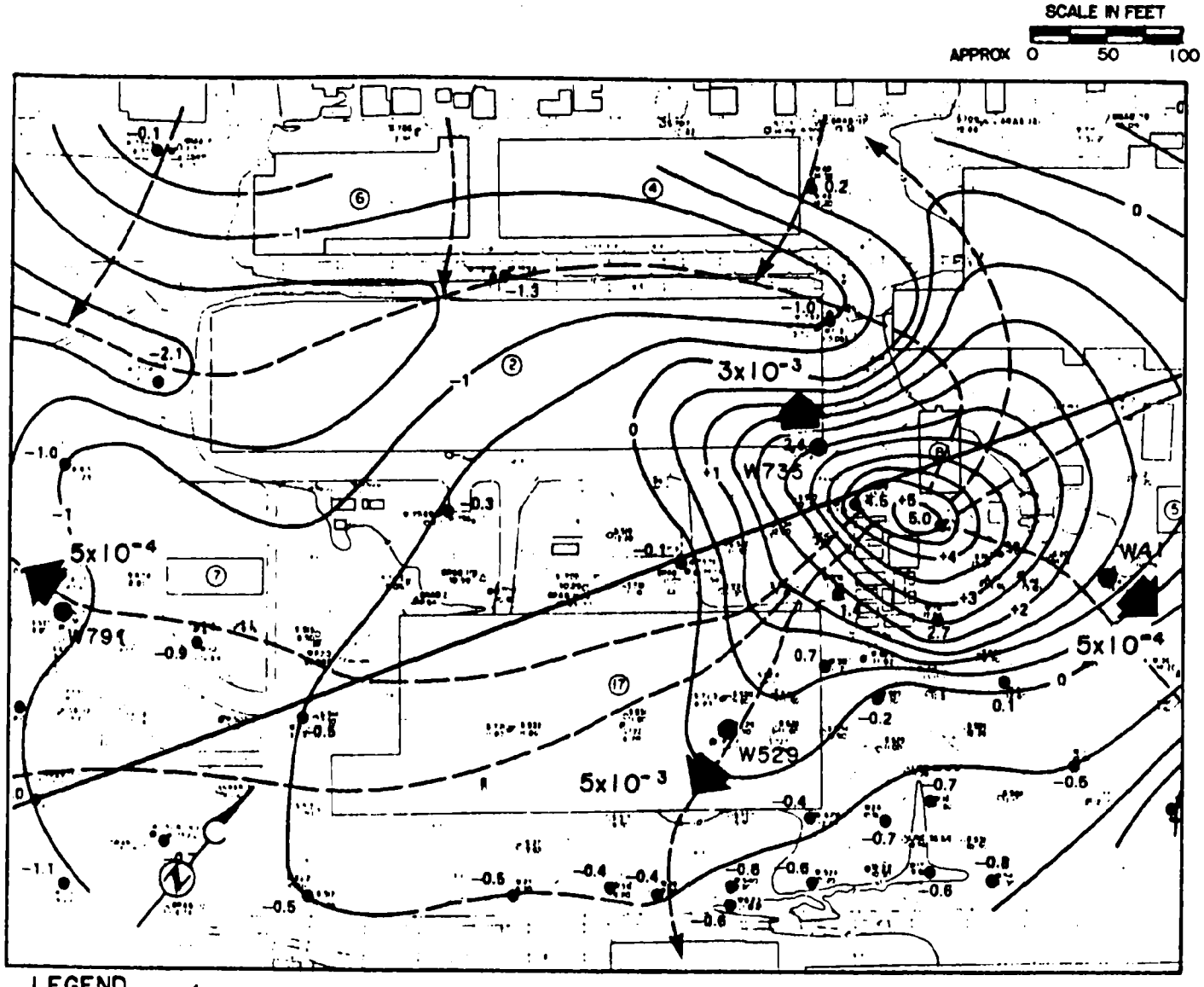
FIGURE 5-2 CROSS-SECTIONAL FLOW NET AND GROUNDWATER FLOW REGIME



GROUNDWATER FLOW VELOCITY AND DIRECTION **FIGURE 5 - 3**

boundaries and 60-foot depth. Groundwater discharge and recharge have been considered for both the horizontal, shallow groundwater flow, as shown on Figure 5-1, and for vertical groundwater flow at the cross section shown on Figure 5-2.

Figure 5-1 shows discharge and recharge boundaries of the site as defined by the flow net. Discharge boundaries are shown where groundwater flow which originates on site crosses the site boundary. These occur around most of the perimeter of the site except for two recharge areas: one in the south between wells W751A and W622 and the other in the northwest between a point about 250 feet northwest of well W754A and well W4A. As discussed previously, groundwater flow from the northwest is shown on Figure 5-2 in the vicinity of Buildings 6 and 4. In addition, recharge in the vertical sense will take place in all the areas on site which are not covered with buildings, asphalt, or concrete. This is due to infiltration of rainfall, especially in those areas where rainfall collects to form a surface pool for infiltration. The two areas where rainfall collects most noticeably are in the southern portion of the site in a triangular area bounded by wells W751A, W752A, and W614 and within the concrete walls of the tank farm.

Figure 5-2 shows discharge and recharge along the vertical site boundaries and across the lower boundary of the 60-foot-deep envelope. Discharge is shown to the south to a depth of about 30 feet, to the north from a depth of about 50 to 60 feet, and along the northerly bottom of the cross section. Recharge is shown from the south for a depth of about 30 to 60 feet and from the north from a depth of about 40 to 50 feet. Recharge is also shown onto the ground surface in the open areas from the south end of the line of section to Building 17 and from Building 17 to the asphalt pavement about 130 feet north of the building.

GROUNDWATER FLUCTUATIONS

Fluctuations in the water levels in monitor wells on site have been evaluated with respect to the location of the groundwater mound near the tank farm and the average seasonal fluctuations of all wells on site. In addition, an evaluation was made of the potential for fluctuations in the groundwater level due to tidal fluctuations.

Fluctuations of the Groundwater Mound

Hydrographs of three wells near the tank farm, W612, W18, and W30, are shown on Figure 5-4A. As shown on Figure 5-1, these three wells are within the groundwater mound as defined by the April 1981 water level elevations. The hydrographs on Figure 5-4A show that

the lowest water levels are in December prior to any rainfall and the highest water levels are in April at the end of the rainy season. The magnitude of fluctuation between December and April, for these wells, ranges from 6.6 feet in W612 to 9.7 feet in W30. Due to the relation of these fluctuations with the rainy season, it seems likely that the groundwater mound is caused by rainfall collecting in the diked tank farm area and slowly infiltrating down to the groundwater.

Seasonal Water Level Fluctuations

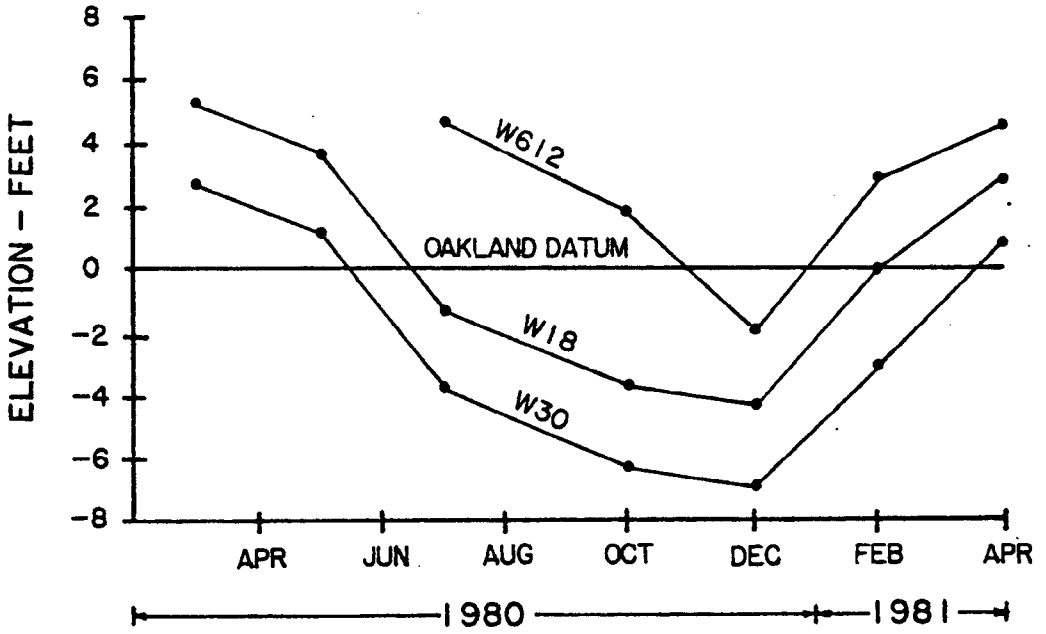
Hydrographs of three wells, W3A, W4A, and W27, were prepared, as shown on Figure 5-4B, to represent the seasonal flucutation of water levels on site, away from the influence of the tank farm. These wells were selected because of the distance from the groundwater mound and the full year of water level record. As shown on Figure 5-4B, the fluctuation for these wells has the same form as those wells on the tank farm with the minimum water level in December and the maximum water level in April. The magnitude of water level fluctuation for these three wells range from 8.6 feet at W4A to 10.1 feet at W27. This magnitude is similar to the magnitude of water level fluctuation for the three wells near the tank farm. This indicates that the seasonal water level fluctuation for wells in the groundwater mound is the same as the average seasonal water level fluctuations for wells on site.

Effect of Tidal Fluctuations

An evaluation of the potential effect of tidal fluctuations in San Francisco Bay on groundwater levels on the General Electric (GE) site has been made using a standard formula.[6] Using the average horizontal permeability for the site presented previously and available tidal information,[7] the fluctuation of groundwater levels on site due to tidal fluctuations are calculated to be negligible, approximately 0.01 inch.

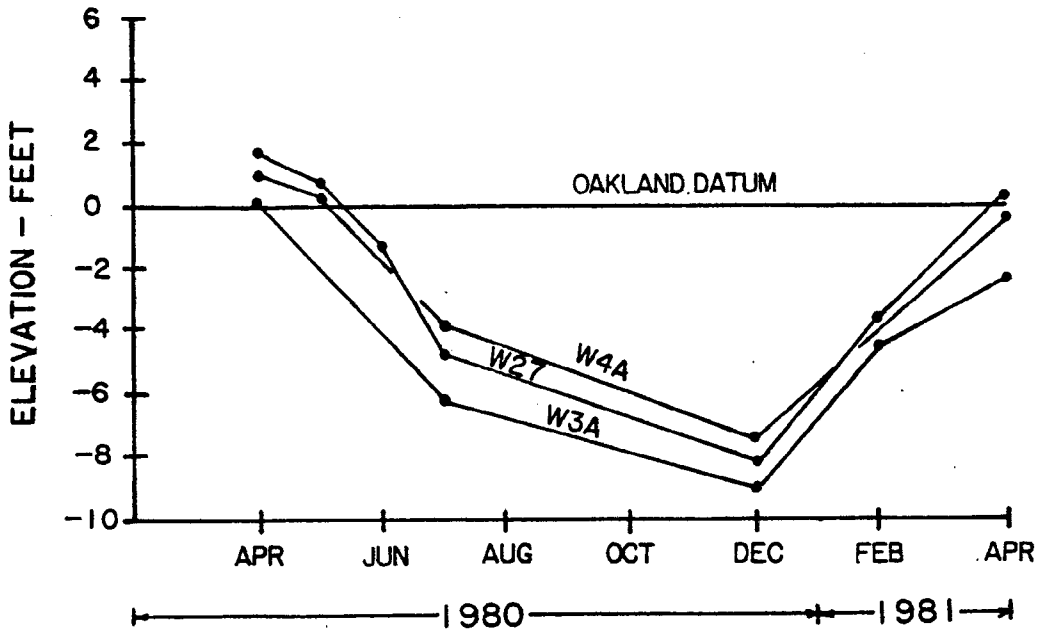
DEPTH TO CONFINED AQUIFERS

Off-site wells available for use in the identification of confined aquifers below the 60-foot-deep on-site shallow groundwater system are the Stokely-Van Camp and Safeway Stores wells. However, a driller's log was only made available by Stokely-Van Camp for their well. This well is on the property immediately southeast of the GE site and is identified as state well number T2S/R3W, 16D1. According to the log, this well was drilled to a depth of 1,025 feet in 1958 and originally was pumped at 260 gallons per minute.



WATER LEVEL FLUCTUATIONS AROUND THE TANK FARM

FIGURE 5 - 4A



SELECTED ON-SITE WATER LEVEL FLUCTUATIONS

FIGURE 5 - 4B

NOTE: OAKLAND DATUM EQUALS 2.998 FEET BELOW MEAN SEA LEVEL

The lithologic log for the Stokely-Van Camp well is shown on Figure 5-5. The perforations are shown to begin at a depth of 236 feet. Therefore, the shallowest confined aquifer zone open to this well is the clay, gravel, and boulders interval shown at a depth of 237 to 270 feet. Other potential aquifer zones, however, appear at a depth less than 236 feet. The gravel and boulders interval from a depth of 133 to 168 feet could produce water, but since this zone is sealed from the well, it is not certain.

Information from the Alameda County Flood Control and Water Conservation District indicates that the Safeway Stores well, on the East 14th Street property, is only 200 feet deep. It is possible that this well produces from the gravel and boulders interval shown in the Stokely well log at a depth of 133 to 168 feet. However, no information was made available on this well.

Hydraulic Continuity

An assessment was made of the potential for hydraulic continuity and possible transport of PCBs between the shallow groundwater system and the confined aquifers identified in the previous section.

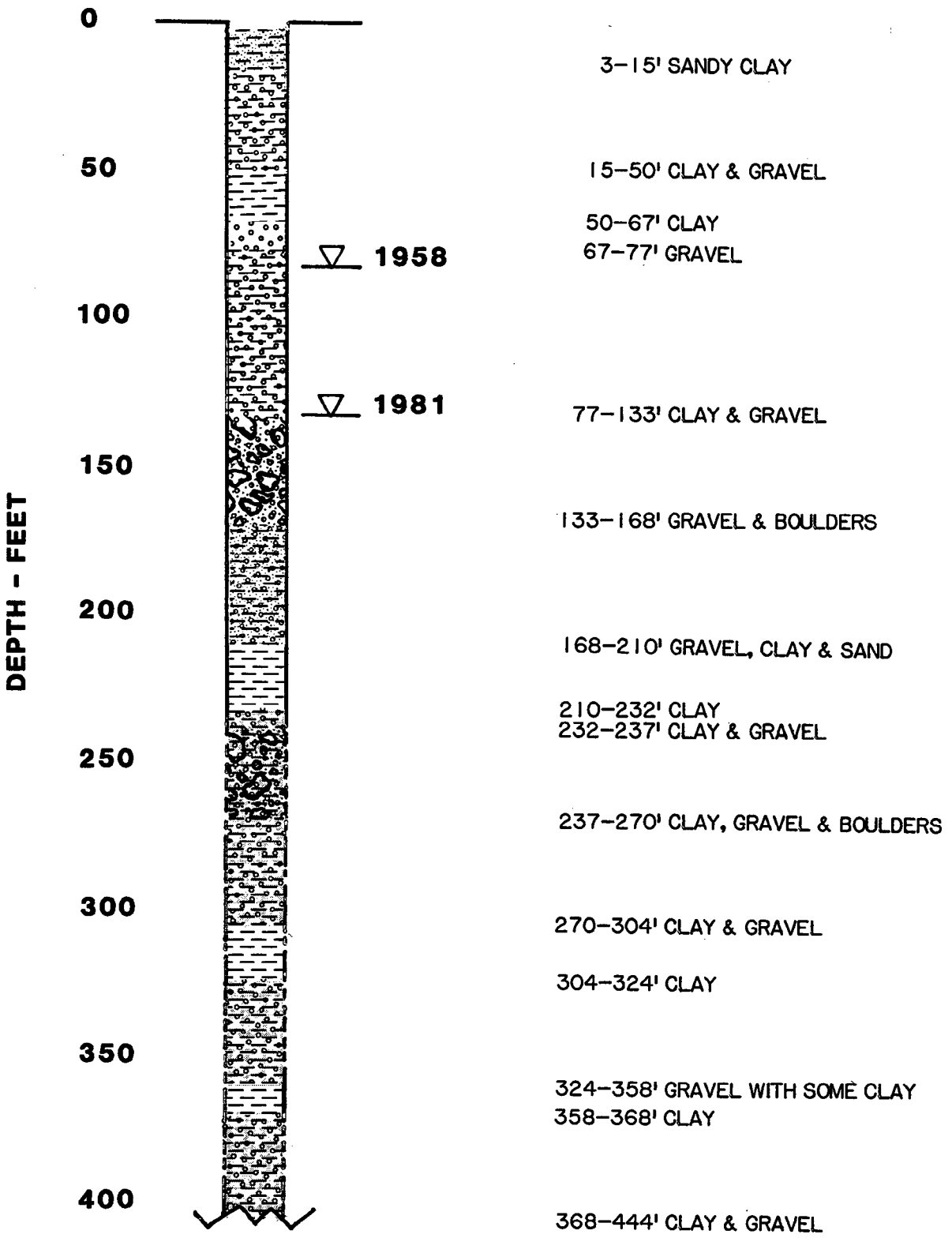
As a worst case approach a vertical velocity was calculated assuming movement of PCBs with the groundwater. The average vertical permeability determined for on-site material, the hydraulic gradient between shallow and deeper wells on site, and the difference in water levels between on-site wells and the Stokely-Van Camp well were used to calculate a vertical velocity of 2×10^{-3} feet per day. This translates to 30 feet of movement in 40 years, the assumed period of significant Pyranol usage on site. This depth is about the maximum depth of PCB contamination on site, both in the oil plume and at the northern corner of Building 2.

Additional evidence supports the conclusion that vertical migration of PCBs from the shallow on-site groundwater system to the deeper confined aquifers is insignificant; for example:

1. The strong affinity of PCBs for clayey soils which are prevalent on site.[8]

2. The complex flow path in the shallow groundwater system shown on Figure 5-2.

3. Velocities of PCBs in groundwater being about two orders of magnitude slower than the groundwater flow velocity.[9]



LITHOLOGIC LOG OF STOKELY - VANCAMP WELL FIGURE 5 - 5

REFERENCES

REFERENCES

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APPENDIX A

SUPPORTING DOCUMENTS

APPENDIX A-1

CLEANUP AND ABATEMENT ORDER NO. 80-011

STATE OF CALIFORNIA—RESOURCES AGENCY

EDMUND G. BROWN JR., Governor

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN FRANCISCO BAY REGION
1111 JACKSON STREET, ROOM 6040
OAKLAND 94607

Phone: Area Code 415
464-1255

Certified Mail No. 875031
Return Receipt Requested

December 5, 1980

File No. 2342.09 (RJC) pet

Mr. Robert De Lay
Plant Manager
General Electric Company
Oakland Facility
5441 East 14th Street
Oakland, CA

Mr. N. Broski
General Manager
General Electric Company
100 Woodlawn Ave.
Pittsfield, Mass 01201

General Electric Company
c/o C.T. Corp Systems
700 S. Flowers St.
Los Angles, CA 90017

Dear Sir:

Subject: Cleanup and Abatement Order No. 80-011

Enclosed is a copy of Cleanup and Abatement Order No. 80-011, relating to the spills and discharge of PCB - contaminated material to the surface and subsurface soils and waters at the General Electric Company Oakland Facility.

The Order requires abatement of discharge of polychlorinated biphenyls oils and oily material and other waste constituents from the facility. It also requires the submittal of (1) a Phase II study by March 1, 1981 which provides historical and current information on plant operations, hydrogeologic information of the site, and additional data collection on the extent of contamination; (2) a study plan by January 20, 1981 which addresses control and removal of the subsurface oil plume and prevention and containment of storm water runoff; and (3) by May 1, 1981 a long-term mitigation plan for final site cleanup and corrective measures.

If you have any questions relating to this matter please contact Mr. Richard Condit at (415) 464-1255.

Sincerely

FRED H. DIERKER
Executive Officer

Attachment: CAO 80-011
cc: David Storm
Jerry Gavin
Gerald Wynn

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN FRANCISCO BAY REGION

CLEANUP AND ABATEMENT ORDER NO. 80-011

GENERAL ELECTRIC COMPANY
OAKLAND FACILITY

FINDINGS

The California Regional Water Quality Control Board, San Francisco Bay Region finds:

1. General Electric Company, hereafter referred to as the discharger, with corporate offices at 100 Woodlawn Avenue, Pittsfield Massachusetts, owns and operates a transformer and motor repair shop at its 24-acre Oakland Facility located at 5441 East 14th Street, Oakland, CA.

2. The Regional Board has not considered waste discharge requirements for this facility.

3. The Oakland facility manufactured transformers from 1923 to 1975. Insulating fluids containing polychlorinated biphenyls (PCBs) produced by Monsanto Chemical Company under the tradename Pyranol were used in transformer manufacturing at the Oakland facility from the early 1930's until approximately 1968 when Pyranol use in transformer manufacturing was discontinued. Pyranol was used in transformer servicing from 1968 to 1975. Additionally, switchboards were manufactured at this facility from 1923 to 1927 and vertical and horizontal motors up to 500 HP rating were manufactured here from 1927 to 1948.

4. General Electric Company's Oakland facility presently repairs industrial and utility equipment manufactured by General Electric including transformers, traction motors and small gas turbines. During present transformers repair 10C oil (a non-PCB insulating fluid) is removed, filtered and placed back into the transformer. In repair of older transformers that contain Pyranol or originally contained Pyranol which subsequently contaminated the replacement 10C oil, fluids are placed in drums and stored in Building 17, a covered cement-floor warehouse.

5. An inspection of the General Electric Oakland facility was made by staff of the Hazardous Materials Management Section of the State Department of Health Services (DOHS) on July 30, 1979, in response to a complaint of improper handling of PCB-contaminated material. Analysis of surface soil samples collected by DOHS staff in areas covered with oily material indicated contamination with PCBs.

6. General Electric Company has engaged Brown and Caldwell consulting engineers of Walnut Creek to identify the extent of PCB contamination and to propose corrective measures. The consultant's Phase I and Ib findings indicated surface and subsurface soil contamination up to 14,000 ppm PCB in localized areas. A plume of oil containing PCBs ranging from 8 to 6,000 ppm has been

identified extending to a -32 foot depth and is contained in soils in a 300-foot by 300-foot area underlying the existing tank farm. The Phase Ib soil borings and groundwater monitoring wells drilled in the primarily silty-clayey alluvium indicates that PCB contamination by the oil plume is well defined and extends into the saturated zone and PCB upper level groundwater contamination is associated with suspended sediments in well water which may not be transported through soils. However, contaminated groundwater migration has not been clearly defined in the Phase I and Ib findings.

7. General Electric Company reports that PCB's reached the ground by accidental spills and by negligent or intentional on-site disposal practices such as dumping on the ground or in excavated pits in the past. General Electric also reports that the oil plume originated from undetected leaking of fresh Pyranol from the tank farm for an unknown length of time in the past. The tank farm is not presently used for storage of Pyranol.

8. Inspection by Regional Board staff on September 30, 1980 and with staff of the Hazardous Material Management Section of the Department of Health Services on October 1, 1980, revealed shallow drainage courses, discolored soils, sumps, oily material in surface soils and porcelain fragments in soils at the General Electric Company Oakland facility that were not identified in the consultant's report. Samples of standing liquid collected by Regional Board staff from an unlined drainage course on site revealed 6.6 ppb and 0.52 ppb of PCB. A dry soil sample from another on-site drainage ditch contained 100 ppm PCB. Off-site drainage courses ultimately reaching East Creek Slough in San Leandro Bay were observed. Surface drainage from the site during the rainy season may contain contaminants and may require containment and/or treatment.

9. The above findings reveal surface and subsurface soil and water contamination with PCBs on the General Electric Company Oakland facility which create a serious threat of contamination to surface and ground waters of the State, to aquatic life and to public health.

10. Groundwater usage in the area is not well documented. One known user of local groundwater is adjacent to the General Electric site. At this time this well does not show PCB contamination; however, the interrelationship of the shallow aquifer(s) and the aquifer serving this well is not known.

11. General Electric has prepared a Phase I Report to define the problem at the Oakland facility and to submit a plan of correction. It appears however, that additional extensive investigation, cleanup and correction action is needed. Due to the potential extent of contamination on-site treatment of contaminated soils and water will likely be required. Removal of liquid wastes and contaminated water through the installation of a French-drain methodologices will be necessary.

12. This action is an order to enforce the Water Quality Control Plan previously adopted by the Board. This action is therefore Categorically exempt from

the provisions of the California Environmental Quality Act (CEQA) pursuant to Section 15121 of the Resource Agency Guidelines.

ORDER

Pursuant to Section 13304 of the California Water Code, IT IS HEREBY ORDERED that General Electric Company shall:

A. Prepare and implement the following studies and immediate and long-term cleanup and abatement measures according to the following schedule:

1. Phase II Study

a. Submit to this Board by January 10, 1981 a written Phase II Definition Study Implementation Plan. The Plan shall address these items listed in Attachment A to this Order and shall be approved by the Board's Executive Officer prior to its implementation.

b. A written report on the findings of the Phase II Definition Study shall be submitted to the Board by March 1, 1981.

2. Immediate Mitigation Measures

a. Abate immediately all discharge of polychlorinated biphenyls, oils and oily materials and other waste constituents originating from the industrial process or any existing on-site storage to the facility yard or in places where drainage to waters of the State is possible.

b. Submit a detailed plan to the Board by January 20, 1981 which addresses measures to be taken to (i) control and remove the subsurface oil plume identified in the phase I Report. (The Board is conceptually in agreement with the French-drain extraction approach as described in the Phase I Report), and (ii) Prevention and containment of storm water runoff in the event runoff shows evidence of being contaminated.

c. Upon approval of the plans submitted in 2B above by the Executive Officer, the oil plume removal shall commence as soon as possible, and storm runoff control implemented as needed.

3. Long-term Mitigation Plan

a. Based on the overall finding of the Phase I and Phase II Definition Studies, a long term mitigation plan shall be submitted to the Board by May 1, 1981. The plan shall describe measures necessary to remove and/or treat contaminated soils and ground-water to acceptable levels and long term control of storm water runoff. Final corrective measures will be reviewed by and approved by the Executive Officer prior to implementation.

All reports requested in A. above are to be submitted under penalty of purjury pursuant to Section 13267 of the California Water Code by appropriate and responsible company representatives and should be based on all information available to any and all company officers or employees. The transmittal letter for the Phase II study plant (due January 10, 1981) should specify that the Phase I study reports previously submitted were submitted pursuant to California Water Code Section 13267 under penalty of perjury.

The Regional Board shall have continuing jurisdiction over the cleanup operation until the problem has been resolved to the satisfaction of the Board.

Pursuant to California Water Code Sections 13304, 13385, 13386 and 13387 the Executive Officer may request the Attorney General to take the appropriate enforcement action against the discharger, including injunction relief, or the Regional Board may schedule a hearing to consider requesting the Attorney General to take the appropriate enforcement action against the discharger, including injunction and civil monetary remedies.

FRED H. DIERKER
Executive Officer

12/5/80
Date

Attachment A
Phase II Definition Plan

The extent of contamination is several areas of the General Electric Company Oakland facility has not been adequately defined. The following information is needed:

A. Plant Operations

1. A detailed history of all existing and removed buildings and structures including dates, uses and locations.

2. A detailed description of all existing, removed and abandoned above-ground and underground storage tanks and all piping including dates, uses, capacities and locations.

3. A detailed account of volumes of historical PCB usage at the Oakland facility.

4. A detailed account of historical practices and locations of PCB loading, storage, and use in manufacturing and repair processes.

5. Identification/discussion of past and present uses, capacities, structure and nature of all liquid or sludge phases remaining and age of all on-site sumps including but not limited to a brick sump containing liquid located southerly of Building 17, a brick sump located between W29 and G104 in area III, several possible concrete-based sumps located between Buildings 5 and 18 in Area I, and several possible sumps along the northwestern side of Buildings 1, 4 and 6. These sumps are to be tested for PCB contamination.

6. A detailed account of all types of waste disposal practices at the Oakland facility and whether any wastes were accepted from other companies or other off-site G.E. facilities for either storage or disposal.

7. A detailed account of all documented PCB or other chemical spills or leaks at the Oakland facility.

B. Hydrogeologic Information

1. A description of all major drainage courses (e.g. course northeasterly of Building 17 and ditch along southern boundary), drainage patterns from buildings and paved and unpaved areas, off-site drainage points and and storm drains. This description shall include tributary areas of each point where runoff leaves the site and tributary areas of drainage courses.

2. Identify the upper level groundwater flow direction and velocity beneath the plant property and immediate vicinity, particulary beneath Buildings 1,2,4,6 and 17.

3. Determine the depth to the confined aquifer(s) under the site.

4. Determine if there is hydraulic continuity between the shallow aquifer and the deep water aquifer from which local well systems are drawing water.

5. Determine discharge and recharge areas of the water table aquifer(s).

6. Discuss the source(s) and fluctutions of the groundwater mound beneath the tank farm identified in the Phase Ib report findings.

7. Determine if there are tidal and/or seasonal fluctuations of the water table aquifer and the extent of any fluctuations.

8. Submit the results of analyses performed but not reported in phase I and Ib studies including soil borings 5527, 5529, 5530, 5531 and 5532 and well W529 beneath Building 17, all well water analyses in addition to PCBs (e.g. TOC, COD, Acurex), blow count and sample depth data for several soil samples (particularly in the 500 series).

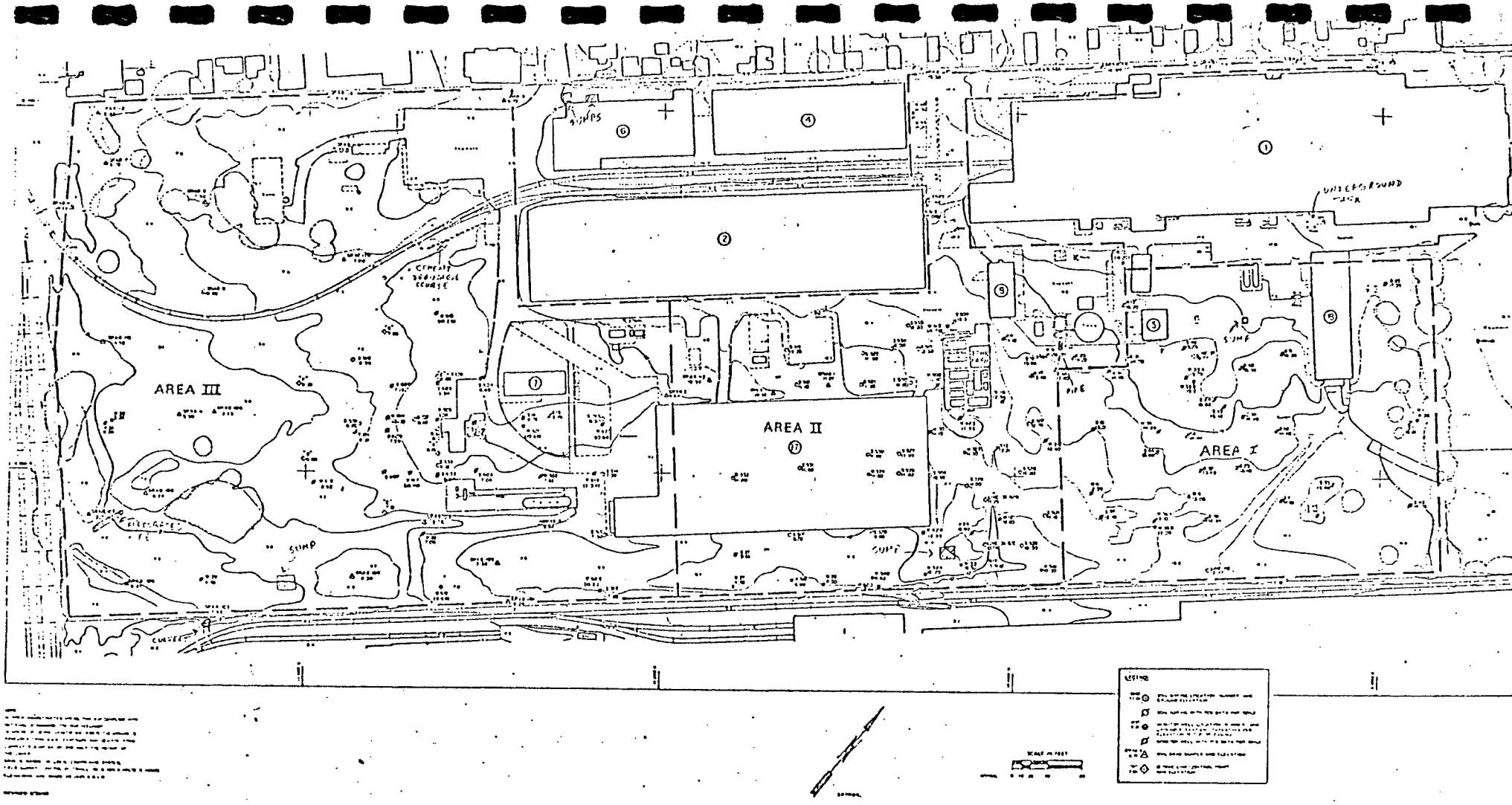
C Additional Sampling

1. Further definition of the vertical extent of contamination in soil borings which indicated heavy PCB contamination in the bottoms of the boreholes including 5626 and W613 near Building 2 and W503 near Building 7.

2. Further definition of extent of contamination is soil and groundwater in areas indicating PCB contamination in surface soil grab samples including the area between Building 2 and 17, the area along the northwestern fenced boundary behind Buildings 1,4 and 6, the unpaved area from Buildings 2 and 6 to the western fenced boundary, and G4 and G108.

3. Development of monitor wells along the periphery of the Oakland facility to measure possible groundwater migration off-site; well location and depths should be based upon the hydrogelogic information and additional sampling in this Attachment and shall be approved by the Board's Executive Officer.

4. In addition to Phase I and Ib analyses further groundwater sampling should include analyses for freon extractables to the 1.0 mg/l detection limit.



STATE OF CALIFORNIA
REGIONAL WATER QUALITY CONTROL BOARD
SAN FRANCISCO BAY REGION

GENERAL ELECTRIC COMPANY
5441 E. 14th St., Oakland

DRAWN BY: TGA	DATE: 11-29-60	DRWG NO. 1

YOS_OAK_03638

APPENDIX A-2

DEPARTMENT OF HEALTH SERVICES LETTER

STATE OF CALIFORNIA—HEALTH AND WELFARE AGENCY

EDMUND G. BROWN JR., Governor

DEPARTMENT OF HEALTH SERVICES
2151 BERKELEY WAY
BERKELEY, CA 94704

(415) 540-2043

Certified No. 0344121

December 8, 1980

Mr. Robert Delay,
Plant Manager
General Electric Company
Oakland Facility
5441 East 14th Street
Oakland, CA 94601

Dear Mr. Delay:

The California Department of Health Services, the California Regional Water Quality Control Board, San Francisco Bay Area Region and the U.S. Environmental Protection Agency have completed their reviews of the Preliminary Phase I Report (June 1980) and the Addendum (September 1980). which define the PCB-contamination problem at the General Electric Company Plant Site at 5441 East 14th Street in Oakland.

The Phase I Report was prepared in response to the Department's directive of November 29, 1979 to define the problem at the Oakland Facility and to submit a Plan of Correction.

As a result of the agencies' reviews, and of subsequent on-site inspection, it appears that several potentially contaminated areas of the General Electric Facility need to be better defined.

Accordingly the Department is requiring, pursuant to Sections 66328(c) and 66620, Chapter 30, Division 4, Title 22 of the California Administrative Code, that the attached Phase II Definition Study be prepared and implemented according to the following schedule:

1. A written Phase II Definition Study Implementation Plan shall be submitted to the Department by January 10, 1981. The Plan shall address those items in Attachment A and shall be approved by the Department prior to its implementation.

2. A written report on the findings of the Phase II Definition Study shall be submitted to the Department by March 1, 1981.

All Phase II Definition Study findings are to be submitted under penalty of purjury pursuant to Section 25189(b) of the California Health and Safety Code by appropriate and responsible company representatives and should be based on all information available to any and all company officers or employees.

Mitigation at the facility needs to be addressed in two stages, immediate corrections and long term corrections.

Immediate Corrections

In the short term stage, the following actions shall be taken to address the most critical problems:

1. All discharge of polychlorinated biphenyls, oils, and oily materials and other waste constituents to the facility yard or in places where drainage off from the property or to water courses is a possibility shall be immediately abated.

2. A detailed plan shall be submitted to the Department by January 20, 1981 which addresses measures to be taken to (a) Control and remove the subsurface oil plume identified in the Phase I Report. The Department is conceptually in agreement with the French-drain extraction approach as described in the Phase I Report. (b) Prevention and containment of storm water runoff in the event runoff shows evidence of being contaminated. In view of the proximity of private residences to your facility, control of surface runoff is of the utmost importance to the Department.

3. Upon approval by the Department, the oil plume removal should commence as soon as possible, and storm runoff control implemented as needed.

Long-Term Corrections

Based on the overall findings of the Phase I and Phase II Definition Studies, a long term mitigation plan shall be submitted to the Department by May 1, 1981. The long-term mitigation plan shall describe measures necessary to remove and/or treat contaminated soils and groundwater to acceptable levels and long term control of storm water runoff. As expressed to you earlier, the Department believes that the General Eelctric Company should place an emphasis on methodology that can be used to substantially remove the PCB material from the property rather than on-site containment. The final corrective measure will be reviewed by and approved by the Department prior to implementation.

You will also receive a Cleanup and Abatement Order from the Regional Water Quality Control Board related to this matter. That Order will be substantially equivalent to this notice. Both directives reflect the collective concerns the two agencies in regard to public health, water quality, and general environmental protection.

The General Electric Comapny staff has been cooperative with the Department in the Definition Phase of this effort, and it is expected that cooperation will continue into the mitigation stages.

The Department will, of course, continue to be available to work with you in addressing this complex matter.

Sincerely,

David L. Storm, Ph.D.,
Regional Administrator
Hazardous Materials Management Section

cc: Peter Rogers, Chief-HMMS

Harold Singer,
Regional Water Quality Control Board
1111 Jackson Street, Rm. 6040
Oakland, CA 94607

Jerry Gavin,
U.S. Environmental Protection Agency
215 Fremont Street
San Francisco, CA 94105

Gerald Wynn,
Alameda County Health Department
470 - 27th Street
Oakland, CA 94612

Mr. N. Borski
General Manager
General Electric Company
100 Woodlawn Avenue
Pittsfield, Mass 01201

DLS:at

Attachment A

Phase II Definition Plan

The extent of contamination in several areas of the General Electric Company Oakland facility has not been adequately defined. The following information is needed:

A. Plant Operations

1. A detailed history of all existing and removed buildings and structures including dates, uses and locations.

2. A detailed description of all existing, removed and abandoned above-ground and underground storage tanks and all piping including dates, uses, capacities and locations.

3. A detailed account of volumes of hisotrical PCB usage at the Oakland facility.

4. A detailed account of historical practices and locations of PCB loading, storage, and use in manufacturing and repair processes.

5. Identification/discussion of past and present uses, capacities, structure and nature of all liquid or sludge phases remaining and age of all on-site sumps including but not limited to a brick sump containing liquid located southerly of Building 17, a brick sump located between W29 and G104 in area III, several possible concrete-based sumps located between Buildings 5 and 18 in Area I, and several possible sumps along the northwestern side of Buildings 1, 4 and 6. These sumps are to be tested for PCB contamination. This report shall include a complete inventory of all PCB-contaminated materials currently stored on-site.

6. A detailed account of all types of waste disposal practices at the Oakland facility and whether any wastes were accepted from other companies or other off-site G.E. facilities for either storage or disposal.

7. A detailed account of all documented PCB or other chemical spills or leaks at the Oakland facility.

B. Hydrogeologic Information

1. A description of all major drainage courses (e.g. course northeasterly of Building 17 and ditch along southern boundary), drainage patterns from buildings and paved and unpaved areas, off-site drainage points and storm drains. This description shall include tributary areas of each point where runoff leaves the site and tributary areas of drainage courses.

2. Identify the upper level groundwater flow direction and velocity beneath the plant property and immediate vicinity, particularly beneath Buildings 1,2,4,6 and 17.

3. Determine the depth to the confined aquifer(s) under the site.

4. Determine if there is hydraulic continuity between the shallow aquifer and the deep water aquifer from which local well systems are drawing water.

5. Determine discharge and recharge areas of the water table aquifer(s).

6. Discuss the source(s) and fluctuations of the groundwater sound beneath the tank farm identified in the Phase Ib report findings.

7. Determine if there are tidal and/or seasonal fluctuations of the water table aquifer and the extent of any fluctuations.

8. Submit the results of analyses performed but not reported in Phase I and Ib studies including soil borings 5527, 5529, 5530, 5531 and 5532 and well W529 beneath Building 17, all well water analyses in addition to PCBs (e.g., TOC, COD, Acurex), blow count and sample depth data for several soil samples (particularly in the 500 series).

C. Additional Sampling

1. Further definition of the vertical extent of contamination in soil borings which indicated heavy PCB contamination in the bottoms of the boreholes including 5626 and W613 near Building 2 and W503 near Building 7.

2. Further definition of extent of contamination in soil and groundwater in areas indicating PCB contamination in surface soil grab samples including the area between Building 2 and 17, the area along the northwestern fenced boundary behind Buildings 1,4 and 6, the unpaved area from Buildings 2 and 6 to the western fenced boundary, and G4 and G108.

3. Development of monitor wells along the periphery of the Oakland facility to measure possible groundwater migration off-site; well location and depths should be based upon the hydrogeologic information and additional sampling in this Attachment and shall be approved by the Regional Water Quality Control Board.

4. In addition to Phase I and Ib analyses further groundwater sampling should include analyses for Freon extractables to the 1.0 mg/l detection limit.

APPENDIX A-3

ENVIRONMENTAL PROTECTION AGENCY LETTER

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
215 Fremont Street
San Francisco, Ca. 94105

CERTIFIED MAIL NO: 5847867
RETURN RECEIPT REQUESTED

In Reply: E-5-2
Refer To: 863.2C

DEC 23 1980

Mr. Robert Delay
Plant Manager
General Electric Company
5441 East 14th Street
Oakland, CA 94601

Dear Mr. Delay:

Under the provision of Section 3007(a) of the Resource Conservation and Recovery Act (RCRA) [42 USC §6927(a)], the Administrator of the Environmental Protection Agency (EPA) is authorized to require persons subject to the Act to make reports and to furnish information as may be necessary for purposes of administering the Act. A copy of section 3007 is enclosed.

You are hereby required to submit the following information, as specified by the December 5, 1980 San Francisco Regional Water Quality Control Board Cleanup and Abatement Order (No.80-011), to the Director of the Enforcement Division, EPA Region IX:

1) Phase II Definition Study Implementation Plan by January 10, 1981;

2) A written report on the findings of the Phase II Definition Study by March 1, 1981;

3) A detailed plan on measures to be taken to control and remove the subsurface oil plume, and to prevent and contain storm water runoff contamination by January 20, 1981; and

4) A long term mitigation plan describing measures necessary to remove and/or treat contaminated soils and groundwater to acceptable levels, and long term control of storm water runoff problems by May 1, 1981.

Under Section 3008 of RCRA [42 USC §6928], failure to provide the information required by this letter may result in an order requiring compliance or a civil action for appropriate relief. Section 3008 also provides for penalties for failure to comply or for making any false statements in reports. A copy of Section 3008 is also enclosed. If you have any questions concerning this letter please contact David Schnapf or Greg Fischer of my staff at 415/556-8000 or 556-7841.

Sincerely yours,

Clyde B. Eller

Clyde B. Eller
Director
Enforcement Division

cc: San Francisco Regional Water Quality Control Board
California Department of Health Services

INSPECTIONS

42 USC 6927. SEC. 3007. (a) ACCESS ENTRY.--For purposes of developing or assisting in the development of any regulation or enforcing the provisions of this title, any person who generates, stores, treats, transports, disposes of, or otherwise handles or has handled hazardous wastes shall, upon request of any officer, employee or representative of the Environmental Protection Agency, duly designated by the Administrator, or upon request of any duly designated officer, employee or representative of a State having an authorized hazardous waste program, furnish information relating to such wastes and permit such person at all reasonable times to have access to, and to copy all records relating to such wastes. For the purposes of developing or assisting in the development of any regulation or enforcing the provisions of this title, such officers, employees or representatives are authorized--

(1) to enter at reasonable times any establishment or other place where hazardous wastes are or have been generated, stored, treated, disposed of, or transported from;

(2) to inspect and obtain samples from any person of any such wastes and samples of any containers or labeling for such wastes.

Each such inspection shall be commenced and completed with reasonable promptness. If the officer, employee or representative obtains any samples, prior to leaving the premises, he shall give to the owner, operator, or agent in charge a receipt describing the sample obtained and if requested a portion of each such sample equal in volume or weight to the portion retained. If any analysis is made of such samples, a copy of the results of such analysis shall be furnished promptly to the owner, operator, or agent in charge.

(b) AVAILABILITY TO PUBLIC.--(1) Any records, reports, or information (including records, reports, or information obtained by representatives of the Environmental Protection Agency) obtained from any person under this section shall be available to the public, except that upon a showing satisfactory to the Administrator (or the State, as the case may be) by any person that records, reports or information, or particular part thereof, to which the Administrator (or the State, as the case may be) or any officer, employee or representative thereof has access under this section if made public, would divulge information entitled to protection under section 1905 of title 18 of the United States Code, such information or particular portion thereof shall be considered confidential in accordance with the purposes of that section, except that such record, report, document, or information may be disclosed to other officers, employees, or authorized representatives of the United States concerned with carrying out this Act, or when relevant in any proceeding under this Act.

(2) Any person not subject to the provisions of section 1905 of title 18 of the United States Code who knowingly and willfully divulges or discloses any information entitled to protection under this subsection shall, upon conviction, be subject to a fine of not more than $5,000 or to imprisonment not to exceed one year, or both.

(3) In submitting data under this Act, a person required to provide such data may-

(A) designate the data which such person believes is entitled to protection under this subsection, and

(B) submit such designated data separately from other data sumitted under this Act.

A designation under this paragraph shall be made in writing and in such manner as the Administrator may prescribe.

(4) Notwithstanding any limitation contained in this section or any other provision of law, all information reported to, or otherwise obtained by, the Administrator (or any representative of the Administrator) under this Act shall be made available, upon writtten request of any duly authorized committee of the Congress, to such Committee.

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FEDERAL ENFORCEMENT

42 USC 6928

Sec. 3008. (a) COMPLIANCE ORDERS.--(1) Except as provided in paragraph (2), whenever on the basis of any information the Administrator determines that any person is in violation of any requirement of this subtitle, the Administrator may may issue an order requiring compliance immediately or within a specified time period or the Administrator may commence a civil action in the United States district court in the district in which the violation occurred for appropriate relief, including a temporary or permanent injunction.

(2) In the case of a violation any requirement of this subtitle where such violation occurs in a State which is authorized to carry out a hazardous waste program under section 3006, the Administrator shall give notice to the State in which such violation has occurred prior to issuing an order or commencing a civil action under this section.

(3) If such violator fails to take corrective action within the time specified in the order, he shall be liable for a civil penalty of not more than $25,000 for each day of continued noncompliance and the Administrator may suspend or revoke any permit issued to the violator (whether issued by the Administrator or the State).

(b) PUBLIC HEARING.--Any order shall become final unless, no later than thirty days after the order is served, the person or persons named therin request a public hearing. Upon such request the Administrator shall promptly conduct a public hearing. In connection with any proceeding under this section the Administrator may issue subpenas for the attendance and testimony of witnesses and the production of relevant papers, books, and documents, and may promulgate rules for discovery procedures.

(c) REQUIREMENTS OF COMPLIANCE ORDERS.--Any order issued under this section may include a suspension or revocation of a permit issued under this subtitle, and shall state with reasonable specificity the nature of the violation and specify a time for compliance and assess a penalty, if any, which the Administrator determines is reasonable taking into account the seriousness of the violation and any good faith efforts to comply with the applicable requirements.

(d) CRIMINAL PENALTIES.--Any person who--

(1) knowlingly transports any hazardous waste identified or listed under this subtitle to a facility which does not have a permit under section 3005 (or 3006 in case of a State program), or pursuant to title I of the Marine Protection, Research, and Sanctuaries Act (86 Stat. 1052),

(2) knowingly treats, stores, or disposes of any hazardous waste identified or listed under this subtitle either--

(A) without having obtained a permit under section 3005 (or 3006 in the case of a State program) or pursuant to title I of the Marine Protection, Research, and Sanctuaries Act (86 Stat. 1052); or

(B) in knowing violation of any material condition or requirement of such permit;

(3) knowingly makes any false material statement or representation in any application, label, manifest, record, report, permit or other document filed, maintained, or used for purposes of compliance with this subtitle; or

(4) knowingly generates, stores, treats, transports, disposes of, or otherwise handles any hazardous waste (whether such activity took place before or takes place after the date of the enactment of this paragraph) and who knowingly destroys, alters, or conceals any record required to be maintained under regulations promulgated by the Administrator under this subtitle shall, upon conviction, be subject to a fine of not more than $25,000 ($50,000 in the case of a violation of paragraph (1) or (2)) for each day of violation, or to imprisonment not to exceed one year (two years in the case of a violation of paragraph (1) or (2)), or both. If the conviction is for a violation committed after a first conviction of such person under this paragraph, punishment shall be by a fine of not more than $50,000 per day of violation, or by imprisonment for not more than two years, or by both.

(e) KNOWING ENDANGERMENT.--Any person who knowingly transports, treats, stores, or disposes of any hazardous waste identified or listed under this subtitle--

(i) (A) in violation of paragraphs (1) or (2) of subsection (d) of this section, or

(B) having applied for a permit under section 3005 or 3006 and knowingly either--

(i) has failed to include in this application material information required under regulations promulgated by the Administrator, or

(ii) fails to comply with the applicable interim status regulations and standards promulgated pursuant to this subtitle, who knows at that time that he thereby places another person in imminent danger of death or serious bodily injury, and

(2)(A) if his conduct in the circumstances manifests an unjustified and inexcusable disregard for human life, or

(B) if his conduct in the circumstances manifests an extreme indifference for human life.

shall, upon conviction, be subject to a fine of not more than $250,000, or imprisonment for not more than 2 years, or both, except that any person who violates subsection (e)(2)(B) shall, upon conviction, be subject to a fine of not more than $250,000 or imprisonment for not more than 5 years, or both. A defendant that is an organization shall, upon conviction of violating this subsection, be subject to a fine of not more than $1,000,000.

(f) SPECIAL RULES--For the purposes of subsection (e)--

(1) A person's state of mind is knowing with respect to--

(A) his conduct, if he is aware of the nature of his conduct;

(B) an existing circumstance, it he is aware or believes that the circumstance exists; of

(C) a result of his conduct, if he is aware or believes that his conduct is substantially certain to cause danger of death or serious bodily injury--

(2) In determining whether a defendant who is natural person knew his conduct placed another person in imminent danger or death or serious bodily injury--

(A) the person is responsible only for actual awareness or actual belief that he possessed; and

(B) knowledge possessed by a person other than the defendant but not by the defedndant himself may not be attributed to the defendant;

Provided that in proving the defendant's possession of actual knowledge, circumstantial evidence may be used including evidence that the defendant took affirmative steps to shield himself from relevant information.

(3) It is an affirmative defense to a prosecution that the conduct charged was consented to by the person endangered and that the danger and conduct charged were reasonably foreseeable hazards of--

(A) an occupation, a business, or a profession; or

(B) medical treatment or medical or scientific experimentation conducted by professionally approved methods and such other person had been made aware of the risks involved prior to giving consent.

The defendent may establish an affirmative defense under this subsection by a preponderance of the evidence.

