



~~DRAFT~~ REPORT - VOLUME II (APPENDICES)
SITE ASSESSMENT INVESTIGATION
CHEVRON-GULF REFINERY
PHILADELPHIA, PENNSYLVANIA

FEBRUARY 13, 1987

UC

Dames & Moore

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APPENDIX A
Background Data

Memorandum

Concord, CA
May 8, 1985

SITE CONDITIONS REVIEW PHILADELPHIA REFINERY (543.710)

MR. F. M. PARKER
San Francisco

Introduction

As requested, an environmental review of the Chevron-Gulf Philadelphia refinery was made to ascertain the probable extent of any subsurface contamination and to identify the general scope of work needed to delineate known problems. This review was based upon a one-day site inspection and discussions with refinery personnel. No groundwater investigations have been conducted at the refinery, therefore, no site-specific data were available for review.

The refinery has identified nearly 70 acres as inactive waste disposal sites under CERCLA, including 57 acres of leaded tank bottoms and 13 acres of landfill. These sites represent the largest potential expenditures should closure or remedial work be required. On-site closure without remedial work is estimated to range from 5 to 10 million dollars, off-site removal of waste is not economically feasible. It is recommended that a timely legal review of potential closure requirements and options be made by PM&S.

Recoverable quantities of subsurface oil are known to be present beneath three locations within the southern portion of the main plant but are not adequately delineated with the existing monitoring well network. No investigation for subsurface oil accumulations has been conducted in the remainder of the main plant or at either of the two remote tankfields. Localized accumulations of oil may be present in the uninvestigated areas but the plant history suggests that extensive accumulations are unlikely. Currently, there appears to be little opportunity for off-site or third party impacts due to subsurface oil at this location except for possible seepage to surface waters. A phased investigation of the shallow aquifer is recommended for each of the refinery properties at a total cost of 50,000 to 100,000 dollars.

Much of the refinery contains oily dirt due to small leaks or spills typical of operations at a plant of this type. This material cannot be economically removed or cleaned up. It is recommended that this material be left in-place and accepted as-is should a property transfer occur. The following report and recommendations are for your

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consideration. This review was facilitated by the knowledgeable assistance of Messrs. F. L. Hannigan and R. J. Schumacher of the Philadelphia refinery.

Facility Description

General

The Philadelphia refinery consists of four separate pieces of property including the main plant, two remote tankfields, and a remote marine unloading facility. Crude oil deliveries to the refinery by ship are unloaded at the Hog Island unloading headers and are then pumped to the Darby Creek Tankfield. Crude oil is then transferred via pipeline under the Schuylkill River to the main plant for refining. Finished products are then transferred back across the river by a second set of underwater pipelines to the Schuylkill River Tankfield where they enter the Colonial Pipeline system for distribution.

Main Plant

The main plant occupies an area of approximately 350 acres along the Schuylkill River. For purposes of site evaluation, the main plant has been divided into three areas as shown figure 1. Area A, south of the Penrose Avenue Bridge, is the oldest portion of the facility dating back to the 1920's. This area, referred to as the "terminal", contains a gasoline tank truck loading rack, a petrochemicals tank truck and rail loading rack, lube oils rail loading facility, a package and grease plant, a marine loading facility, and attendant piping and tankage.

Area B, north of Penrose Bridge and south of Pennypacker Avenue, contains the petrochemical process plants, wastewater treatment system, maintenance and laydown yards, and attendant piping and tankage. Area B formerly contained the original refining units, most of which have been removed except for their foundations. The area also includes the refinery office buildings and laboratory. Two abandoned water supply wells are located adjacent to the laboratory.

Area C, north of Pennypacker Avenue, contains the primary refining units, several separators, and associated piping and tankage. The refining units were constructed during the 1940's. Area C also includes the "Ballfields" a small lot east of the process areas. From the 1940's to the 1970's this property was owned by Union Tank Car Cleaning Company and contained nearly 100 sidings where tank cars were slopped out. The property was sold to Philadelphia Electric then to Arco Oil Company which traded property with Gulf. In 1979, a backhoe was used to dig test pits to investigate site soil conditions. These pits were found to contain a wide variety of spent catalysts, had strong chemical odors, and showed evidence of leaching of a bluish unknown substance. A large mound of dirt of unknown origin also occupies a portion of this site. Currently, the "Ballfields" area is fenced and locked.

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Schuylkill River Tankfield

The Schuylkill River Tankfield provides storage for refined products and access to the Colonial Pipeline distribution system. The facility contains approximately 60 above ground storage tanks, pipeline loading headers, a TEL addition facility, an unsegregated sewer system and separator, and associated piping (Figure 2). The facility is connected to the main plant by cathodically protected pipelines which run beneath the Schuylkill River.

The Schuylkill River tankfield is built over an old trash dump. The history of this property is not well known but reportedly was used for municipal trash disposal and incineration. The facility also contains an inactive leaded sludge disposal site and holding lagoon both identified as CERCLA (Superfund) sites to EPA Region III.

Darby Creek Tankfield

The Darby Creek Tankfield is a crude oil storage area built during the 1950's on the site of an old gravel quarry (Figure 3). The facility is comprised of 32 above ground storage tanks, attendant pumps and piping, a drainage and oil-water separator system, and underground crude oil pipelines leading to the main plant. The site is adjacent to the Tinicum Wildlife Refuge located across Darby Creek.

Three landfills are located on this property and have been identified as CERCLA (Superfund) sites to EPA Region III. Disposal site #1 contains H-F contaminated paper, metals, and other scrap. Disposal site #2 contains acid catalyst and sludge. The third disposal site contains oily sludge, heavy metals, and is associated with a storm water pond.

Hog Island

The Hog Island facility is composed of marine unloading headers for crude oil delivery. Crude oils unloaded at this site are pumped via underground lines to the Darby Creek Tankfield. No above-ground storage tanks are present but between 1 and 3 underground slop oil tanks are thought to be present.

SITE CONDITIONS

Regional Hydrogeology

The Philadelphia Refinery is located just east the Fall line, a physiographic feature separating the Piedmont and Atlantic Coastal Plain physiographic provinces (Figure 4). The Piedmont Province is underlain by solid bedrock consisting of weathered crystalline, metamorphic and igneous rocks, and by consolidated sedimentary rocks. This bedrock extends east under the Atlantic coastal plain, including the refinery, where it is overlain by a wedge unconsolidated sediments (Figure 5).

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These unconsolidated sediments form a series of regional confined and semi-confined aquifers which dip gently to the east.

Groundwater recharge to these aquifers is primarily infiltration of rainfall along their outcrop areas near the Fall Line. The refinery probably lies within a regional groundwater recharge area although local site conditions, discussed below, indicate recharge to deeper aquifers is not likely. Regional groundwater discharge is by upward leakage into the Atlantic Ocean and by groundwater extraction wells. At the time of this writing, more detailed information on regional conditions was not available. This information is being obtained from State agencies and will be the subject of a separate report. A generalized regional geologic cross-section is shown on Figure 5.

Local Hydrogeology and Preliminary Assessment of Contamination

The refinery properties have not been the subject of a specific groundwater investigation, therefore, no quantitative data are available regarding groundwater conditions or quality at this site. The following discussion is based upon field observations made during a one-day visit to the plant. These observations cannot be confirmed without a hydrogeologic investigation of the site. Each of the refinery properties is discussed separately due to differences in hydrogeologic conditions.

Main Plant

The main plant borders the Schuylkill River which is confluent to the Delaware River. The main plant appears to have been constructed by placing artificial fill over a former salt marsh. Typically, these marsh deposits are composed of fairly thick, plastic, low permeability clays. Often, these clays will have peat or high organic content layers which may provide higher permeabilities. Some permeable alluvial materials, sands or gravels, may be interbedded with the marsh deposits.

The origin and composition of the fill materials at the site are not documented. Based on observations of excavations within the plant, refinery personnel report that the fill is heterogeneous. My observation was that the surficial fill was primarily coarse sand size granular material. The variability of fill materials and degree of compaction will influence groundwater and subsurface oil movements at this site. Tidal fluctuations in the Schuylkill River may affect groundwater movements and may limit the migration of free oil.

It is likely that the marsh deposits are underlain by unconsolidated sediments of the Coastal Plain to a depth of more than 100 feet. Abandoned refinery laboratory wells were reportedly drilled into these sediments to depths of about 100 feet. These sediments may be regional aquifers but are not likely to be contaminated by refinery contamination due to the probable existence of low permeability marsh deposits.

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Initially, the fill materials were placed behind a wooden seawall constructed in the early 1920's. This was replaced in the 1950's by 1400 feet of concrete seawall near the oil and grease plant and by 8400 feet of tongue-and-groove steel sheet pile along the remaining waterfront (Photograph #1). This fill-and-bulkhead system has led to the development of a shallow water table which is perched on the underlying marsh deposits. This water table is encountered at depths of 5 to 7 feet and is recharged by rainfall. Discharge of these groundwaters is to the Schuylkill River. The configuration of the water table cannot be determined without a sufficient number of monitor wells but flow directions are expected to be generally towards the river.

Observations regarding contamination at this site are summarized below:

- (1) A known accumulation of free oil is present in the "terminal-area" south of Penrose Bridge. Recoverable quantities of oil appear to be present near the package and grease plant and also along "B-Street." It is not known whether these accumulations are comingled or are separate. Delineation of product source(s), areal extent, thickness, and economics of oil recovery would require a site investigation. Minor seepage to the Schuylkill River is occurring through the bulkhead near the package and grease plant (Photograph #2).

The effected area appears to cover about 20 acres with oil thicknesses observed of several inches in monitor wells near the bulkhead (Figure 6, Photograph #6). Products involved may include #2-oil, jet fuel, lube oils, and perhaps gasoline. This area contains several loading facilities and underground pipeways which are common sources of leakage. Tank leaks and overfills are generally subordinate sources. Oil contaminated soil is obvious along most of the pipeways (Photographs 3, 4 & 5).

- (2) A second known accumulation of free product is present along ARCO crude oil pipelines which parallel Penrose Avenue Bridge. Information on the magnitude of the pipeline leakage or the extent of subsurface oil is sketchy. This accumulation is likely to be localized to the pipeline area due to the limited mobility of crude oils in the subsurface. A site investigation would be needed to determine the extent of this accumulation and to identify a proper recovery system. Recovery efforts could be funded by ARCO if proof exists that their pipelines are the source of this oil.
- (3) Free oil has been noted in some excavations at various locations within the remainder of the refinery, specifically near tanks #1133 and #1134, along the bulkhead near Unit #137, and within the "North Tankfield." There is no indirect evidence, such as seepage to the Schuylkill River, of extensive subsurface oil. It is likely that small, localized accumulation are present in these and other locations within the main plant.
- (4) Significant quantities of oily dirt are present throughout much of the refinery, principally along pipeways. Lessor sources of oily

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dirt are separators, tank overfills, and process units. This material cannot be economically removed or cleaned-up and would have to be accepted on an as-is basis.

Schuylkill River Tankfarm

This facility is constructed on top of an old trash dump. Soil conditions are poorly known and it is uncertain whether natural soils were disturbed during site preparation for the dump. The surficial materials are primarily porous, sands and large rock fragments.

Unconfined groundwaters are likely to be present at depths of less than 20 feet. The bank of the Schuylkill River was not inspected but appeared to be reinforced by rip-rap. Groundwater levels are likely to be several feet above river level and are expected to respond to river stage. Groundwater flow is expected to be eastward toward the river although a component of flow may be directed southward toward a small tributary.

No obvious indications of subsurface oil accumulations were present at the facility. The existence of any localized oil accumulations would require a site investigation but it is nearly certain that any such problems would be limited to Company property. Oil sources would include occasional back-up and overflow of the oil-storm water sewer system and tank overflows. Evidence of tank over-flows were present for the #6-fuel oil tanks. Oily dirt is present along some pipeways and adjacent to overfilled tanks.

Darby Creek Tankfield

Soil conditions at the Darby Creek Tankfield are poorly known. The nature, extent, and thickness of artificial fill at this site is not known. Inspection of the ground surface indicates that coarse granular fill, including brick fragments, was emplaced over much of the site. Natural soils did not outcrop and could not be inspected. Refinery personnel report this area was formerly a gravel pit.

The water table is expected to be encountered several feet above the level of Darby Creek with a generally east gradient. A small unlined impoundment in the northeast area of the plant may create a local groundwater mound. This impoundment is adjacent to some piles of solid waste, mostly soil.

As with the Schuylkill River Tankfarm, there are no obvious indications of subsurface oil at this facility. Any localized accumulations would be confined to Company property. Refinery personnel report few oil problems at this site stemming from tank overfills or pipeline leaks. Some oily dirt, nevertheless, is likely to be present at this site.

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Hog Island and Pipelines

This site borders the Delaware River but was not inspected due to a shortage of time. Refinery personnel report that the facility consists of crude oil unloading headers and transfer lines to the Darby Creek Tankfield. It was also reported that between one and three underground slop oil tanks are present at this site and that some leakage is suspected. This information is poorly documented and additional inspection should be conducted.

Underground pipeline systems are present between Hog Island and the Darby Creek Tankfield and also between the main plant and both remote tankfield facilities. Refinery personnel report that these pipelines are cathodically protected. A history of any leaks or repairs to these lines was not obtained. The frequency of pipeline integrity testing, if any, was also not determined.

CERCLA (SUPERFUND) SITES

The refinery has provided EPA Region III with required notice of a total of thirteen CERCLA sites, nine within the main plant, one at Schuylkill River Tankfield, and three at the Darby Creek Tankfield. This notification was made in 1981 and no subsequent contacts with regulatory agencies have been made. These sites were identified by refinery personnel based on knowledge of plant operations, past tank bottom cleaning methods, visible inspections of waste sites, and some records. The boundaries and areal extent of these sites are estimates only are not substantiated by either sampling or by documentation. No conceptual closure plans have been developed and, therefore, no cost estimates are available. The thirteen waste sites may cover a surface area of nearly 70 acres although the size of the leaded sludge sites appear to be over estimated.

Within the main plant, six areas have been identified as possibly containing leaded tank bottoms, a listed hazardous waste (K052) (Figure 1). Other wastes associated with some of these areas may be slop oil emulsion solids, separator sludge, oily solids, and heavy metals. The areas identified to EPA cover approximately 57.6 acres (2,500,000 ft²). Two smaller areas containing API separator sludge and spent caustic cover areas of about 0.8 acre (35,000 ft²) and 0.46 acre (20,000 ft²), respectively.

The "Ballfields" area described previously was also identified to EPA as a CERCLA site. The contents and boundaries of this site are not known but may cover more than one acre.

The Schuylkill River Tankfarm contains a leaded tank bottom sludge (K052) disposal site covering perhaps 1.8 acres (80,000 ft²). Some separator sludge may also be present at this location.

The Darby Creek Tankfield contains three inactive landfills (Figure 3). Landfill #1 contains H-F contaminated paper, metals, scrap, etc. and

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covers an approximate area of 4.6 acres (200,000 ft²). Landfill #2 contains spent acid catalyst and oily sludge covering an area of about 0.92 acres (40,000 ft²). Landfill #3 contains oil sludge, heavy metals, and some unknown soil waste piles. This site covers approximately 7.3 acres (320,000 ft²).

Conclusions

1. The largest potential expenditures at this site would be closure of the thirteen CERCLA sites which may total nearly 70 acres. The physical boundaries and contents of these waste sites have not been verified or documented. A legal review of closure requirements, options, standards, and time frames is needed to identify the scope of investigation of these sites. If these sites are found to require closure, a detailed analysis of all on-site closure methods would be required. Removal of the waste by excavation and off-site disposal is not economically feasible, 0.6 to 1.0 billion dollars is estimated.

The simplest on-site closure generally includes construction of a soil-synthetic liner cap to prevent infiltration of rainfall or storm water. Unit costs for these caps range from two to three dollars per square foot giving potential closure costs for all disposal sites of six to 10 million dollars. Consolidation of sites would lower these costs, any requirements for groundwater monitoring or remedial action would increase costs significantly. On-site capping has the adverse side-effect of removing land from future refinery construction.

2. Recoverable quantities of free oil are present beneath the package and grease plant area, "B-Street", and along the Arco crude oil lines. No direct evidence of significant accumulations of subsurface oil were observed in the remainder of the main plant or the Schuylkill River and Darby Creek Tankfields. It is probable that localized oil accumulations may be present at one or more of these locations and the presence of a large accumulation cannot be ruled out. A full evaluation of these sites would cost between 50,000 and 100,000 dollars. Oil recovery costs would depend upon the areal extent of the accumulation(s), specific site conditions, and the volume of oil. Estimated costs range from 0.5 to 1.5 million dollars over a three to five year period.
3. Third party impacts due to subsurface oil accumulations appear to be limited to the potential for seepage to surface waters. The sites are located in a heavily industrialized area and appear to be downgradient of any adjoining properties. While a review of regional hydrogeologic information is not complete, it seems unlikely that any refinery contamination could impact either municipal or domestic water supplies. A review of pertinent literature on this issue is currently underway.

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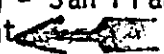
4. Oily dirt is present throughout much of the refinery principally along pipeways and loading/unloading facilities. Due to the large volume of this material, it will have to be left in-place and assumed as-is.
5. This review is based upon a one-day inspection of the plant and discussions with refinery personnel. Very little information is available on groundwater conditions at this refinery as no specific studies or monitoring have been conducted. Investigation of this site may alter some of the observations and conclusions stated above.

Suggested Actions

1. A thorough review of legal requirements for the CERCLA sites should be conducted to establish whether any closure is needed. Due to the great expense of such closures all legal options should be explored. If closure of one or more sites appears necessary, a program combining site investigations and evaluation of on-site closure options would be needed. These efforts would probably require two to four months to complete.
2. A phased program to evaluate the extent of subsurface hydrocarbons at each of the four properties is suggested. The first phase would be designed to establish the presence of any free oil near surface waters which adjoin property lines, loading facilities, and areas suspected to have contamination based on past operations. These initial investigations should be broad enough to identify the extent of significant oil accumulations with some certainty, identify the hydraulic gradient and soil conditions affecting oil recovery, and to allow certification that a piece of property is "clean" if the findings support this conclusion. Any additional work including oil recovery would be based on results of the first phase. Cost is estimated between 50,000 and 100,000 dollars.
3. In the event of a property transfer, Chevron should identify the standards to which the Company is willing to clean-up subsurface oil. This standard should comply with Company policy and any applicable laws. Suggested standards include removal of liquid oil to a trace amount defined as 1/8". Residual oil and oil contaminated soil would be left in-place. Any subsequent incident by a new owner such as a spill, leak, or overfill which adds significantly to the existing problem would result in transfer of clean-up responsibility to the new owner.


J. J. PATRY

JJP:fw

cc: Mr. M. R. Young - San Francisco
Mr. T. L. Wright 

HF SPENT CAUSTIC
PRECIPITATION
BASIN

WWTU

SLUDGE
INCINERATOR
& STORAGE
TANKS

SKIM &
SURGE
TANK

NO. 2
SEP.

NO. 6
SLUDGE
STORAGE
NO. 7 API SEP.
SPENT CAUSTIC
STORAGE

WASTE OIL
PROCESSING
& DRUM STORAGE

NO. 8 API
SEPARATOR

NO. 3 API SEP.

SKIM & SURGE TANK

NO. 4 & 4A SEPARATORS

BALLFIELDS

NO. 24
GATE

DRUM
STORAGE

NO. 19
GATE

NO. 2 GATE

seep
SCHUYLKILL
RIVER

DRUM
STORAGE

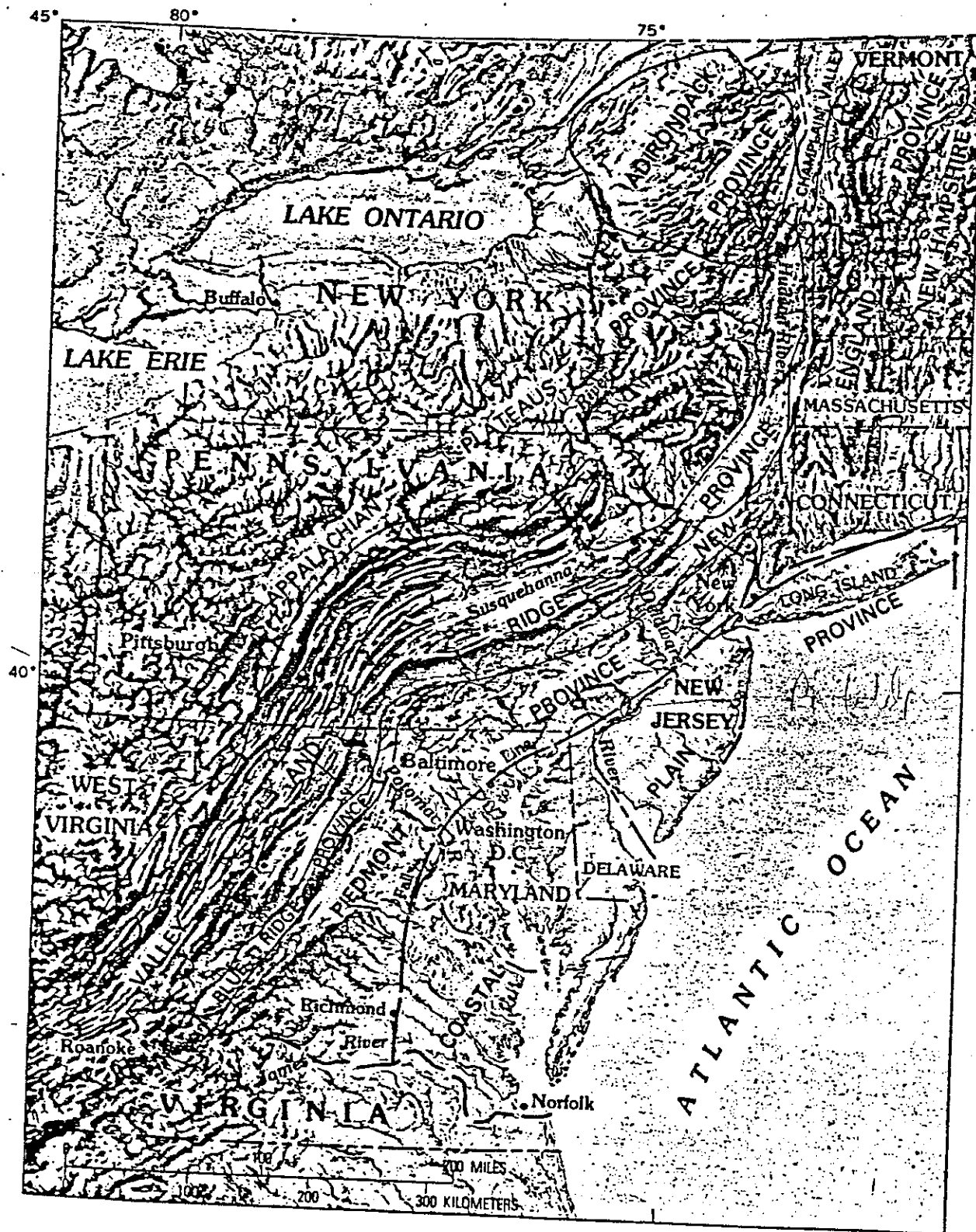
BUILDINGS AND STRUCTURES
GULF OIL COMPANY OF PA
PHILADELPHIA REFINERY
PHILADELPHIA, PA.

PAST DISPOSAL AREAS

CA C

AREA B

AREA A



4—The major physiographic divisions of the Mid-Atlantic Region also define, in a general way, the principal geologic terranes. (After Fenneman and others, 1946.)

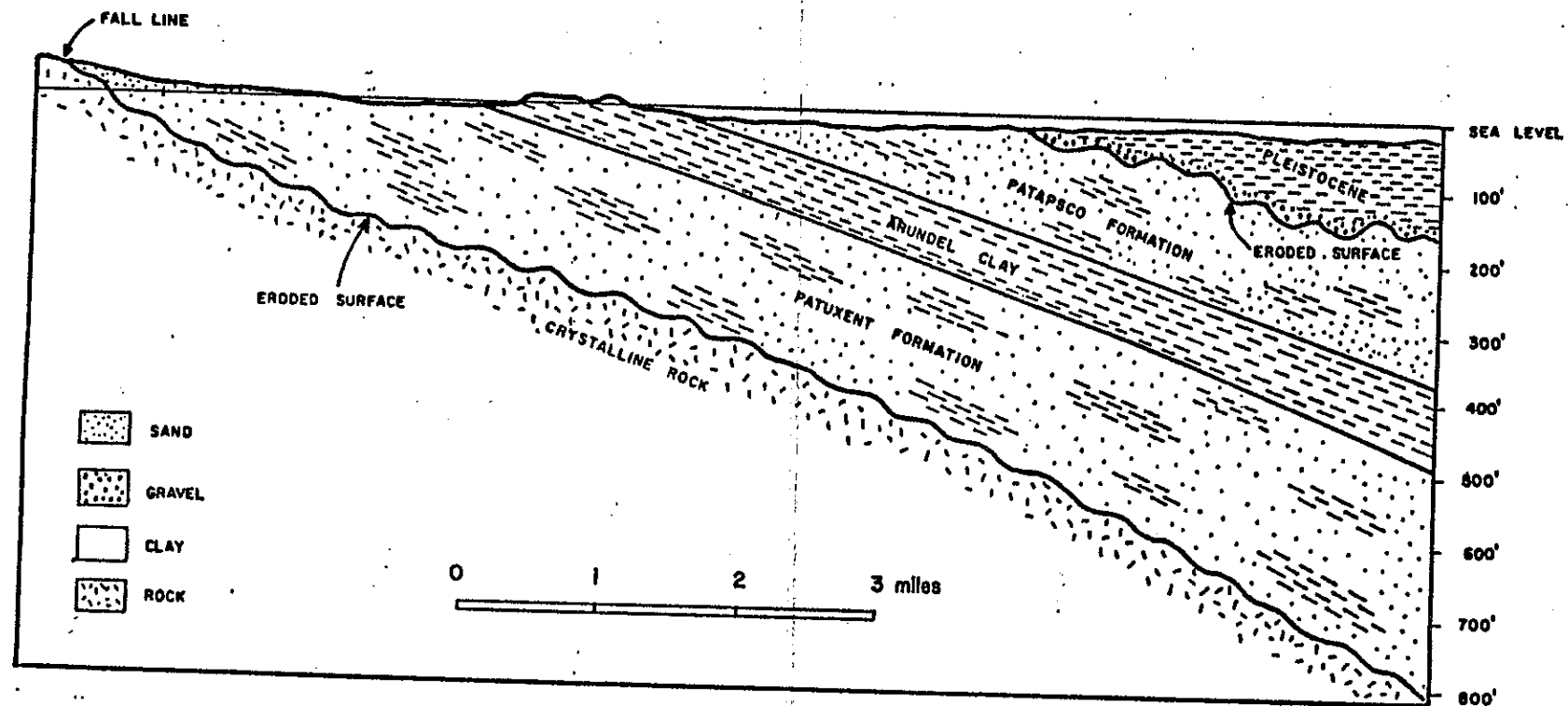
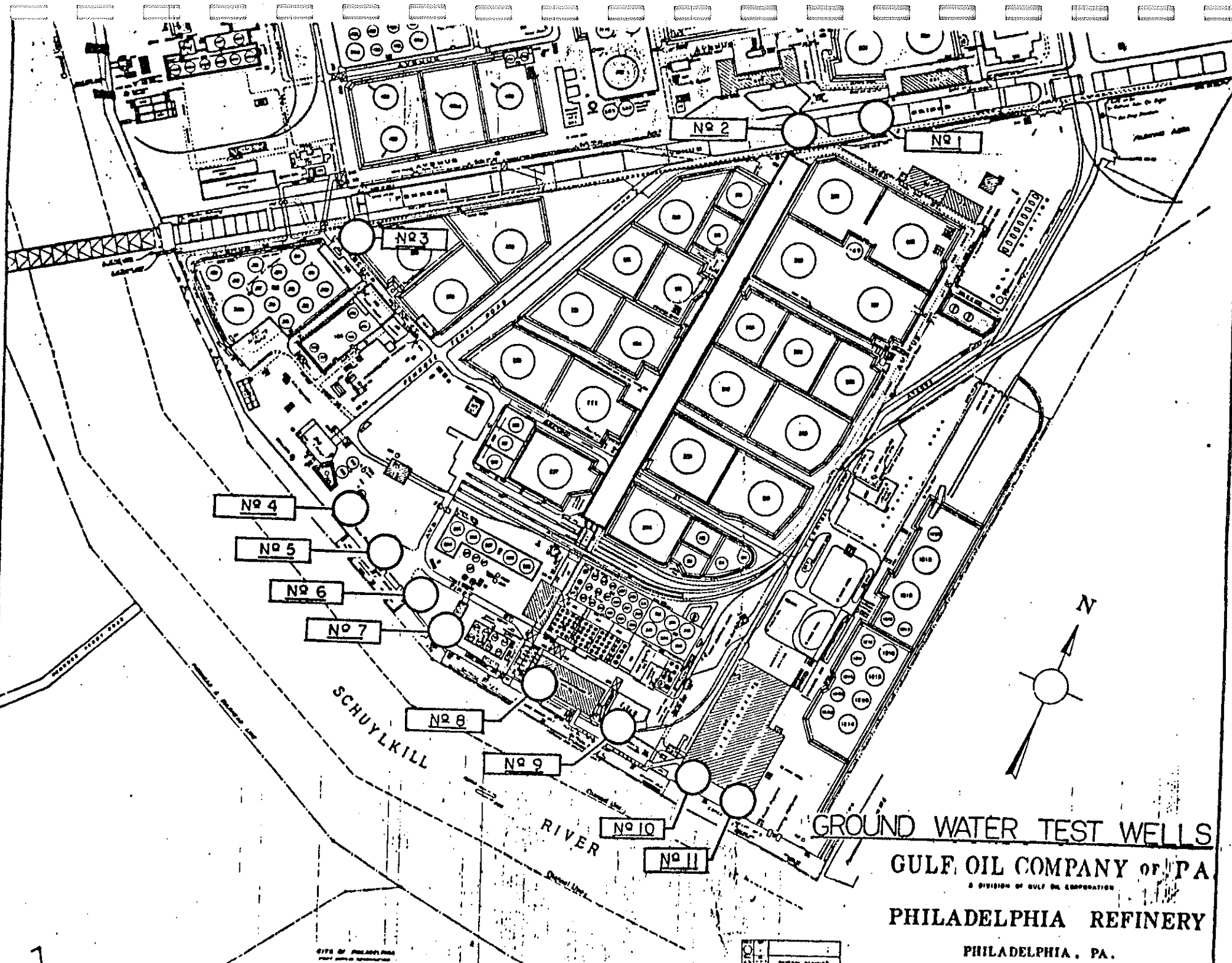


FIGURE 5 GENERALIZED CROSS-SECTION OF ATLANTIC COASTAL PLAIN



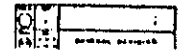
GROUND WATER TEST WELLS

GULF OIL COMPANY OF PA
A DIVISION OF GULF OIL CORPORATION

PHILADELPHIA REFINERY

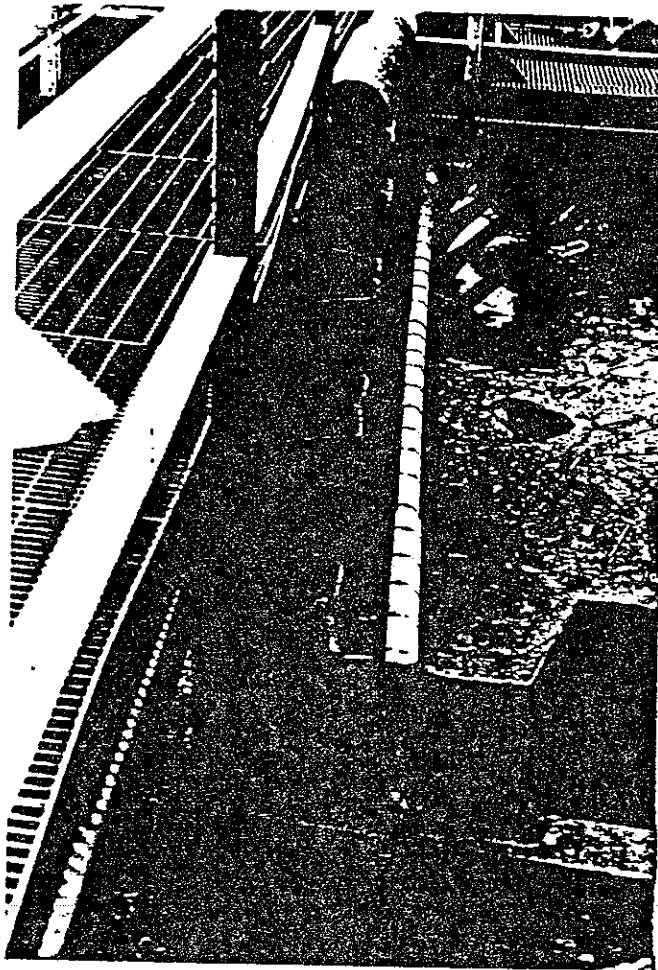
PHILADELPHIA, PA.

CITY OF PHILADELPHIA
PLAT 10000-10000



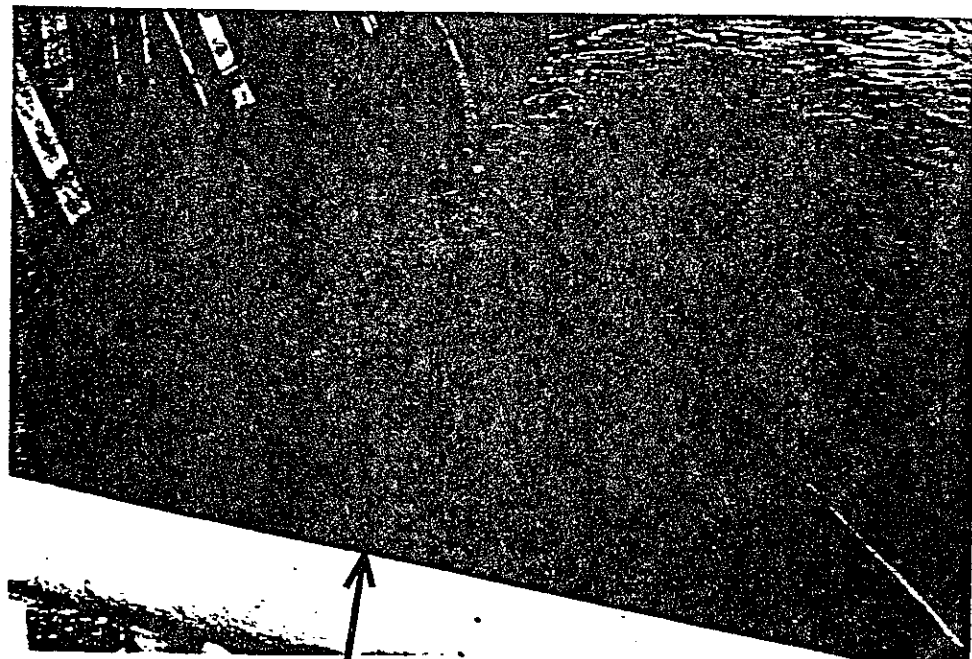
PHOTOGRAPH #1

TONGUE AND GROOVE
STEEL SHEET PILES



PHOTOGRAPH #2

OIL SEEPAGE INTO
SCHUYLKILL RIVER
NEAR PACKAGE AND
GREASE PLANT

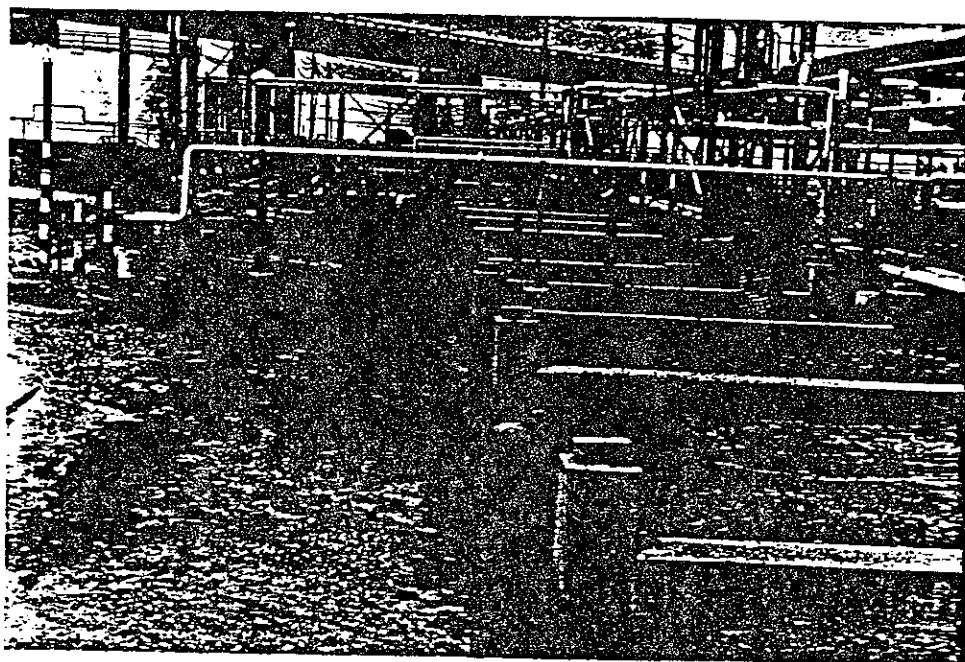


OIL SHEEN

CONTAINMENT
BOOM

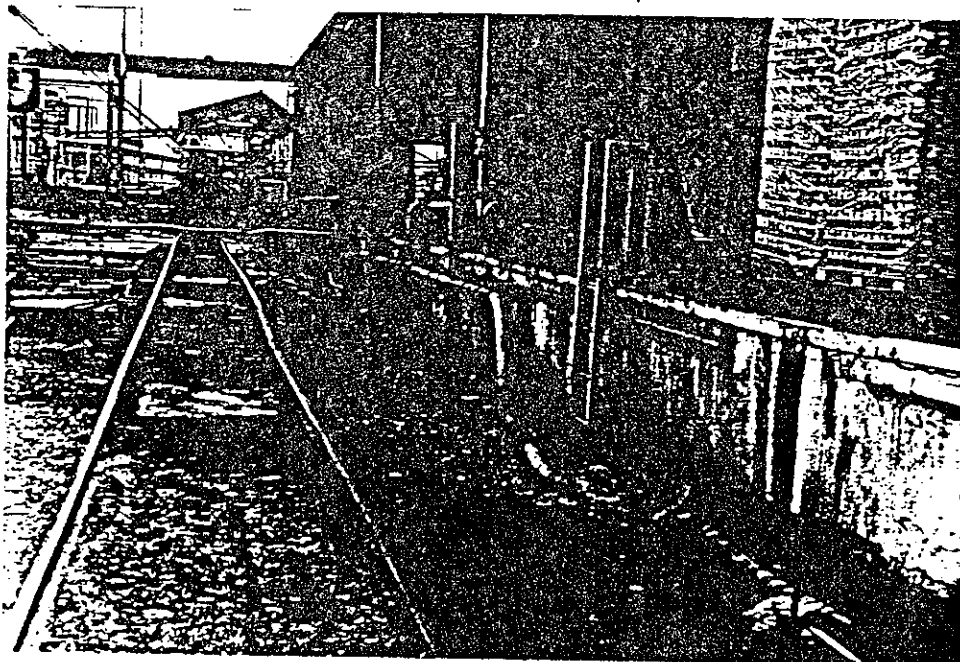
PHOTOGRAPH #3

OILY DIRT ALONG
PIPEWAY



PHOTOGRAPH #4

OILY DIRT AND
STANDING OIL
PACKAGE AND
GREASE PLANT



PHOTOGRAPH #5

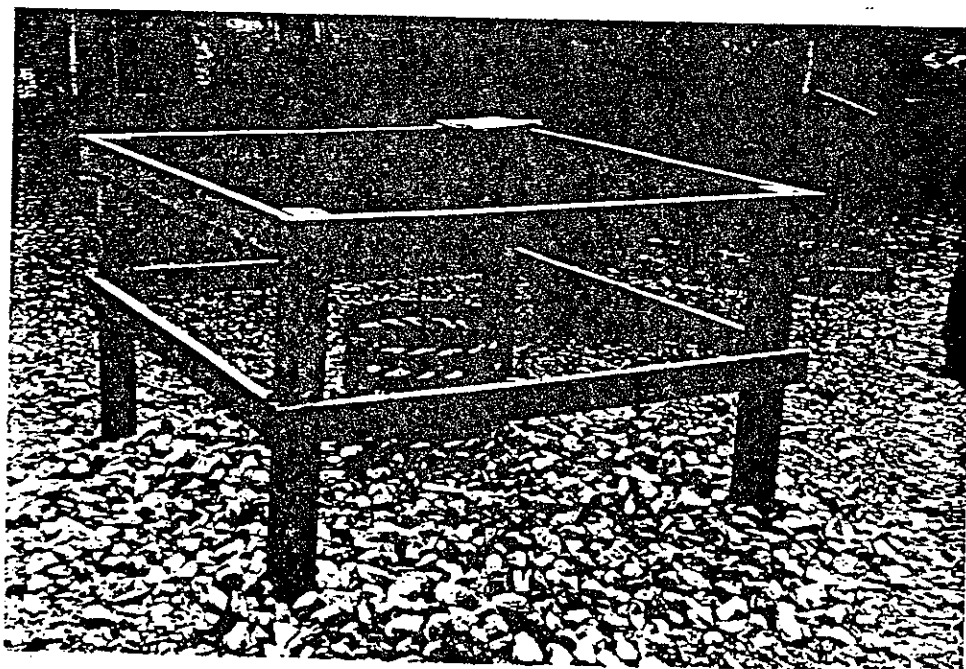
FREE OIL NEAR
PIPEWAY "B-STREET"



FREE OIL

PHOTOGRAPH #6

"MONITORING" WELL OF
PERFORATED CULVERT



REVIEW OF HISTORICAL AERIAL PHOTOGRAPHS

Three sets of historical, black and white, stereo aerial photographs, for the years 1940, 1959 and 1975, were obtained for each refinery area. The photographs, which will be submitted to Chevron upon completion of this project, were provided by Aero Services of Houston, Texas. A number of the locations selected for the installation of monitoring wells during this investigation were based on the aerial photo observations. The following subsections describe Dames & Moore's observations.

The Main Plant

Between 1940 and 1959, major expansion occurred at the Main Plant. In 1940, only the western half of the area C was involved in refinery activities. A large basin, approximately 300 feet by 300 feet in area was located at the northwest corner of Area C. In 1959 and 1975, all three area, A, B, and C were completely involved in refinery activities. No major changes appear to have taken place between 1959 and 1975 although many minor changes were observed. Minor changes included additions, modifications, and deletions of tanks, small buildings and small impoundments or separator units.

The Ballfields

In 1940 and 1959, the entire Ballfields area was occupied by a railcar cleaning operation. Tank cars were parked both on sidings and off-track. Heavy staining characterized most of the ground surface. A group of buildings was present, including one large building on the southern portion of the Ballfields. In 1975, all activities related to the tank car cleaning operation were gone. The area appeared to have been graded, and a ballfield was present. The large mound of soil which is currently present near the center of the site, was present in 1975.

Schuykill River Tank Farm

In 1940, the Schuykill River Tank Farm was not yet constructed. At that time, the area was being used for shallow soil borrow activities. In 1959, the tank farm appeared essentially as it is today. The TEL disposal area and an adjacent separator unit were present. The disposal area contains ponded water. In 1975, a small collection basin was present between the TEL disposal area and the small separator unit. The disposal area appears essentially the same as it did in 1959, with ponded water present.

Darby Creek Tank Farm

In 1940, the Darby Creek Tank Farm had not yet been constructed. At that time, the northern half of the property was occupied by a brick factory and extensive soil borrow activities existed in areas where tanks are now present. In 1959 and 1975, the site appeared essentially as it does at the present time. Four separate basins were present adjacent to Darby Creek on the east side of the property. The northernmost basin showed evidence of disposal activities as it was partially filled with sediment. In 1959 and 1975, the brick factory activities were confined to a smaller area in the west-central portion of the site.

Hog Island

In 1940, the Hog Island Wharves had not yet been constructed. At that time, the area was undeveloped. In 1959 and 1975, the site appeared essentially as it does at present, with three unloading stations. No evidence of above ground tanks or significant surface spills were present in 1959 or 1975.

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APPENDIX B

Drilling and Monitoring Well Construction Procedures,
Soil Sampling Procedures, and Slug Test Procedures

DRILLING AND MONITORING WELL CONSTRUCTION PROCEDURES, SOIL SAMPLING PROCEDURES, AND SLUG TEST PROCEDURES

INTRODUCTION

This Appendix presents the following information pertaining to monitoring well construction and soil sampling:

- o Quality Assurance Procedures
- o Drilling Procedures
- o Monitoring Well Construction Procedures
- o Soil Sampling Procedures
- o Slug Test Procedures

QUALITY ASSURANCE PROCEDURES

- o To prevent cross-contamination, all equipment was cleaned after each use at either the drill site or at the decontamination (laundry area) area. The type of cleaning required varied according to the nature of contamination. For example, heavy oils were removed by steam-cleaning.
- o To prevent cross-contamination between shallow levels and deeper levels in the aquifer, the annular space between the borehole and the well casing was tremie-grouted to the surface.
- o To prevent surface contamination from entering the well, a protective steel casing with a locking cap was installed at the surface.

DRILLING PROCEDURES

Method of drilling: Hollow-stem augers.

Formation sampling: Samples were collected every five-feet, beginning with the 4-6' interval. A standard split-spoon sampler was used to obtain samples. After obtaining each soil sample, the split-spoon was thoroughly rinsed with potable water.

Diameters of borings: Six- and ten-inches.

Decontamination requirements: All downhole tools, including, augers, tremie-pipes, and drill rods were steam cleaned at the laundry area or at the well site using potable water. This procedure was repeated between each well, and at the start and conclusion of the drilling program.

Site cleanup: All debris, paper, etc., were disposed of in areas designated by Chevron personnel.

Abandoning a Boring: Abandoned borings were backfilled to the surface by pressure grouting with a tremie pipe lowered to the bottom of the boring. If the boring was incomplete, and very shallow (above the water table), it was backfilled with drill cuttings and natural material.

MONITORING WELL CONSTRUCTION PROCEDURES

Casing and screen: Four-inch I.D. Schedule 40 PVC. No solvent glue was used in assembling the well screen and riser casing.

Screen slot size: 0.020-inch, machine-slotted.

Bottom cap: A bottom cap was installed at the bottom of the well screen in all cases.

Sand pack: By weight, 90 percent of the sand pack is larger than the size of the screen slot.

Placement of the sand pack: The sand pack extends to a minimum of one foot above the top of the well screen. This was confirmed by measuring down the annular space with a weighted tape or a measured small-diameter pipe, or rod. The sand pack was poured down the annular space.

Bentonite seal:

A minimum one-foot bentonite seal was placed in the annular space above the sand pack in each well by emplacing 1/4-inch diameter volclay pellets in the annular space.

**Grouting annular space:
(Deep wells only)**

In most cases, a bentonite grout was tremie-piped into the annular space from the top of the bentonite seal to the ground surface being careful not to disrupt the bentonite seal. The grout was emplaced so that it completely displaced the drilling water.

Top cap:

A cap was installed on the top of all wells.

Well development:

Each well was developed for about one hour or until the water removed was visually clean (free of sediment). If practical, a minimum of five times the volumes of water standing in the well was removed.

Wells were developed by a centrifugal or submersible pump. All pumps were equipped with check valves to prohibit well water within the discharge lines from entering the well. Dedicated 3/4" poly-pipe was used for each well. Water pumped from the wells was discharged to the ground surface, but not allowed to enter streams or other surface water bodies. All poly-pipe was disposed of in areas designated by Chevron personnel.

Protective casing:

A five-foot long section of six-inch I.D. steel casing was placed over the PVC well casing in order to protect the well. The steel casing was set about two to three feet below the ground surface, extending about two to three feet above the ground surface. A lockable cap was affixed to the protective casing. Where necessary, the finished well was surrounded by protective posts.

Flush mounting:

In some cases, such as roadways, wells were installed flush with the ground surface. In such cases, the wells were finished within a manhole. A lockable waterproof seal was affixed to each well to prevent rain or other surface water from entering the well.

Well labeling:

The complete identification number of each monitoring well was painted on the protective casing or manhole cover.

Surveying:

A level survey was performed by Penonni Associates of Philadelphia, Pennsylvania in which the elevation of the top of the PVC well casing of each well was determined to + 0.01 feet, and the reference point marked. Elevations were referenced to the National Geodetic Vertical Datum (NGVD).

SOIL SAMPLING PROCEDURES

General

At a minimum, sampling procedure standards and techniques were performed in accordance with EPA and PADER guidelines and regulations. In situations not covered by the guidelines or regulations, the procedures were designed to be appropriate for the sample type, location and analyses to be performed.

Soil Sampling Procedures

Collection of soil samples in hand-auger borings was performed using a standard three-inch hand auger. When retrieved, the sample was transferred from the auger to sample jars by means of a scoop or trowel. To the extent possible, soil which came in contact with the walls of the auger was discarded. Soil samples collected in test pits were obtained directly from the walls of the pit and transferred to the sample jars by means of a scoop or trowel.

Before the start of the sampling program and between the gathering of each sample, the sampling equipment was rinsed with a non-phosphate soapy water solution, distilled water, nitric acid, and distilled water, in that order. For each site

sampled, all sampling equipment was handled with a new pair of surgical gloves. All necessary information was recorded in a field notebook, including depth, description, and location of sample.

Environmental Testing and Certification (ETC) of Edison, New Jersey, and Century Laboratories of Thorfare, New Jersey provided all the sample containers in shipping shuttles or coolers. The shuttles or coolers were opened and inspected to make sure that all required bottles were present and labeled. After sample collection, all chain-of-custody forms were filled out, signed and sealed in the shuttles or coolers along with the sample jars. Sample shuttles and coolers were packed with ice. All shuttles and coolers were transported to their respective laboratories within 48 hours after the samples were collected.

SLUG TEST PROCEDURES

The following procedures were used to perform each slug test:

- o Measured the static water level in the well and recorded the data on a Slug Test Data Form.
- o Washed the steel cylindrical slug with alcohol, steam-cleaned and rinsed with distilled water.
- o Lowered the slug rapidly, but smoothly, into the water column of the well and noted the time, to the second, of slug's introduction.
- o Measured the decline of the water level (to the nearest .01 feet) frequently until the water returned to its original static level. Recorded the measurements on the Slug Test Data Form.
- o Continued taking time and water level readings until the water level had recovered to at least 90 percent of the original static water level.
- o Removed the slug rapidly from the water, and the well.
- o Frequently measured and recorded the rising water level as it returned to the static level. Recorded the data on the Slug Test Data Form.
- o Continued taking readings until the water level had recovered to at least 90 percent of the original static water level.
- o Completed the information, including drawdowns, on the Slug Test Data Forms.

0628R

APPENDIX C

Logs of Borings and Monitoring
Well Construction Details

LOG of BORING and MONITORING WELL CONSTRUCTION DETAILS

Project : Chevron/Philadelphia Refinery

Boring/Well No. - A1

Project No. 113-909-032

Date M.W. completed 2/24/86

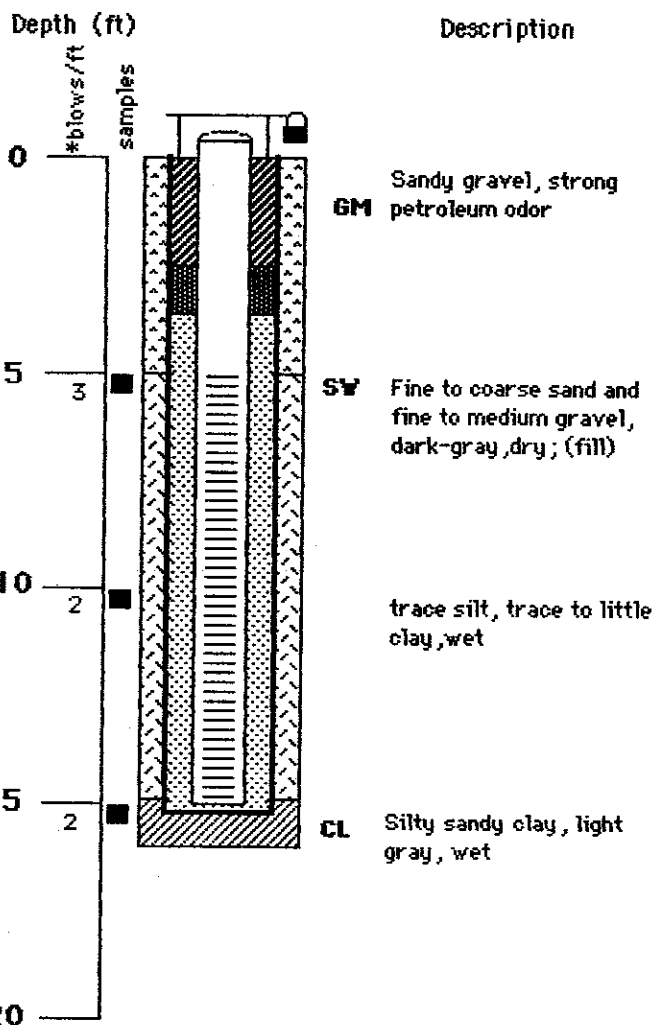
Supervising D & M
Engineer/Geologist Andreu Ivansiu

Location - Chevron Refinery

Driller - Warren George

Drilling Completed - 2/24/86

Type of Rig - Hollow Stem Auger



CONSTRUCTION DATA

Borehole Diam. - 10"

Borehole Depth - 15'

Casing/Screen Type - PVC

Casing Diam. - 4"

Casing Depth - 15'

Screen Setting - 5' - 15'

Slot Width - 0.02"

Type of Seal - Bentonite

Type of Filterpack - #2 Sand

Type of Grout - Cement/Bentonite

MEASUREMENTS (NGVD)

Top of Casing Elevation - 8.63'

Static Water Level Elevation - 3.08'

Date Measured - 1/9/87

Surface Elevation - 8.63'

TEST DATA

Pump Type -

Depth to Intake (ft) -

Satic Water Level (ft) -

Pumping Water Level (ft) -

Drawdown (ft) -

Length of Test (Hrs) -

Notes:

* Blows taken using a 140 lb hammer falling 30 inches.

** All soils classified by visual inspection.

WELL CONSTRUCTION KEY

Filter Pack

Bentonite Seal

Cement Grout

DAMES & MOORE

LOG of BORING and MONITORING WELL CONSTRUCTION DETAILS

Project : Chevron/Philadelphia Refinery

Project No. 113-909-032

Date M.W. completed 2/27/86

Supervising D & M Engineer /Geologist Mark Robertson

Boring/Well No. -A2

Location - Chevron Refinery

Driller - Warren George

Drilling Completed - 2/27/86

Type of Rig - Hollow Stem Auger

CONSTRUCTION DATA

Borehole Diam. - 10"

Borehole Depth - 13'

Casing/Screen Type - PVC

Casing Diam. - 4"

Casing Depth - 13'

Screen Setting - 3' - 13'

Slot Width - 0.02"

Type of Seal - Bentonite

Type of Filterpack - #2 Sand

Type of Grout - Cement/Bentonite

MEASUREMENTS (NGVD)

Top of Casing Elevation - 7.84'

Static Water Level Elevation - 6.12'

Date Measured - 1/9/87

Surface Elevation - 7.84'

TEST DATA

Pump Type -

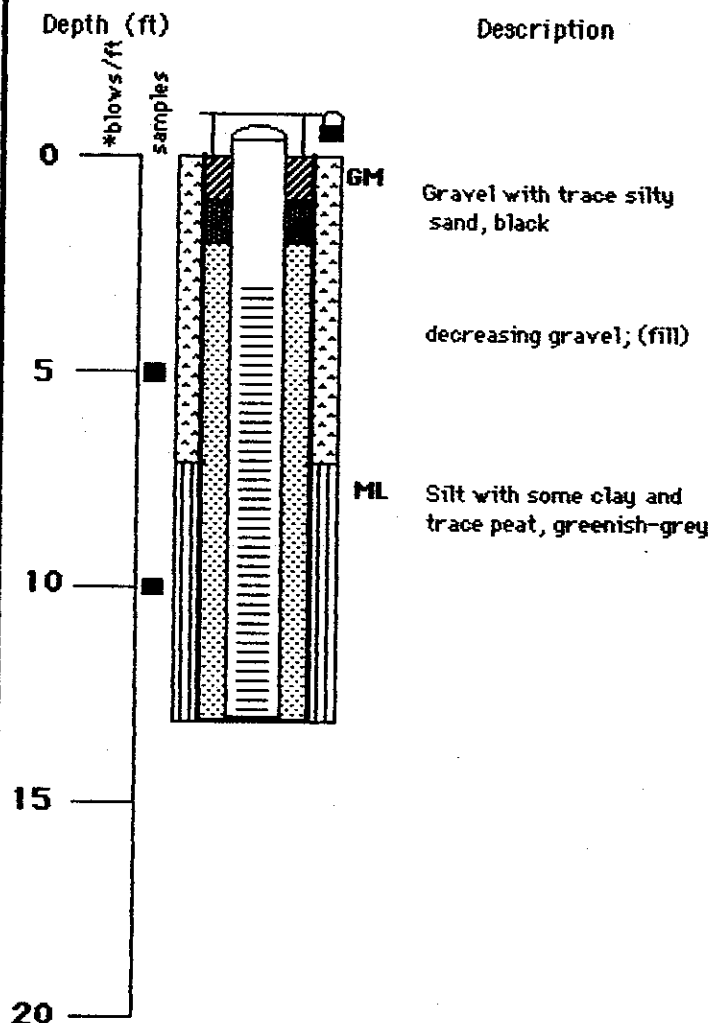
Depth to Intake (ft) -

Satic Water Level (ft) -

Pumping Water Level (ft) -

Drawdown (ft) -

Length of Test (Hrs) -



Notes:

* Blows taken using a 140 lb hammer falling 30 inches.

** All soils classified by visual inspection.

WELL CONSTRUCTION KEY

Filter Pack

Bentonite Seal

Cement Grout

DAMES & MOORE

LOG of BORING and MONITORING WELL CONSTRUCTION DETAILS

Project : Chevron/Philadelphia Refinery

Boring/Well No. - A3

Project No. 113-909-032

Location - Chevron Refinery

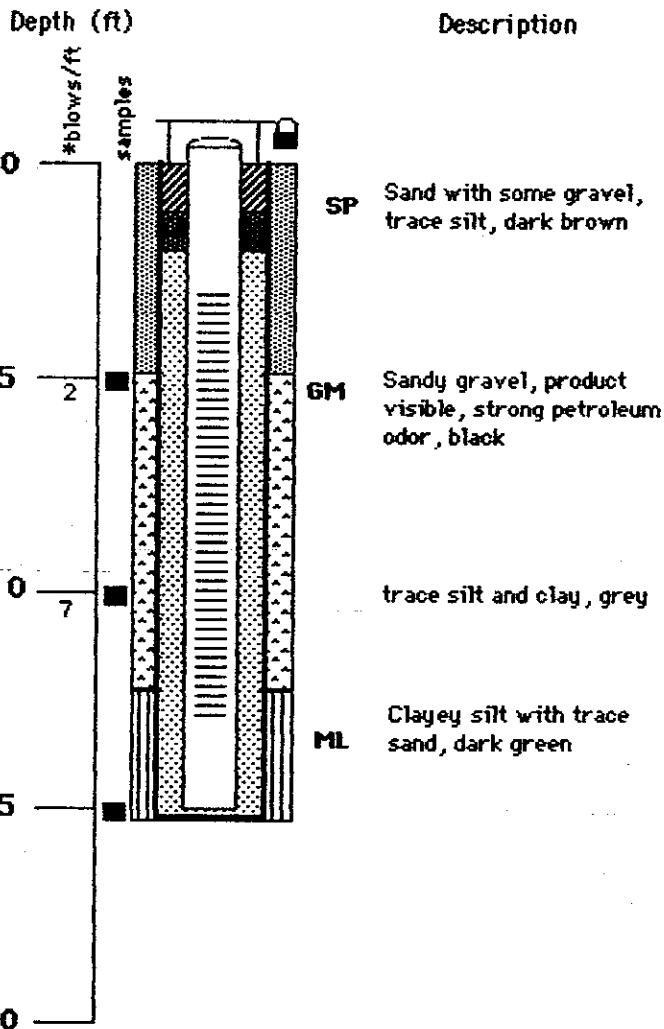
Date M.W. completed 2/24/86

Driller - Warren George

Supervising D & M Engineer/Geologist Mark Robertson

Drilling Completed - 2/24/86

Type of Rig - Hollow Stem Auger



CONSTRUCTION DATA

Borehole Diam. - 10"

Borehole Depth - 15'

Casing/Screen Type - PVC

Casing Diam. - 4"

Casing Depth - 15'

Screen Setting - 3' - 13'

Slot Width - 0.02"

Type of Seal - Bentonite

Type of Filterpack - #2 Sand

Type of Grout - Cement/Bentonite

MEASUREMENTS (NGVD)

Top of Casing Elevation - 9.37'

Static Water Level Elevation - 5.26'

Date Measured - 1/9/87

Surface Elevation - 9.32'

TEST DATA

Pump Type -

Depth to Intake (ft) -

Static Water Level (ft) -

Pumping Water Level (ft) -

Drawdown (ft) -

Length of Test (Hrs) -

Notes:

* Blows taken using a 140 lb hammer falling 30 inches.

** All soils classified by visual inspection.

WELL CONSTRUCTION KEY

Filter Pack

Bentonite Seal

Cement Grout

DAMES & MOORE

LOG of BORING and MONITORING WELL CONSTRUCTION DETAILS

Project : Chevron/Philadelphia Refinery

Boring/Well No. - A4

Project No. 113-909-032

Date M.W. completed 2/24/86

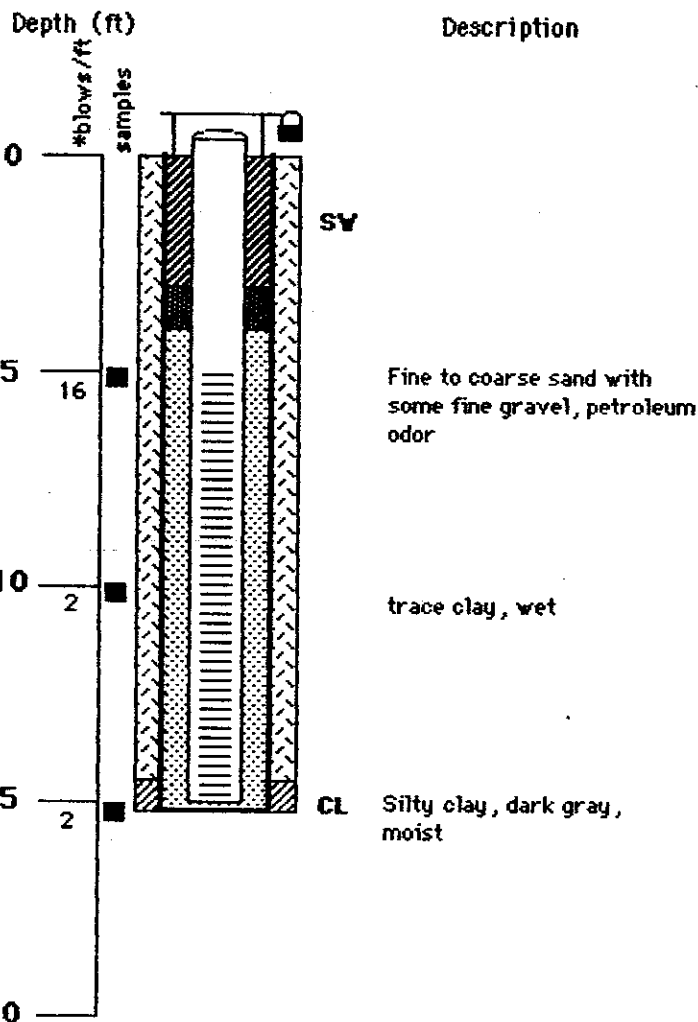
Supervising D & M Engineer/Geologist Andreu Ivansiu

Location - Chevron Refinery

Driller - Warren George

Drilling Completed - 2/24/86

Type of Rig - Hollow Stem Auger



CONSTRUCTION DATA

Borehole Diam. - 10"

Borehole Depth - 15'

Casing/Screen Type - PVC

Casing Diam. - 4"

Casing Depth - 15'

Screen Setting - 5' - 15'

Slot Width - 0.02"

Type of Seal - Bentonite

Type of Filterpack - #2 Sand

Type of Grout - Cement/Bentonite

MEASUREMENTS (NGVD)

Top of Casing Elevation - 7.06'

Static Water Level Elevation - 1.58'

Date Measured - 1/9/87

Surface Elevation - 6.90'

TEST DATA

Pump Type -

Depth to Intake (ft) -

Static Water Level (ft) -

Pumping Water Level (ft) -

Drawdown (ft) -

Length of Test (Hrs) -

Notes:

* Blows taken using a 140 lb hammer falling 30 inches.

** All soils classified by visual inspection.

WELL CONSTRUCTION KEY

Filter Pack

Bentonite Seal

Cement Grout

DAMES & MOORE

LOG of BORING and MONITORING WELL CONSTRUCTION DETAILS

Project : Chevron/Philadelphia Refinery

Boring/Well No. - A5

Project No. 113-909-032

Date M.W. completed 2/25/86

Supervising D & M Engineer/Geologist Andrei Ivansiu

Location - Chevron Refinery

Driller - Warren George

Drilling Completed - 2/25/86

Type of Rig - Hollow Stem Auger

CONSTRUCTION DATA

Borehole Diam. - 10"

Borehole Depth - 18'

Casing/Screen Type - PVC

Casing Diam. - 4"

Casing Depth - 17'

Screen Setting - 4' - 17'

Slot Width - 0.02"

Type of Seal - Bentonite

Type of Filterpack - #2 Sand

Type of Grout - Cement/Bentonite

MEASUREMENTS (NGVD)

Top of Casing Elevation - 6.93'

Static Water Level Elevation - Not Available

Date Measured - 1/9/87

Surface Elevation - 6.77'

TEST DATA

Pump Type -

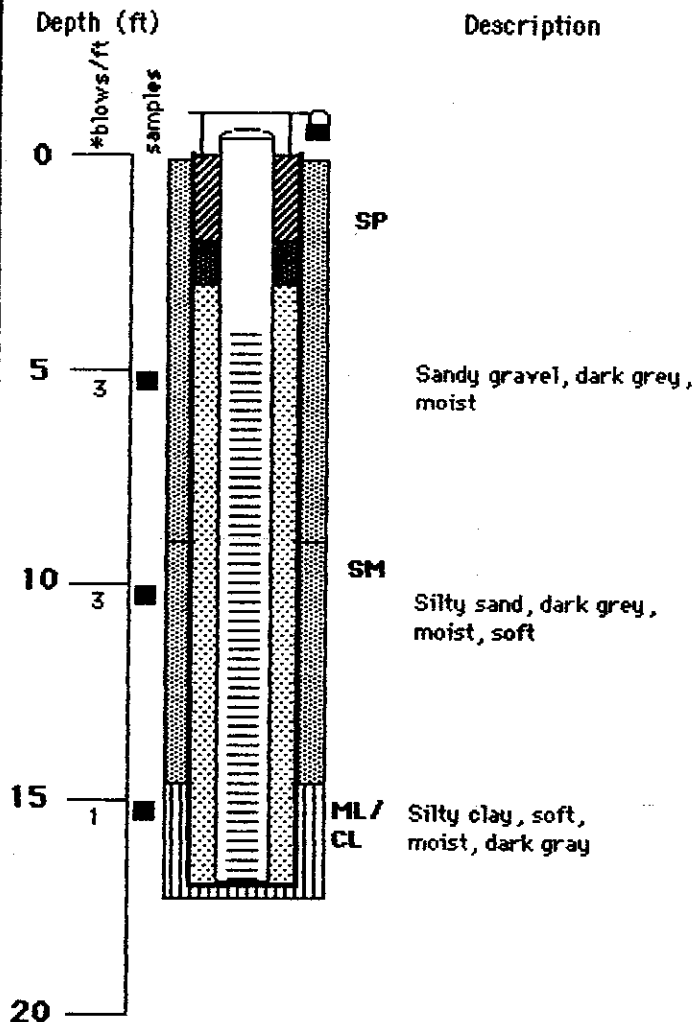
Depth to Intake (ft) -

Static Water Level (ft) -

Pumping Water Level (ft) -

Drawdown (ft) -

Length of Test (Hrs) -



Notes:

* Blows taken using a 140 lb hammer falling 30 inches.

** All soils classified by visual inspection.

WELL CONSTRUCTION KEY

Filter Pack



Bentonite Seal



Cement Grout



DAMES & MOORE

LOG of BORING and MONITORING WELL CONSTRUCTION DETAILS

Project : Chevron/Philadelphia Refinery

Project No. 113-909-032

Date M.W. completed 2/24/86

Supervising D & M
Engineer /Geologist Andreu Ivansiu

Boring/Well No. - A6

Location - Chevron Refinery

Driller - Warren George

Drilling Completed - 2/24/86

Type of Rig - Hollow Stem Auger

CONSTRUCTION DATA

Borehole Diam. - 10"

Borehole Depth - 15'

Casing/Screen Type - PVC

Casing Diam. - 4"

Casing Depth - 15'

Screen Setting - 3' - 15'

Slot Width - 0.02"

Type of Seal - Bentonite

Type of Filterpack - *2 Sand

Type of Grout - Cement/Bentonite

MEASUREMENTS (NGVD)

Top of Casing Elevation - 7.96'

Static Water Level Elevation - 3.25'

Date Measured - 1/9/87

Surface Elevation - 7.88'

TEST DATA

Pump Type -

Depth to Intake (ft) -

Static Water Level (ft) -

Pumping Water Level (ft) -

Drawdown (ft) -

Length of Test (Hrs) -

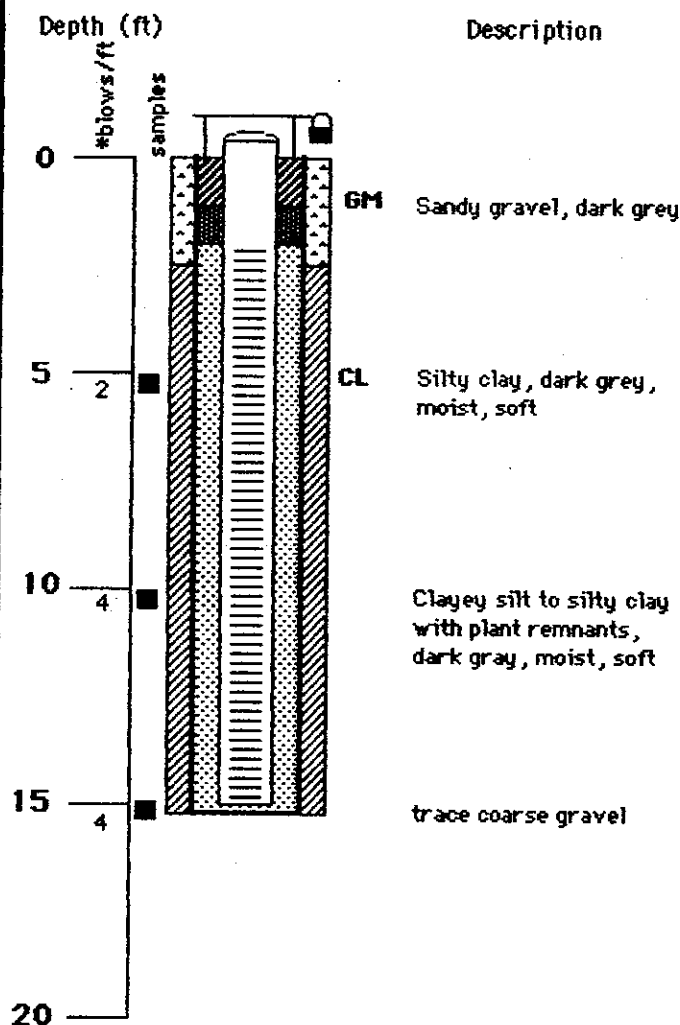
WELL CONSTRUCTION KEY

Filter Pack 

Bentonite Seal 

Cement Grout 

DAMES & MOORE



Notes:

* Blows taken using a 140 lb hammer falling 30 inches.

** All soils classified by visual inspection.

LOG of BORING and MONITORING WELL CONSTRUCTION DETAILS

Project : Chevron/Philadelphia Refinery

Project No. 113-909-032

Date M.W. completed 2/24/86

Supervising D & M
Engineer/Geologist Mark Robertson

Boring/Well No. - A7

Location - Chevron Refinery

Driller - Warren George

Drilling Completed - 2/24/86

Type of Rig - Hollow Stem Auger

CONSTRUCTION DATA

Borehole Diam. - 10"

Borehole Depth - 15'

Casing/Screen Type - PVC

Casing Diam. - 4"

Casing Depth - 15'

Screen Setting - 3' - 13'

Slot Width - 0.02"

Type of Seal - Bentonite

Type of Filterpack - #2 Sand

Type of Grout - Cement/Bentonite

MEASUREMENTS (NGVD)

Top of Casing Elevation - 8.02'

Static Water Level Elevation - 4.95'

Date Measured - 1/9/87

Surface Elevation - 8.02'

TEST DATA

Pump Type -

Depth to Intake (ft) -

Static Water Level (ft) -

Pumping Water Level (ft) -

Drawdown (ft) -

Length of Test (Hrs) -

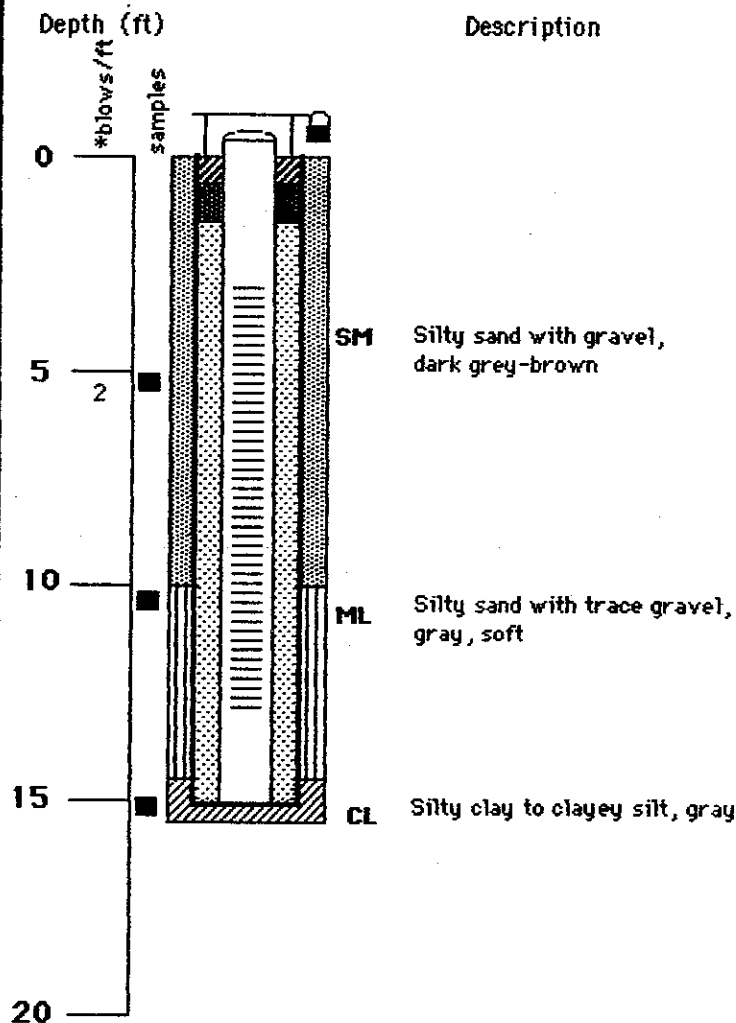
WELL CONSTRUCTION KEY

Filter Pack 

Bentonite Seal 

Cement Grout 

DAMES & MOORE



Notes:

* Blows taken using a 140 lb hammer falling 30 inches.

** All soils classified by visual inspection.

LOG of BORING and MONITORING WELL CONSTRUCTION DETAILS

Project : Chevron/Philadelphia Refinery

Project No. 113-909-032

Date M.W. completed 2/24/86

Supervising D & M
Engineer/Geologist Mark Robertson

Boring/Well No. - A8

Location - Chevron Refinery

Driller - Warren George

Drilling Completed - 2/24/86

Type of Rig - Hollow Stem Auger

CONSTRUCTION DATA

Borehole Diam. - 10"

Borehole Depth - 15'

Casing/Screen Type - PVC

Casing Diam. - 4"

Casing Depth - 15'

Screen Setting - 5' - 15'

Slot Width - 0.02"

Type of Seal - Bentonite

Type of Filterpack - #2 Sand

Type of Grout - Cement/Bentonite

MEASUREMENTS (NGVD)

Top of Casing Elevation - 6.29'

Static Water Level Elevation - 1.04'

Date Measured - 1/9/87

Surface Elevation - 6.13'

TEST DATA

Pump Type -

Depth to Intake (ft) -

Satic Water Level (ft) -


Pumping Water Level (ft) -

Drawdown (ft) -

Length of Test (Hrs) -

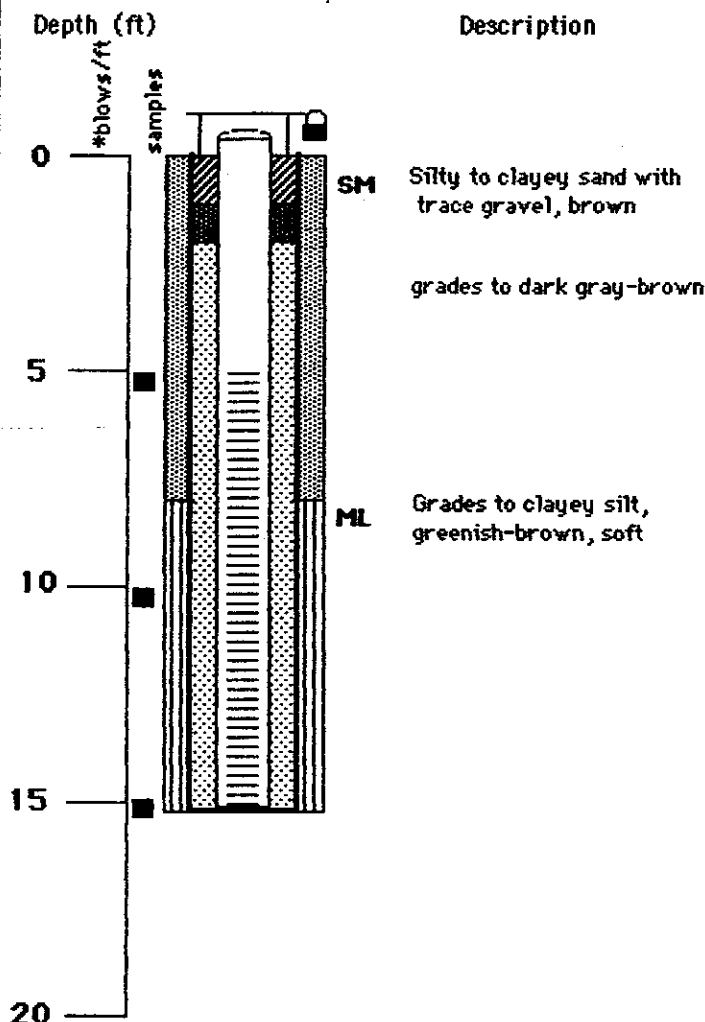
WELL CONSTRUCTION KEY

Filter Pack 

Bentonite Seal 

Cement Grout 

DAMES & MOORE



Notes:

* Blows taken using a 140 lb hammer falling 30 inches.

** All soils classified by visual inspection.

LOG of BORING and MONITORING WELL CONSTRUCTION DETAILS

Project : Chevron/Philadelphia Refinery

Boring/Well No. - A9

Project No. 113-909-032

Location - Chevron Refinery

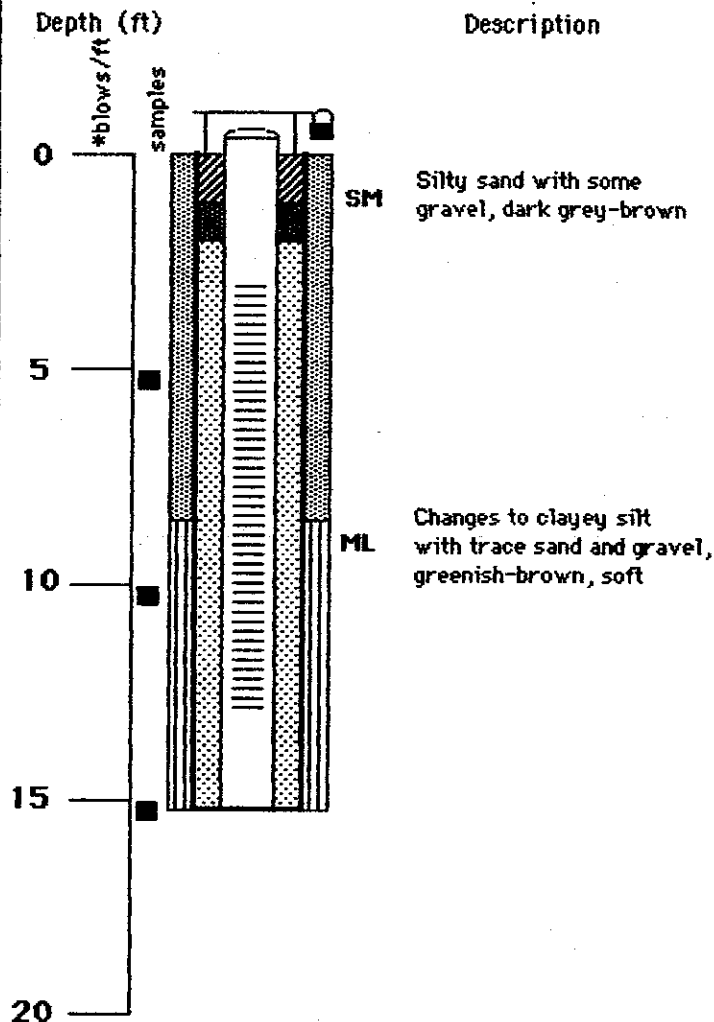
Date M.W. completed 2/24/86

Driller - Warren George

Supervising D & M
Engineer /Geologist Mark Robertson

Drilling Completed - 2/24/86

Type of Rig - Hollow Stem Auger



CONSTRUCTION DATA

Borehole Diam. - 10"

Borehole Depth - 15'

Casing/Screen Type - PVC

Casing Diam. - 4"

Casing Depth - 15'

Screen Setting - 3' -13'

Slot Width - 0.02"

Type of Seal - Bentonite

Type of Filterpack - #2 Sand

Type of Grout - Cement/Bentonite

MEASUREMENTS (NGVD)

Top of Casing Elevation - 7.17'

Static Water Level Elevation - 3.23'

Date Measured - 1/9/87

Surface Elevation - 7.17'

TEST DATA

Pump Type -

Depth to Intake (ft) -

Satic Water Level (ft) -

Pumping Water Level (ft) -

Drawdown (ft) -

Length of Test (Hrs) -

Notes:

* Blows taken using a 140 lb hammer falling 30 inches.

** All soils classified by visual inspection.

WELL CONSTRUCTION KEY

Filter Pack

Bentonite Seal

Cement Grout

DAMES & MOORE

LOG of BORING and MONITORING WELL CONSTRUCTION DETAILS

Project : Chevron/Philadelphia Refinery

Project No. 113-909-032

Date M.W. completed 2/25/86

Supervising D & M Engineer/Geologist Mark Robertson

Boring/Well No. - A10

Location - Chevron Refinery

Driller - Warren George

Drilling Completed - 2/25/86

Type of Rig - Hollow Stem Auger

CONSTRUCTION DATA

Borehole Diam. - 10"

Borehole Depth - 15'

Casing/Screen Type - PVC

Casing Diam. - 4"

Casing Depth - 15'

Screen Setting - 5' - 15'

Slot Width - 0.02"

Type of Seal - Bentonite

Type of Filterpack - #2 Sand

Type of Grout - Cement/Bentonite

MEASUREMENTS (NGVD)

Top of Casing Elevation - 9.48'

Static Water Level Elevation - 6.04'

Date Measured - 1/13/87

Surface Elevation - 9.40'

TEST DATA

Pump Type -

Depth to Intake (ft) -




Satic Water Level (ft) -

Pumping Water Level (ft) -

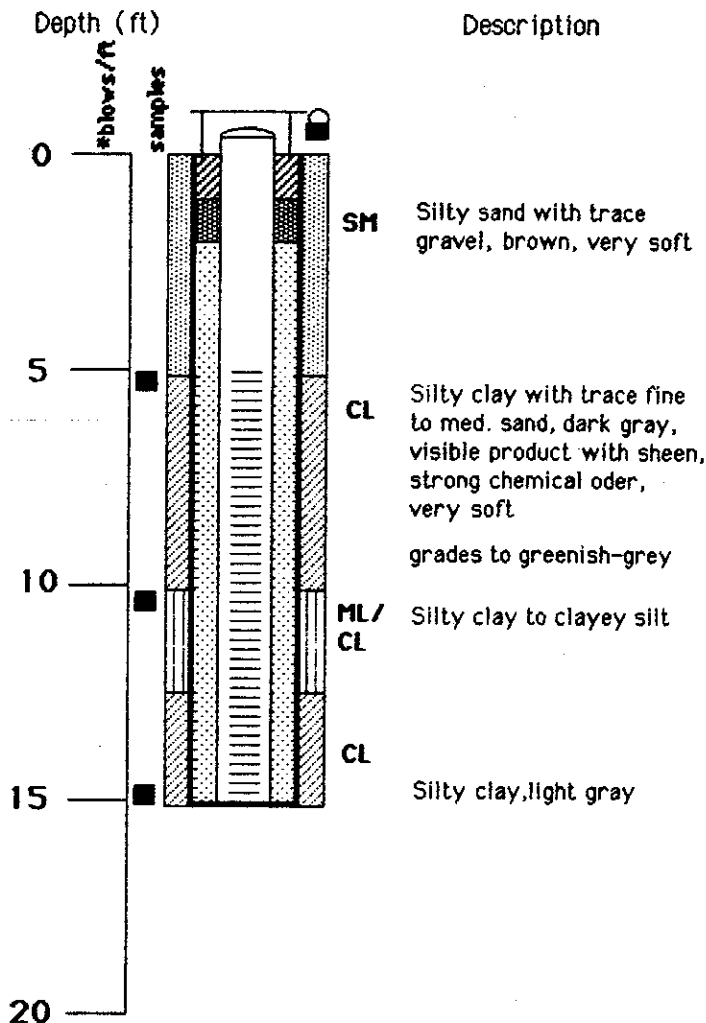
Drawdown (ft) -

Length of Test (Hrs) -

WELL CONSTRUCTION KEY

Filter Pack 
Bentonite Seal 
Cement Grout 

DAMES & MOORE



Notes:

* Blows taken using a 140 lb hammer falling 30 inches.

** All soils classified by visual inspection.

LOG of BORING and MONITORING WELL CONSTRUCTION DETAILS

Project : Chevron/Philadelphia Refinery

Project No. 113-909-032

Date M.W. completed 2/25/86

Supervising D & M
Engineer/Geologist Andrei Ivansiu

Boring/Well No. - A11

Location - Chevron Refinery

Driller - Warren George

Drilling Completed - 2/25/86

Type of Rig - Hollow Stem Auger

CONSTRUCTION DATA

Borehole Diam. - 10"

Borehole Depth - 14'

Casing/Screen Type - PVC

Casing Diam. - 4"

Casing Depth - 13' 6"

Screen Setting - 3' 6" - 13' 6"

Slot Width - 0.02"

Type of Seal - Bentonite

Type of Filterpack - #2 Sand

Type of Grout - Cement/Bentonite

MEASUREMENTS (NGVD)

Top of Casing Elevation - 5.89'

Static Water Level Elevation - 4.04'

Date Measured - 1/13/87

Surface Elevation - 5.57'

TEST DATA

Pump Type -

Depth to Intake (ft) -

Static Water Level (ft) -

Pumping Water Level (ft) -

Drawdown (ft) -

Length of Test (Hrs) -

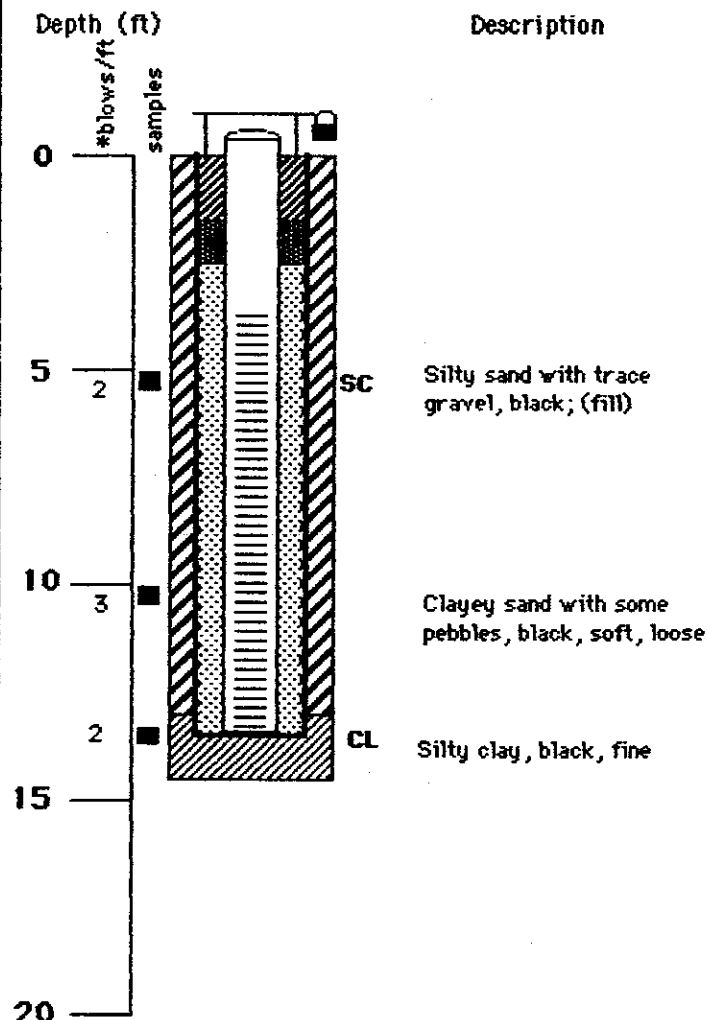
WELL CONSTRUCTION KEY

Filter Pack 

Bentonite Seal 

Cement Grout 

DAMES & MOORE



Notes:

* Blows taken using a 140 lb hammer falling 30 inches.

** All soils classified by visual inspection.

LOG of BORING and MONITORING WELL CONSTRUCTION DETAILS

Project : Chevron/Philadelphia Refinery

Project No. 113-909-032

Date M.W. completed 2/24/86

Supervising D & M Engineer/Geologist Andrei Ivansiu

Boring/Well No. - A12

Location - Chevron Refinery

Driller - Warren George

Drilling Completed - 2/24/86

Type of Rig - Hollow Stem Auger

CONSTRUCTION DATA

Borehole Diam. - 10"

Borehole Depth - 14'

Casing/Screen Type - PVC

Casing Diam. - 4"

Casing Depth - 13'

Screen Setting - 3' - 13'

Slot Width - 0.02"

Type of Seal - Bentonite

Type of Filterpack - #2 Sand

Type of Grout - Cement/Bentonite

MEASUREMENTS (NGVD)

Top of Casing Elevation - 6.14'

Static Water Level Elevation - 3.53'

Date Measured - 1/13/87

Surface Elevation - 5.90'

TEST DATA

Pump Type -

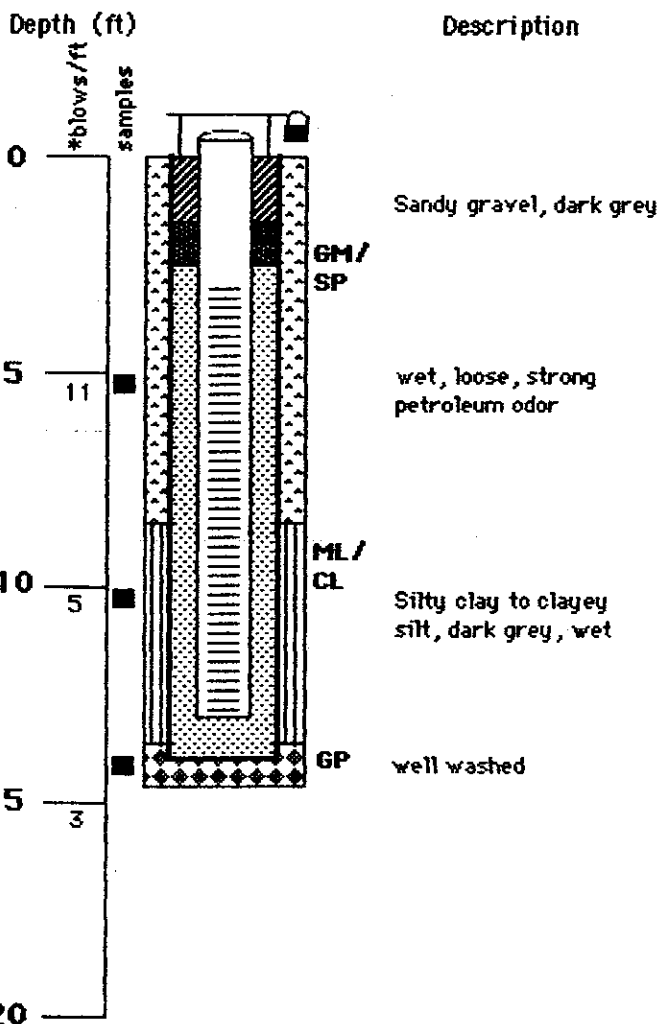
Depth to Intake (ft) -

Satic Water Level (ft) -

Pumping Water Level (ft) -

Drawdown (ft) -

Length of Test (Hrs) -



Notes:

* Blows taken using a 140 lb hammer falling 30 inches.

** All soils classified by visual inspection.

WELL CONSTRUCTION KEY

Filter Pack

Bentonite Seal

Cement Grout

DAMES & MOORE

LOG of BORING and MONITORING WELL CONSTRUCTION DETAILS

Project : Chevron/Philadelphia Refinery

Boring/Well No. -A13

Project No. 113-909-032

Location - Chevron Refinery

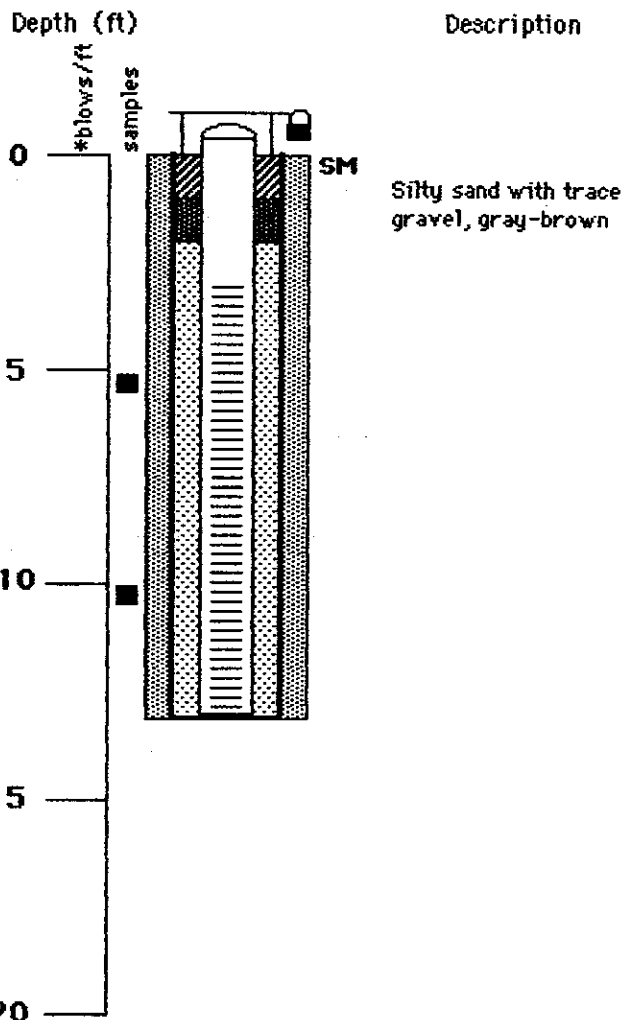
Date M.W. completed 2/27/86

Driller - Warren George

Supervising D & M Engineer /Geologist Mark Robertson

Drilling Completed - 2/27/86

Type of Rig - Hollow Stem Auger



CONSTRUCTION DATA

Borehole Diam. - 10"

Borehole Depth - 13'

Casing/Screen Type - PVC

Casing Diam. - 4"

Casing Depth - 13'

Screen Setting - 3' - 13'

Slot Width - 0.02"

Type of Seal - Bentonite

Type of Filterpack - #2 Sand

Type of Grout - Cement/Bentonite

MEASUREMENTS (NGVD)

Top of Casing Elevation - 7.91'

Static Water Level Elevation - 4.52'

Date Measured - 1/9/87

Surface Elevation - 7.83'

TEST DATA

Pump Type -

Depth to Intake (ft) -

Satic Water Level (ft) -

Pumping Water Level (ft) -

Drawdown (ft) -

Length of Test (Hrs) -

Notes:

* Blows taken using a 140 lb hammer falling 30 inches.

** All soils classified by visual inspection.

WELL CONSTRUCTION KEY

Filter Pack

Bentonite Seal

Cement Grout

DAMES & MOORE

LOG of BORING and MONITORING WELL CONSTRUCTION DETAILS

Project: Chevron/Philadelphia Refinery

Boring/Well No. - A13D

Project No. 113-950-032

Location - Chevron Refinery

Date M.W. completed 11/13/86

Driller - Lambert, Inc.

Supervising D & M Geologist David Wagner

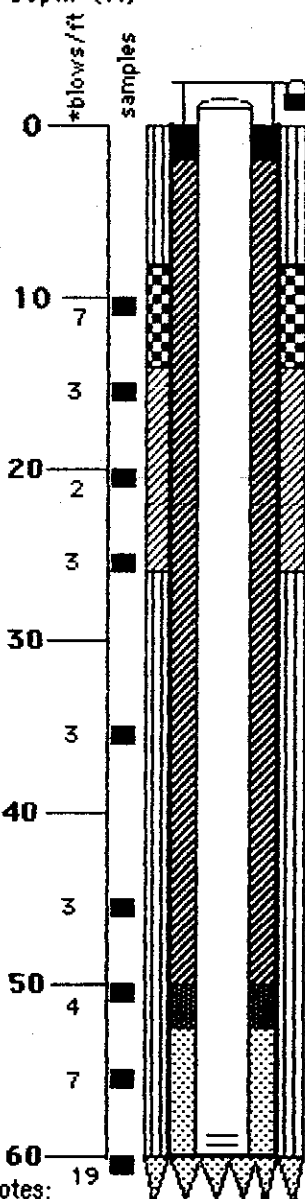
Drilling Completed - 11/13/86

Type of Rig - Hollow Stem Auger

Depth (ft)

Description

CONSTRUCTION DATA



ML Silt with some fine to coarse sand, trace fine gravel, black, saturated; petroleum odor; petroleum residues present

GV Fine gravel with some silt, little fine to coarse sand, black, loose, saturated; strong petroleum odor

CL Clay with little to some silt, dark gray, very soft, saturated; trace organics

Grading to dark brown

ML Increasing silt; silt with some clay

Grading to medium brown

Grading to brownish-gray

Trace mica

Silt with little to some clay, trace fine to medium sand, gray, medium stiff, saturated; trace organics; very micaceous

Borehole Diam. - 10"

Borehole Depth - 70'

Casing/Screen Type - PVC

Casing Diam. - 4"

Casing Depth - 69'

Screen Setting - 59' - 69'

Slot Width - 0.02"

Type of Seal - Bentonite

Type of Filterpack - #2 Sand

Type of Grout - Bentonite

MEASUREMENTS (NGVD)

Top of Casing Elevation - 7.99'

Static Water Level Elevation - -1.95'

Date Measured - 12/22/86

Surface Elevation - 8.10'

TEST DATA

Pump Type -

Depth to Intake (ft) -

Static Water Level (ft) -

Pumping Water Level (ft) -

Drawdown (ft) -

Length of Test (Hrs) -

WELL CONSTRUCTION KEY

WELL CONSTRUCTION KEY

FILTER PACK [Pattern]

BENTONITE SEAL [Pattern]

BENTONITE GROUT [Pattern]

CAVE IN MATERIAL [Pattern]

CONCRETE [Pattern]

Notes:

* Blows taken using a 140 lb hammer falling 30 inches.