(4) All general defenses, affirmative defenses, and bars to prosecution that may apply with respect to other Federal criminal offenses may apply under subsection (e) and shall be determined by the courts of the United States according to the principles of common law as they may be interpreted in light of reason and experience. Concepts of justification and excuse applicable under this section may developed in the light of reason and experience.

(5) The term 'organization' means a legal entity, other than government, established or organized for any purpose, and such terms includes a corporation, company, association, firm, partnership, joint stock company, foundation, institution, trust, society, union, or any other association of persons.

(6) There term 'serious bodily injury' means--

(A) bodily injury which involves a substantial risk of death;

(B) unconsciousness;

(C) extreme physical pain;

(D) protracted and obvious disfigurement; or

(E) protracted loss or impairment of the function of a bodily, member, organ, or mental faculty.

(g) CIVIL PENALTY--Any person who violates any requirement of this subtitle shall be liable to the United States for a civil penalty in an amount not to exceed $25,000 for each such violation. Each day of such violation shall, for purpose of this subsection, constitute a separate violation.

APPENDIX A-4

PHASE II PROBLEM DEFINITION STUDY WORK PLAN

APPENDIX A-4

PHASE II PROBLEM DEFINITION STUDY WORK PLAN

This work plan has been prepared in response to the Cleanup and Abatement Order issued by the executive officer of the San Francisco Bay Regional Water Quality Control Board (RWQCB) dated December 5, 1980, and the letter issued by the California Department of Health Services (DOHS) dated December 8, 1980.

This work plan responds specifically to the requested Phase II Study to further define the extent of soil contamination and provide a more detailed characterization of the groundwater system. The Phase II Study, described below, includes an historical review of physical facilities on the site, polychlorinated biphenyl (PCB) usage and handling practices, identification of site drainage characteristics, a drilling program to collect soil samples and install monitor wells, laboratory analysis of soil and water samples, and the development of a more detailed groundwater system characterization.

We have prepared this work plan to follow a logical sequence of work and have therefore lumped some of the state's specific items into project tasks such as the Field Investigation, Groundwater System, or PCB Distribution in Site Soils. To facilitate the state's verification that all items in Attachment A have been addressed, Table A-4-1 in the next page presents a comparison between state-requested information and tasks contained in this work plan.

The Phase II Study is divided into the following seven work tasks:

Task 1. Site History and Plant Operations

Task 2. Site Drainage

Task 3. Field Investigations

Task 4. Laboratory Analyses

Task 5. Groundwater System

Task 6. PCB Distribution in Soils and Site Structures

Task 7. Report

Table A-4-1. Comparison Between Proposed Phase II Study Tasks and State Requested Information

General Electric proposed tasks		State requested information	
Task number	Task description	Item number	Description
1	Site history and plant operations	A1 - A7	Plant operations
2	Site drainage	B-1	Hydrogeological information
3	Field investigations	A5 C1 - C3	Plant operations Additional sampling
4	Laboratory analyses	A5 C1 - C4	Plant operations Additional sampling
5	Groundwater system	B2 - B7	Hydrogeologic information
6	PCB distribution in soils and site structures	A5 C1 - C2	Plant operations Additional sampling
7	Report	A, B, and C	Summary of all State requested information

Figure A-4-1 presents the proposed Phase II Study schedule indicating approximate time for initiation, duration, and completion of study tasks, as well as the interrelationship among tasks. A detailed description of each task also is presented.

Task 1. Site History and Plan Operations

This task will include a description of past and present physical site conditions, PCB uses and handling practices, and waste disposal practices.

Subtask 1.1--Buildings and Structures. This task will involve the establishment of the history of all existing and demolished buildings and structures. The historical inventory will include the location, size, dates of construction, uses (e.g., manufacturing or storage), and date of demolition, if appropriate, of all buildings and structures. The building and structure inventory will be summarized in a site plan and table and a narrative description.

Sources of information will include interviews with present and retired Oakland plant employees; review of Oakland plant records, engineering drawings, and reports; and a physical site inspection.

Subtask 1.2--Storage Tanks and Piping. This task will involve an identification of existing, removed, and abandoned storage tanks and plant piping. The identification will include locations, tank volumes, line sizes and lengths, and approximate dates of installation, abandonment, or removal. Since many of the plant facilities, including piping, were installed by plant personnel without engineering drawings, documentation which specifies the exact location and line sizes is expected to be very limited. In some instances, only the approximate location of underground plant piping or removed tanks or lines will be provided. The inventory will include all plant piping such as process piping (e.g., chemical, oil, and water supply) and domestic and industrial wastewater sewers.

The inventory will be summarized in a site plan which will identify the approximate location of tanks and piping (surveying will not be performed). The site plan will be keyed to a table which will provide a general description of tanks and piping in instances where detailed size and use information is unavailable.

Sources of information will include interviews with plant personnel (present and retired); review of Oakland records, engineering drawings, and reports; and a physical site inspection. On-site testing (e.g., Sonar) will not be included in this identification.

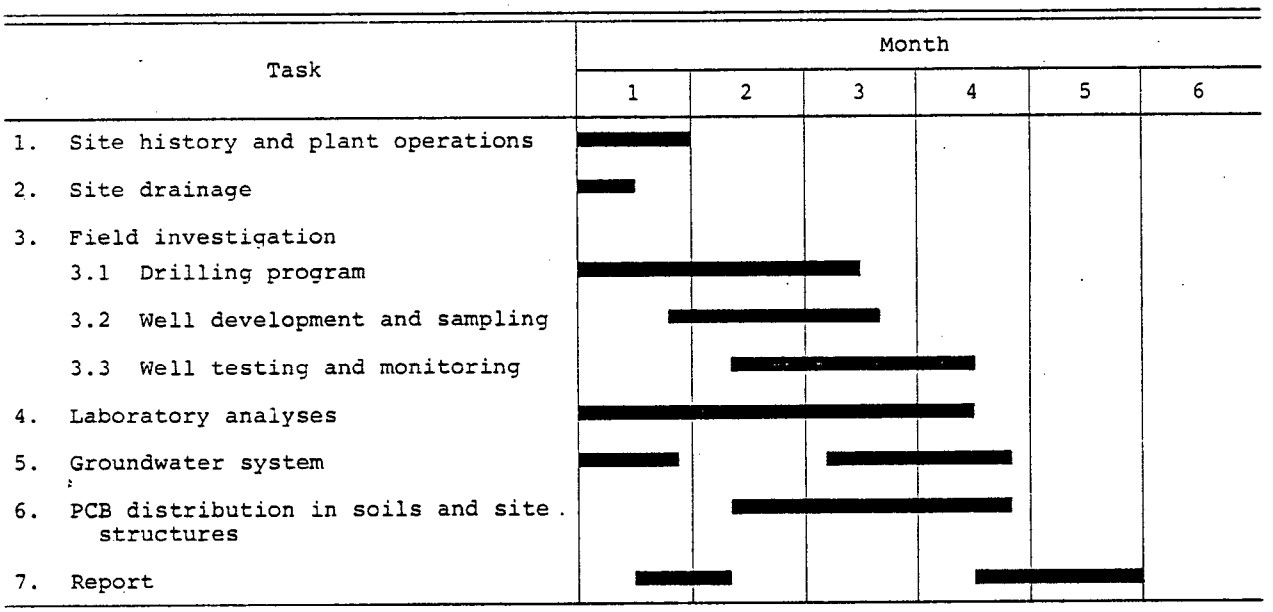

Figure A-4-1 Proposed Phase II Study Schedule

Subtask 1.3--PCB Usage. PCBs were used at the Oakland facility from the early 1930s until 1968, when the use was terminated. General Electric used PCBs in the form of pyranol, a company formulation combining arochlor 1260 with the solvent trichroro-benzene. At the Oakland site, pyranol was used as the dielectric fluid in transformers. Oakland Plant records will be examined to determine if a detailed account of pyranol usage exists. If no records exist or are limited, retired and current plant personnel will be interviewed to establish approximate usage.

In general, PCBs were transported to the site in bulk by tank cars, stored, placed in transformers, and tested for quality control. The locations of point of delivery, storage, and usage will be provided in a site plan in addition to a narrative description of these activities.

Subtask 1.5--Waste Disposal Practices Historical and present waste disposal practices will be documented to the degree afforded by Oakland plant records. Accurately documenting all historical practices will be difficult, if not impossible, due to the less formal nature of recording these practices before initiation of the state's manifest system in 1969.

Sources of information will include plant records and interviews with plant employees.

Subtask 1.6--Chemical Spills. PCBs and solvents have been stored and used at the Oakland Plant almost since its start-up in 1927. These chemicals have been stored in tanks and drums prior to use and/or prior to disposal. As described in the RWQCB cleanup and abatement order, accidental spills or leaks of this material contributed somewhat to the soil and oil storage PCB contamination detected on site to date.

The history of PCB or chemical spills at the Oakland facility will be obtained from interviews with present and retired employees and from a review of plant records. Past spills, if any, will more than likely be largely undocumented, with "documentation" lying primarily in the memories of employees. In many instances, the location, magnitude, time of occurrence, and type of chemical will not be well defined, and conflicting accounts will probably be reported during employee interviews. It is anticipated that the primary value in summarizing the accounts of spills from employees will be to provide an additional perspective on the site conditions as opposed to an accurate detailed accounting of actual spills.

Task 2. Site Drainage

Task 2 entails a detailed description of surface drainage features on the General Electric site in response to item B1 in the Attachment A. This task is divided into two subtasks.

Subtask 2.1. The first subtask involves inspection of the site to identify the major drainage channels, the points of discharge onto and off of the site, and locations of man-made structures on site which collect runoff from buildings and paved areas. On-site drainage structures will be inspected and, if necessary, dye-tested in an attempt to determine where these structures discharge runoff generated on site into city storm sewers.

Subtask 2.2. The second subtask involves preparation of a map of the site showing all major drainage channels and associated basins, directions of general overland flow, and points of discharge onto and off of the site. This task also includes preparation of a table which lists each drainage basin and the area calculated from the map.

Task 3. Field Investigation

This task includes all field work required to meet the state's basic objective of completing the definition of site conditions. This work will involve additional soil sampling, monitor well installation, groundwater sampling, monitoring of well water levels, limited well testing, and searching for and sampling of "sumps" on site. The subtasks under Task 3 are described below.

Subtask 3.1--Drilling Program. The drilling program will involve installation of 25 new monitor wells and 11 soil borings at locations shown on Figure A-4-2. The wells include 14 shallow wells approximately 25 feet deep, 8 deep wells from 45 to 60 feet deep, and 3 multi-cased wells from 45 to about 80 feet deep. The purpose of these additional wells is to comply with items B2, C2, and C3 in Attachment A.

Two additional wells will be installed near soil boring S626 at the northeast end of Building 2. The first well will be a dual-cased, 45-foot-deep well in the No. 2 sand. The second well, also dual-cased, will be drilled to about an 80-foot depth. During the construction of the second well, soil samples will be taken every 5 feet below the No. 2 sand to the bottom of the boring. These soil samples will determine the extent of the PCB contamination presently detected at the 46-foot depth. Dual-cased wells will be utilized in the construction of both wells because of the possible existence of contaminated groundwater in this vicinity of the site. Dual casing will eliminate vertical migration of contaminants.

Compliance with item C2 in Attachment A will be met by drilling at locations shown on Figure A-4-2. At selected locations, 25-foot "shallow wells" and 50-foot "deep wells" will be installed. The deep wells are required because presently known vertical groundwater gradients have the potential for transporting contaminants downward. As in Phase I and the addendum work, soil

samples for PCB analysis will be collected every 5 feet in wells and soil borings at proposed drilling sites. Where the drilling rig cannot gain access or where there is a high risk of drilling into active buried utilities, a hand auger will be used to drill shallow soil borings.

Item C3 in Attachment A requests the installation of monitor wells near the site boundaries. Item C3 specifies that "well locations and depths should be based upon the hydrogeologic information and additional sampling in this attachment and shall be approved by the board's executive officer." We have included 15 new wells along the northwest property line to comply with this request. These new wells will cover a depth range of approximately 25 to 60 feet. If the well locations and depths shown on Figure 2 are not judged adequate for this purpose, we will revise the drilling program as required to comply with the state's objectives.

Subtask 3.2--Well Development and Sampling. To establish good hydraulic communication between the formation and the well and to remove sediment from the bottom of the wells, all wells will be developed by pumping or bailing. Each new well will be pumped or bailed at least three times prior to sampling. Water levels will be allowed to recover between each pumping event. At the end of the third event, a fluid sample will be collected according to procedures currently recommended by the Environmental Protection Agency (EPA).

Subtask 3.3--Well Testing and Monitoring. To comply with item B2 in Attachment A, selected monitor wells will be tested in order to determine the water transmitting properties of soil on site. These data are needed for estimating the velocity of groundwater through shallow soils on site.

In Phase I groundwater velocities were estimated using measured permeabilities, porosities, and hydraulic gradients. During Phase II, we propose to introduce a method new to this project for estimating groundwater velocity. The point dilution method basically relates to observed dilution of a tracer, introduced into standing liquid in a well, to the undisturbed flow of groundwater through the strata adjacent to the screen. If the groundwater flow through the strata, gravel pack, and well screen is steady (unchanging during the test period), and if the tracer is homeogeneously mixed with water in the screen at all times, an apparent dilution of tracer concentrations will be observed. The method has been tested in the laboratory and in the field and is documented in the literature.[1]

To comply with item B2 in Attachment A, the above test will be performed on several shallow wells in the vicinity of Buildings 1, 2, 4, 6, and 17. The direction of groundwater flow requested in item B2 will be met by mapping the hydraulic gradients as described in Task 5.

The testing program will be coordinated with the bimonthly monitoring of static water levels in other monitor wells on site and will not interfere with the latter.

Task 4. Laboratory Analyses

Task 4 involves the determination of contaminants in soil and fluid samples collected during Task 3. Soil samples will be analyzed for PCBs by the methods that were used during Phase I and the addendum work. Fluid samples from all new monitor wells will be analyzed for PCBs and Freon extractables. Analyses for PCBs in fluid samples will be performed by the same methods as used earlier.

We wish to discuss the need for Freon extraction analyses to the 1.0-mg/l limit cited in C4. This will be accomplished at the meeting on January 13th.

Task 5. Groundwater System

This task responds to the request for a more detailed characterization of the on-site groundwater system. To facilitate a mutual understanding of Task 5, we will briefly review the data collected by General Electric to date and then define several technical terms used by the state in Attachment A.

Existing Data. To describe the groundwater system on site, a total of 122 soil borings, 50 monitor wells, and two backhoe trenches have been used. In the soil borings, fluid levels were observed both during and after drilling operations. From five soil borings, laboratory permeability and porosity tests were performed on 18 soil samples.

Monitor wells were designed to provide information on selected parts of the on-site groundwater system and range from 6 to 65 feet deep. During developmental pumping or bailing of each well, fluid levels and quantities of water discharge were observed and recorded. Eight monitor wells representing shallow and deep strata to 65 feet were field tested for permeability data. A systematic program of bimonthly static fluid level observations in all wells was started in October 1980 after submittal of the addendum report. Maps and sections showing static fluid elevations have been prepared for three parts of the site designated as Areas I, II, and III. Estimates of groundwater flow velocities have been made in selected parts of the groundwater system using data generated in Phase I and the addendum work.

During Task 5, additional monitor wells are needed, especially in Area III, to develop a more complete characterization of the on-site groundwater system. To accomplish this, it will be necessary to integrate historic and new data from all three areas into a unified conceptual model of the flow system.

Definition of Groundwater Terms. Technical groundwater terms that require definition include aquifer, water table, water table aquifer, confined aquifer, hydraulic conductivity, groundwater velocity, recharge area, and discharge area. The definitions that follow are consistent with current usage in the field of groundwater hydrology.

An "aquifer" is a formation, group of formation, or part of a formation that contains sufficient saturated permeable materials to yield significant quanities of water to wells and springs.[2] The word "significant" is usually taken to mean enough water to permit economical use of the water. The "water table" is the surface below which earth materials are saturated and have a water pressure equal to atmospheric. It follows from the above definitions that a "water table aquifer" is an aquifer containing groundwater under atmospheric pressure.[2] In contrast, a "confined aquifer" is an aquifer containing water under pressure greater than atmospheric. The upper boundary of a confined aquifer is the bottom of a confining bed which is a body of material having a distinctly smaller permeability than the permeability of the aquifer.[2]

The term "hydraulic continuity" has been applied to field situations involving a stream and an aquifer, a well and an aquifer, and two aquifers separated by a confining bed. For the purposes of this study, it is defined as the existence of a continuous flow path for the transport of water between two points in a groundwater system.

"Groundwater velocity" is defined as the average velocity of a particle of water in the saturated interstitial space between soil particles. Within a homogeneous stratified soil, the velocities may range over several orders of magnitude.

Areas where water enters shallow saturated sediments near the water table are defined as "recharge areas." Areas where water leaves shallow saturated sediments are defined as "discharge areas." These areas may include the land surface or a subsurface area across which water is moving.

The Groundwater System Task 5 has been divided into the following subtasks according to the basic characteristics of groundwater systems.

Subtask 5.1--Flow Direction and Velocity. This subtask responds to item B2 in Attachment A and will result in identifying the upper level groundwater flow and velocity. "Upper level" is to be defined as saturated soils to a depth of 60 feet on site. Due to the complex stratigraphy of soils in the 0- to 60-foot range, the lateral distribution of selected strata is in question. Because the lateral continuity of strata, especially sand beds, is unknown, the true flow directions cannot be accurately determined with existing data and data to be collected in Phase II.

However, to provide a meaningful response to item B2, we propose to prepare a flow net for a single homogeneous layer of saturated soil material extending to a depth of 60 feet. The flow net will show, on a representative section across the site, equipotential contours and generalized flow lines and will be prepared according to generally accepted techniques.[3] The equipotential lines will pass through points of equal head as determined from fluid elevations in monitor wells. The flow lines will not be drawn perpendicular to the equipotential lines because the soil will be considered to be anisotropic in respect to permeability. The ratio of horizontal to vertical permeability will be based on data from Phase I work.

The groundwater velocity will be an average of velocities determined with point dilution tests described previously in Task 3. It is understood that, based on the above definition of velocity, the velocity determined at a test well will be an average for the specific part of the flow system adjacent to the well screen.

Subtask 5.2--Confined Aquifers. To comply with item B3 in Attachment A, the depth to confined aquifer(s) under the site will be determined. This determination will be based on the previous definition of a confined aquifer. Available driller logs on deep wells (greater than 60 feet) located off site but in the immediate vicinity of the site will be used to identify these deep aquifers. Because the shallow saturated sands on site yield only small quantities of poor quality water to monitor wells, they are not considered to be confined aquifers.

Subtask 5.3--Hydraulic Continuity. Item B4 in Attachment A requests General Electric to "determine if there is hydraulic continuity between the shallow aquifer and the deep water aquifer from which local well system(s) are drawing water." For the purposes of this study, "shallow aquifer" is interpreted as the shallow saturated soils from 0 to 60 feet as characterized by our previous reports. The term "deep water aquifer" is interpreted as the first underlying confined aquifer identified in subtask 5.2.

Using the definition stated earlier for hydraulic conductivity, it is almost certain that a flow path through intervening sediments does exist between these two systems. Accordingly, we can assume from the outset that some degree of hydraulic continuity probably exists.

The objective of subtask 5.3 is to determine the degree and significance of this assumed continuity. Hydraulic continuity does not automatically mean that a serious potential for contaminant transport exists. For example, it is possible that heads will be higher in the confined aquifer, thereby preventing downward movement of groundwater. On the other hand, if downward movement

of water does exist, it is not necessarily synonomous with downward movement of contaminants. Organic contaminants may be retained at shallow depths due to bouyance effects (e.g., oil) or due to adsorption onto soil particles. Existing data indicate that on-site groundwater is not contaminated with PCBs. To make an evaluation of hydraulic continuity, the following information will be used:

1. Neighboring off-site wells--available lithologic logs, well logs, and water levels will be obtained from two off-site wells.

2. On-site monitor wells--lithologic logs, permeability data, water levels, and contaminant distributions.

3. Literature--mobility of applicable organics in alluvial soils.

Subtask 5.4--Recharge and Discharge Areas. In item B5, the state requires General Electric to "determine discharge and recharge areas of the water table aquifer." We interpret "water table aquifer" to mean shallow saturated sediments near the water table. By the strict technical definition presented earlier, there is no water table aquifer on site.

The recharge and discharge areas to the shallow sediments will be identified with field observations on the land surface, interpretation of groundwater level changes in shallow wells, and use of the flow net developed in subtask 5-1. Field observations will be made to identify:

1. Depressions where ponding of surface water occurs during the wet season.

2. Areas where permeable artificial fill may serve to collect runoff which later drains to the water table.

3. Areas covered with "impermeable" man-made structures.

4. Areas with high potential for loss of groundwater by evaporation or transportation.

Hydrographs of selected monitor wells representing one wet season and one dry season (if available) will be inspected to identify recharge or discharge areas. The flow net will be used to identify parts of the site boundaries where subsurface recharge and discharge take place.

Subtask 5.5--Groundwater Mound. To comply with item B6 in Attachment A, we will prepare hydrographs for selected monitor wells in the vicinity of the tank farm. To adequately represent

mound fluctuations, the hydrographs should represent one full year of record. The effect of draining and recent covering of the tank farm will be evaluated in light of its potential role as a source of recharge.

Subtask 5.6--Tidal and Seasonal Water Level Changes. To comply with item B7 in Attachment A, we will determine the seasonal changes in groundwater levels and evaluate the possible influence of tides in San Francisco Bay on the groundwater levels.

Seasonal water level fluctuations will be determined with hydrographs showing 1 year of record in selected wells. The wells will be chosen to represent several depth ranges within saturated soils to a maximum depth of 60 feet.

Sinusoidal water level changes in the bay will generate similar groundwater level fluctuations that attenuate inland from the edge of the bay. Existing permeability data generated on site will be used with a specified "normal" high tide to calculate the expected rise in groundwater levels on site. The method to be used is described in Ferris, et al.[4] In our judgment, the site is located too far from the bay (0.4 miles) with fairly impermeable soils to warrant a field test of tide-induced fluctuation.

Subtask 5.7--Groundwater Quality. PCB and Freon extractable analyses on well water samples will be summarized in tabular form. This summary will include analyses reported in the Phase I and addendum reports as well as samples collected from the proposed Phase II wells. A site plan will also be prepared indicating the location of the wells sampled and the reported PCB and Freon extractable concentrations.

Task 6. PCB Distribution in Soils and Site Structures

A number of additional soil samples will be collected for PCB analysis (refer to Figure A-4-2). This additional data will be used to update the soil PCB distribution site maps previously presented in the Phase I and addendum reports. Instead of presenting the distribution by area, an integrated site map including all areas and all PCB analyses performed to date will be prepared.

A number of "on-site" sumps will be sampled for PCBs. The results of these analyses will also be presented in the site map and tabular form. In addition, an updated estimate will be made concerning the volume of soil containing PCB concentrations greater than state-specified levels.

Task 7. Report

The work performed during the Phase II Study will be thoroughly documented and summarized in a report. A preliminary outline of the report is presented below:

Chapter 1.	Summary
Chapter 2.	Investigative Methods
Chapter 3	Site History and Plant Operations
Chapter 4.	Site Drainage
Chapter 5.	Groundwater System
Chapter 6.	PCB Distribution in Soils and Site Structures
Appendix A.	Soil Borings
Appendix B.	Well Development Logs
Appendix C.	PCB Analyses
Appendix D.	Supplemental Data

Appendix D, Supplemental Data, will contain the results of analyses possibly performed but not reported in the Phase I and addendum reports.

REFERENCES

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APPENDIX B

DRILLING AND SOIL SAMPLING PROGRAM

APPENDIX B

DRILLING AND SOIL SAMPLING PROGRAM

The objectives of the Phase II drilling and soil sampling program were to further define the extent of PCB contamination in soil and groundwater and to permit an assessment of the potential for groundwater migration off-site.

APPENDIX B-1

DRILLING AND WELL CONSTRUCTION PROCEDURE

APPENDIX B-1

DRILLING AND WELL CONSTRUCTION PROCEDURE

The drilling program consisted of drilling shallow (25 feet) soil borings and drilling and installing three types of monitor wells: (1) shallow, 25 feet, (2) deep, up to 60 feet, and (3) multi-cased. Figure B-1-1 shows the construction details of a typical monitor well and Figure B-1-2, a typical multi-cased well. Construction details of all wells are presented in Tables B-1-1, B-1-2, and B-1-3.

DRILLING METHODS

Most drilling operations were performed using a truck-mounted power auger drilling rig. Hollow-stem, continuous-flight augers were used to minimize soil disturbance during the collection of soil samples and to provide borehole stability during the installation of the monitor wells. Due to limited access at drilling sites near Building 4, it was necessary to use a hand-held power drill with small diameter, solid-stem, continuous-flight augers for three of the soil borings. The multi-cased wells were constructed using an auger rig and a mud rotary drilling rig, as described later in this section.

A detailed log of soil types found and their vertical distribution was prepared for each drilling site. These descriptions were made by inspection of drill cuttings and soil samples collected for analysis. The drilling logs are contained in Appendix B-3 of this report.

SOIL BORINGS

Twenty soil borings were drilled to an average depth of 26 feet to collect soil samples for PCB analysis. In addition, the borings provide information about the types of subsurface soil materials present and their distribution.

Soil samples were collected at minimum 5-foot intervals, beginning at the ground surface. Continuous samples were collected in sand or gravel materials whenever possible. When drilling in some fill materials, asphalt, or concrete, it was not possible to collect a surface sample and therefore, the first sample was collected as soon as the sampler could penetrate the soil.

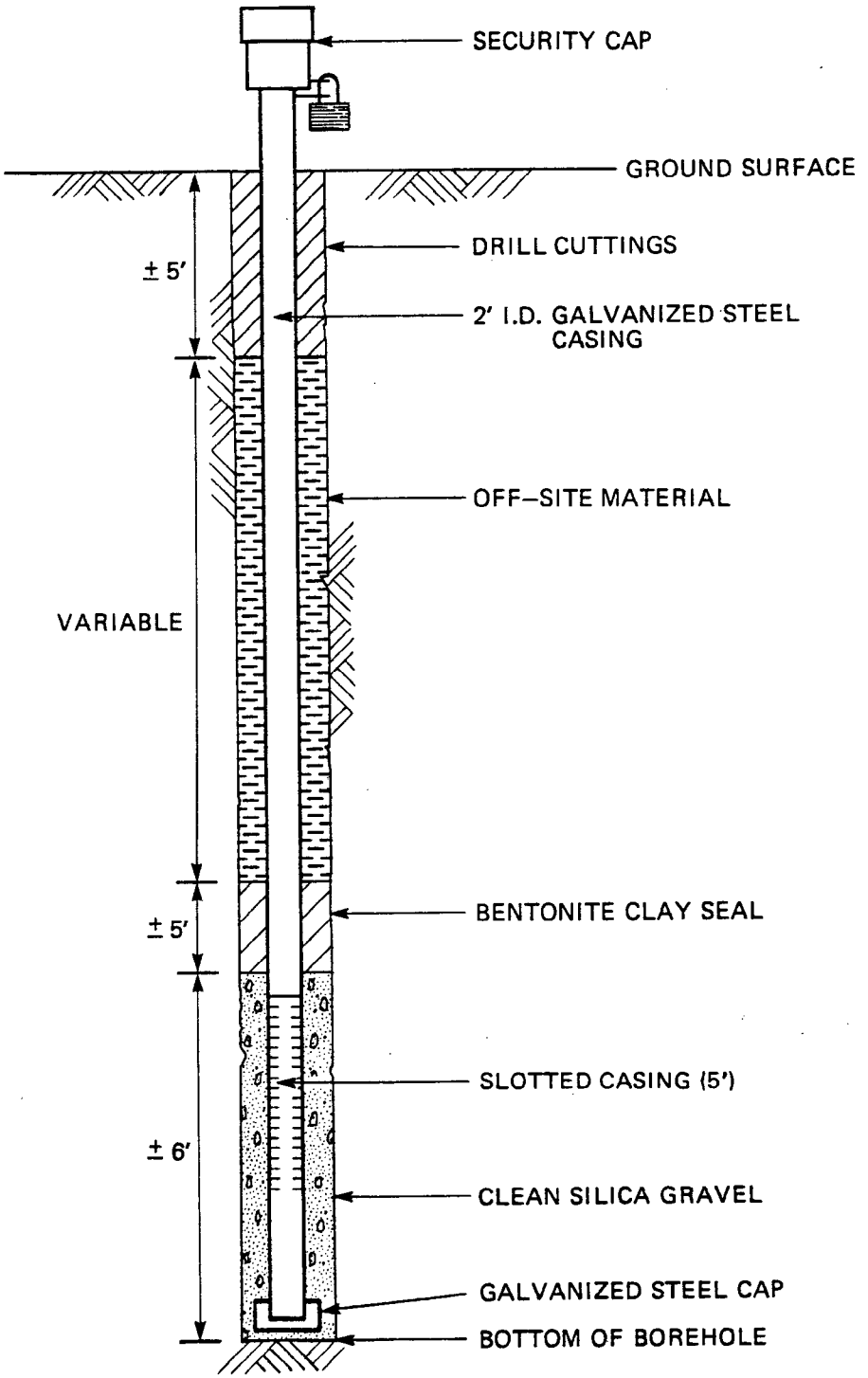

Figure B-1-1 Typical Monitor Well

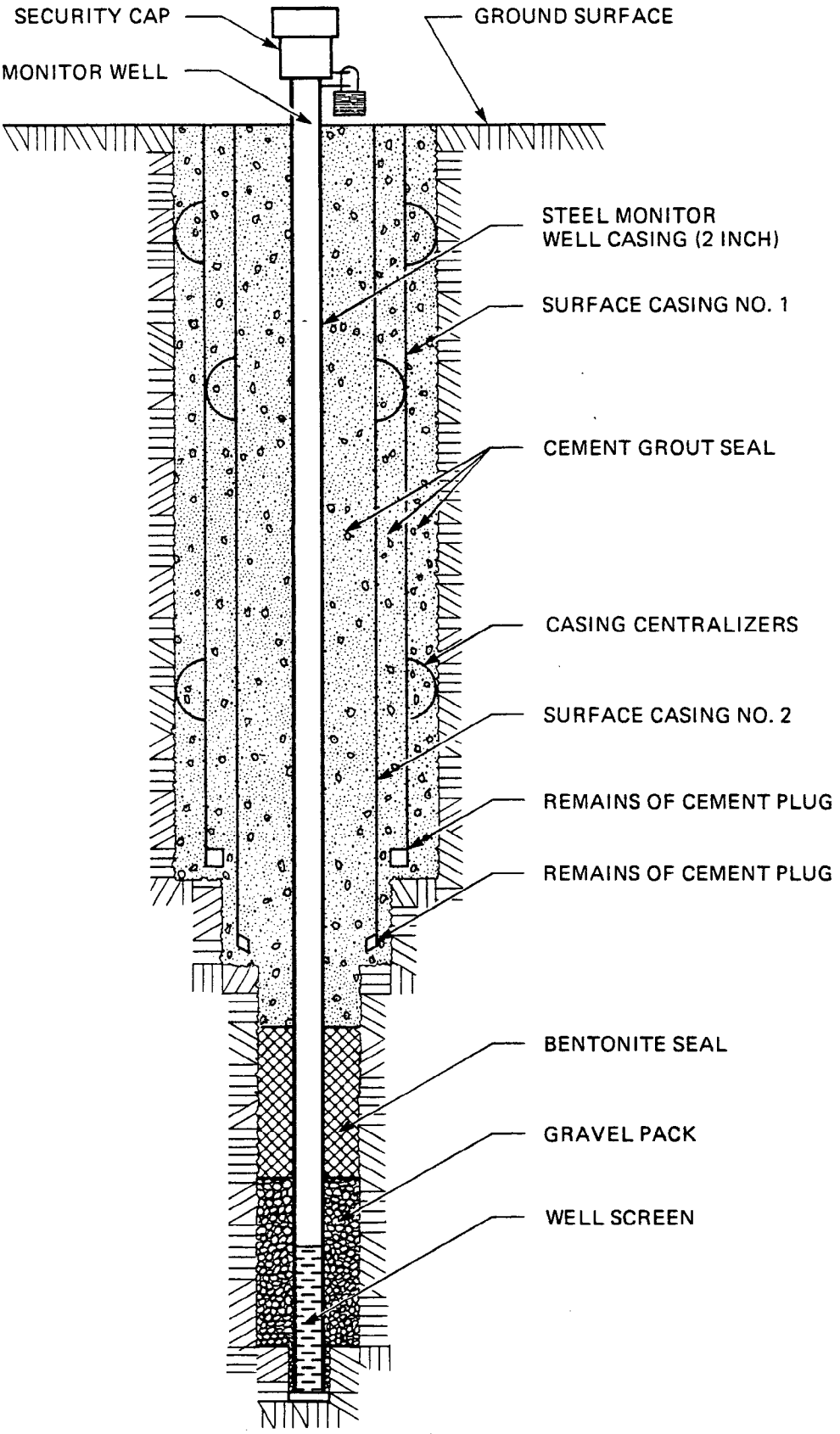

Figure B-1-2 Typical Multi-cased Well

Table B-1-1. Phase I Monitor Well Construction Details

Well Number	Date Constructed	Total Depth Drilled[a] (ft)	Depth to Casing Installed[b] (ft)	Depths of Slotted Screen[c] (ft)	Depth to Top of Gravel[d] (ft)	Cans of Bentonite Used[e]	Bags of Cement Used[f]	Types of Backfill Used[g]	Elevation at Top of Casing (ft)
W-1	3-3-80	56	55	50 - 53	45	1	1	Native	16.95
W-2A	3-19-80	26	24.5	19.5 - 22.5	18	1	1	Imported	11.51
W-2B	4-8-80	51.1	47	42 - 45	40	2	1	Native	11.96
W-3A	4-2-80	21	17	12 - 15	10	1	1	Native	5.76
W-3B	4-2-80	66.5	65	60 - 63	50	1	1	Native	5.40
W-4A	4-10-80	26	25	20 - 23	18	1	1	Native	15.23
W-4B	4-10-80	42	42	37 - 40	35	1	1	Native	14.79
W-6	3-19-80	21	19	14 - 17	13	1	1	Imported	14.55
W-9	4-9-80	25	25	20 - 23	15	1	1	Native	13.42
W-11[h]	3-24-80	20	18	13 - 16	12	1	1	Imported	13.42
W-16[h]	3-25-80	26	24	19 - 22	17	1	1	Imported	11.60
W-17[h]	3-25-80	26	24	19 - 22	17	1	1	Imported	10.55
W-18[h]	3-25-80	21	19	14 - 17	12	1	1	Native	13.66
W-19[h]	4-8-80	6	6	3 - 6	2	½	½	Native	14.53
W-22[h]	3-25-80	36	29	24 - 27	22	1	1	Imported	16.63

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Table B-1-1. Phase I Monitor Well Construction Details (continued)

Well Number	Date Constructed	Total Depth Drilled[a] (ft)	Depth to Casing Installed[b] (ft)	Depths of Slotted Screen[c] (ft)	Depth to Top of Gravel[d] (ft)	Cans of Bentonite Used[e]	Bags of Cement Used[f]	Types of Backfill Used	Elevation at Top of Casing (ft)
W-26[h]	4-1-80	26	22	17 - 20	15	1	1	Imported	9.56
W-27[h]	4-1-80	26	22	17 - 20	15	1	1	Imported	10.15
W-28[h]	3-25-80	21	13.5	8.5 - 11.5	6	½	½	Imported	8.17
W-29[h]	3-26-80	21	10	5 - 8	4	½	½	Imported	5.52
W-30[h]	3-25-80	26	25	20 - 23	18	1	1	Native	12.53
W-31[h]	3-24-80	31	29	24 - 27	22	1	1	Imported	13.73
W-35A	3-24-80	36	35	30 - 33	28	1	1	Imported	15.80
W-35B	4-1-80	61	60	55 - 58	53	1	1	Imported	15.90
W-36A	3-24-80	20	20	15 - 18	13	1	1	Imported	13.06
W-36B	4-7-80	66	65	60 - 63	59	1	1	Native	12.27
W-38	3-24-80	25	20	15 - 18	14	1	1	Native	15.54
W-41[h]	4-9-80	19	19	14 - 17	12	1	1	Native	15.46
W-502	3-25-80	36	34.5	29.5 - 32.5	27	1	1	Native	8.92
W-503	3-21-80	14.5	14.5	9.5 - 12.5	8.5	1	1	Native	9.49
W-506	4-9-80	25	25	15 - 25	12	2	1	Native	12.35
W-516	4-9-80	25	25	15 - 25	12	1	1	Native	9.31

YOS_OAK_03675

Table B-1-1. Phase I Monitor Well Construction Details (continued)

Well Number	Date Constructed	Total Depth Drilled[a] (ft)	Depth to Casing Installed[b] (ft)	Depths of Slotted Screen[c] (ft)	Depth to Top of Gravel[d] (ft)	Cans of Bentonite Used[e]	Bags of Cement Used[f]	Types of Backfill Used	Elevation at Top of Casing (ft)
W-523	4-9-80	25	25	15 - 25	12	2	½	Native	11.92
W-524	4-9-80	25	25	15 - 25	14	1	1	Native	10.92
W-529	4-9-80	20	20	10 - 20	8	1	1	Native	11.64
W-540	4-9-80	25	25	15 - 25	12	1	1	Native	10.42
W-541	4-9-80	25	22.5	12.5 - 22.5	6	1	1	Native	11.00

a. All boreholes drilled with truck-mounted auger rig; no drilling fluids used.

b. Well casing is 2-inch I.D., 2 3/8-inch O.D. galvanized steel.

c. Slotted casing is well casing with saw-cut slots spaced approximately 1" apart.

d. Gravel pack composed of pea gravel; size range approximately 1/4" - 3/4".

e. Bentonite pellets in 50 lb. cans.

f. Type II Portland cement in 94 lb. bags.

g. Native backfill is drill cuttings from well borehole; imported backfill composed of silty, clayey sand.

h. Identified in the boring logs as "S".

YOS_OAK_03676

Table B-1-2. Phase Ib Monitor Well Construction Details

Well number	Date constructed	Total depth drilled,[a] feet	Depth of casing installed,[b] feet	Depth interval of slotted screen, feet	Depth to top of gravel, feet	Elevation at top of casing, feet
W612	7-1-80	26	25	20-25	18	16.78
W613	7-2-80	26	25	20-25	18	15.08
W614	7-3-80	26	25	20-25	18	10.12
W615	7-7-80	26	25	20-25	18	10.28
W616	7-7-80	26	25	20-25	18	8.82
W617	7-8-80	26	25	20-25	18	10.10
W618	7-8-80	26	25	20-25	18	9.66
W619	7-9-80	26	25	20-25	18	9.54
W620	7-9-80	26	25	20-25	18	10.88
W621	7-10-80	26	25	20-25	18	10.69
W622	7-10-80	26	25	20-25	18	10.31
W623	7-11-80	26	25	20-25	18	11.89
W624	7-11-80	26	25	20-25	18	12.85
W625	8-7-80[c]	44.5	44.5	39.5-44.5	37	(11.92)[d]

[a]All bore holes drilled with truck-mounted auger rig; no drilling fluids used; well installed inside hollow stem auger.

[b]Well casing is 2-inch I.D., 2-3/8 O.D. galvanized steel.

[c]Construction of the well W625 through the oil plume was initiated on July 16, 1980.

[d]Ground elevation.

Table B-1-3. Phase II - Monitor Well Construction Details

Well Number	Date Constructed	Total Depth Drilled (ft)	Length of Casing (ft)	Depth to Base of Casing (ft)	Depth of Slotted Screen (ft)	Approximate Depth to Top of Gravel (ft)	Elevation Top of Casing (ft)
W731	2/18/81	26	27.2	24.8	22.9-18.6	16.5	7.9
W732	2/23/81	26	27.2	24.0	23.8-17.8	16.5	9.5
W733	4/17/81	26	26.2	24.5	24.3-19.3	19.	10.1
W734	4/15/81	26	26.2	24.7	24.5-19.5	19	10.9
W735	3/06/81	26	26.2	24.1	23.9-18.9	19	15.4
W736	3/05/81	26	26.2	25.0	24.8-19.8	19	18.4
W741	3/11/81	41	41.2[a]	40.0[a]	40-35[a]	33	11.8
W751A	3/10/81	26	26.2	24.7	24.5-19.5	18	6.5
W751B	3/30/81	61	62.2[a]	58.4[a]	55.2-50.2[a]	50	8.7
W752A	3/09/81	26	26.2	24.8	24.6-19.6	18	10.1
W752B	4/09/81	61	47.2	45.1	44.9-39.9	35	10.7
W753A	3/09/81	26	26.2	24.8	24.6-19.6	18	8.5
W753B	4/17/81	56	55.2[a]	53.8[a]	53.6-48.6[a]	45	8.5
W754A	3/14/81	26	26.2	24.4	24.2-19.2	8	11.7
W754B	4/15/81	51	52.2	49.4	47.2-39.2	33	12.7
W755A	3/12/81	26	26.2	24.0	23.8-18.8	16	12.5
W755B	3/24/81	61	53.2[a]	50.1[a]	49.9-44.9[a]	40	13.2
W756A	2/25/81	26	26.2	24.4	24.2-19.2	17	12.6
W756B	4/06/81	61	50.2	49.0	48.8-43.8	40	11.7
W757A	3/02/81	26	26.2	25.1	24.9-19.9	13	12.8
W757B	3/18/81	56	53.2[a]	50.6[a]	50.4-45.4[a]	40	14.0
W758A	3/10/81	26	26.2	24.0	23.8-18.8	18	19.8
W758B	4/01/81	61	60.2	59.3	59.1-44.1	31.5	18.7
W791	3/26/81	39	43.2[a]	40.2[a]	40.0-35.0[a]	32	11.9
W792	4/01/81	50	53.2	51.4	48.2-43.2	40	15.5
W793	4/22/81	81	82.2[a]	78.6[a]	78.4-68.4[a]	65	17.4

[a]Approximate.

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For the three soil borings drilled with the hand-held power drill, a slightly different procedure was followed. After collecting a surface sample and drilling to the next sampling depth, the solid-stem, continuous-flight augers were removed from the borehole. The sampler was then lowered into the borehole and the sample collected.

All soil borings were backfilled with uncontaminated material immediately after drilling. Bentonite pellets were placed in the bottom of the borehole to form an impermeable seal. Then, uncontaminated off-site fine-grained granular material (quarry fines) was added to within 5 feet below the ground surface. The remaining open borehole was filled with drill cuttings from the drilling site. Excess drill cuttings were spread on the ground adjacent to the boring except the drill cuttings from holes located on paved areas, which were removed to a designated area near Building 7.

MONITOR WELLS

Additional monitor wells were drilled to add to the established groundwater monitoring well network. Information collected from the wells includes water levels; horizontal flow velocities; PCB, chlorobenzene and freon extractable analyses; and floating oil layer thickness.

All wells were constructed after drilling and sampling a soil boring. Except for part of the multi-cased well construction, hollow-stem augers were used exclusively.

Shallow Monitor Wells

The shallow monitor wells were constructed to monitor the previously identified shallow water producing zone located approximately 20 to 25 feet below ground surface.

After completion of soil sampling, well construction involved lowering a 26-foot length of 2-inch I.D. galvanized steel well casing inside the hollow-stem auger to the bottom of the borehole. As the hollow-stem augers were removed in 5-foot sections from the borehole, fine-grained gravel (1 to 4 millimeters [mm]) was poured into the annular space between the well casing and auger to provide a gravel pack around the 5-foot section of slotted casing (well screen). Then, bentonite pellets were poured into the annular space to provide a 5-foot impermeable seal above the gravel pack. After all auger sections were removed, the remaining open borehole was backfilled in the same manner described above for soil borings (fine grained granular material and drill cuttings).

Deep Monitor Wells

The deep monitor wells were constructed to identify permeable zones from 25- to 60-foot depth, to sample soils, and to monitor a selected deeper permeable zone below 25 feet. With the exception of well W741 located in Building 17, each deep monitor well was drilled adjacent to a shallow monitor well previously identified as free of shallow PCB contamination.

Since each deep monitor well is considered an extension of the adjacent shallow well, soil sampling began at a depth equal to the deepest sample collected from the shallower of the pair of wells. Drilling and sampling continued until a monitoring zone was encountered. The criteria for selection of a monitoring zone is based on the following: (1) presence of a coarse-grained zone below 45-foot depth, (2) presence of a very wet zone below 50-foot depth, or (3) a depth of 60 feet.

Well construction proceeded as with the shallow monitor wells except for two differences: (1) steel well casing assembly, and (2) method of adding bentonite. The galvanized steel well casing was assembled inside the augers, using threaded steel couplings to connect the sections or to add additional 5-foot sections of slotted casing. Due to the depth of the wells, it was not always possible to add all of the bentonite pellets through the augers. When bentonite wedged inside the hollow-stem augers, the augers were removed prior to addition of the remaining bentonite. Well construction was then completed by backfilling as described earlier.

Multi-Cased Wells

Certain monitoring wells were drilled through PCB-contaminated soils. To prevent vertical downward movement of contaminants while drilling, it was necessary to seal off the suspect contaminated zone before constructing a monitor well. A multi-cased construction technique was used. The multi-cased well consists of a series of concentric, telescoping casings of decreasing diameter, as shown on Figure B-2. The construction details of the three multi-cased wells, W791, W792, and W793, are presented on the drilling logs in Appendix B-3.

The multi-cased wells were constructed in stages. All sampling and the final 2-inch steel casing installation was done using hollow stem augers as described previously. After sampling, a mud rotary drill rig was used to enlarge the borehole to a diameter sufficient to emplace a steel well casing. Each casing had a drillable grout plug at the bottom to minimize contamination. After drilling, cement-bentonite grout was emplaced to make an effective seal between the casing and borehole. Bentonite mud drilling fluids were used during this stage and were collected in 55-gallon drums for appropriate disposal.

The three multi-cased wells were constructed to depths of 40, 48, and 78 feet. The procedure for constructing the 40- and 48-foot multi-cased wells was as follows:

1. Drill pilot hole to 25 feet and collect soil samples (5-foot minimum interval).

2. Enlarge pilot hole with mud rotary rig, emplace cement bentonite grout and set 14-inch diameter surface casing to 25 feet.

3. Drill through the 14-inch casing grout plug and collect samples (2.5-foot minimum interval).

4. Enlarge borehole, emplace grout, and set 10-inch diameter casing.

5. Drill through 10-inch casing grout plug, collect samples (2.5-foot minimum interval), and identify water-producing zone

6. Install final casing (2 inch) and construct monitor well as described previously under shallow and deep monitor wells.

Deep, multi-cased well W793 was drilled adjacent to shallow, multi-cased well W792 to a depth of 78 feet. Since the deep well, W793, is considered an extention of W792, it was not necessary to drill a pilot hole and collect samples before emplacing the 14-inch and 10-inch surface casings in W793. Before installing the final 2-inch casing, the soil samples were screened for PCB content. The procedure for installing the deep multi-cased well was as follows:

1. Drill the mud rotary borehole, emplace the cement bentonite grout, and set the 14-inch surface casing to a depth of 35 feet.

2. Drill through the 14-inch casing grout plug, emplace grout, and set 10-inch surface casing to a depth of 50 feet.

3. Drill through 10-inch casing grout plug with the auger rig and collect soil samples (2.5-foot minimum interval).

4. Install final casing (2 inch) and construct monitor well to a depth of 78 feet.

APPENDIX B-2

SOIL SAMPLING PROCEDURE

APPENDIX B-2

SOIL SAMPLING

Soil samples for PCB analysis were collected with a California split-tube drive sampler. The sampler was lined with two, 6-inch sections of 2-inch-inside-diameter brass tubing. Prior to sampling, the liner tubes were thoroughly cleaned in the laboratory by the following method: (1) soapy water wash, (2) tap water rinse, (3) air dry, (4) nanograde hexane rinse, and (5) tube ends capped with aluminum foil. Before and between samples, the unlined sections of the sampler were rinsed with technical grade methanol and air-dried.

To collect each sample, the soil sampler, complete with liner tubes, was driven a total distance of 18 inches into the undisturbed soil at the bottom of the borehole. The driving force was a standard 140-pound slide hammer dropped 30 inches. The top 6-inch section of soil was discarded. The bottom and middle tubes containing 12 inches of soil were removed from the sampler, visually inspected for soil type, and the open ends capped with aluminum foil for transport to the laboratory. Each tube was labeled with the soil boring number and sample depth, and recorded on a sample inventory. Any suspected nonrepresentative samples were identified.

To assist in characterizing the compaction of various soil types, field personnel recorded the number of hammer blows required to drive the sampler each 6 inches of the total 18-inch depth.

APPENDIX B-3

DRILLING LOGS

APPENDIX B-3

KEY TO DRILLING LOGS

Information concerning the types of soil encountered while drilling and the depths at which these soils were found is contained in the following drilling logs. A description of key terms used in the logs is presented below.

Soil Boring and Well Designation. Each drilling site is designated by an unique letter-number combination.

The letter "S" indicates a soil boring; a hole that was used for soil sampling only. The letter "W" indicates a well; a hole that was used for soil sampling and installation of a monitor well. For the well pairs, the letter "A" designates the shallow (25 foot) well and the letter "B" designates the deep (up to 60 foot) well.

Depth. Measured in feet below ground surface.

Blows. Records the number of blows required to drive the 2.5-inch diameter soil sampler each 6 inches of the total 18-inch depth.

USC Soil Type. Soils were classified visually in the field according to the Unified Soil Classification (USC) system shown on the next page.

Description. The texture, color, and moisture content of soils were described, plus any other significant observations.

"BOH." Bottom of hole indicating total depth in feet below land surface.

"EOB." Water level measurement made at the end of boring (drilling).

$\overline{\underline{\nabla}}$. First appearance of free water.

MAJOR DIVISIONS			GROUP SYMBOLS	TYPICAL NAMES
COARSE-GRAINED SOILS More than 50% retained on No. 200 sieve*	GRAVELS 50% or more of coarse fraction retained on No. 4 sieve	CLEAN GRAVELS	GW	Well-graded gravels and gravel-sand mixtures, little or no fines
			GP	Poorly graded gravels and gravel-sand mixtures, little or no fines
		GRAVELS WITH FINES	GM	Silty gravels, gravel-sand-silt mixtures
			GC	Clayey gravels, gravel-sand-clay mixtures
	SANDS More than 50% of coarse fraction passes No. 4 sieve	CLEAN SANDS	SW	Well-graded sands and gravelly sands, little or no fines
			SP	Poorly graded sands and gravelly sands, little or no fines
		SANDS WITH FINES	SM	Silty sands, sand-silt mixtures
			SC	Clayey sands, sand-clay mixtures
FINE-GRAINED SOILS 50% or more passes No. 200 sieve*	SILTS AND CLAYS Liquid limit 50% or less		ML	Inorganic silts, very fine sands, rock flour, silty or clayey fine sands
			CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays
			OL	Organic silts and organic silty clays of low plasticity
	SILTS AND CLAYS Liquid limit greater than 50%		MH	Inorganic silts, micaceous or diatomaceous fine sands or silts, elastic silts
			CH	Inorganic clays of high plasticity, fat clays
			OH	Organic clays of medium to high plasticity
Highly Organic Soils			PT	Peat, muck and other highly organic soils

* Based on the material passing the 3-in. (75-mm) sieve.

UNIFIED SOIL CLASSIFICATION

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL

BORING / WELL: W731	PROJECT: GENERAL ELECTRIC	JOB NO.: 672-32	SHEET: 1/3

___ BACKFILLED SOIL BORING X MONITOR WELL ___ MULTI-CASED WELL

DRILL CONTRACTOR: HEW
DRILL RIG: CME 75 Hollow Stem Auger
BC PERSONNEL: Arndt, Erikson, Schick

HOLE DIAMETER: 8"
SAMPLE TYPE: California Split Tube Drive
DRIVE ENERGY: 140 lb.