** All soils classified by visual inspection.

DAMES & MOORE

LOG of BORING and MONITORING WELL CONSTRUCTION DETAILS

Project : Chevron/Philadelphia Refinery

Boring/Well No. - A130 (Cont.)

Project No. 113-950-032

Location - Chevron Refinery

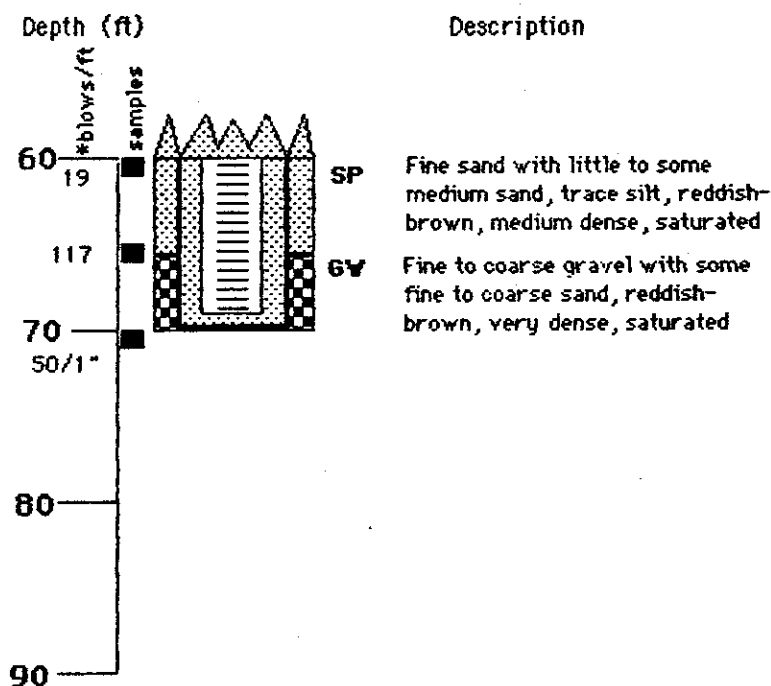
Date M.W. completed 11/13/86

Driller - Lambert, Inc.

Supervising D & M Geologist David Wagner

Drilling Completed - 11/13/86

Type of Rig - Hollow Stem Auger



WELL CONSTRUCTION KEY

| | |
|------------------|--|
| FILTER PACK | |
| BENTONITE SEAL | |
| BENTONITE GROUT | |
| CAVE IN MATERIAL | |
| CONCRETE | |

Notes:

* Blows taken using a 140 lb hammer falling 30 inches.

** All soils classified by visual inspection.

DAMES & MOORE

LOG of BORING and MONITORING WELL CONSTRUCTION DETAILS

Project : Chevron/Philadelphia Refinery

Boring/Well No. -A14

Project No. 113-909-032

Location - Chevron Refinery

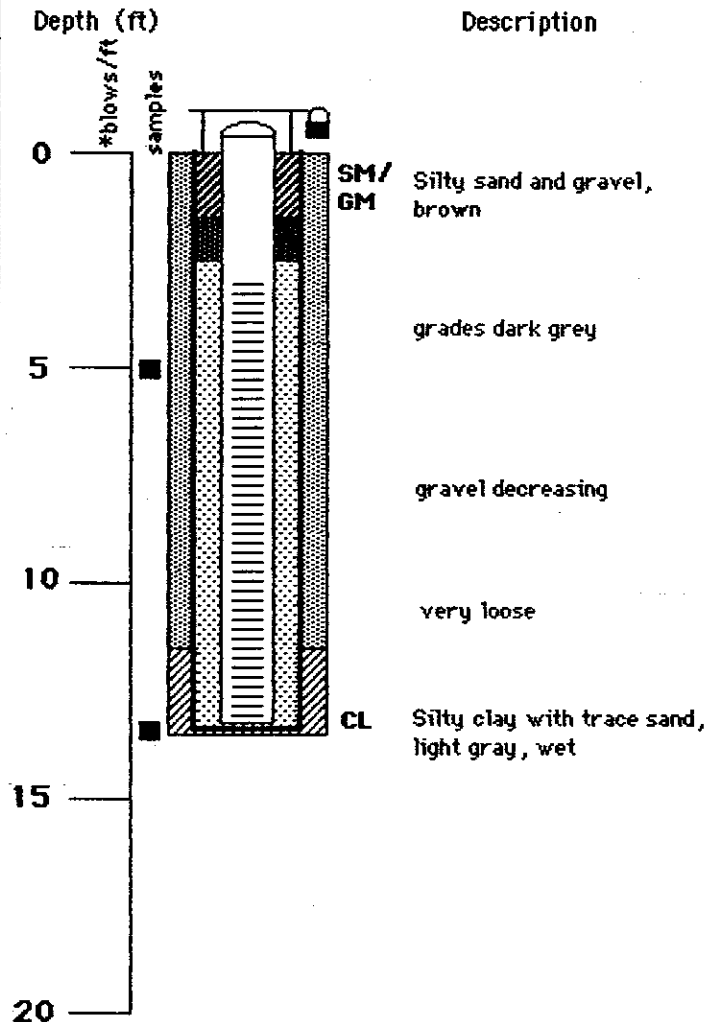
Date M.W. completed 2/26/86

Driller - Warren George

Supervising D & M Engineer /Geologist Mark Robertson

Drilling Completed - 2/26/86

Type of Rig - Hollow Stem Auger



CONSTRUCTION DATA

Borehole Diam. - 10"

Borehole Depth - 13'

Casing/Screen Type - PVC

Casing Diam. - 4"

Casing Depth - 13'

Screen Setting - 3' - 13'

Slot Width - 0.02"

Type of Seal - Bentonite

Type of Filterpack - #2 Sand

Type of Grout - Cement/Bentonite

MEASUREMENTS (NGVD)

Top of Casing Elevation - 8.55'

Static Water Level Elevation - 4.95'

Date Measured - 1/13/87

Surface Elevation - 8.55'

TEST DATA

Pump Type -

Depth to Intake (ft) -

Static Water Level (ft) -

Pumping Water Level (ft) -

Drawdown (ft) -

Length of Test (Hrs) -

Notes:

* Blows taken using a 140 lb hammer falling 30 inches.

** All soils classified by visual inspection.

WELL CONSTRUCTION KEY

Filter Pack

Bentonite Seal

Cement Grout

DAMES & MOORE

LOG of BORING and MONITORING WELL CONSTRUCTION DETAILS

Project : Chevron/Philadelphia Refinery

Boring/Well No. - A15

Project No. 113-909-032

Location - Chevron Refinery

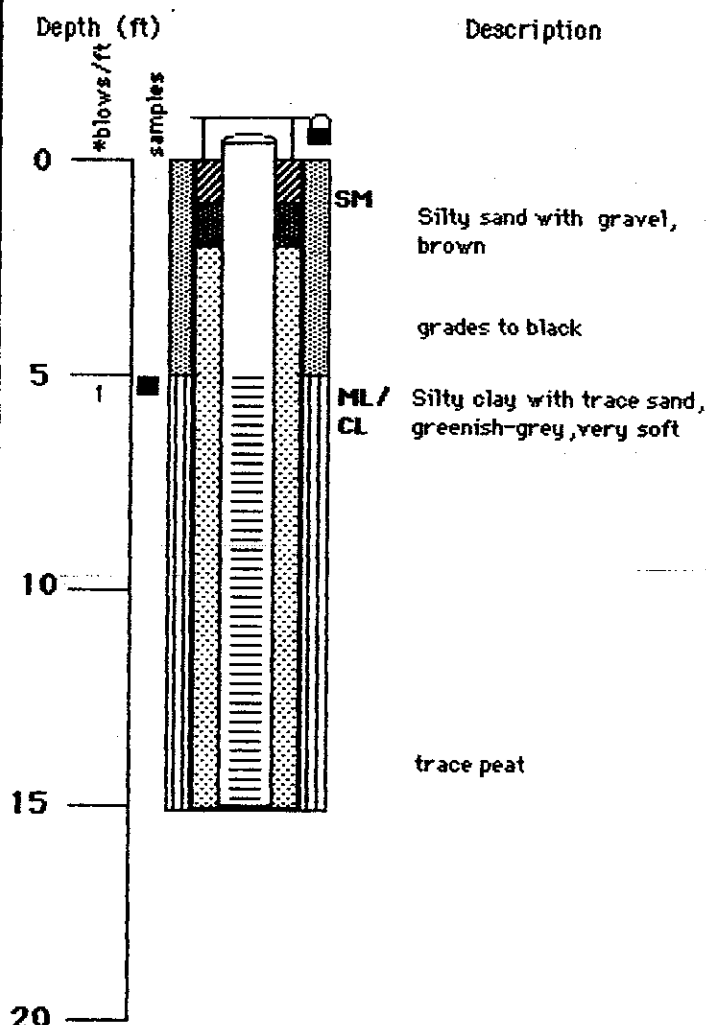
Date M.W. completed 2/25/86

Driller - Warren George

Supervising D & M Engineer/Geologist Mark Robertson

Drilling Completed - 2/25/86

Type of Rig - Hollow Stem Auger



CONSTRUCTION DATA

Borehole Diam. - 10"

Borehole Depth - 15'

Casing/Screen Type - PVC

Casing Diam. - 4"

Casing Depth - 15'

Screen Setting - 5' - 15'

Slot Width - 0.02"

Type of Seal - Bentonite

Type of Filterpack - #2 Sand

Type of Grout - Cement/Bentonite

MEASUREMENTS (NGVD)

Top of Casing Elevation - 6.90'

Static Water Level Elevation - 6.48'

Date Measured - 1/13/87

Surface Elevation - 6.84'

TEST DATA

Pump Type -

Depth to Intake (ft) -

Static Water Level (ft) -

Pumping Water Level (ft) -

Drawdown (ft) -

Length of Test (Hrs) -

WELL CONSTRUCTION KEY

Filter Pack



Bentonite Seal



Cement Grout



DAMES & MOORE

Notes:

* Blows taken using a 140 lb hammer falling 30 inches.

** All soils classified by visual inspection.

LOG of BORING and MONITORING WELL CONSTRUCTION DETAILS

Project : Chevron/Philadelphia Refinery

Boring/Well No. - A16

Project No. 113-909-032

Location - Chevron Refinery

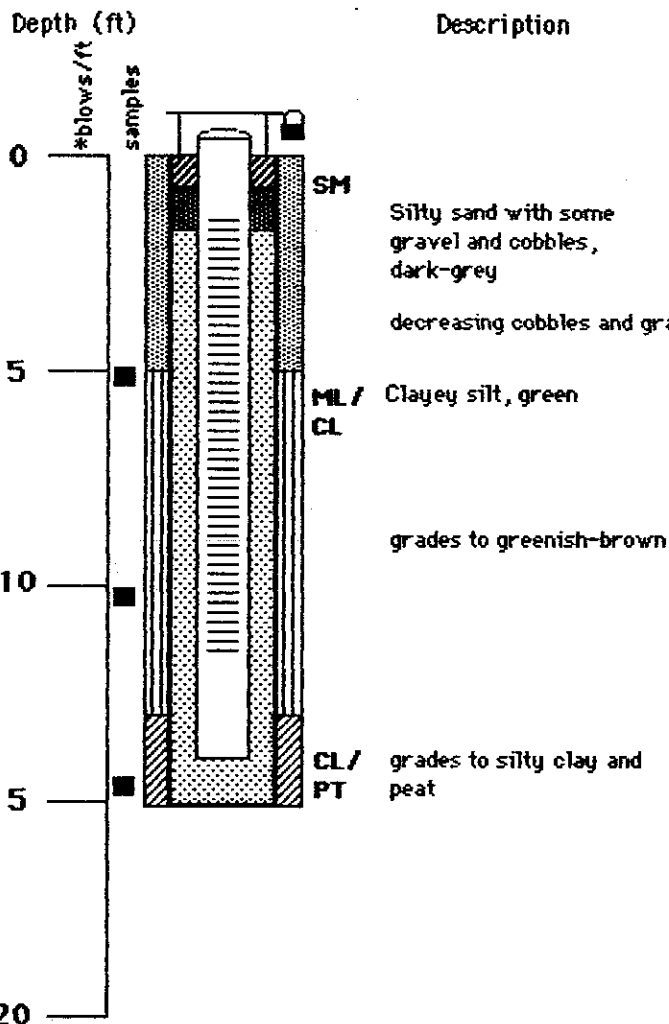
Date M.W. completed 2/25/86

Driller - Warren George

Supervising D & M
Engineer/Geologist Mark Robertson

Drilling Completed - 2/25/86

Type of Rig - Hollow Stem Auger



CONSTRUCTION DATA

| | |
|----------------------|------------------|
| Borehole Diam. - | 10" |
| Borehole Depth - | 15' |
| Casing/Screen Type - | PVC |
| Casing Diam. - | 4" |
| Casing Depth - | 14' |
| Screen Setting - | 1' 6" - 11' 6" |
| Slot Width - | 0.02" |
| Type of Seal - | Bentonite |
| Type of Filterpack - | *2 Sand |
| Type of Grout - | Cement/Bentonite |

MEASUREMENTS (NGVD)

| | |
|--------------------------------|---------|
| Top of Casing Elevation - | 8.47' |
| Static Water Level Elevation - | 6.33' |
| Date Measured - | 1/13/87 |
| Surface Elevation - | 7.81' |

TEST DATA

| | |
|----------------------------|--|
| Pump Type - | |
| Depth to Intake (ft) - | |
| Static Water Level (ft) - | |
| Pumping Water Level (ft) - | |
| Drawdown (ft) - | |
| Length of Test (Hrs) - | |

WELL CONSTRUCTION KEY

| | |
|----------------|--|
| Filter Pack | |
| Bentonite Seal | |
| Cement Grout | |

Notes:

* Blows taken using a 140 lb hammer falling 30 inches.

** All soils classified by visual inspection.

DAMES & MOORE

LOG of BORING and MONITORING WELL CONSTRUCTION DETAILS

Project : Chevron/Philadelphia Refinery

Boring/Well No. -A17

Project No. 113-909-032

Location - Chevron Refinery

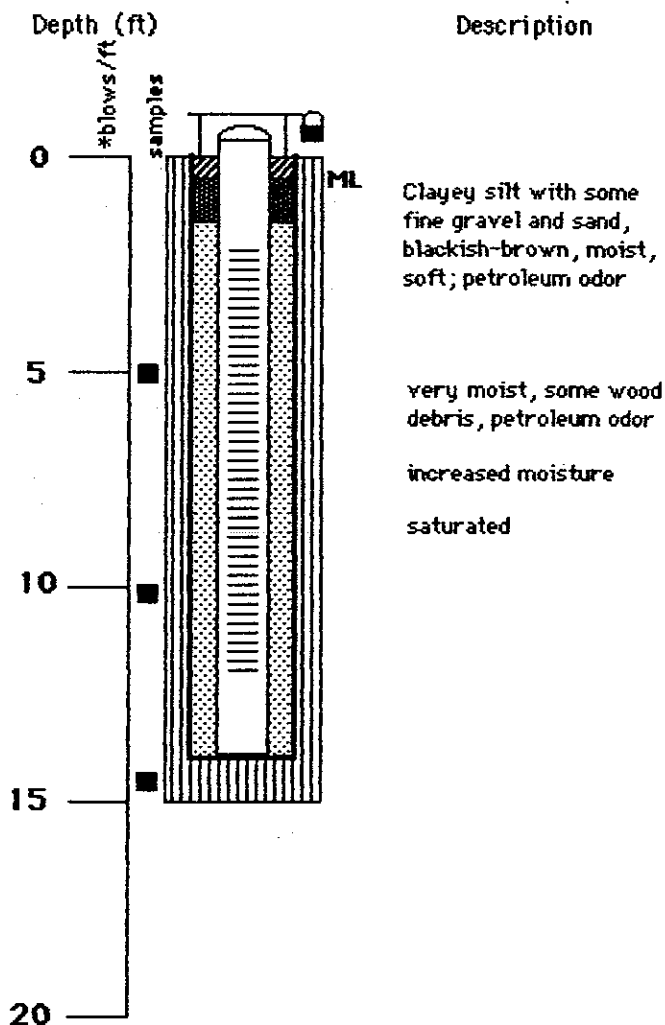
Date M.W. completed 2/27/86

Driller - Warren George

Supervising D & M
Engineer/Geologist Ralph T. Golia

Drilling Completed - 2/27/86

Type of Rig - Hollow Stem Auger



CONSTRUCTION DATA

Borehole Diam. - 10"

Borehole Depth - 15'

Casing/Screen Type - PVC

Casing Diam. - 4"

Casing Depth - 14'

Screen Setting - 2' - 12'

Slot Width - 0.02"

Type of Seal - Bentonite

Type of Filterpack - #2 Sand

Type of Grout - Cement/Bentonite

MEASUREMENTS (NGVD)

Top of Casing Elevation - 9.42'

Static Water Level Elevation - 6.02'

Date Measured - 1/13/87

Surface Elevation - 9.34'

TEST DATA

Pump Type -

Depth to Intake (ft) -

Static Water Level (ft) -

Pumping Water Level (ft) -

Drawdown (ft) -

Length of Test (Hrs) -

Notes:

* Blows taken using a 140 lb hammer falling 30 inches.

** All soils classified by visual inspection.

WELL CONSTRUCTION KEY

Filter Pack

Bentonite Seal

Cement Grout

DAMES & MOORE

LOG of BORING and MONITORING WELL CONSTRUCTION DETAILS

Project : Chevron/Philadelphia Refinery

Project No. 113-909-032

Date M.W. completed 2/27/86

Supervising D & M
Engineer/Geologist Ralph T. Golia

Boring/Well No. -A18

Location - Chevron Refinery

Driller - Warren George

Drilling Completed - 2/27/86

Type of Rig - Hollow Stem Auger

CONSTRUCTION DATA

Borehole Diam. - 10"

Borehole Depth - 12'

Casing/Screen Type - PVC

Casing Diam. - 4"

Casing Depth - 12'

Screen Setting - 2' - 12'

Slot Width - 0.02"

Type of Seal - Bentonite

Type of Filterpack - #2 Sand

Type of Grout - Cement/Bentonite

MEASUREMENTS (NGVD)

Top of Casing Elevation - 9.52'

Static Water Level Elevation - 7.27'

Date Measured - 1/13/87

Surface Elevation - 9.35'

TEST DATA

Pump Type -

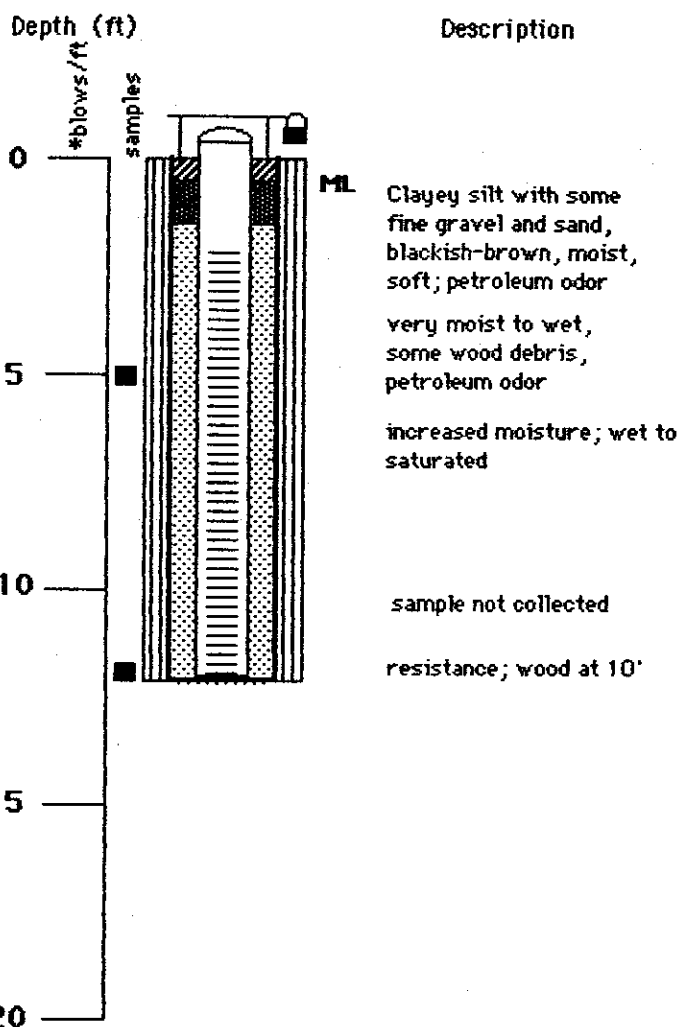
Depth to Intake (ft) -

Static Water Level (ft) -

Pumping Water Level (ft) -

Drawdown (ft) -

Length of Test (Hrs) -



Notes:

* Blows taken using a 140 lb hammer falling 30 inches.

** All soils classified by visual inspection.

WELL CONSTRUCTION KEY

Filter Pack

Bentonite Seal

Cement Grout

DAMES & MOORE

LOG of BORING and MONITORING WELL CONSTRUCTION DETAILS

Project : Chevron/Philadelphia Refinery

Boring/Well No. -A19

Project No. 113-909-032

Location - Chevron Refinery

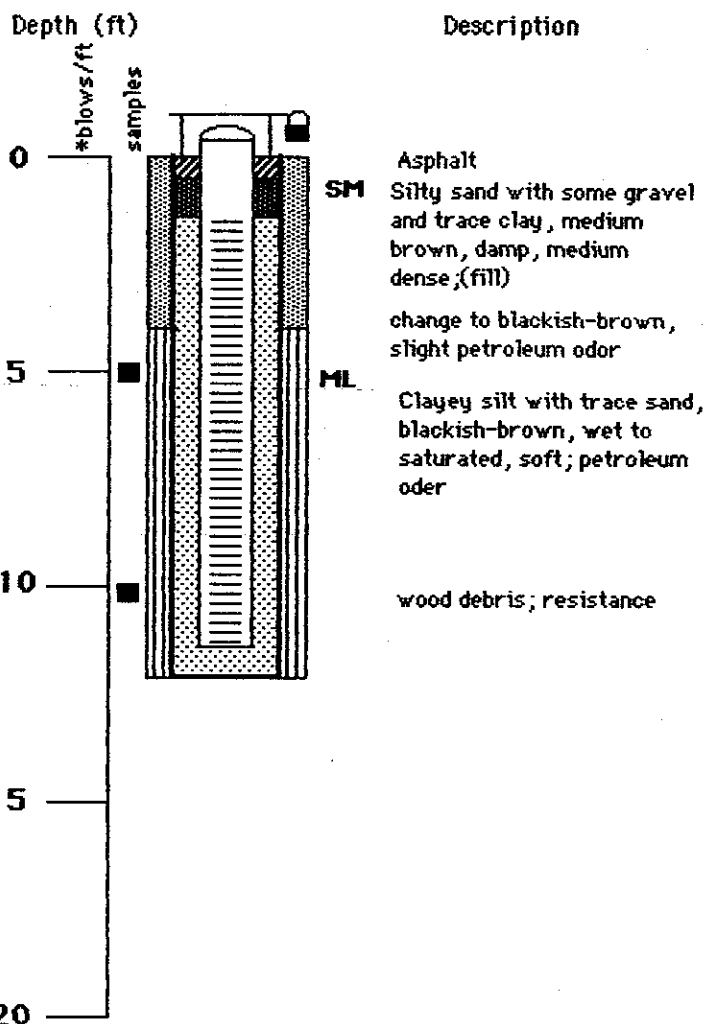
Date M.W. completed 2/27/86

Driller - Warren George

Supervising D & M Engineer/Geologist Ralph T. Golia

Drilling Completed - 2/27/86

Type of Rig - Hollow Stem Auger



CONSTRUCTION DATA

Borehole Diam. - 10"

Borehole Depth - 12'

Casing/Screen Type - PVC

Casing Diam. - 4"

Casing Depth - 11'6"

Screen Setting - 1'6" - 11'6"

Slot Width - 0.02"

Type of Seal - Bentonite

Type of Filterpack - #2 Sand

Type of Grout - Cement/Bentonite

MEASUREMENTS (NGVD)

Top of Casing Elevation - 9.52'

Static Water Level Elevation - 5.77'

Date Measured - 1/13/87

Surface Elevation - 9.28'

TEST DATA

Pump Type -

Depth to Intake (ft) -

Satic Water Level (ft) -

Pumping Water Level (ft) -

Drawdown (ft) -

Length of Test (Hrs) -

Notes:

* Blows taken using a 140 lb hammer falling 30 inches.

** All soils classified by visual inspection.

WELL CONSTRUCTION KEY

Filter Pack

Bentonite Seal

Cement Grout

DAMES & MOORE

LOG of BORING and MONITORING WELL CONSTRUCTION DETAILS

Project: Chevron/Philadelphia Refinery

Boring/Well No. - A19D

Project No. 113-950-032

Location - Chevron Refinery

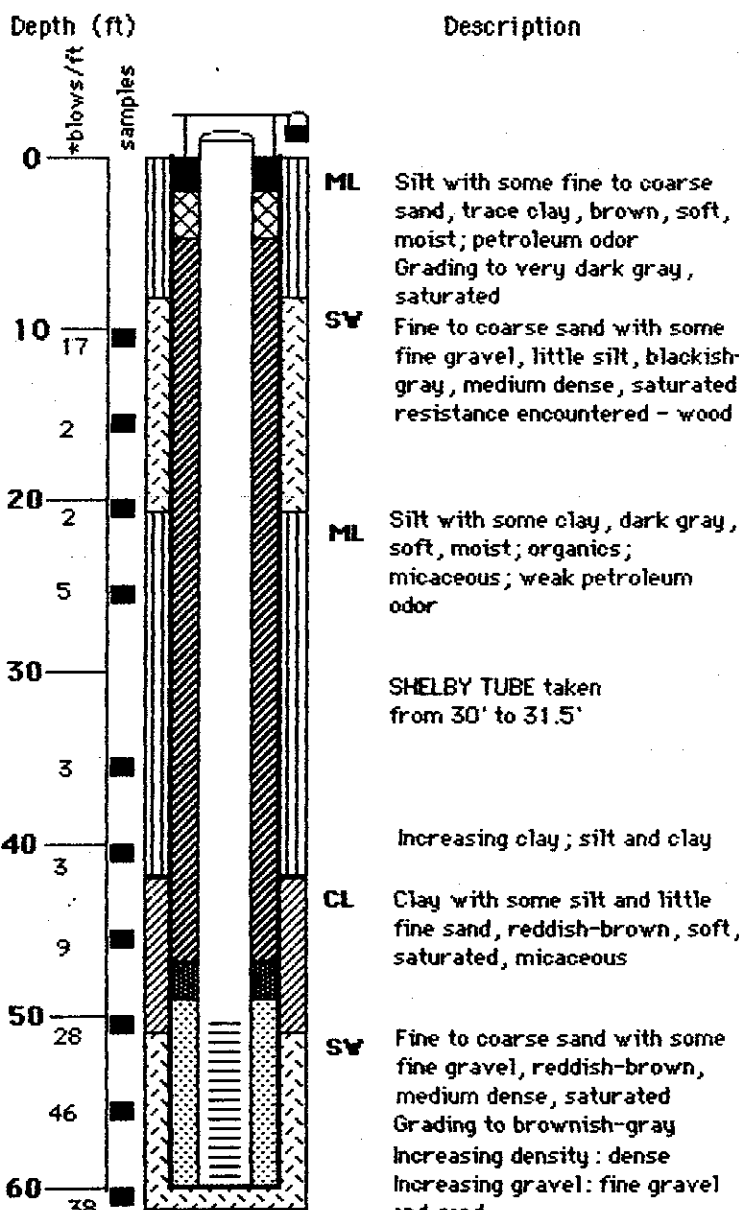
Date M.W. completed 10/30/86

Driller - Lambert, Inc.

Supervising D & M Geologist David Wagner

Drilling Completed - 10/30/86

Type of Rig - Hollow Stem Auger



CONSTRUCTION DATA

Borehole Diam. - 10"

Borehole Depth - 60'

Casing/Screen Type - PVC

Casing Diam. - 4"

Casing Depth - 60'

Screen Setting - 50' - 60'

Slot Width - 0.02"

Type of Seal - Bentonite

Type of Filterpack - #2 Sand

Type of Grout - Bentonite

MEASUREMENTS (NGVD)

Top of Casing Elevation - 11.69'

Static Water Level Elevation - -1.71'

Date Measured - 12/22/86

Surface Elevation - 8.69'

TEST DATA

Pump Type -

Depth to Intake (ft) -

Static Water Level (ft) -

Pumping Water Level (ft) -

Drawdown (ft) -

Length of Test (Hrs) -

WELL CONSTRUCTION KEY

| | |
|------------------|--|
| FILTER PACK | |
| BENTONITE SEAL | |
| BENTONITE GROUT | |
| CAVE IN MATERIAL | |
| CONCRETE | |

Notes:

* Blows taken using a 140 lb hammer falling 30 inches.

** All soils classified by visual inspection.

DAMES & MOORE

LOG of BORING and MONITORING WELL CONSTRUCTION DETAILS

Project :Chevron/Philadelphia Refinery

Boring/Well No. - A20

Project No. 113-909-032

Location - Chevron Refinery

Date M.W. completed 2/24/86

Driller - Warren George

Supervising D & M
Engineer /Geologist Andreu Ivansiu

Drilling Completed - 2/25/86

Type of Rig - Hollow Stem Auger

CONSTRUCTION DATA

Borehole Diam. - 10"

Borehole Depth - 15'

Casing/Screen Type - PVC

Casing Diam. - 4"

Casing Depth - 14'

Screen Setting - 4'-14'

Slot Width - 0.02"

Type of Seal - Bentonite

Type of Filterpack - #2 Sand

Type of Grout - Cement/Bentonite

MEASUREMENTS (NGVD)

Top of Casing Elevation - 8.81'

Static Water Level Elevation - 4.08'

Date Measured - 1/13/87

Surface Elevation - 8.73'

TEST DATA

Pump Type -

Depth to Intake (ft) -

Satic Water Level (ft) -

Pumping Water Level (ft) -

Drawdown (ft) -

Length of Test (Hrs) -

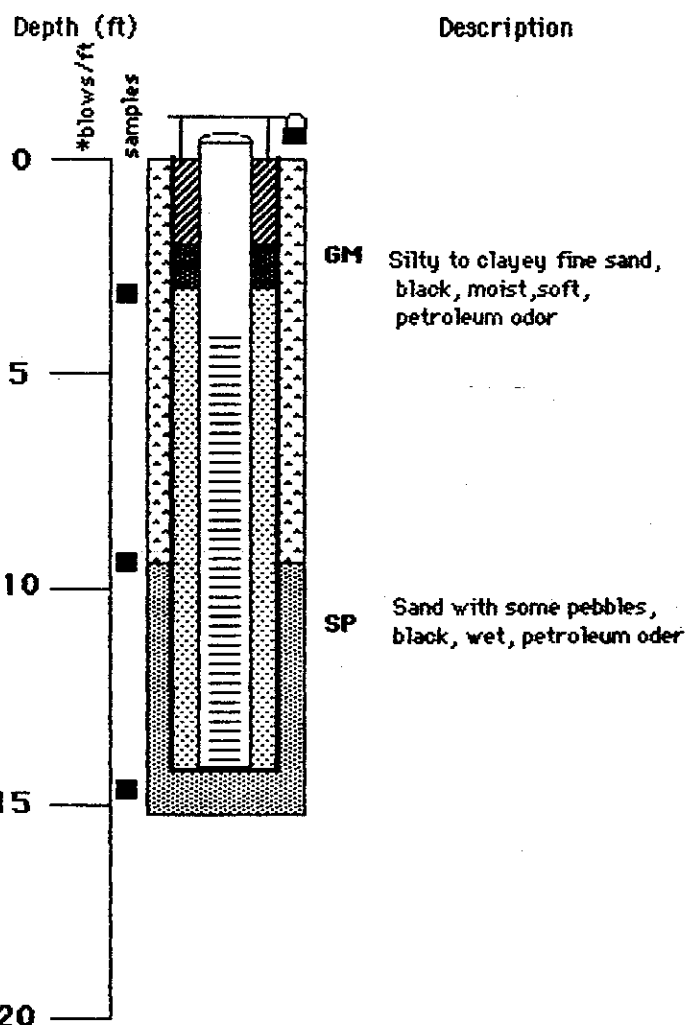
WELL CONSTRUCTION KEY

Filter Pack 

Bentonite Seal 

Cement Grout 

DAMES & MOORE



Notes:

* Blows taken using a 140 lb hammer falling 30 inches.

** All soils classified by visual inspection.

LOG of BORING and MONITORING WELL CONSTRUCTION DETAILS

Project : Chevron/Philadelphia Refinery

Project No. 113-909-032

Date M.W. completed 2/25/86

Supervising D & M
Engineer/Geologist Mark Robertson

Boring/Well No. - A21

Location - Chevron Refinery

Driller - Warren George

Drilling Completed - 2/25/86

Type of Rig - Hollow Stem Auger

CONSTRUCTION DATA

Borehole Diam. - 10"

Borehole Depth - 13'

Casing/Screen Type - PVC

Casing Diam. - 4"

Casing Depth - 13'

Screen Setting - 3' - 13'

Slot Width - 0.02"

Type of Seal - Bentonite

Type of Filterpack - #2 Sand

Type of Grout - Cement/Bentonite

MEASUREMENTS (NGVD)

Top of Casing Elevation - 9.84'

Static Water Level Elevation - Not Available

Date Measured - 1/13/87

Surface Elevation - 9.02'

TEST DATA

Pump Type -

Depth to Intake (ft) -

Static Water Level (ft) -


Pumping Water Level (ft) -

Drawdown (ft) -

Length of Test (Hrs) -

WELL CONSTRUCTION KEY

Filter Pack 

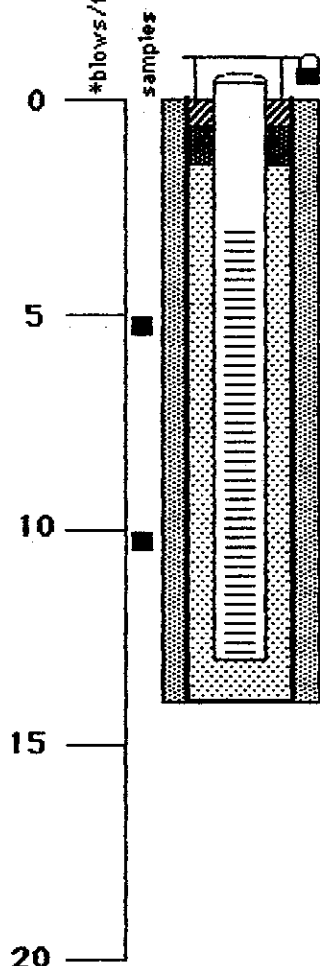
Bentonite Seal 

Cement Grout 

DAMES & MOORE

Depth (ft)

Description



SM

Silty sand with some
gravel and cobble

grades to black,
strong petroleum odor

decreasing gravel and cobbles

Notes:

* Blows taken using a 140 lb hammer falling 30 inches.

** All soils classified by visual inspection.

LOG of BORING and MONITORING WELL CONSTRUCTION DETAILS

Project : Chevron/Philadelphia Refinery

Boring/Well No. - A21D

Project No. 113-950-032

Location - Chevron Refinery

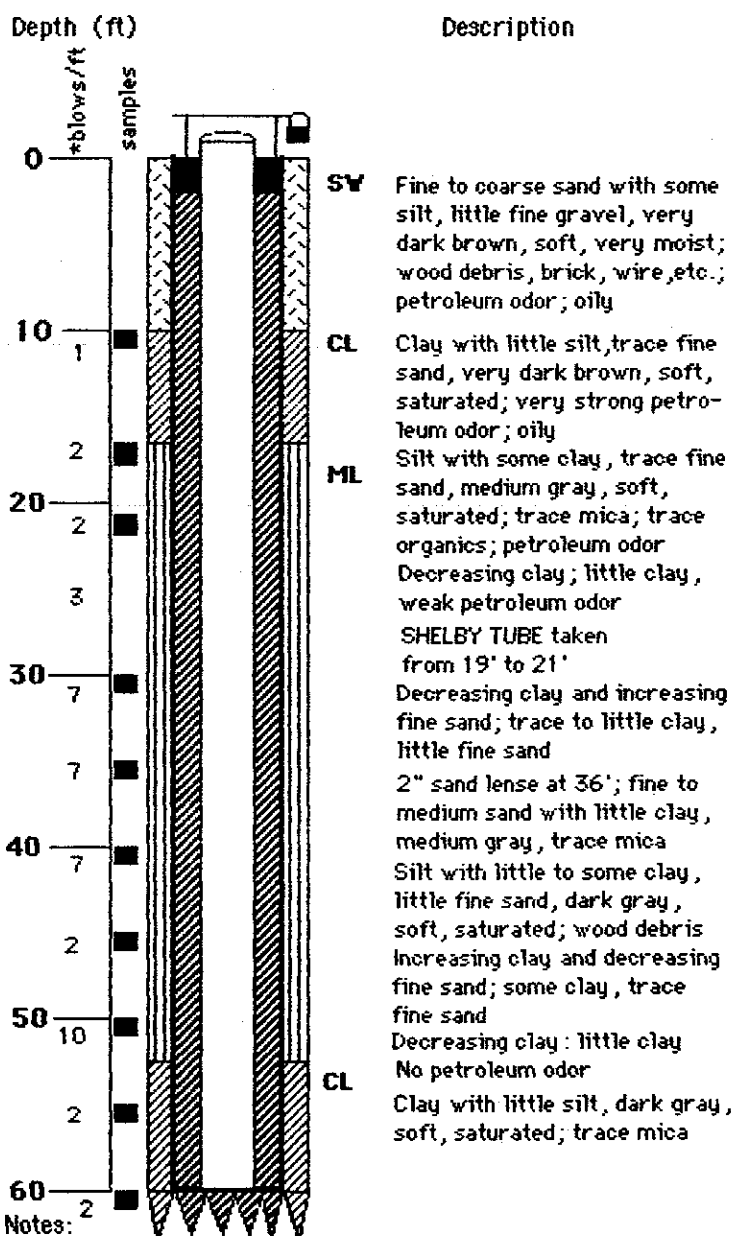
Date M.W. completed 10/28/86

Driller - Lambert, Inc.

Supervising D & M Geologist David Wagner

Drilling Completed - 10/28/86

Type of Rig - Hollow Stem Auger



Notes:

* Blows taken using a 140 lb hammer falling 30 inches.

** All soils classified by visual inspection.

DAMES & MOORE

CONSTRUCTION DATA

Borehole Diam. - 10"

Borehole Depth - 85'

Casing/Screen Type - PVC

Casing Diam. - 4"

Casing Depth - 85'

Screen Setting - 75' - 85'

Slot Width - 0.02"

Type of Seal - Bentonite

Type of Filterpack - #2 Sand

Type of Grout - Cement/Bentonite

MEASUREMENTS (NGVD)

Top of Casing Elevation - 12.18'

Static Water Level Elevation - -4.13'

Date Measured - 12/22/86

Surface Elevation - 8.48'

TEST DATA

Pump Type -

Depth to Intake (ft) -

Static Water Level (ft) -

Pumping Water Level (ft) -

Drawdown (ft) -

Length of Test (Hrs) -

WELL CONSTRUCTION KEY

| | |
|------------------|--|
| FILTER PACK | |
| BENTONITE SEAL | |
| BENTONITE/CEMENT | |
| CAVE IN MATERIAL | |
| CONCRETE | |

LOG of BORING and MONITORING WELL CONSTRUCTION DETAILS

Project : Chevron/Philadelphia Refinery

Boring/Well No. - A21D (Cont.)

Project No. 113-950-032

Location - Chevron Refinery

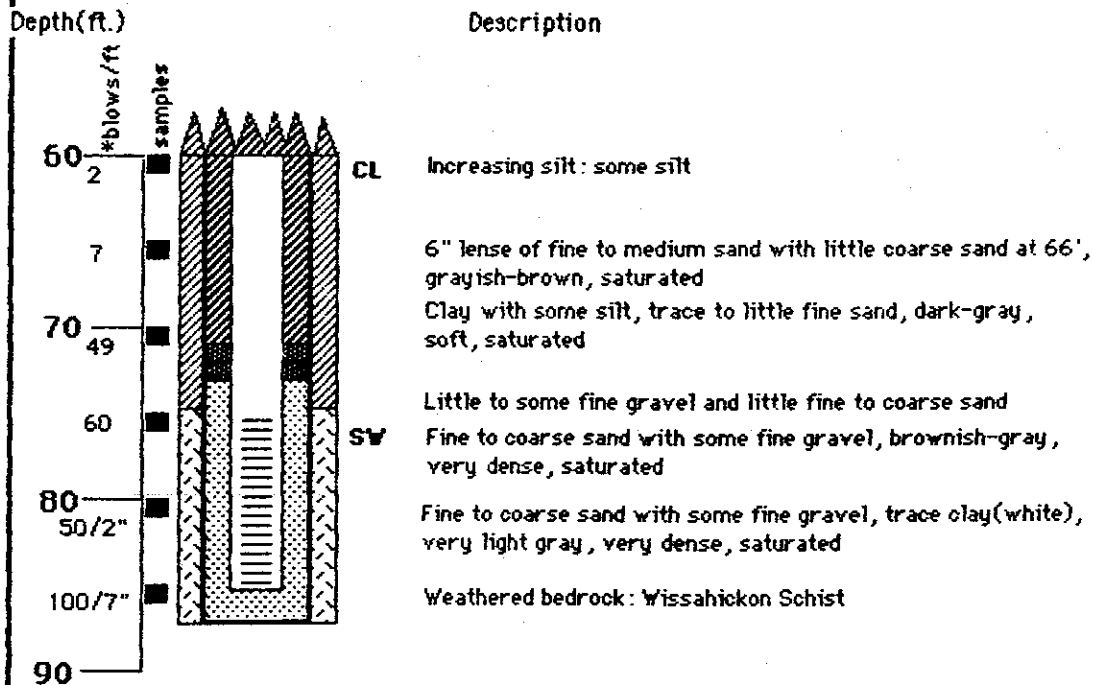
Date M.W. completed 10/28/86

Driller - Lambert, Inc.

Supervising D & M Geologist David Wagner

Drilling Completed - 10/28/86

Type of Rig - Hollow Stem Auger



WELL CONSTRUCTION KEY

| | |
|------------------|--|
| FILTER PACK | |
| BENTONITE SEAL | |
| BENTONITE/CEMENT | |
| CAVE IN MATERIAL | |
| CONCRETE | |

Notes:

- * Blows taken using a 140 lb hammer falling 30 inches.
- ** All soils classified by visual inspection.

DAMES & MOORE

LOG of BORING and MONITORING WELL CONSTRUCTION DETAILS

Project : Chevron/Philadelphia Refinery

Boring/Well No. -A22

Project No. 113-909-032

Location - Chevron Refinery

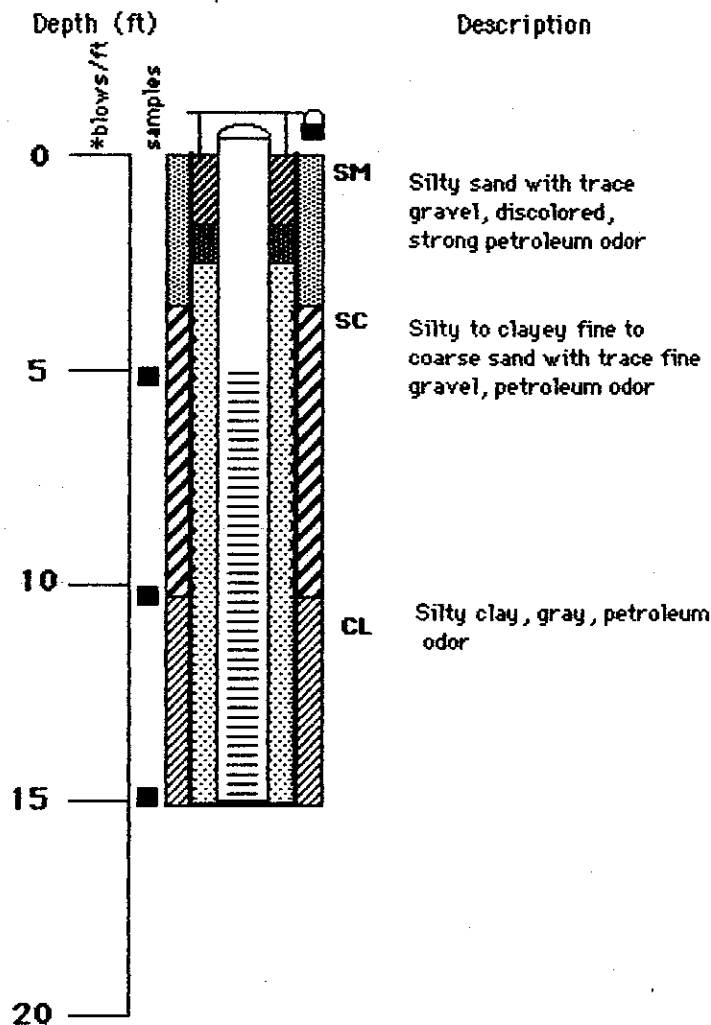
Date M.W. completed 2/26/86

Driller - Warren George

Supervising D & M
Engineer/Geologist Mark Robertson

Drilling Completed - 2/26/86

Type of Rig - Hollow Stem Auger



CONSTRUCTION DATA

Borehole Diam. - 10"

Borehole Depth - 15'

Casing/Screen Type - PVC

Casing Diam. - 4"

Casing Depth - 15'

Screen Setting - 5' - 15'

Slot Width - 0.02"

Type of Seal - Bentonite

Type of Filterpack - #2 Sand

Type of Grout - Cement/Bentonite

MEASUREMENTS (NGVD)

Top of Casing Elevation - 9.02'

Static Water Level Elevation - 1.71'

Date Measured - 1/13/87

Surface Elevation - 8.78'

TEST DATA

Pump Type -

Depth to Intake (ft) -

Static Water Level (ft) -

Pumping Water Level (ft) -

Drawdown (ft) -

Length of Test (Hrs) -

Notes:

* Blows taken using a 140 lb hammer falling 30 inches.

** All soils classified by visual inspection.

WELL CONSTRUCTION KEY

Filter Pack

Bentonite Seal

Cement Grout

DAMES & MOORE

LOG of BORING and MONITORING WELL CONSTRUCTION DETAILS

Project : Chevron/Philadelphia Refinery

Boring/Well No. -A23

Project No. 113-909-032

Location - Chevron Refinery

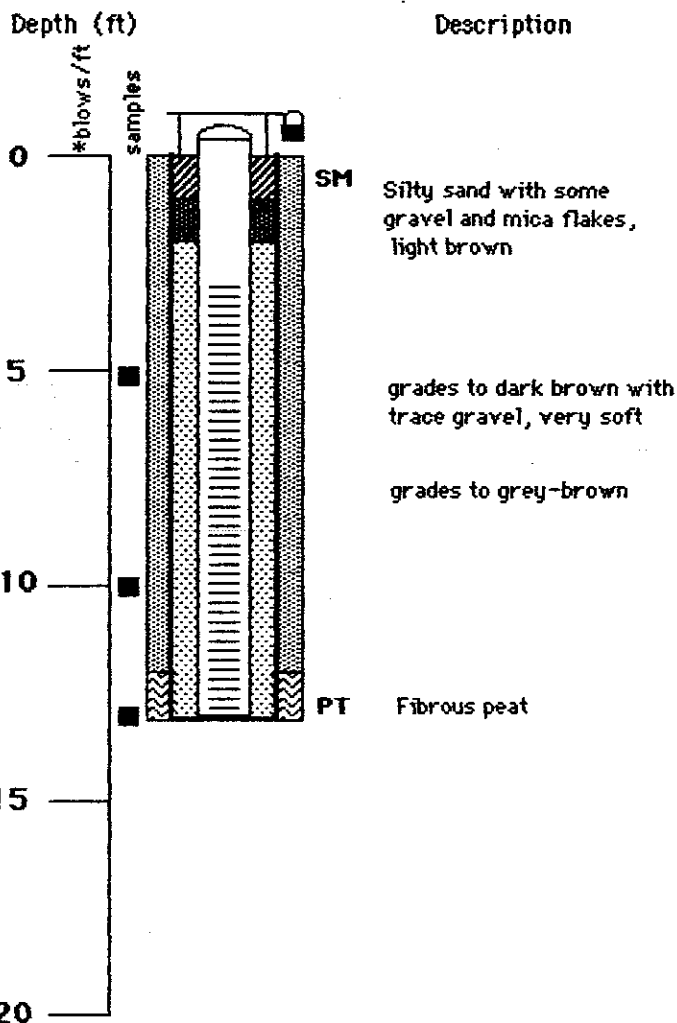
Date M.W. completed 2/27/86

Driller - Warren George

Supervising D & M
Engineer/Geologist Mark Robertson

Drilling Completed - 2/27/86

Type of Rig - Hollow Stem Auger



CONSTRUCTION DATA

Borehole Diam. - 10"

Borehole Depth - 13'

Casing/Screen Type - PVC

Casing Diam. - 4"

Casing Depth - 13'

Screen Setting - 3' - 13'

Slot Width - 0.02"

Type of Seal - Bentonite

Type of Filterpack - #2 Sand

Type of Grout - Cement/Bentonite

MEASUREMENTS (NGVD)

Top of Casing Elevation - 4.71'

Static Water Level Elevation - 4.31'

Date Measured - 1/13/87

Surface Elevation - 4.71'

TEST DATA

Pump Type -

Depth to Intake (ft) -

Static Water Level (ft) -

Pumping Water Level (ft) -

Drawdown (ft) -

Length of Test (Hrs) -

Notes:

* Blows taken using a 140 lb hammer falling 30 inches.