	TIME	DATE
START:	0830	2/18/81
FINISH:	1110	2/18/81
BACKFILL:	----	---
FINISH WELL:	1245	2/18/81

ELEVATIONS

DATUM: OAKLAND (-2.998 M.S.L.)
GROUND SURFACE: 5.50
TOP WELL CASING: 7.94

SUBSURFACE FLUIDS / GROUNDWATER

DEPTH FROM GROUND	TIME	DATE
16.8	1110 EOB	2/18/81

DEPTH, FT.	SAMPLE	BLOWS PER 6 IN.	USC SOIL TYPE	DESCRIPTION OF SUBSURFACE MATERIALS
1	X X	6-9-6	Fill	Fill, mixed sand and gravel, moist.
2, 3, 4, 5			CH	Clay with trace of medium sand and fine gravel, dark brown, moist and stiff.
5, 6	X X	4-3-7		Silty clay with trace of fine gravel, light yellow brown, with small black mottles, moist and stiff.
6, 7, 8, 9, 10			CL	x Gravel in cuttings.
10, 11	X X	6-8-8		
11			CH	Plastic clay, very light beige, moist.
			▽ SC	Clayey coarse sand in tip, medium brown, wet.
12, 13, 14, 15			CL	Silty clay, light yellow brown, moist.

BORING WELL NO. W731

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL (CONTINUED)

BORING / WELL: W731	PROJECT: GENERAL ELECTRIC 672-32	SHEET: 2 / 3

DEPTH, FT.	SAMPLE	BLOWS PER 6 IN.	USC SOIL TYPE	DESCRIPTION OF SUBSURFACE MATERIALS
	X	3-3-3	CL	Silty clay, light yellow brown, moist.
16	X			
17				x Saturated.
18				
19				
20				
	X	3-6-9		
21	X			
22				
23				
24				
25	X	8-9-13		
26	X		CL	Fine sandy clay, light yellow brown, moist.
			BOH	
				Rode sampler down in auger for five feet after sampling.

BORING WELL NO. W731

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL (CONTINUED)

BORING / WELL: W731	PROJECT: GENERAL ELECTRIC 672-32	SHEET: 3 / 3

BACKFILLED SOIL BORING COMPLETION

DEPTH RANGE (FROM GROUND SURFACE)	MATERIALS INSTALLED
	BENTONITE OFF-SITE MATERIAL DRILL CUTTINGS

MONITOR WELL COMPLETION

MATERIAL TYPES

CASING: 2" ID galvanized steel pipe

SCREEN: 3/16" saw cut slots, 2" long, 12 slots per foot of casing

GRAVEL: Monterey sand #3 1 bag = 100 lb.

SEALANT: Bentonite clay pellets 3/8" 1 pail = 50 lb.

BACKFILL: Uncontaminated quarry fines.

DEPTH RANGE (FROM GROUND SURFACE)	MATERIALS INSTALLED
22.9 - 18.6 feet	SLOTTED CASING 4.3 feet
24.8 - 0 feet	CASING 27.2 feet
26 - 16.5 feet	GRAVEL PACK MATERIAL 2.5 bags
16.5 - 11 feet	BENTONITE 2 pails
11 - 0 feet	OFF-SITE MATERIAL
----	DRILL CUTTINGS

MULTI-CASED / MONITOR WELL COMPLETION

MATERIAL TYPES

SURFACE CASINGS:

SEALANT:

BACKFILL:

DEPTH RANGE (FROM GROUND SURFACE)	MATERIALS INSTALLED
	14" SURFACE CASING 10" SURFACE CASING SLOTTED 2" CASING 2" CASING GRAVEL PACK MATERIAL BENTONITE GROUT

BORING WELL NO. W731

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL

BORING / WELL: W732	PROJECT: GENERAL ELECTRIC	JOB NO.: 672-32	SHEET: 1 / 3

___ BACKFILLED SOIL BORING X MONITOR WELL ___ MULTI-CASED WELL

DRILL CONTRACTOR: HEW
DRILL RIG: CME 75 Hollow Stem Auger
BC PERSONNEL: Arndt, Erikson, Schick

HOLE DIAMETER: 8"
SAMPLE TYPE: California Split Tube Drive
DRIVE ENERGY: 140 lb.

	TIME	DATE
START:	1345	2/23/81
FINISH:	1545	2/23/81
BACKFILL:	----	---
FINISH WELL:	1730	2/23/81

ELEVATIONS

DATUM: OAKLAND (-2.998 M.S.L.)
GROUND SURFACE: 6.27
TOP WELL CASING: 9.51

SUBSURFACE FLUIDS / GROUNDWATER

DEPTH FROM GROUND	TIME	DATE
22'	1545 EOB	2/23/81

DEPTH, FT.	SAMPLE	BLOWS PER 6 IN.	USC SOIL TYPE	DESCRIPTION OF SUBSURFACE MATERIALS
1	X X	4-1-1	ML	Clayey silt, dark gray, damp and soft.
3			CL	Fine sandy clay, medium yellow brown, barely moist.
5	X X	3-13-23	ML	Clayey silt, dark gray, sampled through slough.
6			CL	Coarse sandy clay, medium brown, barely moist, trace of fine gravel.
8			CL	Coarse to medium sandy clay, light yellow brown, moist.
10	X X	5-5-7	CL	Fine sandy clay, light yellow brown, moist.
12			CL	Silty clay, light yellow brown, moist and stiff.
15				

BORING WELL NO. W732

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL (CONTINUED)

BORING / WELL: W732	PROJECT: GENERAL ELECTRIC 672-32	SHEET: 2 / 3

DEPTH, FT.	SAMPLE	BLOWS PER 6 IN.	USC SOIL TYPE	DESCRIPTION OF SUBSURFACE MATERIALS
	X	6-15-22	SC	Medium to fine sand, some clay, sub-rounded to sub-angular, lots of dark grains, wet and loose.
16	X	14-10		
	X			
17	X			
				Clayey medium sand, light yellow brown, damp to wet.
18			SC	
19				
20				
	X	9-12-15		Medium sandy clay, light yellow brown, moist.
	X			
21			CL	
22			▽	x Saturated and water on sampler.
23				
24				
25				
	X	9-14-19	CL	Fine sandy clay, light yellow brown with some small black mottles, moist.
26	X			
			BOH	

BORING WELL NO. W732

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL (CONTINUED)

BORING / WELL: W732	PROJECT: GENERAL ELECTRIC 672-32	SHEET: 3/3

BACKFILLED SOIL BORING COMPLETION

DEPTH RANGE (FROM GROUND SURFACE)	MATERIALS INSTALLED
	BENTONITE OFF-SITE MATERIAL DRILL CUTTINGS

MONITOR WELL COMPLETION

MATERIAL TYPES

CASING: 2" ID galvanized steel pipe

SCREEN: 3/16" saw cut slots, 2" long 12 slots per foot of casing.

GRAVEL: Monterey sand #3 1 bag = 100 lb.

SEALANT: Bentonite clay pellets 3/8" 1 pail = 50 lb.

BACKFILL: Uncontaminated quarry fines.

DEPTH RANGE (FROM GROUND SURFACE)	MATERIALS INSTALLED
23.8 - 17.8 feet	SLOTTED CASING 6 feet
24.0 - 0 feet	CASING 27.2 feet
26 - 16.5 feet	GRAVEL PACK MATERIAL 2.5 bags
16.5 - 11 feet	BENTONITE 2 pails
11 - 5 feet	OFF-SITE MATERIAL
5 - 0 feet	DRILL CUTTINGS

MULTI-CASED / MONITOR WELL COMPLETION

MATERIAL TYPES

SURFACE CASINGS:

SEALANT:

BACKFILL:

DEPTH RANGE (FROM GROUND SURFACE)	MATERIALS INSTALLED
	14" SURFACE CASING 10" SURFACE CASING SLOTTED 2" CASING 2" CASING GRAVEL PACK MATERIAL BENTONITE GROUT

BORING WELL NO. W732

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL

BORING / WELL: W733	PROJECT: GENERAL ELECTRIC	JOB NO.: 672-32	SHEET: 1/3

___ BACKFILLED SOIL BORING X MONITOR WELL ___ MULTI-CASED WELL

DRILL CONTRACTOR: HEW
DRILL RIG: CME 75 Hollow Stem Auger
BC PERSONNEL: Arndt, Manson

HOLE DIAMETER: 8"
SAMPLE TYPE: California Split Tube Drive
DRIVE ENERGY: 140 lb.

	TIME	DATE
START:	1030	4/17/81
FINISH:	1400	4/17/81
BACKFILL:	----	---
FINISH WELL:	1530	4/17/81

ELEVATIONS

DATUM: OAKLAND (-2.998 M.S.L.)
GROUND SURFACE: 8.40
TOP WELL CASING: 10.10

SUBSURFACE FLUIDS / GROUNDWATER

DEPTH FROM GROUND	TIME	DATE
25'	1400 EOB	4/17/81

DEPTH, FT.	SAMPLE	BLOWS PER 6 IN.	USC SOIL TYPE	DESCRIPTION OF SUBSURFACE MATERIALS
Too Rocky to Sample				
1			Fill	Mixed large to small gravel, sand and silt, medium yellow brown, dry and loose.
2			ML	Clayey silt, dark gray black, wet and soft.
3	X	4-9-16	CL	Fine sandy clay with trace of fine black gravel, medium yellow brown with small black mottles, moist and very stiff.
4	X			
5	X	5-14-22		
6	X			
7			CL	Silty clay, light yellow brown, moist and stiff.
8				
9				
10	X	9-13-22		x Trace of medium sand and fine gravel.
11	X			
12				
13				
14				
15				

BORING WELL NO. W733

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL (CONTINUED)

BORING / WELL: W733	PROJECT: GENERAL ELECTRIC 672-32	SHEET: 2 / 3

DEPTH, FT.	SAMPLE	BLOWS PER 6 IN.	USC SOIL TYPE	DESCRIPTION OF SUBSURFACE MATERIALS
	X	6-9-13		x Silty clay with trace of fine black gravel, light yellow brown, damp and soft.
16	X			
17			CL	
18				
19				
20	X	6-10-14		Silty clay, gray brown with light beige mottles, (Plastic clay?), moist and firm.
21	X		CL	
22				
23				
24			▽	Water on sampler.
25	X	8-12-17		
26	X			
			BOH	

BORING WELL NO. W733

YOS_OAK_03694

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL (CONTINUED)

BORING / WELL: W733	PROJECT: GENERAL ELECTRIC 672-32	SHEET: 3 / 3

BACKFILLED SOIL BORING COMPLETION

DEPTH RANGE (FROM GROUND SURFACE)	MATERIALS INSTALLED
	BENTONITE OFF-SITE MATERIAL DRILL CUTTINGS

MONITOR WELL COMPLETION

MATERIAL TYPES

CASING: 2" ID galvanized steel pipe

SCREEN: 3/16" saw cut slots, 2" long
12 slots per foot of casing

SEALANT: Bentonite clay pellets 3/8"
1 pail = 50 lb.

BACKFILL: Uncontaminated quarry fines.

GRAVEL: Monterey sand #3, 1 bag = 100 lb.

DEPTH RANGE (FROM GROUND SURFACE)	MATERIALS INSTALLED
24.3 - 19.3 feet	SLOTTED CASING 5 feet
24.5 - 0 feet	CASING 26.2 feet
26 - 19 feet	GRAVEL PACK MATERIAL 2 bags
19 - 13 feet	BENTONITE 2 pails
13 - 5 feet	OFF-SITE MATERIAL
5 - 0 feet	DRILL CUTTINGS

MULTI-CASED / MONITOR WELL COMPLETION

MATERIAL TYPES

SURFACE CASINGS:

SEALANT:

BACKFILL:

DEPTH RANGE (FROM GROUND SURFACE)	MATERIALS INSTALLED
	14" SURFACE CASING 10" SURFACE CASING SLOTTED 2" CASING 2" CASING GRAVEL PACK MATERIAL BENTONITE GROUT

BORING WELL NO. W733

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL

BORING / WELL: W734	PROJECT: GENERAL ELECTRIC	JOB NO.: 672-32	SHEET: 1 / 3

___ BACKFILLED SOIL BORING X MONITOR WELL ___ MULTI-CASED WELL

DRILL CONTRACTOR: HEW
DRILL RIG: CME 75 Hollow Stem Auger
BC PERSONNEL: Arndt, Erikson, Manson

HOLE DIAMETER: 8"
SAMPLE TYPE: California Split Tube Drive
DRIVE ENERGY: 140 lb.

	TIME	DATE
START:	1330	4/15/81
FINISH:	1500	4/15/81
BACKFILL:	----	---
FINISH WELL:	1600	4/15/81

ELEVATIONS

DATUM: OAKLAND (-2.998 M.S.L.)
GROUND SURFACE: 9.37
TOP WELL CASING: 10.93

SUBSURFACE FLUIDS / GROUNDWATER

DEPTH FROM GROUND	TIME	DATE
Dry	1500 EOB	4/15/81

DEPTH, FT.	SAMPLE	BLOWS PER 6 IN.	USC SOIL TYPE	DESCRIPTION OF SUBSURFACE MATERIALS
1	X X	3-5-7	Fill	Mixed clay, sand and gravel, light gray with lots of rust veining and rust/black mottles, moist and stiff.
2			ML	Clayey silt, light gray, damp and soft.
3			ML	Fine sandy silt with some clay, light gray, moist and soft.
4			CL	Fine sandy clay with trace of fine gravel, medium brown, moist and soft.
5	X X	3-6-9	CL	Fine sandy clay, medium yellow brown with large golden brown and small black mottles, moist and firm.
6				
7				
8				
9				
10	X X	6-12-29		
11			CL	Medium sandy clay, light yellow brown, moist and firm.
12				
13				
14			CL	Fine sandy clay with some fine black gravel and coarse sand light gray, moist and firm.
15				

BORING WELL NO. W734

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL (CONTINUED)

BORING / WELL: W734	PROJECT: GENERAL ELECTRIC 672-32	SHEET 2 / 3

DEPTH, FT.	SAMPLE	BLOWS PER 6 IN.	USC SOIL TYPE	DESCRIPTION OF SUBSURFACE MATERIALS
	X	6-11-23	CL	Fine sandy clay with some fine black gravel and coarse sand, light gray, moist and firm.
16	X			
17				
18				
19				
20	X	5-9-12		
21	X			
22				
23			CL	Silty clay, medium yellow brown with small black mottles, moist and soft.
24				
25	X	8-14-14	CL	Fine sandy clay, light gray, large golden brown mottles and some small black mottles, moist and soft.
26	X		BOH	

BORING WELL NO. W734

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL (CONTINUED)

BORING / WELL: W734	PROJECT: GENERAL ELECTRIC 672-32	SHEET: 3 /3

BACKFILLED SOIL BORING COMPLETION

DEPTH RANGE (FROM GROUND SURFACE)	MATERIALS INSTALLED
	BENTONITE OFF-SITE MATERIAL DRILL CUTTINGS

MONITOR WELL COMPLETION

MATERIAL TYPES

CASING: 2" ID galvanized steel pipe.

SCREEN: 3/16" saw cut slots 2" long. 12 slots per foot of casing.

GRAVEL: Monterey sand #3 1 bag - 100 lb.

SEALANT: Bentonite clay pellets 3/8" 1 pail = 50 lb.

BACKFILL: Uncontaminated quarry fines.

DEPTH RANGE (FROM GROUND SURFACE)	MATERIALS INSTALLED
24.5 - 19.5 feet	SLOTTED CASING 5 feet
24.7 - 0 feet	CASING 26.2 feet
26 - 19 feet	GRAVEL PACK MATERIAL 2 bags
19 - 8 feet	BENTONITE 2 pails
8 - 5 feet	OFF-SITE MATERIAL
5 - 0 feet	DRILL CUTTINGS

MULTI-CASED / MONITOR WELL COMPLETION

MATERIAL TYPES

SURFACE CASINGS:

SEALANT:

BACKFILL:

DEPTH RANGE (FROM GROUND SURFACE)	MATERIALS INSTALLED
	14" SURFACE CASING 10" SURFACE CASING SLOTTED 2" CASING 2" CASING GRAVEL PACK MATERIAL BENTONITE GROUT

BORING WELL NO. W734

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL

BORING / WELL: W735	PROJECT: GENERAL ELECTRIC	JOB NO.: 672-32	SHEET: 1 / 3

___ BACKFILLED SOIL BORING X MONITOR WELL ___ MULTI-CASED WELL

DRILL CONTRACTOR: HEW
DRILL RIG: CME 75 Hollow Stem Auger
BC PERSONNEL: Arndt, Reddy, Manson

HOLE DIAMETER: 8"
SAMPLE TYPE: California Split Tube Drive
DRIVE ENERGY: 140 lb.

	TIME	DATE
START:	1345	3/6/81
FINISH:	1530	3/6/81
BACKFILL:	----	---
FINISH WELL:	1615	3/6/81

ELEVATIONS

DATUM: OAKLAND (-2.998 M.S.L.)
GROUND SURFACE: 13.34
TOP WELL CASING: 15.45

SUBSURFACE FLUIDS / GROUNDWATER

DEPTH FROM GROUND	TIME	DATE
Dry	1530 EOB	3/6/81

DEPTH, FT.	SAMPLE	BLOWS PER 6 IN.	USC SOIL TYPE	DESCRIPTION OF SUBSURFACE MATERIALS
			Asphalt	Asphalt
1	X	3-3-5	Fill	Mixed sand, gravel and clay, dark gray and medium yellow brown, damp and loose, trace of possible oil, wood and brick.
2	X		▽	Water on sampler.
3			SC	Clayey medium sand with trace of fine gravel, dark gray, wet and soft.
4			ML	Clayey silt, dark gray, damp to wet.
5	X	7-11-20	CL	Silty clay, medium yellow brown, moist.
Lost 6	X			
7			SW	Fine sand with trace of clay, light yellow brown, wet and loose, very uniform.
8				
9				Grades into silty clay.
10	X	6-11-15	CL	Silty clay, medium yellow brown, moist and stiff.
11	X			
12				
13				
14				
15				

BORING WELL NO. W735

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL (CONTINUED)

BORING / WELL: W735	PROJECT: GENERAL ELECTRIC 672-32	SHEET: 2 / 3

DEPTH, FT.	SAMPLE	BLOWS PER 6 IN.	USC SOIL TYPE	DESCRIPTION OF SUBSURFACE MATERIALS
	X	5-8-14		Silty clay with some fine gravel, gray brown, moist and stiff.
16	X			
17			CL	
18				
19				
20				
21				x Drove wrong sampler.
22	X X	9-11-17		
23				
24				x Trace of fine gravel.
25				x With gray green mottles.
	X	8-15-28		
26	X		CL	Medium sandy clay, medium yellow brown with gray green mottles, damp.
			BOH	

BORING WELL NO. W735

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL (CONTINUED)

BORING / WELL: W735	PROJECT: GENERAL ELECTRIC 672-32	SHEET: 3/3

BACKFILLED SOIL BORING COMPLETION

DEPTH RANGE (FROM GROUND SURFACE)	MATERIALS INSTALLED
	BENTONITE OFF-SITE MATERIAL DRILL CUTTINGS

MONITOR WELL COMPLETION

MATERIAL TYPES

CASING: 2" ID galvanized steel pipe

SCREEN: 3/16" saw cut slots, 2" long
12 slots per foot of casing

GRAVEL: Monterey sand #3 1 bag = 100 lb.

SEALANT: Bentonite clay pellets 3/8"
1 pail = 50 lb.

BACKFILL: Uncontaminated quarry fines.

DEPTH RANGE (FROM GROUND SURFACE)	MATERIALS INSTALLED
23.9 - 18.9 feet	SLOTTED CASING 6 feet
24.1 - 0 feet	CASING 26.2 feet
26 - 19 feet	GRAVEL PACK MATERIAL 2 bags
19 - 9 feet	BENTONITE 2 pails
9 - 5 feet	OFF-SITE MATERIAL
5 - 0 feet	DRILL CUTTINGS

MULTI-CASED / MONITOR WELL COMPLETION

MATERIAL TYPES

SURFACE CASINGS:

SEALANT:

BACKFILL:

DEPTH RANGE (FROM GROUND SURFACE)	MATERIALS INSTALLED
	14" SURFACE CASING 10" SURFACE CASING SLOTTED 2" CASING 2" CASING GRAVEL PACK MATERIAL BENTONITE GROUT

BORING WELL NO. W735

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL

BORING / WELL: W736	PROJECT: GENERAL ELECTRIC	JOB NO.: 672-32	SHEET: 1 / 3

___ BACKFILLED SOIL BORING X MONITOR WELL ___ MULTI-CASED WELL

DRILL CONTRACTOR: HEW
DRILL RIG: CME 75 Hollow Stem Auger
BC PERSONNEL: Arndt, Reddy

HOLE DIAMETER: 8"
SAMPLE TYPE: California Split Tube Drive
DRIVE ENERGY: 140 lb.

	TIME	DATE
START:	1330	3/5/81
FINISH:	1600	3/5/81
BACKFILL:	----	---
FINISH WELL:	1640	3/5/81

ELEVATIONS

DATUM: OAKLAND (-2.998 M.S.L.)
GROUND SURFACE: 17.24
TOP WELL CASING: 18.43

SUBSURFACE FLUIDS / GROUNDWATER

DEPTH FROM GROUND	TIME	DATE
Dry	1640 EOB	3/5/81

DEPTH, FT.	SAMPLE	BLOWS PER 6 IN.	USC SOIL TYPE	DESCRIPTION OF SUBSURFACE MATERIALS
1	X X	3-5-7	Fill	Large gravel, concrete blocks and very sandy clay, medium brown, moist to damp, bricks.
3			CL	Fine sandy clay, medium brown, damp and soft.
5	X X	4-3-4	CL	Fine sandy clay, light gray, damp.
10	X X	6-9-13	CL	Silty clay with trace of fine gravel and sand, medium brown with large gray green mottles, moist and stiff.
15				

BORING WELL NO. W736

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL (CONTINUED)

BORING / WELL: W736

PROJECT: GENERAL ELECTRIC 672-32

SHEET: 2 / 3

DEPTH, FT.	SAMPLE	BLOWS PER 6 IN.	USC SOIL TYPE	DESCRIPTION OF SUBSURFACE MATERIALS
	X	5-7-12		Clay, medium yellow brown with gray green mottles, barely moist and stiff.
	X			
16				
17			CL	x Trace of fine gravel.
18				
				Clay, medium yellow brown, moist and stiff.
19			CL	
20	X	6-20-26	SC	Clayey coarse sand and fine gravel, sub-angular to sub-rounded, dark green gray, damp and loose.
	X			
21				
22	X	5-13-17		
	X		SC	Clayey fine sand, dark gray green, moist.
23				
	X	10-14-21		Plastic clay, medium yellow brown with gray green mottles, barely moist and stiff.
	X			
24			CH	
25	X	11-12-17		
	X			
26			BOH	
				Moved hole N 1 foot due to buried pipe - did not repeat surface sample.

BORING WELL NO. W736

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL (CONTINUED)

BORING / WELL: W736	PROJECT: GENERAL ELECTRIC 672-32	SHEET: 3 /3

BACKFILLED SOIL BORING COMPLETION

DEPTH RANGE (FROM GROUND SURFACE)	MATERIALS INSTALLED
	BENTONITE OFF-SITE MATERIAL DRILL CUTTINGS

MONITOR WELL COMPLETION

MATERIAL TYPES

CASING: 2" ID galvanized steel pipe

SCREEN: 3/16" saw cut slots, 2" long, 12 slots per foot of casing.

GRAVEL: Monterey sand #3, 1 bag = 100 lb.

SEALANT: Bentonite clay pellets 3/8" 1 pail = 50 lb.

BACKFILL: Uncontaminated quarry fines.

DEPTH RANGE (FROM GROUND SURFACE)	MATERIALS INSTALLED
24.8 - 19.8 feet	SLOTTED CASING 5 feet
25.0 - 0 feet	CASING 26.2 feet
26 - 19 feet	GRAVEL PACK MATERIAL 2 bags
19 - 13 feet	BENTONITE 2 pails
13 - 5 feet	OFF-SITE MATERIAL
5 - 0 feet	DRILL CUTTINGS

MULTI-CASED / MONITOR WELL COMPLETION

MATERIAL TYPES

SURFACE CASINGS:

SEALANT:

BACKFILL:

DEPTH RANGE (FROM GROUND SURFACE)	MATERIALS INSTALLED
	14" SURFACE CASING 10" SURFACE CASING SLOTTED 2" CASING 2" CASING GRAVEL PACK MATERIAL BENTONITE GROUT

BORING WELL NO. W736

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL

BORING / WELL: W741	PROJECT: GENERAL ELECTRIC	JOB NO.: 672-32	SHEET: 1 / 4

___ BACKFILLED SOIL BORING X MONITOR WELL ___ MULTI-CASED WELL

DRILL CONTRACTOR: HEW
DRILL RIG: CME 75 Hollow Stem Auger
BC PERSONNEL: Arndt, Erikson

HOLE DIAMETER: 8"
SAMPLE TYPE: California Split Tube Drive
DRIVE ENERGY: 140 lb.

	TIME	DATE
START:	0930	3/11/81
FINISH:	1430	3/11/81
BACKFILL:	----	---
FINISH WELL:	1730	3/11/81

ELEVATIONS

DATUM: OAKLAND (-2.998 M.S.L.)
GROUND SURFACE: 11.77
TOP WELL CASING: 11.77

SUBSURFACE FLUIDS / GROUNDWATER

DEPTH FROM GROUND	TIME	DATE
8'	1430 EOB	3/11/81

DEPTH, FT.	SAMPLE	BLOWS PER 6 IN.	USC SOIL TYPE	DESCRIPTION OF SUBSURFACE MATERIALS
			Concrete	Concrete.
1	X	7-8-10		
2	X		Fill	Fill - Clay mixed with coarse sand, large and fine gravel, dark yellow brown, moist, cobbles.
3			▽ ML	Water on auger. Clayey silt, dark gray, dry and loose.
4				x Damp to moist.
5	X	7-14-19	CL	Fine sandy clay, medium yellow brown with greenish gray mottles, moist and friable.
6	X			
7				
8				
9				
10	X	8-15-24	CL	Silty clay, light yellow brown with small black mottles, barely moist and stiff.
11	X			
12				
13				
14				
15				

BORING WELL NO. W741

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL (CONTINUED)

BORING / WELL: W741 | PROJECT: GENERAL ELECTRIC 672-32 | SHEET: 2 / 4

DEPTH, FT.	SAMPLE	BLOWS PER 6 IN.	USC SOIL TYPE	DESCRIPTION OF SUBSURFACE MATERIALS
	X	7-12-14	CL	
16	X		CL	Fine sandy clay, light yellow brown, moist and friable.
17				Silty clay, light yellow brown with small black mottles, damp and soft.
18				
19				
20	X	4-8-14	CL	
21	X			
22			▽	x Saturated cuttings - water on sampler.
23				
24				
25	X	10-15-18		x Wet and soft.
26	X			
27				
28				
29	X	7-9-17		Silty clay, light yellow brown with small black mottles, moist and very stiff.
30	X			
31			CH	
32				
33				
34				
35	X	6-6-13		x Wet and soft, trace of coarse sand.
36	X			

BORING WELL NO. W741

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL (CONTINUED)

BORING / WELL: W741	PROJECT: GENERAL ELECTRIC 672-32	SHEET: 3 / 4

DEPTH, FT.	SAMPLE	BLOWS PER 6 IN.	USC SOIL TYPE	DESCRIPTION OF SUBSURFACE MATERIALS
37			CL	x Coarse sand and fine to large gravel in cuttings, clayey, angular
38				x Flowing mud.
39				
40	X	12-28-26	SC	Clayey medium sand with fine to medium gravel (angular), light yellow brown, wet and firm.
41	X		BOH	

BORING WELL NO. W741

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL (CONTINUED)

BORING / WELL: W741	PROJECT: GENERAL ELECTRIC 672-32	SHEET: 4/4

BACKFILLED SOIL BORING COMPLETION

DEPTH RANGE (FROM GROUND SURFACE)	MATERIALS INSTALLED
	BENTONITE OFF-SITE MATERIAL DRILL CUTTINGS

MONITOR WELL COMPLETION

MATERIAL TYPES

CASING: 2" I.D. galvanized steel pipe

SCREEN: 3/16" Saw cut slots, 2"long
12 slots per foot of casing

GRAVEL: Monterey Sand #3 1 bag = 100 lb.

SEALANT: Bentonite clay pellets 3/8"
1 pail = 50 lb.

BACKFILL: Uncontaminated quarry fines

DEPTH RANGE (FROM GROUND SURFACE)	MATERIALS INSTALLED
40 - 35 feet	SLOTTED CASING 5 feet
40 - 0 feet	CASING 41.2 feet
41 - 33 feet	GRAVEL PACK MATERIAL 2 bags
33 - 14 feet	BENTONITE 2 pails
14 - 5 feet	OFF-SITE MATERIAL
5 - 0 feet	DRILL CUTTINGS

MULTI-CASED / MONITOR WELL COMPLETION

MATERIAL TYPES

SURFACE CASINGS:

SEALANT:

BACKFILL:

DEPTH RANGE (FROM GROUND SURFACE)	MATERIALS INSTALLED
	14" SURFACE CASING 10" SURFACE CASING SLOTTED 2" CASING 2" CASING GRAVEL PACK MATERIAL BENTONITE GROUT

BORING WELL NO. W741

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL

BORING / WELL: W751A	PROJECT: GENERAL ELECTRIC JOB NO.: 672-32	SHEET: 1 / 3

___ BACKFILLED SOIL BORING X MONITOR WELL ___ MULTI-CASED WELL

DRILL CONTRACTOR: HEW
DRILL RIG: CME 75 Hollow Stem Auger
BC PERSONNEL: Manson, Arndt

HOLE DIAMETER: 8"
SAMPLE TYPE: California Split Tube Drive
DRIVE ENERGY: 140 lb.

	TIME	DATE
START:	0830	3/10/81
FINISH:	1030	3/10/81
BACKFILL:	----	---
FINISH WELL:	1130	3/10/81

ELEVATIONS

DATUM: OAKLAND (-2.998 M.S.L.)
GROUND SURFACE: 4.98
TOP WELL CASING: 6.51

SUBSURFACE FLUIDS / GROUNDWATER

DEPTH FROM GROUND	TIME	DATE
23.5'	1030 EOB	3/10/81

DEPTH, FT.	SAMPLE	BLOWS PER 6 IN.	USC SOIL TYPE	DESCRIPTION OF SUBSURFACE MATERIALS
	X X	2-3-5	ML	Fine sandy silt, medium brown, dry and loose.
1			CL	Silty clay, dark gray, damp and soft.
2				
3				
4				
5	X X	9-16-23	SC	Clayey coarse sand with lots of fine gravel, medium red brown, dry and loose, angular.
6				
7	X X	20-29-29	CL	Silty clay, medium yellow brown with small black mottles, barely moist and firm.
8				
9				
10	X X	8-11-17	CL	Silty clay, light yellow brown with small black mottles, barely moist and firm.
11				
12			CL	Medium sandy clay, medium brown, moist and stiff.
13			CL	Silty clay, medium yellow brown, moist and stiff.
14				
15				

BORING WELL NO. W751A

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL (CONTINUED)

BORING / WELL: W751A	PROJECT: GENERAL ELECTRIC 672-32	SHEET: 2/3

DEPTH, FT.	SAMPLE	BLOWS PER 6 IN.	USC SOIL TYPE	DESCRIPTION OF SUBSURFACE MATERIALS
	X	8-10-21	CL	Silty clay, medium yellow brown, moist and stiff.
16	X			
		Too hard to sample.	SC	Clayey coarse sand and fine to medium gravel, medium yellow brown, dry and very firm.
17				
18				
19			CL	Silty clay, medium yellow brown, barely moist and firm.
20	X	4-7-9		Silty clay, light yellow brown, damp and soft.
21	X			
22			CL	
23			▽	Water on sampler.
24			CH	Plastic clay, light yellow brown, wet and soft.
25	X	7-12-17	CL	Fine sandy clay, light yellow brown, wet and soft.
26	X		BOH	

BORING WELL NO. W751A

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL (CONTINUED)

BORING / WELL: W751A	PROJECT: GENERAL ELECTRIC 672-32	SHEET: 3 / 3

BACKFILLED SOIL BORING COMPLETION

DEPTH RANGE (FROM GROUND SURFACE)	MATERIALS INSTALLED
	BENTONITE OFF-SITE MATERIAL DRILL CUTTINGS

MONITOR WELL COMPLETION

MATERIAL TYPES

CASING: 2" I.D. galvanized steel pipe

SCREEN: 3/16" Saw cut slots, 2"long
12 slots per foot of casing

GRAVEL: Monterey Sand #3 1 bag = 100 lb.

SEALANT: Bentonite clay pellets 3/8"
1 pail = 50 lb.

BACKFILL: Uncontaminated quarry fines

DEPTH RANGE (FROM GROUND SURFACE)	MATERIALS INSTALLED
24.5 - 19.5 feet	SLOTTED CASING 5 feet
24.7 - 0 feet	CASING 26.2 feet
26 - 18 feet	GRAVEL PACK MATERIAL 2 bags
18 - 8 feet	BENTONITE
8 - 4 feet	OFF-SITE MATERIAL
4 - 0 feet	DRILL CUTTINGS

MULTI-CASED / MONITOR WELL COMPLETION

MATERIAL TYPES

SURFACE CASINGS:

SEALANT:

BACKFILL:

DEPTH RANGE (FROM GROUND SURFACE)	MATERIALS INSTALLED
	14" SURFACE CASING 10" SURFACE CASING SLOTTED 2" CASING 2" CASING GRAVEL PACK MATERIAL BENTONITE GROUT

BORING WELL NO. W751A

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL

BORING / WELL: W751B	PROJECT: GENERAL ELECTRIC	JOB NO.: 672-32	SHEET: 1 / 5

___ BACKFILLED SOIL BORING X MONITOR WELL ___ MULTI-CASED WELL

DRILL CONTRACTOR: HEW
DRILL RIG: CME 75 Hollow Stem Auger
BC PERSONNEL: Arndt, Erikson

HOLE DIAMETER: 8"
SAMPLE TYPE: California Split Tube Drive
DRIVE ENERGY: 140 lb.

	TIME	DATE
START:	0930	3/30/81
FINISH:	1700	3/30/81
BACKFILL:	----	---
FINISH WELL:	1900	3/30/81

ELEVATIONS

DATUM: OAKLAND (-2.998 M.S.L.)
GROUND SURFACE: 4.90
TOP WELL CASING: 8.71

SUBSURFACE FLUIDS / GROUNDWATER

DEPTH FROM GROUND	TIME	DATE
Not Taken	----	3/30/81

DEPTH, FT.	SAMPLE	BLOWS PER 6 IN.	USC SOIL TYPE	DESCRIPTION OF SUBSURFACE MATERIALS
1, 2		No Samples Taken Until 25 feet	CL	Silty clay, dark gray black, damp and soft.
3, 4			CL	Coarse sandy clay with some fine gravel, medium brown, moist and stiff.
5, 6, 7			CL	Silty clay, medium yellow brown, moist to damp, stiff to soft.
8, 9, 10			CL	Silty clay, light yellow brown with small black mottles, damp and soft.
11			CL	Medium sandy clay, medium brown, moist and stiff.
12, 13, 14, 15			CL	Silty clay, light yellow brown, moist and stiff.

BORING WELL NO. W751B

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL (CONTINUED)

BORING / WELL: W751B	PROJECT: GENERAL ELECTRIC 672-32	SHEET: 2 / 5

DEPTH, FT.	SAMPLE	BLOWS PER 6 IN.	USC SOIL TYPE	DESCRIPTION OF SUBSURFACE MATERIALS
16			CL	Coarse sandy clay, medium brown, barely moist and stiff.
17				
18			CL	Silty clay, medium yellow brown, moist and soft.
19				
20				Silty clay, light yellow brown, damp and soft.
21			CL	
22				x Trace of fine gravel in cuttings Water on plug.
23				
24				
25				
	X	8-11-15		Fine sandy clay, light yellow brown with large medium yellow brown and small black mottles, moist.
26	X			
27				
28			CL	
29				Grades into
30				
	X	8-11-14		Silty clay, light yellow brown with large medium yellow brown mottles, moist.
31	X			
32				
33				
34				
35			CL	Fine sandy clay, light yellow brown with large medium yellow brown and black mottles, moist and soft.
	X	6-6-8		
36	X			

BORING WELL NO. W751B

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL (CONTINUED)

BORING / WELL: W751B	PROJECT: GENERAL ELECTRIC 672-32	SHEET: 3 / 5

DEPTH, FT.	SAMPLE	BLOWS PER 6 IN.	USC SOIL TYPE	DESCRIPTION OF SUBSURFACE MATERIALS
			CL	x Saturated, trace of medium sand in cuttings.
37				
38				
39				
40	X	13-14-20	CL	Silty clay, light yellow brown with small black mottles, damp and stiff.
	X			
41				
42				x Trace of coarse sand in cuttings.
43				
44				
45	X	15-19-22		
	X			
46				
47				
48				
49				
50	X	12-14-19		x Moist and very stiff.
	X			
51				
52				x Coarse sand and fine gravel in cuttings (solid pieces).
53				
54				
55	X	7-8-13	CL	Very fine sandy clay, light yellow brown with small black and large medium yellow brown mottles, moist and friable.
	X			
56				
57				x Coarse sand and fine gravel in cuttings.

BORING WELL NO. W751B

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL (CONTINUED)

BORING / WELL: W751B	PROJECT: GENERAL ELECTRIC 672-32	SHEET: 4 / 5

DEPTH, FT.	SAMPLE	BLOWS PER 6 IN.	USC SOIL TYPE	DESCRIPTION OF SUBSURFACE MATERIALS
58			CL	
59				
60				
	X	13-16-18		Very fine sandy clay, light yellow brown with small black and large medium yellow brown mottles, moist and friable.
61	X			
			BOH	

BORING WELL NO. W751B

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL (CONTINUED)

BORING / WELL: W751B	PROJECT: GENERAL ELECTRIC 672-32	SHEET: 5 / 5

BACKFILLED SOIL BORING COMPLETION

DEPTH RANGE (FROM GROUND SURFACE)	MATERIALS INSTALLED
	BENTONITE OFF-SITE MATERIAL DRILL CUTTINGS

MONITOR WELL COMPLETION

MATERIAL TYPES

CASING: 2" I.D. galvanized steel pipe

SCREEN: 3/16" Saw cut slots, 2" long

GRAVEL: 12 slots per foot of casing
Monterey Sand #2 1 bag = 100 lb.

SEALANT: Bentonite clay pellets 3/8"
1 pail = 50 lb.

BACKFILL: Uncontaminated quarry fines

DEPTH RANGE (FROM GROUND SURFACE)	MATERIALS INSTALLED
55.2 - 50.2 feet	SLOTTED CASING 5 feet
58.4 - 0 feet	CASING 62.2 feet
61 - 50 feet	GRAVEL PACK MATERIAL 2 bags
50 - 40 feet	BENTONITE 2 pails
40 - 5 feet	OFF-SITE MATERIAL
5 - 0 feet	DRILL CUTTINGS

MULTI-CASED / MONITOR WELL COMPLETION

MATERIAL TYPES

SURFACE CASINGS:

SEALANT:

BACKFILL:

DEPTH RANGE (FROM GROUND SURFACE)	MATERIALS INSTALLED
	14" SURFACE CASING 10" SURFACE CASING SLOTTED 2" CASING 2" CASING GRAVEL PACK MATERIAL BENTONITE GROUT

BORING WELL NO. W751B

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL

BORING / WELL: W752A	PROJECT: GENERAL ELECTRIC	JOB NO.: 672-32	SHEET: 1 / 3

___ BACKFILLED SOIL BORING X MONITOR WELL ___ MULTI-CASED WELL

DRILL CONTRACTOR: HEW
DRILL RIG: CME 75 Hollow Stem Auger
BC PERSONNEL: Arndt, Reddy

HOLE DIAMETER: 8"
SAMPLE TYPE: California Split Tube Drive
DRIVE ENERGY: 140 lb.

	TIME	DATE
START:	1345	3/9/81
FINISH:	1525	3/9/81
BACKFILL:	----	---
FINISH WELL:	1630	3/9/81

ELEVATIONS

DATUM: OAKLAND (-2.998 M.S.L.)
GROUND SURFACE: 8.67
TOP WELL CASING: 10.09

SUBSURFACE FLUIDS / GROUNDWATER

DEPTH FROM GROUND	TIME	DATE
13'11"	1525 EOB	3/9/81

DEPTH, FT.	SAMPLE	BLOWS PER 6 IN.	USC SOIL TYPE	DESCRIPTION OF SUBSURFACE MATERIALS
1	X X	6-11-11	ML	Clayey silt with lots of medium gravel, medium brown, dry and loose.
2, 3, 4			CH	Plastic clay, dark gray with green gray mottles, moist and soft.
5, 6	X X	6-12-16	CL	Silty clay, light yellow brown, moist and firm.
7, 8, 9			CL	Fine sandy clay, light yellow brown, moist and soft.
10, 11	X X	8-11-15	CL	
12, 13, 14, 15				

BORING WELL NO. W752A

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL (CONTINUED)

BORING / WELL: W752A	PROJECT: GENERAL ELECTRIC 672-32	SHEET: 2 / 3

DEPTH, FT.	SAMPLE	BLOWS PER 6 IN.	USC SOIL TYPE	DESCRIPTION OF SUBSURFACE MATERIALS
	X	3-5-7		Plastic clay, very light yellow brown, wet and soft.
16	X			
			CH	
17				
			▽	Water on sampler.
18				
19				
20				
	X	4-4-5		Plastic clay, light yellow brown, wet and soft.
21	X			
22			CH	
23				
24				
25				
	X	7-9-14		
26	X			
			BOH	

BORING WELL NO. W752A

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL (CONTINUED)

BORING / WELL: W752A	PROJECT: GENERAL ELECTRIC 672-32	SHEET: 3 /3

BACKFILLED SOIL BORING COMPLETION

DEPTH RANGE (FROM GROUND SURFACE)	MATERIALS INSTALLED
	BENTONITE OFF-SITE MATERIAL DRILL CUTTINGS

MONITOR WELL COMPLETION

MATERIAL TYPES

CASING: 2" I.D. galvanized steel pipe

SCREEN: 3/16" Saw cut slots, 2"long
12 slots per foot of casing

GRAVEL: Monterey Sand #3 1 bag = 100 lb.

SEALANT: Bentonite clay pellets 3/8"
1 pail = 50 lb.

BACKFILL: Uncontaminated quarry fines

DEPTH RANGE (FROM GROUND SURFACE)	MATERIALS INSTALLED
24.6 - 19.6 feet	SLOTTED CASING 5 feet
24.8 - 0 feet	CASING 26.2 feet
26 - 18 feet	GRAVEL PACK MATERIAL 2 bags
18 - 9 feet	BENTONITE 2 pails
9 - 5 feet	OFF-SITE MATERIAL
5 - 0 feet	DRILL CUTTINGS

MULTI-CASED / MONITOR WELL COMPLETION

MATERIAL TYPES

SURFACE CASINGS:

SEALANT:

BACKFILL:

DEPTH RANGE (FROM GROUND SURFACE)	MATERIALS INSTALLED
	14" SURFACE CASING 10" SURFACE CASING SLOTTED 2" CASING 2" CASING GRAVEL PACK MATERIAL BENTONITE GROUT

BORING WELL NO. W752A

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL

BORING / WELL: W752B	PROJECT: GENERAL ELECTRIC	JOB NO.: 672-32	SHEET: 1 / 5

___ BACKFILLED SOIL BORING X MONITOR WELL ___ MULTI-CASED WELL

DRILL CONTRACTOR: HEW
DRILL RIG: CME 75 Hollow Stem Auger
BC PERSONNEL: Arndt, Manson

HOLE DIAMETER: 8"
SAMPLE TYPE: California Split Tube Drive
DRIVE ENERGY: 140 lb.

	TIME	DATE
START:	0900	4/7/81
FINISH:	1330	4/8/81
BACKFILL:	----	---
FINISH WELL:	1000	4/9/81

ELEVATIONS

DATUM: OAKLAND (-2.998 M.S.L.)
GROUND SURFACE: 8.61
TOP WELL CASING: 10.72

SUBSURFACE FLUIDS / GROUNDWATER

DEPTH FROM GROUND	TIME	DATE
Not Taken	---	4/8/81

DEPTH, FT.	SAMPLE	BLOWS PER 6 IN.	USC SOIL TYPE	DESCRIPTION OF SUBSURFACE MATERIALS
		No Samples Taken Until 25 Feet.	Fill	Mixed silt and sand with some fine to coarse gravel, medium brown, dry and loose.
1			ML	Silt, dark gray, dry and loose.
2				x Moist.
3			Fill	Clayey silt with some large gravel, dark gray black, dry and loose.
4			CL	Silty clay, medium brown with large yellow green mottles, moist and stiff.
5				
6			CL	Silty clay, medium yellow brown, moist and stiff.
7				
8			SC	Clayey medium sand, medium brown, moist and soft.
9			CL	Fine sandy clay, medium brown, moist and soft.
10				x Trace of fine gravel.
11			CL	Silty clay, medium brown, moist and stiff.
12				
13			CL	Silty clay, medium yellow brown, moist and stiff.
14			CH	Plastic clay, very light yellow brown, damp and soft.
15				

BORING WELL NO. W752B

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL (CONTINUED)

BORING / WELL: W752B	PROJECT: GENERAL ELECTRIC 672-32	SHEET: 2 /5

DEPTH, FT.	SAMPLE	BLOWS PER 6 IN.	USC SOIL TYPE	DESCRIPTION OF SUBSURFACE MATERIALS
				Plastic clay, very light yellow brown, damp and soft.
16				
17			▽	Water on plug.
18			CH	
19				
20				
21				Silty clay, light yellow brown, moist and stiff.
22			CL	
23				
24				
25				x Fine sand on tip of plug.
	X	6-6-8		x Large very light yellow brown and small black mottles.
26	X			
27				x Wet to saturated.
28				
29				
30	X	10-10-13		x Moist and stiff.
31	X			
32				x Wet, trace of medium sand.
33				
34				
35			SC	Very clayey fine sand, medium yellow brown, damp and loose.
	X	5-6-11		
36	X			Clayey medium sand, medium red brown, wet and loose with some fine to medium gravel and trace of coarse sand.
			SC	

BORING WELL NO. W752B

YOS_OAK_03721

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL (CONTINUED)

BORING / WELL: W752B | PROJECT: GENERAL ELECTRIC 672-32 | SHEET: 3 / 5

DEPTH, FT.	SAMPLE	BLOWS PER 6 IN.	USC SOIL TYPE	DESCRIPTION OF SUBSURFACE MATERIALS
37	X X	14-17-9	SC	Clayey medium sand with some fine to medium gravel and trace of coarse sand, medium red brown, wet and loose.
38			CL	Silty clay, medium yellow brown, moist and stiff.
39				
40	X X	9-14-29	CL	Fine sandy clay, medium yellow browm, moist and soft.
41			SC	Very clayey coarse to medium sand with fine to medium angular gravel, medium red brown, moist and firm.
42	X X	23-30-17		x Lost half of sampler in hole, drilled to 50' to recover sampler in auger.
43				
44			CL	
45				
46				
47				
48				
49				
50				x Ended drilling 4/7/81, 1730. x Resumed drilling 4/8/81, 1030.
51	X X	9-11-18		Silty clay, light gray brown with large golden brown mottles, moist and stiff.
52				
53				
54				
55	X X	10-10-11		x Damp and soft.
56				
57				

BORING WELL NO. W752B

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL (CONTINUED)

BORING / WELL: W752B	PROJECT: GENERAL ELECTRIC 672-32	SHEET: 4 / 5

DEPTH, FT.	SAMPLE	BLOWS PER 6 IN.	USC SOIL TYPE	DESCRIPTION OF SUBSURFACE MATERIALS
58				
59			CL	
60	X	12-20-24		Silty clay, light gray brown with large golden brown mottles, damp and soft.
61	X			
			BOH	

BORING WELL NO. W752B

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL (CONTINUED)

BORING / WELL: W752B	PROJECT: GENERAL ELECTRIC 672-32	SHEET: 5 / 5

BACKFILLED SOIL BORING COMPLETION

DEPTH RANGE (FROM GROUND SURFACE)	MATERIALS INSTALLED
	BENTONITE OFF-SITE MATERIAL DRILL CUTTINGS

MONITOR WELL COMPLETION

MATERIAL TYPES

CASING: 2" I.D. galvanized steel pipe

SCREEN: 3/16" Saw cut slots, 2" long

GRAVEL: 12 slots per foot of casing
Monterey Sand #2 1 bag = 100 lb.

SEALANT: Bentonite clay pellets 3/8"
1 pail = 50 lb.

BACKFILL: Uncontaminated quarry fines

DEPTH RANGE (FROM GROUND SURFACE)	MATERIALS INSTALLED
44.9 - 39.9 feet	SLOTTED CASING 5 feet
45.1 - 0 feet	CASING 47.2 feet
45 - 35 feet	GRAVEL PACK MATERIAL 2 bags
35 - 25 feet	BENTONITE 2 pails
25- 5 feet	OFF-SITE MATERIAL
5 - 5 feet	DRILL CUTTINGS

MULTI-CASED / MONITOR WELL COMPLETION

MATERIAL TYPES

SURFACE CASINGS:

SEALANT:

BACKFILL:

DEPTH RANGE (FROM GROUND SURFACE)	MATERIALS INSTALLED
	14" SURFACE CASING 10" SURFACE CASING SLOTTED 2" CASING 2" CASING GRAVEL PACK MATERIAL BENTONITE GROUT

BORING WELL NO. W752B

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL

BORING / WELL: W753A	PROJECT: GENERAL ELECTRIC	JOB NO.: 672-32	SHEET: 1 / 3

___ BACKFILLED SOIL BORING X MONITOR WELL ___ MULTI-CASED WELL

DRILL CONTRACTOR: HEW
DRILL RIG: CME 75 Hollow Stem Auger
BC PERSONNEL: Arndt, Schick, Erikson

HOLE DIAMETER: 8"
SAMPLE TYPE: California Split Tube Drive
DRIVE ENERGY: 140 lb.

	TIME	DATE
START:	0915	3/9/81
FINISH:	1100	3/9/81
BACKFILL:	----	---
FINISH WELL:	1200	3/9/81

ELEVATIONS

DATUM: OAKLAND (-2.998 M.S.L.)
GROUND SURFACE: 7.14
TOP WELL CASING: 8.50

SUBSURFACE FLUIDS / GROUNDWATER

DEPTH FROM GROUND	TIME	DATE
25'6"	1100 EOB	3/9/81

DEPTH, FT.	SAMPLE	BLOWS PER 6 IN.	USC SOIL TYPE	DESCRIPTION OF SUBSURFACE MATERIALS
1	X X	3-1-6	ML	Clayey silt with trace of fine and medium gravel, dark gray, barely moist and soft.
2				
3			ML	Clayey silt, light medium brown, dry and loose.
4				Fine sandy clay, yellow brown, barely moist and firm.
5	X X	9-18-23	CL	
6				x Trace of coarse sand and fine gravel in cuttings.
7				
8				
9				
10			CL	
11	X X	5-8-12		Silty clay, medium yellow brown with small black mottles, moist.
12				x Damp and soft.
13				
14				
15				

BORING WELL NO. W753A

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL (CONTINUED)

BORING / WELL: W753A	PROJECT: GENERAL ELECTRIC 672-32	SHEET: 2 / 3

DEPTH, FT.	SAMPLE	BLOWS PER 6 IN.	USC SOIL TYPE	DESCRIPTION OF SUBSURFACE MATERIALS
	X	7-10-10		Silty clay, medium yellow brown with small black mottles, damp and soft.
	X			
16				
17				
18				
19				
			CL	
20				x Moist and stiff.
	X	6-12-17		
	X			
21				
22				
23				
24				
25				
	X	9-13-19		Water on sampler
	X			
26			BOH	x Light beige mottles, (plastic clay?).

BORING WELL NO. W753A

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL (CONTINUED)

BORING / WELL: W753A	PROJECT: GENERAL ELECTRIC 672-32	SHEET: 3 / 3

BACKFILLED SOIL BORING COMPLETION

DEPTH RANGE (FROM GROUND SURFACE)	MATERIALS INSTALLED
	BENTONITE OFF-SITE MATERIAL DRILL CUTTINGS

MONITOR WELL COMPLETION

MATERIAL TYPES

CASING: 2" I.D. galvanized steel pipe

SCREEN: 3/16" Saw cut slots, 2"long
12 slots per foot of casing

GRAVEL: Monterey Sand #3 1 bag = 100 lb.

SEALANT: Bentonite clay pellets 3/8"
1 pail = 50 lb.

BACKFILL: Uncontaminated quarry fines

DEPTH RANGE (FROM GROUND SURFACE)	MATERIALS INSTALLED
24.6 - 19.5 feet	SLOTTED CASING 5 feet
24.8 - 0 feet	CASING 26.2 feet
26 - 18 feet	GRAVEL PACK MATERIAL 2 bags
18 - 8 feet	BENTONITE 2 pails
8 - 3 feet	OFF-SITE MATERIAL
3 - 0 feet	DRILL CUTTINGS

MULTI-CASED / MONITOR WELL COMPLETION

MATERIAL TYPES

SURFACE CASINGS:

SEALANT:

BACKFILL:

DEPTH RANGE (FROM GROUND SURFACE)	MATERIALS INSTALLED
	14" SURFACE CASING 10" SURFACE CASING SLOTTED 2" CASING 2" CASING GRAVEL PACK MATERIAL BENTONITE GROUT

BORING WELL NO. W753A

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL

BORING / WELL: W753B	PROJECT: GENERAL ELECTRIC	JOB NO.: 672-32	SHEET: 1 / 4

___ BACKFILLED SOIL BORING X MONITOR WELL ___ MULTI-CASED WELL

DRILL CONTRACTOR: HEW
DRILL RIG: CME 75 Hollow Stem Auger
BC PERSONNEL: Arndt, Reddy

HOLE DIAMETER: 8"
SAMPLE TYPE: California Split Tube Drive
DRIVE ENERGY: 140 lb.

	TIME	DATE
START:	0900	4/16/81
FINISH:	1700	4/16/81
BACKFILL:	----	---
FINISH WELL:	0900	4/16/81

ELEVATIONS

DATUM: OAKLAND (-2.998 M.S.L.)
GROUND SURFACE: 7.14
TOP WELL CASING: 8.51

SUBSURFACE FLUIDS / GROUNDWATER

DEPTH FROM GROUND	TIME	DATE
Not Taken	---	4/16/81

DEPTH, FT.	SAMPLE	BLOWS PER 6 IN.	USC SOIL TYPE	DESCRIPTION OF SUBSURFACE MATERIALS
1		No Samples Taken Until 25 feet.		NOT LOGGED UNTIL 25 FEET.
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				

BORING WELL NO. W753B

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL (CONTINUED)

BORING / WELL: W753B	PROJECT: GENERAL ELECTRIC 672-32	SHEET: 2/4

DEPTH, FT.	SAMPLE	BLOWS PER 6 IN.	USC SOIL TYPE	DESCRIPTION OF SUBSURFACE MATERIALS
16				
17				NOT LOGGED UNTIL 25 FEET.
18				
19				
20				
21				
22				
23				Water on sampler.
24			▽	
25				x Light beige mottles (plastic clay?).
	X	10-13-14	CL	Silty clay with trace of medium and coarse sand, medium yellow brown, moist and stiff.
26	X			
27				
28				
29				
30				
	X	6-9-12	CL	Silty clay, light yellow brown with small black mottles, moist and stiff.
31	X			
32				
33				
34				
35	X	8-12-13	CH	Heavy clay, medium yellow brown with small black mottles, barely moist and very stiff.
36	X			

BORING WELL NO. W753B

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL (CONTINUED)

BORING / WELL: W753B	PROJECT: GENERAL ELECTRIC 672-32	SHEET: 3 / 4

DEPTH, FT.	SAMPLE	BLOWS PER 6 IN.	USC SOIL TYPE	DESCRIPTION OF SUBSURFACE MATERIALS
37			CH	Heavy clay, medium yellow brown with small black mottles, barely moist and very stiff.
38				
39				
40	X	11-17-24	CL	Fine sandy clay, light yellow brown with small black mottles, moist and stiff.
41	X			Clayey medium sand with some fine angular gravel, gray brown with large limonite mottles, moist and friable.
Lost Sample 42	X X	8-12-21	SC	
43				
44				
45	X	12-17-13 sand trap	CL	Fine sandy clay and fine gravel/coarse sand, light yellow brown with some small black mottles, moist and firm.
46	X			
47				
48				
49				
50	X	13-16-17 sand trap		Medium sandy clay, light yellow brown, moist and soft.
51	X		CL	
52				
53				
54				
55	X	10-16-22 sand trap		
56	X			
			BOH	

BORING WELL NO. W753B

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL (CONTINUED)

BORING / WELL: W753B	PROJECT: GENERAL ELECTRIC 672-32	SHEET: 4 / 4

BACKFILLED SOIL BORING COMPLETION

DEPTH RANGE (FROM GROUND SURFACE)	MATERIALS INSTALLED
	BENTONITE OFF-SITE MATERIAL DRILL CUTTINGS

MONITOR WELL COMPLETION

MATERIAL TYPES

CASING: 2" I.D. galvanized steel pipe

SCREEN: 3/16" Saw cut slots, 2" long

GRAVEL: 12 slots per foot of casing
Monterey Sand #2 1 bag = 100 lb.

SEALANT: Bentonite clay pellets 3/8"
1 pail = 50 lb.

BACKFILL: Uncontaminated quarry fines

DEPTH RANGE (FROM GROUND SURFACE)	MATERIALS INSTALLED
53.6 - 48.6 feet	SLOTTED CASING 5 feet
53.8 - 0 feet	CASING 55.2 feet
55 - 45 feet	GRAVEL PACK MATERIAL 2 bags
45 - 35 feet	BENTONITE 2 pails
35 - 5 feet	OFF-SITE MATERIAL
5 - 0 feet	DRILL CUTTINGS

MULTI-CASED / MONITOR WELL COMPLETION

MATERIAL TYPES

SURFACE CASINGS:

SEALANT:

BACKFILL:

DEPTH RANGE (FROM GROUND SURFACE)	MATERIALS INSTALLED
	14" SURFACE CASING 10" SURFACE CASING SLOTTED 2" CASING 2" CASING GRAVEL PACK MATERIAL BENTONITE GROUT

BORING WELL NO. W753B

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL

BORING / WELL: W754A	PROJECT: GENERAL ELECTRIC	JOB NO.: 672-32	SHEET: 1 / 3

___ BACKFILLED SOIL BORING X MONITOR WELL ___ MULTI-CASED WELL

DRILL CONTRACTOR: HEW
DRILL RIG: CME 75 Hollow Stem Auger
BC PERSONNEL: Arndt, Reddy

HOLE DIAMETER: 8"
SAMPLE TYPE: California Split Tube Drive
DRIVE ENERGY: 140 lb.

	TIME	DATE
START:	0845	3/14/81
FINISH:	1100	3/14/81
BACKFILL:	----	---
FINISH WELL:	1345	3/14/81

ELEVATIONS

DATUM: OAKLAND (-2.998 M.S.L.)
GROUND SURFACE: 9.87
TOP WELL CASING: 11.66

SUBSURFACE FLUIDS / GROUNDWATER

DEPTH FROM GROUND	TIME	DATE
23'	1100 EOB	3/14/81

DEPTH, FT.	SAMPLE	BLOWS PER 6 IN.	USC SOIL TYPE	DESCRIPTION OF SUBSURFACE MATERIALS
	X X	6-5-7	Fill	Sandy clay with some large gravel, dark gray brown. moist and soft.
1				Clayey silt, dark gray, moist to damp and soft.
2			ML	x Wet and soft.
3				
4				
5	X X	8-10-18	CL	Silty clay, light gray brown, moist and stiff.
6				
7			CL	Silty clay, medium yellow brown with small black mottles and lots of limonite stains, barely moist and stiff.
8				
9				
10				x Used wrong sampler.
11	X X	14-24-30		x No limonite staining.
12				
13				
14				
15				

BORING WELL NO. W754A

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL (CONTINUED)

BORING / WELL: W754A	PROJECT: GENERAL ELECTRIC 672-32	SHEET: 2 / 3

DEPTH, FT.	SAMPLE	BLOWS PER 6 IN.	USC SOIL TYPE	DESCRIPTION OF SUBSURFACE MATERIALS
16	X X	10-17-27	SC	Clayey medium sand with trace of fine gravel, medium red brown, wet and loose.
17	X X	23-25-18		
18			CL	Silty clay, light yellow brown, moist.
19				
20				
21	X X	5-8-12	SC	Very clayey fine sand, medium yellow brown, moist and soft.
22	X X	10-25-19		
23			▽	Water on sampler.
24			CL	Silty clay, medium yellow brown with small black mottles, moist and stiff.
25				
26	X X	8-10-12		
			BOH	

BORING WELL NO. W754A

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL (CONTINUED)

BORING / WELL: W754A	PROJECT: GENERAL ELECTRIC 672-32	SHEET: 3 /3

BACKFILLED SOIL BORING COMPLETION

DEPTH RANGE (FROM GROUND SURFACE)	MATERIALS INSTALLED
	BENTONITE OFF-SITE MATERIAL DRILL CUTTINGS

MONITOR WELL COMPLETION

MATERIAL TYPES

CASING: 2" I.D. galvanized steel pipe

SCREEN: 3/16" Saw cut slots, 2"long
12 slots per foot of casing

GRAVEL: Monterey Sand #3 1 bag = 100 lb.

SEALANT: Bentonite clay pellets 3/8"
1 pail = 50 lb.

BACKFILL: Uncontaminated quarry fines

DEPTH RANGE (FROM GROUND SURFACE)	MATERIALS INSTALLED
24.2 - 19.2 feet	SLOTTED CASING 5 feet
24.4 - 0 feet	CASING 26.2 feet
26 - 8 feet	GRAVEL PACK MATERIAL 2 bags
8 - 0 feet	BENTONITE 1.5 pails
---	OFF-SITE MATERIAL
---	DRILL CUTTINGS

MULTI-CASED / MONITOR WELL COMPLETION

MATERIAL TYPES

SURFACE CASINGS:

SEALANT:

BACKFILL:

DEPTH RANGE (FROM GROUND SURFACE)	MATERIALS INSTALLED
	14" SURFACE CASING 10" SURFACE CASING SLOTTED 2" CASING 2" CASING GRAVEL PACK MATERIAL BENTONITE GROUT

BORING WELL NO. W754A

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL

BORING / WELL: W754B	PROJECT: GENERAL ELECTRIC	JOB NO.: 672-32	SHEET: 1 / 4

___ BACKFILLED SOIL BORING X MONITOR WELL ___ MULTI-CASED WELL

DRILL CONTRACTOR: HEW
DRILL RIG: CME 75 Hollow Stem Auger
BC PERSONNEL: Arndt

HOLE DIAMETER: 8"
SAMPLE TYPE: California Split Tube Drive
DRIVE ENERGY: 140 lb.

	TIME	DATE
START:	0930	4/14/81
FINISH:	1600	4/14/81
BACKFILL:	----	---
FINISH WELL:	1200	4/15/81

ELEVATIONS

DATUM: OAKLAND (-2.998 M.S.L.)
GROUND SURFACE: 9.88
TOP WELL CASING: 12.69

SUBSURFACE FLUIDS / GROUNDWATER

DEPTH FROM GROUND	TIME	DATE
Not Taken	----	4/14/81

DEPTH, FT.	SAMPLE	BLOWS PER 6 IN.	USC SOIL TYPE	DESCRIPTION OF SUBSURFACE MATERIALS
1		No Samples Taken Until 25 feet.	Fill	Mixed sand and clay with some fine to large angular gravel, dark gray brown, dry.
2			ML	Clayey silt, dark gray, moist and soft.
3				
4			CL	Silty clay, medium yellow brown, moist and firm.
5				
6			CL	Fine sandy clay, medium yellow brown, moist and soft.
7				
8				
9				
10				
11				x Trace of medium black gravel.
12			CL	Silty clay, medium brown, moist and stiff.
13				
14			CL	Silty clay, light yellow brown, damp and soft.
15				

BORING WELL NO. W754B

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL (CONTINUED)

BORING / WELL: W754B	PROJECT: GENERAL ELECTRIC 672-32	SHEET: 2 / 4

DEPTH, FT.	SAMPLE	BLOWS PER 6 IN.	USC SOIL TYPE	DESCRIPTION OF SUBSURFACE MATERIALS
16			CL	Silty clay, light yellow brown, damp and soft.
17				
18				
19				
20				
21				
22			SC	Very clayey fine to medium sand, light yellow brown, wet and soft.
23				
24			CL	Silty clay, light yellow brown with small black mottles, moist and stiff.
25	X	9-15-14 Sand Boiled up inside Augers.		
26	X		SW ▽	Coarse sand with some fine angular gravel, medium red brown with lots of dark grains, wet and loose, well sorted.
27				Water on sampler.
28				
29				
30	X	34-23 Used Sand Trap.	SW	Coarse sand, no gravel, medium red brown, wet and loose, mostly dark grains, well sorted.
31	X			
32				
33				
34				
35	X	10-10-10 Sand Trap.	SW	Coarse sand with lots of fine to medium subangular gravel, medium red brown with lots of black grains, wet and loose.
36	X			

BORING WELL NO. W754B

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL (CONTINUED)

BORING / WELL: W754B	PROJECT: GENERAL ELECTRIC 672-32	SHEET: 3/4

DEPTH, FT.	SAMPLE	BLOWS PER 6 IN.	USC SOIL TYPE	DESCRIPTION OF SUBSURFACE MATERIALS
37			SW	Coarse sand with lots of fine to medium subangular gravel, medium red brown with lots of dark grains, wet and loose.
38				
39				
40			CL	Fine sandy clay, medium yellow brown, wet and soft
	X	11-14-25		
41	X	Sand Trap.	SC	
42				
43				
44				
45	X	13-13-12	SC	Clayey coarse sand, medium red brown, wet and loose, poorly sorted.
46	X	Sand Trap.		
47				
48				
49				
50	X	13-13-19		
51	X		CL	Silty clay, medium yellow brown with small black mottles, moist and stiff.
			BOH	

BORING WELL NO. W754B

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL (CONTINUED)

BORING / WELL: W754B	PROJECT: GENERAL ELECTRIC 672-32	SHEET: 4 / 4

BACKFILLED SOIL BORING COMPLETION

DEPTH RANGE (FROM GROUND SURFACE)	MATERIALS INSTALLED
	BENTONITE OFF-SITE MATERIAL DRILL CUTTINGS

MONITOR WELL COMPLETION

MATERIAL TYPES

CASING: 2" I.D. galvanized steel pipe

SCREEN: 3/16" Saw cut slots, 2" long

GRAVEL: 12 slots per foot of casing
Monterey Sand #2 1 bag = 100 lb.

SEALANT: Bentonite clay pellets 3/8"
1 pail = 50 lb.

BACKFILL: Uncontaminated quarry fines

DEPTH RANGE (FROM GROUND SURFACE)	MATERIALS INSTALLED
47.2 - 39.2 feet	SLOTTED CASING 8 feet
49.4 - 0 feet	CASING 52.2 feet
51 - 33 feet	GRAVEL PACK MATERIAL 3 bags
33 - 26.5 feet	BENTONITE 2 pails
26.5 - 5 feet	OFF-SITE MATERIAL
5 - 0 feet	DRILL CUTTINGS

MULTI-CASED / MONITOR WELL COMPLETION

MATERIAL TYPES

SURFACE CASINGS:

SEALANT:

BACKFILL:

DEPTH RANGE (FROM GROUND SURFACE)	MATERIALS INSTALLED
	14" SURFACE CASING 10" SURFACE CASING SLOTTED 2" CASING 2" CASING GRAVEL PACK MATERIAL BENTONITE GROUT

BORING WELL NO. W754B

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL

BORING / WELL: W755A	PROJECT: GENERAL ELECTRIC	JOB NO.: 672-32	SHEET: 1 / 3

___ BACKFILLED SOIL BORING X MONITOR WELL ___ MULTI-CASED WELL

DRILL CONTRACTOR: HEW
DRILL RIG: CME 75 Hollow Stem Auger
BC PERSONNEL: Arndt, Erikson, Schick

HOLE DIAMETER: 8"
SAMPLE TYPE: California Split Tube Drive
DRIVE ENERGY: 140 lb.

	TIME	DATE
START:	1100	3/12/81
FINISH:	1400	3/12/81
BACKFILL:	----	---
FINISH WELL:	1600	3/12/81

ELEVATIONS

DATUM: OAKLAND (-2.998 M.S.L.)
GROUND SURFACE: 10.28
TOP WELL CASING: 12.49

SUBSURFACE FLUIDS / GROUNDWATER

DEPTH FROM GROUND	TIME	DATE
Not Taken	---	3/12/81

DEPTH, FT.	SAMPLE	BLOWS PER 6 IN.	USC SOIL TYPE	DESCRIPTION OF SUBSURFACE MATERIALS
			GP	Railroad bed gravel.
1	X X	7-6-8	Fill	Mixed sand, gravel, clay, iron pieces, medium yellow brown, dry.
2			ML	Clayey silt, gray brown, dry and loose.
3			CL	Silty clay, medium brown, moist and soft.
4			CL	Fine sandy clay, medium yellow brown, moist and soft.
5	X X	16-20-24	SC	Clayey fine to medium sand, medium yellow brown, barely moist.
6	X X	14-16-28		
7			SC	Clayey coarse sand, medium yellow brown, moist.
8			CL	Fine sandy clay, medium yellow brown, moist and soft.
9				
10	X X	6-20-29	SC	Clayey coarse sand with some fine gravel, medium yellow brown, moist.
11	X X	8-23-21		
12			CL	Silty clay, gray brown, moist and soft.
13				
14				
15				

BORING WELL NO. W755A

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL (CONTINUED)

BORING / WELL: W755A	PROJECT: GENERAL ELECTRIC 672-32	SHEET: 2 /3

DEPTH, FT	SAMPLE	BLOWS PER 6 IN.	USC SOIL TYPE	DESCRIPTION OF SUBSURFACE MATERIALS
	X	5-19-13		Silty clay, dark brown, moist and hard.
16	X			
17			CL	
18				
19				
20				
	X	5-20-30	SW	Coarse sand and gravel up to 1 inch, yellow brown, moist.
21	X			
	X	17-19-16		
22	X		SC	Clayey medium grained sand, medium brown, moist.
23				
24			CL	Silty clay (somewhat more plastic), medium brown, moist and very sticky.
25				
	X	5-5-10		
26	X			
			BOH	
				Lost lead weight in hole.

BORING WELL NO. W755A

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL (CONTINUED)

BORING / WELL: W755A	PROJECT: GENERAL ELECTRIC 672-32	SHEET: 3 /3

BACKFILLED SOIL BORING COMPLETION

DEPTH RANGE (FROM GROUND SURFACE)	MATERIALS INSTALLED
	BENTONITE OFF-SITE MATERIAL DRILL CUTTINGS

MONITOR WELL COMPLETION

MATERIAL TYPES

CASING: 2" I.D. galvanized steel pipe

SCREEN: 3/16" Saw cut slots, 2"long
12 slots per foot of casing

GRAVEL: Monterey Sand #3 1 bag = 100 lb.

SEALANT: Bentonite clay pellets 3/8"
1 pail = 50 lb.

BACKFILL: Uncontaminated quarry fines

DEPTH RANGE (FROM GROUND SURFACE)	MATERIALS INSTALLED
23.8 - 18.8 feet	SLOTTED CASING 5 feet
24.0 - 0 feet	CASING 26.2 feet
26 - 16 feet	GRAVEL PACK MATERIAL 2.5 bags
16 - 8 feet	BENTONITE 2 pails
8 - 5 feet	OFF-SITE MATERIAL
5 - 0 feet	DRILL CUTTINGS

MULTI-CASED / MONITOR WELL COMPLETION

MATERIAL TYPES

SURFACE CASINGS:

SEALANT:

BACKFILL:

DEPTH RANGE (FROM GROUND SURFACE)	MATERIALS INSTALLED
	14" SURFACE CASING 10" SURFACE CASING SLOTTED 2" CASING 2" CASING GRAVEL PACK MATERIAL BENTONITE GROUT

BORING WELL NO. W755A

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL

BORING / WELL: W755B	PROJECT: GENERAL ELECTRIC	JOB NO.: 672-32	SHEET: 1 / 5

___ BACKFILLED SOIL BORING X MONITOR WELL ___ MULTI-CASED WELL

DRILL CONTRACTOR: HEW
DRILL RIG: CME 75 Hollow Stem Auger
BC PERSONNEL: Arndt, Erikson

HOLE DIAMETER: 8"
SAMPLE TYPE: California Split Tube Drive
DRIVE ENERGY: 140 lb.

	TIME	DATE
START:	0940	3/23/81
FINISH:	1500	3/23/81
BACKFILL:	----	---
FINISH WELL:	1645	3/24/81

ELEVATIONS

DATUM: OAKLAND (-2.998 M.S.L.)
GROUND SURFACE: 10.12
TOP WELL CASING: 13.19

SUBSURFACE FLUIDS / GROUNDWATER

DEPTH FROM GROUND	TIME	DATE
Not Taken	----	3/23/81

DEPTH, FT.	SAMPLE	BLOWS PER 6 IN.	USC SOIL TYPE	DESCRIPTION OF SUBSURFACE MATERIALS
		No Samples Taken Until 25 Feet.	GP	Railroad bed gravel.
1			Fill	Mixed sand, gravel, and clay, medium yellow brown, moist.
2			ML	Clayey silt, gray brown, dry and loose.
3			CL	Fine sandy clay, medium yellow brown, moist and soft.
4				
5			SC	Clayey fine sand, medium yellow brown, barely moist and soft.
6				
7			CL	
8				Fine to medium sandy clay with trace of coarse sand, medium brown, moist.
9				
10			CL	Silty clay, medium yellow brown, moist and stiff.
11				x Coarse sand in cuttings.
12				
13				
14				
15				

BORING WELL NO. W755B

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL (CONTINUED)

BORING / WELL: W755B	PROJECT: GENERAL ELECTRIC 672-32	SHEET: 2 / 5

DEPTH, FT.	SAMPLE	BLOWS PER 6 IN.	USC SOIL TYPE	DESCRIPTION OF SUBSURFACE MATERIALS
16			CL	Silty clay, medium yellow brown, moist and stiff.
17				
18			SC	Very clayey medium sand with some coarse sand, medium yellow brown, moist to damp.
19				
20				
21			SC	Clayey coarse sand with some fine gravel, medium yellow brown, damp to wet.
22			▽	Water on sampler.
23			CL	Medium to coarse sandy clay, medium yellow brown, damp.
24				
25	X	10-11-15	CL	Silty clay, medium yellow brown with small black mottles, barely moist and very stiff.
26	X			
27				
28				
29				
30	X	8-10-12		x Limonite staining.
31	X			
32				
33				
34				
35	X	15-17-21	CL	
36	X			Silty clay, medium brown with small black mottles, moist and very stiff.

BORING WELL NO. W755B

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL (CONTINUED)

BORING / WELL: W755B	PROJECT: GENERAL ELECTRIC 672-32	SHEET: 3 /5

DEPTH, FT.	SAMPLE	BLOWS PER 6 IN.	USC SOIL TYPE	DESCRIPTION OF SUBSURFACE MATERIALS
37			CL	Silty clay, medium brown with small black mottles, moist and very stiff.
38				
39			CL	
40	X	11-16-18		Fine sandy clay, light yellow brown, moist and firm, lots of rust staining.
41	X			
42			SC	Clayey coarse sand with trace of fine gravel, light yellow brown, saturated.
43				x Wet.
44				
45	X	11-29-34	SW	Slightly clayey coarse sand with lots of fine to large gravel, medium yellow brown with lots of small black grains and rust stains, angular to subangular, wet and loose.
46	X			
47	X	16-16-15		More clayey with depth.
48			CL	Silty clay, medium yellow brown with lots of small black mottles and rust stains, moist and stiff.
49				
50	X	11-13-14		x Damp and soft.
51	X			
52				x Trace of fine gravel in cuttings. x Saturated.
53				
54				
55	X	12-16-24		x Moist and stiff.
56	X			
57				x Saturated, trace of coarse sand in cuttings.

BORING WELL NO. W755B

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL (CONTINUED)

BORING / WELL: W755B	PROJECT: GENERAL ELECTRIC 672-32	SHEET: 4 /5

DEPTH, FT.	SAMPLE	BLOWS PER 6 IN.	USC SOIL TYPE	DESCRIPTION OF SUBSURFACE MATERIALS
58				
59			CL	
60	X	9-14-30		Silty clay, medium yellow brown with lots of small black mottles and rust stains, moist and stiff.
61	X		BOH	

BORING WELL NO. W755B

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL (CONTINUED)

BORING / WELL: W755B	PROJECT: GENERAL ELECTRIC 672-32	SHEET: 5 / 5

BACKFILLED SOIL BORING COMPLETION

DEPTH RANGE (FROM GROUND SURFACE)	MATERIALS INSTALLED
	BENTONITE OFF-SITE MATERIAL DRILL CUTTINGS

MONITOR WELL COMPLETION

MATERIAL TYPES

CASING: 2" I.D. galvanized steel pipe

SCREEN: 3/16" Saw cut slots, 2" long
12 slots per foot of casing

GRAVEL: Monterey Sand #2 1 bag = 100 lb.

SEALANT: Bentonite clay pellets 3/8"
1 pail = 50 lb.

BACKFILL: Uncontaminated quarry fines

DEPTH RANGE (FROM GROUND SURFACE)	MATERIALS INSTALLED
49.9 - 44.9 feet	SLOTTED CASING 5 feet
50.1 - 0 feet	CASING 53.2 feet
50 - 40 feet	GRAVEL PACK MATERIAL 2 bags
40 - 30 feet	BENTONITE 2 pails
30 - 5 feet	OFF-SITE MATERIAL
5 - 0 feet	DRILL CUTTINGS

MULTI-CASED / MONITOR WELL COMPLETION

MATERIAL TYPES

SURFACE CASINGS:

SEALANT:

BACKFILL:

DEPTH RANGE (FROM GROUND SURFACE)	MATERIALS INSTALLED
	14" SURFACE CASING 10" SURFACE CASING SLOTTED 2" CASING 2" CASING GRAVEL PACK MATERIAL BENTONITE GROUT

BORING WELL NO. W755B

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL

BORING / WELL: W756 A	PROJECT: GENERAL ELECTRIC JOB NO.: 672-32	SHEET: 1 / 3

___ BACKFILLED SOIL BORING X MONITOR WELL ___ MULTI-CASED WELL

DRILL CONTRACTOR: HEW
DRILL RIG: CME 75 Hollow Stem Auger
BC PERSONNEL: Arndt, Erikson

HOLE DIAMETER: 8"
SAMPLE TYPE: California Split Tube Drive
DRIVE ENERGY: 140 lb.

	TIME	DATE
START:	0920	2/25/81
FINISH:	1115	2/25/81
BACKFILL:	----	---
FINISH WELL:	1245	2/25/81

ELEVATIONS

DATUM: OAKLAND (-2,998 M.S.L.)
GROUND SURFACE: 10.81
TOP WELL CASING: 12.64

SUBSURFACE FLUIDS / GROUNDWATER

DEPTH FROM GROUND	TIME	DATE
17'4"	1115 EOB	2/25/81

DEPTH, FT.	SAMPLE	BLOWS PER 6 IN.	USC SOIL TYPE	DESCRIPTION OF SUBSURFACE MATERIALS
	X	8-13-15	Fill	Fill, mixed sand and gravel, medium brown, moist.
1	X			Clay coated gravel, medium yellow brown.
2			Fill	
3			▽	Water on auger.
4			CL	Silty clay, medium yellow brown, wet.
5	X	4-9-20		Silty clay, gray, damp.
6	X			x Some coarse sand in sample.
7			CL	x Wet.
8				
9				
10	X	6-13-17		Fine sandy clay, light yellow brown with small black mottles, moist.
11	X		CL	
12				x Trace of fine gravel.
13				
14				
15				

BORING WELL NO. W756 A

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL (CONTINUED)

BORING / WELL: W756 A	PROJECT: GENERAL ELECTRIC 672-32	SHEET: 2 / 3

DEPTH, FT.	SAMPLE	BLOWS PER 6 IN.	USC SOIL TYPE	DESCRIPTION OF SUBSURFACE MATERIALS
	X	5-7-8		Plastic clay, light yellow brown with small black mottle damp.
16	X			
17				x Some fine gravel and coarse sand in cuttings.
18				
19			CH	
20				
	X	4-6-7		
21	X			
22				
23				
24				
25				
	X	6-8-9		x Moist.
26	X			
			BOH	

BORING WELL NO. W756 A

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL (CONTINUED)

BORING / WELL: W756A	PROJECT: GENERAL ELECTRIC 672-32	SHEET: 3 / 3

BACKFILLED SOIL BORING COMPLETION

DEPTH RANGE (FROM GROUND SURFACE)	MATERIALS INSTALLED
	BENTONITE OFF-SITE MATERIAL DRILL CUTTINGS

MONITOR WELL COMPLETION

MATERIAL TYPES

CASING: 2" I.D. galvanized steel pipe

SCREEN: 3/16" Saw cut slots, 2"long
12 slots per foot of casing

GRAVEL: Monterey Sand #3 1 bag = 100 lb.

SEALANT: Bentonite clay pellets 3/8"
1 pail = 50 lb.

BACKFILL: Uncontaminated quarry fines

DEPTH RANGE (FROM GROUND SURFACE)	MATERIALS INSTALLED
24.2 - 19.2 feet	SLOTTED CASING 5 feet
24.4 - 0 feet	CASING 26.2 feet
26 - 17 feet	GRAVEL PACK MATERIAL 2.25 bags
17 - 13 feet	BENTONITE 2 pails
13 - 5 feet	OFF-SITE MATERIAL
5 - 0 feet	DRILL CUTTINGS

MULTI-CASED / MONITOR WELL COMPLETION

MATERIAL TYPES

SURFACE CASINGS:

SEALANT:

BACKFILL:

DEPTH RANGE (FROM GROUND SURFACE)	MATERIALS INSTALLED
	14" SURFACE CASING 10" SURFACE CASING SLOTTED 2" CASING 2" CASING GRAVEL PACK MATERIAL BENTONITE GROUT

BORING WELL NO. W756A

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL

BORING / WELL: W756B	PROJECT: GENERAL ELECTRIC	JOB NO.: 672-32	SHEET: 1 / 5

___ BACKFILLED SOIL BORING X MONITOR WELL ___ MULTI-CASED WELL

DRILL CONTRACTOR: HEW
DRILL RIG: CME 75 Hollow Stem Auger
BC PERSONNEL: Arndt, Erikson

HOLE DIAMETER: 8"
SAMPLE TYPE: California Split Tube Drive
DRIVE ENERGY: 140 lb.

	TIME	DATE
START:	0915	4/2/81
FINISH:	1800	4/2/81
BACKFILL:	----	---
FINISH WELL:	0930	4/6/81

ELEVATIONS

DATUM: OAKLAND (-2.998 M.S.L.)
GROUND SURFACE: 10.54
TOP WELL CASING: 11.71

SUBSURFACE FLUIDS / GROUNDWATER

DEPTH FROM GROUND	TIME	DATE
Not Taken	----	4/2/81

DEPTH, FT.	SAMPLE	BLOWS PER 6 IN.	USC SOIL TYPE	DESCRIPTION OF SUBSURFACE MATERIALS
1		No Samples Taken Until 25 Feet.	Fill	Gravelly fill - up to 4" rock.
2				
3				
4			▽	Water on plug. x Saturated.
5				
6			?	NO CUTTINGS UNTIL 25 FEET.
7				
8				
9				
10				
11				
12				
13				
14				
15				

BORING WELL NO. W756B

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL (CONTINUED)

BORING / WELL: W756B	PROJECT: GENERAL ELECTRIC 672-32	SHEET: 2/5

DEPTH, FT.	SAMPLE	BLOWS PER 6 IN.	USC SOIL TYPE	DESCRIPTION OF SUBSURFACE MATERIALS
16				
17				
18			?	NO CUTTINGS UNTIL 25 FEET.
19				
20				
21				
22				
23				
24				
25	X	7-8-13		
26	X			
27				
28				
29			CL	
30	X	13-18-27		Silty clay, light yellow brown with small black mottles, moist and stiff.
31	X			
32				
33				
34				
35	X	6-10-14		
36	X			

BORING WELL NO. W756B

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL (CONTINUED)

BORING / WELL: W756B	PROJECT: GENERAL ELECTRIC 672-32	SHEET: 3 / 5

DEPTH, FT.	SAMPLE	BLOWS PER 6 IN.	USC SOIL TYPE	DESCRIPTION OF SUBSURFACE MATERIALS
37			CL	Silty clay, light yellow brown with small black mottles, moist and stiff.
38				
39				
40	X	9-10-11	CL	Fine sandy clay, light gray with large golden brown and small black mottles, moist and soft.
41	X			
42				
43				
44				
45				
46				
47	X	14-20-29		
	X			
48			SC	Clayey fine to medium sand with trace of coarse sand and fine gravel, medium brown, wet and loose.
49				
50	X	7-11-18	CL	Silty clay, light yellow brown with small black mottles, moist and very stiff.
	X			
51				
52				
53				
54				
55	X	5-6-12		
	X			
56			CL	Fine sandy clay, light gray with large golden brown mottles, moist and soft, trace of fine gravel.
57				

BORING WELL NO. W756B

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL (CONTINUED)

BORING / WELL: W756B	PROJECT: GENERAL ELECTRIC 672-32	SHEET: 4 / 5

DEPTH, FT.	SAMPLE	BLOWS PER 6 IN.	USC SOIL TYPE	DESCRIPTION OF SUBSURFACE MATERIALS
58				
59			CL	Fine sandy clay with trace of fine gravel, light gray with large golden brown mottles, moist and soft.
60	X	6-6-17		
61	X		BOH	

BORING WELL NO. W756B

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL (CONTINUED)

BORING / WELL: W756B	PROJECT: GENERAL ELECTRIC 672-32	SHEET: 5 /5

BACKFILLED SOIL BORING COMPLETION

DEPTH RANGE (FROM GROUND SURFACE)	MATERIALS INSTALLED
	BENTONITE OFF-SITE MATERIAL DRILL CUTTINGS

MONITOR WELL COMPLETION

MATERIAL TYPES

CASING: 2" I.D. galvanized steel pipe

SCREEN: 3/16" Saw cut slots, 2" long

GRAVEL: 12 slots per foot of casing
Monterey Sand #2 1 bag = 100 lb.

SEALANT: Bentonite clay pellets 3/8"
1 pail = 50 lb.

BACKFILL: Uncontaminated quarry fines

DEPTH RANGE (FROM GROUND SURFACE)	MATERIALS INSTALLED
48.8 - 43.8 feet	SLOTTED CASING 5 feet
49.0 - 0 feet	CASING 50.2 feet
50 - 40 feet	GRAVEL PACK MATERIAL 2 bags
40 - 30 feet	BENTONITE 2 pails
30 - 5 feet	OFF-SITE MATERIAL
5 - 0 feet	DRILL CUTTINGS

MULTI-CASED / MONITOR WELL COMPLETION

MATERIAL TYPES

SURFACE CASINGS:

SEALANT:

BACKFILL:

DEPTH RANGE (FROM GROUND SURFACE)	MATERIALS INSTALLED
	14" SURFACE CASING 10" SURFACE CASING SLOTTED 2" CASING 2" CASING GRAVEL PACK MATERIAL BENTONITE GROUT

BORING WELL NO. W756B

BC BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL

BORING / WELL: W757A	PROJECT: GENERAL ELECTRIC	JOB NO.: 672-32	SHEET: 1 / 3

___ BACKFILLED SOIL BORING X MONITOR WELL ___ MULTI-CASED WELL

DRILL CONTRACTOR: HEW
DRILL RIG: CME 45 Hollow Stem Auger
BC PERSONNEL: Erikson, Reddy

HOLE DIAMETER: 8"
SAMPLE TYPE: California Split Tube Drive
DRIVE ENERGY: 140 lb.

	TIME	DATE
START:	1300	3/2/81
FINISH:	1445	3/2/81
BACKFILL:	----	---
FINISH WELL:	1600	3/2/81

ELEVATIONS

DATUM: OAKLAND (-2.998 M.S.L.)
GROUND SURFACE: 11.72
TOP WELL CASING: 12.78

SUBSURFACE FLUIDS / GROUNDWATER

DEPTH FROM GROUND	TIME	DATE
1"	1315	3/2/81

DEPTH, FT.	SAMPLE	BLOWS PER 6 IN.	USC SOIL TYPE	DESCRIPTION OF SUBSURFACE MATERIALS
1	X X	Grab-too hard to sample	Fill	Gravel, dirt, fill, gray brown, metal residue.
5	X X	5-8-10	ML	Lost sample, re-drove 24". Clayey silt with small gravel, medium brown, sample well mixed with slough.
10	X X	6-8-22	CL	Clayey silt with some small pebbles and fine sand, medium brown, barely moist.
15				

BORING WELL NO. W757A

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL (CONTINUED)

BORING / WELL: W757A	PROJECT: GENERAL ELECTRIC 672-32	SHEET: 2 /3

DEPTH, FT.	SAMPLE	BLOWS PER 6 IN.	USC SOIL TYPE	DESCRIPTION OF SUBSURFACE MATERIALS
	X	6-9-12	CL	Silty clay, medium brown with mottles, very stiff.
16	X			
17				
18				
19				
20	X	6-7-23		
	X			
21			SC	Silty sand and gravel in tip.
22	X	3-6-25		
	X			
23				
24				
25	X	7-10-12	CL	Silty clay, medium brown with mottles.
	X			
26			BOH	

BORING WELL NO. W757A

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL (CONTINUED)

BORING / WELL: W757A	PROJECT: GENERAL ELECTRIC 672-32	SHEET: 3 / 3

BACKFILLED SOIL BORING COMPLETION

DEPTH RANGE (FROM GROUND SURFACE)	MATERIALS INSTALLED
	BENTONITE OFF-SITE MATERIAL DRILL CUTTINGS

MONITOR WELL COMPLETION

MATERIAL TYPES

CASING: 2" I.D. galvanized steel pipe

SCREEN: 3/16" Saw cut slots, 2" long
12 slots per foot of casing

GRAVEL: Monterey Sand #3 1 bag = 100 lb.

SEALANT: Bentonite clay pellets 3/8"
1 pail = 50 lb.

BACKFILL: Uncontaminated quarry fines

DEPTH RANGE (FROM GROUND SURFACE)	MATERIALS INSTALLED
24.9 - 19.9 feet	SLOTTED CASING 5 feet
25.1 - 0 feet	CASING 26.2 feet
26 - 13 feet	GRAVEL PACK MATERIAL 3.5 bags
13 - 7 feet	BENTONITE 2 pails
7 - 4 feet	OFF-SITE MATERIAL
4 - 0 feet	DRILL CUTTINGS

MULTI-CASED / MONITOR WELL COMPLETION

MATERIAL TYPES

SURFACE CASINGS:

SEALANT:

BACKFILL:

DEPTH RANGE (FROM GROUND SURFACE)	MATERIALS INSTALLED
	14" SURFACE CASING 10" SURFACE CASING SLOTTED 2" CASING 2" CASING GRAVEL PACK MATERIAL BENTONITE GROUT

BORING WELL NO. W757A

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL

BORING / WELL: W757B	PROJECT: GENERAL ELECTRIC	JOB NO.: 672-32	SHEET: 1/4

___ BACKFILLED SOIL BORING X MONITOR WELL ___ MULTI-CASED WELL

DRILL CONTRACTOR: HEW
DRILL RIG: CME 75 Hollow Stem Auger
BC PERSONNEL: Arndt, Erikson, Reddy

HOLE DIAMETER: 8"
SAMPLE TYPE: California Split Tube Drive
DRIVE ENERGY: 140 lb.

	TIME	DATE
START:	0915	3/16/81
FINISH:	1600	3/16/81
BACKFILL:	----	---
FINISH WELL:	1600	3/18/81

ELEVATIONS

DATUM: OAKLAND (-2.998 M.S.L.)
GROUND SURFACE: 11.38
TOP WELL CASING: 14.02

SUBSURFACE FLUIDS / GROUNDWATER

DEPTH FROM GROUND	TIME	DATE
Not Taken	----	3/16/81

DEPTH, FT.	SAMPLE	BLOWS PER 6 IN.	USC SOIL TYPE	DESCRIPTION OF SUBSURFACE MATERIALS
1		No Samples Taken Until 25 feet.	Fill	Mixed sand, gravel, and clay, lots of rusty nails, metal pieces, medium brown, damp.
2			▽ ML	Clayey silt, gray, wet to saturated. Water on auger.
3				
4				
5			CL	Fine sandy clay, medium yellow brown, moist and soft.
6			CL	Silty clay, light yellow brown, wet to saturated.
7				x Trace of coarse sand in cuttings.
8				
9				
10				
11				
12				x Damp and soft.
13				
14				
15				

BORING WELL NO. W757B

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL (CONTINUED)

BORING / WELL: W757B	PROJECT: GENERAL ELECTRIC 672-32	SHEET: 2 / 4

DEPTH, FT.	SAMPLE	BLOWS PER 6 IN.	USC SOIL TYPE	DESCRIPTION OF SUBSURFACE MATERIALS
16			CH	Plastic clay, light yellow brown, barely moist and very stiff.
17				
18				x Trace of coarse sand in cuttings. x Saturated.
19				
20			CL	Coarse sandy clay, light yellow brown, wet and soft.
21				
22				
23				
24				
25				
26	X X	8-8-10	CL	Silty clay, light yellow brown with small black mottles, moist and stiff.
27				x Damp.
28				
29				
30				
31	X X	6-8-13		x Moist and stiff.
32				x Coarse sand in cuttings.
33				
34				
35				
36	X X	5-8-14	CL	Fine sandy clay, medium yellow brown, moist and firm.

BORING WELL NO. W757B

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL (CONTINUED)

BORING / WELL: W757B	PROJECT: GENERAL ELECTRIC 672-32	SHEET: 3 / 4

DEPTH, FT.	SAMPLE	BLOWS PER 6 IN.	USC SOIL TYPE	DESCRIPTION OF SUBSURFACE MATERIALS
37, 38, 39			CL	Fine sandy clay, medium yellow brown, moist and firm.
40, 41, 42, 43	X X	8-9-13	CL	Medium to fine sandy clay, medium yellow brown with large light gray mottles, moist and soft, trace of fine gravel.
44, 45, 46	X X	4-4-13	SW	Slightly clayey, fine to medium sand, medium yellow brown with light gray mottles, wet and loose.
47	X X	16-15-29		
48, 49			SC	Very clayey coarse sand with fine to medium gravel, medium yellow brown, moist and somewhat loose, lots of limonite staining.
50	X X	8-8-12	SW	Slightly clayey medium sand, medium yellow brown, wet and loose.
51, 52, 53, 54			CL	Silty clay, medium yellow brown, moist and stiff.
55	X X	9-13-17	CL	Fine sandy clay, medium yellow brown, moist and soft.
56			CL	Silty clay, medium yellow brown, moist and stiff.
			BOH	

BORING WELL NO. W757B

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL (CONTINUED)

BORING / WELL: W757B	PROJECT: GENERAL ELECTRIC 672-32	SHEET: 4 / 4

BACKFILLED SOIL BORING COMPLETION

DEPTH RANGE (FROM GROUND SURFACE)	MATERIALS INSTALLED
	BENTONITE OFF-SITE MATERIAL DRILL CUTTINGS

MONITOR WELL COMPLETION

MATERIAL TYPES

CASING: 2" I.D. galvanized steel pipe

SCREEN: 3/16" Saw cut slots, 2" long

GRAVEL: 12 slots per foot of casing
Monterey Sand #2 1 bag = 100 lb.

SEALANT: Bentonite clay pellets 3/8"
1 pail = 50 lb.

BACKFILL: Uncontaminated quarry fines

DEPTH RANGE (FROM GROUND SURFACE)	MATERIALS INSTALLED
50.4 - 45.4 feet	SLOTTED CASING 5 feet
50.6 - 0 feet	CASING 53.2 feet
50 - 40 feet	GRAVEL PACK MATERIAL 2 bags
40 - 30 feet	BENTONITE 2 pails
30 - 5 feet	OFF-SITE MATERIAL
5 - 0 feet	DRILL CUTTINGS

MULTI-CASED / MONITOR WELL COMPLETION

MATERIAL TYPES

SURFACE CASINGS:

SEALANT:

BACKFILL:

DEPTH RANGE (FROM GROUND SURFACE)	MATERIALS INSTALLED
	14" SURFACE CASING 10" SURFACE CASING SLOTTED 2" CASING 2" CASING GRAVEL PACK MATERIAL BENTONITE GROUT

BORING WELL NO. W757B

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL

BORING / WELL: W758A	PROJECT: GENERAL ELECTRIC JOB NO.: 672-32	SHEET: 1 / 3

___ BACKFILLED SOIL BORING X MONITOR WELL ___ MULTI-CASED WELL

DRILL CONTRACTOR: HEW
DRILL RIG: CME 75 Hollow Stem Auger
BC PERSONNEL: Arndt, Erikson

HOLE DIAMETER: 8"
SAMPLE TYPE: California Split Tube Drive
DRIVE ENERGY: 140 lb.

	TIME	DATE
START:	1400	3/10/81
FINISH:	1615	3/10/81
BACKFILL:	----	---
FINISH WELL:	1645	3/10/81

ELEVATIONS

DATUM: OAKLAND (-2.998 M.S.L.)
GROUND SURFACE: 17.56
TOP WELL CASING: 19.78

SUBSURFACE FLUIDS / GROUNDWATER

DEPTH FROM GROUND	TIME	DATE
Dry	1615 EOB	3/10/81

DEPTH, FT.	SAMPLE	BLOWS PER 6 IN.	USC SOIL TYPE	DESCRIPTION OF SUBSURFACE MATERIALS
	X X	7-5-6	ML	Clayey silt, trace of fill gravel at surface, dark gray, dry and loose, thin organic horizon on top.
1			CL	Fine sandy clay, medium brown, dry and loose.
2				
3				
4				
5	X X	6-19-17	Fill ▽	Water on sampler. Oil-soaked wood in sampler.
6			CL	Silty clay, lots of wood fragments and roots, gray with large green mottles, wet and soft.
			CL	Silty clay, green, damp and stiff.
7			CL	Silty clay, gray, moist and stiff.
8				x Wet.
9			CL	
10	X X	8-12-15		Silty clay, medium yellow brown with large green mottles, moist and stiff.
11				
12			CL	Silty clay, medium yellow brown with small black mottles, damp and soft.
13				
14				
15				

BORING WELL NO. W758A

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL (CONTINUED)

BORING / WELL: W758A	PROJECT: GENERAL ELECTRIC 672-32	SHEET: 2/3

DEPTH, FT.	SAMPLE	BLOWS PER 6 IN.	USC SOIL TYPE	DESCRIPTION OF SUBSURFACE MATERIALS
	X	6-7-15		
	X		SC	Clayey coarse sand, medium yellow brown, moist and firm.
16				
17				Silty clay, light yellow brown, damp and soft.
18				
19				
			CL	
20	X	7-11-16		× Green mottles in sample.
	X			
21				
22				
23				
24				
25	X	13-16-21		
	X			
26				
			BOH	

BORING WELL NO. W758A

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL (CONTINUED)

BORING / WELL: W758A	PROJECT: GENERAL ELECTRIC 672-32	SHEET: 3 /3

BACKFILLED SOIL BORING COMPLETION

DEPTH RANGE (FROM GROUND SURFACE)	MATERIALS INSTALLED
	BENTONITE OFF-SITE MATERIAL DRILL CUTTINGS

MONITOR WELL COMPLETION

MATERIAL TYPES

CASING: 2" I.D. galvanized steel pipe

SCREEN: 3/16" Saw cut slots, 2"long
12 slots per foot of casing

GRAVEL: Monterey Sand #3 1 bag = 100 lb.

SEALANT: Bentonite clay pellets 3/8"
1 pail = 50 lb.

BACKFILL: Uncontaminated quarry fines

DEPTH RANGE (FROM GROUND SURFACE)	MATERIALS INSTALLED
23.8 - 18.8 feet	SLOTTED CASING 5 feet
24.0 - 0 feet	CASING 26.2 feet
26 - 18 feet	GRAVEL PACK MATERIAL 2 bags
18 - 8 feet	BENTONITE 2 pails
8 - 5 feet	OFF-SITE MATERIAL
5 - 0 feet	DRILL CUTTINGS

MULTI-CASED / MONITOR WELL COMPLETION

MATERIAL TYPES

SURFACE CASINGS:

SEALANT:

BACKFILL:

DEPTH RANGE (FROM GROUND SURFACE)	MATERIALS INSTALLED
	14" SURFACE CASING 10" SURFACE CASING SLOTTED 2" CASING 2" CASING GRAVEL PACK MATERIAL BENTONITE GROUT

BORING WELL NO. W758A

BC BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL

BORING / WELL: W758B	PROJECT: GENERAL ELECTRIC JOB NO.: 672-32	SHEET: 1 / 5

___ BACKFILLED SOIL BORING X MONITOR WELL ___ MULTI-CASED WELL

DRILL CONTRACTOR: HEW
DRILL RIG: CME 75 Hollow Stem Auger
BC PERSONNEL: Arndt

HOLE DIAMETER: 8"
SAMPLE TYPE: California Split Tube Drive
DRIVE ENERGY: 140 lb.