** All soils classified by visual inspection.

WELL CONSTRUCTION KEY

Filter Pack

Bentonite Seal

Cement Grout

DAMES & MOORE

LOG of BORING and MONITORING WELL CONSTRUCTION DETAILS

Project :Chevron/Philadelphia Refinery

Boring/Well No. - A24

Project No. 113-909-032

Location - Chevron Refinery

Date M.W. completed 2/24/86

Driller - Warren George

Supervising D & M
Engineer /Geologist Mark Robertson

Drilling Completed - 2/24/86

Type of Rig - Hollow Stem Auger

CONSTRUCTION DATA

Borehole Diam. - 10"

Borehole Depth - 14' 6"

Casing/Screen Type - PVC

Casing Diam. - 4"

Casing Depth - 14' 6"

Screen Setting - 2' - 12'

Slot Width - 0.02"

Type of Seal - Bentonite

Type of Filterpack - #2 Sand

Type of Grout - Cement/Bentonite

MEASUREMENTS (NGVD)

Top of Casing Elevation - 6.54'

Static Water Level Elevation 3.78'

Date Measured - 1/9/87

Surface Elevation - 6.46'

TEST DATA

Pump Type -

Depth to Intake (ft) -

Static Water Level (ft) -

Pumping Water Level (ft) -

Drawdown (ft) -

Length of Test (Hrs) -

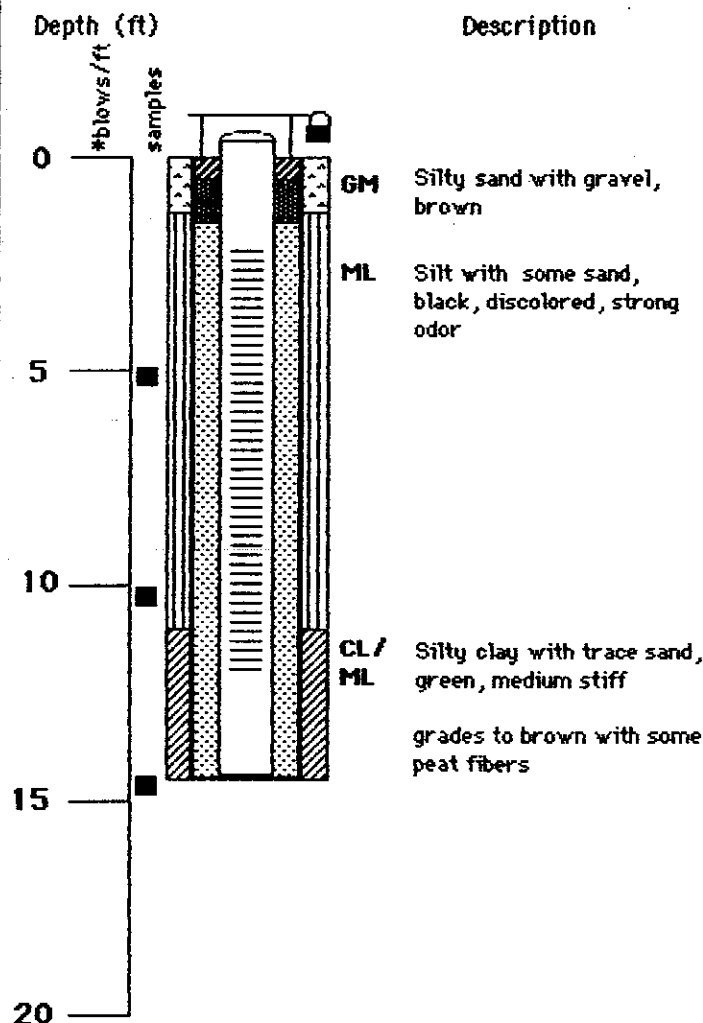
WELL CONSTRUCTION KEY

Filter Pack 

Bentonite Seal 

Cement Grout 

DAMES & MOORE



Notes:

* Blows taken using a 140 lb hammer falling 30 inches.

** All soils classified by visual inspection.

LOG of BORING and MONITORING WELL CONSTRUCTION DETAILS

Project : Chevron/Philadelphia Refinery

Project No. 113-909-032

Date M.W. completed 2/27/86

Supervising D & M
Engineer/Geologist Mark Robertson

Boring/Well No. -A25

Location - Chevron Refinery

Driller - Warren George

Drilling Completed - 2/27/86

Type of Rig - Hollow Stem Auger

CONSTRUCTION DATA

Borehole Diam. - 10"

Borehole Depth - 13'

Casing/Screen Type - PVC

Casing Diam. - 4"

Casing Depth - 13'

Screen Setting - 3' - 13'

Slot Width - 0.02"

Type of Seal - Bentonite

Type of Filterpack - #2 Sand

Type of Grout - Cement/Bentonite

MEASUREMENTS (NGVD)

Top of Casing Elevation - 10.46'

Static Water Level Elevation - 5.16'

Date Measured - 1/13/87

Surface Elevation - 10.38'

TEST DATA

Pump Type -

Depth to Intake (ft) -

Static Water Level (ft) -

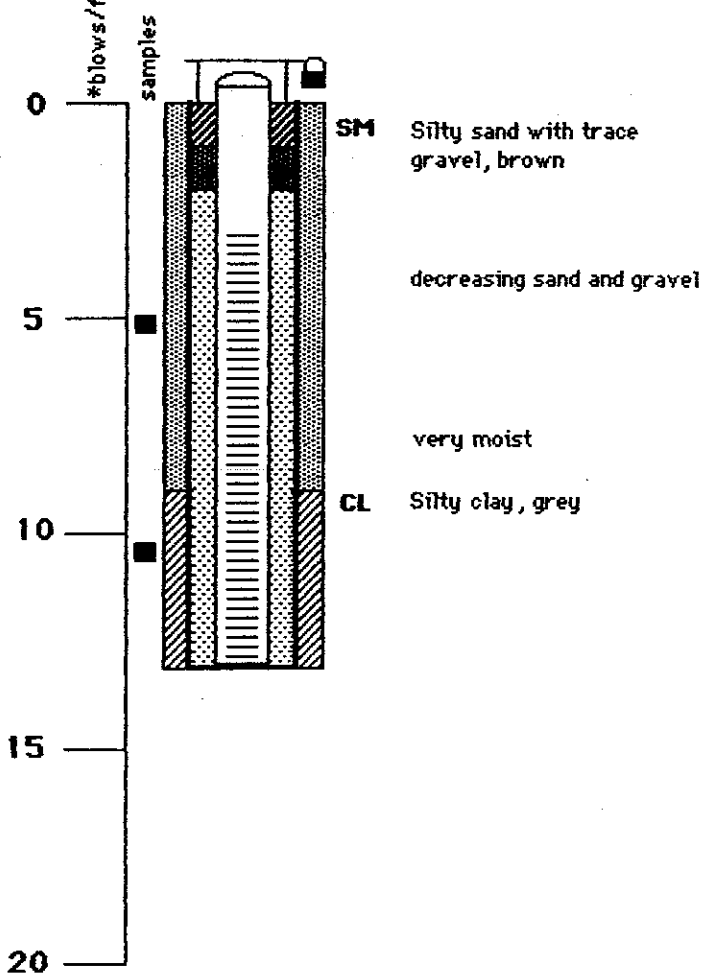
Pumping Water Level (ft) -

Drawdown (ft) -

Length of Test (Hrs) -

Depth (ft)

Description



Notes:

* Blows taken using a 140 lb hammer falling 30 inches.

** All soils classified by visual inspection.

WELL CONSTRUCTION KEY

Filter Pack

Bentonite Seal

Cement Grout

DAMES & MOORE

LOG of BORING and MONITORING WELL CONSTRUCTION DETAILS

Project : Chevron/Philadelphia Refinery

Project No. 113-909-032

Date M.W. completed 2/27/86

Supervising D & M
Engineer/Geologist Ralph T. Golia

Boring/Well No. -A26

Location - Chevron Refinery

Driller - Warren George

Drilling Completed - 2/27/86

Type of Rig - Hollow Stem Auger

CONSTRUCTION DATA

Borehole Diam. - 10"

Borehole Depth - 15'

Casing/Screen Type - PVC

Casing Diam. - 4"

Casing Depth - 15'

Screen Setting - 3'6" - 13'6"

Slot Width - 0.02"

Type of Seal - Bentonite

Type of Filterpack - #2 Sand

Type of Grout - Cement/Bentonite

MEASUREMENTS (NGVD)

Top of Casing Elevation - 11.38'

Static Water Level Elevation - 4.23'

Date Measured - 1/13/87

Surface Elevation - 11.24'

TEST DATA

Pump Type -

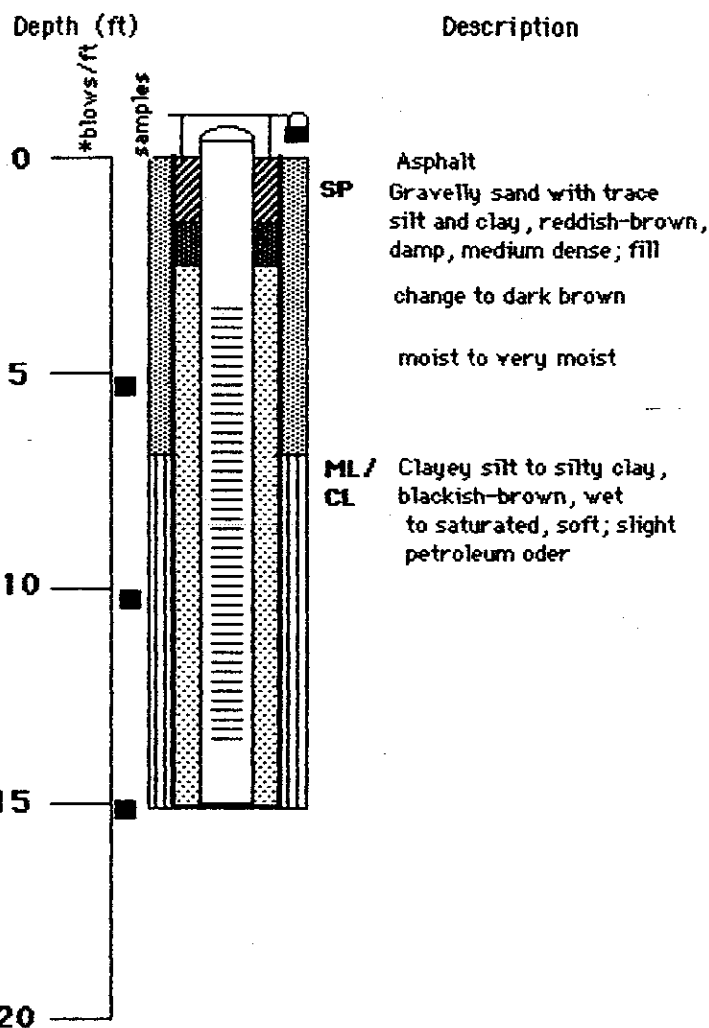
Depth to Intake (ft) -

Static Water Level (ft) -

Pumping Water Level (ft) -

Drawdown (ft) -

Length of Test (Hrs) -



Notes:

* Blows taken using a 140 lb hammer falling 30 inches.

** All soils classified by visual inspection.

WELL CONSTRUCTION KEY

Filter Pack

Bentonite Seal

Cement Grout

DAMES & MOORE

LOG of BORING and MONITORING WELL CONSTRUCTION DETAILS

Project : Chevron/Philadelphia Refinery

Project No. 113-909-032

Date M.W. completed 2/27/86

Supervising D & M
Engineer/Geologist Ralph T. Golia

Boring/Well No. -A27

Location - Chevron Refinery

Driller - Warren George

Drilling Completed - 2/27/86

Type of Rig - Hollow Stem Auger

CONSTRUCTION DATA

Borehole Diam. - 10"

Borehole Depth - 15'

Casing/Screen Type - PVC

Casing Diam. - 4"

Casing Depth - 15'

Screen Setting - 5' -15'

Slot Width - 0.02"

Type of Seal - Bentonite

Type of Filterpack - #2 Sand

Type of Grout - Cement/Bentonite

MEASUREMENTS (NGVD)

Top of Casing Elevation - 12.08'

Static Water Level Elevation - 3.84'

Date Measured - 1/13/87

Surface Elevation - 11.58'

TEST DATA

Pump Type -

Depth to Intake (ft) -

Static Water Level (ft) -

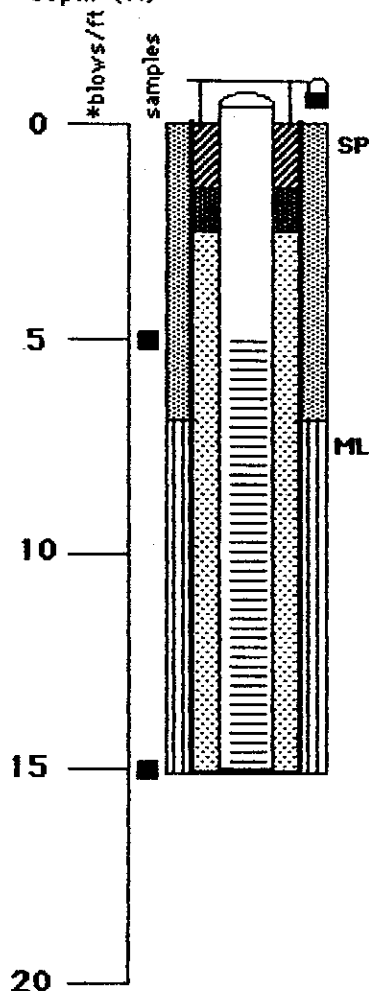
Pumping Water Level (ft) -

Drawdown (ft) -

Length of Test (Hrs) -

Depth (ft)

Description



Gravelly sand with trace
silt and clay, reddish-brown,
damp, medium dense

change to dark brown

moist to very moist

Clayey silt to silty clay
with trace wood, blackish-
brown, wet to saturated,
soft; slight petroleum odor,
wood

Notes:

* Blows taken using a 140 lb hammer falling 30 inches.

** All soils classified by visual inspection.

WELL CONSTRUCTION KEY

Filter Pack

Bentonite Seal

Cement Grout

DAMES & MOORE

LOG of BORING and MONITORING WELL CONSTRUCTION DETAILS

Project : Chevron/Philadelphia Refinery

Boring/Well No. - A91

Project No. 113-950-032

Location - Chevron Refinery

Date M.W. completed 10/21/86

Driller - Lambert, Inc.

Supervising D & M Geologist David Wagner

Drilling Completed - 10/21/86

Type of Rig - Hollow Stem Auger

CONSTRUCTION DATA

Borehole Diam. - 10"

Borehole Depth - 15'

Casing/Screen Type - PVC

Casing Diam. - 4"

Casing Depth - 13'

Screen Setting - 3'-13'

Slot Width - 0.02"

Type of Seal - Bentonite

Type of Filterpack - #2 Sand

Type of Grout -

MEASUREMENTS(NGVD)

Top of Casing Elevation - 10.85'

Static Water Level Elevation - 5.93'

Date Measured - 1/14/87

Surface Elevation - 7.85'

TEST DATA

Pump Type -

Depth to Intake (ft) -





Satic Water Level (ft) -

Pumping Water Level (ft) -

Drawdown (ft) -

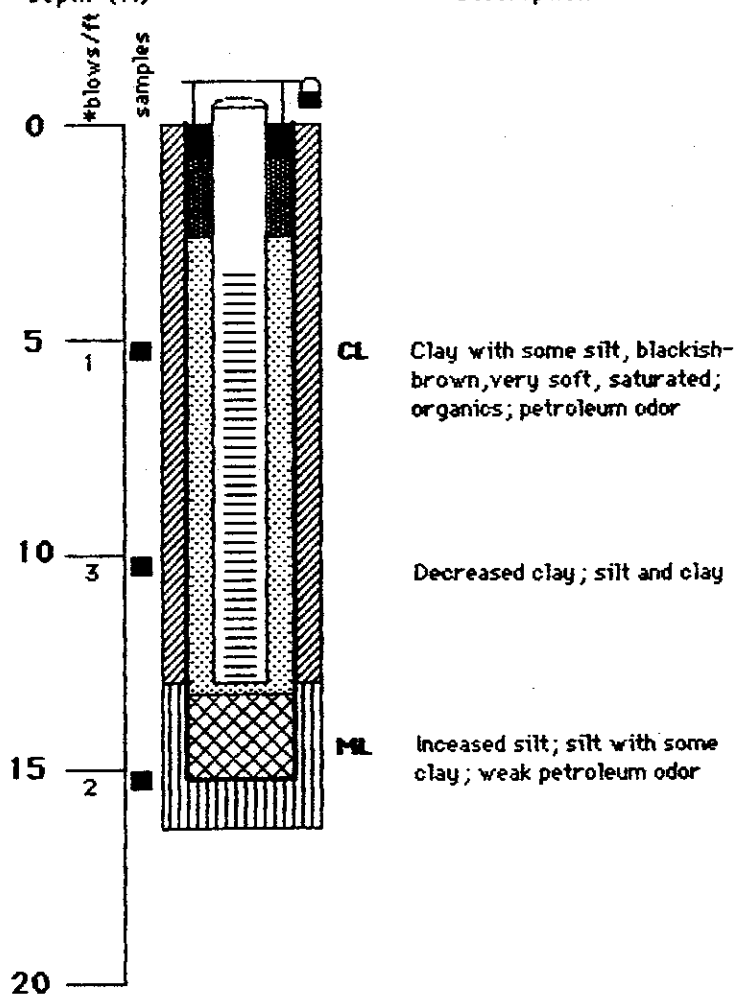
Length of Test (Hrs) -

WELL CONSTRUCTION KEY

FILTER PACK 
BENTONITE SEAL 
CONCRETE 
CAVE IN MATERIAL 

Depth (ft)

Description



Notes:

* Blows taken using a 140 lb hammer falling 30 inches.

** All soils classified by visual inspection.

DAMES & MOORE

LOG of BORING and MONITORING WELL CONSTRUCTION DETAILS

Project : Chevron/Philadelphia Refinery

Boring/Well No. - B39

Project No. 113-909-032

Location - Chevron Refinery

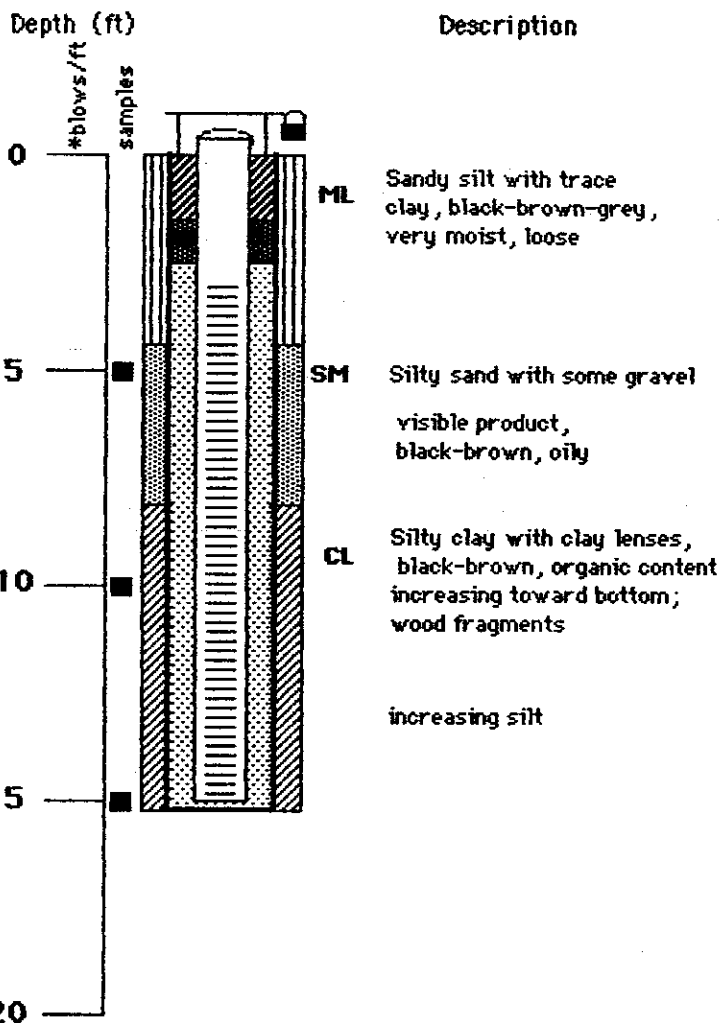
Date M.W. completed 2/19/86

Driller - Warren George

Supervising D & M
Engineer/Geologist David Wagner

Drilling Completed - 2/19/86

Type of Rig - Hollow Stem Auger



CONSTRUCTION DATA

Borehole Diam. - 10"

Borehole Depth - 15'

Casing/Screen Type - PVC

Casing Diam. - 4"

Casing Depth - 15'

Screen Setting - 3' - 15'

Slot Width - 0.02"

Type of Seal - Bentonite

Type of Filterpack - #2 Sand

Type of Grout - Cement/Bentonite

MEASUREMENTS (NGVD)

Top of Casing Elevation - 8.73'

Static Water Level Elevation - 6.68'

Date Measured - 1/13/87

Surface Elevation - 8.33'

TEST DATA

Pump Type -

Depth to Intake (ft) -

Static Water Level (ft) -

Pumping Water Level (ft) -

Drawdown (ft) -

Length of Test (Hrs) -

WELL CONSTRUCTION KEY

Filter Pack



Bentonite Seal



Cement Grout



DAMES & MOORE

Notes:

* Blows taken using a 140 lb hammer falling 30 inches.

** All soils classified by visual inspection.

LOG of BORING and MONITORING WELL CONSTRUCTION DETAILS

Project : Chevron/Philadelphia Refinery

Boring/Well No. - B40

Project No. 113-909-032

Date M.W. completed 2/18/86

Supervising D & M
Engineer /Geologist Mark Robertson

Location - Chevron Refinery

Driller - Warren George

Drilling Completed - 2/18/86

Type of Rig - Hollow Stem Auger

CONSTRUCTION DATA

Borehole Diam. - 10"

Borehole Depth - 15'

Casing/Screen Type - PVC

Casing Diam. - 4"

Casing Depth - 13'

Screen Setting - 3' - 13'

Slot Width - 0.02"

Type of Seal - Bentonite

Type of Filterpack - #2 Sand

Type of Grout - Cement/Bentonite

MEASUREMENTS (NGVD)

Top of Casing Elevation - 7.17'

Static Water Level Elevation - 5.56'

Date Measured - 1/13/87

Surface Elevation - 7.17'

TEST DATA

Pump Type -

Depth to Intake (ft) -

Static Water Level (ft) -

Pumping Water Level (ft) -

Drawdown (ft) -

Length of Test (Hrs) -

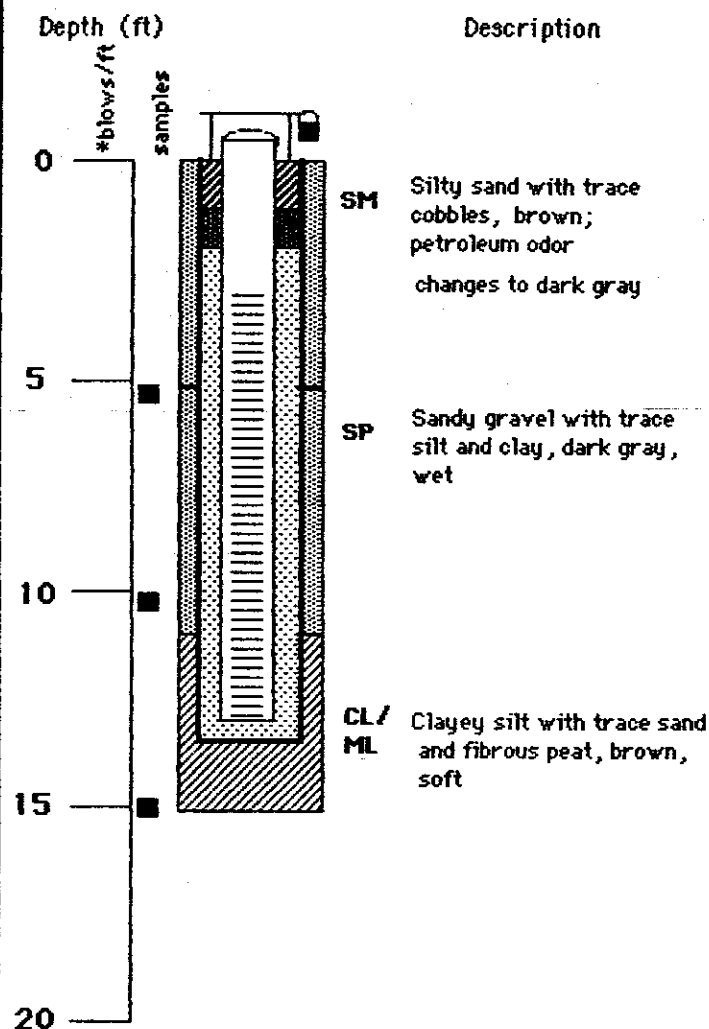
WELL CONSTRUCTION KEY

Filter Pack 

Bentonite Seal 

Cement Grout 

DAMES & MOORE



Notes:

* Blows taken using a 140 lb hammer falling 30 inches.

** All soils classified by visual inspection.

LOG of BORING and MONITORING WELL CONSTRUCTION DETAILS

Project :Chevron/Philadelphia Refinery

Boring/Well No. - B41

Project No. 113-909-032

Location - Chevron Refinery

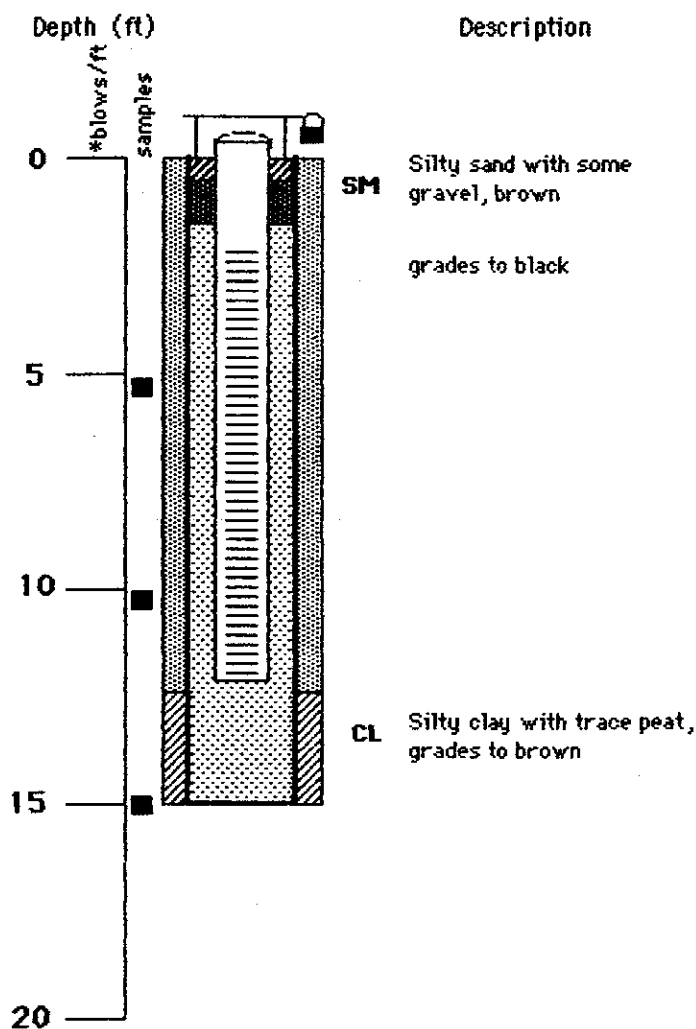
Date M.W. completed 2/21/86

Driller - Warren George

Supervising D & M
Engineer/Geologist Mark Robertson

Drilling Completed - 2/21/86

Type of Rig - Hollow Stem Auger



CONSTRUCTION DATA

Borehole Diam. - 10"

Borehole Depth - 15'

Casing/Screen Type - PVC

Casing Diam. - 4"

Casing Depth - 12'

Screen Setting - 2' - 12'

Slot Width - 0.02"

Type of Seal - Bentonite

Type of Filterpack - #2 Sand

Type of Grout - Cement/Bentonite

MEASUREMENTS (NGVD)

Top of Casing Elevation - 8.85'

Static Water Level Elevation - 6.77'

Date Measured - 1/13/87

Surface Elevation - 8.78'

TEST DATA

Pump Type -

Depth to Intake (ft) -

Static Water Level (ft) -

Pumping Water Level (ft) -

Drawdown (ft) -

Length of Test (Hrs) -

Notes:

* Blows taken using a 140 lb hammer falling 30 inches.

** All soils classified by visual inspection.

WELL CONSTRUCTION KEY

Filter Pack

Bentonite Seal

Cement Grout

DAMES & MOORE

LOG of BORING and MONITORING WELL CONSTRUCTION DETAILS

Project :Chevron/Philadelphia Refinery

Boring/Well No. - B42

Project No. 113-909-032

Location - Chevron Refinery

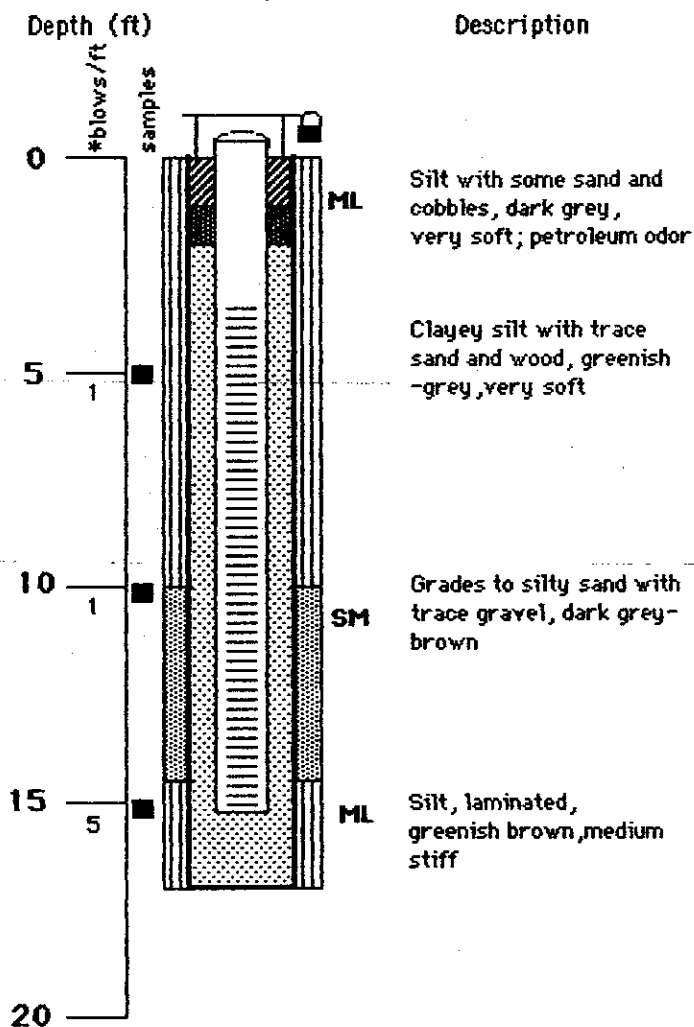
Date M.W. completed 2/19/86

Driller - Warren George

Supervising D & M
Engineer /Geologist Mark Robertson

Drilling Completed - 2/19/86

Type of Rig - Hollow Stem Auger



CONSTRUCTION DATA

Borehole Diam. - 10"
Borehole Depth - 17'
Casing/Screen Type - PVC
Casing Diam. - 4"
Casing Depth - 15'
Screen Setting - 2.5' - 15'
Slot Width - 0.02"
Type of Seal - Bentonite
Type of Filterpack - #2 Sand
Type of Grout - Cement/Bentonite

MEASUREMENTS (NGVD)

Top of Casing Elevation - 8.04'
Static Water Level Elevation - 7.11'
Date Measured - 1/13/87
Surface Elevation - 8.04'

TEST DATA




Pump Type -
Depth to Intake (ft) -
Static Water Level (ft) -
Pumping Water Level (ft) -
Drawdown (ft) -
Length of Test (Hrs) -

Notes:

* Blows taken using a 140 lb hammer falling 30 inches.

** All soils classified by visual inspection.

WELL CONSTRUCTION KEY

Filter Pack 
Bentonite Seal 
Cement Grout 

DAMES & MOORE

LOG of BORING and MONITORING WELL CONSTRUCTION DETAILS

Project : Chevron/Philadelphia Refinery

Boring/Well No. - B43

Project No. 113-909-032

Location - Chevron Refinery

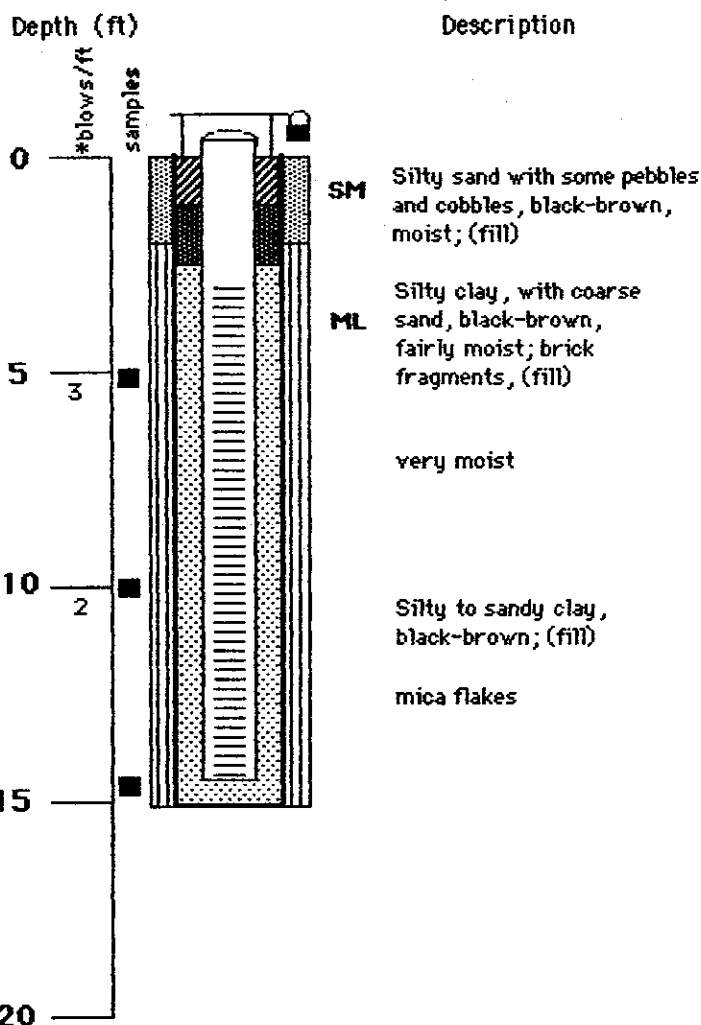
Date M.W. completed 2/19/85

Driller - Warren George

Supervising D & M
Engineer/Geologist David Wagner

Drilling Completed - 2/19/86

Type of Rig - Hollow Stem Auger



CONSTRUCTION DATA

Borehole Diam. - 10"

Borehole Depth - 15'

Casing/Screen Type - PVC

Casing Diam. - 4"

Casing Depth - 14.5'

Screen Setting - 3' - 14.5'

Slot Width - 0.02"

Type of Seal - Bentonite

Type of Filterpack - #2 Sand

Type of Grout - Cement/Bentonite

MEASUREMENTS (NGVD)

Top of Casing Elevation - 9.36'

Static Water Level Elevation - 4.30'

Date Measured - 1/13/87

Surface Elevation - 9.28'

TEST DATA

Pump Type -

Depth to Intake (ft) -

Satic Water Level (ft) -

Pumping Water Level (ft) -

Drawdown (ft) -

Length of Test (Hrs) -

WELL CONSTRUCTION DETAILS

Filter Pack



Bentonite Seal



Cement Grout



DAMES & MOORE

Notes:

* Blows taken using a 140 lb hammer falling 30 inches.

** All soils classified by visual inspection.

LOG of BORING and MONITORING WELL CONSTRUCTION DETAILS

Project : Chevron/Philadelphia Refinery

Project No. 113-909-032

Date M.W. completed 2/20/86

Supervising D & M
Engineer/Geologist Blake Moyer, Jr.

Boring/Well No. - B44

Location - Chevron Refinery

Driller - Warren George

Drilling Completed - 2/20/86

Type of Rig - Hollow Stem Auger

CONSTRUCTION DATA

Borehole Diam. - 10"

Borehole Depth - 17'

Casing/Screen Type - PVC

Casing Diam. - 4"

Casing Depth - 15'

Screen Setting - 3' - 13'

Slot Width - 0.02"

Type of Seal - Bentonite

Type of Filterpack - #2 Sand

Type of Grout - Cement/Bentonite

MEASUREMENTS (NGVD)

Top of Casing Elevation - 8.21'

Static Water Level Elevation - 6.16'

Date Measured - 1/13/87

Surface Elevation - 7.97'

TEST DATA

Pump Type -

Depth to Intake (ft) -

Static Water Level (ft) -

Pumping Water Level (ft) -

Drawdown (ft) -

Length of Test (Hrs) -

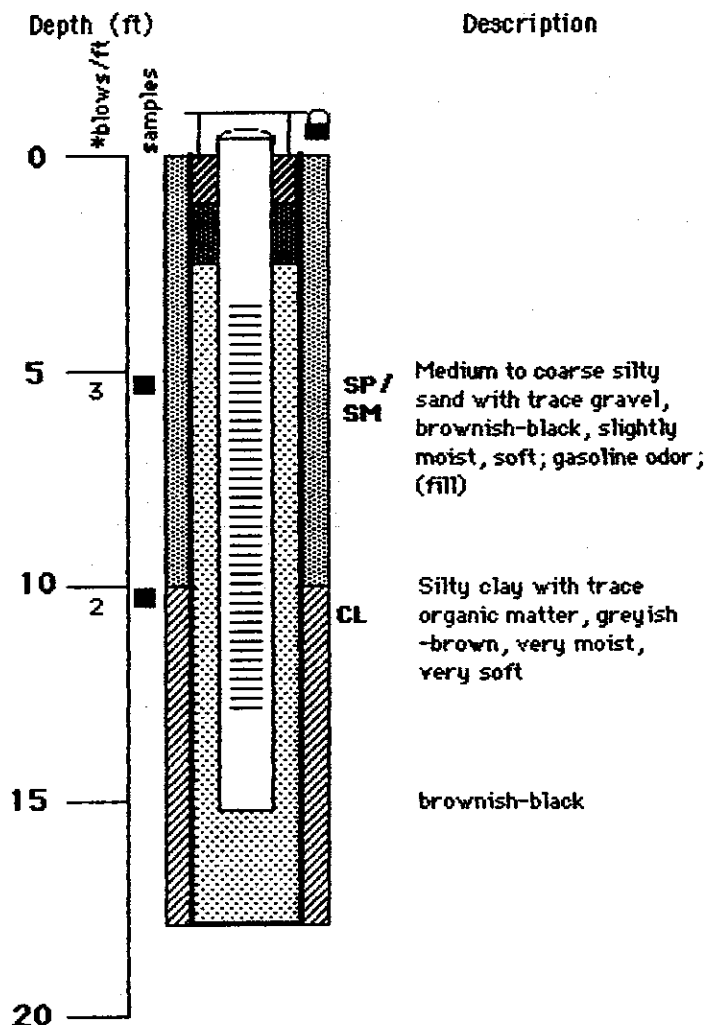
WELL CONSTRUCTION KEY

Filter Pack

Bentonite Seal

Cement Grout

DAMES & MOORE



Notes:

* Blows taken using a 140 lb hammer falling 30 inches.

** All soils classified by visual inspection.

LOG of BORING and MONITORING WELL CONSTRUCTION DETAILS

Project : Chevron/Philadelphia Refinery

Project No. 113-909-032

Date M.W. completed 2/20/86

Supervising D & M
Engineer /Geologist Blake Moyer, Jr.

Boring/Well No. - B45

Location - Chevron Refinery

Driller - Warren George

Drilling Completed - 2/20/86

Type of Rig - Hollow Stem Auger

CONSTRUCTION DATA

Borehole Diam. - 10"

Borehole Depth - 17'

Casing/Screen Type - PVC

Casing Diam. - 4"

Casing Depth - 15'

Screen Setting - 3' - 15'

Slot Width - 0.02"

Type of Seal - Bentonite

Type of Filterpack - #2 Sand

Type of Grout - Cement/Bentonite

MEASUREMENTS (NGVD)

Top of Casing Elevation - 7.30'

Static Water Level Elevation - 5.70'

Date Measured - 1/13/87

Surface Elevation - 6.98'

TEST DATA

Pump Type -

Depth to Intake (ft) -

Satic Water Level (ft) -

Pumping Water Level (ft) -

Drawdown (ft) -

Length of Test (Hrs) -

WELL CONSTRUCTION KEY

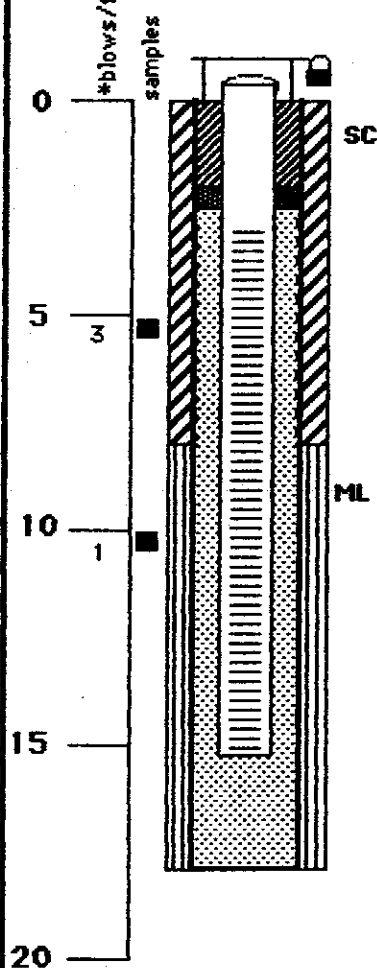
Filter Pack 

Bentonite Seal 

Cement Grout 

Depth (ft)

Description



Notes:

* Blows taken using a 140 lb hammer falling 30 inches.

** All soils classified by visual inspection.

DAMES & MOORE

LOG of BORING and MONITORING WELL CONSTRUCTION DETAILS

Project : Chevron/Philadelphia Refinery

Project No. 113-909-032

Date M.W. completed 2/21/86

Supervising D & M
Engineer /Geologist David Wagner

Boring/Well No. - B46

Location - Chevron Refinery

Driller - Warren George

Drilling Completed - 2/21/86

Type of Rig - Hollow Stem Auger

CONSTRUCTION DATA

Borehole Diam. - 10"

Borehole Depth - 15'

Casing/Screen Type - PVC

Casing Diam. - 4"

Casing Depth - 15'

Screen Setting - 2' - 12'

Slot Width - 0.02"

Type of Seal - Bentonite

Type of Filterpack - #2 Sand

Type of Grout - Cement/Bentonite

MEASUREMENTS (NGVD)

Top of Casing Elevation - 10.56'

Static Water Level Elevation - 9.03'

Date Measured - 1/13/87

Surface Elevation - 10.47'

TEST DATA

Pump Type -

Depth to Intake (ft) -

Satic Water Level (ft) -

Pumping Water Level (ft) -

Drawdown (ft) -

Length of Test (Hrs) -

WELL CONSTRUCTION KEY

Filter Pack



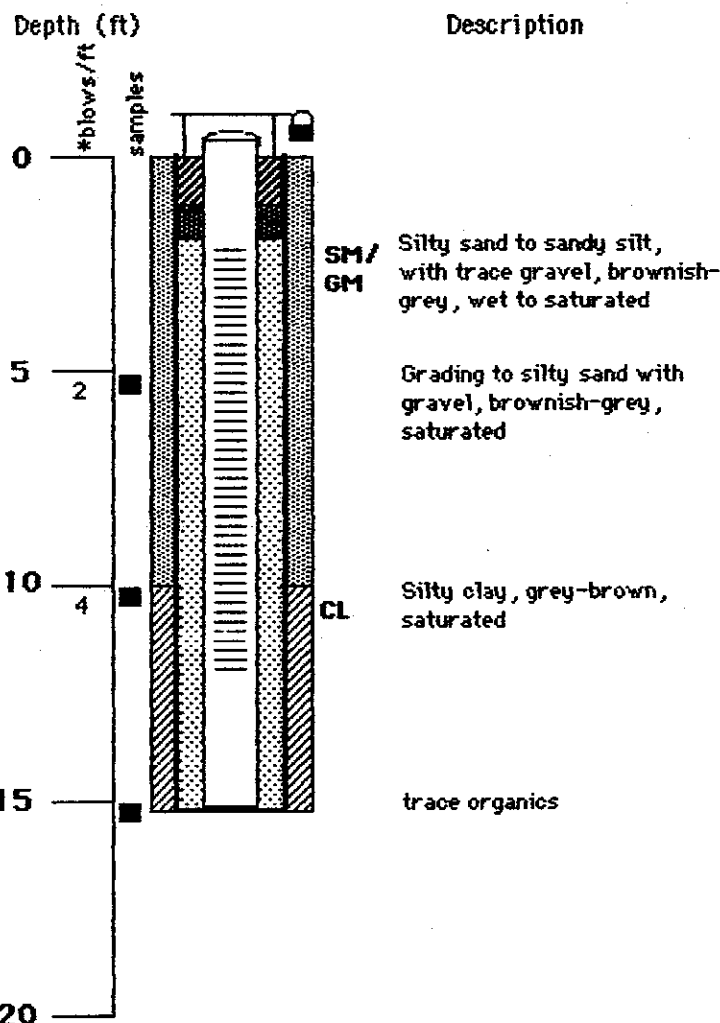
Bentonite Seal



Cement Grout



DAMES & MOORE



Notes:

* Blows taken using a 140 lb hammer falling 30 inches.

** All soils classified by visual inspection.

LOG of BORING and MONITORING WELL CONSTRUCTION DETAILS

Project : Chevron/Philadelphia Refinery

Project No. 113-909-032

Date M.W. completed 2/21/86

Supervising D & M
Engineer/Geologist David Wagner

Boring/Well No. - B47

Location - Chevron Refinery

Driller - Warren George

Drilling Completed - 2/21/86

Type of Rig - Hollow Stem Auger

CONSTRUCTION DATA

Borehole Diam. - 10"

Borehole Depth - 15'

Casing/Screen Type - PVC

Casing Diam. - 4"

Casing Depth - 15'

Screen Setting - 3' - 13'

Slot Width - 0.02"

Type of Seal - Bentonite

Type of Filterpack - #2 Sand

Type of Grout - Cement/Bentonite

MEASUREMENTS (NGVD)

Top of Casing Elevation - 10.56'

Static Water Level Elevation - 7.28'

Date Measured - 1/13/87

Surface Elevation - 10.32'

TEST DATA

Pump Type -

Depth to Intake (ft) -

Static Water Level (ft) -

Pumping Water Level (ft) -

Drawdown (ft) -

Length of Test (Hrs) -

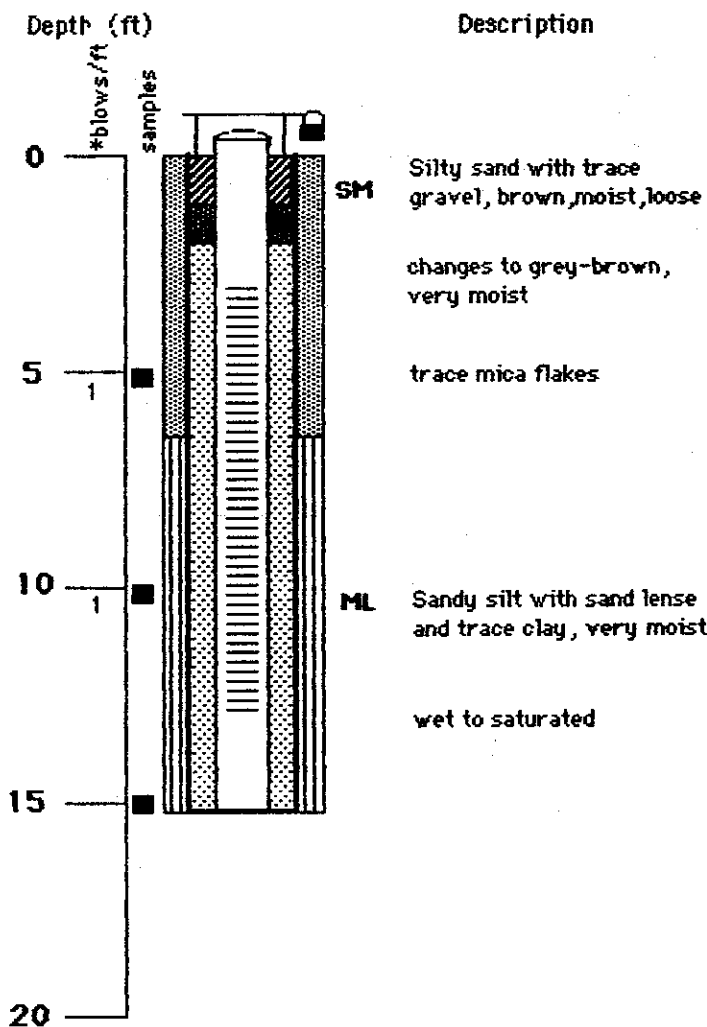
WELL CONSTRUCTION KEY

Filter Pack 

Bentonite Seal 

Cement Grout 

DAMES & MOORE



Notes:

* Blows taken using a 140 lb hammer falling 30 inches.