	TIME	DATE
START:	0930	3/31/81
FINISH:	1830	3/31/81
BACKFILL:	----	---
FINISH WELL:	1230	4/01/81

ELEVATIONS

DATUM: OAKLAND (-2.998 M.S.L.)
GROUND SURFACE: 17.80
TOP WELL CASING: 18.72

SUBSURFACE FLUIDS / GROUNDWATER

DEPTH FROM GROUND	TIME	DATE
59'	1000 EOB	4/1/81
44'	1500	4/2/81

DEPTH, FT.	SAMPLE	BLOWS PER 6 IN.	USC SOIL TYPE	DESCRIPTION OF SUBSURFACE MATERIALS
1		No Samples Taken Until 25 feet.	Fill	Mixed sand, clay, and gravel, medium brown, moist and loose.
2			CL	Fine sandy clay, medium brown, moist and soft.
3			CL	Fine sandy clay and silt, medium brown, lots of roots and organic debris.
4			CL	Silty clay, medium brown with large green mottles, moist and stiff.
5				
6			CL	Silty clay, green, moist and stiff.
7			CL	Silty clay, gray with large green mottles.
8			CL	Silty clay, medium yellow brown with large green mottles, moist and stiff.
9				x Trace of coarse sand.
10				
11				
12				
13				
14			CL	Silty clay, light yellow brown with large green mottles, moist and stiff.
15				

BORING WELL NO. W758B

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL (CONTINUED)

BORING / WELL: W758B

PROJECT: GENERAL ELECTRIC 672-32

SHEET: 2 / 5

DEPTH, FT.	SAMPLE	BLOWS PER 6 IN.	USC SOIL TYPE	DESCRIPTION OF SUBSURFACE MATERIALS
			CL	Silty clay, light yellow brown with large green mottles, moist and stiff.
16				
			CL	Silty clay, light yellow brown, moist and stiff.
17				
18				
19				
20				
21				
22				
23			CL	Silty clay, light yellow brown with large green mottles, moist and stiff.
24				
25	X	11-14-18		
26	X		CL	Silty clay, gray green, moist and stiff.
27				
28			CL	Silty clay, light gray brown, moist and stiff.
29				
30	X	14-18-27	SW	Well sorted uniform fine sand, medium brown, dry and loose.
31	X			
32	X	9-24-31		
33	X	17-19-25		
34	X		SW	
35	X	16-28-26+		Medium sand with coarse sand and fine to medium gravel, medium brown, dry and loose.
36				

BORING WELL NO. W758B

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL (CONTINUED)

BORING / WELL: W758B	PROJECT: GENERAL ELECTRIC 672-32	SHEET: 3 /5

DEPTH, FT.	SAMPLE	BLOWS PER 6 IN.	USC SOIL TYPE	DESCRIPTION OF SUBSURFACE MATERIALS
added 20 gallons	X X	26-26		
37 water outside hole				
38				
39				
40				
41	X X	25-22-25+	SW	Medium sand with coarse sand and fine to medium gravel, medium brown, dry and loose.
42				
43			▽	Water on sampler (from water added?)
44				
45	X	30+ too hard to sample		Sample not recovered. x Medium sandy clay in cuttings, medium brown, barely moist.
46				x Wet and loose.
47			SW	Well sorted medium sand, medium brown, dry and loose.
48	X X	8-22-33	GP	Coarse sand and fine gravel, lots of quartz and dark grains, angular to subrounded, wet and loose (from water added?), trace of clay.
49				
50	X X	9-26-33		x Fine to medium angular gravel
51			GP	Poorly sorted fine to large angular to subrounded gravel, trace of coarse sand and clay, wet and loose.
52				
53			GP	Clayey fine to medium subangular to subrounded gravel, poorly sorted, medium brown, wet and loose.
54				
55	X X	31+ too hard to sample	SC	Clayey coarse sand and fine gravel, medium brown, wet and soft, more clay than above.
56				
57				

BORING WELL NO. W758B

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL (CONTINUED)

BORING / WELL: W758B	PROJECT: GENERAL ELECTRIC 672-32	SHEET: 4/5

DEPTH, FT.	SAMPLE	BLOWS PER 6 IN.	USC SOIL TYPE	DESCRIPTION OF SUBSURFACE MATERIALS
58			SC	Clayey coarse sand and fine gravel, medium brown, wet and soft, more clay than above.
59				
60	X	17-15-17		Sample not recovered.
	X			
61			BOH	

BORING WELL NO. W758B

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL (CONTINUED)

BORING / WELL: W758B	PROJECT: GENERAL ELECTRIC 672-32	SHEET: 5 / 5

BACKFILLED SOIL BORING COMPLETION

DEPTH RANGE (FROM GROUND SURFACE)	MATERIALS INSTALLED
	BENTONITE OFF-SITE MATERIAL DRILL CUTTINGS

MONITOR WELL COMPLETION

MATERIAL TYPES

CASING: 2" I.D. galvanized steel pipe

SCREEN: 3/16" Saw cut slots, 2" long

GRAVEL: 12 slots per foot of casing
Monterey Sand #2 1 bag = 100 lb.

SEALANT: Bentonite clay pellets 3/8"
1 pail = 50 lb.

BACKFILL: Uncontaminated quarry fines

DEPTH RANGE (FROM GROUND SURFACE)	MATERIALS INSTALLED
59.1 - 44.1 feet	SLOTTED CASING 15 feet
59.3 - 0 feet	CASING 60.2 feet
61 - 31.5 feet	GRAVEL PACK MATERIAL 6 bags
31.5 - 25 feet	BENTONITE 2 pails
25 - 5 feet	OFF-SITE MATERIAL
5 - 0 feet	DRILL CUTTINGS

MULTI-CASED / MONITOR WELL COMPLETION

MATERIAL TYPES

SURFACE CASINGS:

SEALANT:

BACKFILL:

DEPTH RANGE (FROM GROUND SURFACE)	MATERIALS INSTALLED
	14" SURFACE CASING 10" SURFACE CASING SLOTTED 2" CASING 2" CASING GRAVEL PACK MATERIAL BENTONITE GROUT

BORING WELL NO. W758B

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL

BORING / WELL: W791	PROJECT: GENERAL ELECTRIC	JOB NO.: 672-32	SHEET: 1/4

___ BACKFILLED SOIL BORING ___ MONITOR WELL X MULTI-CASED WELL

DRILL CONTRACTOR: HEW
DRILL RIG: CME 45 Hollow Stem Auger
BC PERSONNEL: Erikson, Reddy

HOLE DIAMETER: 8"
SAMPLE TYPE: California Split Tube Drive
DRIVE ENERGY: 140 lb.

	TIME	DATE
START:	0845	3/02/81
FINISH:	1400	3/13/81
BACKFILL:	----	---
FINISH WELL:	1215	3/26/81

ELEVATIONS

DATUM: OAKLAND (-2.998 M.S.L.)
GROUND SURFACE: 8.87
TOP WELL CASING: 11.88

SUBSURFACE FLUIDS / GROUNDWATER

DEPTH FROM GROUND	TIME	DATE
17'0"	1045 EOB	3/2/81

DEPTH, FT.	SAMPLE	BLOWS PER 6 IN.	USC SOIL TYPE	DESCRIPTION OF SUBSURFACE MATERIALS
	X X	12-14-8	Fill	Fill, gravel, concrete, nuts, bolts, wire, etc, rusty brown, moist.
1				
2				
3			ML	Clayey silt, gray, damp.
4				
5	X X	6-6-9		Lost first sample, redrove 20",
6				x Moist.
7				
8			CL	
9				Silty clay, light brown, barely moist.
10	X X	7-30-25	CL	Gray silt at top of sample is slough. Very fine sandy clay, light brown.
11			SC	Silty sand and gravel, medium brown, barely moist.
12			CH	
13				
14				Plastic clay, light brown, moist.
15				

BORING WELL NO. W791

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL (CONTINUED)

BORING / WELL: W791 | PROJECT: GENERAL ELECTRIC 672-32 | SHEET: 2 / 4

DEPTH, FT.	SAMPLE	BLOWS PER 6 IN.	USC SOIL TYPE	DESCRIPTION OF SUBSURFACE MATERIALS
	X X	5-5-8		Clayey silt, gray brown, stiff.
16			ML	Sandy silt at top of sample probably slough.
17				
18				
19				
			CL	Silty clay, light brown, moist.
20				
	X X	8-9-14	CH	Clay, gray brown, barely moist and stiff.
21				
22				
23				x Wet clay.
24				
25				
	X X	4-8-13	ML ▽	Clayey silt, medium brown with mottles. Water on sampler.
26				
			BOH	Ended drilling 3/2/81, 1030.

BORING WELL NO. W791

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL (CONTINUED)

BORING / WELL: W791	PROJECT: GENERAL ELECTRIC 672-32	SHEET: 3/4

DEPTH, FT.	SAMPLE	BLOWS PER 6 IN.	USC SOIL TYPE	DESCRIPTION OF SUBSURFACE MATERIALS
				Resumed drilling 3/13/81, 1030, Arndt, Erikson, Reddy
	X X	15-9-14	SW	Thin layer of medium sand, wet and loose.
27				
28				Silty clay, medium yellow brown, moist and stiff.
29				
30	X X	7-10-11	CL	x Small black mottles.
31				
32				
33	X X	5-8-11		
34				
35			SC	Clayey fine to medium sand, medium yellow brown, moist and loose.
36	X X	11-14-17	CL	Fine sandy clay, medium yellow brown, moist and soft.
			SC	Clayey fine sand, medium yellow brown, moist and loose.
37	X X	11-34-42	SW	Medium sand, trace of coarse sand and fine gravel, subangular, very uniform, medium yellow brown, wet and loose.
38				
39	X X	10-15-20	CL	Silty clay, medium yellow brown, moist and stiff.
			BOH	Ended drilling 3/13/81, 1400.

BORING WELL NO. W791

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL (CONTINUED)

BORING / WELL: W791	PROJECT: GENERAL ELECTRIC 672-32	SHEET: 4 / 4

BACKFILLED SOIL BORING COMPLETION

DEPTH RANGE (FROM GROUND SURFACE)	MATERIALS INSTALLED
	BENTONITE OFF-SITE MATERIAL DRILL CUTTINGS

MONITOR WELL COMPLETION

MATERIAL TYPES

CASING: 2" I.D. galvanized steel pipe

SCREEN: 3/16" Saw cut slots, 2" long
12 slots per foot of casing

GRAVEL: Monterey Sand #2 1 bag = 100 lb.

SEALANT: Bentonite clay pellets 3/8"
1 pail = 50 lb.

BACKFILL: Uncontaminated quarry fines

DEPTH RANGE (FROM GROUND SURFACE)	MATERIALS INSTALLED
	SLOTTED CASING CASING GRAVEL PACK MATERIAL BENTONITE OFF-SITE MATERIAL DRILL CUTTINGS

MULTI-CASED / MONITOR WELL COMPLETION

MATERIAL TYPES

SURFACE CASINGS: Mild steel of minimum 0.188" thickness, with minimum 6" basal drillable grout plug.

SEALANT: Bentonite clay pellets 3/8", 1 pail = 50 lb.

BACKFILL: Bentonite - cement grout

DEPTH RANGE (FROM GROUND SURFACE)	MATERIALS INSTALLED
26 - 0 feet	14" SURFACE CASING
32 - 0 feet	10" SURFACE CASING
40 - 35 feet	SLOTTED 2" CASING
40.2 - 0 feet	2" CASING
40 - 32 feet	GRAVEL PACK MATERIAL 2 bags
32 - 26 feet	BENTONITE 2 pails
26 - 0 feet	GROUT

BORING WELL NO. W791

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL

BORING / WELL: W792	PROJECT: GENERAL ELECTRIC	JOB NO.: 672-32	SHEET: 1/5

___ BACKFILLED SOIL BORING ___ MONITOR WELL X MULTI-CASED WELL

DRILL CONTRACTOR: HEW
DRILL RIG: CME 75 Hollow Stem Auger
BC PERSONNEL: Arndt, Reddy

HOLE DIAMETER: 8"
SAMPLE TYPE: California Split Tube Drive
DRIVE ENERGY: 140 lb.

	TIME	DATE
START:	0915	3/06/81
FINISH:	1700	3/27/81
BACKFILL:	----	---
FINISH WELL:	1630	4/01/81

ELEVATIONS

DATUM: OAKLAND (-2.998 M.S.L.)
GROUND SURFACE: 13.67
TOP WELL CASING: 15.54

SUBSURFACE FLUIDS / GROUNDWATER

DEPTH FROM GROUND	TIME	DATE
22'9"	1130 EOB	3/06/81

DEPTH, FT.	SAMPLE	BLOWS PER 6 IN.	USC SOIL TYPE	DESCRIPTION OF SUBSURFACE MATERIALS
			Asphalt	Asphalt
1	X	9-6-8	Fill	Mixed sand, gravel, and clay, medium brown, dry and loose.
	X			
2			ML	Clayey silt, gray, moist and soft.
3				
4				
No Sample 5	X	4-2-1		Clayey silt, gray moist and soft. sample suspect, not on bottom of hole?
	X			
6				x Damp.
7			CL	Silty clay, medium yellow brown, moist and stiff.
8				
9				
10	X	8-13-25	SC	Clayey fine sand, light yellow brown with small black mottles, moist and friable.
11	X			
12	X	11-22-22	CL	Sandy clay with trace of coarse sand and fine gravel, light yellow brown with lots of black and rust mottles, moist and stiff.
	X			
13			CL	Coarse sandy clay, medium brown, moist and stiff.
14				
15				

BORING WELL NO. W792

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL (CONTINUED)

BORING / WELL: W792	PROJECT: GENERAL ELECTRIC 672-32	SHEET: 2 /5

DEPTH, FT.	SAMPLE	BLOWS PER 6 IN.	USC SOIL TYPE	DESCRIPTION OF SUBSURFACE MATERIALS
	X	8-13-16	CL	Coarse sandy clay, medium brown, moist and stiff.
16	X		CL	Silty clay, light yellow brown with small black mottles, barely moist and stiff.
17				
18				
19				
20	X	6-10-20		xLarge gray green mottles.
21	X			
22				
23			CL	Coarse sandy clay, medium brown, moist and stiff.
24				
25	X	8-13-19	SC	Clayey medium sand, medium brown, moist and loose.
26	X			
27	X	10-15-19	CL	Silty clay, light yellow brown, moist and stiff.
	X			
			BOH	Ended drilling, 3/6/81, 1130

BORING WELL NO. W792

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL (CONTINUED)

BORING / WELL: W792	PROJECT: GENERAL ELECTRIC 672-32	SHEET: 3 / 5

DEPTH, FT.	SAMPLE	BLOWS PER 6 IN.	USC SOIL TYPE	DESCRIPTION OF SUBSURFACE MATERIALS
				Resumed drilling, 3/14/81, 1500, Arndt and Reddy.
27	X	8-10-14		
28	X			
29			CL	Silty clay, light yellow brown, moist and stiff.
30	X	6-8-12		
31	X			
32				
33	X	17-14-19		Fine sandy clay, medium yellow brown, moist and stiff.
34	X			
35			CL	
36	X	18-11-9		
37	X			
			BOH	Ended drilling, 3/14/81, 1730.

BORING WELL NO. W792

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL (CONTINUED)

BORING / WELL: W792	PROJECT: GENERAL ELECTRIC 672-32	SHEET: 4 /5

DEPTH, FT.	SAMPLE	BLOWS PER 6 IN.	USC SOIL TYPE	DESCRIPTION OF SUBSURFACE MATERIALS
				Resume drilling, 3/27/81, 1030, Arndt, Reddy.
	X X	4-7-11	CL	Fine sandy clay, medium yellow brown, damp and soft.
37				Top of sample mostly grout.
38				
39				
40	X X	12-16-15		x Small black mottles, and large rust mottles.
41				
42				
Lost Sampler 43	X X		SC	Clayey coarse sand with much large gravel, angular, recovered after drilling to 50 feet.
44				
45				
46			?	Drilled to 50 feet to recover sampler.
47				
48				
49				
50			BOH	Ended drilling 3/27/81, 1700.

BORING WELL NO. W792

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL (CONTINUED)

BORING / WELL: W792	PROJECT: GENERAL ELECTRIC 672-32	SHEET: 5 /5

BACKFILLED SOIL BORING COMPLETION

DEPTH RANGE (FROM GROUND SURFACE)	MATERIALS INSTALLED
	BENTONITE OFF-SITE MATERIAL DRILL CUTTINGS

MONITOR WELL COMPLETION

MATERIAL TYPES

CASING: 2" I.D. galvanized steel pipe

SCREEN: 3/16" Saw cut slots, 2" long

GRAVEL: 12 slots per foot of casing
Monterey Sand #2 1 bag = 100 lb.

SEALANT: Bentonite clay pellets 3/8"
1 pail = 50 lb.

BACKFILL: Uncontaminated quarry fines

DEPTH RANGE (FROM GROUND SURFACE)	MATERIALS INSTALLED
	SLOTTED CASING CASING GRAVEL PACK MATERIAL BENTONITE OFF-SITE MATERIAL DRILL CUTTINGS

MULTI-CASED / MONITOR WELL COMPLETION

MATERIAL TYPES

SURFACE CASINGS: Mild steel of minimum 0.188" thickness, with minimum 6" basal drillable grout plug.

SEALANT: Bentonite clay pellets 3/8" 1 pail = 50 lb.

BACKFILL: Bentonite - cement grout.

DEPTH RANGE (FROM GROUND SURFACE)	MATERIALS INSTALLED
27 - 0 feet	14" SURFACE CASING
36 - 0 feet	10" SURFACE CASING
48.2 - 43.2 feet	SLOTTED 2" CASING
51.4 - 0 feet	2" CASING
50 - 40 feet	GRAVEL PACK MATERIAL 2 bags
40 - 34 feet	BENTONITE 2 pails
34 - 0 feet	GROUT

BORING WELL NO. W792

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL

BORING / WELL: W793	PROJECT: GENERAL ELECTRIC	JOB NO.: 672-32	SHEET: 1 / 6

___ BACKFILLED SOIL BORING ___ MONITOR WELL _X_ MULTI-CASED WELL

DRILL CONTRACTOR: HEW
DRILL RIG: CME 75 Hollow Stem Auger
BC PERSONNEL: Arndt, Erikson

HOLE DIAMETER: 8"
SAMPLE TYPE: California Split Tube Drive
DRIVE ENERGY: 140 lb.

	TIME	DATE
START:	1300	4/6/81
FINISH:	1900	4/9/81
BACKFILL:	----	---
FINISH WELL:	1400	4/13/81 . . .

ELEVATIONS

DATUM: OAKLAND (-2.998 M.S.L.)
GROUND SURFACE: 13.77
TOP WELL CASING: 17.43

SUBSURFACE FLUIDS / GROUNDWATER

DEPTH FROM GROUND	TIME	DATE
17'	0900	4/14/81

.Repeat Installation 1500, 4/22/81

DEPTH, FT.	SAMPLE	BLOWS PER 6 IN.	USC SOIL TYPE	DESCRIPTION OF SUBSURFACE MATERIALS
1				
2				
3				
4				
5				
6				NOT LOGGED
7				
8				
9				
10				
11				
12				
13				
14				
15				

BORING WELL NO. W793

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL (CONTINUED)

BORING / WELL: W793	PROJECT: GENERAL ELECTRIC 672-32	SHEET: 2 / 6

DEPTH. FT.	SAMPLE	BLOWS PER 6 IN.	USC SOIL TYPE	DESCRIPTION OF SUBSURFACE MATERIALS
16				
17				
18				
19				
20				
21				
22				NOT LOGGED
23				
24				
25				
26				
27				
28				
29				
30				
31				
32				
33				
34				
35				
36				

BORING WELL NO. W793

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL (CONTINUED)

BORING / WELL: W793	PROJECT: GENERAL ELECTRIC 672-32	SHEET: 3 /6

DEPTH, FT.	SAMPLE	BLOWS PER 6 IN.	USC SOIL TYPE	DESCRIPTION OF SUBSURFACE MATERIALS
37				NOT LOGGED.
38				
39				
40				
41				
42				
43				
44				
45				
46				
47				
48				
49				
50				
51				
52				
Not Kept	X	29-30-22	Grout	Grout pieces.
53	X			
54			Grout and CL	Silty clay, medium yellow brown, moist and stiff, mixed with grout.
Not Kept	X	20-18-24		
55	X			
56				
	X	16-20-25	CL	Silty clay, medium yellow brown with large gray mottles, moist and stiff.
57	X			

BORING WELL NO. W793

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL (CONTINUED)

BORING / WELL: W793	PROJECT: GENERAL ELECTRIC 672-32	SHEET: 4 / 6

DEPTH, FT.	SAMPLE	BLOWS PER 6 IN.	USC SOIL TYPE	DESCRIPTION OF SUBSURFACE MATERIALS
58			CL	Silty clay, medium yellow brown with large gray mottles, moist and stiff.
59	X X	9-13-20		
			BOH	End drilling, 4/6/81, 1630.

BORING WELL NO. W793

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL (CONTINUED)

BORING / WELL: W793	PROJECT: GENERAL ELECTRIC 672-32	SHEET: 5 / 6

DEPTH, FT.	SAMPLE	BLOWS PER 6 IN.	USC SOIL TYPE	DESCRIPTION OF SUBSURFACE MATERIALS
				Resumed drilling, 4/9/81, 1100, Arndt, Schick.
60			CL	
61	X X	13-20-25		Silty clay, light gray brown with large golden brown and small black mottles, moist and stiff.
62				
63				
64				
65	X X	11-13-17		
66				
67			CL	Fine sandy clay, medium yellow brown with large gray mottles, moist and stiff.
68	X X	15-40	SC	
69				Clayey medium to coarse sand with fine to medium sub-angular to subrounded gravel, medium red brown, damp and loose.
70	X	40+ Too Hard to Sample.		With large (to 2") gravel.
71				
72		Too Hard to Sample.		
73				
74	X	36-30+ Too Hard to Sample		
75	X		GW	Clayey fine to large, angular to subrounded gravel with lots of medium to coarse sand, wet and loose, poorly sorted.
76				
77				
78				
79				
80	X	21-30+ Too Hard to Sample		
81	X		BOH	Ended drilling 4/9/81, 1900.

BORING WELL NO. W793

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL (CONTINUED)

BORING / WELL: W793	PROJECT: GENERAL ELECTRIC 672-32	SHEET: 6/6

BACKFILLED SOIL BORING COMPLETION

DEPTH RANGE (FROM GROUND SURFACE)	MATERIALS INSTALLED
	BENTONITE OFF-SITE MATERIAL DRILL CUTTINGS

MONITOR WELL COMPLETION

MATERIAL TYPES

CASING: 2" I.D. galvanized steel pipe

SCREEN: 3/16" Saw cut slots, 2" long

GRAVEL: 12 slots per foot of casing
Monterey Sand #2 1 bag = 100 lb.

SEALANT: Bentonite clay pellets 3/8"
1 pail = 50 lb.

BACKFILL: Uncontaminated quarry fines

DEPTH RANGE (FROM GROUND SURFACE)	MATERIALS INSTALLED
	SLOTTED CASING CASING GRAVEL PACK MATERIAL BENTONITE OFF-SITE MATERIAL DRILL CUTTINGS

MULTI-CASED / MONITOR WELL COMPLETION

MATERIAL TYPES

SURFACE CASINGS: Mild steel of minimum 0.188" thickness, with minimum 6" basal drillable grout plug.

SEALANT: Bentonite clay pellets 3/8"

BACKFILL: Bentonite - cement grout

DEPTH RANGE (FROM GROUND SURFACE)	MATERIALS INSTALLED
35 - 0 feet	14" SURFACE CASING
50 - 0 feet	10" SURFACE CASING
78.4 - 68.4 feet	SLOTTED 2" CASING
78.6 - 0 feet	2" CASING
81 - 65 feet	GRAVEL PACK MATERIAL 4 bags
65 - 56 feet	BENTONITE 3 pails
56 - 0 feet	GROUT

BORING WELL NO. W793

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL

BORING / WELL: S701	PROJECT: GENERAL ELECTRIC	JOB NO.: 672-32	SHEET: 1 / 3

X BACKFILLED SOIL BORING ___ MONITOR WELL ___ MULTI-CASED WELL

DRILL CONTRACTOR: HEW
DRILL RIG: CME 75 Hollow Stem Auger
BC PERSONNEL: Arndt, Erikson, Schick

HOLE DIAMETER: 8"
SAMPLE TYPE: California Split Tube Drive
DRIVE ENERGY: 140 lb.

	TIME	DATE
START:	1030	2-17-81
FINISH:	1400	2-17-81
BACKFILL:	1500	2-17-81
FINISH WELL:	----	---

ELEVATIONS

DATUM: OAKLAND (-2.998 M.S.L.)
GROUND SURFACE: 7.19
TOP WELL CASING: ----

SUBSURFACE FLUIDS / GROUNDWATER

DEPTH FROM GROUND	TIME	DATE
19.7'	1300 EOB	2-17-81

DEPTH, FT.	SAMPLE	BLOWS PER 6 IN.	USC SOIL TYPE	DESCRIPTION OF SUBSURFACE MATERIALS
Lost	X X	9-8-6	Fill	Lost much of sample - rock in sampler. Mixed gravel, sand, wood, dry to slightly moist, loose.
1				
2			ML	Clayey silt, dark medium brown, moist.
3				
4				
5	X X	5-4-7	CL	Silty clay, dark medium brown, moist, traces of fine dark black gravel.
6				
7			CL	Very fine sandy clay, light yellow brown, moist.
8				
9				
10	X X	7-8-18	SC	Clayey sand, light yellow brown, moist to damp, traces of fine gravel, loose.
11			CL	Silty clay, light yellow brown, damp.
12				
13				
14				
15				

BORING WELL NO. S701

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL (CONTINUED)

BORING / WELL: S701	PROJECT: GENERAL ELECTRIC 672-32	SHEET: 2 / 3

DEPTH, FT.	SAMPLE	BLOWS PER 6 IN.	USC SOIL TYPE	DESCRIPTION OF SUBSURFACE MATERIALS
	X	4-5-8		
16	X			x Thin layer of silty clay with fine black gravel, light yellow brown, damp (in sample only).
17				
18			CL	
19				
20	X	5-6-13		
21	X		▽	Water on sampler.
22				x Gravel in cuttings.
23				
24				Moist.
25	X	7-8-11		
26	X		BOH	
				Rode sampler down in auger for five feet after sampling.

BORING WELL NO. S701

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL (CONTINUED)

BORING / WELL: S701	PROJECT: GENERAL ELECTRIC 672-32	SHEET: 3 / 3

BACKFILLED SOIL BORING COMPLETION

DEPTH RANGE (FROM GROUND SURFACE)	MATERIALS INSTALLED
26 - 20 feet	BENTONITE 2 pails-1/2"
20 - 5 feet	OFF-SITE MATERIAL
5 - 0 feet	DRILL CUTTINGS

MONITOR WELL COMPLETION

MATERIAL TYPES

CASING:

SEALANT:

SCREEN:

BACKFILL:

GRAVEL:

DEPTH RANGE (FROM GROUND SURFACE)	MATERIALS INSTALLED
	SLOTTED CASING
	CASING
	GRAVEL PACK MATERIAL
	BENTONITE
	OFF-SITE MATERIAL
	DRILL CUTTINGS

MULTI-CASED / MONITOR WELL COMPLETION

MATERIAL TYPES

SURFACE CASINGS:

SEALANT:

BACKFILL:

DEPTH RANGE (FROM GROUND SURFACE)	MATERIALS INSTALLED
	14" SURFACE CASING
	10" SURFACE CASING
	SLOTTED 2" CASING
	2" CASING
	GRAVEL PACK MATERIAL
	BENTONITE
	GROUT

BORING WELL NO. S701

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL

BORING / WELL: S702	PROJECT: GENERAL ELECTRIC	JOB NO.: 672-32	SHEET: 1 / 3

X BACKFILLED SOIL BORING ___ MONITOR WELL ___ MULTI-CASED WELL

DRILL CONTRACTOR: HEW
DRILL RIG: CME 75 Hollow Stem Auger
BC PERSONNEL Arndt, Erikson, Schick

HOLE DIAMETER: 8"
SAMPLE TYPE: California Split Tube Drive
DRIVE ENERGY: 140 lb.

	TIME	DATE
START:	1430	2-18-81
FINISH:	1730	2-18-81
BACKFILL:	0900	2-19-81
FINISH WELL:	----	---

ELEVATIONS

DATUM: OAKLAND (-2.998 M.S.L.)
GROUND SURFACE: 5.95
TOP WELL CASING: ----

SUBSURFACE FLUIDS / GROUNDWATER

DEPTH FROM GROUND	TIME	DATE
21.5'	1715 EOB	2-18-81

DEPTH, FT.	SAMPLE	BLOWS PER 6 IN.	USC SOIL TYPE	DESCRIPTION OF SUBSURFACE MATERIALS
	X X	6-4-4	Fill	Fill, mixed sand and gravel, some clay, moist.
1				
2			ML	Silt with trace of fine to medium sand, dark gray, moist.
3				
4			CL	Silty clay, medium brown, moist.
5	X X	3-2-2		x Large gravel in sample.
6				x Fine gravel in cuttings.
7			CL	Silty clay, light yellow brown, moist.
8				
9				
10	X X	4-6-7		Plastic clay, very light beige, barely moist, friable.
11			CH	
12			CL	x Coarse sandy clay, trace of fine gravel, medium brown, moist
13				
14				
15				

BORING WELL NO. S702

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL (CONTINUED)

BORING / WELL: S702	PROJECT: GENERAL ELECTRIC 672-32	SHEET: 2 / 3

DEPTH, FT.	SAMPLE	BLOWS PER 6 IN.	USC SOIL TYPE	DESCRIPTION OF SUBSURFACE MATERIALS
	X	10-14-32	SC	Medium to coarse dark sand, some brown clay, some fine to coarse gravel, loose and wet, angular at top, sub-angular to sub-rounded lower, more clay at 16 feet.
	X			
16				
17				
18				Silty clay, light yellow brown, moist, sand and fine gravel in cuttings.
19			▽	Saturated. Water on sampler.
20			CL	x Trace of sand.
	X	5-6-10		
21	X			Small black mottles, moist and stiff.
22				
23				
24				
25				
	X	3-6-13		
26	X			
			BOH	
				Rode sample down in auger for five feet after sampling.

BORING WELL NO. S702

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL (CONTINUED)

BORING / WELL: S702	PROJECT: GENERAL ELECTRIC 672-32	SHEET: 3 / 3

BACKFILLED SOIL BORING COMPLETION

DEPTH RANGE (FROM GROUND SURFACE)	MATERIALS INSTALLED
26 - 20 feet	BENTONITE 2 pails-1/2"
20 - 5 feet	OFF-SITE MATERIAL
5 - 0 feet	DRILL CUTTINGS

MONITOR WELL COMPLETION

MATERIAL TYPES

CASING:

SEALANT:

SCREEN:

BACKFILL:

GRAVEL:

DEPTH RANGE (FROM GROUND SURFACE)	MATERIALS INSTALLED
	SLOTTED CASING
	CASING
	GRAVEL PACK MATERIAL
	BENTONITE
	OFF-SITE MATERIAL
	DRILL CUTTINGS

MULTI-CASED / MONITOR WELL COMPLETION

MATERIAL TYPES

SURFACE CASINGS:

SEALANT:

BACKFILL:

DEPTH RANGE (FROM GROUND SURFACE)	MATERIALS INSTALLED
	14" SURFACE CASING
	10" SURFACE CASING
	SLOTTED 2" CASING
	2" CASING
	GRAVEL PACK MATERIAL
	BENTONITE
	GROUT

BORING WELL NO. S702

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL

BORING / WELL: S703	PROJECT: GENERAL ELECTRIC	JOB NO.: 672-32	SHEET: 1 / 3

X BACKFILLED SOIL BORING ___ MONITOR WELL ___ MULTI-CASED WELL

DRILL CONTRACTOR: HEW
DRILL RIG: CME 75 Hollow Stem Auger
BC PERSONNEL: Arndt, Erikson

HOLE DIAMETER: 8"
SAMPLE TYPE: California Split Tube Drive
DRIVE ENERGY: 140 lb.

	TIME	DATE
START:	1230	2-20-81
FINISH:	1430	2-20-81
BACKFILL:	1530	2-20-81
FINISH WELL:	----	----

ELEVATIONS

DATUM: OAKLAND (-2.998 M.S.L.)
GROUND SURFACE: 9.05
TOP WELL CASING: ----

SUBSURFACE FLUIDS / GROUNDWATER

DEPTH FROM GROUND	TIME	DATE
13.5'	1500 EOB	2-20-81

DEPTH, FT.	SAMPLE	BLOWS PER 6 IN.	USC SOIL TYPE	DESCRIPTION OF SUBSURFACE MATERIALS
	X X	11-8-7	Fill	Mixed sand and gravel, some clay, dark brown, moist and loose wood chips and mica, metal pieces.
1				
2			ML	Clayey silt, dark gray, moist to damp.
3				
4				Silty clay, medium yellow brown with small black mottles, moist.
5	X X	1-4-9	CL	First six inches probably all slough in sample.
6				
7			CL	Silty clay, gray, saturated.
8			▽ CL	Silty clay, yellow brown, saturated. Water on sampler.
9			SC	Clayey coarse to medium sand, gray with mostly light rounded and sub-rounded grains, wet and loose in top of slough barrel
10	X X	5-9-19	CL	Silty clay, medium yellow brown, moist.
11				
12				
13				
14				
15				

BORING WELL NO. S703

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL (CONTINUED)

BORING / WELL: S703	PROJECT: GENERAL ELECTRIC 672-32	SHEET: 2 /3

DEPTH, FT.	SAMPLE	BLOWS PER 6 IN.	USC SOIL TYPE	DESCRIPTION OF SUBSURFACE MATERIALS
16	X X	5-5-4	CL	Silty clay, light yellow brown, damp and soft.
17				
18				
19				
20			CL	
21	X X	6-12-14		Silty clay, light gray with some medium white mottles, moist.
22				
23			CL	Silty clay, medium brown with small black mottles, mois
24				
25				
26	X X	3-7-13	BOH	

Removed sampler after sampling, used D&M sampler as plug, lead auger dirty inside.

BORING WELL NO. S703

YOS_OAK_03792

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL (CONTINUED)

BORING / WELL: S703	PROJECT: GENERAL ELECTRIC 672-32	SHEET: 3/3

BACKFILLED SOIL BORING COMPLETION

DEPTH RANGE (FROM GROUND SURFACE)	MATERIALS INSTALLED
26 - 20 feet	BENTONITE 2 pails - 1/2"
20 - 5 feet	OFF-SITE MATERIAL
5 - 0 feet	DRILL CUTTINGS

MONITOR WELL COMPLETION

MATERIAL TYPES

CASING:

SEALANT:

SCREEN:

BACKFILL:

GRAVEL:

DEPTH RANGE (FROM GROUND SURFACE)	MATERIALS INSTALLED
	SLOTTED CASING
	CASING
	GRAVEL PACK MATERIAL
	BENTONITE
	OFF-SITE MATERIAL
	DRILL CUTTINGS

MULTI-CASED / MONITOR WELL COMPLETION

MATERIAL TYPES

SURFACE CASINGS:

SEALANT:

BACKFILL:

DEPTH RANGE (FROM GROUND SURFACE)	MATERIALS INSTALLED
	14" SURFACE CASING
	10" SURFACE CASING
	SLOTTED 2" CASING
	2" CASING
	GRAVEL PACK MATERIAL
	BENTONITE
	GROUT

BORING WELL NO. S703

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL

BORING / WELL: S704	PROJECT: GENERAL ELECTRIC	JOB NO.: 672-32	SHEET: 1 / 3

X BACKFILLED SOIL BORING ___ MONITOR WELL ___ MULTI-CASED WELL

DRILL CONTRACTOR: HEW
DRILL RIG: CME 75 Hollow Stem Auger
BC PERSONNEL: Arndt, Erikson, Reddy

HOLE DIAMETER: 8"
SAMPLE TYPE: California Split Tube Drive
DRIVE ENERGY: 140 lb.

	TIME	DATE
START:	1230	2-19-81
FINISH:	1500	2-19-81
BACKFILL:	1600	2-19-81
FINISH WELL:	----	---

ELEVATIONS

DATUM: OAKLAND (-2.998 M.S.L.)
GROUND SURFACE: 10.61
TOP WELL CASING: -----

SUBSURFACE FLUIDS / GROUNDWATER

DEPTH FROM GROUND	TIME	DATE
18'10"	1300 EOB	2-19-81

DEPTH, FT.	SAMPLE	BLOWS PER 6 IN.	USC SOIL TYPE	DESCRIPTION OF SUBSURFACE MATERIALS
	X X	12-50-35	Fill	Fill, mixed gravel, sand, silt and clay, lots of rusty iron pieces, dark gray to black, moist.
1				
2			ML	Silt, dark gray, wet, no free water.
3				
4				
5	X X	2-1-8	CL	Silty clay, some sand and fill materials, dark gray, moist and stiff.
6				
7				x Large sheet of muscovite in cuttings (from fill?).
8				
9				
10	X X	3-6-12		
11				Silty clay, yellow brown, moist.
12			CL	x Fine gravel in cuttings.
13			CL	Silty clay, dark gray, damp.
14				
15				

BORING WELL NO. S704

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL (CONTINUED)

BORING / WELL: S704	PROJECT: GENERAL ELECTRIC 672-32	SHEET: 2 / 3

DEPTH, FT.	SAMPLE	BLOWS PER 6 IN.	USC SOIL TYPE	DESCRIPTION OF SUBSURFACE MATERIALS
	X	3-5-19	CL	Silty clay, yellow brown, moist.
	X		CL	
16			SC	Clayey fine to medium sand with some fine gravel, medium brown, with dark grains, damp and loose.
17			CL	Silty clay, medium brown , moist and stiff.
18				Clay, light yellow brown with small black mottles, moist and very stiff.
19				
20				
	X	3-5-9	CH	
21	X			
22				
23				
24				
25				
	X	3-7-9		
26	X			No free water while augers in hole.
			BOH	
				Removed sampler after sampling.

BORING WELL NO. S704

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL (CONTINUED)

BORING / WELL: S704	PROJECT: GENERAL ELECTRIC 672-32	SHEET: 3 / 3

BACKFILLED SOIL BORING COMPLETION

DEPTH RANGE (FROM GROUND SURFACE)	MATERIALS INSTALLED
26 - 20 feet	BENTONITE 2 pails-1/2"
20 - 5 feet	OFF-SITE MATERIAL
5 - 0 feet	DRILL CUTTINGS

MONITOR WELL COMPLETION

MATERIAL TYPES

CASING:

SEALANT:

SCREEN:

BACKFILL:

GRAVEL:

DEPTH RANGE (FROM GROUND SURFACE)	MATERIALS INSTALLED
	SLOTTED CASING
	CASING
	GRAVEL PACK MATERIAL
	BENTONITE
	OFF-SITE MATERIAL
	DRILL CUTTINGS

MULTI-CASED / MONITOR WELL COMPLETION

MATERIAL TYPES

SURFACE CASINGS:

SEALANT:

BACKFILL:

DEPTH RANGE (FROM GROUND SURFACE)	MATERIALS INSTALLED
	14" SURFACE CASING
	10" SURFACE CASING
	SLOTTED 2" CASING
	2" CASING
	GRAVEL PACK MATERIAL
	BENTONITE
	GROUT

BORING WELL NO. S704

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL

BORING / WELL: S705	PROJECT: GENERAL ELECTRIC	JOB NO.: 672-32	SHEET: 1 / 3

X BACKFILLED SOIL BORING ___ MONITOR WELL ___ MULTI-CASED WELL

DRILL CONTRACTOR: HEW
DRILL RIG: CME 75 Hollow Stem Auger
BC PERSONNEL: Arndt, Erikson

HOLE DIAMETER: 8"
SAMPLE TYPE: California Split Tube Drive
DRIVE ENERGY: 140 lb.

	TIME	DATE
START:	0830	2-20-81
FINISH:	1030	2-20-81
BACKFILL:	1545	2-20-81
FINISH WELL:	-	-

ELEVATIONS

DATUM: OAKLAND (-2.998 M.S.L.)
GROUND SURFACE: 10.99
TOP WELL CASING: -----

SUBSURFACE FLUIDS / GROUNDWATER

DEPTH FROM GROUND	TIME	DATE
21'2"	1030 EOB	2-20-81

DEPTH, FT.	SAMPLE	BLOWS PER 6 IN.	USC SOIL TYPE	DESCRIPTION OF SUBSURFACE MATERIALS
1	X X	8-7-9	Fill	Fill, mixed sand, silt and gravel, dark brown to black, moist and loose, muscovite flakes.
2, 3, 4			ML	Clayey silt, dark gray, damp.
5, 6	X X	5-9-16	CL	Silty clay, light yellow brown with small black mottles moist.
7, 8, 9				
10, 11	X X	3-7-11		
12, 13, 14, 15				

BORING WELL NO. S705

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL (CONTINUED)

BORING / WELL: S705	PROJECT: GENERAL ELECTRIC 672-32	SHEET: 2 / 3

DEPTH, FT.	SAMPLE	BLOWS PER 6 IN.	USC SOIL TYPE	DESCRIPTION OF SUBSURFACE MATERIALS
	X			
16	X	5-8-15		Silty clay, light yellow brown with small black mottles, moist.
17			CL	
18				
19				
20	X	3-8-8		
21	X			Silty clay, light gray brown with small black mottles, moist.
22				
23			CL	
24				
25	X	5-9-14		
26	X		BOH	
				Removed sampler after sampling, used D&M sampler as plug.

BORING WELL NO. S705

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL (CONTINUED)

BORING / WELL: S705	PROJECT: GENERAL ELECTRIC 672-32	SHEET: 3 / 3

BACKFILLED SOIL BORING COMPLETION

DEPTH RANGE (FROM GROUND SURFACE)	MATERIALS INSTALLED
26 - 20 feet	BENTONITE 2 pails - 1/2"
20 - 5 feet	OFF-SITE MATERIAL
5 - 0 feet	DRILL CUTTINGS

MONITOR WELL COMPLETION

MATERIAL TYPES

CASING:

SCREEN:

GRAVEL:

SEALANT:

BACKFILL:

DEPTH RANGE (FROM GROUND SURFACE)	MATERIALS INSTALLED
	SLOTTED CASING
	CASING
	GRAVEL PACK MATERIAL
	BENTONITE
	OFF-SITE MATERIAL
	DRILL CUTTINGS

MULTI-CASED / MONITOR WELL COMPLETION

MATERIAL TYPES

SURFACE CASINGS:

SEALANT:

BACKFILL:

DEPTH RANGE (FROM GROUND SURFACE)	MATERIALS INSTALLED
	14" SURFACE CASING
	10" SURFACE CASING
	SLOTTED 2" CASING
	2" CASING
	GRAVEL PACK MATERIAL
	BENTONITE
	GROUT

BORING WELL NO. S705

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL

BORING / WELL: S706	PROJECT: General Electric	JOB NO.: 672-32	SHEET: 1 / 3

X BACKFILLED SOIL BORING ___ MONITOR WELL ___ MULTI-CASED WELL

DRILL CONTRACTOR: HEW
DRILL RIG: CME 75 Hollow Stem Auger
BC PERSONNEL: Arndt, Reddy

HOLE DIAMETER: 8"
SAMPLE TYPE: California Split Tube Drive
DRIVE ENERGY: 140 lb

	TIME	DATE
START:	0840	2/23/81
FINISH:	1130	2/23/81
BACKFILL:	1230	2/23/81
FINISH WELL:	----	----

ELEVATIONS

DATUM: OAKLAND (-2.998 M.S.L.)
GROUND SURFACE: 12.96
TOP WELL CASING: -----

SUBSURFACE FLUIDS / GROUNDWATER

DEPTH FROM GROUND	TIME	DATE
22.8'	1130 EOB	2/23/81

DEPTH, FT.	SAMPLE	BLOWS PER 6 IN.	USC SOIL TYPE	DESCRIPTION OF SUBSURFACE MATERIALS
		not taken	Asphalt	Asphalt
1			GP	Large angular gravel fill, light colored, dry.
2			ML	Very clayey silt, medium brown, dry and loose, trace of sand and fine gravel.
3				
4				
5	X	7-13-12		
6	X		CL	Coarse sandy clay, some fine angular gravel, medium brown, dry and loose.
7			CL	Silty clay, medium yellow brown, moist.
8				x Coarse sand in cuttings.
9				
10	X	7-12-16	CL	Coarse sandy clay, medium yellow brown, moist, trace of fine gravel.
11	X			
12				
13			CL	Fine sandy clay, medium yellow brown, moist to damp.
14				
15				

BORING WELL NO. S706

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL (CONTINUED)

BORING / WELL: S706	PROJECT: General Electric 672-32	SHEET: 2 / 3

DEPTH, FT.	SAMPLE	BLOWS PER 6 IN.	USC SOIL TYPE	DESCRIPTION OF SUBSURFACE MATERIALS
	X	5-11-16		Silty clay, medium yellow brown, moist, some fine angular gravel and coarse sand.
	X			
16				
17				
18				
19				
			CL	
20	X	5-6-10		
	X			
21				
22				
23				
24			▽	Water on sampler.
25				
	X	12-21-38	SC	Clayey medium sand, medium brown, wet and loose, trace of fine gravel.
26	X			
	X	20-17		
	X		SC	Clayey coarse sand, medium brown, wet, trace of coarse gravel, sub-angular to sub-rounded.
27	X	7-6		
	X			x More clay in sand.
28			CL	Silty clay, light yellow brown, damp to wet.
			BOH	

BORING WELL NO. S706

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL (CONTINUED)

BORING / WELL: S706	PROJECT: General Electric 672-32	SHEET: 3 /3

BACKFILLED SOIL BORING COMPLETION

DEPTH RANGE (FROM GROUND SURFACE)	MATERIALS INSTALLED
28 - 19 feet	BENTONITE 3 pails - 1/2"
19 - 5 feet	OFF-SITE MATERIAL
5 - 0 feet	DRILL CUTTINGS

MONITOR WELL COMPLETION

MATERIAL TYPES

CASING:

SEALANT:

SCREEN:

BACKFILL:

GRAVEL:

DEPTH RANGE (FROM GROUND SURFACE)	MATERIALS INSTALLED
	SLOTTED CASING
	CASING
	GRAVEL PACK MATERIAL
	BENTONITE
	OFF-SITE MATERIAL
	DRILL CUTTINGS

MULTI-CASED / MONITOR WELL COMPLETION

MATERIAL TYPES

SURFACE CASINGS:

SEALANT:

BACKFILL:

DEPTH RANGE (FROM GROUND SURFACE)	MATERIALS INSTALLED
	14" SURFACE CASING
	10" SURFACE CASING
	SLOTTED 2" CASING
	2" CASING
	GRAVEL PACK MATERIAL
	BENTONITE
	GROUT

BORING WELL NO. S706

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL

BORING / WELL: S707	PROJECT: GENERAL ELECTRIC	JOB NO.: 672-32	SHEET: 1 / 3

X BACKFILLED SOIL BORING ___ MONITOR WELL ___ MULTI-CASED WELL

DRILL CONTRACTOR: HEW
DRILL RIG: Minuteman
BC PERSONNEL: Schick

HOLE DIAMETER: 4"
SAMPLE TYPE: California Split Tube Drive
DRIVE ENERGY: 100 lb.

	TIME	DATE
START:	0900	4/15/81
FINISH:	1530	4/15/81
BACKFILL:	1600	4/15/81
FINISH WELL:	----	---

ELEVATIONS

DATUM: OAKLAND (-2.998 M.S.L.)
GROUND SURFACE: 12.42
TOP WELL CASING: -----

SUBSURFACE FLUIDS / GROUNDWATER

DEPTH FROM GROUND	TIME	DATE
10'	1530 EOB	4/15/81

DEPTH, FT.	SAMPLE	BLOWS PER 6 IN.	USC SOIL TYPE	DESCRIPTION OF SUBSURFACE MATERIALS
	X X	18/12"	Fill	Fill, Coarse sand and gravel, dark brown.
1				
2				
3			Fill	
4				Wood at 4 feet.
5				
	X X	16/12"	CL	Silty clay, light brown, slight black mottling, slightly moist, very firm.
6				
7				
				x Encountered water coming back up with cuttings.
8				
9				
10				
	X X	27/12"	CL	Silty clay, medium brown with black mottling, slightly moist, very firm.
11				
12				
13				
14				
15				

BORING WELL NO. S707

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL (CONTINUED)

BORING / WELL: S707	PROJECT: GENERAL ELECTRIC 672-32	SHEET: 2 / 3

DEPTH, FT.	SAMPLE	BLOWS PER 6 IN.	USC SOIL TYPE	DESCRIPTION OF SUBSURFACE MATERIALS
	X	24/12"	CH	Clay, very little silt, medium brown, black mottling barely moist, very firm.
	X			
16				
17				
18				
19				
20	X	15/12"	SC	Clayey sand and gravel, medium brown, mottled black color, moist. Gravel to 1/4 inch.
	X			
21				
22				
23				
24				
	X		CH	Clay, medium brown with black mottles, barely moist very firm.
25	X			
			BOH	

BORING WELL NO. S707

YOS_OAK_03804

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL (CONTINUED)

BORING / WELL: S707	PROJECT: GENERAL ELECTRIC 672-32	SHEET: 3/3

BACKFILLED SOIL BORING COMPLETION

DEPTH RANGE (FROM GROUND SURFACE)	MATERIALS INSTALLED
25 - 5 feet	BENTONITE 1 pail - 3/8"
---	OFF-SITE MATERIAL
5 - 0 feet	DRILL CUTTINGS

MONITOR WELL COMPLETION

MATERIAL TYPES

CASING:

SCREEN:

GRAVEL:

SEALANT:

BACKFILL:

DEPTH RANGE (FROM GROUND SURFACE)	MATERIALS INSTALLED
	SLOTTED CASING
	CASING
	GRAVEL PACK MATERIAL
	BENTONITE
	OFF-SITE MATERIAL
	DRILL CUTTINGS

MULTI-CASED / MONITOR WELL COMPLETION

MATERIAL TYPES

SURFACE CASINGS:

SEALANT:

BACKFILL:

DEPTH RANGE (FROM GROUND SURFACE)	MATERIALS INSTALLED
	14" SURFACE CASING
	10" SURFACE CASING
	SLOTTED 2" CASING
	2" CASING
	GRAVEL PACK MATERIAL
	BENTONITE
	GROUT

BORING WELL NO. S707

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL

BORING / WELL: S708	PROJECT: GENERAL ELECTRIC	JOB NO.: 672-32	SHEET: 1/3

X BACKFILLED SOIL BORING ___ MONITOR WELL ___ MULTI-CASED WELL

DRILL CONTRACTOR: HEW
DRILL RIG: Minuteman
BC PERSONNEL: Schick

HOLE DIAMETER: 4"
SAMPLE TYPE: California Split Tube Drive
DRIVE ENERGY: 100 lb.

	TIME	DATE
START:	0930	4/14/81
FINISH:	1545	4/14/81
BACKFILL:	1600	4/14/81
FINISH WELL:	----	---

ELEVATIONS

DATUM: OAKLAND (-2.998 M.S.L.)
GROUND SURFACE: 13.40
TOP WELL CASING: -----

SUBSURFACE FLUIDS / GROUNDWATER

DEPTH FROM GROUND	TIME	DATE
5'	1600 EOB	4/14/81

DEPTH, FT.	SAMPLE	BLOWS PER 6 IN.	USC SOIL TYPE	DESCRIPTION OF SUBSURFACE MATERIALS
	X	20/12"	Fill	Fill-silty sand in first six inches.
1	X			
			CH	Clay, yellow-brown, with black mottles, somewhat moist, stiff.
2				
3				
4				
5			▽	Water on auger.
	X	29/12"	CH	Clay, medium brown, very wet cuttings on auger.
	X			
6				
7			CL	Sample from sampler is a very moist silty clay (wood in sampler).
8				
9				
10				
	X	23/12"		Silty clay, medium brown with black mottles, sticky and moist.
	X			
11				
12				
13				
14				

BORING WELL NO. S708

YOS_OAK_03806

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL (CONTINUED)

BORING / WELL: S708	PROJECT: GENERAL ELECTRIC 672-32	SHEET: 2 / 3

DEPTH, FT.	SAMPLE	BLOWS PER 6 IN.	USC SOIL TYPE	DESCRIPTION OF SUBSURFACE MATERIALS
	X	22/12"		Gravelly silty clay, medium brown with black-yellow mottles, very firm, barely moist.
	X			
16				
17				
18				
19			CL	
20	X	27/12"		Silty clay, medium brown with some mottles, somewhat moist, and firm.
	X			
21				
22				
23				
lost 24	X	25/12"		
lost	X		SC	
25			BOH	Bottom of augers are clayey sand, medium brown.

BORING WELL NO. S708

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL (CONTINUED)

BORING / WELL: S708	PROJECT: GENERAL ELECTRIC 672-32	SHEET: 3/3

BACKFILLED SOIL BORING COMPLETION

DEPTH RANGE (FROM GROUND SURFACE)	MATERIALS INSTALLED
25 - 0 feet	BENTONITE 1 pail - 3/8"
---	OFF-SITE MATERIAL
---	DRILL CUTTINGS

MONITOR WELL COMPLETION

MATERIAL TYPES

CASING:

SEALANT:

SCREEN:

BACKFILL:

GRAVEL:

DEPTH RANGE (FROM GROUND SURFACE)	MATERIALS INSTALLED
	SLOTTED CASING
	CASING
	GRAVEL PACK MATERIAL
	BENTONITE
	OFF-SITE MATERIAL
	DRILL CUTTINGS

MULTI-CASED / MONITOR WELL COMPLETION

MATERIAL TYPES

SURFACE CASINGS:

SEALANT:

BACKFILL:

DEPTH RANGE (FROM GROUND SURFACE)	MATERIALS INSTALLED
	14" SURFACE CASING
	10" SURFACE CASING
	SLOTTED 2" CASING
	2" CASING
	GRAVEL PACK MATERIAL
	BENTONITE
	GROUT

BORING WELL NO. S708

BC BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL

BORING / WELL: S709	PROJECT: GENERAL ELECTRIC	JOB NO.: 672-32	SHEET: 1/3

X BACKFILLED SOIL BORING ___ MONITOR WELL ___ MULTI-CASED WELL

DRILL CONTRACTOR: HEW
DRILL RIG: CME 45 Hollow Stem Auger
BC PERSONNEL: Arndt, Reddy, Manson

HOLE DIAMETER: 8"
SAMPLE TYPE: California Split Tube Drive
DRIVE ENERGY: 140 lb.