** All soils classified by visual inspection.

LOG of BORING and MONITORING WELL CONSTRUCTION DETAILS

Project : Chevron/Philadelphia Refinery

Project No. 113-909-032

Date M.W. completed 2/21/86

Supervising D & M
Engineer /Geologist Mark Robertson

Boring/Well No. - B48

Location - Chevron Refinery

Driller - Warren George

Drilling Completed - 2/21/86

TYPE OF LOG - RIGID STEM AUGER

CONSTRUCTION DATA

Borehole Diam. - 10"

Borehole Depth - 16'

Casing/Screen Type - PVC

Casing Diam. - 4"

Casing Depth - 14'

Screen Setting - 4' - 14'

Slot Width - 0.02"

Type of Seal - Bentonite

Type of Filterpack - #2 Sand

Type of Grout - Cement/Bentonite

MEASUREMENTS (NGVD)

Top of Casing Elevation - 8.90'

Static Water Level Elevation - 8.35'

Date Measured - 1/13/87

Surface Elevation - 8.90'

TEST DATA

Pump Type -

Depth to Intake (ft) -

Static Water Level (ft) -

Pumping Water Level (ft) -

Drawdown (ft) -

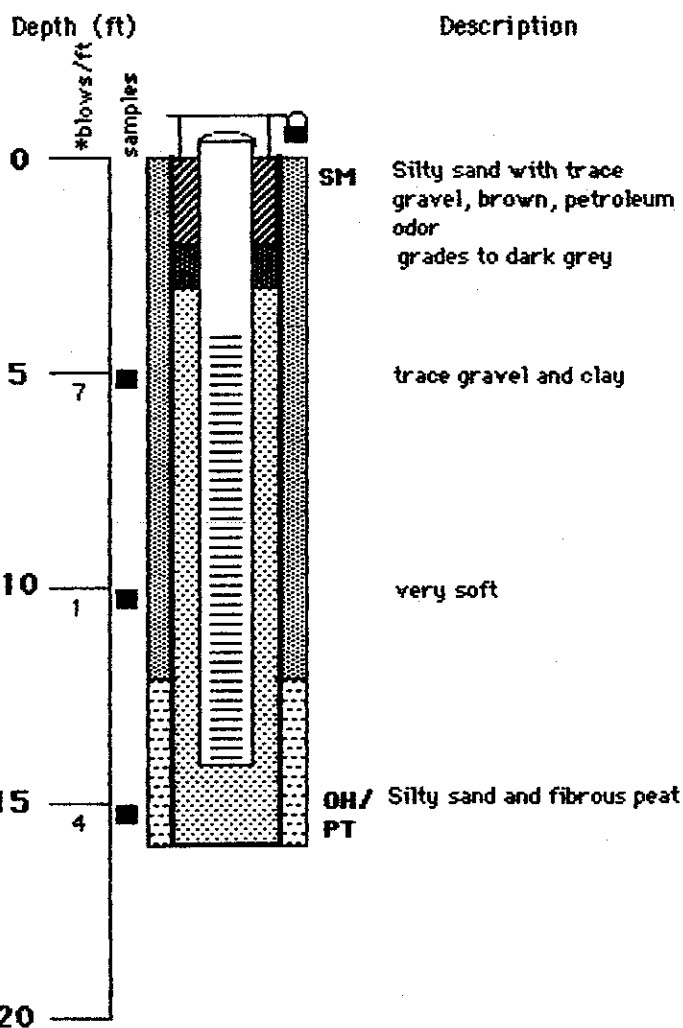
Length of Test (Hrs) -

WELL CONSTRUCTION KEY

Filter Pack 

Bentonite Seal 

Cement Grout 



Notes:

* Blows taken using a 140 lb hammer falling 30 inches.

** All soils classified by visual inspection.

DAMES & MOORE

LOG of BORING and MONITORING WELL CONSTRUCTION DETAILS

Project : Chevron/Philadelphia Refinery

Boring/Well No. - B48D

Project No. 113-950-032

Location - Chevron Refinery

Date M.W. completed 11/6/86

Driller - Lambert, Inc.

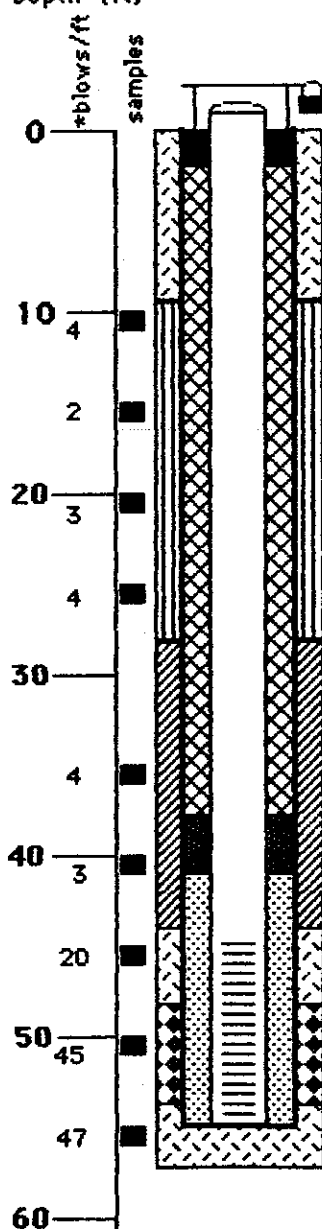
Supervising D & M Geologist David Wagner

Drilling Completed - 11/6/86

Type of Rig - Hollow Stem Auger

Depth (ft)

Description



SV Fine to coarse sand with little to some fine gravel, little clay and silt, very dark brown, soft, saturated; strong petroleum odor

ML Silt with little clay, very dark brown, soft, very moist; micaceous; strong petroleum odor

Increasing clay; some clay with abundant organics

Increasing clay; silt and clay

Decreasing clay; some clay and trace fine sand; organics; weak petroleum odor

CL Clay with some silt, dark gray, soft, very moist; organics; very weak petroleum odor
SHELBY TUBE taken from 30' to 31.5'

SV Fine to coarse sand with some fine gravel, trace silt, reddish-brown, medium dense, saturated

GP Fine gravel with little to some fine to coarse sand, trace silt and clay, dark reddish-brown, dense, saturated; micaceous

SV Fine to coarse sand with some fine gravel, light reddish-brown to light reddish-gray, dense, saturated

CONSTRUCTION DATA

Borehole Diam. - 10"

Borehole Depth - 55'

Casing/Screen Type - PVC

Casing Diam. - 4"

Casing Depth - 55'

Screen Setting - 45' - 55'

Slot Width - 0.02"

Type of Seal - Bentonite

Type of Filterpack - #2 Sand

Type of Grout -

MEASUREMENTS (NGVD)

Top of Casing Elevation - 9.82'

Static Water Level Elevation - -2.17'

Date Measured - 12/22/86

Surface Elevation - 8.90'

TEST DATA

Pump Type -

Depth to Intake (ft) -

Static Water Level (ft) -

Pumping Water Level (ft) -

Drawdown (ft) -

Length of Test (Hrs) -

WELL CONSTRUCTION KEY

FILTER PACK
BENTONITE SEAL
BENTONITE GROUT
CAVE IN MATERIAL
CONCRETE

Notes:

* Blows taken using a 140 lb hammer falling 30 inches.

** All soils classified by visual inspection.

DAMES & MOORE

LOG of BORING and MONITORING WELL CONSTRUCTION DETAILS

Project : Chevron/Philadelphia Refinery

Boring/Well No. - B92

Project No. 113-950-032

Location - Chevron Refinery

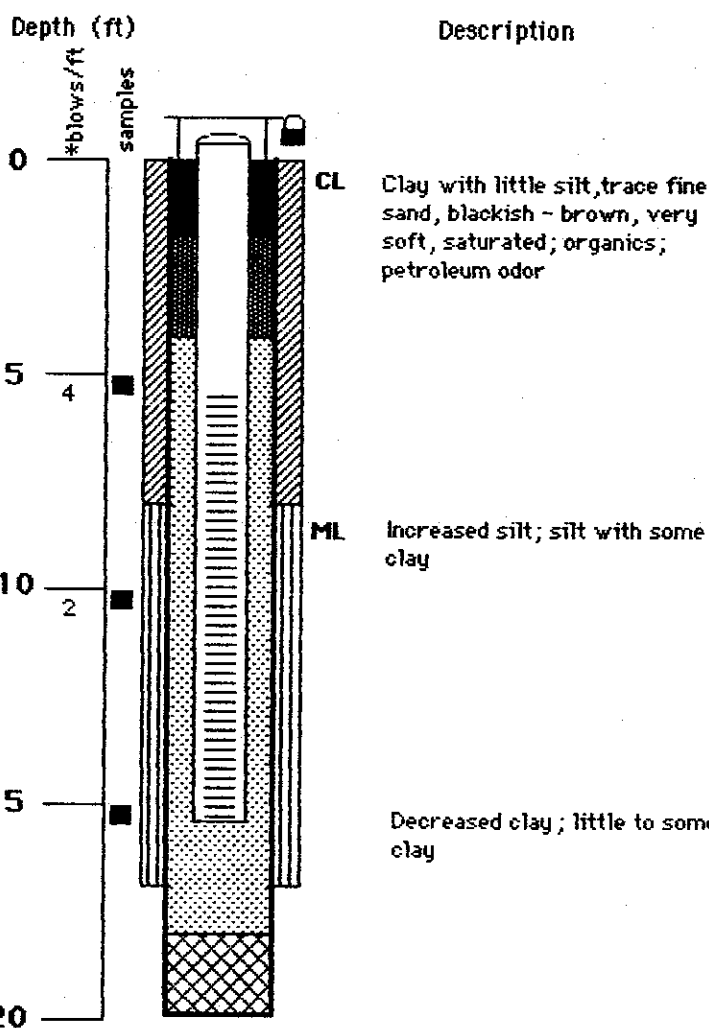
Date M.W. completed 10/21/86

Driller - Lambert, Inc.

Supervising D & M Geologist David Wagner

Drilling Completed - 10/21/86

Type of Rig - Hollow Stem Auger



CONSTRUCTION DATA

Borehole Diam. - 10"

Borehole Depth - 20'

Casing/Screen Type - PVC

Casing Diam. - 4"

Casing Depth - 15.5'

Screen Setting - 5.5' - 15.5'

Slot Width - 0.02"

Type of Seal - Bentonite

Type of Filterpack - #2 Sand

Type of Grout -

MEASUREMENTS (NGVD)

Top of Casing Elevation - 12.33'

Static Water Level Elevation - 7.19'

Date Measured - 1/14/87

Surface Elevation - 9.33'

TEST DATA

Pump Type -

Depth to Intake (ft) -

Static Water Level (ft) -

Pumping Water Level (ft) -

Drawdown (ft) -

Length of Test (Hrs) -

WELL CONSTRUCTION KEY

- FILTER PACK
- BENTONITE SEAL
- CONCRETE
- CAVE IN MATERIAL

Notes:

- * Blows taken using a 140 lb hammer falling 30 inches.
- ** All soils classified by visual inspection.

DAMES & MOORE

LOG of BORING and MONITORING WELL CONSTRUCTION DETAILS

Project: Chevron/Philadelphia Refinery

Boring/Well No. - B93

Project No. 113-950-032

Location - Chevron Refinery

Date M.W. completed 10/22/86

Driller - Lambert, Inc.

Supervising D & M Geologist David Wagner

Drilling Completed - 10/22/86

Type of Rig - Hollow Stem Auger

CONSTRUCTION DATA

Borehole Diam. - 10"

Borehole Depth - 20'

Casing/Screen Type - PVC

Casing Diam. - 4"

Casing Depth - 13.5'

Screen Setting - 3.5' - 13.5'

Slot Width - 0.02"

Type of Seal - Bentonite

Type of Filterpack - #2 Sand

Type of Grout -

MEASUREMENTS (NGVD)

Top of Casing Elevation - 12.83'

Static Water Level Elevation - 7.79'

Date Measured - 1/14/87

Surface Elevation - 9.83'

TEST DATA

Pump Type -

Depth to Intake (ft) -

Satic Water Level (ft) -


Pumping Water Level (ft) -

Drawdown (ft) -

Length of Test (Hrs) -

WELL CONSTRUCTION KEY

FILTER PACK 

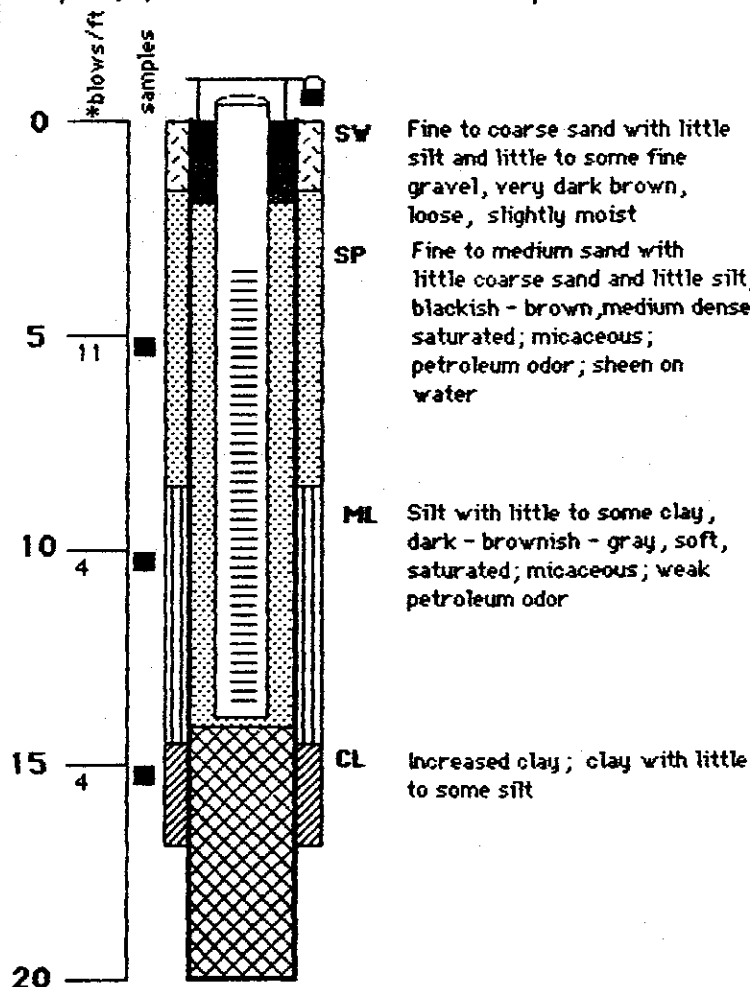
BENTONITE SEAL 

CONCRETE 

CAVE IN MATERIAL 

Depth (ft)

Description



Notes:

* Blows taken using a 140 lb hammer falling 30 inches.

** All soils classified by visual inspection.

DAMES & MOORE

LOG of BORING and MONITORING WELL CONSTRUCTION DETAILS

Project : Chevron/Philadelphia Refinery

Boring/Well No. - B94

Project No. 113-950-032

Location - Chevron Refinery

Date M.W. completed 10/22/86

Driller - Lambert, Inc.

Supervising D & M Geologist David Wagner

Drilling Completed - 10/22/86

Type of Rig - Hollow Stem Auger

CONSTRUCTION DATA

Borehole Diam. - 10"

Borehole Depth - 15'

Casing/Screen Type - PVC

Casing Diam. - 4"

Casing Depth - 14'

Screen Setting - 4' - 14'

Slot Width - 0.02"

Type of Seal - Bentonite

Type of Filterpack - #2 Sand

Type of Grout -

MEASUREMENTS (NGVD)

Top of Casing Elevation - 11.21'

Static Water Level Elevation - 5.11'

Date Measured - 1/14/87

Surface Elevation - 8.03'

TEST DATA

Pump Type -

Depth to Intake (ft) -

Satic Water Level (ft) -


Pumping Water Level (ft) -

Drawdown (ft) -

Length of Test (Hrs) -

WELL CONSTRUCTION KEY

FILTER PACK 

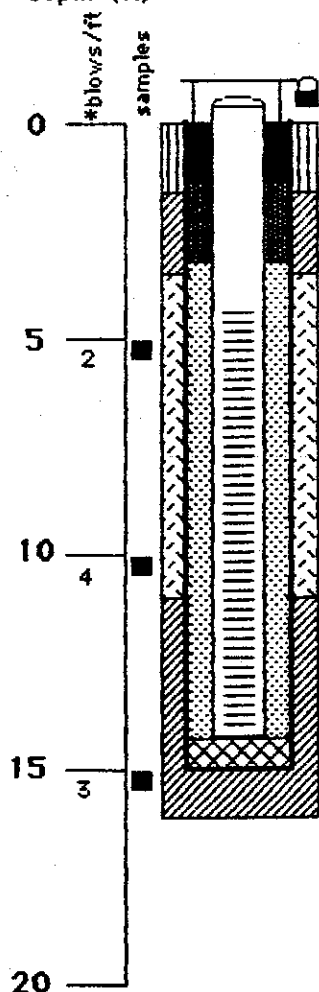
BENTONITE SEAL 

CONCRETE 

CAVE IN MATERIAL 

Depth (ft)

Description



ML Silt and fine to coarse sand and fine gravel, dark gray, loose, moist

CL Clay with little to some silt, trace fine to medium sand, dark gray, soft, moist; micaceous

SW Fine to coarse sand with fine gravel, little silt, trace clay, dark brown, loose, saturated; weak petroleum odor; sheen on water

CL Clay with some silt, dark gray, soft, saturated; micaceous

Notes:

* Blows taken using a 140 lb hammer falling 30 inches.

** All soils classified by visual inspection.

DAMES & MOORE

LOG of BORING and MONITORING WELL CONSTRUCTION DETAILS

Project :Chevron/Philadelphia Refinery

Project No. 113-909-032

Date M.W. completed 2/22/86

Supervising D & M
Engineer /Geologist T. Helgason

Boring/Well No. - C49

Location - Chevron Refinery

Driller - Drill Consult

Drilling Completed - 2/22/86

Type of Rig - Hollow Stem Auger

CONSTRUCTION DATA

Borehole Diam. - 7"

Borehole Depth - 20'

Casing/Screen Type - PVC

Casing Diam. - 4"

Casing Depth - 18'

Screen Setting - 8' - 18'

Slot Width - 0.02"

Type of Seal - Bentonite

Type of Filterpack - #2 Sand

Type of Grout - Cement/Bentonite

MEASUREMENTS (NGVD)

Top of Casing Elevation - 12.16'

Static Water Level Elevation - 5.94'

Date Measured - 1/13/87

Surface Elevation - 10.92'

TEST DATA

Pump Type -

Depth to Intake (ft) -

Satic Water Level (ft) -

Pumping Water Level (ft) -

Drawdown (ft) -

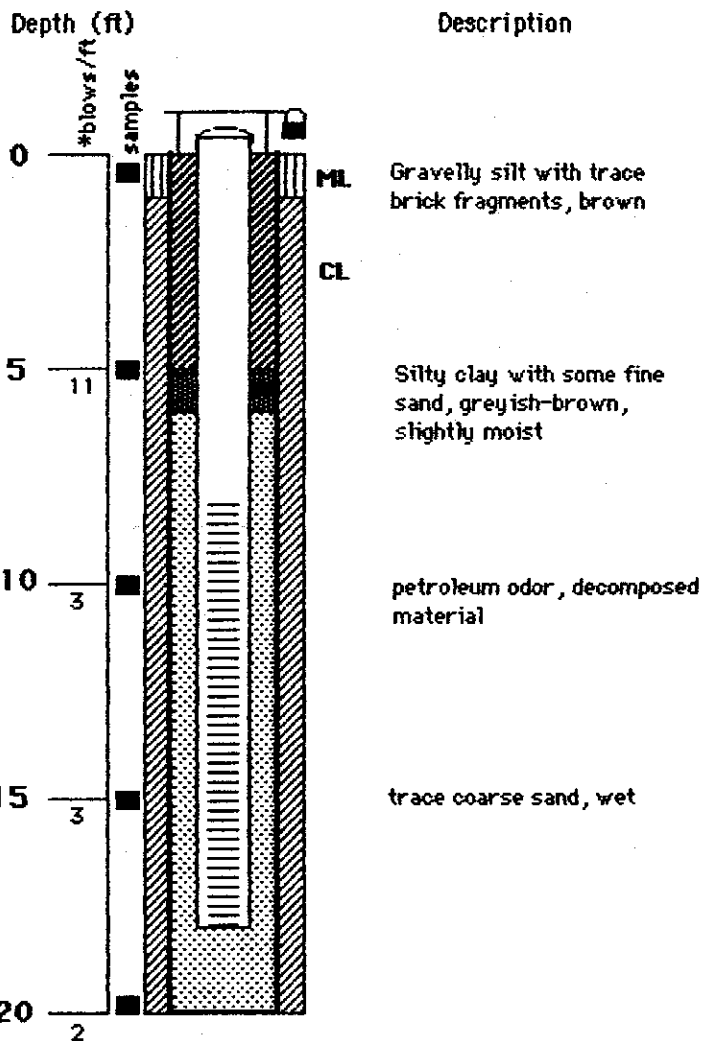
Length of Test (Hrs) -

WELL CONSTRUCTION KEY

Filter Pack

Bentonite Seal

Cement Grout



Notes:

* Blows taken using a 140 lb hammer falling 30 inches.

** All soils classified by visual inspection.

DAMES & MOORE

LOG of BORING and MONITORING WELL CONSTRUCTION DETAILS

Project :Chevron/Philadelphia Refinery

Project No. 113-909-032

Date M.W. completed 2/22/86

Supervising D & M
Engineer/Geologist E.J. Fillo

Boring/Well No. - C50

Location - Chevron Refinery

Driller - Drill Consult

Drilling Completed - 2/22/86

Type of Rig - Hollow Stem Auger

CONSTRUCTION DATA

Borehole Diam. - 7"

Borehole Depth - 16'

Casing/Screen Type - PVC

Casing Diam. - 4"

Casing Depth - 15' 6"

Screen Setting - 5' 6" - 15' 6"

Slot Width - 0.02"

Type of Seal - Bentonite

Type of Filterpack - #2 Sand

Type of Grout - Cement/Bentonite

MEASUREMENTS (NGVD)

Top of Casing Elevation - 15.35'

Static Water Level Elevation - 4.71'

Date Measured - 1/13/87

Surface Elevation - 11.14'

TEST DATA

Pump Type -

Depth to Intake (ft) -

Static Water Level (ft) -

Pumping Water Level (ft) -

Drawdown (ft) -

Length of Test (Hrs) -

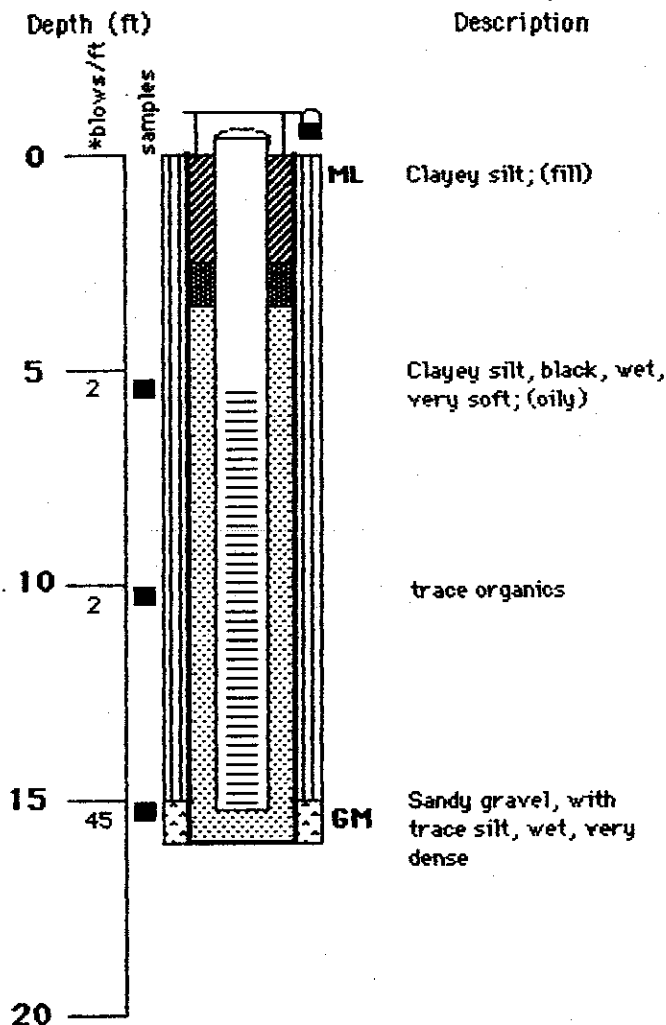
WELL CONSTRUCTION KEY

Filter Pack 

Bentonite Seal 

Cement Grout 

DAMES & MOORE



Notes:

* Blows taken using a 140 lb hammer falling 30 inches.

** All soils classified by visual inspection.

LOG of BORING and MONITORING WELL CONSTRUCTION DETAILS

Project : Chevron/Philadelphia Refinery

Boring/Well No. - C50D

Project No. 113-950-032

Location - Chevron Refinery

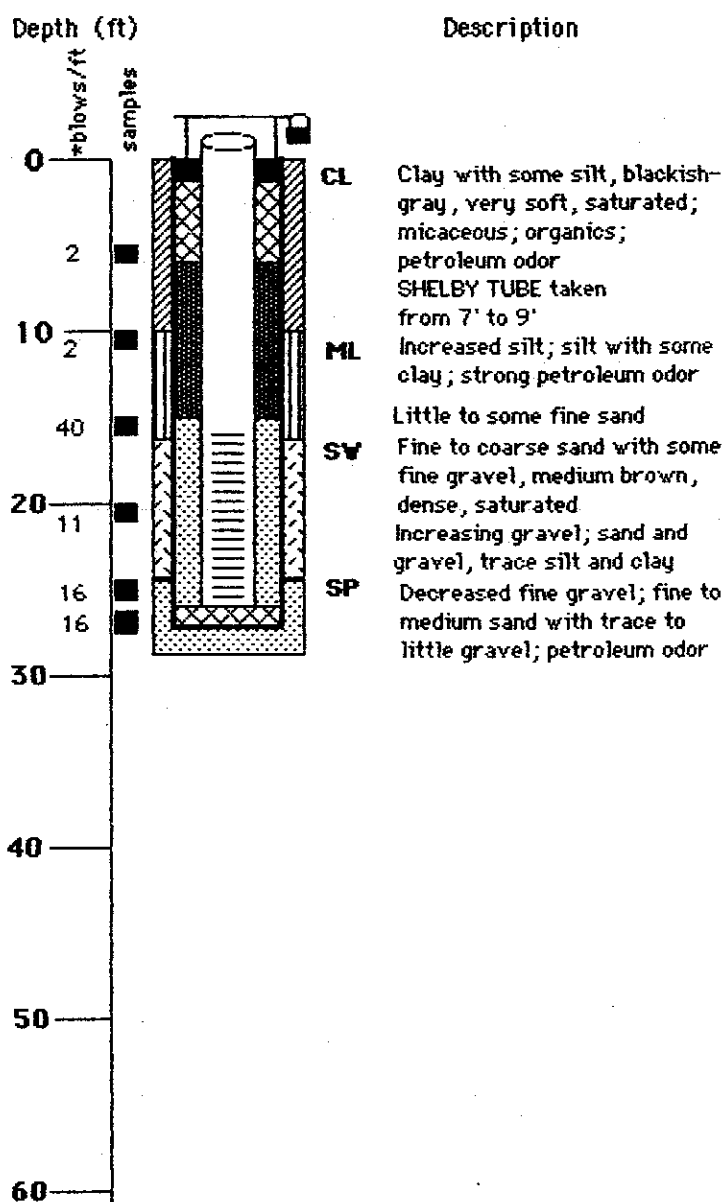
Date M.W. completed 11/4/86

Driller - Lambert, Inc.

Supervising D & M Geologist David Wagner

Drilling Completed - 11/4/86

Type of Rig - Hollow Stem Auger



CONSTRUCTION DATA

Borehole Diam. - 10"

Borehole Depth - 27'

Casing/Screen Type - PVC

Casing Diam. - 4"

Casing Depth - 26'

Screen Setting - 16' - 26'

Slot Width - 0.02"

Type of Seal - Bentonite

Type of Filterpack - #2 Sand

Type of Grout -

MEASUREMENTS (NGVD)

Top of Casing Elevation - 13.76'

Static Water Level Elevation - 1.43'

Date Measured - 12/22/86

Surface Elevation - 10.97'

TEST DATA

Pump Type -

Depth to Intake (ft) -

Static Water Level (ft) -

Pumping Water Level (ft) -

Drawdown (ft) -

Length of Test (Hrs) -

WELL CONSTRUCTION KEY

- FILTER PACK
- BENTONITE SEAL
- BENTONITE GROUT
- CAVE IN MATERIAL
- CONCRETE

Notes:

* Blows taken using a 140 lb hammer falling 30 inches.

** All soils classified by visual inspection.

DAMES & MOORE

LOG of BORING and MONITORING WELL CONSTRUCTION DETAILS

Project : Chevron/Philadelphia Refinery

Project No. 113-909-032

Date M.W. completed 2/25/86

Supervising D & M
Engineer/Geologist Blake Moyer, Jr.

Boring/Well No. - C51

Location - Chevron Refinery

Driller - Drill Consult

Drilling Completed - 2/25/86

Type of Rig - Hollow Stem Auger

CONSTRUCTION DATA

Borehole Diam. - 7"

Borehole Depth - 14'

Casing/Screen Type - PVC

Casing Diam. - 4"

Casing Depth - 13'

Screen Setting - 3' - 13'

Slot Width - 0.02"

Type of Seal - Bentonite

Type of Filterpack - #2 Sand

Type of Grout - Cement/Bentonite

MEASUREMENTS (NGVD)

Top of Casing Elevation - 10.71'

Static Water Level Elevation - 7.86'

Date Measured - 1/13/87

Surface Elevation - 9.06'

TEST DATA

Pump Type -

Depth to Intake (ft) -

Static Water Level (ft) -

Pumping Water Level (ft) -

Drawdown (ft) -

Length of Test (Hrs) -

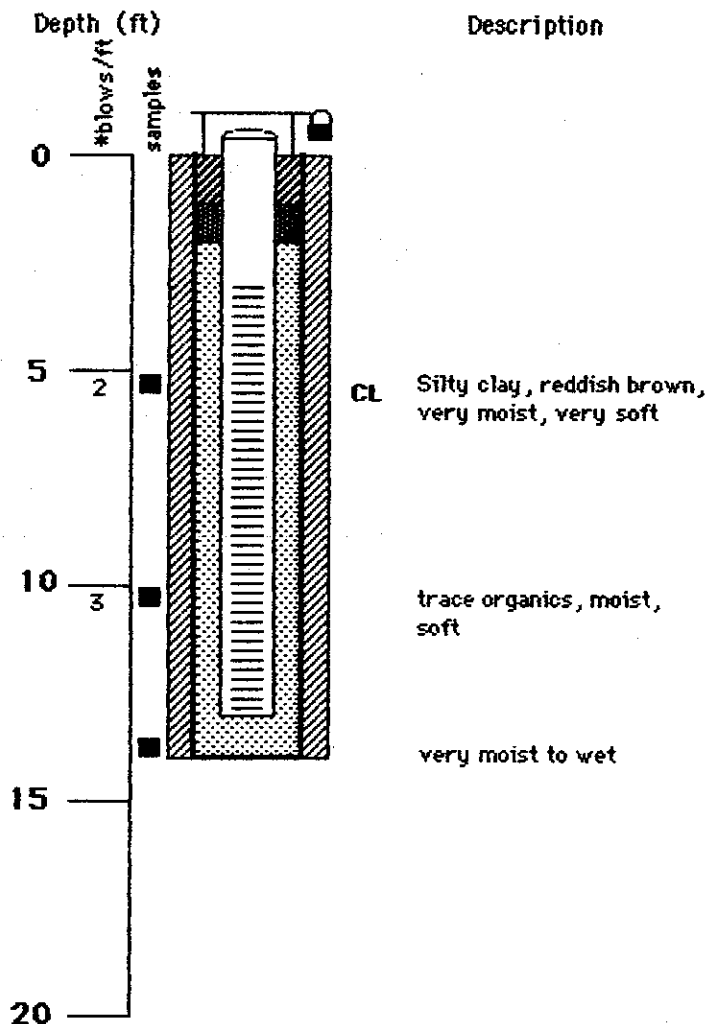
WELL CONSTRUCTION KEY

Filter Pack 

Bentonite Seal 

Cement Grout 

DAMES & MOORE



Notes:

* Blows taken using a 140 lb hammer falling 30 inches.

** All soils classified by visual inspection.

LOG of BORING and MONITORING WELL CONSTRUCTION DETAILS

Project : Chevron/Philadelphia Refinery

Project No. 113-909-032

Date M.W. completed 2/25/86

Supervising D & M
Engineer/Geologist Blake Moyer, Jr.

Boring/Well No. - C52

Location - Chevron Refinery

Driller - Drill Consult

Drilling Completed - 2/25/86

Type of Rig - Hollow Stem Auger

CONSTRUCTION DATA

Borehole Diam. - 7"

Borehole Depth - 14'

Casing/Screen Type - PVC

Casing Diam. - 4"

Casing Depth - 13'

Screen Setting - 3' - 13'

Slot Width - 0.02"

Type of Seal - Bentonite

Type of Filterpack - #2 Sand

Type of Grout - Cement/Bentonite

MEASUREMENTS (NGVD)

Top of Casing Elevation - 10.14'

Static Water Level Elevation - 2.91'

Date Measured - 1/13/87

Surface Elevation - 9.07'

TEST DATA

Pump Type -

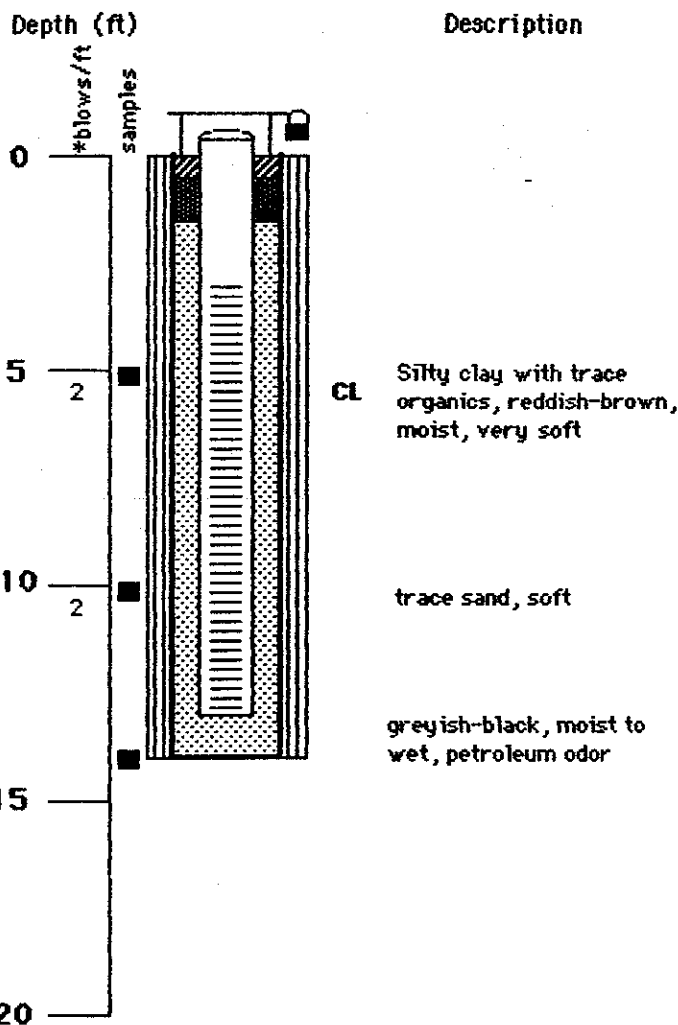
Depth to Intake (ft) -

Static Water Level (ft) -

Pumping Water Level (ft) -

Drawdown (ft) -

Length of Test (Hrs) -



Notes:

* Blows taken using a 140 lb hammer falling 30 inches.

** All soils classified by visual inspection.

WELL CONSTRUCTION KEY

Filter Pack

Bentonite Seal

Cement Grout

DAMES & MOORE

LOG of BORING and MONITORING WELL CONSTRUCTION DETAILS

Project : Chevron/Philadelphia Refinery

Project No. 113-909-032

Date M.W. completed 2/24/86

Supervising D & M
Engineer/Geologist T. Helgason

Boring/Well No. - C53

Location - Chevron Refinery

Driller - Drill Consult

Drilling Completed - 2/24/86

Type of Rig - Hollow Stem Auger

CONSTRUCTION DATA

Borehole Diam. - 7"

Borehole Depth - 16'

Casing/Screen Type - PVC

Casing Diam. - 4"

Casing Depth - 15'

Screen Setting - 5' - 15'

Slot Width - 0.02"

Type of Seal - Bentonite

Type of Filterpack - #2 Sand

Type of Grout - Cement/Bentonite

MEASUREMENTS (NGVD)

Top of Casing Elevation - 11.93'

Static Water Level Elevation - 6.78'

Date Measured - 1/13/87

Surface Elevation - 10.13'

TEST DATA

Pump Type -

Depth to Intake (ft) -

Satic Water Level (ft) -

Pumping Water Level (ft) -

Drawdown (ft) -

Length of Test (Hrs) -

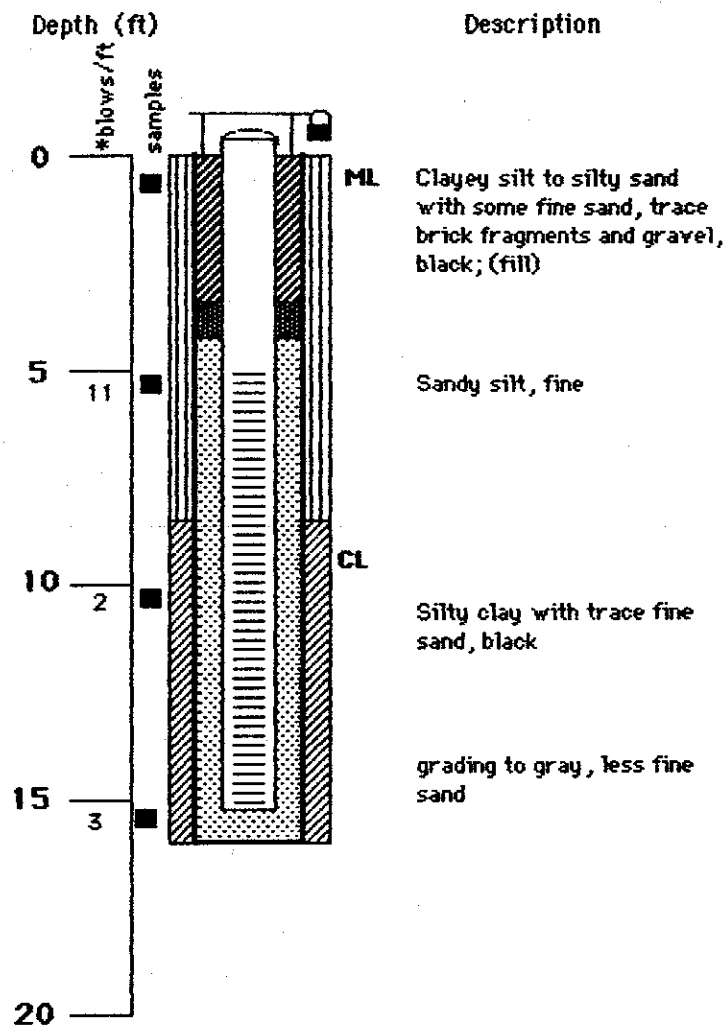
WELL CONSTRUCTION KEY

Filter Pack 

Bentonite Seal 

Cement Grout 

DAMES & MOORE



Notes:

* Blows taken using a 140 lb hammer falling 30 inches.

** All soils classified by visual inspection.

LOG of BORING and MONITORING WELL CONSTRUCTION DETAILS

Project : Chevron/Philadelphia Refinery

Project No. 113-909-032

Date M.W. completed 2/24/86

Supervising D & M
Engineer/Geologist T. Helgason

Boring/Well No. - C54

Location - Chevron Refinery

Driller - Drill Consult

Drilling Completed - 2/24/86

Type of Rig - Hollow Stem Auger

CONSTRUCTION DATA

Borehole Diam. - 7"

Borehole Depth - 16'

Casing/Screen Type - PVC

Casing Diam. - 4"

Casing Depth - 14'

Screen Setting - 4' - 14'

Slot Width - 0.02"

Type of Seal - Bentonite

Type of Filterpack - #2 Sand

Type of Grout - Cement/Bentonite

MEASUREMENTS (NGVD)

Top of Casing Elevation - 9.58'

Static Water Level Elevation - 8.44'

Date Measured - 1/13/87

Surface Elevation - 8.26'

TEST DATA

Pump Type -

Depth to Intake (ft) -

Satic Water Level (ft) -

Pumping Water Level (ft) -

Drawdown (ft) -

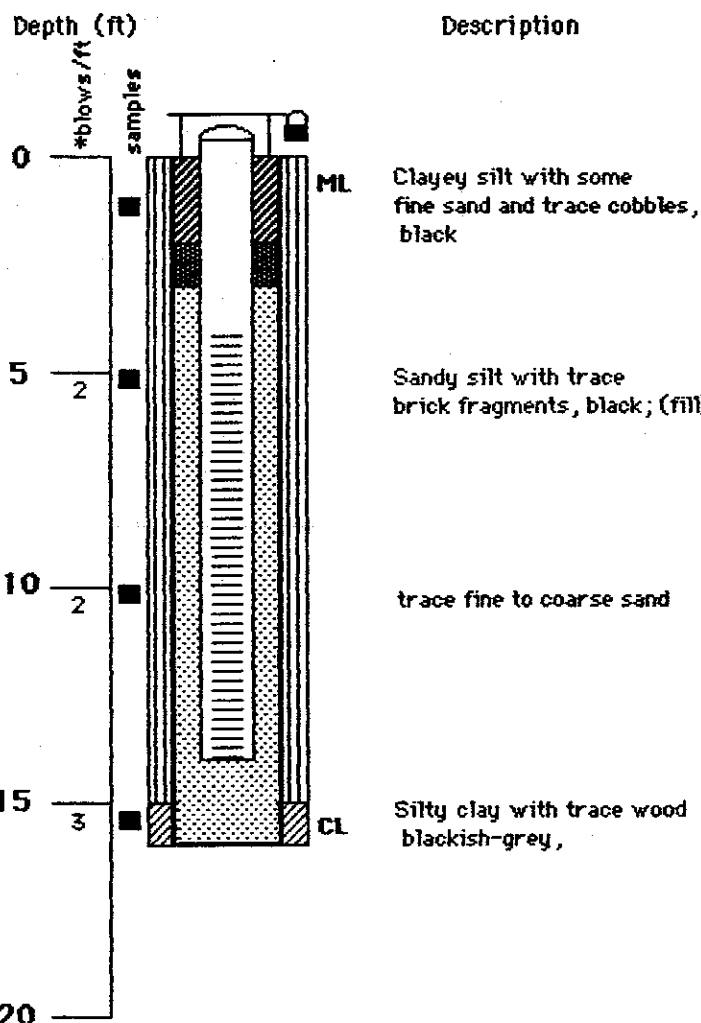
Length of Test (Hrs) -

WELL CONSTRUCTION KEY

Filter Pack 

Bentonite Seal 

Cement Grout 



Notes:

* Blows taken using a 140 lb hammer falling 30 inches.

** All soils classified by visual inspection.

DAMES & MOORE

LOG of BORING and MONITORING WELL CONSTRUCTION DETAILS

Project : Chevron/Philadelphia Refinery

Boring/Well No. - C55

Project No. 113-909-032

Location - Chevron Refinery

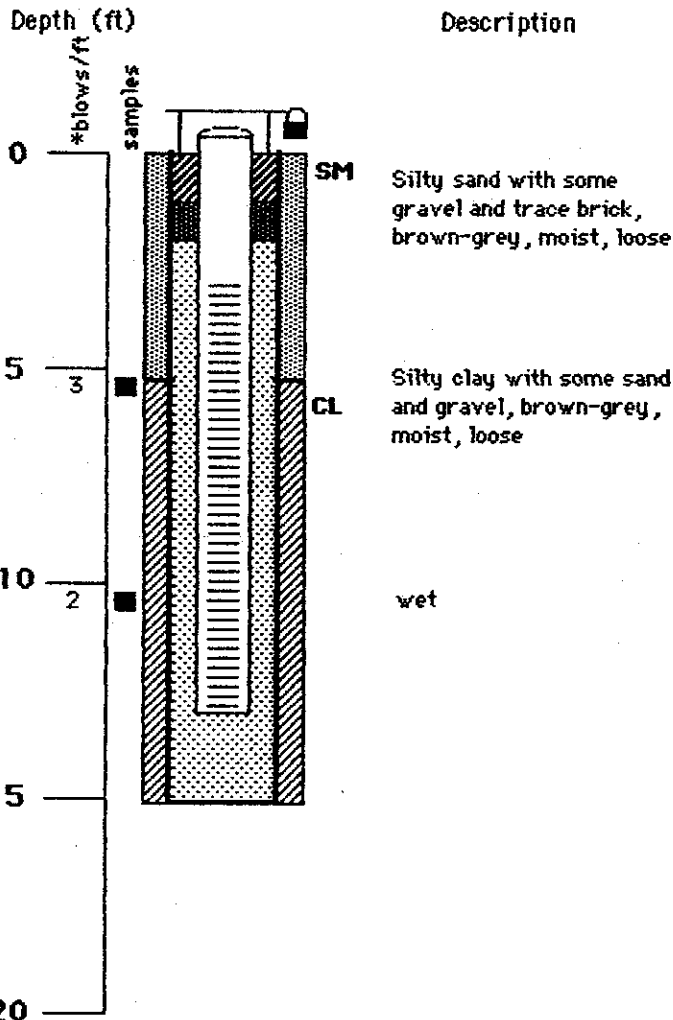
Date M.W. completed 2/24/86

Driller - Warren George

Supervising D & M
Engineer/Geologist David Wagner

Drilling Completed - 2/24/86

Type of Rig - Hollow Stem Auger



CONSTRUCTION DATA

Borehole Diam. - 10"
Borehole Depth - 15'
Casing/Screen Type - PVC
Casing Diam. - 4"
Casing Depth - 15'
Screen Setting - 5' - 15'
Slot Width - 0.02"
Type of Seal - Bentonite
Type of Filterpack - #2 Sand
Type of Grout - Cement/Bentonite

MEASUREMENTS (NGVD)

Top of Casing Elevation - 12.21'
Static Water Level Elevation - 6.73'
Date Measured - 1/13/87
Surface Elevation - 8.31'

TEST DATA




Pump Type -
Depth to Intake (ft) -
Static Water Level (ft) -
Pumping Water Level (ft) -
Drawdown (ft) -
Length of Test (Hrs) -

Notes:

* Blows taken using a 140 lb hammer falling 30 inches.

** All soils classified by visual inspection.

WELL CONSTRUCTION KEY

Filter Pack 
Bentonite Seal 
Cement Grout 

DAMES & MOORE

LOG of BORING and MONITORING WELL CONSTRUCTION DETAILS

Project : Chevron/Philadelphia Refinery

Project No. 113-909-032

Date M.W. completed 2/24/86

Supervising D & M
Engineer /Geologist T. Helgason

Boring/Well No. - C56

Location - Chevron Refinery

Driller - Drill Consult

Drilling Completed - 2/24/86

Type of Rig - Hollow Stem Auger

CONSTRUCTION DATA

Borehole Diam. - 7"

Borehole Depth - 14'

Casing/Screen Type - PVC

Casing Diam. - 4"

Casing Depth - 13'

Screen Setting - 3' - 13'

Slot Width - 0.02"

Type of Seal - Bentonite

Type of Filterpack - #2 Sand

Type of Grout - Cement/Bentonite

MEASUREMENTS (NGVD)

Top of Casing Elevation - 11.77'

Static Water Level Elevation - 9.39'

Date Measured - 1/13/87

Surface Elevation - 10.04'

TEST DATA

Pump Type -

Depth to Intake (ft) -

Static Water Level (ft) -

Pumping Water Level (ft) -

Drawdown (ft) -

Length of Test (Hrs) -

WELL CONSTRUCTION KEY

Filter Pack



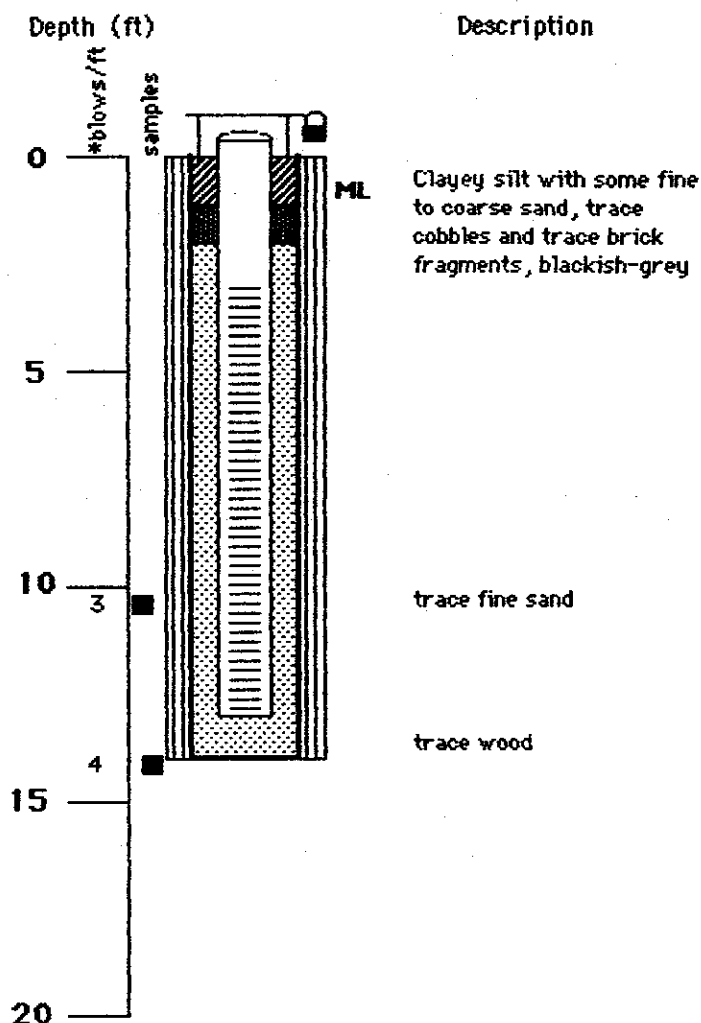
Bentonite Seal



Cement Grout



DAMES & MOORE



Notes:

* Blows taken using a 140 lb hammer falling 30 inches.

** All soils classified by visual inspection.

LOG of BORING and MONITORING WELL CONSTRUCTION DETAILS

Project : Chevron/Philadelphia Refinery

Boring/Well No. - C57

Project No. 113-909-032

Location - Chevron Refinery

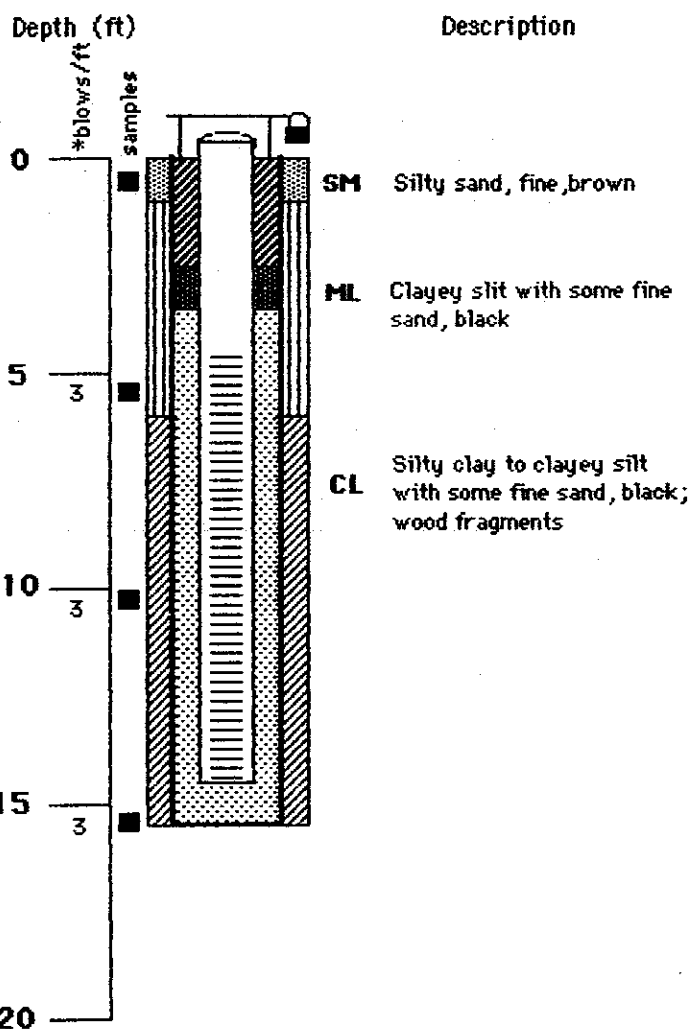
Date M.W. completed 2/24/86

Driller - Drill Consult

Supervising D & M
Engineer/Geologist T. Helgason

Drilling Completed - 2/24/86

Type of Rig - Hollow Stem Auger



CONSTRUCTION DATA

Borehole Diam. - 7"

Borehole Depth - 15' 6"

Casing/Screen Type - PVC

Casing Diam. - 4"

Casing Depth - 14' 6"

Screen Setting - 4' 6" - 14' 6"

Slot Width - 0.02"

Type of Seal - Bentonite

Type of Filterpack - #2 Sand

Type of Grout - Cement/Bentonite

MEASUREMENTS (NGVD)

Top of Casing Elevation - 10.77'

Static Water Level Elevation - 7.67'

Date Measured - 1/13/87

Surface Elevation - 10.61'

TEST DATA

Pump Type -

Depth to Intake (ft) -

Satic Water Level (ft) -

Pumping Water Level (ft) -

Drawdown (ft) -

Length of Test (Hrs) -

WELL CONSTRUCTION KEY

Filter Pack

Bentonite Seal

Cement Grout

Notes:

* Blows taken using a 140 lb hammer falling 30 inches.

** All soils classified by visual inspection.

DAMES & MOORE

LOG of BORING and MONITORING WELL CONSTRUCTION DETAILS

Project : Chevron/Philadelphia Refinery

Project No. 113-909-032

Date M.W. completed 2/29/86

Supervising D & M
Engineer/Geologist Dave Wagner

Boring/Well No. - C58

Location - Chevron Refinery

Driller - Dril Consult

Drilling Completed - 2/29/86

Type of Rig - Hollow Stem Auger

CONSTRUCTION DATA

Borehole Diam. - 7"

Borehole Depth - 14' 6"

Casing/Screen Type - PVC

Casing Diam. - 4"

Casing Depth - 13'

Screen Setting - 3' - 13'

Slot Width - 0.02"

Type of Seal - Bentonite

Type of Filterpack - #2 Sand

Type of Grout - Cement/Bentonite

MEASUREMENTS (NGVD)

Top of Casing Elevation - 9.75'

Static Water Level Elevation - 8.57'

Date Measured - 1/13/87

Surface Elevation - 9.58'

TEST DATA

Pump Type -

Depth to Intake (ft) -

Satic Water Level (ft) -

Pumping Water Level (ft) -

Drawdown (ft) -

Length of Test (Hrs) -

WELL CONSTRUCTION KEY

Filter Pack



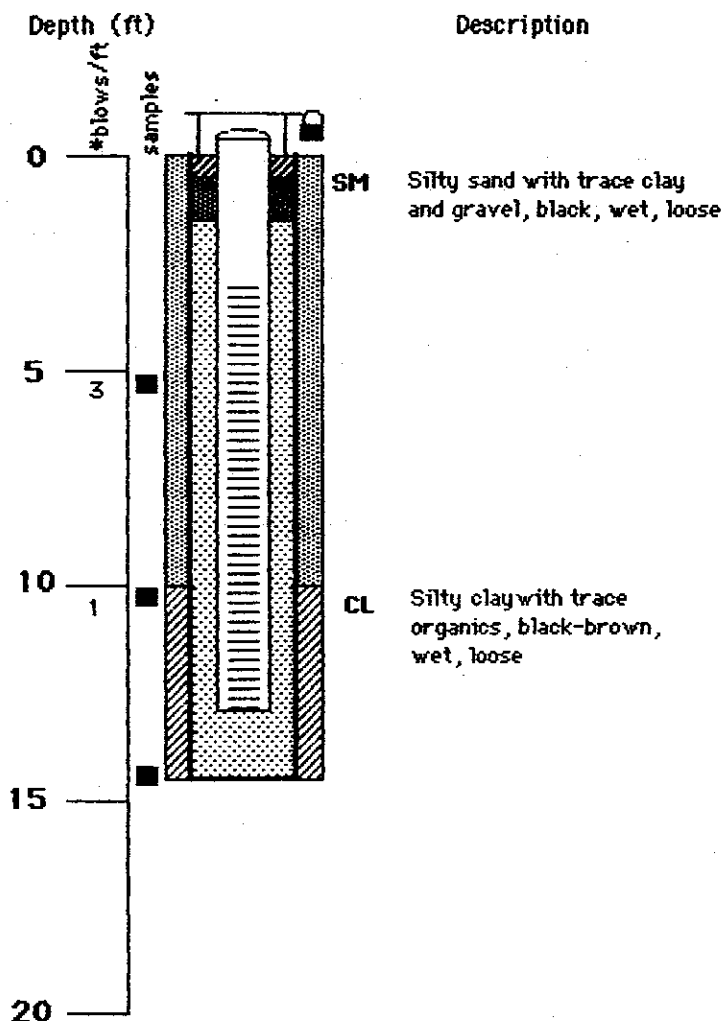
Bentonite Seal



Cement Grout



DAMES & MOORE



Notes:

* Blows taken using a 140 lb hammer falling 30 inches.

** All soils classified by visual inspection.

LOG of BORING and MONITORING WELL CONSTRUCTION DETAILS

Project : Chevron/Philadelphia Refinery

Project No. 113-909-032

Date M.W. completed 2/24/86

Supervising D & M
Engineer /Geologist David Wagner

Boring/Well No. - C59

Location - Chevron Refinery

Driller - Drill Consult

Drilling Completed - 2/24/86

Type of Rig - Hollow Stem Auger

CONSTRUCTION DATA

Borehole Diam. - 7"

Borehole Depth - 15'

Casing/Screen Type - PVC

Casing Diam. - 4"

Casing Depth - 14'

Screen Setting - 4' - 14'

Slot Width - 0.02"

Type of Seal - Bentonite

Type of Filterpack - #2 Sand

Type of Grout - Cement/Bentonite

MEASUREMENTS (NGVD)

Top of Casing Elevation - 9.75'

Static Water Level Elevation - 8.73'

Date Measured - 1/13/87

Surface Elevation - 9.67'

TEST DATA

Pump Type -

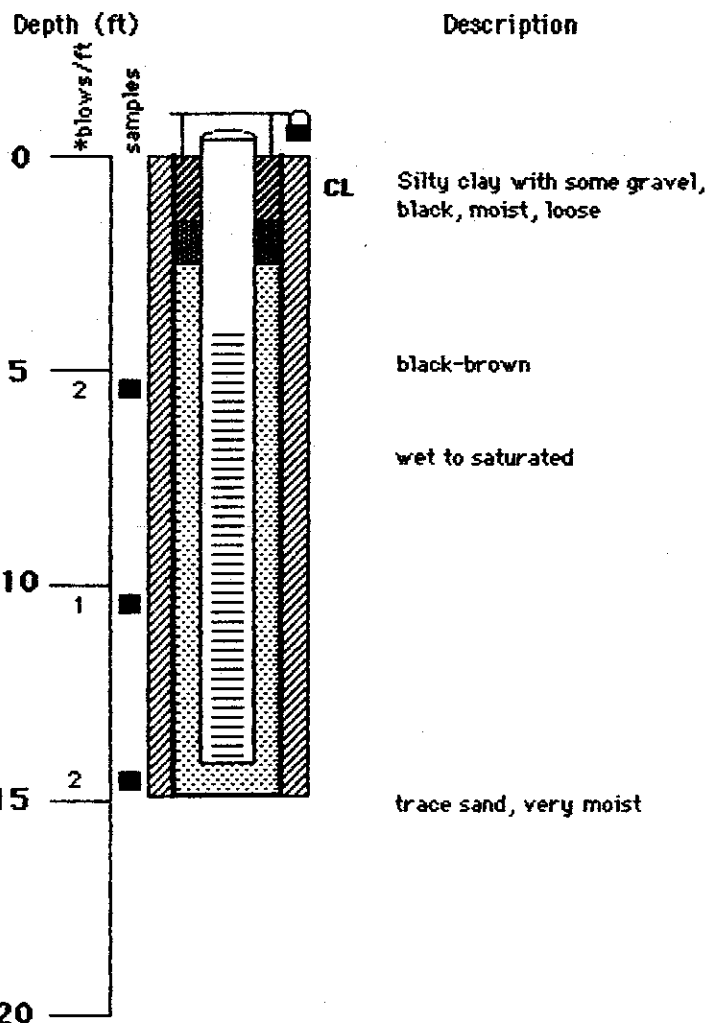
Depth to Intake (ft) -

Static Water Level (ft) -

Pumping Water Level (ft) -

Drawdown (ft) -

Length of Test (Hrs) -



Notes:

* Blows taken using a 140 lb hammer falling 30 inches.

** All soils classified by visual inspection.

WELL CONSTRUCTION KEY

Filter Pack

Bentonite Seal

Cement Grout

DAMES & MOORE

LOG of BORING and MONITORING WELL CONSTRUCTION DETAILS

Project : Chevron/Philadelphia Refinery

Project No. 113-909-032

Date M.W. completed 2/24/86

Supervising D & M
Engineer/Geologist Dave Wagner

Boring/Well No. - C60

Location - Chevron Refinery

Driller - Drill Consult

Drilling Completed - 2/24/86

Type of Rig - Hollow Stem Auger

CONSTRUCTION DATA

Borehole Diam. - 7"

Borehole Depth - 14'

Casing/Screen Type - PVC

Casing Diam. - 4"

Casing Depth - 13'

Screen Setting - 3' - 13'

Slot Width - 0.02"

Type of Seal - Bentonite

Type of Filterpack - #2 Sand

Type of Grout - Cement/Bentonite

MEASUREMENTS (NGVD)

Top of Casing Elevation - 9.85'

Static Water Level Elevation - 6.05'

Date Measured - 1/13/87

Surface Elevation - 8.61'

TEST DATA

Pump Type -

Depth to Intake (ft) -

Static Water Level (ft) -

Pumping Water Level (ft) -

Drawdown (ft) -

Length of Test (Hrs) -

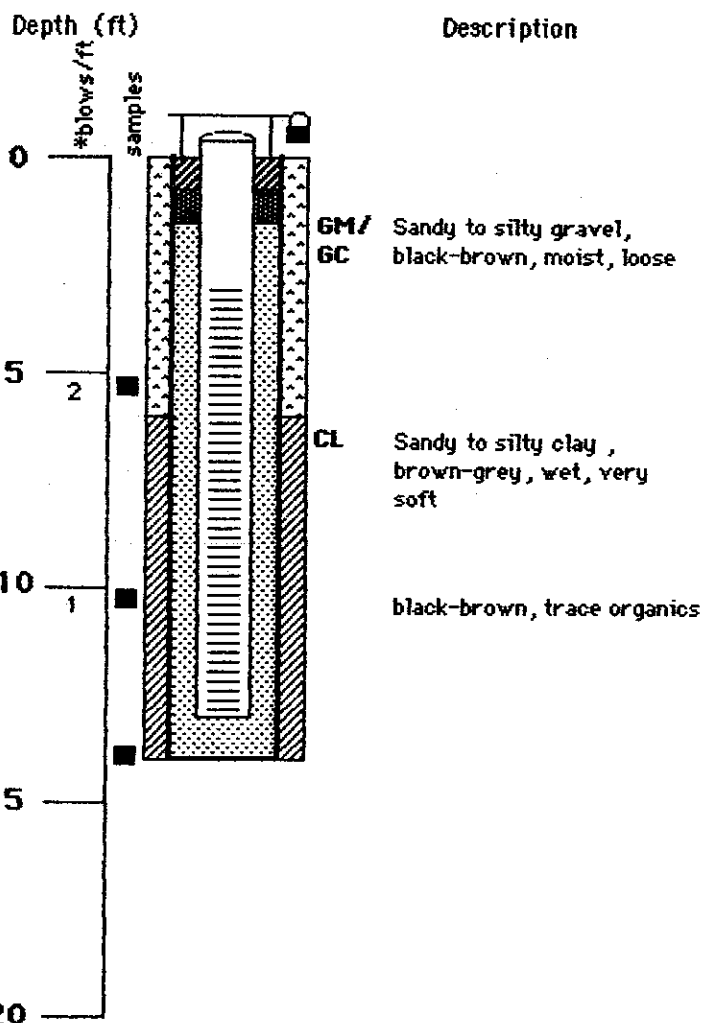
WELL CONSTRUCTION KEY

Filter Pack 

Bentonite Seal 

Cement Grout 

DAMES & MOORE



Notes:

* Blows taken using a 140 lb hammer falling 30 inches.

** All soils classified by visual inspection.

LOG of BORING and MONITORING WELL CONSTRUCTION DETAILS

Project : Chevron/Philadelphia Refinery

Project No. 113-909-032

Date M.W. completed 2/25/86

Supervising D & M
Engineer /Geologist Blake Moyer, Jr.

Boring/Well No. - C61

Location - Chevron Refinery

Driller - Drill Consult

Drilling Completed - 2/25/86

Type of Rig - Hollow Stem Auger

CONSTRUCTION DATA

Borehole Diam. - 7"

Borehole Depth - 14'

Casing/Screen Type - PVC

Casing Diam. - 4"

Casing Depth - 13'

Screen Setting - 3' - 13'

Slot Width - 0.02"

Type of Seal - Bentonite

Type of Filterpack - #2 Sand

Type of Grout - Cement/Bentonite

MEASUREMENTS (NGVD)

Top of Casing Elevation - 11.27'

Static Water Level Elevation - 7.72'

Date Measured - 1/13/87

Surface Elevation - 9.87'

TEST DATA

Pump Type -

Depth to Intake (ft) -

Satic Water Level (ft) -

Pumping Water Level (ft) -

Drawdown (ft) -

Length of Test (Hrs) -

WELL CONSTRUCTION KEY

Filter Pack



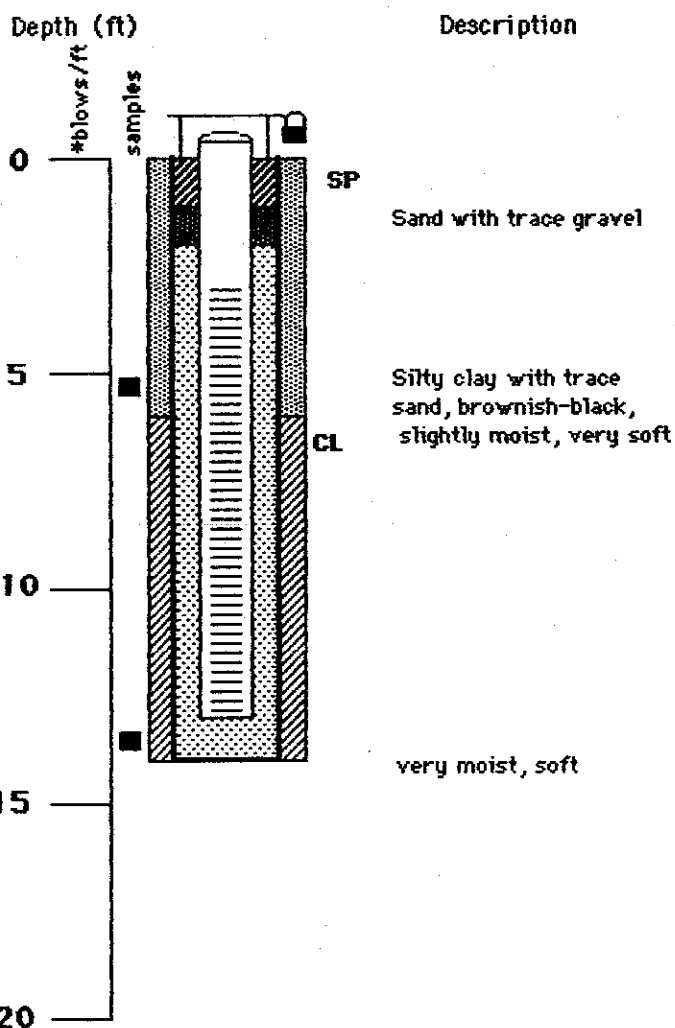
Bentonite Seal



Cement Grout



DAMES & MOORE



Notes:

* Blows taken using a 140 lb hammer falling 30 inches.

** All soils classified by visual inspection.

LOG of BORING and MONITORING WELL CONSTRUCTION DETAILS

Project :Chevron/Philadelphia Refinery

Boring/Well No. - C62

Project No. 113-909-032

Location - Chevron Refinery

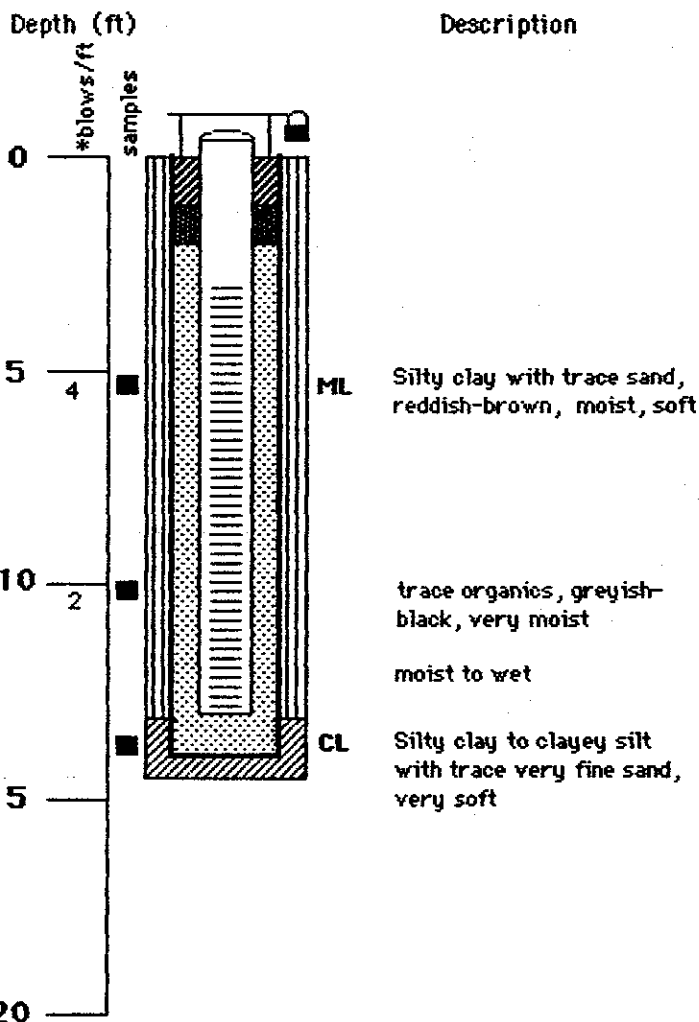
Date M.W. completed 2/25/86

Driller - Drill Consult

Supervising D & M
Engineer/Geologist Blake Moyer, Jr.

Drilling Completed - 2/25/86

Type of Rig - Hollow Stem Auger



CONSTRUCTION DATA

Borehole Diam. - 7"

Borehole Depth - 14'

Casing/Screen Type - PVC

Casing Diam. - 4"

Casing Depth - 13'

Screen Setting - 3' - 13'

Slot Width - 0.02"

Type of Seal - Bentonite

Type of Filterpack - #2 Sand

Type of Grout - Cement/Bentonite

MEASUREMENTS (NGVD)

Top of Casing Elevation - 13.90'

Static Water Level Elevation - 9.96'

Date Measured - 1/13/87

Surface Elevation - 10.35'

TEST DATA

Pump Type -

Depth to Intake (ft) -

Static Water Level (ft) -

Pumping Water Level (ft) -

Drawdown (ft) -

Length of Test (Hrs) -

WELL CONSTRUCTION KEY

Filter Pack



Bentonite Seal



Cement Grout



Notes:

* Blows taken using a 140 lb hammer falling 30 inches.

** All soils classified by visual inspection.

DAMES & MOORE

LOG of BORING and MONITORING WELL CONSTRUCTION DETAILS

Project : Chevron/Philadelphia Refinery

Project No. 113-909-032

Date M.W. completed 2/24/86

Supervising D & M
Engineer /Geologist T. Helgason

Boring/Well No. - C63

Location - Chevron Refinery

Driller - Drill Consult

Drilling Completed - 2/24/86

Type of Rig - Hollow Stem Auger

CONSTRUCTION DATA

Borehole Diam. - 7"

Borehole Depth - 17'

Casing/Screen Type - PVC

Casing Diam. - 4"

Casing Depth - 13'

Screen Setting - 3' - 13'

Slot Width - 0.02"

Type of Seal - Bentonite

Type of Filterpack - #2 Sand

Type of Grout - Cement/Bentonite

MEASUREMENTS (NGVD)

Top of Casing Elevation - 9.22'

Static Water Level Elevation - 4.02'

Date Measured - 1/13/87

Surface Elevation - 7.82'

TEST DATA

Pump Type -

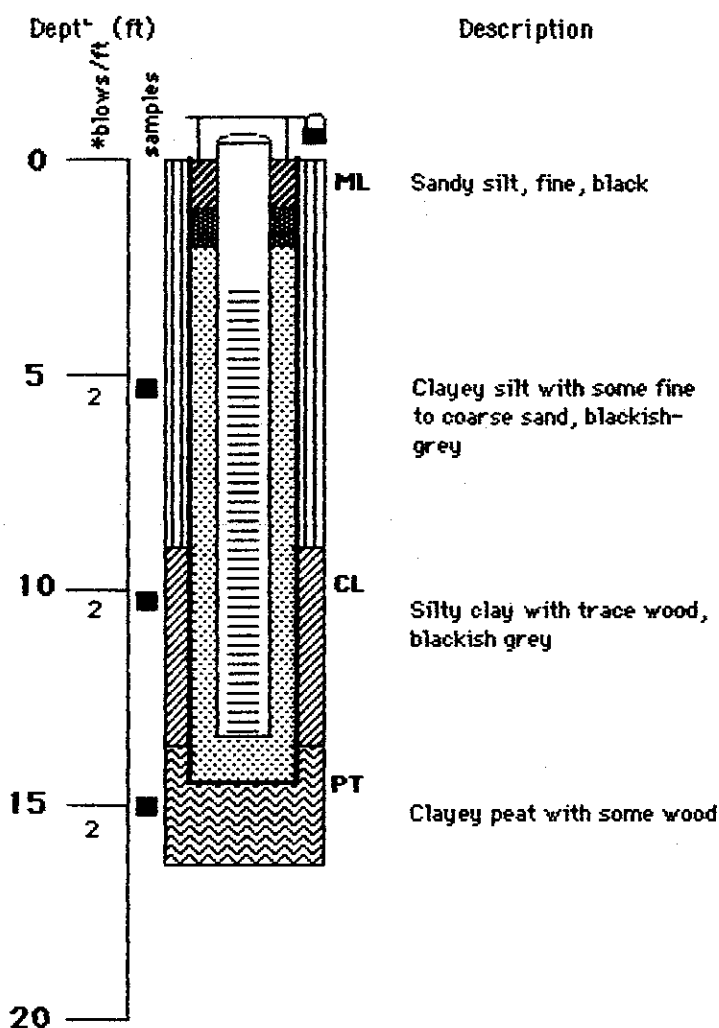
Depth to Intake (ft) -

Satic Water Level (ft) -

Pumping Water Level (ft) -

Drawdown (ft) -

Length of Test (Hrs) -



Notes:

* Blows taken using a 140 lb hammer falling 30 inches.

** All soils classified by visual inspection.

WELL CONSTRUCTION KEY

Filter Pack

Bentonite Seal

Cement Grout

DAMES & MOORE

LOG of BORING and MONITORING WELL CONSTRUCTION DETAILS

Project : Chevron/Philadelphia Refinery

Project No. 113-909-032

Date M.W. completed 2/24/86

Supervising D & M
Engineer/Geologist Dave Wagner

Boring/Well No. - C64

Location - Chevron Refinery

Driller - Drill Consult

Drilling Completed - 2/24/86

Type of Rig - Hollow Stem Auger

CONSTRUCTION DATA

Borehole Diam. - 7"

Borehole Depth - 14' 6"

Casing/Screen Type - PVC

Casing Diam. - 4"

Casing Depth - 13'

Screen Setting - 3' - 13'

Slot Width - 0.02"

Type of Seal - Bentonite

Type of Filterpack - #2 Sand

Type of Grout - Cement/Bentonite

MEASUREMENTS (NGVD)

Top of Casing Elevation - 10.21'

Static Water Level Elevation - 3.72'

Date Measured - 1/13/87

Surface Elevation - 8.40'

TEST DATA

Pump Type -

Depth to Intake (ft) -

Static Water Level (ft) -

Pumping Water Level (ft) -

Drawdown (ft) -

Length of Test (Hrs) -

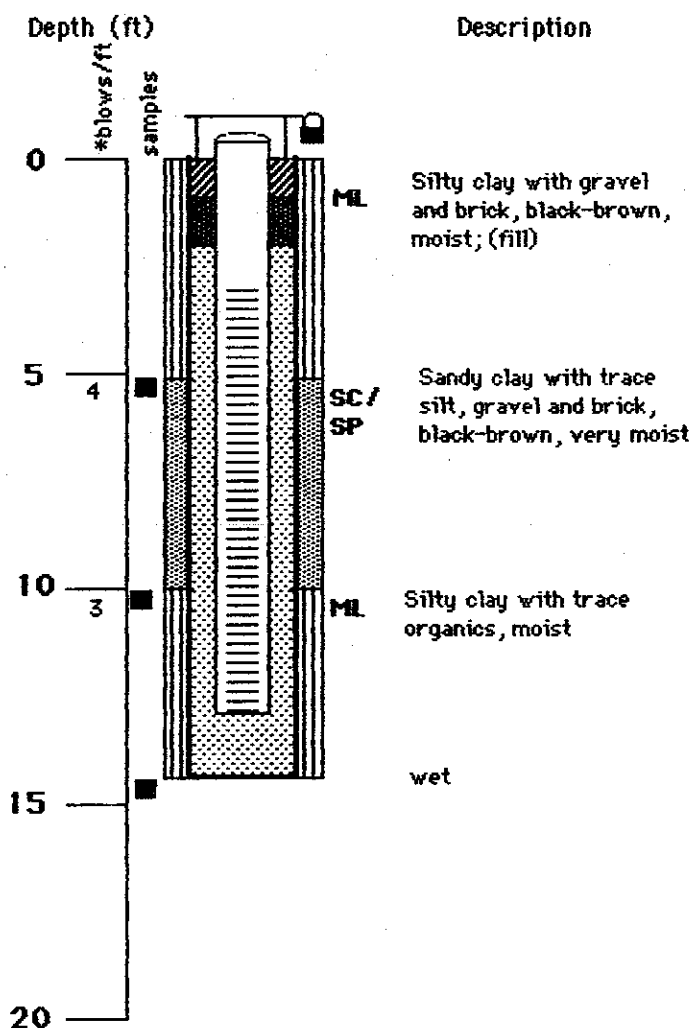
WELL CONSTRUCTION KEY

Filter Pack 

Bentonite Seal 

Cement Grout 

DAMES & MOORE



Notes:

* Blows taken using a 140 lb hammer falling 30 inches.

** All soils classified by visual inspection.

LOG of BORING and MONITORING WELL CONSTRUCTION DETAILS

Project : Chevron/Philadelphia Refinery

Project No. 113-909-032

Date M.W. completed 2/25/86

Supervising D & M
Engineer/Geologist Blake Moyer, Jr.

Boring/Well No. - C65

Location - Chevron Refinery

Driller - Drill Consult

Drilling Completed - 2/25/86

Type of Rig - Hollow Stem Auger

CONSTRUCTION DATA

Borehole Diam. - 7"

Borehole Depth - 14'

Casing/Screen Type - PVC

Casing Diam. - 4"

Casing Depth - 13'

Screen Setting - 3' - 13'

Slot Width - 0.02"

Type of Seal - Bentonite

Type of Filterpack - #2 Sand

Type of Grout - Cement/Bentonite

MEASUREMENTS (NGVD)

Top of Casing Elevation - 13.33'

Static Water Level Elevation - Not Available

Date Measured - 1/15/87

Surface Elevation - 9.70'

TEST DATA

Pump Type -

Depth to Intake (ft) -

Static Water Level (ft) -

Pumping Water Level (ft) -

Drawdown (ft) -

Length of Test (Hrs) -

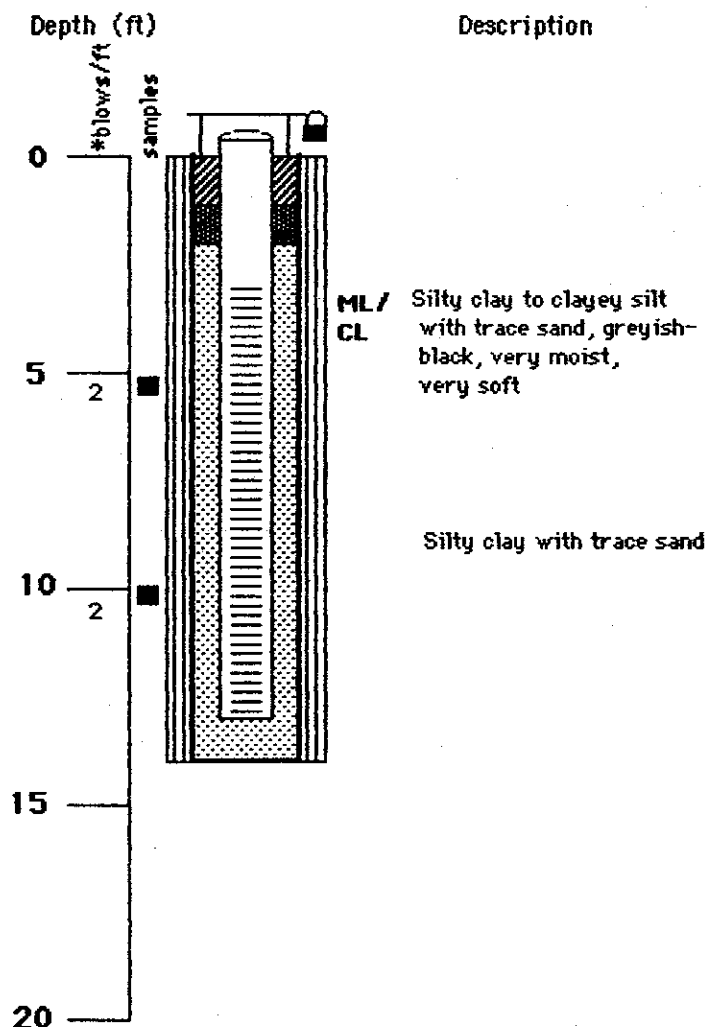
WELL CONSTRUCTION KEY

Filter Pack 

Bentonite Seal 

Cement Grout 

DAMES & MOORE



Notes:

* Blows taken using a 140 lb hammer falling 30 inches.

** All soils classified by visual inspection.

LOG of BORING and MONITORING WELL CONSTRUCTION DETAILS

Project : Chevron/Philadelphia Refinery

Boring/Well No. - C65D

Project No. 113-950-032

Location - Chevron Refinery

Date M.W. completed 11/11/86

Driller - Lambert, Inc.

Supervising D & M Geologist David Wagner

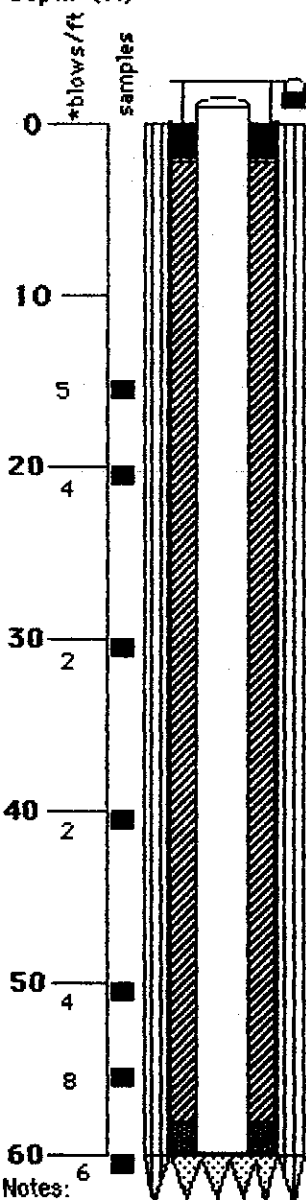
Drilling Completed - 11/11/86

Type of Rig - Hollow Stem Auger

Depth (ft)

Description

CONSTRUCTION DATA



ML Silt with trace to little fine to coarse sand, trace fine gravel, black, moist; strong petroleum odor; brick fragments

Silt with little clay, medium gray, soft, moist; organics

SHELBY TUBE taken from 25' to 27'
Trace mica

Decreasing density; very soft

Increasing density; soft
Decreasing clay; trace clay and trace fine sand

Increasing sand; little fine sand, stratified

Borehole Diam. - 10"

Borehole Depth - 75'

Casing/Screen Type - PVC

Casing Diam. - 4"

Casing Depth - 75'

Screen Setting - 65' - 75'

Slot Width - 0.02"

Type of Seal - Bentonite

Type of Filterpack - #2 Sand

Type of Grout - Bentonite

MEASUREMENTS(NGVD)

Top of Casing Elevation - 11.96'

Static Water Level Elevation - -2.16'

Date Measured - 12/22/86

Surface Elevation - 9.94'

TEST DATA

Pump Type -

Depth to Intake (ft) -

Satic Water Level (ft) -

Pumping Water Level (ft) -

Drawdown (ft) -

Length of Test (Hrs) -

WELL CONSTRUCTION KEY

FILTER PACK
BENTONITE SEAL
BENTONITE GROUT
CAVE IN MATERIAL
CONCRETE

Notes:

* Blows taken using a 140 lb hammer falling 30 inches.

** All soils classified by visual inspection.

DAMES & MOORE

LOG of BORING and MONITORING WELL CONSTRUCTION DETAILS

Project: Chevron/Philadelphia Refinery

Boring/Well No. - C65D (Cont.)

Project No. 113-950-032

Location - Chevron Refinery

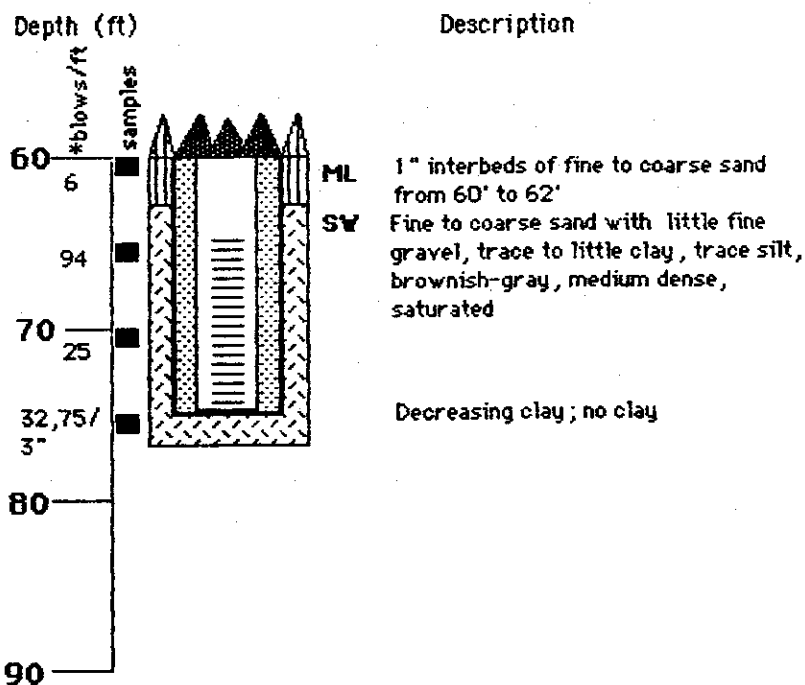
Date M.W. completed 11/12/86

Driller - Lambert, Inc.

Supervising D & M Geologist David Wagner

Drilling Completed - 11/12/86

Type of Rig - Hollow Stem Auger



WELL CONSTRUCTION KEY

- FILTER PACK
- BENTONITE SEAL
- BENTONITE GROUT
- CAVE IN MATERIAL
- CONCRETE

Notes:

* Blows taken using a 140 lb hammer falling 30 inches.

** All soils classified by visual inspection.

DAMES & MOORE

LOG of BORING and MONITORING WELL CONSTRUCTION DETAILS

Project : Chevron/Philadelphia Refinery

Boring/Well No. - C95

Project No. 113-950-032

Location - Chevron Refinery

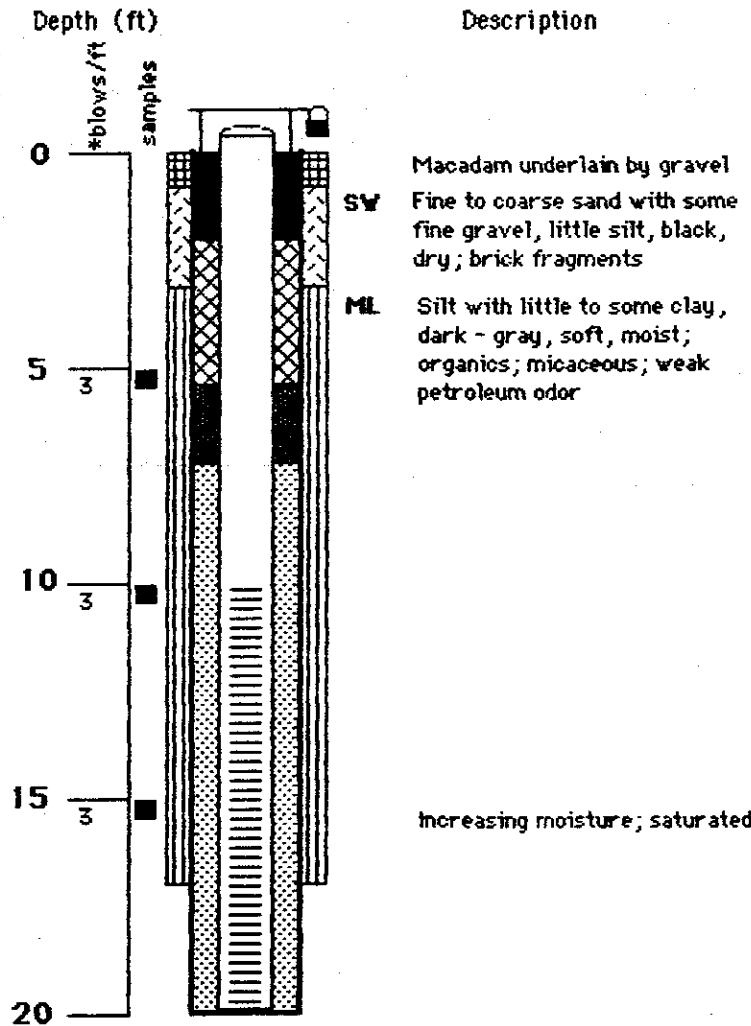
Date M.W. completed 10/22/86

Driller - Lambert, Inc.

Supervising D & M Geologist David Wagner

Drilling Completed - 10/22/86

Type of Rig - Hollow Stem Auger



CONSTRUCTION DATA

Borehole Diam. - 10"

Borehole Depth - 20'

Casing/Screen Type - PVC

Casing Diam. - 4"

Casing Depth - 20'

Screen Setting - 10' - 20'

Slot Width - 0.02"

Type of Seal - Bentonite

Type of Filterpack - #2 Sand

Type of Grout -

MEASUREMENTS(NGVD)

Top of Casing Elevation - 14.84'

Static Water Level Elevation - 8.71'

Date Measured - 1/14/87

Surface Elevation - 12.38'

TEST DATA

Pump Type -

Depth to Intake (ft) -

Static Water Level (ft) -

Pumping Water Level (ft) -

Drawdown (ft) -

Length of Test (Hrs) -

WELL CONSTRUCTION KEY

FILTER PACK

BENTONITE SEAL

CONCRETE

CAVE IN MATERIAL

Notes:

* Blows taken using a 140 lb hammer falling 30 inches.

** All soils classified by visual inspection.

DAMES & MOORE

LOG of BORING and MONITORING WELL CONSTRUCTION DETAILS

Project: Chevron/Philadelphia Refinery

Boring/Well No. - C96

Project No. 113-950-032

Location - Chevron Refinery

Date M.W. completed 10/23/86

Driller - Lambert, Inc.

Supervising D & M Geologist David Wagner

Drilling Completed - 10/23/86

Type of Rig - Hollow Stem Auger

CONSTRUCTION DATA

Borehole Diam. - 10"

Borehole Depth - 20'

Casing/Screen Type - PVC

Casing Diam. - 4"

Casing Depth - 17'

Screen Setting - 7' - 17'

Slot Width - 0.02"

Type of Seal - Bentonite

Type of Filterpack - #2 Sand

Type of Grout -

MEASUREMENTS (NGVD)

Top of Casing Elevation - 14.61'

Static Water Level Elevation - 9.96'

Date Measured - 1/14/87

Surface Elevation - 11.51'

TEST DATA

Pump Type -

Depth to Intake (ft) -





Static Water Level (ft) -

Pumping Water Level (ft) -

Drawdown (ft) -

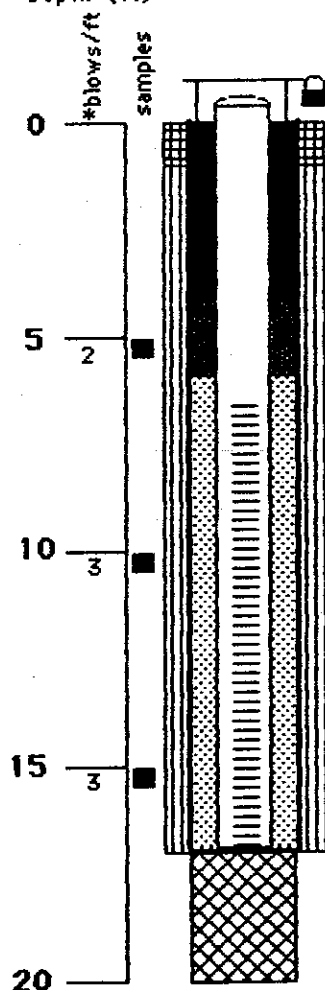
Length of Test (Hrs) -

WELL CONSTRUCTION KEY

FILTER PACK 
BENTONITE SEAL 
CONCRETE 
CAVE IN MATERIAL 

Depth (ft)

Description



Slag, silt and sand

ML Silt with little to some clay and trace fine sand, dark - gray, soft, slightly moist, organics; micaceous; petroleum odor

Increased moisture; moist

Increased moisture; saturated

Increased organics

Notes:

* Blows taken using a 140 lb hammer falling 30 inches.

** All soils classified by visual inspection.

DAMES & MOORE

LOG of BORING and MONITORING WELL CONSTRUCTION DETAILS

Project : Chevron/Philadelphia Refinery

Boring/Well No. - C97

Project No. 113-950-032

Location - Chevron Refinery

Date M.W. completed 10/23/86

Driller - Lambert, Inc.

Supervising D & M Geologist David Wagner

Drilling Completed - 10/23/86

Type of Rig - Hollow Stem Auger

CONSTRUCTION DATA

Borehole Diam. - 10"

Borehole Depth - 20'

Casing/Screen Type - PVC

Casing Diam. - 4"

Casing Depth - 15'

Screen Setting - 5' - 15'

Slot Width - 0.02"

Type of Seal - Bentonite

Type of Filterpack - #2 Sand

Type of Grout -

MEASUREMENTS (NGVD)

Top of Casing Elevation - 13.07'

Static Water Level Elevation - 3.17'

Date Measured - 1/14/87

Surface Elevation - 9.68'

TEST DATA

Pump Type -

Depth to Intake (ft) -

Static Water Level (ft) -


Pumping Water Level (ft) -

Drawdown (ft) -

Length of Test (Hrs) -

WELL CONSTRUCTION KEY

FILTER PACK 

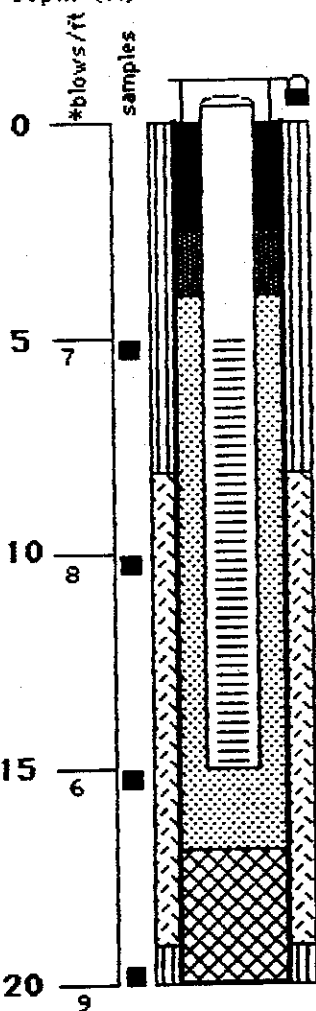
BENTONITE SEAL 

CONCRETE 

CAVE IN MATERIAL 

Depth (ft)

Description



ML Silt with little to some clay, little fine gravel, trace fine to coarse sand, blackish-brown, soft, slightly moist to moist; brick fragments; petroleum odor

SY Fine to coarse sand with some fine gravel, little silt, little clay, blackish-gray and brown, loose, saturated; brick fragments; strong petroleum odor; sheen on water

ML Silt with some clay, blackish-gray, soft, very moist; organics; petroleum odor

Notes:

* Blows taken using a 140 lb hammer falling 30 inches.

** All soils classified by visual inspection.

DAMES & MOORE

LOG of BORING and MONITORING WELL CONSTRUCTION DETAILS

Project : Chevron/Philadelphia Refinery

Boring/Well No. - C98

Project No. 113-950-032

Location - Chevron Refinery

Date M.W. completed 10/23/86

Driller - Lambert, Inc.

Supervising D & M Geologist

David Wagner

Drilling Completed - 10 /23/86

Type of Rig - Hollow Stem Auger

CONSTRUCTION DATA

Borehole Diam. - 10"

Borehole Depth - 20'

Casing/Screen Type - PVC

Casing Diam. - 4"

Casing Depth - 16.5'

Screen Setting - 6.5' - 16.5'

Slot Width - 0.02"

Type of Seal - Bentonite

Type of Filterpack - #2 Sand

Type of Grout -

MEASUREMENTS (NGVD)

Top of Casing Elevation - 12.90'

Static Water Level Elevation - 5.98'

Date Measured - 1/14/87

Surface Elevation - 9.47'

TEST DATA

Pump Type -

Depth to Intake (ft) -





Static Water Level (ft) -

Pumping Water Level (ft) -

Drawdown (ft) -

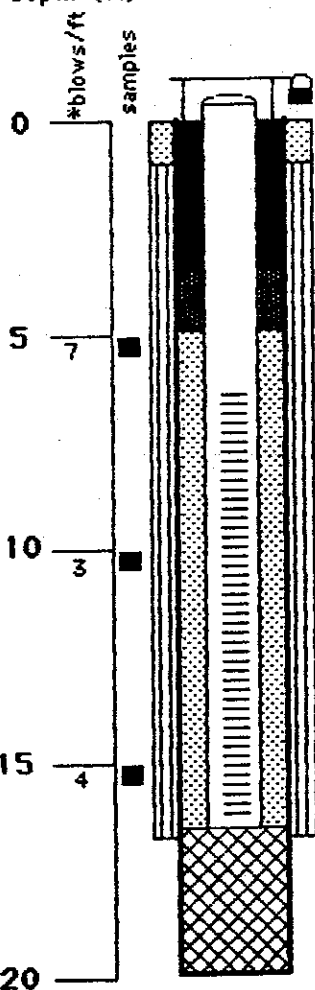
Length of Test (Hrs) -

WELL CONSTRUCTION KEY

FILTER PACK 
BENTONITE SEAL 
CONCRETE 
CAVE IN MATERIAL 

Depth (ft)

Description



SP Fine to medium sand and gravel

ML Silt with little clay, little to fine to medium sand, little to some fine gravel, grayish-black, medium stiff, moist; micaceous; glass and brick fragments; strong petroleum odor

Silt with some clay, grayish-brown, soft, moist, weak petroleum odor

Increasing moisture; saturated

Notes:

* Blows taken using a 140 lb hammer falling 30 inches.