	TIME	DATE
START:	0845	3-5-81
FINISH:	1115	3-5-81
BACKFILL:	1300	3-5-81
FINISH WELL:	----	------

ELEVATIONS

DATUM: OAKLAND (-2.998 M.S.L.)
GROUND SURFACE: 15.88
TOP WELL CASING: -----

SUBSURFACE FLUIDS / GROUNDWATER

DEPTH FROM GROUND	TIME	DATE
Dry	1115 EOB	3-5-81

DEPTH, FT.	SAMPLE	BLOWS PER 6 IN.	USC SOIL TYPE	DESCRIPTION OF SUBSURFACE MATERIALS
	X	8-3-5	Fill	Mixed gravel, silt and clay, medium brown, moist and loose.
1	X			
2			ML	Clayey silt, dark gray, damp and soft.
3				
4			CL	Sandy clay with some fine gravel, medium yellow brown, moist and soft.
5	X	6-8-15		
6	X			
7				
8				
9				
10	X	9-35-21		Clayey, medium to coarse sand, medium brown, damp and loose, fine to large gravel
11	X			
Lost	X	6-10		Lost in hole or not on bottom.
Lost 12	X			
13			SC	
14				Some sand and gravel all the way to 15'.

BORING WELL NO. S709

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL (CONTINUED)

BORING / WELL: S709	PROJECT: GENERAL ELECTRIC 672-32	SHEET: 2 / 3

DEPTH, FT.	SAMPLE	BLOWS PER 6 IN.	USC SOIL TYPE	DESCRIPTION OF SUBSURFACE MATERIALS
	X	15-18-26	SC	Clayey medium sand, medium brown, wet and loose.
16	X			
Lost on	X	4-5-20		x Damp.
17	X			
Ground				
18			CL	Grades into medium sandy clay, medium brown.
19				
20				Silty clay, light yellow brown with small black mottles, damp and soft.
	X	6-8-10		
	X		CL	
21				
22				
23				
24				
25				
	X	11-14-22		Same as above-but large gray mottles.
26	X			
			BOH	
				Used D&M sampler as plug-other plug too short
				Sampler removed after sampling.

BORING WELL NO. S709

YOS_OAK_03810

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL (CONTINUED)

BORING / WELL: S709	PROJECT: GENERAL ELECTRIC 672-32	SHEET: 3 / 3

BACKFILLED SOIL BORING COMPLETION

DEPTH RANGE (FROM GROUND SURFACE)	MATERIALS INSTALLED
26 - 19 feet	BENTONITE 2 pails-3/8"
19 - 5 feet	OFF-SITE MATERIAL
5 - 0 feet	DRILL CUTTINGS

MONITOR WELL COMPLETION

MATERIAL TYPES

CASING:

SEALANT:

SCREEN:

BACKFILL:

GRAVEL:

DEPTH RANGE (FROM GROUND SURFACE)	MATERIALS INSTALLED
	SLOTTED CASING
	CASING
	GRAVEL PACK MATERIAL
	BENTONITE
	OFF-SITE MATERIAL
	DRILL CUTTINGS

MULTI-CASED / MONITOR WELL COMPLETION

MATERIAL TYPES

SURFACE CASINGS:

SEALANT:

BACKFILL:

DEPTH RANGE (FROM GROUND SURFACE)	MATERIALS INSTALLED
	14" SURFACE CASING
	10" SURFACE CASING
	SLOTTED 2" CASING
	2" CASING
	GRAVEL PACK MATERIAL
	BENTONITE
	GROUT

BORING WELL NO. S709

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL

BORING / WELL: S710	PROJECT: General Electric JOB NO.: 672-32	SHEET: 1 / 3

X BACKFILLED SOIL BORING ___ MONITOR WELL ___ MULTI-CASED WELL

DRILL CONTRACTOR: HEW
DRILL RIG: CME 45 Hollow Stem Auger
BC PERSONNEL: Erikson, Reddy

HOLE DIAMETER: 8"
SAMPLE TYPE: California Split Tube Drive
DRIVE ENERGY: 140 lb.

	TIME	DATE
START:	1200	3/03/81
FINISH:	1500	3/03/81
BACKFILL:	1530	3/03/81
FINISH WELL:	----	----

ELEVATIONS

DATUM: OAKLAND (-2.998 M.S.L.)
GROUND SURFACE: 17.32
TOP WELL CASING: -----

SUBSURFACE FLUIDS / GROUNDWATER

DEPTH FROM GROUND	TIME	DATE
Dry	1500 EOB	3/03/8

DEPTH, FT.	SAMPLE	BLOWS PER 6 IN.	USC SOIL TYPE	DESCRIPTION OF SUBSURFACE MATERIALS
1	X X	7-14-11	Fill	Silty clay, dark brown moist at tip, brick and paint residue, top of sample humsey.
2				
3			ML	Clayey silt, dark gray.
4				
5	X X	2-5-9	ML	Clayey silt, gray-green, moist and stiff.
6				
7				
8				
9				
10	X X	6-11-20	ML	Sandy silt with fine gravel, medium brown.
11			CL	Silty clay, light gray brown, barely moist.
12				Silty clay in browner, then greener layers.
13				
14				
15				

BORING WELL NO. S710

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL (CONTINUED)

BORING / WELL: S710	PROJECT: General Electric Job No: 672-32	SHEET: 2 /3

DEPTH, FT.	SAMPLE	BLOWS PER 6 IN.	USC SOIL TYPE	DESCRIPTION OF SUBSURFACE MATERIALS
	X	7-13-17		Silty sand and gravel, gray green, moist.
16	X			
	X	3-15-28	SM	
17	X			
	X	5-8-12		Clay, medium brown with black mottles and gray streaks, moist, ribbons well.
	X			
18				
19			CL	
20				
	X	8-10-16		Silty clay, gray brown with mottles, barely moist.
	X			
21				
22				
23				
24				
				Silty sand and gravel, gray green, moist, very similar to 15-18", gravel is rounded, very little clay.
25	X	10-30-35	SM	
	X			
26	X	9-19		
	X			
27			CL	Silty clay, medium brown with mottles, stiff.
				x Sample 26-26 1/2 discarded
				No water.

BORING WELL NO. S710

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL (CONTINUED)

BORING / WELL: S710	PROJECT: General Electric Job No: 672-32	SHEET: 3/3

BACKFILLED SOIL BORING COMPLETION

DEPTH RANGE (FROM GROUND SURFACE)	MATERIALS INSTALLED
27 - 21 feet	BENTONITE 2 pails - 1/2"
21 - 5 feet	OFF-SITE MATERIAL
5 - 0 feet	DRILL CUTTINGS

MONITOR WELL COMPLETION

MATERIAL TYPES

CASING:

SEALANT:

SCREEN:

BACKFILL:

GRAVEL:

DEPTH RANGE (FROM GROUND SURFACE)	MATERIALS INSTALLED
	SLOTTED CASING
	CASING
	GRAVEL PACK MATERIAL
	BENTONITE
	OFF-SITE MATERIAL
	DRILL CUTTINGS

MULTI-CASED / MONITOR WELL COMPLETION

MATERIAL TYPES

SURFACE CASINGS:

SEALANT:

BACKFILL:

DEPTH RANGE (FROM GROUND SURFACE)	MATERIALS INSTALLED
	14" SURFACE CASING
	10" SURFACE CASING
	SLOTTED 2" CASING
	2" CASING
	GRAVEL PACK MATERIAL
	BENTONITE
	GROUT

BORING WELL NO. S710

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL

BORING / WELL: S711	PROJECT: GENERAL ELECTRIC	JOB NO.: 672-32	SHEET: 1 / 3

X BACKFILLED SOIL BORING ___ MONITOR WELL ___ MULTI-CASED WELL

DRILL CONTRACTOR: HEW
DRILL RIG: CME 75 Hollow Stem Auger
BC PERSONNEL: Arndt, Reddy

HOLE DIAMETER: 8"
SAMPLE TYPE: California Split Tube Drive
DRIVE ENERGY: 140 lb.

	TIME	DATE
START:	1030	2/24/81
FINISH:	1300	2/24/81
BACKFILL:	1330	2/24/81
FINISH WELL:	----	----

ELEVATIONS

DATUM: OAKLAND (-2.998 M.S.L.)
GROUND SURFACE: 17.19
TOP WELL CASING: -----

SUBSURFACE FLUIDS / GROUNDWATER

DEPTH FROM GROUND	TIME	DATE
Not Taken	---	2/24/81

DEPTH, FT.	SAMPLE	BLOWS PER 6 IN.	USC SOIL TYPE	DESCRIPTION OF SUBSURFACE MATERIALS
	X	4-5-10	Fill	Sand and gravel, dark black, wood chips, mixed fill and organic horizon of soil.
1	X		CL	Silty clay with trace of coarse sand and fine gravel, medium brown, moist.
2				
3				
4			▽	Water on sampler.
			CH	Plastic clay, medium brown, wet and soft.
5	X	26-27-26	SC	Clayey medium sand, with trace of fine gravel, medium yellow brown, damp and firm.
	X			
6			SC	Clayey coarse sand, dark gray, damp.
7			CH	Plastic clay, light gray, wet and soft.
8				
9				
10	X	dropped		
	X	6-11-23	SC	Clayey, medium to coarse sand, medium yellow brown, lots of dark grains, damp.
11				x Saturated.
12			SC	Clayey coarse sand, medium yellow brown, wet.
13			CL	Silty clay, medium yellow brown, wet.
14				x Damp.

S711

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL (CONTINUED)

BORING / WELL: S711	PROJECT: GENERAL ELECTRIC 672-32	SHEET: 2/3

DEPTH, FT.	SAMPLE	BLOWS PER 6 IN.	USC SOIL TYPE	DESCRIPTION OF SUBSURFACE MATERIALS
	X	5-7-16		Silty clay, medium yellow brown, damp.
16	X			x Trace of gravel in cuttings
17				x Moist
18				With small black mottles.
19				
20			CL	
	X	5-6-8		Same as above
21	X			
22				
23				
24				
25	X	7-10-17		Same as above
26	X			
			BOH	

BORING WELL NO. S711

YOS_OAK_03816

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL (CONTINUED)

BORING / WELL: S711	PROJECT: GENERAL ELECTRIC 672-32	SHEET: 3 / 3

BACKFILLED SOIL BORING COMPLETION

DEPTH RANGE (FROM GROUND SURFACE)	MATERIALS INSTALLED
26 - 20 feet	BENTONITE 2 pails - 1/2"
20 - 5 feet	OFF-SITE MATERIAL
5 - 0 feet	DRILL CUTTINGS

MONITOR WELL COMPLETION

MATERIAL TYPES

CASING:

SEALANT:

SCREEN:

BACKFILL:

GRAVEL:

DEPTH RANGE (FROM GROUND SURFACE)	MATERIALS INSTALLED
	SLOTTED CASING
	CASING
	GRAVEL PACK MATERIAL
	BENTONITE Top 13'
	OFF-SITE MATERIAL
	DRILL CUTTINGS

MULTI-CASED / MONITOR WELL COMPLETION

MATERIAL TYPES

SURFACE CASINGS:

SEALANT:

BACKFILL:

DEPTH RANGE (FROM GROUND SURFACE)	MATERIALS INSTALLED
	14" SURFACE CASING
	10" SURFACE CASING
	SLOTTED 2" CASING
	2" CASING
	GRAVEL PACK MATERIAL
	BENTONITE
	GROUT

BORING WELL NO. S711

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL

BORING / WELL: S712	PROJECT: GENERAL ELECTRIC	JOB NO.: 672-32	SHEET: 1 /3

X BACKFILLED SOIL BORING ___ MONITOR WELL ___ MULTI-CASED WELL

DRILL CONTRACTOR: HEW
DRILL RIG: CME 75 Hollow Stem Auger
BC PERSONNEL: Arndt, Manson

HOLE DIAMETER: 8"
SAMPLE TYPE: California Split Tube Drive
DRIVE ENERGY: 140 lb.

	TIME	DATE
START:	1500	4/13/81
FINISH:	1800	4/13/81
BACKFILL:	1700	4/15/81
FINISH WELL:	----	----

ELEVATIONS

DATUM: OAKLAND (-2.998 M.S.L.)
GROUND SURFACE: 13.91
TOP WELL CASING: -----

SUBSURFACE FLUIDS / GROUNDWATER

DEPTH FROM GROUND	TIME	DATE
21.6'	1800 EOB	4/13/81

DEPTH, FT.	SAMPLE	BLOWS PER 6 IN.	USC SOIL TYPE	DESCRIPTION OF SUBSURFACE MATERIALS
			Asphalt	Asphalt
1			Railroad Bed Gravel	Medium to large angular gravel, white, dry and loose.
2				
3	X X	30+ Too Hard to Sample	Fill	Mixed clay, coarse sand, and fine to medium angular gravel, dark gray, dry and loose.
4			SC	Clayey fine sand, medium yellow brown with small black mottles, dry and soft.
5				
6	X X	7-11-16	CL	Fine sandy clay, medium yellow brown, barely moist and firm.
7			SC	Very clayey medium to coarse sand with some fine to medium angular gravel, medium red brown, barely moist.
8				
9			CL	Fine sandy clay with some coarse sand and fine gravel, medium yellow brown, barely moist and stiff.
10			SC	Very clayey medium to coarse sand with lots of fine to large angular to subangular gravel, medium red brown with lots of red and black grains, moist and very stiff poorly sorted.
11	X X	8-18-30		
12	X X	8-19-30		Same as above.
13				
14			CL	Coarse sandy clay, medium red brown, stiff and moist.
15			CL	Fine sandy clay with trace of coarse sand, medium red brown damp and soft.

BORING WELL NO. S712

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL (CONTINUED)

BORING / WELL: S712	PROJECT: GENERAL ELECTRIC 672-32	SHEET: 2 / 3

DEPTH, FT.	SAMPLE	BLOWS PER 6 IN.	USC SOIL TYPE	DESCRIPTION OF SUBSURFACE MATERIALS
	X X	6-7-12		Silty clay, medium yellow brown with small black mottles damp and soft.
16				
17			CL	
18				
19				
20	X X	9-10-14		
21			▽	Water on sampler.
			SC	Clayey medium sand, medium red brown, damp and soft.
22	X X	6-9-20		
23			SP	Subangular to subrounded coarse sand with trace of clay, well sorted, medium red brown with lots of black grains, wet and loose.
	X X	9-13-15		
24			SC	Clayey medium sand, well sorted with trace of fine gravel, medium yellow brown, wet and soft.
25				
	X X	10-15-20	CL	Silty clay, medium yellow brown with small black mottles damp and soft.
26			BOH	

BORING WELL NO. S712

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL (CONTINUED)

BORING / WELL: S712	PROJECT: GENERAL ELECTRIC 672-32	SHEET: 3/3

BACKFILLED SOIL BORING COMPLETION

DEPTH RANGE (FROM GROUND SURFACE)		MATERIALS INSTALLED
26 - 17 feet	Hole caved.	BENTONITE 2 pails - 3/8"
17 - 0 feet		OFF-SITE MATERIAL
----		DRILL CUTTINGS

MONITOR WELL COMPLETION

MATERIAL TYPES

CASING:

SEALANT:

SCREEN:

BACKFILL:

GRAVEL:

DEPTH RANGE (FROM GROUND SURFACE)	MATERIALS INSTALLED
	SLOTTED CASING
	CASING
	GRAVEL PACK MATERIAL
	BENTONITE
	OFF-SITE MATERIAL
	DRILL CUTTINGS

MULTI-CASED / MONITOR WELL COMPLETION

MATERIAL TYPES

SURFACE CASINGS:

SEALANT:

BACKFILL:

DEPTH RANGE (FROM GROUND SURFACE)	MATERIALS INSTALLED
	14" SURFACE CASING
	10" SURFACE CASING
	SLOTTED 2" CASING
	2" CASING
	GRAVEL PACK MATERIAL
	BENTONITE
	GROUT

BORING WELL NO. S712

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL

BORING / WELL: S713	PROJECT: GENERAL ELECTRIC	JOB NO.: 672-32	SHEET: 1/3

X BACKFILLED SOIL BORING ___ MONITOR WELL ___ MULTI-CASED WELL

DRILL CONTRACTOR: HEW
DRILL RIG: Minuteman
BC PERSONNEL: Erikson, Schick

HOLE DIAMETER: 4"
SAMPLE TYPE: California Split Tube Drive
DRIVE ENERGY: 100 lb.

	TIME	DATE
START:	0900	4/16/81
FINISH:	1600	4/16/81
BACKFILL:	1630	4/16/81
FINISH WELL:	----	---

ELEVATIONS

DATUM: OAKLAND (-2.998 M.S.L.)
GROUND SURFACE: 14.02
TOP WELL CASING: -----

SUBSURFACE FLUIDS / GROUNDWATER

DEPTH FROM GROUND	TIME	DATE
15'	1600 EOB	4/16/81

DEPTH, FT.	SAMPLE	BLOWS PER 6 IN.	USC SOIL TYPE	DESCRIPTION OF SUBSURFACE MATERIALS
1	X X	40/12"	Fill	Gravely fill, brown, moist.
2				
3	X X	Grab	CL	Silty clay, medium gray, fairly dry. Took sample from drill cuttings.
			CL	Silty clay, light gray.
4				
5			CL	Silty clay with fine gravel, medium brown with mottles.
6	X X	36/12"		Silty clay, medium brown with mottles.
7			CL	
8				
9				x Cuttings becoming moister.
10	X X	25/12"		Clay with some gravel, medium brown with black mottles, dry, very firm.
11				
12			CH	
13				
14				
15				

BORING WELL NO. S713

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL (CONTINUED)

BORING / WELL: S713	PROJECT: GENERAL ELECTRIC 672-32	SHEET: 2 / 3

DEPTH, FT.	SAMPLE	BLOWS PER 6 IN.	USC SOIL TYPE	DESCRIPTION OF SUBSURFACE MATERIALS
	X	23/12"		
16	X		CH	Clay with some gravel, medium brown with black mottles, dry, very firm,
17				
18				
19				
20			▽	Water on sampler.
	X	29/12"	SP	Coarse sand and gravel, very little clay, yellow brown with black mottles.
21	X			
22				
23				
24	X	22/12"	CH	Clay, medium brown with black mottles, slightly moist, firm.
25	X		BOH	

BORING WELL NO. S713

YOS_OAK_03822

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL (CONTINUED)

BORING / WELL: S713	PROJECT: GENERAL ELECTRIC 672-32	SHEET: 3 / 3

BACKFILLED SOIL BORING COMPLETION

DEPTH RANGE (FROM GROUND SURFACE)	MATERIALS INSTALLED
25 - 5 feet	BENTONITE 1 pail - 3/8"
---	OFF-SITE MATERIAL
5 - 0 feet	DRILL CUTTINGS

MONITOR WELL COMPLETION

MATERIAL TYPES

CASING:

SCREEN:

GRAVEL:

SEALANT:

BACKFILL:

DEPTH RANGE (FROM GROUND SURFACE)	MATERIALS INSTALLED
	SLOTTED CASING
	CASING
	GRAVEL PACK MATERIAL
	BENTONITE
	OFF-SITE MATERIAL
	DRILL CUTTINGS

MULTI-CASED / MONITOR WELL COMPLETION

MATERIAL TYPES

SURFACE CASINGS:

SEALANT:

BACKFILL:

DEPTH RANGE (FROM GROUND SURFACE)	MATERIALS INSTALLED
	14" SURFACE CASING
	10" SURFACE CASING
	SLOTTED 2" CASING
	2" CASING
	GRAVEL PACK MATERIAL
	BENTONITE
	GROUT

BORING WELL NO. S713

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL

BORING / WELL: S714	PROJECT: General Electric	JOB NO.: 672-32	SHEET: 1 / 3

X BACKFILLED SOIL BORING ___ MONITOR WELL ___ MULTI-CASED WELL

DRILL CONTRACTOR: HEW
DRILL RIG: CME 75 Hollow Stem Auger
BC PERSONNEL: Arndt

HOLE DIAMETER: 8"
SAMPLE TYPE: California Split Tube Drive
DRIVE ENERGY: 140 lb.

	TIME	DATE
START:	0945	4/20/81
FINISH:	1200	4/20/81
BACKFILL:	1230	4/20/81
FINISH WELL:	----	---

ELEVATIONS

DATUM: OAKLAND (-2.998 M.S.L.)
GROUND SURFACE: 13.31
TOP WELL CASING: -----

SUBSURFACE FLUIDS / GROUNDWATER

DEPTH FROM GROUND	TIME	DATE
24'	1200 EOB	4/20/81

DEPTH, FT.	SAMPLE	BLOWS PER 6 IN.	USC SOIL TYPE	DESCRIPTION OF SUBSURFACE MATERIALS
			Asphalt	Asphalt
1		Too Hard to sample.	Fill	Mixed sand, silt, and fine to large angular gravel, large bolts, metal, and wire pieces, lots of muscovite, glass, ceramic insulators, dark black, dry to moist and loose.
2	X	7-5-3		
3	X			
			ML	Clayey silt, dark gray, damp and soft.
4			CL	Silty clay, light gray, moist and firm.
5			CL	Silty clay, medium yellow brown, moist and firm.
6			SC	Very clayey fine to medium sand, medium yellow brown, damp and soft.
7				
8				
9			CL	Silty clay, medium yellow brown, moist and stiff.
10				
11				
12				
13	X	16-11-10		First sampling attempt all slough (fill) Silty lay, medium yellow brown, moist and soft.
	X	12-13-16		
14				
15				

BORING WELL NO. S714

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL (CONTINUED)

BORING / WELL: S714

PROJECT: GENERAL ELECTRIC 672-32

SHEET: 2/3

DEPTH, FT.	SAMPLE	BLOWS PER 6 IN.	USC SOIL TYPE	DESCRIPTION OF SUBSURFACE MATERIALS
				Silty clay, medium yellow brown, moist and soft.
16			CL	x Moist and stiff.
17				
18				
19			CL	Silty clay, gray brown, moist and stiff.
20				
21			CL	Medium sandy clay, gray brown with green mottles, damp and soft.
22				
23				
24				
25				
	X	8-11-16 Grab from auger*		
26	X		CL	Coarse to medium sandy clay, medium yellow brown with green mottles, moist and stiff.
	X		BOH	No free water while augers in hole.
			SP	*At 26' slightly clayey, well sorted coarse sand, wet.

BORING WELL NO. S714

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL (CONTINUED)

BORING / WELL: S714	PROJECT: GENERAL ELECTRIC 672-32	SHEET: 3/3

BACKFILLED SOIL BORING COMPLETION

DEPTH RANGE (FROM GROUND SURFACE)	MATERIALS INSTALLED
26 - 0 feet	BENTONITE 10 pails - 3/8"
---	OFF-SITE MATERIAL
---	DRILL CUTTINGS

MONITOR WELL COMPLETION

MATERIAL TYPES

CASING:

SEALANT:

SCREEN:

BACKFILL:

GRAVEL:

DEPTH RANGE (FROM GROUND SURFACE)	MATERIALS INSTALLED
	SLOTTED CASING
	CASING
	GRAVEL PACK MATERIAL
	BENTONITE
	OFF-SITE MATERIAL
	DRILL CUTTINGS

MULTI-CASED / MONITOR WELL COMPLETION

MATERIAL TYPES

SURFACE CASINGS:

SEALANT:

BACKFILL:

DEPTH RANGE (FROM GROUND SURFACE)	MATERIALS INSTALLED
	14" SURFACE CASING
	10" SURFACE CASING
	SLOTTED 2" CASING
	2" CASING
	GRAVEL PACK MATERIAL
	BENTONITE
	GROUT

BORING WELL NO. S714

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL

BORING / WELL: S715	PROJECT: General Electric JOB NO.: 672-32	SHEET: 1 / 2

X BACKFILLED SOIL BORING ___ MONITOR WELL ___ MULTI-CASED WELL

DRILL CONTRACTOR: HEW
DRILL RIG: CME 75 Hollow Stem Auger
BC PERSONNEL: Arndt

HOLE DIAMETER: 8"
SAMPLE TYPE: California Split Tube Drive
DRIVE ENERGY: 140 lb.

	TIME	DATE
START:	1400	4/20/81
FINISH:	1500	4/20/81
BACKFILL:	1510	4/20/81
FINISH WELL:	----	---

ELEVATIONS

DATUM: OAKLAND (-2.998 M.S.L.)
GROUND SURFACE: 13.15
TOP WELL CASING: -----

SUBSURFACE FLUIDS / GROUNDWATER

DEPTH FROM GROUND	TIME	DATE
Dry	1500 EOB	4/20/81

DEPTH, FT.	SAMPLE	BLOWS PER 6 IN.	USC SOIL TYPE	DESCRIPTION OF SUBSURFACE MATERIALS
1			Fill	Mixed medium sand and fine to large angular gravel, medium yellow brown, dry and loose.
2				x Moist.
3				
	X	6-8-10		
4	X			
	X	8-9-14	ML	Clayey silt, dark gray black with green mottles, moist and soft, oily spots.
5	X	4-4-9		x With light gray mottles.
6			ML	Clayey silt with trace of medium sand, medium yellow gray with green-gray mottles.
7			BOH	
8				
9				
10				
11				
12				
13				
14				
15				

BORING WELL NO. S715

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL (CONTINUED)

BORING / WELL: S715	PROJECT: GENERAL ELECTRIC 672-32	SHEET: 2 /2

BACKFILLED SOIL BORING COMPLETION

DEPTH RANGE (FROM GROUND SURFACE)	MATERIALS INSTALLED
----	BENTONITE
----	OFF-SITE MATERIAL
5.5 - 0 feet	DRILL-CUTTINGS

MONITOR WELL COMPLETION

MATERIAL TYPES

CASING:

SEALANT:

SCREEN:

BACKFILL:

GRAVEL:

DEPTH RANGE (FROM GROUND SURFACE)	MATERIALS INSTALLED
	SLOTTED CASING
	CASING
	GRAVEL PACK MATERIAL
	BENTONITE
	OFF-SITE MATERIAL
	DRILL CUTTINGS

MULTI-CASED / MONITOR WELL COMPLETION

MATERIAL TYPES

SURFACE CASINGS:

SEALANT:

BACKFILL:

DEPTH RANGE (FROM GROUND SURFACE)	MATERIALS INSTALLED
	14" SURFACE CASING
	10" SURFACE CASING
	SLOTTED 2"CASING
	2" CASING
	GRAVEL PACK MATERIAL
	BENTONITE
	GROUT

BORING WELL NO. S715

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL

BORING / WELL: S721	PROJECT: GENERAL ELECTRIC	JOB NO.: 672-32	SHEET: 1 / 3

X BACKFILLED SOIL BORING ___ MONITOR WELL ___ MULTI-CASED WELL

DRILL CONTRACTOR: HEW
DRILL RIG: CME 45 Hollow Stem Auger
BC PERSONNEL: Arndt, Erikson

HOLE DIAMETER: 8"
SAMPLE TYPE: Shelby Tube Drive and Push
DRIVE ENERGY: Sledge Hammer, Feed

	TIME	DATE
START:	1000	3/10/81
FINISH:	1330	3/10/81
BACKFILL:	1430	3/10/81
FINISH WELL:	----	----

ELEVATIONS

DATUM: OAKLAND (-2.998 M.S.L.)
GROUND SURFACE: 11.82
TOP WELL CASING: -----

SUBSURFACE FLUIDS / GROUNDWATER

DEPTH FROM GROUND	TIME	DATE
Not Taken	----	3/10/81

DEPTH, FT.	SAMPLE	BLOWS PER 6 IN.	USC SOIL TYPE	DESCRIPTION OF SUBSURFACE MATERIALS
			Concrete	Concrete.
1	X X	Sledge Hammer	Fill	Large angular gravel, poorly sorted with some clay, metal pieces and parts of ceramic insulators, light red brown.
2			Fill	Fill as above, dark gray black, dry and loose.
3				Silt, dark gray, dry and loose.
4			ML	x Large light gray mottles.
5	X X	Push	CL	Silty clay, light gray, barely moist and stiff.
6			CL	Silty clay, medium yellow brown, barely moist and stiff.
7				x Trace of coarse sand and fine gravel
8				
9				x Trace of fine gravel
10	X X	Push		
11				
12				
13			CL	Silty clay with trace of fine gravel and coarse sand, medium yellow brown, moist and very stiff.
14			CL	Silty clay, light yellow brown, damp and soft.

S721

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL (CONTINUED)

BORING / WELL: S721	PROJECT: GENERAL ELECTRIC 672-32	SHEET: 2/3

DEPTH, FT.	SAMPLE	BLOWS PER 6 IN.	USC SOIL TYPE	DESCRIPTION OF SUBSURFACE MATERIALS
	X	∇ Push	∇	Water on sampler.
16	X		CL	Silty clay, light yellow brown, damp and soft.
17				
18				
19				
20	X	Push	CL	Fine sandy clay, light yellow brown, damp and soft.
21	X			
22				
23				
24				
25	X	Push		Fine sandy clay, light yellow brown with small black mottles, damp and soft.
26	X			
			BOH	

BORING WELL NO. S721

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL (CONTINUED)

BORING / WELL: S721	PROJECT: GENERAL ELECTRIC 672-32	SHEET: 3 / 3

BACKFILLED SOIL BORING COMPLETION

DEPTH RANGE (FROM GROUND SURFACE)	MATERIALS INSTALLED
26 - 20 feet	BENTONITE 2 pails - 3/8"
20 - 0 feet	OFF-SITE MATERIAL
Concrete will be patched.	DRILL CUTTINGS

MONITOR WELL COMPLETION

MATERIAL TYPES

CASING:

SEALANT:

SCREEN:

BACKFILL:

GRAVEL:

DEPTH RANGE (FROM GROUND SURFACE)	MATERIALS INSTALLED
	SLOTTED CASING
	CASING
	GRAVEL PACK MATERIAL
	BENTONITE
	OFF-SITE MATERIAL
	DRILL CUTTINGS

MULTI-CASED / MONITOR WELL COMPLETION

MATERIAL TYPES

SURFACE CASINGS:

SEALANT:

BACKFILL:

DEPTH RANGE (FROM GROUND SURFACE)	MATERIALS INSTALLED
	14" SURFACE CASING
	10" SURFACE CASING
	SLOTTED 2" CASING
	GRAVEL PACK MATERIAL
	BENTONITE
	GROUT

BORING WELL NO. S721

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL

BORING / WELL: S722	PROJECT: General Electric JOB NO.: 672-32	SHEET: 1 /3

X BACKFILLED SOIL BORING ___ MONITOR WELL ___ MULTI-CASED WELL

DRILL CONTRACTOR: HEW
DRILL RIG: CME 75 Hollow Stem Auger
BC PERSONNEL: Arndt, Manson

HOLE DIAMETER: 8"
SAMPLE TYPE: California Split Tube Drive
DRIVE ENERGY: 140 lb.

	TIME	DATE
START:	1045	3/20/81
FINISH:	1515	3/20/81
BACKFILL:	1630	3/20/81
FINISH WELL:	----	----

ELEVATIONS

DATUM: OAKLAND (-2.998 M.S.L.)
GROUND SURFACE: 11.78
TOP WELL CASING: -----

SUBSURFACE FLUIDS / GROUNDWATER

DEPTH FROM GROUND	TIME	DATE
22'	1530 EOB	3/20/81

DEPTH, FT.	SAMPLE	BLOWS PER 6 IN.	USC SOIL TYPE	DESCRIPTION OF SUBSURFACE MATERIALS
			Concrete	Concrete
1	X X	11-10-17	Fill	Clayey coarse sand and fine to large angular gravel, medium red brown, moist.
2			ML	Very clayey silt, dark gray, dry and loose.
3				
4				x Moist.
5	X X	8-11-14	CL	Silty clay, medium yellow brown with small black mottles, moist and stiff
6				
7			CL	Medium sandy clay, medium brown, moist and friable.
8				
9				
10	X X	15-26-27		
11			SC	Clayey coarse sand, medium brown, moist and loose.
12	X X	9-16-21	CL	Silty clay, medium yellow brown, moist and very stiff.
13				
14				
15				

BORING WELL NO. S722

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL (CONTINUED)

BORING / WELL: S722	PROJECT: General Electric 672-32	SHEET: 2/3

DEPTH, FT.	SAMPLE	BLOWS PER 6 IN.	USC SOIL TYPE	DESCRIPTION OF SUBSURFACE MATERIALS
	X	4-9-11		Silty clay, light yellow brown with small black mottles, moist and firm
16	X			
17				
18				
19			CL	
20	X	5-9-10		
	X			x Damp and soft.
21				
22				x Wet to saturated.
23				
24				
25				
	X	7-13-16		
26	X		SC	Clayey fine sand, medium yellow brown, damp and soft.
27	X	11-15-21	CL	Silty clay, medium yellow brown, moist and firm.
	X		BOH	

BORING WELL NO. S722

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL (CONTINUED)

BORING / WELL: S722	PROJECT: General Electric Job No: 672-32	SHEET: 3/3

BACKFILLED SOIL BORING COMPLETION

DEPTH RANGE (FROM GROUND SURFACE)	MATERIALS INSTALLED
27.5 - 18.5 feet	BENTONITE 3 pails - 3/8"
18.5 - 0.5 feet	OFF-SITE MATERIAL
0.5 - 0 feet	DRILL CUTTINGS

Concrete will be patched.

MONITOR WELL COMPLETION

MATERIAL TYPES

CASING:

SEALANT:

SCREEN:

BACKFILL:

GRAVEL:

DEPTH RANGE (FROM GROUND SURFACE)	MATERIALS INSTALLED
	SLOTTED CASING
	CASING
	GRAVEL PACK MATERIAL
	BENTONITE
	OFF-SITE MATERIAL
	DRILL CUTTINGS

MULTI-CASED / MONITOR WELL COMPLETION

MATERIAL TYPES

SURFACE CASINGS:

SEALANT:

BACKFILL:

DEPTH RANGE (FROM GROUND SURFACE)	MATERIALS INSTALLED
	14" SURFACE CASING
	10" SURFACE CASING
	SLOTTED 2" CASING
	2" CASING
	GRAVEL PACK MATERIAL
	BENTONITE
	GROUT

BORING WELL NO. S722

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL

BORING / WELL: S723	PROJECT: General Electric JOB NO.: 672-32	SHEET: 1 / 3

X BACKFILLED SOIL BORING ___ MONITOR WELL ___ MULTI-CASED WELL

DRILL CONTRACTOR: HEW
DRILL RIG: CME 75 Hollow Stem Auger
BC PERSONNEL: Arndt, Reddy

HOLE DIAMETER: 8"
SAMPLE TYPE: California Split Tube Drive
DRIVE ENERGY: 140 lb.

	TIME	DATE
START:	1445	3/26/81
FINISH:	1720	3/26/81
BACKFILL:	1000	3/27/81
FINISH WELL:	----	---

ELEVATIONS

DATUM: OAKLAND (-2.998 M.S.L.)
GROUND SURFACE: 11.83
TOP WELL CASING: -----

SUBSURFACE FLUIDS / GROUNDWATER

DEPTH FROM GROUND	TIME	DATE
21'4"	1730 EOB	3/26/81

DEPTH, FT.	SAMPLE	BLOWS PER 6 IN.	USC SOIL TYPE	DESCRIPTION OF SUBSURFACE MATERIALS
			Concrete	Concrete.
1	X X	9-10-7	Fill	Mixed sand, silt and clay with fine to medium gravel, medium brown with large black mottles, moist.
2				
3			ML	Clayey silt, dark gray black, moist and soft.
4				x Dry and loose.
5			CL	Silty clay, dark gray, damp and soft.
No Sample	X X	8-10-18		
6			CL	Silty clay, medium yellow brown with small black mottles, moist and stiff.
7				
8				x Trace of coarse to medium sand, barely moist and very stiff.
9				
10	X X	13-20-27		
11				
12			CL	Silty clay, light yellow brown, damp and soft.
13				
14				
15				

BORING WELL NO. S723

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL (CONTINUED)

BORING / WELL: S723	PROJECT: General Electric 672-32	SHEET: 2 / 3

DEPTH, FT.	SAMPLE	BLOWS PER 6 IN.	USC SOIL TYPE	DESCRIPTION OF SUBSURFACE MATERIALS
	X	8-10-16	CH	Plastic clay, light gray brown, barely moist and very stiff.
16	X			
17				
18				
19				
20				
	X	6-12-15		Plastic clay, light gray brown with medium yellow brown mottles.
21	X			
22			▽	x Damp. Water on sampler.
23				x Wet, with trace of medium sand.
24				
25	X	9-10-12		x Moist and very stiff.
26	X			
			BOH	

BORING WELL NO. S723

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL (CONTINUED)

BORING / WELL: S723	PROJECT: General Electric Job No: 672-32	SHEET: 3/3

BACKFILLED SOIL BORING COMPLETION

DEPTH RANGE (FROM GROUND SURFACE)	MATERIALS INSTALLED
26 - 20 feet	BENTONITE 2 pails - 3/8"
20 - 0.5 feet	OFF-SITE MATERIAL
0.5 - 0 feet	DRILL CUTTINGS

Concrete will be patched.

MONITOR WELL COMPLETION

MATERIAL TYPES

CASING:

SEALANT:

SCREEN:

BACKFILL:

GRAVEL:

DEPTH RANGE (FROM GROUND SURFACE)	MATERIALS INSTALLED
	SLOTTED CASING
	CASING
	GRAVEL PACK MATERIAL
	BENTONITE
	OFF-SITE MATERIAL
	DRILL CUTTINGS

MULTI-CASED / MONITOR WELL COMPLETION

MATERIAL TYPES

SURFACE CASINGS:

SEALANT:

BACKFILL:

DEPTH RANGE (FROM GROUND SURFACE)	MATERIALS INSTALLED
	14" SURFACE CASING
	10" SURFACE CASING
	SLOTTED 2" CASING
	GRAVEL PACK MATERIAL
	BENTONITE
	GROUT

BORING WELL NO. S723

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL

BORING / WELL: S724	PROJECT: General Electric JOB NO.: 672-32	SHEET: 1 / 3

X BACKFILLED SOIL BORING ___ MONITOR WELL ___ MULTI-CASED WELL

DRILL CONTRACTOR: HEW
DRILL RIG: CME 45 Hollow Stem Auger
BC PERSONNEL: Erikson, Reddy

HOLE DIAMETER: 8"
SAMPLE TYPE: Push, California Split Tube Drive
DRIVE ENERGY: Feed, 140 lb.

	TIME	DATE
START:	0900	3/03/81
FINISH:	1000	3/03/81
BACKFILL:	1000	3/20/81
FINISH WELL:	----	----

ELEVATIONS

DATUM: OAKLAND (-2.998 M.S.L.)
GROUND SURFACE: 11.77
TOP WELL CASING: -----

SUBSURFACE FLUIDS / GROUNDWATER

DEPTH FROM GROUND	TIME	DATE
24'	1215 EOB	3/19/81

DEPTH, FT.	SAMPLE	BLOWS PER 6 IN.	USC SOIL TYPE	DESCRIPTION OF SUBSURFACE MATERIALS
			Concrete	Concrete
1	X X	Pushed	Fill	Sandy, gravelly, fill, medium brown, moist.
2				
3			ML	Clayey silt, dark gray, barely moist.
4				
5	X X	Pushed		Clayey silt, medium brown on tip, middle is gray with mottles, moist, top tube discarded because of slough.
6			ML	
7				
8				
9				Resumed drilling 1000 3/19/81, Arndt, Reddy. Water in hole when resumed drilling, rainfall?
10	X X	Grab x x	CL	Medium sandy clay, medium brown, barely moist and very stiff, lots of fine to coarse gravel.
11		19-29-37	CL	Fine to medium sandy clay, medium brown, barely moist and very stiff
12				
13			CL	
14				Coarse sandy clay, medium yellow brown, wet and soft.
15				

x Damp.

BORING WELL NO. S724

YOS_OAK_03838

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL (CONTINUED)

BORING / WELL: S724	PROJECT: General Electric Job No: 672-32	SHEET: 2 / 3

DEPTH, FT.	SAMPLE	BLOWS PER 6 IN.	USC SOIL TYPE	DESCRIPTION OF SUBSURFACE MATERIALS
	X	8-10-16		Silty clay with trace of coarse sand, medium yellow brown with small black mottles, damp and soft.
16	X			
17			CL	
18				
19				
20	X	5-4-13		Fine sandy clay, medium yellow brown, damp and soft.
21	X		CL	
22				x Moist and more stiff.
23				
24				
25			CL	Silty clay, light yellow brown, moist and stiff.
	X	11-13-16		
26	X			
			BOH	Finished drilling 1215, 3/19/81.

BORING WELL NO. S724

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL (CONTINUED)

BORING / WELL: S724	PROJECT: General Electric Job No: 672-32	SHEET: 3/3

BACKFILLED SOIL BORING COMPLETION

DEPTH RANGE (FROM GROUND SURFACE)	MATERIALS INSTALLED
26 - 19 feet	BENTONITE 2 pails - 3/8"
19 - 0.5 feet	OFF-SITE MATERIAL
0.5 - 0 feet	DRILL CUTTING

Concrete will be patched.

MONITOR WELL COMPLETION

MATERIAL TYPES

CASING:

SEALANT:

SCREEN:

BACKFILL:

GRAVEL:

DEPTH RANGE (FROM GROUND SURFACE)	MATERIALS INSTALLED
	SLOTTED CASING
	CASING
	GRAVEL PACK MATERIAL
	BENTONITE
	OFF-SITE MATERIAL
	DRILL CUTTINGS

MULTI-CASED / MONITOR WELL COMPLETION

MATERIAL TYPES

SURFACE CASINGS:

SEALANT:

BACKFILL:

DEPTH RANGE (FROM GROUND SURFACE)	MATERIALS INSTALLED
	14" SURFACE CASING
	10" SURFACE CASING
	SLOTTED 2" CASING
	2" CASING
	GRAVEL PACK MATERIAL
	BENTONITE
	GROUT

BORING WELL NO. S724

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL

BORING / WELL: S725	PROJECT: General Electric	JOB NO.: 672-32	SHEET: 1 / 3

X BACKFILLED SOIL BORING ___ MONITOR WELL ___ MULTI-CASED WELL

DRILL CONTRACTOR: HEW
DRILL RIG: CME 75 Hollow Stem Auger
BC PERSONNEL: Arndt, Reddy, Schick

HOLE DIAMETER: 8"
SAMPLE TYPE: California Split Tube Drive
DRIVE ENERGY: 140 lb.

	TIME	DATE
START:	1500	3/19/81
FINISH:	1715	3/19/81
BACKFILL:	1500	3/20/81
FINISH WELL:	----	----

ELEVATIONS

DATUM: OAKLAND (-2.998 M.S.L.)
GROUND SURFACE: 11.79
TOP WELL CASING: -----

SUBSURFACE FLUIDS / GROUNDWATER

DEPTH FROM GROUND	TIME	DATE
22.5'	1730 EOB	3/19/81

DEPTH, FT.	SAMPLE	BLOWS PER 6 IN.	USC SOIL TYPE	DESCRIPTION OF SUBSURFACE MATERIALS
			Concrete	Concrete
1	X X	11-9-7	Fill	Clayey coarse sand with lots of fine to large angular gravel, medium red brown, damp to wet.
2				
3			SC	Clayey coarse sand and fine to medium gravel, dark gray black, damp and soft.
4			ML	Clayey silt, dark gray black, damp and soft.
5				
6	X X	6-11-15	ML	Very clayey silt, medium red brown, barely moist and crumbly.
7				
8				
9				
10	X X	11-21-26	CL	Silty clay, medium brown with large gray mottles, barely moist and firm.
11				
12				x Trace of coarse sand in cuttings.
13				
14				
15				

BORING WELL NO. S725

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL (CONTINUED)

BORING / WELL: S725	PROJECT: General Electric Job No: 672-32	SHEET: 2 / 3

DEPTH, FT.	SAMPLE	BLOWS PER 6 IN.	USC SOIL TYPE	DESCRIPTION OF SUBSURFACE MATERIALS
	X X	6-9-17	CL	Fine sandy clay, medium brown, moist and firm.
16				
17				
18				
19			CL	
20	X X	6-7-17		Silty clay, medium brown, moist and slightly firm to plastic.
21				
22				
23				
24				
25	X X	8-14-16	CL	Clay with silt, medium to dark brown, moist and very firm.
26			BOH	

BORING WELL NO. S725

YOS_OAK_03842

BROWN AND CALDWELL

LOG OF SOIL BORING OR MONITOR WELL (CONTINUED)

BORING / WELL: S725	PROJECT: General Electric Job No: 672-32	SHEET: 3/3

BACKFILLED SOIL BORING COMPLETION

DEPTH RANGE (FROM GROUND SURFACE)	MATERIALS INSTALLED
26 - 20 feet	BENTONITE 2 pails - 3/8"
20 - 0.5 feet	OFF-SITE MATERIAL
0.5 - 0 feet	DRILL CUTTINGS

Concrete will be patched.

MONITOR WELL COMPLETION

MATERIAL TYPES

CASING:

SEALANT:

SCREEN:

BACKFILL:

GRAVEL:

DEPTH RANGE (FROM GROUND SURFACE)	MATERIALS INSTALLED
	SLOTTED CASING
	CASING
	GRAVEL PACK MATERIAL
	BENTONITE
	OFF-SITE MATERIAL
	DRILL CUTTINGS

MULTI-CASED / MONITOR WELL COMPLETION

MATERIAL TYPES

SURFACE CASINGS:

SEALANT:

BACKFILL:

DEPTH RANGE (FROM GROUND SURFACE)	MATERIALS INSTALLED
	14" SURFACE CASING
	10" SURFACE CASING
	SLOTTED 2" CASING
	2" CASING
	GRAVEL PACK MATERIAL
	BENTONITE
	GROUT

BORING WELL NO. S725

APPENDIX C

SOIL SAMPLE PCB ANALYTICAL PROCEDURE AND RESULTS

APPENDIX C-1

ANALYTICAL PROCEDURE FOR PCB SOIL ANALYSES

POLYCHLORINATED BIPHENYLS (PCB) ANALYSIS IN SOILS
GAS CHROMATOGRAPHIC

1. Scope and Application
   1.1 This method is for the determination of Aroclors 1016, 1221, 1232, 1242, 1248, 1254, 1260, and 1262.

2. Summary of Method
   2.1 Soil samples are dried and ground, then extracted with hexane on an automatic wrist action shaker.
   2.2 Soil/hexane slurry is allowed to settle.
   2.3 Hexane extract is decanted off, then appropriate dilutions are made.
   2.4 Diluted extract is quantitated on a 1.95% SP2401/1.5% SP2250 on 100/120 mesh supelcoport column by GC/ECD.

3. Interferences
   3.1 Interferences can originate from virtually any source, such as glassware, solvents, tygon tubing, polyethylene bottles, or sample matrix. These interferences are minimized by careful handling of the sample and solvents, florisil clean-up and acetonitrile partitioning when necessary. Alternate column packings are also used to resolve components from a suspected interference.

4. Equipment
   4.1 Gas chromatograph equipped with an electron capture detector.
   4.2 6'x4mm ID 1.95% SP2401/1.5% SP2250 on 80/100 mesh Supelcoport glass column.
   4.3 Burrell wrist action shaker.
   4.4 8 ounce glass bottles with teflon lined caps.
   4.5 Top loading pan balance
   4.6 40 mL volatile organics analysis vials.
   4.7 Chromaflex column (Kontes #K420290).
   4.8 Powder funnels.

5. Reagents
   5.1 Hexane, pesticide quality, nanograde
   5.2 Florisil, 60/100 mesh activated at 130° overnight.
   5.3 PCB standards obtained from US EPA EMSL made up in isooctane.

6. Sample Collection and Handling.
   6.1 Samples should be collected with only metal or glass equipment. Plastic materials must be avoided.

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6.2 To avoid cross contamination of samples from sampling equipment, rinsing of spades or shovels with acetone followed by air drying is recommended.

6.3 Sample should be put into a glass jar with metal or foil lined screw cap lid, or placed in heavy duty aluminum foil, wrapped tightly and secured with duct tape.

7. Sample Preparation

7.1 Empty soil sample into an aluminum pan.

7.2 Remove atypical debris such as trash, rocks, and sticks.

7.3 Allow sample to air dry at ambient temperature, in an area of the laboratory not subject to drafts or heavy traffic so as to avoid cross contamination. Drying times will vary with moisture content and consistency of each sample but range typically from two to four days. During drying, soil should be occasionally gently stirred with a clean wooden (popsicle) stick which is left in the aluminum pan.

7.4 Crush soil with a rolling pin wrapped with heavy duty aluminum foil, then screen with an 18 mesh sieve.

7.5 Weigh 50 g sieved sample and transfer to clean 8 ounce glass bottle with a teflon lined cap using a powder funnel.

7.6 Add 100 mLs hexane and secure cap.

7.7 Fasten to shaker apparatus and extract for 30 minutes.

7.8 Remove bottle from shaker apparatus and allow slurry to settle.

7.9 Decant hexane extract into a teflon capped glass vial.

7.10 Perform optional Florisil clean up (7.11) if necessary, otherwise procede with step 8.

7.11 Florisil Column Absorption Chromatography

7.11.1 Place a charge of activated florisil in a Chromaflex column. After settling the florisil by tapping the column, add about one-half inch layer of anhydrous granular sodium sulfate to the top.

7.11.2 Pre-elute the column, after cooling, with 50-60 mLs of petroleum ether. Discard the eluate and just prior to exposure of the sulfate layer to the air, quantitatively transfer the sample extract into the column by decantation and subsequent petroleum ether washings. Adjust the elution rate to about 5 mL per minute and, separately, collect two eluates in 500 mL K-D flasks equipped with 10 mL ampuls.

Perform the first elution with 200 mL of 6 % ethyl ether in petroleum ether, and the second elution with 200 mL of 15% ether in petroleum ether.

7.11.3 Concentrate the eluates to 6-10 mL in the K-D evaporator in a hot water bath.

7.11.4 Sample extract is now ready for instrumental analysis.

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8. Instrumental Analysis
   8.1 Make appropriate dilutions to bring sample within range of standars.
   8.2 Inject into gas chromatograph equipped with a 1.95% SP2401/ 1.5% SP2250 on 80/100 mesh supelcoport glass column and an electron capture detector.
   8.3 Make identifications by comparing relative peak heights and retention times of sample chromatograms to standards for several characteristic peaks for each PCB.

9. Calculation
   9.1 Quantification by integrated peak areas is calculated and averaged for several peaks in the PCB chromatogram by the following equation:

$$\text{PCB in sample} = \frac{\text{PCB in standard}}{\text{Area in standard}} \text{(area of sample) (dilution factors)}$$

   9.2 Samples exceeding the range of the standards are diluted to bring them into range.
   9.3 Peak height may be substituted for peak area quantification.