** All soils classified by visual inspection.

DAMES & MOORE

LOG of BORING and MONITORING WELL CONSTRUCTION DETAILS

Project : Chevron/Philadelphia Refinery

Boring/Well No. - D66

Project No. 113-909-032

Location - Chevron Refinery

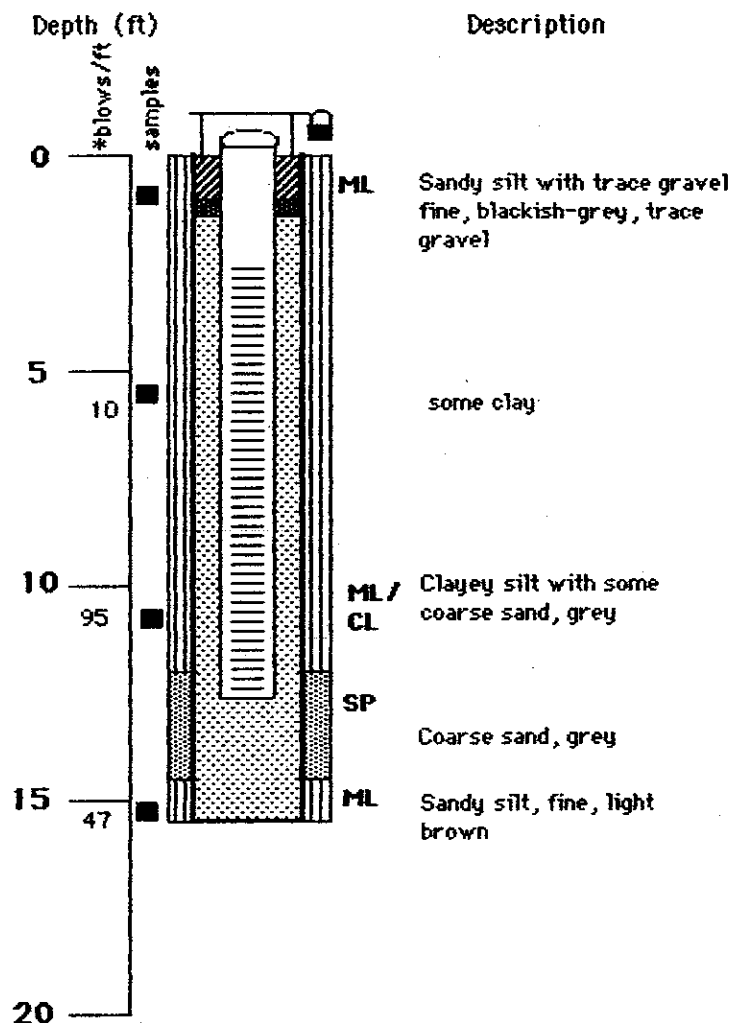
Date M.W. completed 2/19/86

Driller - Drill Consult

Supervising D & M
Engineer /Geologist T. Helgason

Drilling Completed - 2/19/86

Type of Rig - Hollow Stem Auger



CONSTRUCTION DATA

Borehole Diam. - 7"

Borehole Depth - 15.5'

Casing/Screen Type - PVC

Casing Diam. - 4"

Casing Depth - 12.5'

Screen Setting - 2.5' - 12.5'

Slot Width - 0.02"

Type of Seal - Bentonite

Type of Filterpack - #2 Sand

Type of Grout - Cement/Bentonite

MEASUREMENTS (NGVD)

Top of Casing Elevation - 35.23'

Static Water Level Elevation - 30.53'

Date Measured - 1/9/87

Surface Elevation - 33.50'

TEST DATA

Pump Type -

Depth to Intake (ft) -

Satic Water Level (ft) -

Pumping Water Level (ft) -

Drawdown (ft) -

Length of Test (Hrs) -

Notes:

* Blows taken using a 140 lb hammer falling 30 inches.

** All soils classified by visual inspection.

WELL CONSTRUCTION KEY

Filter Pack



Bentonite Seal



Cement Grout



DAMES & MOORE

LOG of BORING and MONITORING WELL CONSTRUCTION DETAILS

Project : Chevron/Philadelphia Refinery

Boring/Well No. - D67

Project No. 113-909-032

Location - Chevron Refinery

Date M.W. completed 2/19/86

Driller - Drill Consult

Supervising D & M
Engineer/Geologist E.J. Fillo

Drilling Completed - 2/19/86

Type of Rig - Hollow Stem Auger

CONSTRUCTION DATA

Borehole Diam. - 7"

Borehole Depth - 25'

Casing/Screen Type - PVC

Casing Diam. - 4"

Casing Depth - 24'

Screen Setting - 14' - 24'

Slot Width - 0.02"

Type of Seal - Bentonite

Type of Filterpack - #2 Sand

Type of Grout - Cement/Bentonite

MEASUREMENTS (NGVD)

Top of Casing Elevation - 16.12'

Static Water Level Elevation - 2.33'

Date Measured - 1/9/87

Surface Elevation - 12.82'

TEST DATA

Pump Type -

Depth to Intake (ft) -

Satic Water Level (ft) -

Pumping Water Level (ft) -

Drawdown (ft) -

Length of Test (Hrs) -

WELL CONSTRUCTION KEY

Filter Pack



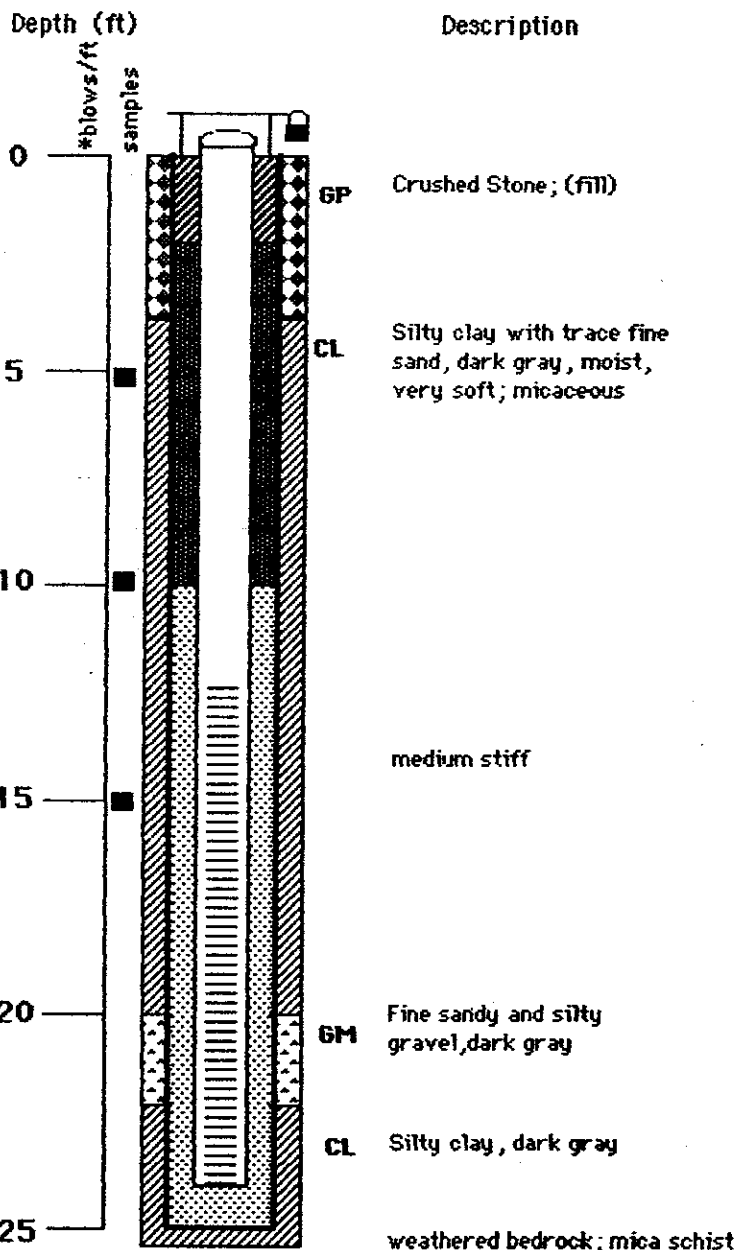
Bentonite Seal



Cement Grout



DAMES & MOORE



LOG of BORING and MONITORING WELL CONSTRUCTION DETAILS

Project : Chevron/Philadelphia Refinery

Boring/Well No. - D68

Project No. 113-909-032

Location - Chevron Refinery

Date M.W. completed 2/20/86

Driller - Drill Consult

Supervising D & M
Engineer/Geologist T. Helgason

Drilling Completed - 2/20/86

Type of Rig - Hollow Stem Auger

CONSTRUCTION DATA

Borehole Diam. - 7"

Borehole Depth - 15' 6"

Casing/Screen Type - PVC

Casing Diam. - 4"

Casing Depth - 12' 6"

Screen Setting - 2' 6" - 12' 6"

Slot Width - 0.02"

Type of Seal - Bentonite

Type of Filterpack - #2 Sand

Type of Grout - Cement/Bentonite

MEASUREMENTS (NGVD)

Top of Casing Elevation - 13.28'

Static Water Level Elevation - 9.04'

Date Measured - 1/9/87

Surface Elevation - 9.73'

TEST DATA

Pump Type -

Depth to Intake (ft) -

Static Water Level (ft) -

Pumping Water Level (ft) -

Drawdown (ft) -

Length of Test (Hrs) -

WELL CONSTRUCTION KEY

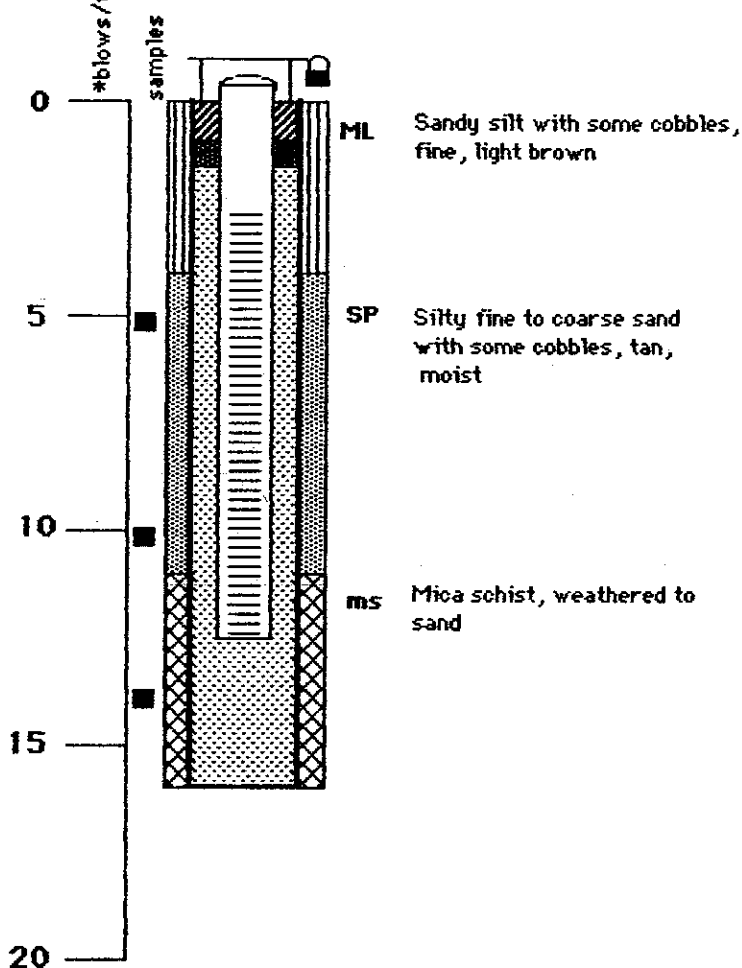
Filter Pack 

Bentonite Seal 

Cement Grout 

Depth (ft)

Description



Notes:

* Blows taken using a 140 lb hammer falling 30 inches.

** All soils classified by visual inspection.

DAMES & MOORE

LOG of BORING and MONITORING WELL CONSTRUCTION DETAILS

Project : Chevron/Philadelphia Refinery

Boring/Well No. - D69

Project No. 113-909-032

Location - Chevron Refinery

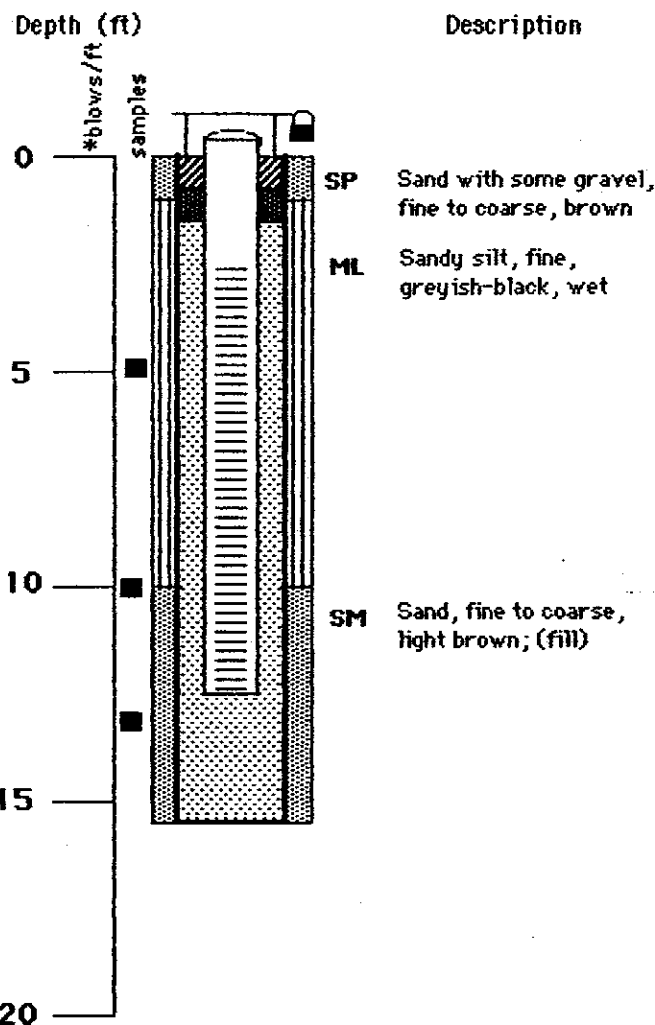
Date M.W. completed 2/19/86

Driller - Drill Consult

Supervising D & M
Engineer /Geologist T. Helgason

Drilling Completed - 2/19/86

Type of Rig - Hollow Stem Auger



CONSTRUCTION DATA

Borehole Diam. - 7"

Borehole Depth - 15.5'

Casing/Screen Type - PVC

Casing Diam. - 4"

Casing Depth - 13.5'

Screen Setting - 2.5' - 12.5'

Slot Width - 0.02"

Type of Seal - Bentonite

Type of Filterpack - #2 Sand

Type of Grout - Cement/Bentonite

MEASUREMENTS (NGVD)

Top of Casing Elevation - 14.97'

Static Water Level Elevation - 10.60'

Date Measured - 1/9/87

Surface Elevation - 12.91'

TEST DATA

Pump Type -

Depth to Intake (ft) -

Static Water Level (ft) -

Pumping Water Level (ft) -

Drawdown (ft) -

Length of Test (Hrs) -

WELL CONSTRUCTION KEY

Filter Pack

Bentonite Seal

Cement Grout

Notes:

* Blows taken using a 140 lb hammer falling 30 inches.

** All soils classified by visual inspection.

DAMES & MOORE

LOG of BORING and MONITORING WELL CONSTRUCTION DETAILS

Project : Chevron/Philadelphia Refinery

Boring/Well No. - D70

Project No. 113-909-032

Location - Chevron Refinery

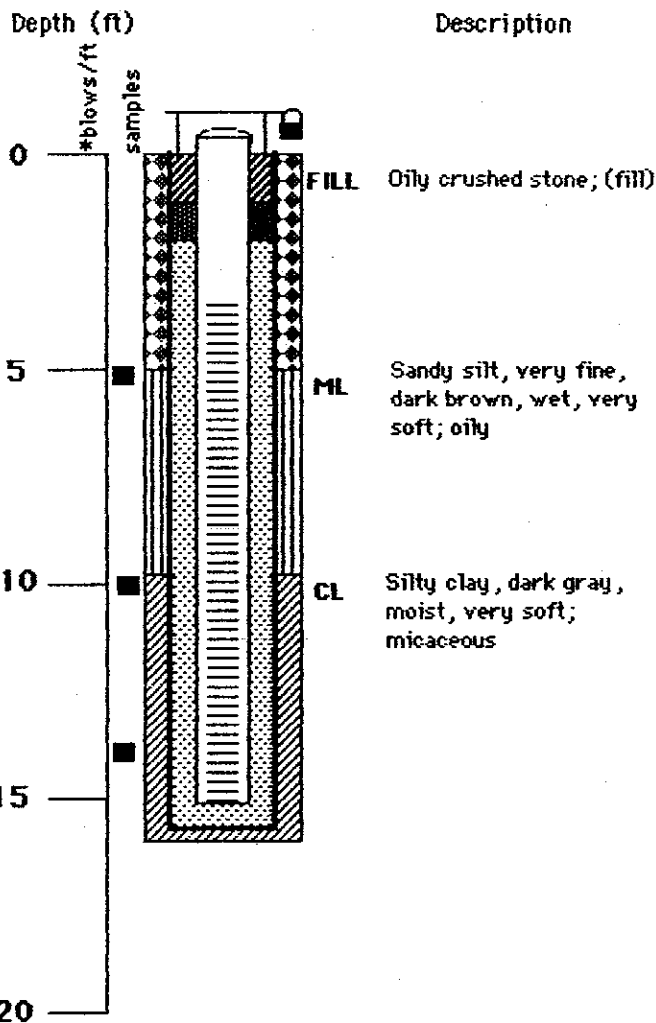
Date M.W. completed 2/19/96

Driller - Drill Consult

Supervising D & M
Engineer/Geologist E.J. Fillo

Drilling Completed - 2/19/86

Type of Rig - Hollow Stem Auger



CONSTRUCTION DATA

Borehole Diam. - 7"

Borehole Depth - 17'

Casing/Screen Type - PVC

Casing Diam. - 4"

Casing Depth - 15'

Screen Setting - 5' - 15'

Slot Width - 0.02"

Type of Seal - Bentonite

Type of Filterpack - #2 Sand

Type of Grout - Cement/Bentonite

MEASUREMENTS (NGVD)

Top of Casing Elevation - 12.54'

Static Water Level Elevation - 9.69'

Date Measured - 1/9/87

Surface Elevation - 11.38'

TEST DATA

Pump Type -

Depth to Intake (ft) -

Static Water Level (ft) -

Pumping Water Level (ft) -

Drawdown (ft) -

Length of Test (Hrs) -

WELL CONSTRUCTION KEY

Filter Pack

Bentonite Seal

Cement Grout

DAMES & MOORE

Notes:

* Blows taken using a 140 lb hammer falling 30 inches.

** All soils classified by visual inspection.

LOG of BORING and MONITORING WELL CONSTRUCTION DETAILS

Project : Chevron/Philadelphia Refinery

Boring/Well No. - D71

Project No. 113-909-032

Location - Chevron Refinery

Date M.W. completed 2/20/86

Driller - Drill Consult

Supervising D & M
Engineer/Geologist Andre Ivansiu

Drilling Completed - 2/20/86

Type of Rig - Hollow Stem Auger

CONSTRUCTION DATA

Borehole Diam. - 7"

Borehole Depth - 25'

Casing/Screen Type - PVC

Casing Diam. - 4"

Casing Depth - 20'

Screen Setting - 5' - 20'

Slot Width - 0.02"

Type of Seal - Bentonite

Type of Filterpack - #2 Sand

Type of Grout - Cement/Bentonite

MEASUREMENTS (NGVD)

Top of Casing Elevation - 13.22'

Static Water Level Elevation - 5.79'

Date Measured - 1/9/87

Surface Elevation - 10.41'

TEST DATA

Pump Type -

Depth to Intake (ft) -

Static Water Level (ft) -

Pumping Water Level (ft) -

Drawdown (ft) -

Length of Test (Hrs) -

WELL CONSTRUCTION KEY

Filter Pack



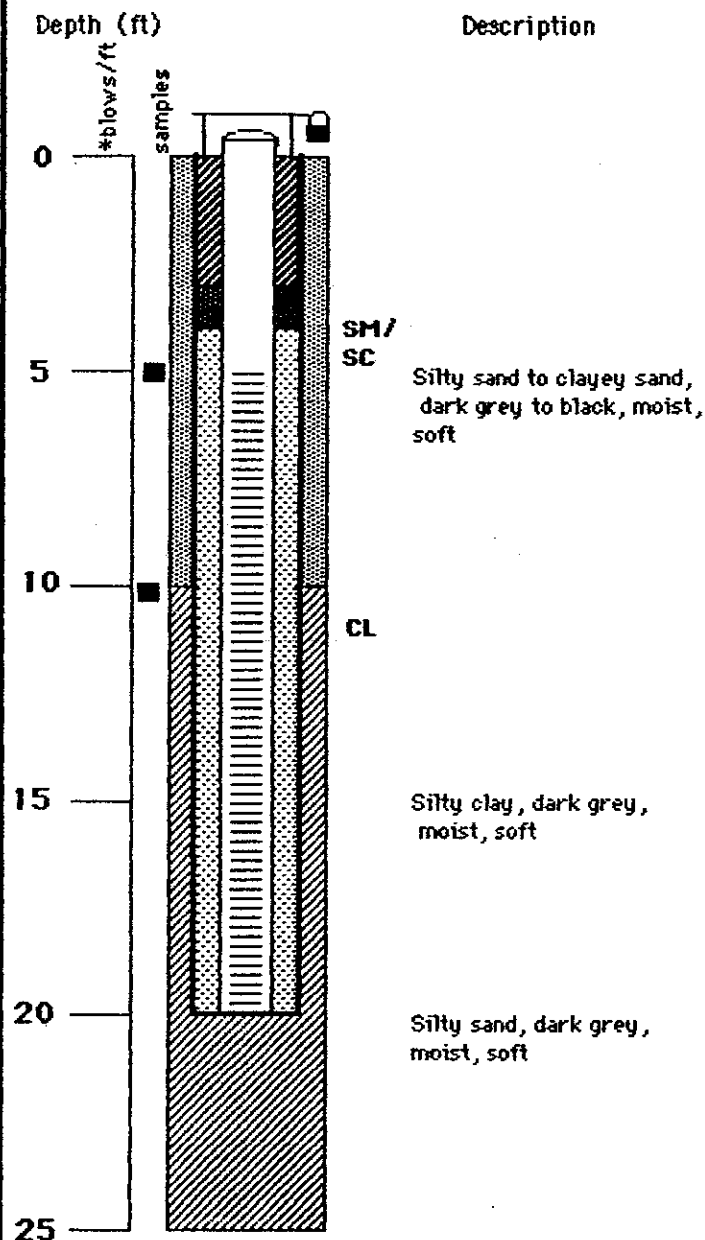
Bentonite Seal



Cement Grout



DAMES & MOORE



LOG of BORING and MONITORING WELL CONSTRUCTION DETAILS

Project : Chevron/Philadelphia Refinery

Boring/Well No. - D72

Project No. 113-909-032

Location - Chevron Refinery

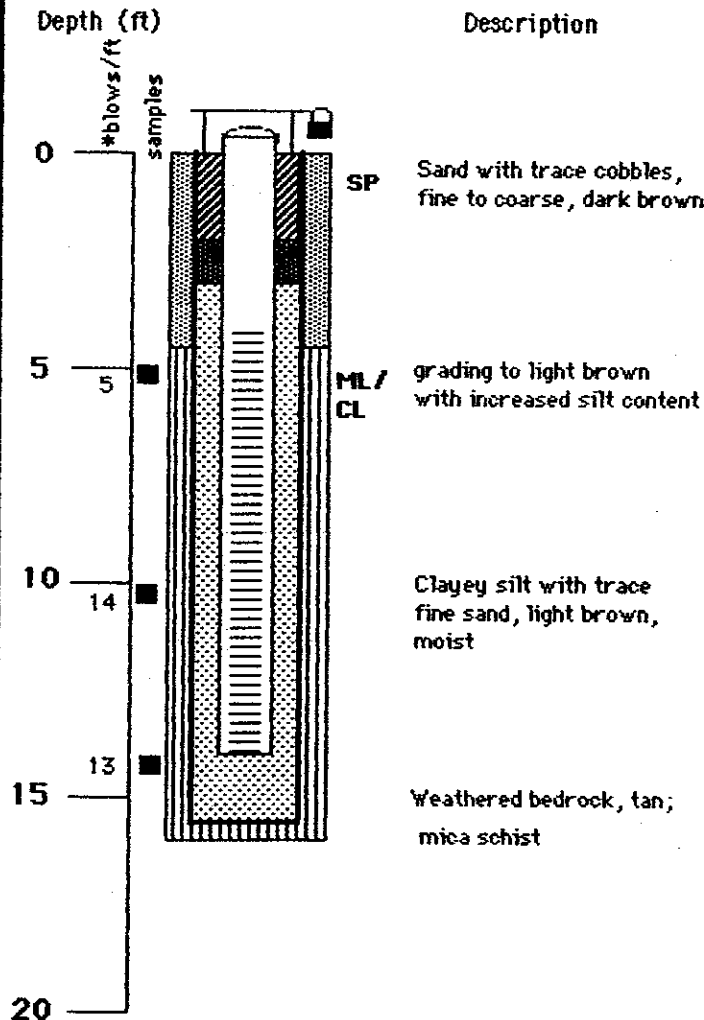
Date M.W. completed 2/20/86

Driller - Drill Consult

Supervising D & M Engineer/Geologist T. HELGASON

Drilling Completed - 2/20/86

Type of Rig - Hollow Stem Auger



CONSTRUCTION DATA

| | |
|----------------------|------------------|
| Borehole Diam. - | 7" |
| Borehole Depth - | 15' 6" |
| Casing/Screen Type - | PVC |
| Casing Diam. - | 4" |
| Casing Depth - | 14' |
| Screen Setting - | 4' - 14' |
| Slot Width - | 0.02" |
| Type of Seal - | Bentonite |
| Type of Filterpack - | #2 Sand |
| Type of Grout - | Cement/Bentonite |

MEASUREMENTS (NGVD)

| | |
|--------------------------------|--------|
| Top of Casing Elevation - | 15.58' |
| Static Water Level Elevation - | 6.54' |
| Date Measured - | 1/9/87 |
| Surface Elevation - | 13.76' |

TEST DATA

| | |
|----------------------------|--|
| Pump Type - | |
| Depth to Intake (ft) - | |
| Static Water Level (ft) - | |
| Pumping Water Level (ft) - | |
| Drawdown (ft) - | |
| Length of Test (Hrs) - | |

Notes:

* Blows taken using a 140 lb hammer falling 30 inches.

** All soils classified by visual inspection.

WELL CONSTRUCTION KEY

| | |
|----------------|--|
| Filter Pack | |
| Bentonite Seal | |
| Cement Grout | |

DAMES & MOORE

LOG of BORING and MONITORING WELL CONSTRUCTION DETAILS

Project : Chevron/Philadelphia Refinery

Project No. 113-909-032

Date M.W. completed 2/20/86

Supervising D & M Engineer/Geologist Andre Ivansiu

Boring/Well No. - D73

Location - Chevron Refinery

Driller - Drill Consult

Drilling Completed - 2/20/86

Type of Rig - Hollow Stem Auger

CONSTRUCTION DATA

Borehole Diam. - 7"

Borehole Depth - 20'

Casing/Screen Type - PVC

Casing Diam. - 4"

Casing Depth - 20'

Screen Setting - 10' - 20'

Slot Width - 0.02"

Type of Seal - Bentonite

Type of Filterpack - #2 Sand

Type of Grout - Cement/Bentonite

MEASUREMENTS (NGVD)

Top of Casing Elevation - 27.02'

Static Water Level Elevation - 14.72'

Date Measured - 1/9/87

Surface Elevation - 23.97'

TEST DATA

Pump Type -

Depth to Intake (ft) -

Satic Water Level (ft) -

Pumping Water Level (ft) -

Drawdown (ft) -

Length of Test (Hrs) -

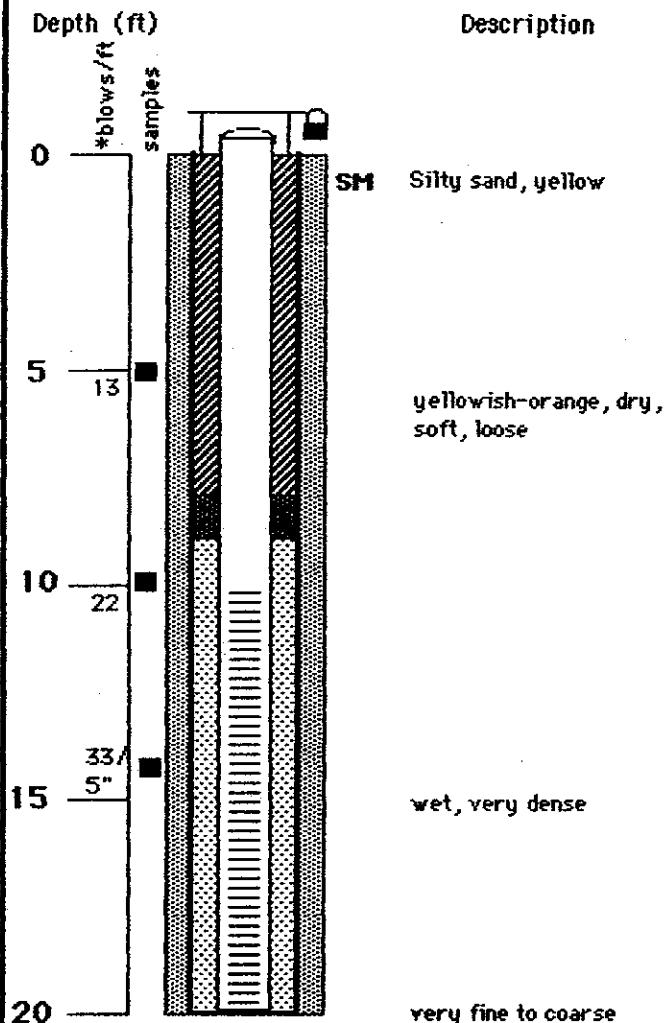
WELL CONSTRUCTION KEY

Filter Pack

Bentonite Seal

Cement Grout

DAMES & MOORE



Notes:

* Blows taken using a 140 lb hammer falling 30 inches.

** All soils classified by visual inspection.

LOG of BORING and MONITORING WELL CONSTRUCTION DETAILS

Project : Chevron/Philadelphia Refinery

Boring/Well No. - D107

Project No. 113-950-032

Location - Chevron Refinery

Date M.W. completed 10/1/86

Driller - Lambert, Inc.

Supervising D & M Geologist David Wagner

Drilling Completed - 10/1/86

Type of Rig - Hollow Stem Auger

CONSTRUCTION DATA

Borehole Diam. - 6"

Borehole Depth - 17'

Casing/Screen Type - PVC

Casing Diam. - 4"

Casing Depth - 12.5'

Screen Setting - 2.5' - 12.5'

Slot Width - 0.02"

Type of Seal - Bentonite

Type of Filterpack - #2 Sand

Type of Grout -

MEASUREMENTS(NGVD)

Top of Casing Elevation - 10.27'

Static Water Level Elevation - 4.87'

Date Measured - 1/14/87

Surface Elevation - 7.27'

TEST DATA

Pump Type -

Depth to Intake (ft) -





Satic Water Level (ft) -

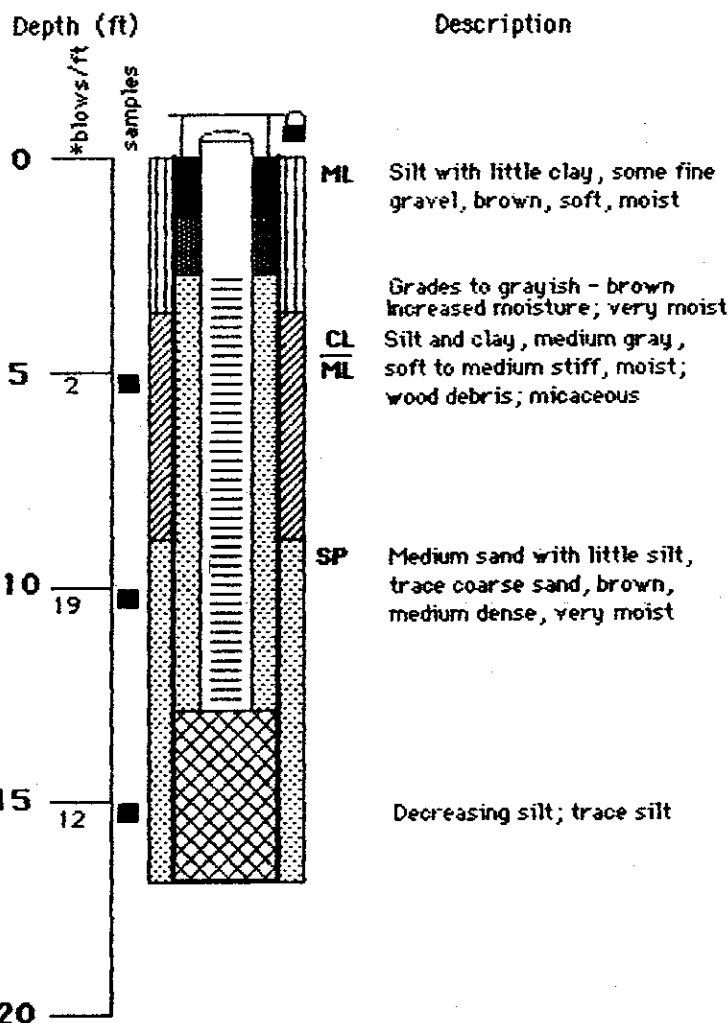
Pumping Water Level (ft) -

Drawdown (ft) -

Length of Test (Hrs) -

WELL CONSTRUCTION KEY

FILTER PACK 
BENTONITE SEAL 
CONCRETE 
CAVE IN MATERIAL 



Notes:

* Blows taken using a 140 lb hammer falling 30 inches.

** All soils classified by visual inspection.

DAMES & MOORE

LOG of BORING and MONITORING WELL CONSTRUCTION DETAILS

Project : Chevron/Philadelphia Refinery

Boring/Well No. - D108

Project No. 113-950-032

Location - Chevron Refinery

Date M.W. completed 10/1/86

Driller - Lambert, Inc.

Supervising D & M Geologist David Wagner

Drilling Completed - 10/1/86

Type of Rig - Hollow Stem Auger

CONSTRUCTION DATA

Borehole Diam. - 6"

Borehole Depth - 15'

Casing/Screen Type - PVC

Casing Diam. - 4"

Casing Depth - 14'

Screen Setting - 4' - 14'

Slot Width - 0.02"

Type of Seal - Bentonite

Type of Filterpack - #2 Sand

Type of Grout -

MEASUREMENTS (NGVD)

Top of Casing Elevation - 10.87'

Static Water Level Elevation - 5.32'

Date Measured - 1/14/87

Surface Elevation - 8.37'

TEST DATA

Pump Type -

Depth to Intake (ft) -

Satic Water Level (ft) -

Pumping Water Level (ft) -

Drawdown (ft) -

Length of Test (Hrs) -

WELL CONSTRUCTION KEY

FILTER PACK 

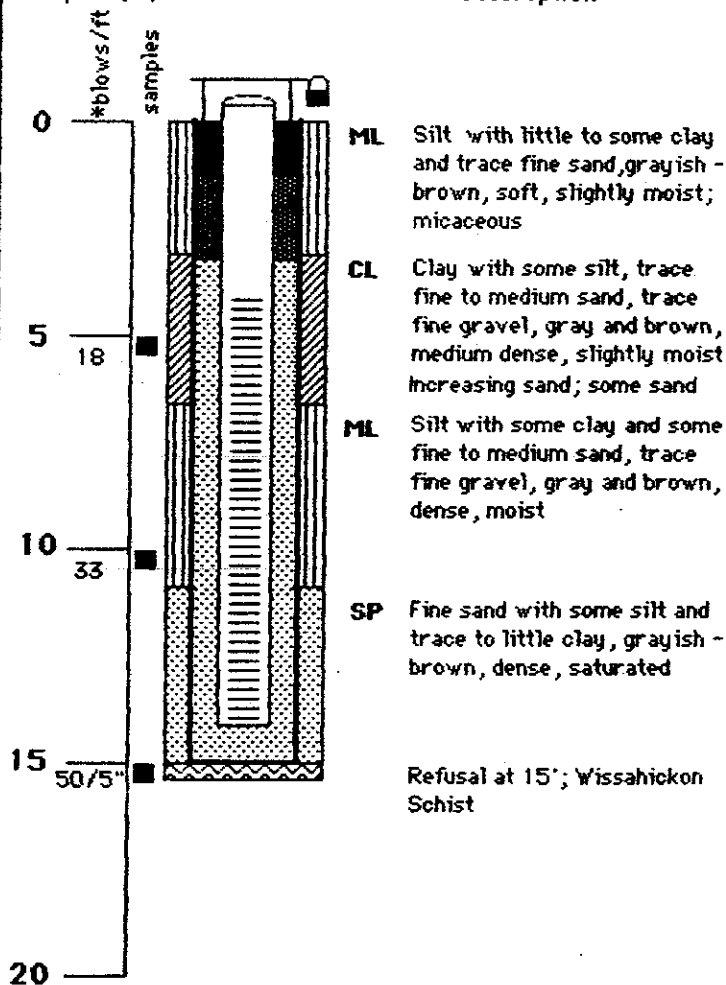
BENTONITE SEAL 

CONCRETE 

CAVE IN MATERIAL 

Depth (ft)

Description



Notes:

* Blows taken using a 140 lb hammer falling 30 inches.

** All soils classified by visual inspection.

DAMES & MOORE

LOG of BORING and MONITORING WELL CONSTRUCTION DETAILS

Project : Chevron/Philadelphia Refinery

Boring/Well No. - D109

Project No. 113-950-032

Location - Chevron Refinery

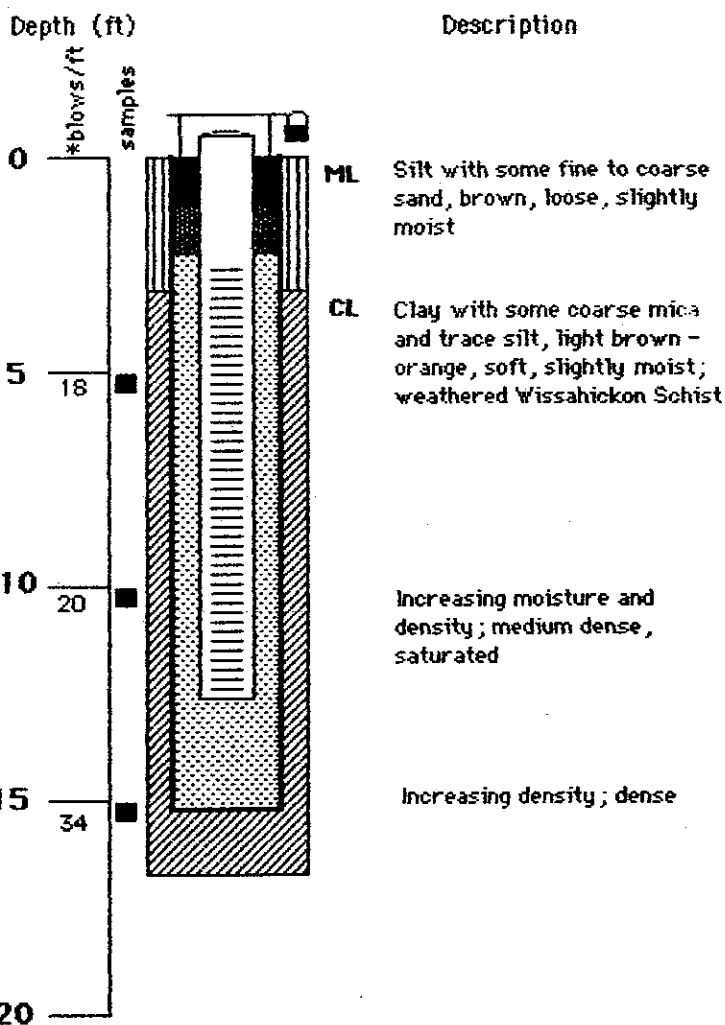
Date M.W. completed 10/2/86

Driller - Lambert, Inc.

Supervising D & M Geologist David Wagner

Drilling Completed - 10/2/86

Type of Rig - Hollow Stem Auger



CONSTRUCTION DATA

Borehole Diam. - 6"

Borehole Depth - 15'

Casing/Screen Type - PVC

Casing Diam. - 4"

Casing Depth - 12.5'

Screen Setting - 2.5' - 12.5'

Slot Width - 0.02"

Type of Seal - Bentonite

Type of Filterpack - #2 Sand

Type of Grout -

MEASUREMENTS (NGVD)

Top of Casing Elevation - 18.31'

Static Water Level Elevation - 14.61'

Date Measured - 1/14/87

Surface Elevation - 16.10'

TEST DATA

Pump Type -

Depth to Intake (ft) -

Static Water Level (ft) -

Pumping Water Level (ft) -

Drawdown (ft) -

Length of Test (Hrs) -

WELL CONSTRUCTION KEY

- FILTER PACK
- BENTONITE SEAL
- CONCRETE
- CAVE IN MATERIAL

Notes:

* Blows taken using a 140 lb hammer falling 30 inches.

** All soils classified by visual inspection.

DAMES & MOORE

LOG of BORING and MONITORING WELL CONSTRUCTION DETAILS

Project : Chevron/Philadelphia Refinery

Project No. 113-909-032

Date M.W. completed 2/21/86

Supervising D & M
Engineer/Geologist T. Helgason

Boring/Well No. - S74

Location - Chevron Refinery

Driller - Drill Consult

Drilling Completed - 2/21/86

Type of Rig - Hollow Stem Auger

CONSTRUCTION DATA

Borehole Diam. - 7"

Borehole Depth - 15'6"

Casing/Screen Type - PVC

Casing Diam. - 4"

Casing Depth - 14'

Screen Setting - 4' - 14'

Slot Width - 0.02"

Type of Seal - Bentonite

Type of Filterpack - #2 Sand

Type of Grout - Cement/Bentonite

MEASUREMENTS (NGVD)

Top of Casing Elevation - 14.54'

Static Water Level Elevation - 6.95'

Date Measured - 1/9/87

Surface Elevation - 12.81'

TEST DATA

Pump Type -

Depth to Intake (ft) -

Satic Water Level (ft) -

Pumping Water Level (ft) -

Drawdown (ft) -

Length of Test (Hrs) -

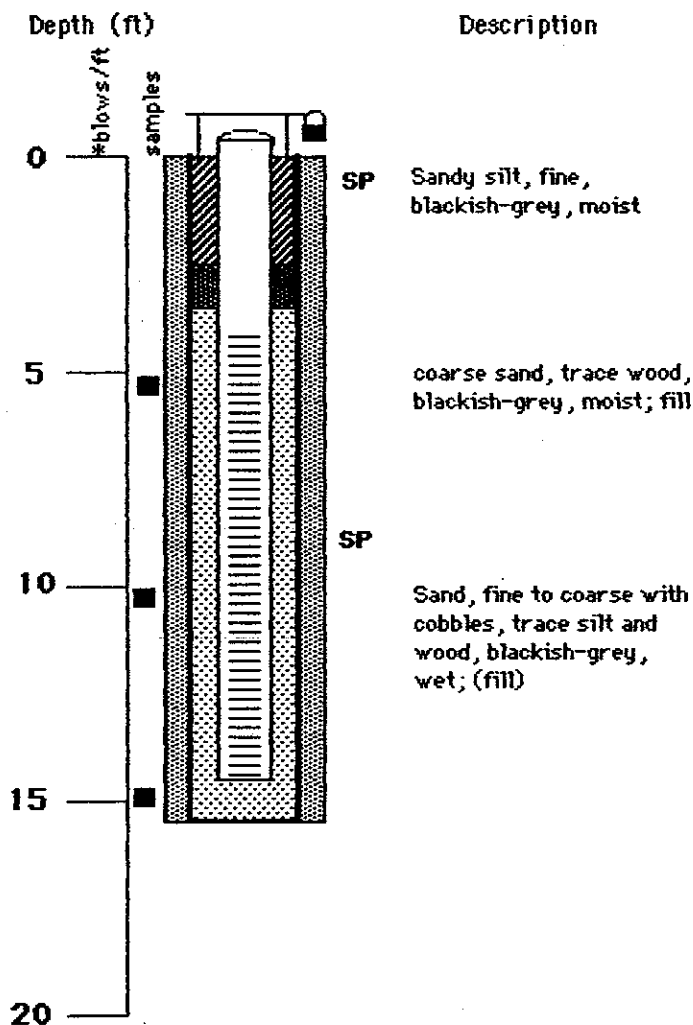
WELL CONSTRUCTION KEY

Filter Pack 

Bentonite Seal 

Cement Grout 

DAMES & MOORE



Notes:

* Blows taken using a 140 lb hammer falling 30 inches.

** All soils classified by visual inspection.

LOG of BORING and MONITORING WELL CONSTRUCTION DETAILS

Project : Chevron/Philadelphia Refinery

Project No. 113-909-032

Date M.W. completed 2/21/86

Supervising D & M
Engineer/Geologist T. Helgason

Boring/Well No. - S75

Location - Chevron Refinery

Driller - Drill Consult

Drilling Completed - 2/21/86

Type of Rig - Hollow Stem Auger

CONSTRUCTION DATA

Borehole Diam. - 7"

Borehole Depth - 15' 6"

Casing/Screen Type - PVC

Casing Diam. - 4"

Casing Depth - 15' 6"

Screen Setting - 5' 6" - 15' 6"

Slot Width - 0.02"

Type of Seal - Bentonite

Type of Filterpack - #2 Sand

Type of Grout - Cement/Bentonite

MEASUREMENTS (NGVD)

Top of Casing Elevation - 13.19'

Static Water Level Elevation - 6.45'

Date Measured - 1/19/87

Surface Elevation - 12.78'

TEST DATA

Pump Type -

Depth to Intake (ft) -

Satic Water Level (ft) -

Pumping Water Level (ft) -

Drawdown (ft) -

Length of Test (Hrs) -

WELL CONSTRUCTION KEY

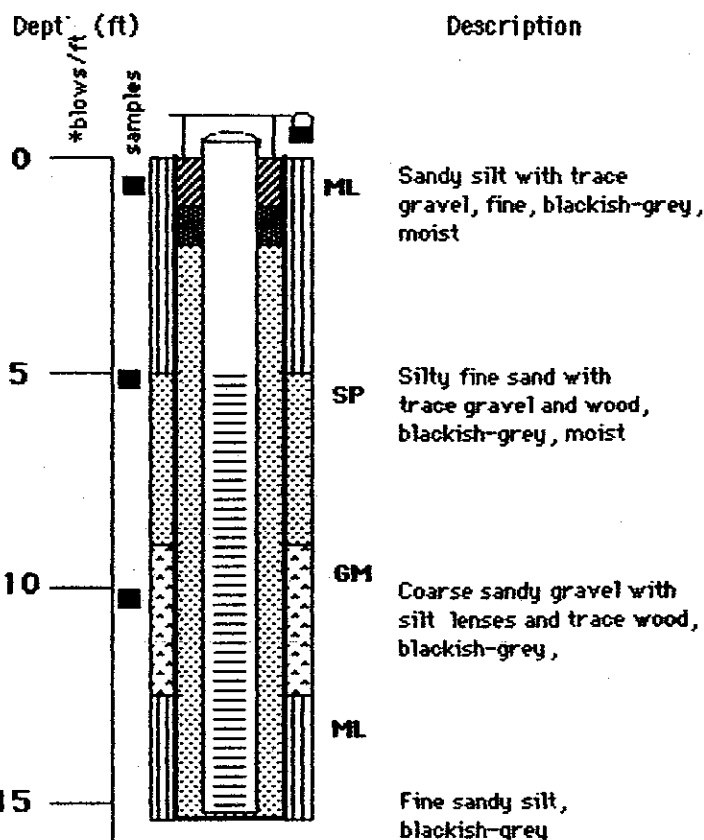
Filter Pack

Bentonite Seal

Cement Grout



DAMES & MOORE



Notes:

* Blows taken using a 140 lb hammer falling 30 inches.