APPENDIX C-2

PHASE I PCB SOIL DATA

Table C-2-1. Area I Soil Boring PCB Concentrations

Soil Boring No.	PCB ppm[a]			
	0-1[b]	1-2	2-3	3-4
S1	ND[c]	----	----	----
S5	220	28	ND	1.3
S66	1.5	----	----	----
S7	1.6	----	----	----
S8	29	147	151	0.32
S9	1.4	----	----	----
S10	44	71	19	1.7
S11	1.7	----	----	----
S23	1.6	----	----	----
S24	4.7	0.19	ND	ND
S25	4.9	----	----	----
S32	ND	----	----	----
S33	ND	----	----	----
S34	4.7	4.5	ND	1.6
S35	210	----	0.20	ND
S36	0.83	----	----	----
S37	13	----	----	----
S38	4.6	----	----	----
S39	0.69	----	----	----
S40	94	83	1.5	ND
S41	34	----	----	----
S42	ND	----	----	----
S43	0.66	----	----	----
S44	2.6	----	----	----
S45	130	58	ND	ND
S46	0.16	----	----	0.55

[a] Aroclor 1260

[b] depth interval, in feet

[c] ND = < 0.10 ppm

Table C-2-2. Area I Soil Boring PCB Concentrations

Soil Boring No.	PCB ppm[a]			
	4-5[b]	5-6	10-11	15-16
S1[d]	----	ND	ND	ND
S5	ND[c]	ND	ND	ND
S6	----	ND	ND	ND
S7	----	ND	ND	ND
S8[e]	ND	1.8	0.16	ND
S9[f]	ND	ND	ND	ND
S10	ND	ND	ND	ND
S11	----	0.10	ND	ND
S23	----	ND	ND	ND
S24	ND	ND	ND	ND
S25	----	ND	ND	ND
S32	----	ND	ND	ND
S33	----	ND	ND	ND
S34	ND	ND	ND	ND
S35	ND	ND	0.43	ND
S36	----	ND	ND	ND
S37	----	ND	ND	ND
S38	----	ND	ND	ND
S39	----	ND	ND	ND
S40	3.7	ND	ND	ND
S41	----	ND	ND	ND
S42	----	ND	ND	ND
S43	----	ND	ND	ND
S44	----	ND	ND	ND
S45[g]	ND	ND	ND	ND
S46[h]	----	ND	----	----

[a] Aroclor 1260

[b] depth interval, in feet

[c] ND = < 0.10 ppm

[d] concentration in 20-21 , 25-26 , 40-41 and 50-51 = ND

[e] concentration in 55-56 = ND

[f] concentration in 55-56 = ND

[g] concentration in 7-8 and 13-14 = ND

[h] concentration in 7-8 = ND

Table C-2-3. Area II and III Soil Boring PCB Concentrations

Soil Boring No.	PCB ppm[a]				
	0-1[b]	5-6	10-11	15-16	20-21
S2	31	3.1	0.13	0.68	ND[c]
S3	0.67	ND	ND	ND	ND
S4	0.62	ND	ND	ND	ND
S6	410	0.10	20	ND	0.71
S12[d]	1400	0.11	0.12	ND	ND
S13	45	7.1	11	12	14
S14[e]	1400	250	0.19	0.17	ND
S16[f]	77	14	7.2	0.43	1.2
S17	32	ND	ND	ND	ND
S18	82	7.5	3.5	0.68	0.61
S19	24	0.10	ND	ND	0.81
S20	340	ND	ND	ND	ND
S21	49	ND	ND	ND	ND
S22[g]	52	ND	ND	ND	ND
S26	2.6	ND	ND	ND	ND
S27	45	0.10	ND	ND	ND
S28	5.0	ND	ND	ND	ND
S29	6.8	0.20	ND	ND	ND
S30[h]	53	2.6	0.50	0.13	2.0
S31	33	ND	ND	ND	ND
S47[i]	63	0.22	1.1	28	11
W502	4.6	ND	ND	ND	ND
W503	400	130	360	230	----

[a] Aroclor 1260

[b] depth interval, in feet

[c] ND = < 0.10 ppm

[d] 0-1 (Aroclor 1254) = 460

[e] > 1 - < 5 = 500

[f] 0-1 (Aroclor 1254) = 5.0

[g] 0-1 (Aroclor 1254) = 120 5-6 (Aroclor 1254) = 0.13

[h] 2-4 = 18

[i] 3-4 = 0.42 7-8 = ND

Table C-2-4. Area II and III Soil Boring PCB Concentrations

Soil Boring No.	PCB ppm[a]			
	25-26[b]	30-31	35-36	40-41
S2	0.62	----	----	----
S3	----	-----	----	----
S4	ND[c]	----	----	----
S6	----	----	----	----
S12	ND	0.12	0.18	ND
S13	13	----	----	----
S14	0.57	----	----	----
S16	ND	----	----	----
S17	ND	----	----	----
S18	----	----	----	----
S19	----	----	----	----
S20	----	----	----	----
S21	ND	----	----	----
S22	ND	ND	ND	----
S26	ND	----	----	----
S27	ND	ND	----	----
S28	----	----	----	----
S29	----	----	----	----
S30	0.52	----	----	----
S31	ND	----	----	----
S47	----	----	----	----
W502	ND	ND	ND	----
W503	----	----	----	----

[a] Aroclor 1260

[b] depth interval, in feet

[c] ND = < 0.10 ppm

Table C-2-5. Area II and III Soil Boring PCB Concentrations

Soil Boring No.	Depth (in feet)	PCB ppm [a]
Trench 1	0.5	32
	1.5	35
	3	13000
	4	1400
	7	24
	10	28
	11.5	81
	16	ND [b]
	17	14
Trench 2	0.5	1900
	1.1	53
	3.0	0.96
	3.75	ND
	4.5	ND
	5.5	ND
	10	ND
S15	0-1	990
	1-1.5	1500
	1.5-2	930
	2-2.5	570
	2.5-3	440
	5-6	240
	10-11	8.6
	15-16	1.8
	20-21	0.18
S48	2	0.41
	4	0.22
	6	1.4
	8-10	0.36
	12	ND
	14	ND
	15-15.5	0.14
S48 (cont)	15.5-16	ND
	16-16.5	ND
	16.5-17	ND
	17.2-17.4	ND
	18-18.4	1.3
	18.4-19	0.41
	19-19.5	ND
S504	2	0.56
	4	0.15
	6-8	ND
S506	2	56
	6-6.5	23
	8.2-8.7	2.8
	10.5-11	1.1
	13.5-14	0.14
	16-16.5	4.6
	17.7-18.2	17
S509	4-5	0.33
	6-7	ND
	9-10	0.57
	11-12	ND
	15-15.3	0.26
	15.5-16	0.29
	16-16.5	0.51
	16.5-17	0.30
	17-17.5	0.22
	17.5-18	0.18
	18-18.5	ND
	18.5-19	0.12
	19-19.5	0.13
S528	1-2	63

[a] Aroclor 1260

[b] ND = < 0.10 ppm

Table C-2-6. Area II and III Soil Analysis on Selected Depths

Depth (in Feet)	Total Solids (percent)	Moisture (percent)	Freon Extractables mg/kg	Freon Extractables percent
Trench 1				
0.5	95.2	4.8	715	0.07
1.5	91.0	9.0	42030	4.2
3.0	85.4	14.6	51020	5.10
4.0	87.4	12.6	2420	0.24
7.0	90.1	9.9	1580	0.16
10.0	92.3	7.7	1385	0.14
11.5	87.8	12.2	1150	0.11
16.0	85.1	14.9	3780	0.38
17.0	90.4	9.6	2230	0.22
Trench 2				
0.5	94.3	5.7	5465	0.55
1.1	91.0	9.0	2700	0.27
3.0	82.8	17.2	20	0.002
3.75	81.7	18.3	< 7	----
4.5	87.8	12.2	< 6.3	----
5.5	90.2	9.8	< 6.5	----
10	90.5	9.5	69	0.007
Soil Boring S506				
2.0	89.8	10.2	6525	0.65
6.0-6.5	88.9	11.1	5260	0.53
8.0-8.5	88.8	11.2	2275	0.23
10.6-11.0	86.5	13.5	1045	0.10
13.6-14.0	82.4	17.6	180	0.02
16.0-16.5	82.4	17.6	3425	0.34
17.5-18.0	89.4	10.6	8495	0.85

[a] Aroclor 1260

Table C-2-7. Area II and III Surface Soil Grab Samples

Sample No.	PCB ppm[a]
G1	63
G2	126
G3	42
G4	148
G5	0.12
G6	0.43
G7	ND[b]
G8	0.11
G9	0.63

[a] Aroclor 1260

[b] ND = < 0.10 ppm

Table C-2-8. Quality Control Data

Soil Boring No.	Depth (in feet)	Analysis I ppm [a]	Analysis II ppm [a]	Mean ppm
Area I Duplicate Analyses				
S5	0-1	220	220	220
S7	0-1	1.6	1.5	1.6
S10	0-1	47	40	44
S24	0-1	5.0	4.3	4.7
S25	0-1	5.2	4.5	4.9
S34	0-1	5.0	4.3	4.7
S35	0-1	220	200	210
S40	0-1	94	95	94
S44	0-1	2.6	2.5	2.6
S45	0-1	140	120	130
Area II Duplicate Analysis				
Trench 2	0.5	1900	1900	1900
S2	5-6	3.5	2.6	3.1
S3	0-1	0.65	0.68	0.67
S6	10-11	18	21	20
S13	15-16	12	12	12
S14	5-6	250	250	250
S15	2.5-3	450	430	440
S16	5-6	15	13	14
S18	20-21	0.62	0.59	0.61
S20	0-1	340	340	340
S22	0-1	54	50	52
S26	0-1	2.8	2.3	2.6
S27	0-1	48	42	45
S29	5-6	0.20	0.19	0.20
S30	20-21	2.2	1.7	2.0
S47	15-16	27	29	28
S48	18.5-19	0.36	0.45	0.41
S506	6-6.5	24	21	23
S509	17.5-18	0.19	0.17	0.18
S528	1-2	59	67	63

[a] Aroclor 1260

APPENDIX C-3

PHASE Ib PCB SOIL DATA

Table C-3-1. Summary of PCBs in Subsurface Soil Samples, ppm

Soil boring number	Date collected	Depth interval, feet					
		0-1	5-6	10-11	15-16	20-21	25-26
S601	6-25-80	210	75	N.D.[a]	N.D.	N.D.	N.D.
S602	6-25-80	2,500	140	N.D.	-[b]	-	-
S603	6-25-80	37	N.D.	0.11	-	-	-
S604	6-26-80	3,400	N.D.	-	-	-	-
S605	6-26-80	12	2.8	N.D.	-	-	-
S606	6-26-80	78	N.D.	N.D.	-	-	-
S607	6-26-80	36	8.6	N.D.	-	-	-
S608	6-30-80	29	12	N.D.	-	-	-
S609	6-30-80	55	26	N.D.	N.D.	-	-
S610	6-30-80	360	140	N.D.	-	-	-
S611	7-1-80	64	35	N.D.	0.18	-	-
W612	7-1-80	26[c]	2.8	N.D.	0.26	0.21	0.34
W613	7-2-80	1,300	1,100	1,000	520	850	5,800
W614	7-3-80	47	1.6	-	-	-	-
W615	7-7-80	39	42	7.3	0.38	-	-
W616	7-7-80	3.5	3.1	0.36	-	-	-
W617	7-8-80	30	30	8.8	14	2.1	0.14
W618	7-8-80	-	-	-	-	-	-
W619	7-9-80	23	150	4.2	-	-	-
W620	7-9-80	41	33	17	11	3.6	-
W621	7-10-80	-	-	-	-	-	-
W622	7-10-80	110	13	2.2	0.11	-	-
W623	7-11-80	4.2	0.36	-	-	-	-
W624	7-11-80	6.0	0.44	-	-	-	-
S626	8-7-80	11,000	3,100	6,100	2,600	6,500	5,100[d]

[a]N.D. - not detected.

[b]Dash indicates sample collected but held in storage for possible future analysis for PCBs.

[c]1- to 2-foot interval.

[d]Additional depth intervals of 30-31, 35-36, 40-41, and 45-46 had soil PCBs of 1,500, 710, 75, and 210 ppm, respectively.

Table C-3-2. Summary of PCB Analyses on Soil Samples During Multi-Cased Well Construction

Depth interval, feet	PCB, ppm
1-2	55
5-6	30
10-11	0.15
15-16	N.D.
16.5-17	0.22
19-20	5.5
20.5-21.5	5.8
22-23	0.46
23.5-24.5	0.48
30.5-31	10
31-31.5	2.5
31.5-32	1.6
32.5-33	4.1
33-33.5	0.61
33.5-34	N.D.
34.5-35	0.11
35-36	0.12
36.8-37.8	0.4
37.8-38.2	0.11
38.7-39.7	0.10
39.7-40.2	0.23
41-42	0.19
42-42.5	1.8
42.5-43	0.15
43-43.5	6.7
43.5-44	N.D.
44-45	0.16

Table C-3-3. Summary of PCBs in Surface Grab Soil Samples

Grab sample number	PCB, ppm
G101	1.5[a]
G102	0.34
G103	33
G104	0.24
G105	1.6
G106	N.D.
G107	0.15
G108	11
G109	0.15
G110	0.28
G111	N.D.
G112	N.D.
G113	29
G114	78
G115	0.16
G116	2.1
G117	0.84
G118	180(1.9)[b]
G119	120(10)
G120	0.18
G121	56(8.8)
G122	17(4.0)
G123	17(14)

[a]Represents soil sample collected from surface to 1-foot depth.

[b]Represents soil sample collected from 1- to 2-foot depth.

Note: N.D. - not detected.

Table C-3-4. Quality Control PCB Analyses

Soil sample number	PCB analysis, ppm		
	Run 1	Run 2	Average
S601	220	190	210
S604	3,400	3,300	3,400
G103	33	32	33
W615	39	39	39
G119	120	110	120
W625	48	61	55
S610	390	330	360
S611	63	65	6.4
W616	3.4	3.6	3.5
W612	27	25	26
G119	10	10	10
G122	16	18	17
S626	11,000	10,000	11,500

APPENDIX C-4

PHASE II PCB SOIL DATA

MEMORANDUM 672-33

March 30, 1981

TO: RICH SHERIDAN

FROM: STEVEN FISHER

SUBJECT: GENERAL ELECTRIC SOIL BORINGS
TRANSMITTAL OF RESULTS

Boring No.	Sample (feet)	Date Collected	Aroclor 1260 Results ppm
S701	* 0-1	2-17-81	33
	* 5-6	"	27
	*10-11	"	3.0
	15-16	"	ND
S702	* 0-1	2-18-81	2500
	* 5-6	"	640
	*10-11	"	.10
	15-16	"	ND
W731	* 0-1	"	1.5
	* 5-6	"	.55
	*10-11	"	.05
	15-16	"	ND
S704	* 0-1	2-19-81	1900
	* 5-6	"	110
	*10-11	"	3.4
	15-16	"	.07
	20-21	"	.09
	25-26	"	ND
S703	* 0-1	2-20-81	840
	* 5-6	"	3.5
	*10-11	"	ND
S705	* 0-1	"	25
	* 5-6	"	ND
	*10-11	"	.06
	15-16	"	ND
S706	* 5-6	2-23-81	2.7
	*10-11	"	ND
W732	0-1	"	.54
	5-6	"	.06
	10-11	"	ND

Rich Sheridan
March 30, 1981
Page two

Boring No.	Sample (feet)	Date Collected	Aroclor 1260 Results ppm
S711	0-1	2-24-81	21
	5-6	"	1.0
	10-11	"	.17
	15-16	"	.05
	20-21	"	ND
W756A	0-1	2-25-81	5.8
	5-6	"	1.1
	10-11	"	.05
	15-16	"	.14
	20-21	"	ND
	25-26	"	.05
W791	0-1	3-02-81	83
	5-6	"	5.1
	10-11	"	.06**
	15-16	"	.05**
	20-21	"	ND
	25-26	"	ND
	26-27	3-13-81	.12
	29-30	"	ND
	32-33	"	.05
	35-36	"	ND
	36-37	"	ND
	38-39	"	ND
W757A	0-1	3-02-81	9.7
	5-6	"	.59
	10-11	"	ND
	15-16	"	ND
	20-21	"	ND
	21-22	"	.05
	25-26	"	ND
S710	0-1	3-03-81	24
	5-6	"	3.4
	10-11	"	.05
	15-16	"	.25
	16-17	"	.35
	17-18	"	.15
	20-21	"	.05
	25-26	"	1.1
	26-27	"	ND
S709	0-1	3-05-81	25
	5-6	"	.05
	10-11	"	.05
	15-16	"	ND
	20-21	"	.05
	25-26	"	.12

Rich Sheridan
March 30, 1981
Page three

Boring No.	Sample (feet)	Date Collected	Aroclor 1260 Results ppm
W736	0-1	3-05-81	510
	5-6	"	11
	10-11	"	.15
	15-16	"	.15
	20-21	"	1.1
	21.5-22.5	"	1.8
	23-24	"	.30
	25-26	"	.05
W792	1-2	3-06-81	5500
	5-6	"	4600
	10-11	"	4600
	11.5-12.5	"	3800
	15-16	"	900
	20-21	"	1400
	25-26	"	1100
	26.5-27.5	"	2.2
	27-28	3-14-81	11
	30-31	"	890
	33-34	"	500
	36-37	"	210
W735	1-2	3-06-81	10
	5-6	"	24
	10-11	"	.17
	15-16	"	.30
	21.5-22.5	"	.13
	25-26	"	.91
W753A	0-1	3-09-81	ND
	5-6	"	ND
	10-11	"	ND
W752A	0-1	"	2.0
	5-6	"	ND
	10-11	"	ND
W751A	0-1	3-10-81	.44
	5-6	"	ND
	10-11	"	ND
W758A	0-1	"	42
	5-6	"	.38
	10-11	"	ND
	15-16	"	ND
W741	1-2	3-11-81	.07
	5-6	"	ND
	10-11	"	ND
	15-16	"	ND
	20-21	"	ND
	25-26	"	ND

Boring No.	Sample (feet)	Date Collected	Aroclor 1260 Results ppm
W755A	0-1	3-12-81	1.4
	5-6	"	.94
	6-7	"	ND
	10-11	"	ND

* Reported previously
** Possibly contaminated in the field

MEMORANDUM

April 28, 1981

673-33

TO: BRIAN BRACKEN

FROM: EDWARD WILSON

SUBJECT: GENERAL ELECTRIC SOIL BORINGS
TRANSMITTAL OF RESULTS

Boring No.	Sample (feet)	Date Collected	Aroclor 1260 Results (ppm)
W754A	0-1	3/14/81	0.22
	5-6	3/14/81	0.25
	11-12	3/14/81	None Detected
W757B	25-26	3/16/81	None Detected
	30-31	3/16/81	0.05
	35-36	3/16/81	0.12
	40-41	3/16/81	None Detected
	45-46	3/16/81	None Detected
	50-51	3/16/81	None Detected
S724	0-1	3/03/81	0.13
	5-6	3/03/81	0.30
	10-11	3/03/81	4.6
	10-11	(jar sample) 3/19/81	0.33
	15-16	(core sample) 3/19/81	None Detected
	20-21	3/19/81	1.5
	25-26	3/19/81	0.19
S725	0-1	3/19/81	0.69
	5-6	3/19/81	2.1
	10-11	3/19/81	0.40
	15-16	3/19/81	0.21
	20-21	3/19/81	0.10
	25-26	3/19/81	None Detected
S722	0.5-1.5	3/20/81	0.20
	5-6	3/20/81	None Detected
	10-11	3/20/81	None Detected
	15-16	3/20/81	None Detected
	20-21	3/20/81	None Detected
	25-26	3/20/81	None Detected
W755B	25-26	3/23/81	None Detected
	30-31	3/23/81	None Detected
	35-36	3/23/81	None Detected
	45-46	3/23/81	None Detected

Boring No.	Sample (feet)	Date Collected	Aroclor 1260 Results (ppm)
W755B	46.5-47.5	3/23/81	None Detected
	50-51	3/23/81	None Detected
S723	0-1	3/26/81	3.0
	5-6	3/26/81	0.72
	10-11	3/26/81	0.41
	15-16	3/26/81	None Detected
	20-21	3/26/81	None Detected
	25-26	3/26/81	None Detected
W792	36-37	3/27/81[a]	0.67
	39-40	3/27/81	0.99
	42-43	3/27/81	None Detected
W751B	30-31	3/30/81	None Detected
	35-36	3/30/81	None Detected
	40-41	3/30/81	None Detected
W758B	30-31	3/31/81	None Detected
	31.5-32.5	3/31/81	None Detected
	33-34	3/31/81	None Detected
W793	55.5-56.5	4/06/81	None Detected
	58.5-59.5	4/06/81	None Detected
	61.5-62.5	4/09/81	None Detected
	64.5-65.5	4/09/81	None Detected
	67-68	4/09/81	None Detected
W756B	25-26	4/02/81	0.08
	30-31	4/02/81	0.05
	35-36	4/02/81	0.05
	40-41	4/02/81	None Detected
W752B	25-26	4/08/81	None Detected
	30-31	4/08/81	None Detected
	35-36	4/08/81	None Detected
	41.5-42.5	4/08/81	None Detected
	51-52	4/08/81	None Detected
	55-56	4/08/81	None Detected
S721	0.5-1.5	4/10/81	0.05
	5-6	4/10/81	38
	10-11	4/10/81	0.05
	15-16	4/10/81	None Detected
S712	2.5-3.5	4/13/81	120
	5.5-6.5	4/13/81	20
	10-11	4/13/81	31
	11.5-12.5	4/13/81	0.29
	15-16	4/13/81	1.9
	20-21	4/13/81	None Detected

a) Grout plug below Casing #1

Boring No.	Sample (feet)	Date Collected	Aroclor 1260 Results (ppm)
S712	21.5-22.5	4/13/81	0.77
	23-24	4/13/81	None Detected
	25-26	4/13/81	1.6
W754B	25-26	4/14/81	None Detected
	30-31	4/14/81	None Detected
	35-36	4/14/81	None Detected
S708	0-1	4/14/81	0.23
	5-6	4/14/81	None Detected
	10-11	4/14/81	None Detected
S707	0-1	4/15/81	0.44
	5-6	4/15/81	None Detected
	10-11	4/15/81	None Detected
W734	0-1	4/15/81	0.83
	5-6	4/15/81	None Detected
	10-11	4/15/81	0.13
	15-16	4/15/81	0.78
W753B	25-26	4/16/81	None Detected
	30-31	4/16/81	None Detected
	35-36	4/16/81	None Detected
S713	0-1	4/16/81	0.16
	2-3	4/16/81	2.8
	5-6	4/16/81	None Detected
	10-11	4/16/81	None Detected
	15-16	4/16/81	None Detected
	20-21	4/16/81	None Detected
	24-25	4/16/81	None Detected
W733	3-4	4/17/81	None Detected
	5-6	4/17/81	None Detected
	10-11	4/17/81	None Detected

Aroclors 1016 through 1262 would have been reported they appeared at or above the detection limit of 0.05 ppm.

Reported by:_____

Edward Wilson
Laboratory Director

BROWN AND CALDWELL
CONSULTING ENGINEERS

ENVIRONMENTAL SCIENCES DIVISION

D. H. CALDWELL, PE Chairman
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S. A. FISHER

May 14, 1981

Mr. Brian Bracken
Brown and Caldwell
1501 North Broadway
Walnut Creek, CA 94596

Job #673-33

POLYCHLORINATED BIPHENYLS ANALYSIS OF SOILS

Boring No.	Sample Depth (feet)	Date Collected	Aroclor 1260 Results (ppm)
W734	20-21	4/15/81	0.06
W734	25-26	4/15/81	1.2

Aroclors 1016 through 1262 would have been reported had they appeared at or above the detection limit of 0.05 ppm.

Reported by:_____
Edward Wilson
Laboratory Director

APPENDIX C-5

PCB ANALYSES OF DRUMS

PHASE IB
PCB DRUM SAMPLE ANALYSES

Drum No.	Date Sampled	Fluid	PCB (Aroclor 1260)
1	9/11/80	Water	8.5 ppb
2	9/11/80	Water	0.50 ppb
3	9/11/80	Water	0.64 ppb
4	9/11/80	Water	0.69 ppb
5	9/11/80	Water	2.7 ppb
6	9/11/80	Water	0.79 ppb
7	9/11/80	Water	62 ppb
8	9/11/80	Water	N.D.
9	9/11/80	Water	3.8 ppb
10	9/11/80	Water	0.61 ppb
11	9/11/80	Water	5.4 ppb
12	9/11/80	Water	6.7 ppb
13	9/11/80	Water	N.D.
14	9/11/80	Water	Broken in lab
15	9/11/80	Water	2.8 ppb
16	9/11/80	Water	N.D.
17		Water	
18	9/11/80	Mud	16 ppm
19	9/12/80	Mud	1.2 ppm
20	9/12/80	Mud	1.2 ppm
21	9/12/80	Mud	2.4 ppm
22	9/12/80	Mud	3.5 ppm
23	9/12/80	Mud	5.4 ppm
24	9/12/80	Mud	5.8 ppm
25	9/12/80	Mud	7.5 ppm
26	9/12/80	Mud	8.7 ppm
27	9/12/80	Mud	7.5 ppm
28	9/12/80	Mud	7.7 ppm
29	9/12/80	Mud	2.4 ppm
30	9/12/80	Mud	6.8 ppm
31	9/12/80	Mud	11 ppm
32	9/12/80	Mud	570 ppb
33	9/12/80	Mud	2.8 ppm
34	9/12/80	Mud	8.6 ppm
35	9/15/80	Mud	
36	9/15/80	Mud	0.22 ppm
37	9/15/80	Mud	0.22 ppm
38	9/15/80	Mud	6.6 ppm
39	9/15/80	Mud	22 ppm
40	9/15/80	Mud	3.5 ppm
41	9/15/80	Mud	5.3 ppm
42	9/15/80	Mud	5.1 ppm
43	9/15/80	Mud	4.8 ppm
44	9/15/80	Mud	1.3 ppm
45	9/15/80	Mud	3.6 ppm

PHASE IB
PCB DRUM SAMPLE ANALYSES

Drum No.	Date Sampled	Fluid	PCB (Aroclor 1260)
46	9/15/80	Mud	0.11 ppm
47	9/15/80	Mud	ppm
48	9/15/80	Mud	6.1 ppm
49	9/15/80	Mud	0.50 ppm
50	9/15/80	Mud	0.35 ppm
51	9/15/80	Mud	0.36 ppm
52	9/15/80	Mud	
53	9/15/80	Mud	2.7 ppm
54	9/16/80	Mud	0.26 ppm
55	9/16/80	Mud	0.48 ppm
56	9/16/80	Mud	4.0 ppm
57	9/16/80	Mud	3.0 ppm
58		Mud	
59		Mud	
60		Mud	
61		Mud	
Resamples			
14	9/16/80	Mud	N.D.
35	9/16/80	Mud	5.5 ppm
47	9/16/80	Mud	10 ppm
52	9/16/80	Mud	N.D.

MEMORANDUM

March 30, 1981

TO: RICH SHERIDAN

FROM: STEVEN FISHER

SUBJECT: GENERAL ELECTRIC DRUM SAMPLES
TRANSMITTAL OF RESULTS

Drum No.	Date Sampled Sample Description/Identification	Aroclor 1260 Results ppm
701	3-10-81	12
702	Drilling mud and cuttings from W791	3.4
703	"	3.4
704	"	2.6
705	"	3.6
706	"	3.2
707	"	3.3
708	"	3.4
709	"	3.2
710	"	3.2
711	3-11-81	3.4
712	"	2.9
713	"	3.2
714	"	3.4
715	"	3.5
716	"	3.8
717	"	4.7
718	"	3.0
719	3-12-81	8100
720	Mud from reaming to 25 foot surface	3900
721	Casing #1, W792	3300
722	"	3200
723	"	3000
724	"	2800
725	"	2400
726	"	2600
727	"	2500
728	"	2600
729	"	2600
730	"	2400
731	"	2400
732	"	2600
733	"	2600
734	"	2500

SAF:mh

cc: GE Oakland, Karl Lathrop

MEMORANDUM

April 14, 1981

TO: BRIAN BRACKEN

FROM: EDWARD WILSON

SUBJECT: GENERAL ELECTRIC DRUM SAMPLES
TRANSMITTAL OF RESULTS

Drum No.	Date Sampled Sample Description/Identification	Aroclor 1260 Results (ppm)
735	3/12/81	2800
736	Mud from reaming to 25' Surface casing #1	2200
737	Well 792	1900
738	"	2200
739	"	3300
740	3/16/81	22
741	Well 791 Reaming and Setting Surface	2.9
742	Casing #2 to 32' Drill 25 to 32'	3.3
743	"	1.8
744	"	3.5
745	"	6.9
746	"	2.5
747	3/18/81	210
748	Well 792 Reaming and Setting Surface	220
749	Surface Casing #2 Drill 25-35'	240
750	"	210
751	"	160
752	"	160
753	"	140
754	Well #792 - Reaming from 25 to 35'	100
755	Excess near Surface Soil from Installing Mud sump	(No Sample)
756	Well #793 - Reaming from 0 to 35'	370
757	"	350
758	"	340
759	"	370
760	"	300
761	"	270
762	"	290
763	"	250
764	"	250

Drum No.	Date Sampled Sample Description/Identification	Aroclor 1260 Results (ppm)
765	Well #793 - Reaming from 0 to 35'	220
766	"	230
767	"	170
768	Well #793 - Reaming & Casing #1 0-35' 3/26/81	140
769	"	130
770	"	130
771	"	140
772	"	130
773	"	120
774	"	100
775	"	75
776	"	89
777	"	100
778	"	83
779	"	200
780	Well #793 - Second Casing 3/31/81	0.97
781	"	0.62
782	"	0.29
783	"	0.35
784	"	0.29
785	"	0.21
786	"	0.33
787	"	0.56
788	"	0.41

EEW:tld

cc: GE Oakland, Karl Lathrop

APPENDIX C-6

PCB CONCENTRATION OF SITE SUMPS

BROWN AND CALDWELL
CONSULTING ENGINEERS

ENVIRONMENTAL SCIENCES DIVISION

D H CALDWELL PE Chairman
T V LUTGE PE President
L B DUNLAP PE Exec Vice Pres
R C ABERLEY PE Vice Pres
S A FISHER Vice Pres

April 16, 1981

Mr. Brian Bracken
Brown and Caldwell
1501 North Broadway
Walnut Creek, CA 94596

POLYCHLORINATED BIPHENYLS ANALYSIS - JOB #672-33

Date Sampled: 4/9/81
Date Received: 4/9/81

Log No.	Sample Description/Identification	Aroclor 1260 Results
31C1	Sump #1; Water Sample	5.0 µg/L
31C2	Sump #2; Water Sample	180 µg/L
31C3	Sump #3; Water Sample	1.9 µg/L
31C4	Sump #4; Water Sample	1.3 µg/L
31C5	Sump #1; Sediment Sample	62 ppm
31C6	Sump #2; Sediment Sample includes an oil layer	44 ppm
31C7	Sump #3; Sediment Sample	7.7 ppm
31C8	Sump #4; Sediment Sample	6.8 ppm

Aroclors 1016 through 1262 would have been reported had they appeared at or above the detection limits as indicated below:

31C1 - 31C4 = 0.70 µg/L
31C5 = 0.10 ppm
31C6 - 31C8 = 0.05 ppm

Reported by: _____
Edward Wilson
Laboratory Director

APPENDIX D

WELL DEVELOPMENT AND TESTING RESULTS

APPENDIX D-1

WELL DEVELOPMENT PROCEDURE

APPENDIX D-1

WELL DEVELOPMENT PROCEDURE

All monitor wells were developed prior to sampling to ensure that fluid samples were representative of the groundwater. Development consisted of pumping the wells with an ISCO Model 1680 automatic water sampler unless the water level was deeper than 25 feet. For these deep wells, development was done manually by bailing. Development was done on each well until either the fluids removed were sediment-free or until the water level was drawn to the bottom of the well. This procedure was done several times until enough fluid was removed to equal approximately five times the volume of the water in the well at the beginning of development. All fluids were collected in 55-gallon drums for proper disposal.

Data recorded during well development included location, date, time, depth to water before and after development, volume removed, and observations of color, odor, and turbidity. Well development data are shown in Appendix D-3.

APPENDIX D-2

FLUID SAMPLING PROCEDURE

APPENDIX D-2

FLUID SAMPLING PROCEDURE

After thorough well development, fluid samples were collected for analyses of PCBs, oil and grease by the Freon extractable method, and total suspended solids. Two sampling methods were generally used. For wells with water levels less than 25 feet below ground surface, a peristaltic pump was used; and for deeper wells, samples were manually collected by bailing.

An ISCO Model 1680 automatic sampler pump was used for the pumped samples. To avoid possible cross-contamination between wells, individual teflon tubes were used and left in each well. In addition, the pump was used to evacuate the air in a sample bottle so that no fluids entered the pump itself.

Methanol-rinsed stainless steel bailers were used to sample the deep wells. The bailers were emptied directly into the sample bottles.

Data recorded during well sampling was identical to that collected during well development and is included in Appendix D-3. Any excess water was collected in 55-gallon drums for proper disposal.

Fluid samples for volatile organics analyses were collected only by bailing. Each bailer was tap-water washed, methanol-rinsed, and distilled-water rinsed before use. After mixing the well water, two samples were collected; the first sample was discarded, and the second sample was emptied into a hexane-rinsed bottle. Care was taken to ensure that no air was entrapped with the sample.

APPENDIX D-3

WELL DEVELOPMENT LOGS

WELL MONITORING DATA

W731

Well No.	Date/ Time	Bailed By	Volume Removed	Water Level Start	Water Level Finish	Observations
731	3-9-81 0900	D. Erikson	10 gals	12'3"	14'10"	Used Isco to pump.
731	3-17-81 1530	C. Reddy	10 gals	9'4"	12'7"	Clear water.
731	4-2-81 1030	M. Manson	3.5gals	8'9"	9'5"	Well Sample Collected Used Isco for sampling.

WELL MONITORING DATA

W732

Well No.	Date/ Time	Bailed By	Volume Removed	Water Level Start	Water Level Finish	Observations
732	3-9-81 1000	M. Manson	10gals.	13'3"	24'5½"	Used Isco to pump.
732	3-17-81 1430	C. Reddy	10gals.	12'3½"	19'2"	
732	4-2-81 1100	M. Manson	0.5gals.	10'2½"	10'8"	Well Sample Collected Used Isco for sampling.

WELL MONITORING DATA

W733

Well No.	Date/ Time	Bailed By	Volume Removed	Water Level Start	Water Level Finish	Observations
733	4-24-81 1130	M. Manson	8 gals.	12'5"	13'0½"	Sand and mud in first 3 gallons; Clear for last 3 gallons. Recovery rate=no change/10min.
						Samples collected. Used Isco to pump and sample.

WELL MONITORING DATA

W734

Well No.	Date/ Time	Bailed By	Volume Removed	Water Level Start	Water Level Finish	Observations
734	4-24-81 1030	M. - Manson	5 gals.	12'9"	20'6"	Sand and mud in first 2 gallons. Last 3 gallons clear. Recovery rate=3'6"/10min. Samples coll.
						Used Isco to pump and sample.

WELL MONITORING DATA

W735

Well No.	Date/ Time	Bailed By	Volume Removed	Water Level Start	Water Level Finish	Observations
735	3-23-81 1130	M. Manson	9 gals.	14'3"	26'5"	Used Isco to pump. Last 5 gallons clear.
735	4-2-81 1500	M. Manson	5 gals.	13'3"	24'3"	Clear water. Low level.
735	4-3-81 1030	M. Manson	0.5gals.	14'2½"	16'5½"	Used Isco for sampling. Well sample collected.
735	4-29-81	P. Arndt	----	----	-----	Oil droplets observed on Teflon tubing when setting up aquifer test.

WELL MONITORING DATA

W736

Well No.	Date/ Time	Bailed By	Volume Removed	Water Level Start	Water Level Finish	Observations
736	3-23-81 1500	C. Reddy	3 gals.	20'3"	25'0"	Note low water level;unable to pump past 25 foot level.
736	3-24-81 1000	M. Manson	1 gal.	23'6½"	25'0"	Note low level.
736	4-29-81 1530	M. Manson	3.5gals.	19'10"	24'8"	Pumped till level was too low.
736	4-30-81 1430	M. Manson	2.5gals.	23'2"	26'2"	Pumped dry.
736	5-1-81 1030	M. Manson	.25gal.	24'10"	26'2"	Sample collected with bailer; must return after recharge to complete sample volume.
736	5-1-81 1400	M. Manson	.10gal.	25'5"	26'2"	Slow recharge rate; must return after recharge again.
736	5-1-81 1600	M. Manson	.10gal.	25'8"	26'2"	Well sampling completed.

WELL MONITORING DATA

W741

ll No.	Date/ Time	Bailed By	Volume Removed	Water Level Start	Water Level Finish	Observations
741	3-24-81 1130	M. Manson	7 gals.	13'11"	19'2"	Very muddy water. Used Isco to pump.
741	3-26-81 0930	M. Manson	10 gals.	13'8"	15'0"	Last 2 gallons clear.
741	4-3-81 1100	M. Manson	5 gals.	13'3"	15'0"	Used Isco for sampling. Clear water. Well sample collecte

WELL MONITORING DATA

W751A

Well No.	Date/ Time	Bailed By	Volume Removed	Water Level Start	Water Level Finish	Observations
751A	3-11-81 1330	M. Manson	10gals.	10'2"	19'4½"	Used Isco to pump. Last 7 Gallons clear.
751A	4-6-81 1530	M. Manson	10gals.	8'0"	11'8"	Used Isco for Sampling. Well sample collected.

WELL MONITORING DATA
W 751B

Well No.	Date/ Time	Bailed By	Volume Removed	Water Level Start	Water Level Finish	Observations
751B	4-20-81 1400	M. Manson	3 gals.	19'8"	30'0"	Used bailer; very thick mud removed, note low level.
751B	4-21-81 1000	M. Manson	½gal. 4gals.	19'11"	36'4"	Low level prohibits pumping; only ½gal. removed with pump.
751B	4-27-81 1530	M. Manson	5gals.	19'8"	37'2"	Used bailer, muddy water, slow recovery rate.
751B	4-30-81 1300	M. Manson	5gals.	19'10"	39'8"	Pumped 0.5gal.; bailed 4.5gals. Water clearer, ready to sample.
751B	5-1-81 0900	M. Manson	0.5gal.	20'0"	25'6"	Unable to pump sample(low level) used bailer. Sample collected.

WELL MONITORING DATA

W 752A

Well No.	Date/ Time	Bailed By	Volume Removed	Water Level Start	Water Level Finish	Observations
752A	3-16-81 1500	M. Manson	10 gals.	12'0"	13'0"	Used Isco to pump. Last 5 gallons clear.
752A	4-6-81 1000	M. Manson	10 gals.	10'0"	11'3½"	Used Isco for sampling. Well sample collected.
752A	4-22-81 1000	M. Manson	10 gals.	11'9"	12'1"	Using Isco, removed 10 gals. for Pilot Plant Test.
752A	4-27-81 0900	M. Manson	10 gals.	11'10"	12'8"	Also for Pilot Plant Test, Pumped using Isco Sampler.
752A	4-29-81 0900	M. Manson	18 gals.	11'8"	16'1½"	For Pilot Plant Test; pumped using new electric pump, rate of flow about 20gals/30minutes.
752A	4-29-81 1200	M. Manson	100 gals.	12'4"	19'9"	Used new electric pump, into 55 gallon barrels for test.
752A	4-30-81 0900	M. Manson	135 gals.	11'8"	23'6"	Collected the rest of the sample for Pilot Plant Test.
752A	5-4-81 0900	M. Manson	220gals.	15'6"	23'2"	Water level taken after priming pump; sample for Pilot Plant.
752A	5-4-81 1500	M. Manson	110gals.	---	---	Did not take water level. Additional sample water for test.
752A	5-5-81 0730	M. Manson	110gals.	12'1"	23'8"	Completion of Pilot Plant Sample.

WELL MONITORING DATA

W 752B

Well No.	Date/ Time	Bailed By	Volume Removed	Water Level Start	Water Level Finish	Observations
752B	4-15-81 1000	M. Manson	11gals.	14'2½"	25'2"	Very muddy water; bailed first 6 gallons; did not clear.
752B	4-15-81 1300	M. Manson	5gals.	13'6"	16'9"	Muddy for first gallon; last 4 gallons murky water.
752B	4-17-81 1130	M. Manson	10gals.	11'9"	16'6"	Muddy for 3 galloms; last 7 gallons clear; samples collected ~~using Isco sampler.~~

WELL MONITORING DATA
W753A

Well No.	Date/ Time	Bailed By	Volume Removed	Water Level Start	Water Level Finish	Observations
753A	3-9-81 1400	M. Manson	7.6gals.	16'4½"	26'2½"	Used Isco to pump. Last 5 gallons clear.
753A	4-6-81 1400	M. Manson	5gals.	9'10"	20'1"	Used Isco for sampling. Well Sample collected.

WELL MONITORING DATA

W 753B

Well No.	Date/ Time	Bailed By	Volume Removed	Water Level Start	Water Level Finish	Observations
753B	4-29-81 1430	M. Manson	5 gals.	17'5"	36'6"	Very thick mud removed with bailer. Note low level.
753B	4-30-81 1500	M. Manson	9 gals.	13'10"	54'9"	Thick mud, bailed till well almost empty, allow to recharge.
753B	5-1-81 0930	M. Manson	10 gals.	12'6"	17'4½"	Pumped 9.5 gallons, last 2 gals. clear; Sample collected w/Isco.

WELL MONITORING DATA

W 754A

Well No.	Date/ Time	Bailed By	Volume Removed	Water Level Start	Water Level Finish	Observations
754A	4-21-81 1330	M. Manson	10 gals.	12'4"	20'10"	Mud and sand for first 5 gallons; clear for last 5 gallons. Used Isco to pump.
754A	4-22-81 1400	M. Manson	8 gals.	14'11"	17'11"	Sand and mud for 2 gallons; last 3 gallons clear water.
754A	4-23-81 1030	M. Manson	2.5gals.	14'0"	19'8"	Clear but cloudy water removed. Samples collected; used Isco.

WELL MONITORING DATA

W 754B

Well No.	Date/ Time	Bailed By	Volume Removed	Water Level Start	Water Level Finish	Observations
754B	4-23-81 1100	M. Manson	15gals.	15'1"	15' 5"	Very thick, sand and mud; bailed first 5 gals. Used Isco to pump last 10 gals.
754B	4-23-81 1400	M. Manson	8 gals.	15'4"	15'1"	Samples collected, used Isco. Clear for last 5 gallons.

WELL MONITORING DATA

W755A

Well No.	Date/ Time	Bailed By	Volume Removed	Water Level Start	Water Level Finish	Observations
755A	3-26-81 1330	M. Manson	10 gals	13'0½"	17'10"	Used Isco to pump. Last 2 gallons clear.
755A	4-3-81 1200	M. Manson	10 gals	12'5"	16'2"	Used Isco for sampling. Well sample collected.

WELL MONITORING DATA

W755B

Well No.	Date/ Time	Bailed By	Volume Removed	Water Level Start	Water Level Finish	Observations
755B	3-30-81 1100	M. Manson	(none)	20'10"	20'10"	Unable to pump any water.
755B	4-20-81 0900	M. Manson	25gals.	14'2"	15'0"	First 15 gallons muddy water; last 10 gals. clear. Samples collected. Used bailer, then pumped last 15 gals.

WELL MONITORING DATA

W 756A

Well No.	Date/ Time	Bailed By	Volume Removed	Water Level Start	Water Level Finish	Observations
756A	2-27-81 1500	P.Arndt	5 gals.	15'11"	17'3"	Used Isco to pump.
756A	3-11-81 1530	MManson	3.5 gals.	15'7½"	19'10"	
756A	3-16-81 1300	M.Manson	10 gals.	14'10"	17'4"	Last 7 gallons clear.
756A	4-6-81 1100	M.Manson	.5gals.	12'8"	15'0"	Sampled with Isco. Well Sample Collected

WELL MONITORING DATA
W 756B

Well No.	Date/ Time	Bailed By	Volume Removed	Water Level Start	Water Level Finish	Observations
756B	4-9-81 1130	M. Manson	10 gals.	13'7"	(no meas.)	Sounder unavailable; well very muddy, need to use bailer.
756B	4-14-81 1400	M. Manson	3 gals.	(No meas)	14'2"	Still very thick mud. Bailer used.
756B	4-16-81 1100	M. Manson	15 gals.	12'10½"	13'2"	Used Isco to pump. Last 7 gallons clear water.
756B	4-17-81 1000	M. Manson	10 gals.	12'5"	12'9"	Last 5 gallons clear; Samples collected. Used Isco.

WELL MONITORING DATA

W757A

Well No.	Date/ Time	Bailed By	Volume Removed	Water Level Start	Water Level Finish	Observations
757A	3-11-81 1430	M. Manson	5 gals.	7'3½"	17'8½"	Very thick mud. Used Isco to pump.
757A	3-17-81 0930	M. Manson	9 gals.	14'8"	18'9"	Last 4 gallons clear
757A	4-2-81 1430	M. Manson	10gals.	12'7"	12'10"	Used Isco for sampling. Last 8 gallons clear. Well sample collected.

WELL MONITORING DATA
W757B

Well No.	Date/ Time	Bailed By	Volume Removed	Water Level Start	Water Level Finish	Observations
757B	3-27-81 1430	M. Manson	6 gals.	15'7"	15'0"	Used Isco to pump. Very muddy water.
757B	3-30-81 0930	M. Manson	10 gals.	14'2"	14'2"	Did not clear.
757B	4-3-81 1400	M. Manson	5 gals.	14'0"	14'0"	Last 4 gallons clear.
757B	4-6-81 1100	M. Manson	0.5gal.	14'0½"	14'1"	Used Isco for sampling. Well sample collected.

WELL MONITORING DATA

W758A

Well No.	Date/ Time	Bailed By	Volume Removed	Water Level Start	Water Level Finish	Observations
758A	3-24-81 1030	M. Manson	(none)	26'1"	26'2½"	Note low water level; unable to pump past 25 foot level.
758A	4-30-81 1430	M. Manson	.25 gal.	24'10"	25'10"	This well is essentially dry; unable to develop. Sampling begins; well emptied once.
758A	5-1-81 1100	M. Manson	.25gal.	25'0"	25'10"	Sample collected, unable to complete without recharging.
758A	5-1-81 1400	M. Manson	.10gal.	25'8"	25'10"	Slow recharge rate, difficulty in completing sampling.
758A	5-1-81 1600	M. Manson	(none)	25'10"	25'10"	Well is dry, unable to complete sample; partial sample collected.

WELL MONITORING DATA
W 758B

Well No.	Date/ Time	Bailed By	Volume Removed	Water Level Start	Water Level Finish	Observations
758B	4-10-81 1000	M. Manson	40 gals.	45'0"	45'0"	Used bailer; very muddy, sandy; hard to remove mud.
758B	4-13-81 1000	M. Manson	40 gals.	45'0"	45'0"	Still lots of mud; note that no Teflon tube is installed.
758B	4-28-81 1100	M. Manson	1 gal.	45'0"	45'0"	Sample collected with bailer. Note: Still no Teflon sample tube installed.

WELL MONITORING DATA

W 791

Well No.	Date/ Time	Bailed By	Volume Removed	Water Level Start	Water Level Finish	Observations
791	3-30-81 1400	M. Manson	15 gals.	10'4"	11'10"	Used Isco to pump. Last 5 gallons clear.
791	4-8-81 1500	M. Manson	5 gals.	12'0"	12'4"	Used Isco for sampling. Well sample collected.

WELL MONITORING DATA

W 792

Well No.	Date/ Time	Bailed By	Volume Removed	Water Level Start	Water Level Finish	Observations
792	4-28-81 1200	M. Manson	1 gal.	15'6"	21'4"	Pumped only 1 gallon, very thick mud, prohibits pumping.
792	4-28-81 1400	M. Manson	2 gals.	21'4"	29'10" (29'6")	Used bailer, sticks on kink at bottom. Recovery=4"/10min.
792	5-5-81 1000	M. Manson	5 gals.	17'4"	42'3"	Used bailer, care taken not to allow bailer to stick. Muddy water removed.
792	5-5-81 1030	M. Manson	-----	---	40'8"	Level Recovery Measurement, in 10 minute increments.
	1040				39'9"	11"/10 minute interval X 6=
	1050				38'10"	Recharge rate= 5'6"/hour End of Recovery Measurement.
792	5-5-81 1110	M. Manson	4 gals.	37'8"	53'2"	Bailed dry, slow recovery rate. Thick mud removed.
792	5-5-81 1230	M. Manson	2 gals.	44'0"	53'2"	Bailed dry.
792	5-5-81 1330	M. Manson	2 gals.	44'2"	53'2"	Bailed dry.
792	5-5-81 1430	M. Manson	2 gals.	46'0"	53'2"	Bailed dry.
792	5-5-81 1530	M. Manson	1 gal.	----	----	Sounder not available. Bailed dry.
792	5-6-81 0900	M. Manson	o.5gal.	16'10"	18'0½"	Collected well sample using Isco sampler method.

WELL MONITORING DATA

W 793

Well No.	Date/ Time	Bailed By	Volume Removed	Water Level Start	Water Level Finish	Observations
793	4-23-81 1000	M. Manson	6 gals.	31'11"	46'2"	Very thick mud; used bailer; note low level.
793	4-28-81 1430	M. Manson	4 gals.	42'7"	44'9"	Still muddy; bailer reaches bottom of well.
793	5-1-81 1430	M. Manson	20 gals.	43'5½"	44'0"	Used bailer, murky water with little mud; Sample collected.

APPENDIX D-4

POINT DILUTION WELL TESTING METHOD

APPENDIX D-4

POINT DILUTION WELL TESTING METHOD

The point dilution well testing method provides an estimate of the average horizontal velocity of the undisturbed groundwater in the soil adjacent to the well casing. The test is performed by isolating a segment of slotted well casing and then quickly introducing a tracer. If the groundwater flow through the soil, gravel pack, and slotted casing is steady (unchanging during the test period), and if the tracer is homogeneously mixed with water in the isolated slotted casing segment at all times, an apparent dilution of the tracer concentration will be observed.[2]

The apparent flow velocity, V_a, of groundwater flowing through the slotted casing can be calculated using the following equation:[9]

$$V_a = -\frac{V}{At} \ln \frac{C}{C_o}$$

V = Volume of the isolated well segment.

A = Vertical cross-sectional area through the center of the isolated well segment.

t = Elapsed time after complete mixing.

C = Tracer concentration at time "t".

C_o = Tracer concentration at time of complete mixing (start of test).

From the apparent flow velocity in the tested well segment, the undisturbed groundwater flow velocity near the well, V_f, can be calculated by:

$$V_f = \frac{V_a}{\alpha}$$

where α is a correction factor. The usual range of α for tests in sand or gravel is from 0.5 to 4.[2]

For this test the specific conductance of the well water was monitored, since it is a measure of the dissolved salt concentration. Potassium chloride, a salt, was used as the tracer

since it is readily soluble in water and because it is commonly used in calibrating conductivity meters. To minimize any apparent dilution due to the sorption of the tracer on soil particles in the well, only sediment-free wells were tested. Therefore, all tested wells were developed prior to testing.

After isolating a 5-foot section of slotted casing screen with flexible rubber washers, a known volume of 0.1N potassium chloride solution was quickly pumped into the top of the isolated well segment. Fluid at the base of the isolated segment was circulated to the top of the segment using an ISCO 1392 automatic sampler pump. Fluid was continuously circulated for at least 30 minutes at the beginning of each test. After that, fluid was circulated for several minutes prior to each conductance measurement. The specific conductance of the fluid was measured using a temperature-compensated YSI-33 conductivity meter. Observations of temperature, conductance, and time elapsed since complete initial mixing were made.

APPENDIX D-5

FIELD DATA FOR POINT DILUTION TESTING

POINT DILUTION TEST
FOR MEASURING GROUNDWATER FLOW

WELL NUMBER: W41 PROJECT: General Electric

DEPTH MONITORED: 14-17 feet JOB NUMBER: 672-32

TRACER TYPE: KCL Potassium Chloride DATE: 5/8/81

CONCENTRATION TRACER: 0.1 N (12,500 µmhos at 25°C)

VOLUME TRACER ADDED: 1.0 L

ANALYTICAL INSTRUMENT USED: YSI-33 Conductivity Meter (temperature-compensated)

PUMP TYPE: ISCO 1392

DATE	TIME	CONDUCTANCE µmhos	TEMPERATURE ° C	COMMENTS
5/8/81	1025	1700	20	Background
5/8/81	1030	----	--	Add Tracer
5/8/81	1036	5300	23	Pumped Continuously
5/8/81	1037	4650	21	Pumped Continuously
5/8/81	1038	4800	21	Pumped Continuously
5/8/81	1039	4600	21	Pumped Continuously
5/8/81	1040 t_o	4650	22	Pumped Continuously
5/8/81	1041	4650	22	Pumped Continuously
5/8/81	1042	4600	22	Pumped Continuously
5/8/81	1043	4600	22	Pumped Continuously
5/8/81	1044	4600	22	Pumped Continuously
5/8/81	1046	4550	22.5	Pumped Continuously
5/8/81	1048	4500	22.5	Pumped Continuously
5/8/81	1051	4450	22.5	Pumped Continuously
5/8/81	1052	4400	23	Pumped Continuously
5/8/81	1055	4350	23	Pumped Continuously
5/8/81	1059	4300	22.5	Stopped Pumping
5/8/81	1116	3700	23	
5/8/81	1125	3650	23	
5/8/81	1155	3300	24	
5/8/81	1200	3250	24	
5/8/81	1232	3000	24	
5/8/81	1300	2900	24	
5/8/81	1342	2800	23.5	
5/8/81	1413	2700	24	
5/8/81	1500	2600	24	
5/8/81	1535	2550	24	
5/8/81	1600	2550	23	
5/8/81	1645	2450	23	End Test

POINT DILUTION TEST
FOR MEASURING GROUNDWATER FLOW

WELL NUMBER: W529 PROJECT: General Electric

DEPTH MONITORED: 20-15 feet JOB NUMBER: 672-32

TRACER TYPE: Potassium Chloride KCl DATE: 5/4/81

CONCENTRATION TRACER: 0.1 N (12,500 μmhos at 25°C)

VOLUME TRACER ADDED: 1.0 L

ANALYTICAL INSTRUMENT USED: YSI - 33 Conductivity Meter (temperature-compensated)

PUMP TYPE: ISCO 1392

DATE	TIME	CONDUCTANCE μmhos	TEMPERATURE ° C	COMMENTS
5/4/81	1053	2500	17	Background
5/4/81	1055	----	17	Add Tracer
5/4/81	1058	3900	17	Pumped Continuously
5/4/81	1059	2750	17	Pumped Continuously
5/4/81	1100	2950	17	Pumped Continuously
5/4/81	1101	3400	17	Pumped Continuously
5/4/81	1102	3900	17	Pumped Continuously
5/4/81	1103	4200	17	Pumped Continuously
5/4/81	1104	4300	17	Pumped Continuously
5/4/81	1105 t_o	4350	17	Pumped Continuously
5/4/81	1106	4300	17	Pumped Continuously
5/4/81	1107	4250	17	Pumped Continuously
5/4/81	1108	4000	17	Pumped Continuously
5/4/81	1109	3800	17	Pumped Continuously
5/4/81	1112	3800	17	Pumped Continuously
5/4/81	1121	3600	17	Pumped Continuously
5/4/81	1124	3600	17	Stopped Pumping
5/4/81	1139	3500	17	
5/4/81	1154	3400	17	
5/4/81	1240	3400	17	
5/4/81	1248	3250	17	
5/4/81	1340	3200	17	
5/4/81	1440	3200	17	
5/4/81	1505	3150	17	
5/4/81	1555	3150	17	
5/5/81	1030	2900	16	End Test

POINT DILUTION TEST
FOR MEASURING GROUNDWATER FLOW

WELL NUMBER: W735 PROJECT: General Electric

DEPTH MONITORED: 23.9-18.9 feet JOB NUMBER: 672-32

TRACER TYPE: KCl Potassium Chloride DATE: 4/29/81

CONCENTRATION TRACER: 0.1 N (12,500 µmhos at 25°C)

VOLUME TRACER ADDED: 0.5 L

ANALYTICAL INSTRUMENT USED: YSI-33 Conductivity Meter (temperature-compensated)

PUMP TYPE: ISCO 1392

DATE	TIME	CONDUCTANCE µmhos	TEMPERATURE ° C	COMMENTS
4/29/81	1044	1300	24	Background
4/29/81	1045	----	24	Add Tracer
4/29/81	1046	2700	24	Pumped Continuously
4/29/81	1047	1400	24	Pumped Continuously
4/29/81	1048	1600	24	Pumped Continuously
4/29/81	1049	2350	24	Pumped Continuously
4/29/81	1050	3050	24	Pumped Continuously
4/29/91	1052	2900	24	Pumped Continuously
4/29/81	1053	2200	24	Pumped Continuously
4/29/81	1056	2650	24	Pumped Continuously
4/29/81	1101	2400	25	Pumped Continuously
4/29/81	1103 to	2600	25	Pumped Continuously
4/29/81	1105	2550	25	Stopped Pumping
4/29/81	1107	2400	25	
4/29/81	1115	2400	25	
4/29/81	1120	2300	25	
4/29/81	1135	2250	25	
4/29/81	1145	2100	25	
4/29/81	1312	2050	25	
4/29/81	1415	2000	26	
4/29/81	1453	2000	25.5	
4/29/81	1550	1900	24.5	
4/29/81	1635	1900	24.5	
4/30/81	0900	1600	23	End Test
				Oil droplets on teflon sampling tube 4/29/81.

POINT DILUTION TEST
FOR MEASURING GROUNDWATER FLOW

WELL NUMBER: W791 PROJECT: General Electric

DEPTH MONITORED: 40-35 feet JOB NUMBER: 672-32

TRACER TYPE: KCl Potassium Chloride DATE: 4/28/81

CONCENTRATION TRACER: 0.1 N (12,500 µmhos at 25°C)

VOLUME TRACER ADDED: 1.0 L

ANALYTICAL INSTRUMENT USED: YSI-33 Conductivity Meter (temperature-compensated)

PUMP TYPE: ISCO 1392

DATE	TIME	CONDUCTANCE µmhos	TEMPERATURE ° C	COMMENTS
4/28/81	0959	2800	20	Background
4/28/81	1000	----	20	Add Tracer
4/28/81	1002	3000	20	Pumped Continuously
4/28/81	1004	3600	20	Pumped Continuously
4/28/81	1006	4700	20	Pumped Continuously
4/28/81	1007	5200	20	Pumped Continuously
4/28/81	1008	5300	20	Pumped Continuously
4/28/81	1009	4900	20	Pumped Continuously
4/28/81	1010	4200	20	Pumped Continuously
4/28/81	1012	4700	20.5	Pumped Continuously
4/28/81	1015	4500	20.5	Pumped Continuously
4/28/81	1019 t_o	4650	20.5	Pumped Continuously
4/28/81	1022	4600	21	Pumped Continuously
4/28/81	1026	4650	21	Pumped Continuously
4/28/81	1027	4600	21	Stopped Pumping
4/28/81	1030	4600	21	
4/28/81	1040	4500	21	
4/28/81	1100	4400	21	
4/28/81	1125	4300	22	
4/28/81	1215	4300	21.5	
4/28/81	1323	4000	22	
4/28/81	1403	3900	22	
4/28/81	1500	3800	22	
4/28/81	1525	3750	22	
4/28/81	1605	3650	22	
4/28/81	1645	3600	22	
4/29/81	0845	2800	20	End Test

APPENDIX E

FLUID SAMPLE PCB AND FREON EXTRACTABLE ANALYTICAL PROCEDURE AND RESULTS

APPENDIX E-1

FLUID ANALYTICAL PROCEDURE

CHLORINATED HYDROCARBONS

This section of the manual is devoted to the analysis of organochlorine pesticides, polychlorinated biphenyls and chlorophenoxy acid herbicides. They have all generally become termed total identifiable chlorinated hydrocarbons (TICH). The use of gas liquid chromatography in conjunction with an electron capture detector (ECD) facilitates identification and quantitation of these compounds at sub-µg/L levels.

The procedures developed at the Brown and Caldwell Environmental Sciences Division Laboratory are based upon a number of similar procedures reported elsewhere.[1,2]

ORGANOCHLORINE PESTICIDES AND POLYCHLORINATED BIPHENYLS (Water and Wastewater Samples) Gas Chromatographic

1. Scope and Application
   1.1 This method is for the determination of organochlorine pesticides (eg. DDT and its analogs, BHC, lindane, heptachlor, aldrin, heptachlor epoxide, dieldrin, endrin, methoxychlor, mirex, chlordane and toxaphene, and polychlorinated biphenyls (Aroclors 1016, 1221, 1232, 1242, 1248, 1254, and 1260)

2. Summary of Method
   2.1 Dependent upon the sample type and interferences present, several analytical alternatives are available to the analyst. Sludge, soil, sediment, or tissue are homogenized, followed by a hexane extraction either by an automatic shaker apparatus or a Soxhlet apparatus. Water and wastewater samples are extracted using a hexane/methylene chloride cosolvent

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1. Manual of Analytical Methods for the Analysis of Pesticides in Humans and Environmental Samples. (EPA-600/8-80-038), June 1980.

2 Standard Methods for the Examination of Water and Wastewater, 14th Edition, 1975.

system. The sample extract is concentrated, cleaned, if necessary by liquid chromatography with activated florisil as an absorbant and then reconcentrated. Finally, the sample extract is injected onto a 1.5% SP2250/1.95% SP2401 column for preliminary identification and quantification, followed by injection onto a 5% SP2401 column to confirm the identifications.

3. Interferences

3.1 Interferences can originate from virtually any source, such as glassware, solvents, tygon tubing, polyethylene bottles, or the sample matrix. These interferences are minimized by careful handling of the sample and solvents, florisil clean-up and acetonitrile partitioning when necessary. Alternate column packings are also used to resolve components from suspected interference.

4. Sample Preparation

4.1 Samples for filtered Polychlorinated Biphenyls content should be filtered through a GF/C glass fiber filter or equivalent. Otherwise, proceed to step 4.2.

4.2 Homogenize the sample if suspended matter is present and adjust pH to near neutral (pH6.5-7.5) with 50% sulfuric acid or 10 N sodium hydroxide.

4.3 For a detection limit of 0.3 µg/L, take 900 mL of sample for analysis. If interferences pose no problem, as little as 500 mL of sample may be used.

4.4 Quantitatively transfer the proper aliquot into a two-liter separatory funnel and dilute to one liter.

5. Extraction

5.1 Add 60 mL of 15% methylene chloride in hexane (v:v) to the sample in the separatory funnel and shake vigorously for two minutes.

5.2 Allow the mixed solvent to separate from the sample, then draw the water into a one-liter Erlenmeyer flask. Pass the organic layer through a column containing 3-4 inches of anhydrous sodium sulfate and collect it in a 500 mL K-D flask equipped with a 10 mL ampul. Return the water phase to the separatory funnel. Rinse the Erlenmeyer flask with a second 60 mL volume of solvent; add the solvent to the separatory funnel and complete the extraction procedure a second time. Perform a third extraction in the same manner.

5.3 Concentrate the extract in the K-D evaporator on a hot water bath.

5.4 Sample extract is now ready for analysis or clean-up if required.

6. Clean-up and Separation Procedures (Optional)

6.1 Interferences in the form of distinct peaks and/or high background in the initial gas chromatographic analysis, as well as the physical characteristics of the extract (color, cloudiness, viscosity) and background knowledge of the sample will indicate wheter clean-up is required. When these interfere with measurement of the pesticides, or affect column life or detector sensitivity, proceed as directed below.

6.2 Acetonitrile Partition - This procedure is used to isolate fats and oils from the sample extracts. It should be noted that not all pesticides are quantitatively recovered by this procedure. The analyst must be aware of this and demonstrate the efficiency of the partitioning for specific pesticides. Of the pesticides listed in Scope (1.1) only mirex is not efficiently recovered.

6.2.1 Quantitatively transfer the previously concentrated extract to a 125 ml separatory funnel with enough hexane to bring the final volume to 15 ml. Extract the sample four times by shaking vigorously for one minute with 30 ml portions of hexane-saturated acetonitrile.

6.2.2 Combine and transfer the acetonitrile phases to a one-liter separatory funnel and add 650 ml of distilled water and 40 ml of saturated sodium chloride solution. Mix thoroughly for 30 to 40 seconds. Extract with two 100 ml portions of hexane by vigorously shaking for about 15 seconds.

6.2.3 Combine the hexane extracts in a one-liter separatory funnel and wash with two 100 ml portions of distilled water. Discard the water layer and pour the hexane layer through a 3-4 inch anhydrous sodium sulfate column into a 500 ml K-D flask equipped with a 10 ml ampul. Rinse the separatory funnel and column with three 10 ml portions of hexane.

6.2.4 Concentrate the extracts to 6-10 ml in the K-D evaporator in a hot water bath.

6.2.5 Analyze by gas chromatography unless a need for further clean-up is indicated.

6.3 Florisil Column Absorption Chromatography

6.3.1 Adjust the sample extract volume to 10 ml.

6.3.2 Place a charge of activated florisil in a Chromaflex column. After settling the florisil by tapping the column, add about one-half inch layer of anhydrous granular sodium sulfate to the top.

6.3.3 Pre-elute the column, after cooling, with 50-60 ml of petroleum ether. Discard the eluate and just prior to exposure of the sulfate layer to the air, quantitatively transfer the sample extract into the column by decantation and subsequent petroleum ether washings. Adjust the elution rate to about 5 ml per minute and , separately, collect up to three eluates in 500 ml K-D flasks equipped with 10 ml ampuls.

(See Eluate Composition 10.4)

Perform the first elution with 200 ml of 6% ethyl ether in petroleum ether, and the second elution with 200 ml of 15% ether in petroleum ether. Perform the third elution with 200 ml of 50% ethyl ether - petroleum ether and the fourth elution with 200 ml of 100% ethyl ether.

6.3.4 Concentrate the eluates to 6-10 ml in the K-D evaporator in a hot water bath.

6.3.5 Sample extract is now ready for instrumental analysis.

OIL AND GREASE, TOTAL, RECOVERABLE

Gravimetric, Separatory Funnel Extraction

1. Scope and Application
   1.1 This method includes the measurement of fluorocarbon-113 (Freon) extractable matter from surface and saline waters, industrial and domestic wastes. It is applicable to the determination of relatively non-volatile hydrocarbons, vegetable oils, animal fats, waxes, soaps, greases and related matter.
   1.2 The method is not applicable to measurement of light hydrocarbons that volatilize at temperatures below 70°C. Petroleum fuels from gasoline through #2 fuel oils are completely or partially lost in the solvent removal operation.
   1.3 Some crude oils and heavy fuel oils contain a signifcant percentage of residue-type materials that are not soluble in fluorocarbon-113. Accordingly, recoveries of these materials will be low.
   1.4 The method covers the range from 5 to 1000 mg/L of extractable material.
2. Summary of Method
   2.1 The sample is acidified to a low pH (< 2) and serially extracted with fluorocarbon-113 in a separatory funnel. The solvent is evaporated from the extract and the residue weighed.
3. Definitions
   3.1 The definition of oil and grease is based on the procedure used. The nature of the oil and/or grease, and the presence of extractable non-oily matter will influence the material measured and interpretation of results.
4. Sampling and Storage
   4.1 A representative sample of 1 liter volume should be collected in a glass bottle. If analysis is to be delayed for more than a few hours, the sample is preserved by the addition of 2 mL H_2SO_4 and refrigerated at 4°C.
   4.2 Because losses of grease will occur on sampling equipment, the collection of a composite sample is impractical. Individual portions collected at prescribed time intervals must be analyzed separately to obtain the average concentration over an extended period.
5. Apparatus
   5.1 Separatory funnel, 2000 mL, with Teflon stopcock
   5.2 Vacuum pump.
   5.3 Flask, boiling, 125 mL.
   5.4 Rotary evaporator.
6. Reagents
   6.1 Fluorocarbon-113, (1,1,2-trichloro-1,2,2-trifluoroethane), b. p. 48°C.
   6.2 Sodium sulfate, anhydrous crystal.

7. Procedure

7.1 Mark the sample bottle at the water meniscus for later determination of sample volume. If the sample was not acidified at time of collection, add 2 mL sulfuric acid to the sample bottle. After mixing the sample, check the pH by touching pH-sensitive paper to the cap to insure that the pH is 2 or lower. Add more acid if necessary.

7.2 Pour the sample into a separatory funnel.

7.3 Tare a boiling flask (pre-dried in an oven at 103°C and stored in a desiccator).

7.4 Add 30 mL fluorocarbon-113 (6.1) to the sample bottle and rotate the bottle to rinse the sides. Transfer the solvent into the separatory funnel. Extract by shaking vigorously for 2 minutes. Allow the layers to separate, and filter the solvent layer into the flask through a funnel containing solvent moistened filter paper.
NOTE: An emulsion that fails to dissipate can be broken by pouring about 1 g sodium sulfate (6.2) into the filter paper cone and slowly draining the emulsion through the salt. Addtional 1 g portions can be added to the cone as required.

7.5 Repeat (7.4) twice more, with additional portions of fresh solvent, combining all solvent in the boiling flask.

7.6 Rinse the tip of the separatory funnel, the filter paper, and then the funnel with a total of 10-20 mL solvent and collect the rinsings in the flask.

7.7 Connect the boiling flask to the rotary evaporator and evaporate the solvent by immersing the lower half of the flask in water at 70°C. Collect the solvent for reuse. A solvent blank should accompany each set of samples.

7.8 When evaporation is complete remove the flask from the rotary evaporator and wipe the outside to remove excess moisture and fingerprints.

7.9 Cool the boiling flask in a desiccator for 30 minutes and weigh.

8. Calculation

8.1 mg/L total oil and grease $= \frac{R - B}{V}$

where:

R = residue, gross weight of extraction flask minus the tare weight, in milligrams.

B = blank determination, residue of equivalent volume of extraction solvent, in milligrams.

V = volume of sample, determined by refilling sample bottle to calibration line and correcting for acid addition if necessary, in liters.

References

1. Standard Methods for the Examination of Water and Wastewater, 14th Edition, p 515, Method 502A, (1975).

2. Methods for Chemical Analysis of Water and Wastes, United States Environmental Protection Agency, EMSL, Publication EPA-600/4-79-020, March 1979.

APPENDIX E-2

PHASE I PCB AND FREON EXTRACTABLE FLUID DATA

Table E-2-1. Phase I Freon Extractable Data

Well No.	Date	O&G, mg/l
W2A	4/25	9
W2B	4/25	< 5
W7	3/12	< 5
W11	3/14	< 5
W17	4/25	< 5
W26	4/25	8
W27	4/25	13
W28	4/01	< 5
W29	4/01	< 5
W31	3/19	14
W35	3/18	< 5
W48	3/27	22
W503	3/27	23
W504	3/27	< 5
W508	3/28	124
W509	3/27	793
W512	3/27	< 5
W513	3/27	< 5
W514	3/27	32
W515	3/27	< 5
W516	3/28	< 5
	4/25	10
W517	3/28	< 5
W518	3/28	< 5

Well No.	Date	O&G, mg/l
W519	3/28	< 5
W520	3/28	< 5
W521	3/28	< 5
W522	3/28	< 5
W524	3/28	< 5
	4/25	5
W525	3/28	15
	4/25	17
W527	3/31	19
W528	3/31	1165
W529	4/01	< 5
W530	3/31	< 5
W531	3/31	< 5
W532	4/01	< 5
W533	4/01	7
W534	4/01	20
W535	4/01	< 5
W536	4/01	< 5
W537	4/01	< 5
W538	4/01	< 5
W539	4/01	< 5
W540	4/25	795
W541	4/25	465

Table E-2-2. Phase I Monitor Well PCB Data

Area	Well number	Date sampled	PCB, ppb[a]
I	W1	4-22-80	N.D.[b]
II	W2A	5-7-80	0.63
II	W2B	5-5-80	N.D.
III	W3A[c]	6-10-80	N.D.
III	W3B[c]	6-10-80	N.D.
II	W4A[c]	6-2-80	N.D.
II	W4B[c]	6-10-80	N.D.
I	W9[c]	6-2-80	N.D.
I	W11	5-5-80	N.D.
II	W17	5-13-80	15
II	W22[c]	6-2-80	N.D.
II	W26	5-6-80	N.D.
II	W27	5-6-80	N.D.
III	W28[c]	6-2-80	N.D.
III	W29[c]	6-2-80	N.D.
I	W35A	5-5-80	N.D.
I	W35B	5-13-80	0.33
I	W36A	5-5-80	N.D.
I	W36B	5-13-80	N.D.
I	W38	5-5-80	N.D.
I	W41	5-5-80	N.D.
III	W502	5-9-80	N.D.
III	W503[d]	5-9-80	47
II	W516	5-6-80	N.D.
II	W524	5-5-80	N.D.
II	W540	5-5-80	N.D.
II	W541	5-5-80	N.D.

[a]Aroclor 1260.

[b]N.D. = <0.3 ppb.

[c]Well development, sampling, and analysis was not completed for inclusion in the May 1980 report.

[d]Aroclor 1254 = 4.2.

APPENDIX E-3

PHASE Ib PCB FLUID DATA

Table E-3-1. Phase Ib Monitor Well PCB Data

Area	Well number	Date sampled	PCB, ppb		Total suspended solids, ppm
			Total[a]	Filtered[b]	
II	W2A	7-21-80	0.74	N.D.[c]	66,580
II	W2A	7-23-80	1.7	N.D.	9,060
	W2A	7-25-80	4.4	N.D.	160,960
II	W17	7-25-80	2.2	N.D.	25
II	W17	7-31-80	1.4	N.D.	18
III	W503[d]	-	-	-	-
I	W35B	7-18-80	N.D.	-	-
I	W35B	7-24-80	N.D.	-	-
I	W35B	7-31-80	1.9	N.D.	61
II	W613	7-24-80	430	0.80 (N.D.)[e]	356
III	W614	7-31-80	1.4	N.D.	28,780
III	W615	7-31-80	2.1	N.D.	10,010
III	W616	7-31-80	0.50	N.D.	7,600
III	W617	7-25-80	N.D.	-	33
III	W618	7-23-80	N.D.	-	162
III	W619	7-24-80	0.52	N.D.	976
III	W620	7-24-80	1.0	N.D.	336
III	W621	7-31-80	N.D.	-	58
III	W622	7-24-80	N.D.	-	148
III	W623	7-24-80	N.D.	-	198
III	W624	7-24-80	N.D.	-	21
III	W625	8-14-80	N.D.	-	<1

[a]Unfiltered sample.

[b]Sample filtered through Reeve Angel 934AH 1.25 micron filter paper; PCB analysis on filtrate.

[c]N.D. = <0.3 ppb.

[d]Well water level did not recover after redevelopment pumping.

[e]First analysis on sample filtered with 1.25 micron paper; second analysis on sample filtered by both 1.25 and 0.45 micron paper.

APPENDIX E-4

PHASE II PCB AND FREON EXTRACTABLE FLUID DATA

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

Log No. 39B

Date Sampled 5/1/81
Date Received 5/1/81
Date Reported 5/22/81

Report To: Mr. Brian Bracken
Brown and Caldwell
1501 North Broadway
Walnut Creek, California 94596

Job #672-33

cc.

Laboratory Director

Log No.	Sample Description
39B2	G.E. Sample Well Sample 753 B

Results mg/L

Sample Log No.	39B2					
Total Suspended Solids	1620					
Oil and Grease	< 5					

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S. A. FISHER Vice Pres

May 22, 1981

Mr. Brian Bracken
Brown and Caldwell
1501 North Broadway
Walnut Creek, California 94596

Job #672-33

POLYCHLORINATED BIPHENYLS ANALYSIS

Date Sample/Received: 5/1/81
Concentration Units: µg/L

Log No.	Sample Description/Identification	Results
39B2	Well Sample 753 B	None Detected

Aroclors 1016 through 1262 would have been reported had they appeared at or above the detection limit of 0.30 µg/L.

Reported by: _____
Edward Wilson
Laboratory Director

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

Log No. 40P1

Date Sampled 5/6/81
Date Received 5/6/81
Date Reported 5/21/81

Report To:
Mr. Brian Bracken
Brown and Caldwell
1501 North Broadway
Walnut Creek, California 94596

Job #672-33

Laboratory Director

Log No.	Sample Description
40P1	G.E. Sample Well Sample W792

Results mg/L

Sample Log No.	40P1					
Total Suspended Solids	2210					
Oil and Grease	< 5					

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May 21, 1981

Mr. Brian Bracken
Brown and Caldwell
1501 North Broadway
Walnut Creek, California 94596

Job #672-33

POLYCHLORINATED BIPHENYLS ANALYSIS OF WATER

Date Sampled/Received: 5/6/81
Concentration Units: µg/L

Log No.	Sample Description/Identification	Aroclor 1260 Filtered Results	Aroclor 1260 Unfiltered Results
40P1	Well Sample: W792	None Detected	1.3

Aroclors 1016 through 1262 would have been reported had they appeared at or above the detection limit of 0.30 µg/L.

Reported by: _____
Edward Wilson
Laboratory Director

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S. A. FISHER Vice Pres

April 16, 1981

Mr. Brian Bracken
Brown and Caldwell
1501 North Broadway
Walnut Creek, CA 94596

TRANSMITTAL OF RESULTS OF TOTAL POLYCHLORINATED BIPHENYLS/TOTAL SUSPENDED SOLIDS ANALYSES - JOB #672-33

Date Sampled: 4/2/81
Date Recieved: 4/2/81

Log No.	Sample Description	Total Polychlorinated Biphenyls µg/L	Total Suspended Solids mg/L
28J1	Well Sample: W731	None Detected[a]	32
28J2	Well Sample: W732	None Detected[a]	88
28J3	Well Sample: W757A	None Detected[a]	76

a) Aroclors 1016 through 1262 would have been reported had they appeared at or above the detection limit of 0.30 µg/L.

Reported by:_____
Edward Wilson
Laboratory Director

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

Log No. 35W

Date Sampled 4/22/81
Date Received 4/22/81
Date Reported 4/27/81

Job #672-33

Report To: Mr. Brian Bracken
Brown and Caldwell
1501 North Broadway
Walnut Creek, CA 94596

cc.

Laboratory Director

Log No.	G.E. Samples	Sample Description
35W1	Well Sample: W732	
35W2	Well Sample: W735	
35W3	Well Sample: W741	
35W4	Well Sample: W752A	
35W5	Well Sample: W752B	
35W6	Well Sample: W756A	

Results mg/L

Sample Log No.	35W1	35W2	35W3	35W4	35W5	35W6
Oil and Grease (Freon Extractable)	< 5	< 5	< 5	6	10	< 5

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1255 POWELL STREET
EMERYVILLE, CA 94608
PHONE (415) 428-2300

Log No. 35W

Date Sampled 4/22/81
Date Received 4/22/81
Date Reported 4/27/81

Report To: Mr. Brian Bracken
Brown and Caldwell
1501 North Broadway
Walnut Creek, CA 94596

cc.

Laboratory Director

Log No.	G.E. Samples	Sample Description
35W7	Well Sample: W756B	
35W8	Well Sample: W757A	
35W9	Well Sample: W757B	

Results mg/L

Sample Log No.	35W7	35W8	35W9			
Oil and Grease (Freon Extractable)	< 5	8	< 5			

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1255 POWELL STREET
EMERYVILLE, CA 94608
PHONE (415) 428-2300

Log No. 36V

Date Sampled 4/24/81
Date Received 4/24/81
Date Reported 5/04/81

Report To:
Mr. Brian Bracken
Brown and Caldwell
1501 North Broadway
Walnut Creek, CA 94596

Job No: 672-33

cc.

Laboratory Director

Log No.	GE Samples	Sample Description
36V1	Well Sample: W733	
36V2	Well Sample: W734	

Results mg/L

Sample Log No.	36V1	36V2				
Total Suspended Solids	1320	100				
Oil and Grease (Freon Extractable)	< 5	< 5				

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S. A. FISHER

May 4, 1981

Mr. Brian Bracken
Brown and Caldwell
1501 North Broadway
Walnut Creek, CA 94596

672-33

POLYCHLORINATED BIPHENYLS ANALYSIS OF WATER

Log No.	Sample Identification	Results µg/L
36V1	Well Sample; W733	None Detected
36V2	Well Sample; W734	None Detected

Aroclors 1016 through 1262 would have been reported had they appeared at or above the detection limit of 0.30 µg/L.

Reported by:_____
Edward Wilson
Laboratory Director

YOS_OAK_03943

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

Log No. 37W1

Date Sampled 4/28/81
Date Received 4/28/81
Date Reported 5/13/81

Report To: Mr. Brian Bracken
Brown and Caldwell
1501 North Broadway
Walnut Creek, CA 94596

Job #672-33

cc.

Edward Wilson
Laboratory Director

Log No.	Sample Description
37W1	General Electric Sample Well Sample: W758 B

Results (mg/L unless indicated otherwise)

Sample Log No.	37W1					
Total Suspended Solids	8610					
Oil and Grease	<5					

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S. A. FISHER

May 13, 1981

Mr. Brian Bracken
Brown and Caldwell
1501 North Broadway
Walnut Creek, CA 94596

Job #672-33

POLYCHLORINATED BIPHENYLS ANALYSIS OF WATER

Date Sample/Received: 4/28/81

Log No.	Sample Description/Identification	Results
37W1	Well Sample; W758 B	None Detected

Aroclors 1016 through 1262 would have been reported had they appeared at or above the detection limit of 0.30 ppb.

Reported by: Edward Wilson
Edward Wilson
Laboratory Director

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

Log No. 39E

Date Sampled 5/1/81
Date Received 5/1/81
Date Reported 5/15/81

Report To:
Mr. Brian Bracken
Brown and Caldwell
1501 North Broadway
Walnut Creek, CA 94596

cc.

Laboratory Director

Log No.	Sample Description
	General Electric Samples
39E1	Well Sample: W736
39E2	Well Sample: W758A
39E3	Well Sample: W793

Results mg/L

Sample Log No.	39E1	39E2	39E3			
Total Suspended Solids[a]	15,400	5,030	23,200			
Oil and Grease	8	6	7			

[a] Sample was shaken, sand layer was allowed to settle for five seconds, then a portion was drawn off for analysis.

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May 15, 1981

Mr. Brian Bracken
Brown and Caldwell
1501 North Broadway
Walnut Creek, CA 94596

POLYCHLORINATED BIPHENYLS ANALYSIS

Date Sampled/Received: 5/1/81
Concentration Units: µg/L

Log No.	Sample Description/Identification	Unfiltered PCBs Aroclor 1260	Filtered PCBs Results
39E1	Well Sample: W736	1.1	None Detected
39E2	Well Sample: W758A	0.43	a
39E3	Well Sample: W793	None Detected	--

Aroclors 1016 through 1262 would have been reported had they appeared at or above the detection limit of 0.30 µg/L.

[a]Insufficient sample was given for a filtered PCB analysis to be run at or near an equivalent detection limit as unfiltered analysis.

Reported by:_____
Edward Wilson
Laboratory Director

YOS_OAK_03947

MEMORANDUM

672-33

May 11, 1981

TO: BRIAN BRACKEN

FROM: ED WILSON EW

SUBJECT: RESULTS OF ANALYSES PERFORMED ON GENERAL ELECTRIC WELL SAMPLES COLLECTED APRIL 3, 1981 THROUGH MAY 1, 1981.

All results are reported in mg/L unless indicated otherwise.

Log No.	Well No.	Date Sampled	TSS mg/L	Oil & Grease mg/L	Total PCB µg/L	Filtered PCB µg/L
28W1	W735	4/3/81	10	---	1.8[a]	ND
28W2	W741	4/3/81	130	---	ND	---
28W3	W755A	4/3/81	160	---	ND	---
37X6	W755A	4/23/81	---	< 5	---	---
29L1	W751A	4/6/81	80	---	ND	---
37X2	W751A	4/23/81	---	7	---	---
29L2	W752A	4/6/81	30	---	ND	---
29L3	W753A	4/6/81	30	---	ND	---
37X3	W753A	4/23/81	---	< 5	---	---
29L4	W756A	4/6/81	30	---	0.36[a]	ND
29L5	W757B	4/6/81	100	---	ND	---
30W1	W791	4/8/81	380	---	ND	---
37X8	W791	4/23/81	---	< 5	---	---
34F1	W752B	4/17/81	180	---	ND	---
34F2	W756B	4/17/81	150	---	ND	---
34Z1	W755B	4/20/81	2210	---	ND	---
37X7	W755B	4/23/81	---	< 5	---	---
36Q1	W754A	4/23/81	480	---	ND	---
37X4	W754A	4/23/81	---	< 5	---	---

[a]Aroclor 1260.

Continued

ND = None Detected.

Log No.	Well No.	Date Sampled	TSS mg/L	Oil & Grease mg/L	Total PCB µg/L	Filtered PCB µg/L
36Q2	W754B	4/23/81	810	---	ND	---
37X5	W754B	4/23/81	---	< 5	---	---
37X1	W731	4/23/81	---	< 5	---	---
39B1	W751B	5/1/81	650	< 5	ND	---
39B2	W752B	5/1/81	1620	< 5	ND	---

[a]Aroclor 1260.

Aroclors 1016 through 1262 would have been reported had they appeared at or above the detection limit of 0.30 µg/L.

ND = None Detected.

Reported by: Edward Wilson
Edward Wilson
Laboratory Director

APPENDIX E-5

MISCELLANEOUS FLUID ANALYSES

SUMMARY OF WATER SAMPLING TO APRIL 2, 1980

Location	Date	Cased	Uncased	Depth Drilled	Water Level	PCB ppb 1260	O&G ppm	Filt.COD [a] ppm	Comments
Area 1									
S7	3/12		X	26'		----	< 5	----	
S11	3/14		X	21'		----	< 5	----	
S35	3/18		X	36'		----	< 5	----	
Area II									
S6	3/20		X	----	----	NA	---	----	oil from broken pipe
	3/28	X		----	8'4"	----	---	----	trace of oil
S13	3/12		X	26'		4100	---	----	floating oil present
S16	3/17		X	26'	8'11"	NA	---	----	floating oil present
	3/28	X				----	---	----	.5 cm heavy emulsion
S17	3/14		X	26'	8'4"	.67	---	----	
S18	3/14		X	21''	9'6"	2300	---	----	water phase
	3/14		X			≅ 4000	---	----	oil phase analysis considered semi-quantitative
	3/28		X			----	---	----	7 cm floating oil
	3/28	X				----	---	----	.2 cm floating oil
S19	3/13		X	21'	1'8"	26,000	---	----	hexane extract was dark brown possibly indicating suspended oil
S21	3/12		X	26'		.60	---	----	
S22	3/18		X	36'		3.2	---	----	.50 ug/l 1254
S26	4/1		X	26'	7'10"	----	---	23	
S27	3/14		X	31'		.31	---	----	
S30	3/18		X	26'	8'6"	NA	---	----	
	3/28	X				----	---	----	6 cm floating oil
S31	3/19		X	31'		----	14	----	
S41	3/24		X	16'	10'6"	----	---	----	no apparent oil
S47	3/28		X	21'	9'10"	----	---	----	2 cm oil
S48	3/27		X	19'6"	11'6"	----	22	----	
S500	3/28		X	20'		----	---	----	1 cm heavy emulsion

NA - not analyzed

YOS_OAK_03951

SUMMARY OF WATER SAMPLING TO APRIL 2, 1980 (continued)

Location	Date	Cased	Uncased	Depth Drilled	Water Level	PCB ppb 1260	O&G ppm	Filt.COD[a] ppm	Comments
Area II									
S504	3/27		X	20'	9'0"	----	< 5	----	
S506	3/28		X	20'		----	---	----	20 cm oil
S507	3/28		X	25'	12'2"	----	---	----	light emulsion
S508	3/28		X	20'	9'10"	----	124	----	
S509	3/27		X	19'6"	3'4"	----	793	----	trace quantity visible oil
S510	3/28		X	25'		----	---	----	2 cm oil
S512	3/27		X	20'	5'11"	----	< 5	----	
	4/1		X		5'11"	----	---	77	
S513	3/27		X	20'	3'0"	----	< 5	----	
	4/1		X		3'0"	----	---	33	
S514	3/27		X	20'	5'0"	----	32	----	
S515	3/27		X	20'	6'6"	----	< 5	----	
S516	3/28		X	20'	7'5"	----	< 5	----	
	4/1		X		7'4"	----	---	12	
S517	3/28		X	20'	7'10"	----	< 5	----	
	4/1		X		8'3"	----	---	22	
S518	3/28		X	20'	2'10"	----	< 5	----	
S519	3/28		X	20'	9'7"	----	< 5	----	
S520	3/28		X	20'	8'0"	----	< 5	----	
	4/1		X		8'6"	----	---	24	
S521	3/28		X	20'	8'0"	----	< 5	----	
S522	3/28		X	20'	9'7"	----	< 5	----	
S523	3/28		X	20'	10'0"	----	---	----	1 cm oil
S524	3/28		X	20'	8'10"	----	< 5	----	
	4/1		X		8'11"	----	---	17	
S525	3/31		X	20'	9'10"	----	15	----	
S526	3/31		X	25'	11'1"	----	---	----	heavy emulsion
S527	3/31		X	20'	10'1"	----	19	----	
S528	3/31		X	20'	10'1"	----	1664	----	light emulsion
S529	4/1		X	20'	10'2"	----	< 5	----	

YOS_OAK_03952

SUMMARY OF WATER SAMPLING TO APRIL 2, 1980 (continued)

Location	Date	Cased	Uncased	Depth Drilled	Water Level	PCB ppb 1260	O&G ppm	Filt.COD[a] ppm	Comments
Area II									
S530	3/31		X	20'	10'0"	----	< 5	----	
S531	3/31		X	20'	9'11"	----	< 5	----	
S532	4/1		X	20'	10'0"	----	< 5	----	
S533	4/1		X	25'	11'0"	----	7	----	
S534	4/1		X	20'	9'4"	----	20	----	sample was blackish and quite turbid
S538	4/1		X	30'	9'2"	----	< 5	19	
Area III									
S28	4/1	X		21'	5'9"	----	< 5	208	
S29	3/13		X	21'		----	105	----	
	4/1	X			3'6"	----	< 5	50	sample quite clear
S503B	3/27		X	8'	6'3"	----	23	----	sample clear and light yellow
	3/28		X			NA	---	311	COD run on unfilt. sample
	4/1		X		6'8"	----	---	362	
S535	4/1		X	20'	7'0"	----	< 5	41	
S536	4/1		X	20'	7'3"	----	< 5	25	
S537	4/1		X	20'	7'6"	----	< 5	48	
S539	4/1		X	20'	5'11"	----	< 5	23	

YOS_OAK_03953

APPENDIX F

CHLOROBENZENE ANALYTICAL PROCEDURE AND RESULTS

APPENDIX F

CHLOROBENZENE ANALYTICAL PROCEDURE AND RESULTS

There is no Environmental Protection Agency (EPA) documented procedure established for the analysis of di-, tri-, and tetrachlorobenzenes in soil and water matrices. Methods do exist for dichlorobenzenes (methods 601, 602, and 612); however, these methods are only suitable for aqueous samples and not necessarily applicable to the tri- and tetrachloro isomers.

Because the compounds to be analyzed consist of a volatile fraction and a chlorinated hydrocarbon fraction, the gas chromatography method developed has special features. For aqueous samples, a liquid/liquid extraction is used instead of a purge and trap technique. To eliminate masking interferences by trace sulfur and other compounds, a Hall electrolytic conductivity detector (sensitive only to halogenated compounds) is used instead of an electron capture detector. The increased selectivity of the Hall detector offsets its decreased sensitivity.

For soil samples, any moisture must be removed to release the analyte to the extraction solvent, yet the soils cannot be air-dried due to the volatile constituents. Fifty percent anhydrous sodium sulfate, a common drying agent, is used to absorb any water. Except for the use of the Hall detector, this method closely resembles the soil PCB method developed by Stewart Laboratories.

Detailed analytical procedures are presented in Appendix F-1 and the results appear in Appendix F-2.

APPENDIX F-1

SOIL AND FLUID ANALYTICAL PROCEDURE

ANALYSIS OF CHLOROBENZENES IN SOILS

1. Scope and Application
   - 1.1 This method is for the determination of di, tri, and tetrachlorinated benzenes in soils.
   - 1.2 The estimated useful range of this method is 1.0 to 10,000 mg/kg.

2. Summary of Method
   - 2.1 The untreated sample is mixed with anhydrous sodium sulfate and placed in a wide mouth 250 mL glass jar, and then placed on an automatic wrist action shaker.
   - 2.2 The hexane extract is concentrated using a Kuderna-Danish apparatus.
   - 2.3 The concentrated extract is analyzed by temperature programmed gas chromatography using a Hall electrolytic conductivity detector.

3. Interferences
   - 3.1 Solvents, reagents, glassware and other sample processing equipment may provide discrete artifacts and may even produce elevated baselines although this problem is not as acute as might be the case if an electron capture detector were used.
   - 3.2 Excessive exposure of the sample to air may result is significant losses of the dichlorobenzenes.
   - 3.3 Halogenated hydrocarbons which might coelute with compounds of interest.

4. Sample Collection, Handling, and Preservation
   - 4.1 Samples should be collected with only metal or glass equipment. Plastic materials must be avoided.
   - 4.2 If sampling equipment is reused in the field, it must be rinsed with acetone or methanol followed by air drying prior to reuse.
   - 4.3 Immediately after collection, samples are transferred to glass or metal containers with foil-lined caps. The sample should fill the container as completely as possible to minimize losses of dichlorobenzenes.
   - 4.4 Samples should be refrigerated prior to analysis.

5. Equipment and Apparatus
   - 5.1 Gas chromatograph equipped with a Hall electrolytic conductivity detector.
   - 5.2 6' x 2mm ID glass column packed with 1.5% OV-1/1.5% OV-225 on 80/100 mesh Gas Chrom Q.
   - 5.3 Top loading balance.
   - 5.4 250 mL wide mouth glass bottles.
   - 5.5 Automatic wrist action shaker.
   - 5.6 Kuderna-Danish (K-D) apparatus.
   - 5.7 Water bath.
   - 5.8 Miscellaneous glassware and syringes.

6. Reagents
   6.1 Hexane, pesticide quality, nanograde.
   6.2 Anhydrous sodium sulfate oven-dried overnight at 130°C.
   6.3 Chlorinated benzene standards.

7. Procedure
   7.1 Lable a sufficient number of precleaned 250 mL wide mouthed glass bottles, Teflon sheeting and caps to handle a batch of samples together with spikes and blanks.
   7.2 Add appro imately 10g of anhydrous sodium sulfate to the glass jar.
   7.3 Weigh the jar and its contents to the nearest 0.1g.
   7.4 Open sample container. Quickly transfer approximately 10g of sample to the jar. An attempt should be made during the transfer to exclude foreign matter such as sticks, stones, glass, etc. Record weight to nearest 0.1g.
   7.5 Immediately add 5-20 mL hexane to minimize volatilization of the dichlorobenzenes. Stir and grind the mixture with a sturdy, fire polished glass stirring rod, so that the sodium sulfate and the soil become intimately mixed.
   7.6 Add another 100 mL of hexane to the jar. The stirring rod should be rinsed with this solvent as it is added.
   7.7 Using the Teflon sheet as a liner, tightly screw the cap into place and fasten to the shaking apparatus. Shake for 30 minutes.
   7.8 Remove bottle from apparatus. Allow slurry to settle. Decant extract through anhydrous sodium sulfate leaving most of the soil in the sample bottle. Collect the filtered extract in a 500 mL Kuderna-Danish (K-D) flask fitted with a 10 mL graduated concentrator tube.
   7.9 Wash the extraction bottle with hexane (3 x 25 mL). Pour each washing through the sodium sulfate as before.
   7.10 The combined extract and washings are concentrated to 10.0 mL and transferred to a sealed vial prior to analysis.
   7.11 Make appropriate dilutions to bring the sample within the range of the standards.
   7.12 Inject 2-5 microliters of the sample using the solvent flush technique. Suggested gas chromatographic conditions are: 6' x 2 mm glass column packed with Gas Chrom Q 80/100 mesh coated with 1.5% OV - 1.5% OV-225. Temperature program 50° 5 minutes, 8°/minute to 175° hold 15 minutes. Carrier gas, helium at 30 cc/minute. Quantification is based upon response relative to standards producing a similar response as recorded by the Hall electrolytic conductivity detector.

8. Calculations
   8.1 Quantification by integrated peak areas is calculated by the following equation:

$$\text{Concentration in sample} = \frac{\text{Level in standard}}{\text{Area in standard}} \text{ (Area of Sample) (Dilution Factors)}$$

8.2 Samples exceeding the range of the standards are diluted to bring them into range.

8.3 Peak height may be substituted for peak area quanitfication.

ANALYSIS OF CHLOROBENZENE IN WATER

1. Scope and Application
   1.1 This method is for the determination of di, tri, and tetrachlorinated benzenes in water.
   1.2 The estimated useful range of this method is 1.0 to 10,000 µg/L.

2. Summary of Method
   2.1 The aqueous sample is extracted with hexane.
   2.2 The hexane extract is concentrated on a Kuderna-Danish (K-D) concentrator.
   2.3 The concentrated extract is analyzed by temperature programmed gas chromatography using a Hall electrolytic conductivity detector.

3. Interferences
   3.1 Solvent, reagents, glassware and other sample processing equipment may provide discrete artifacts and may even produce elevated baselines although this problem is not as acute as might be the case if an electron capture detector were used.
   3.2 Excessive exposure of the sample to air may result in significant losses of the dichlorobenzenes.
   3.3 Non-chlorobenzene halogenated hydrocarbons which might coelute with compounds of interest.

4. Sample Collection and Preservation
   4.1 Samples should be collected with only metal or glass equipment. Plastic materials must be avoided.
   4.2 If sampling equipment is reused in the field, it must be rinsed with acetone or methanol followed by air drying prior to reuse.
   4.3 If samples are to be drawn from a well, a bailer should be employed. Do not pull a vacuum on sample.
   4.4 Sample should immediately be transferred to a 1 L glass jar and filled completely.
   4.5 Place a teflon sheet over jar and screw down cap. Inspect jar for air bubbles by inverting. If present refull and repeat this step.
   4.6 Samples should be analyzed as soon as possible. If they must be held, refrigerate.

5. Equipment and Apparatus
   5.1 Gas chromatograph equipped with a Hall electrolytic conductivity detector.
   5.2 6' x 12 mm ID glass column packed with 1.5% OV-1/1.5% OV-225 on 80/100 mesh Gas Chrom Q.
   5.3 2 L separatory funnel.

5.4 Kuderna-Danish (K-D) concentrator apparatus.
5.5 Water bath.
5.6 Miscellaneous glassware and syringes.

6. Reagents
6.1 Hexane, pesticide quality, nanograde.
6.2 Anhydrous sodium sulfate oven-dried overnight at 130°C.
6.3 Chlorinated benzene standards.

7. Procedure
7.1 Pour entire contents of jar into 2 L separatory funnel. Rinse jar with 50 mL of hexane and add to separatory funnel along with sample.
7.2 Shake vigorously for two minutes and allow two phases to separate. NOTE: If an emulsion occurs, the addition of salt will aid the separation.
7.3 Drain aqueous (lower) layer into a 1 L Erlenmeyer flask.
7.4 Transfer hexane layer to the 500 mL K-D apparatus fitted with a 10 mL graduated concentrator tube by filtering it through dried sodium sulfate.
7.5 Return aqueous sample to the two liter separatory funnel.
7.6 Add another 50 mL aliquot of hexane.
7.7 Repeat steps 7.2-7.6 once more.
7.8 Repeat steps 7.2 - 7.4.
7.9 The combined extracts are then concentrated to 1.0 mL and transferred to a sealed vial prior to analysis.
7.10 Make appropriate dilutions to bring the sample within the range of the standards.
7.11 Inject 2-5 microliters of the sample using the solvent flush technique. Suggested gas chromatographic conditions are: 6' x 2[illegible] mm glass column packed with Gas Chrom Q 80/100 mesh coated with 1.5% OV-1/1.5% OV-225. Temperature program 50° 5 minutes, 8°/minute to 175° hold 15 minutes. Carrier gas, helium at 30 cc/minute. Quantification is based upon response relative to standards producing a similar response as recorded by the Hall electrolytic conductivity detector.

8. Calculations
8.1 Quantification by integrated peak areas is calculated by the following equation:

$$\text{Concentration in sample} = \frac{\text{Level in standard}}{\text{Area in standard}} \text{ (Area of Sample) (Dilution Factors)}$$

8.2 Samples exceeding the range of the standards are diluted to bring them into range.
8.3 Peak height may be substituted for peak area quantification.

MEMORANDUM

May 22, 1981

TO: Brian Bracken

FROM: Edward Wilson EW

SUBJECT: CHLORINATED BENZENES ANALYSIS

Enclosed are the results of the chlorinated benzenes analysis of soil samples collected from the G.E. site.

The only change in the methodology originally submitted was the use of 15% dichloromethane in hexane as the extraction solvent instead of hexane alone.

hf

enc.

APPENDIX F-2

CHLOROBENZENE DATA

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

Log No. 43C

Date Sampled 5/13/81
Date Received 5/13/81
Date Reported 5/22/81

Report To: Mr. Brian Bracken
Brown and Caldwell
1501 North Broadway
Walnut Creek, California 94596

Job #672-44

Edward Wilson
Laboratory Director

Log No.	G. E. Samples	Sample Description
43C1	W612	
43C2	W613	
43C3	W624	
43C4	W625	

Results µg/L

Sample Log No.	43C1	43C2	43C3	43C4		
o-Dichlorobenzene	<0.5	260	<0.5	0.6		
m-Dichlorobenzene / p-Dichlorobenzene	14	130	<1	4.4		
1,2,3-Trichlorobenzene	0.5	3000	<0.5	<0.5		
1,2,4-Trichlorobenzene	3.4	4300	<1	<1		
1,3,5-Trichlorobenzene	<0.5	7.4	<0.5	<0.5		
1,2,3,4-Tetrachlorobenzene	<0.5	3900	<0.5	<0.5		
1,2,3,5-Tetrachlorobenzene / 1,2,4,5-Tetrachlorobenzene	<0.5	150	<0.5	<0.5		
TOTAL	17.4	11,747	<1	5.0		

NOTE: o- and m-dichlorobenzene and 1,2,3,5- and 1,2,4,5-tetrachlorobenzene co-chromatograph. Since complete isomer separation was not achieved, the values are reported as a sum of the compounds.

CHLORINATED BENZENES RESULTS (PPM)

Soil Sample:	5714 3'-4'	5714 12.5'-13.5'	5714 25'-26'	5714 26' Grab	5715 3'-4'	5715 4'-5'	5715 5'-6'
ISOMER							
o-dichlorobenzene	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
m-dichlorobenzene p-dichlorobenzene	<1	<1	<1	<1	<1	<1	<1
1,2,3-trichlorobenzene	<1	<1	<1	<1	<1	<1	<1
1,2,4-trichlorobenzene	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,3,5-trichlorobenzene	<1	<1	<1	<1	<1	<1	<1
1,2,3,4-tetrachlorobenzene	<1	<1	<1	<1	<1	<1	<1
1,2,3,5-tetrachlorobenzene 1,2,4,5-tetrachlorobenzene	<1	<1	<1	<1	<1	<1	<1
TOTAL	<1	<1	<1	<1	<1	<1	<1

NOTE: 0- and m-dichlorobenzene as well as 1,2,3,5- and 1,2,4,5-tetrachlorobenzene co-chromatograph. Since complete isomer separation was not achieved, the values are reported as a sum of the compounds.