** All soils classified by visual inspection.

LOG of BORING and MONITORING WELL CONSTRUCTION DETAILS

Project : Chevron/Philadelphia Refinery

Boring/Well No. - S76

Project No. 113-909-032

Location - Chevron Refinery

Date M.W. completed 2/21/86

Driller - Drill Consult

Supervising D & M
Engineer/Geologist Andrei Ivanciu

Drilling Completed - 2/21/86

Type of Rig - Hollow Stem Auger

CONSTRUCTION DATA

Borehole Diam. - 7"

Borehole Depth - 15'

Casing/Screen Type - PVC

Casing Diam. - 4"

Casing Depth - 14'

Screen Setting - 4' - 14'

Slot Width - 0.02"

Type of Seal - Bentonite

Type of Filterpack - #2 Sand

Type of Grout - Cement/Bentonite

MEASUREMENTS (NGVD)

Top of Casing Elevation - 8.56'

Static Water Level Elevation - -3.95'

Date Measured - 1/9/87

Surface Elevation - 8.06'

TEST DATA

Pump Type -

Depth to Intake (ft) -

Static Water Level (ft) -

Pumping Water Level (ft) -

Drawdown (ft) -

Length of Test (Hrs) -

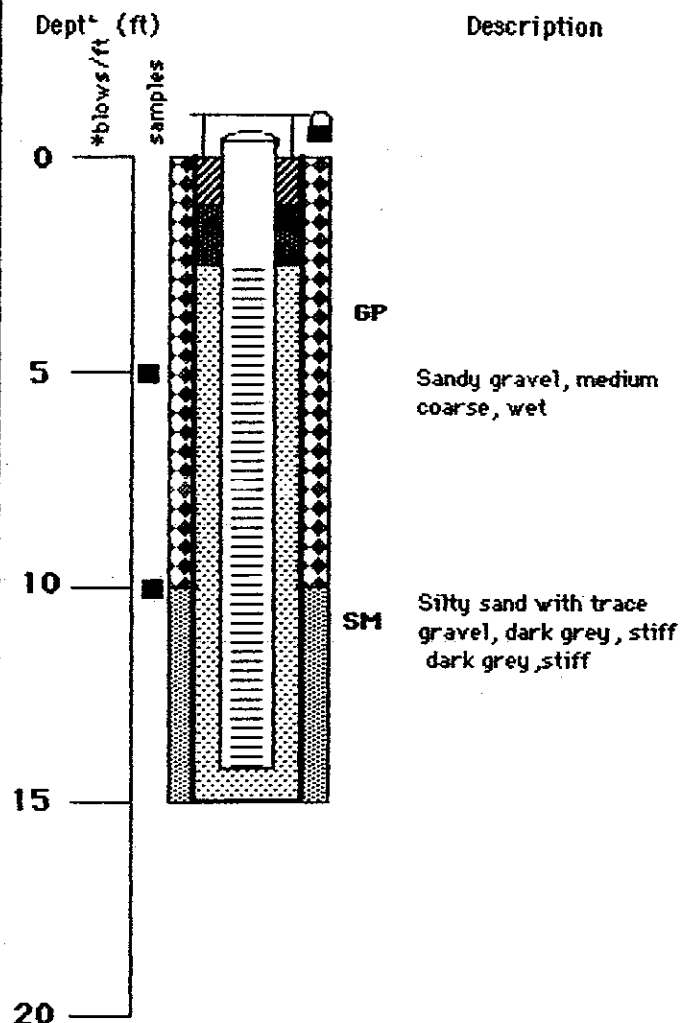
WELL CONSTRUCTION KEY

Filter Pack 

Bentonite Seal 

Cement Grout 

DAMES & MOORE



Notes:

* Blows taken using a 140 lb hammer falling 30 inches.

** All soils classified by visual inspection.

LOG of BORING and MONITORING WELL CONSTRUCTION DETAILS

Project : Chevron/Philadelphia Refinery

Boring/Well No. - S77

Project No. 113-909-032

Date M.W. completed 2/20/86

Supervising D & M
Engineer/Geologist T. Helgason

Location - Chevron Refinery

Driller - Drill Consult

Drilling Completed - 2/20/86

Type of Rig - Hollow Stem Auger

CONSTRUCTION DATA

Borehole Diam. - 7"

Borehole Depth - 16'

Casing/Screen Type - PVC

Casing Diam. - 4"

Casing Depth - 15'

Screen Setting - 5' - 15'

Slot Width - 0.02"

Type of Seal - Bentonite

Type of Filterpack - #2 Sand

Type of Grout - Cement/Bentonite

MEASUREMENTS (NGVD)

Top of Casing Elevation - 6.20'

Static Water Level Elevation - -4.11'

Date Measured - 1/9/87

Surface Elevation - 5.20'

TEST DATA

Pump Type -

Depth to Intake (ft) -

Static Water Level (ft) -

Pumping Water Level (ft) -

Drawdown (ft) -

Length of Test (Hrs) -

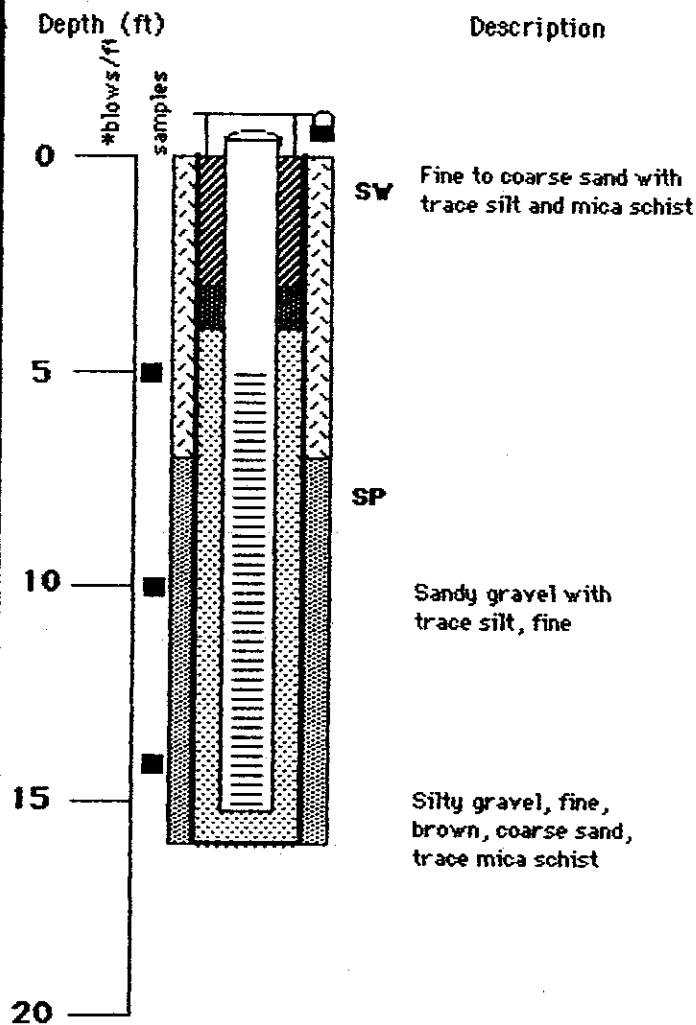
WELL CONSTRUCTION KEY

Filter Pack 

Bentonite Seal 

Cement Grout 

DAMES & MOORE



Notes:

* Blows taken using a 140 lb hammer falling 30 inches.

** All soils classified by visual inspection.

LOG of BORING and MONITORING WELL CONSTRUCTION DETAILS

Project : Chevron/Philadelphia Refinery

Project No. 113-909-032

Date M.W. completed 2/21/86

Supervising D & M
Engineer /Geologist T. Helgason

Boring/Well No. - S78

Location - Chevron Refinery

Driller - Drill Consult

Drilling Completed - 2/21/86

Type of Rig - Hollow Stem Auger

CONSTRUCTION DATA

Borehole Diam. - 7"

Borehole Depth - 18'

Casing/Screen Type - PVC

Casing Diam. - 4"

Casing Depth - 14'

Screen Setting - 4' - 14'

Slot Width - 0.02"

Type of Seal - Bentonite

Type of Filterpack - #2 Sand

Type of Grout - Cement/Bentonite

MEASUREMENTS (NGVD)

Top of Casing Elevation - 2.77'

Static Water Level Elevation - -4.69'

Date Measured - 1/9/87

Surface Elevation - 2.52'

TEST DATA

Pump Type -

Depth to Intake (ft) -

Static Water Level (ft) -

Pumping Water Level (ft) -

Drawdown (ft) -

Length of Test (Hrs) -

WELL CONSTRUCTION KEY

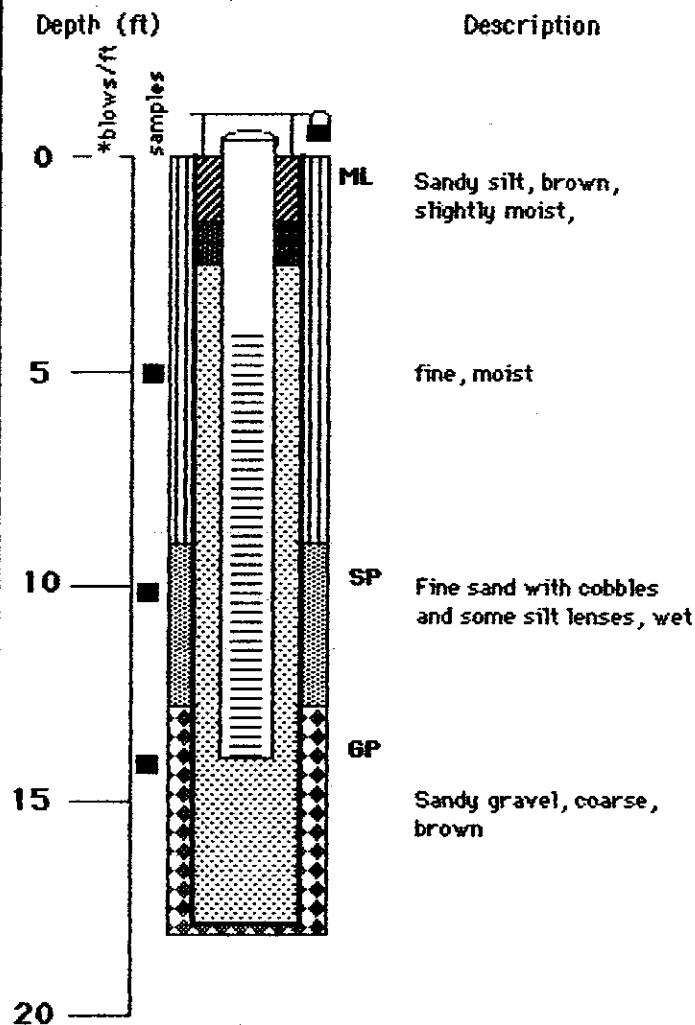
Filter Pack

Bentonite Seal

Cement Grout



DAMES & MOORE



Notes:

* Blows taken using a 140 lb hammer falling 30 inches.

** All soils classified by visual inspection.

LOG of BORING and MONITORING WELL CONSTRUCTION DETAILS

Project : Chevron/Philadelphia Refinery

Boring/Well No. - 579

Project No. 113-909-032

Location - Chevron Refinery

Date M.W. completed 2/21/86

Driller - Drill Consult

Supervising D & M
Engineer/Geologist Andrei Ivanciu

Drilling Completed - 2/21/86

Type of Rig - Hollow Stem Auger

CONSTRUCTION DATA

Borehole Diam. - 7"

Borehole Depth - 15'

Casing/Screen Type - PVC

Casing Diam. - 4"

Casing Depth - 14' 6"

Screen Setting - 4' 6" - 14' 6"

Slot Width - 0.02"

Type of Seal - Bentonite

Type of Filterpack - #2 Sand

Type of Grout - Cement/Bentonite

MEASUREMENTS (NGVD)

Top of Casing Elevation - 3.88'

Static Water Level Elevation - -3.94'

Date Measured - 1/9/87

Surface Elevation - 3.72'

TEST DATA

Pump Type -

Depth to Intake (ft) -

Static Water Level (ft) -

Pumping Water Level (ft) -

Drawdown (ft) -

Length of Test (Hrs) -

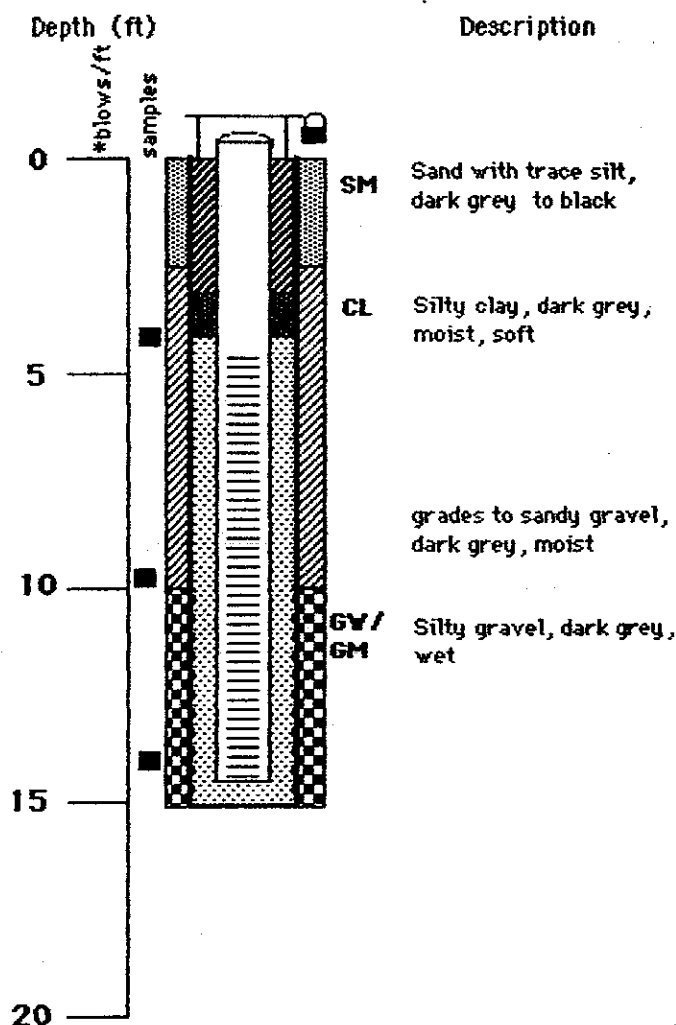
WELL CONSTRUCTION KEY

Filter Pack 

Bentonite Seal 

Cement Grout 

DAMES & MOORE



Notes:

* Blows taken using a 140 lb hammer falling 30 inches.

** All soils classified by visual inspection.

LOG of BORING and MONITORING WELL CONSTRUCTION DETAILS

Project : Chevron/Philadelphia Refinery

Boring/Well No. - S80

Project No. 113-909-032

Date M.W. completed 2/21/86

Supervising D & M
Engineer/Geologist Andrei Ivanciu

Location - Chevron Refinery

Driller - Drill Consult

Drilling Completed - 2/21/86

Type of Rig - Hollow Stem Auger

CONSTRUCTION DATA

Borehole Diam. - 7"

Borehole Depth - 20'

Casing/Screen Type - PVC

Casing Diam. - 4"

Casing Depth - 15'

Screen Setting - 4' 8" - 14' 8"

Slot Width - 0.02"

Type of Seal - Bentonite

Type of Filterpack - #2 Sand

Type of Grout - Cement/Bentonite

MEASUREMENTS (NGVD)

Top of Casing Elevation - 3.20'

Static Water Level Elevation - -4.80'

Date Measured - 1/9/87

Surface Elevation - 3.12'

TEST DATA

Pump Type -

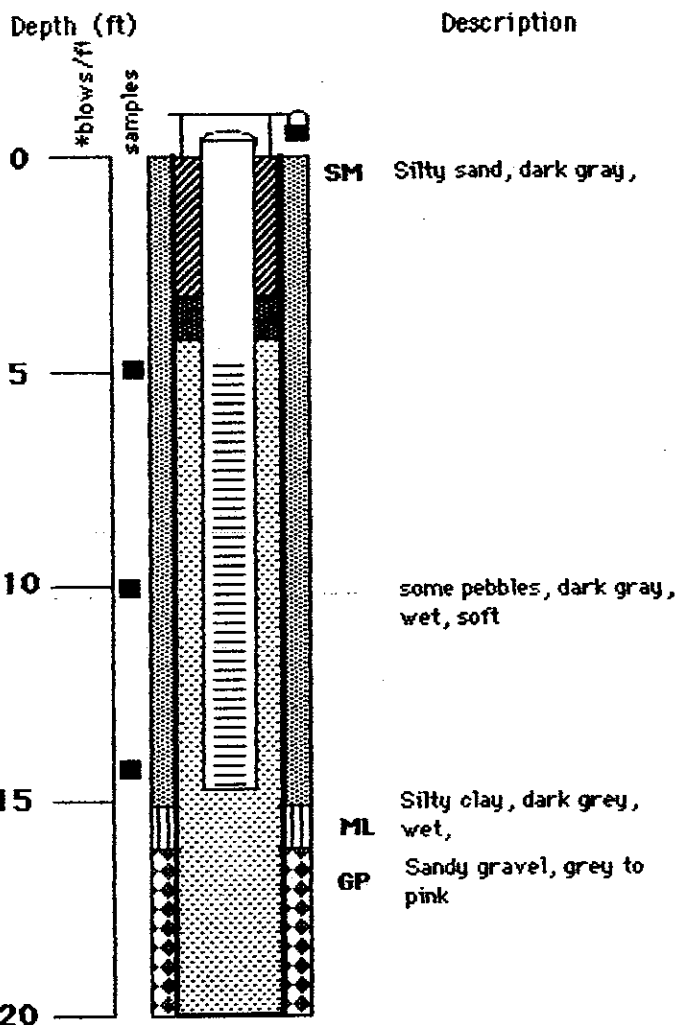
Depth to Intake (ft) -

Satic Water Level (ft) -

Pumping Water Level (ft) -

Drawdown (ft) -

Length of Test (Hrs) -



Notes:

* Blows taken using a 140 lb hammer falling 30 inches.

** All soils classified by visual inspection.

WELL CONSTRUCTION KEY

Filter Pack

Bentonite Seal

Cement Grout

DAMES & MOORE

LOG of BORING and MONITORING WELL CONSTRUCTION DETAILS

Project : Chevron/Philadelphia Refinery

Boring/Well No. - S81

Project No. 113-909-032

Date M.W. completed 2/21/86

Supervising D & M
Engineer/Geologist Andrei Ivansiu

Location - Chevron Refinery

Driller - Drill Consult

Drilling Completed - 2/20/86

Type of Rig - Hollow Stem Auger

CONSTRUCTION DATA

Borehole Diam. - 7"

Borehole Depth - 15'

Casing/Screen Type - PVC

Casing Diam. - 4"

Casing Depth - 13' 3"

Screen Setting - 3' 3" - 13' 3"

Slot Width - 0.02"

Type of Seal - Bentonite

Type of Filterpack - #2 Sand

Type of Grout - Cement/Bentonite

MEASUREMENTS (NGVD)

Top of Casing Elevation - 3.57'

Static Water Level Elevation - -4.55'

Date Measured - 1/9/87

Surface Elevation - 1.51'

TEST DATA

Pump Type -

Depth to Intake (ft) -

Static Water Level (ft) -

Pumping Water Level (ft) -

Drawdown (ft) -

Length of Test (Hrs) -

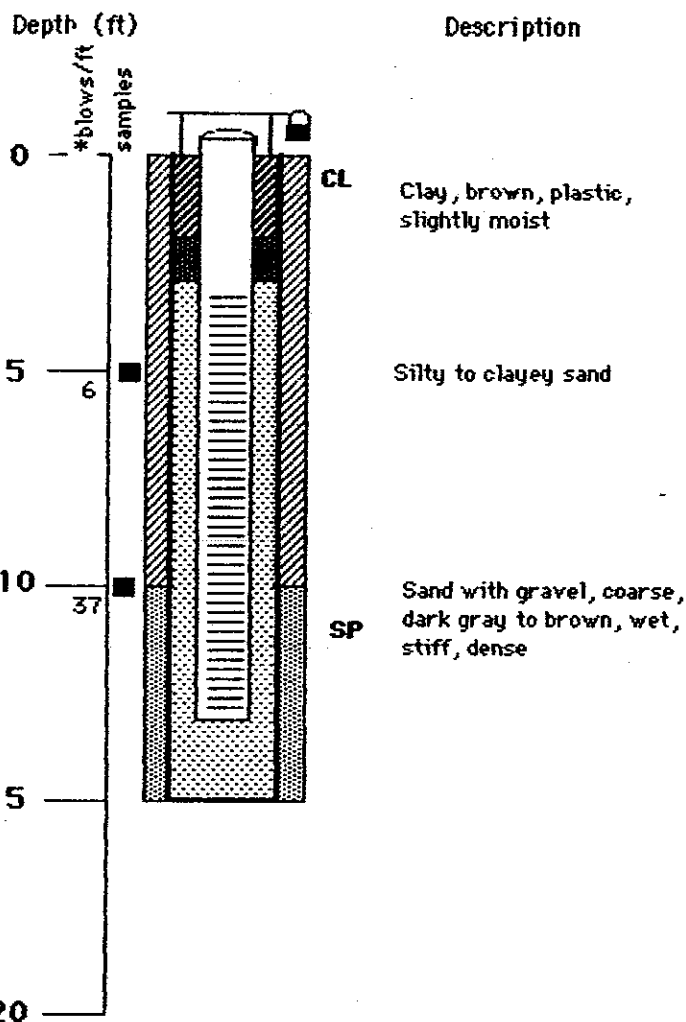
WELL CONSTRUCTION KEY

Filter Pack 

Bentonite Seal 

Cement Grout 

DAMES & MOORE



Notes:

* Blows taken using a 140 lb hammer falling 30 inches.

** All soils classified by visual inspection.

LOG of BORING and MONITORING WELL CONSTRUCTION DETAILS

Project : Chevron/Philadelphia Refinery

Project No. 113-909-032

Date M.W. completed 2/25/86

Supervising D & M
Engineer/Geologist Blake Moyer, Jr.

Boring/Well No. - S82

Location - Chevron Refinery

Driller - Drill Consult

Drilling Completed - 2/25/86

Type of Rig - Hollow Stem Auger

CONSTRUCTION DATA

Borehole Diam. - 7"

Borehole Depth - 14'

Casing/Screen Type - PVC

Casing Diam. - 4"

Casing Depth - 13'

Screen Setting - 3' - 13'

Slot Width - 0.02"

Type of Seal - Bentonite

Type of Filterpack - #2 Sand

Type of Grout - Cement/Bentonite

MEASUREMENTS (NGVD)

Top of Casing Elevation - 3.00'

Static Water Level Elevation - 1.30'

Date Measured - 1/9/87

Surface Elevation - 1.76'

TEST DATA

Pump Type -

Depth to Intake (ft) -

Satic Water Level (ft) -

Pumping Water Level (ft) -

Drawdown (ft) -

Length of Test (Hrs) -

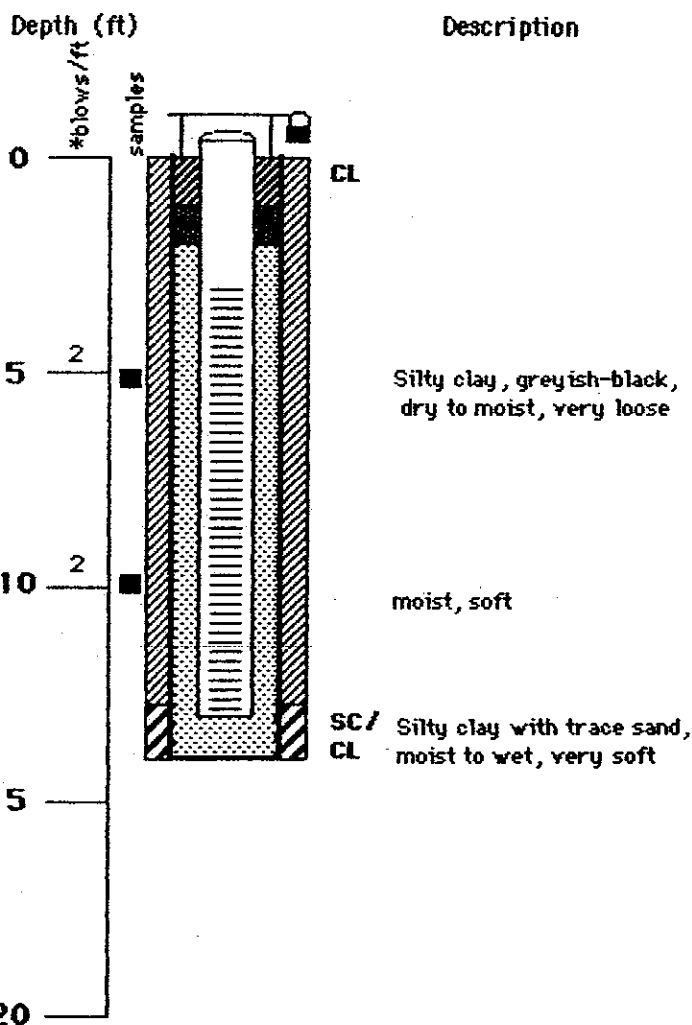
WELL CONSTRUCTION KEY

Filter Pack 

Bentonite Seal 

Cement Grout 

DAMES & MOORE



Notes:

* Blows taken using a 140 lb hammer falling 30 inches.

** All soils classified by visual inspection.

LOG of BORING and MONITORING WELL CONSTRUCTION DETAILS

Project : Chevron/Philadelphia Refinery

Boring/Well No. - S83

Project No. 113-909-032

Location - Chevron Refinery

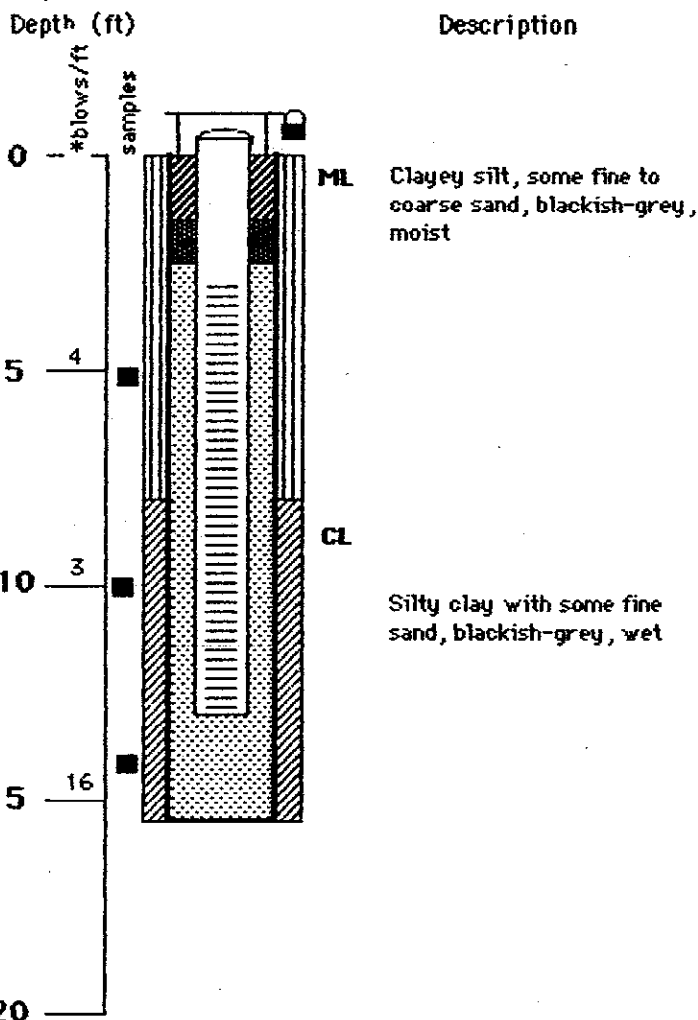
Date M.W. completed 2/22/86

Driller - Drill Consult

Supervising D & M Engineer/Geologist T. Helgason

Drilling Completed - 2/22/86

Type of Rig - Hollow Stem Auger



CONSTRUCTION DATA

Borehole Diam. - 7"

Borehole Depth - 15' 6"

Casing/Screen Type - PVC

Casing Diam. - 4"

Casing Depth - 13'

Screen Setting - 3' - 13'

Slot Width - 0.02"

Type of Seal - Bentonite

Type of Filterpack - #2 Sand

Type of Grout - Cement/Bentonite

MEASUREMENTS (NGVD)

Top of Casing Elevation - 4.35'

Static Water Level Elevation' - -0.53'

Date Measured - 1/9/87

Surface Elevation - 3.55'

TEST DATA

Pump Type -

Depth to Intake (ft) -

Satic Water Level (ft) -

Pumping Water Level (ft) -

Drawdown (ft) -

Length of Test (Hrs) -

WELL CONSTRUCTION KEY

Filter Pack

Bentonite Seal

Cement Grout

Notes:

* Blows taken using a 140 lb hammer falling 30 inches.

** All soils classified by visual inspection.

DAMES & MOORE

LOG of BORING and MONITORING WELL CONSTRUCTION DETAILS

Project : Chevron/Philadelphia Refinery

Boring/Well No. - S104

Project No. 113-950-032

Location - Chevron Refinery

Date M.W. completed 10/3/86

Driller - Lambert, Inc.

Supervising D & M Geologist David Wagner

Drilling Completed - 10/3/86

Type of Rig - Hollow Stem Auger

CONSTRUCTION DATA

Borehole Diam. - 6"

Borehole Depth - 15'

Casing/Screen Type - PVC

Casing Diam. - 4"

Casing Depth - 15'

Screen Setting - 5' - 15'

Slot Width - 0.02"

Type of Seal - Bentonite

Type of Filterpack - #2 Sand

Type of Grout -

MEASUREMENTS (NGVD)

Top of Casing Elevation - 11.97'

Static Water Level Elevation - 3.17'

Date Measured - 1/14/87

Surface Elevation - 9.25'

TEST DATA

Pump Type -

Depth to Intake (ft) -





Satic Water Level (ft) -

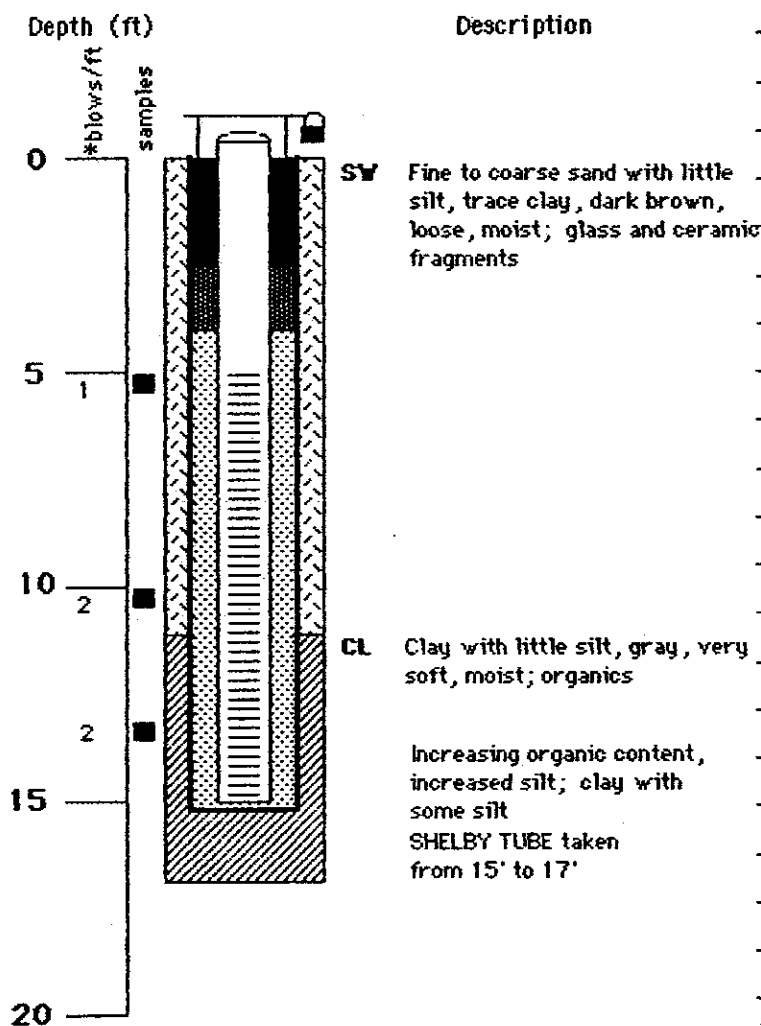
Pumping Water Level (ft) -

Drawdown (ft) -

Length of Test (Hrs) -

WELL CONSTRUCTION KEY

FILTER PACK 
BENTONITE SEAL 
CONCRETE 
CAVE IN MATERIAL 



Notes:

* Blows taken using a 140 lb hammer falling 30 inches.

** All soils classified by visual inspection.

DAMES & MOORE

LOG of BORING and MONITORING WELL CONSTRUCTION DETAILS

Project: Chevron/Philadelphia Refinery

Boring/Well No. - S105

Project No. 113-950-032

Location - Chevron Refinery

Date M.W. completed 10/7/86

Driller - Lambert, Inc.

Supervising D & M Geologist David Wagner

Drilling Completed - 10/7/86

Type of Rig - Hollow Stem Auger

CONSTRUCTION DATA

Borehole Diam. - 10"

Borehole Depth - 70'

Casing/Screen Type - PVC

Casing Diam. - 4"

Casing Depth - 12.5'

Screen Setting - 2.5' - 12.5'

Slot Width - 0.02"

Type of Seal - Bentonite

Type of Filterpack - #2 Sand

Type of Grout - Bentonite

MEASUREMENTS (NGVD)

Top of Casing Elevation - 3.83'

Static Water Level Elevation - -4.35'

Date Measured - 1/14/87

Surface Elevation - 0.83'

TEST DATA

Pump Type -

Depth to Intake (ft) -

Static Water Level (ft) -

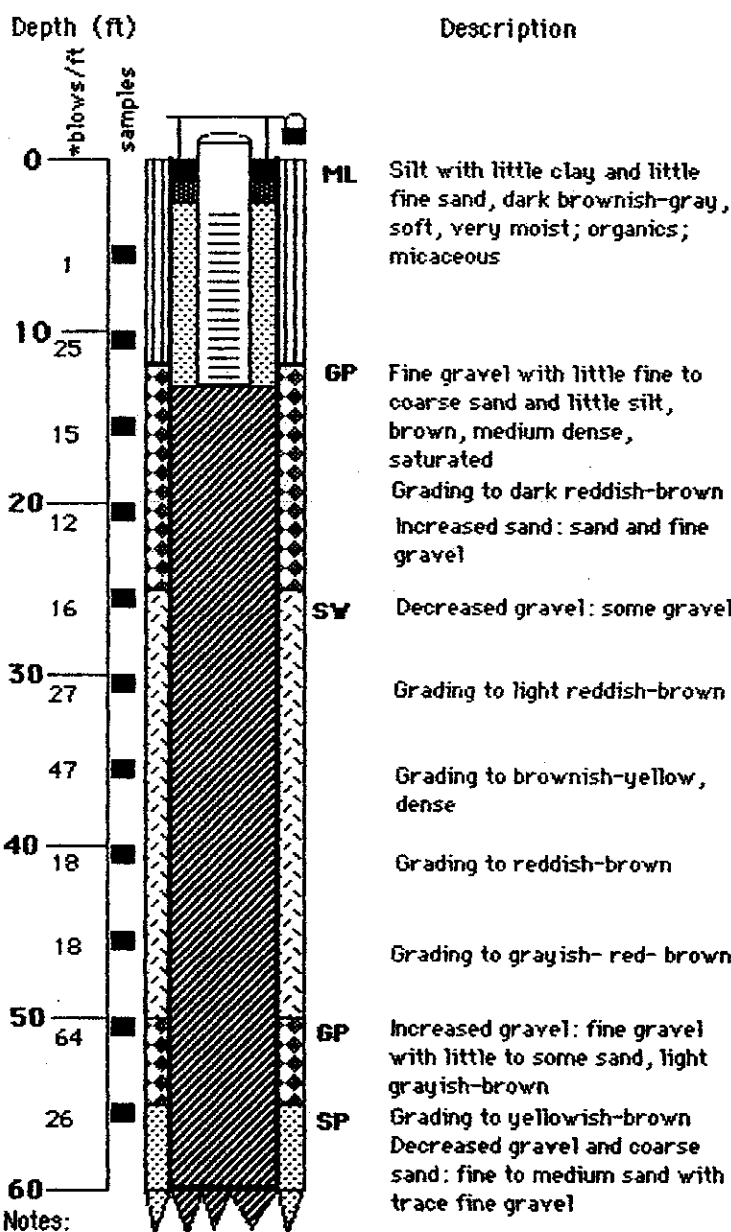
Pumping Water Level (ft) -

Drawdown (ft) -

Length of Test (Hrs) -

WELL CONSTRUCTION KEY

| | |
|------------------|--|
| FILTER PACK | |
| BENTONITE SEAL | |
| BENTONITE GROUT | |
| CAVE IN MATERIAL | |
| CONCRETE | |



Notes:

* Blows taken using a 140 lb hammer falling 30 inches.

** All soils classified by visual inspection.

DAMES & MOORE

LOG of BORING and MONITORING WELL CONSTRUCTION DETAILS

Project : Chevron/Philadelphia Refinery

Boring/Well No. - S105 (Cont.)

Project No. 113-950-032

Location - Chevron Refinery

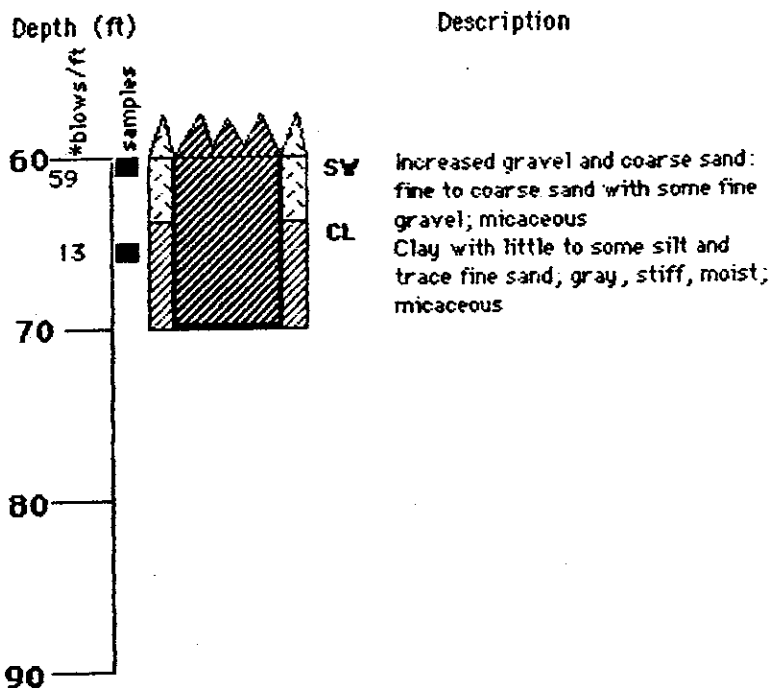
Date M.W. completed 10/7/86

Driller - Lambert, Inc.

Supervising D & M Geologist David Wagner

Drilling Completed - 10/7/86

Type of Rig - Hollow Stem Auger



WELL CONSTRUCTION KEY

- FILTER PACK
- BENTONITE SEAL
- BENTONITE GROUT
- CAVE IN MATERIAL
- CONCRETE

Notes:

- * Blows taken using a 140 lb hammer falling 30 inches.
- ** All soils classified by visual inspection.

DAMES & MOORE

LOG of BORING and MONITORING WELL CONSTRUCTION DETAILS

Project: Chevron/Philadelphia Refinery

Boring/Well No. - S106

Project No. 113-950-032

Location - Chevron Refinery

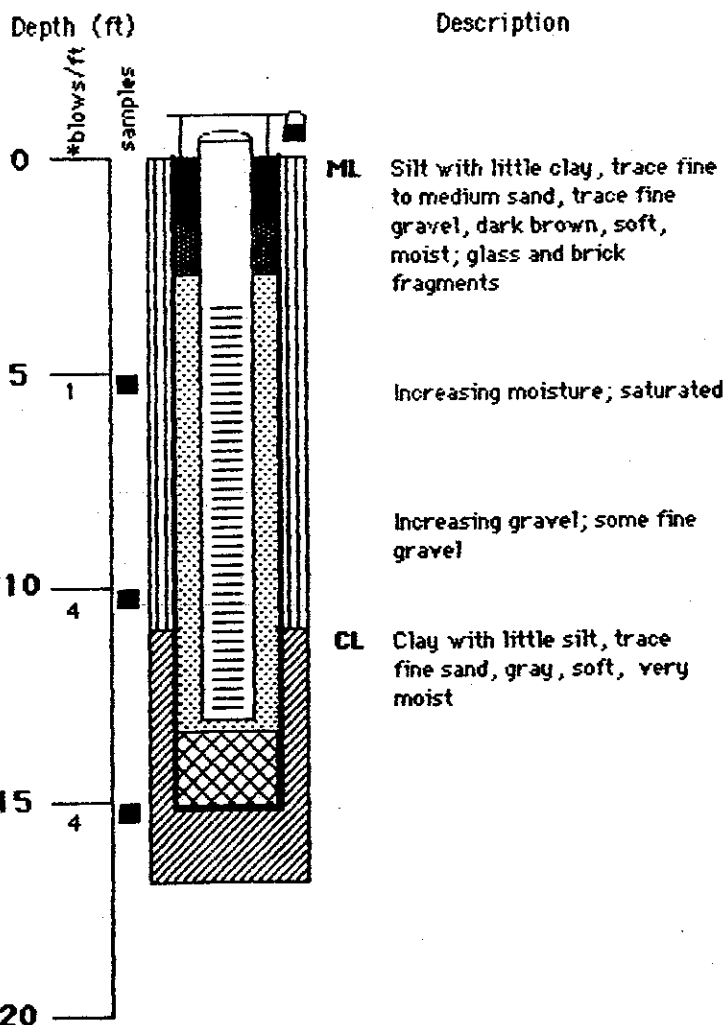
Date M.W. completed 10/2/86

Driller - Lambert, Inc.

Supervising D & M Geologist David Wagner

Drilling Completed - 10/2/86

Type of Rig - Hollow Stem Auger



CONSTRUCTION DATA

Borehole Diam. - 6"

Borehole Depth - 15'

Casing/Screen Type - PVC

Casing Diam. - 4"

Casing Depth - 13'

Screen Setting - 3' - 13'

Slot Width - 0.02"

Type of Seal - Bentonite

Type of Filterpack - #2 Sand

Type of Grout -

MEASUREMENTS (NGVD)

Top of Casing Elevation - 12.13'

Static Water Level Elevation - 7.04'

Date Measured - 1/14/87

Surface Elevation - 9.13'

TEST DATA

Pump Type -

Depth to Intake (ft) -

Static Water Level (ft) -

Pumping Water Level (ft) -

Drawdown (ft) -

Length of Test (Hrs) -

WELL CONSTRUCTION KEY

FILTER PACK

BENTONITE SEAL

CONCRETE

CAVE IN MATERIAL

Notes:

* Blows taken using a 140 lb hammer falling 30 inches.

** All soils classified by visual inspection.

DAMES & MOORE

LOG of BORING and MONITORING WELL CONSTRUCTION DETAILS

Project : Chevron/Philadelphia Refinery

Boring/Well No. - H85

Project No. 113-909-032

Location - Chevron Refinery

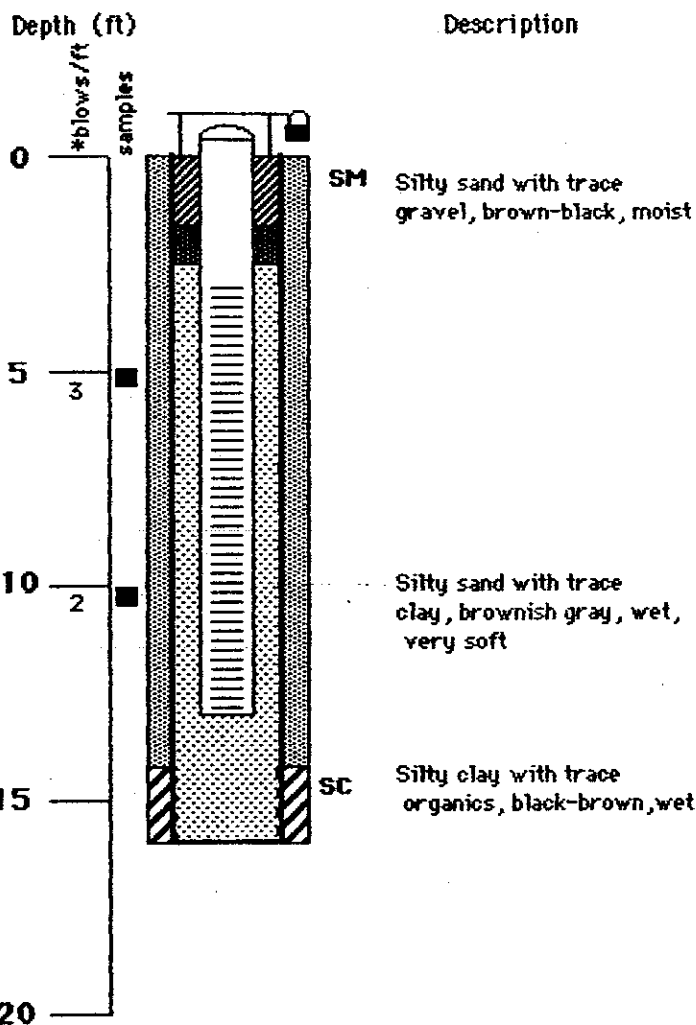
Date M.W. completed 2/26/86

Driller - Drill Consult

Supervising D & M Engineer/Geologist Dave Wagner

Drilling Completed - 2/26/86

Type of Rig - Hollow Stem Auger



CONSTRUCTION DATA

Borehole Diam. - 7"

Borehole Depth - 16'

Casing/Screen Type - PVC

Casing Diam. - 4"

Casing Depth - 13'

Screen Setting - 3' - 13'

Slot Width - 0.02"

Type of Seal - Bentonite

Type of Filterpack - #2 Sand

Type of Grout - Cement/Bentonite

MEASUREMENTS (NGVD)

Top of Casing Elevation - 12.23'

Static Water Level Elevation - 4.37'

Date Measured - 1/9/87

Surface Elevation - 9.92'

TEST DATA

Pump Type -

Depth to Intake (ft) -

Static Water Level (ft) -

Pumping Water Level (ft) -

Drawdown (ft) -

Length of Test (Hrs) -

Notes:

* Blows taken using a 140 lb hammer falling 30 inches.

** All soils classified by visual inspection.

WELL CONSTRUCTION KEY

Filter Pack

Bentonite Seal

Cement Grout

DAMES & MOORE

LOG of BORING and MONITORING WELL CONSTRUCTION DETAILS

Project : Chevron/Philadelphia Refinery

Project No. 113-909-032

Date M.W. completed 2/26/86

Supervising D & M
Engineer /Geologist Dave Wagner

Boring/Well No. - H86

Location - Chevron Refinery

Driller - Drill Consult

Drilling Completed - 2/26/86

Type of Rig - Hollow Stem Auger

CONSTRUCTION DATA

Borehole Diam. - 7"

Borehole Depth - 16'

Casing/Screen Type - PVC

Casing Diam. - 4"

Casing Depth - 13'

Screen Setting - 3' - 13'

Slot Width - 0.02"

Type of Seal - Bentonite

Type of Filterpack - #2 Sand

Type of Grout - Cement/Bentonite

MEASUREMENTS (NGVD)

Top of Casing Elevation - 13.20'

Static Water Level Elevation - 5.94'

Date Measured - 1/9/87

Surface Elevation - 9.86'

TEST DATA

Pump Type -

Depth to Intake (ft) -

Satic Water Level (ft) -

Pumping Water Level (ft) -

Drawdown (ft) -

Length of Test (Hrs) -

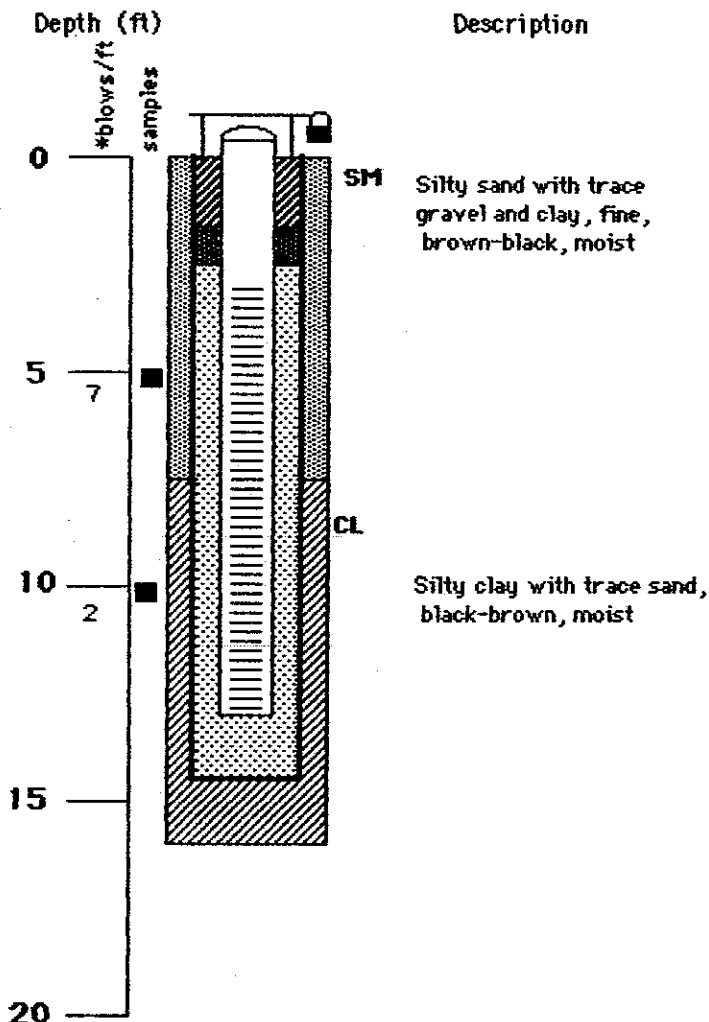
WELL CONSTRUCTION KEY

Filter Pack

Bentonite Seal

Cement Grout

DAMES & MOORE



Notes:

* Blows taken using a 140 lb hammer falling 30 inches.

** All soils classified by visual inspection.

LOG of BORING and MONITORING WELL CONSTRUCTION DETAILS

Project : Chevron/Philadelphia Refinery

Project No. 113-909-032

Date M.W. completed 2/26/86

Supervising D & M
Engineer/Geologist Dave Wagner

Boring/Well No. - H87

Location - Chevron Refinery

Driller - Drill Consult

Drilling Completed - 2/26/86

Type of Rig - Hollow Stem Auger

CONSTRUCTION DATA

Borehole Diam. - 7"

Borehole Depth - 14' 6"

Casing/Screen Type - PVC

Casing Diam. - 4"

Casing Depth - 13'

Screen Setting - 3' - 13'

Slot Width - 0.02"

Type of Seal - Bentonite

Type of Filterpack - #2 Sand

Type of Grout - Cement/Bentonite

MEASUREMENTS (NGVD)

Top of Casing Elevation - 12.15'

Static Water Level Elevation - 6.06'

Date Measured - 1/9/87

Surface Elevation - 9.59'

TEST DATA

Pump Type -

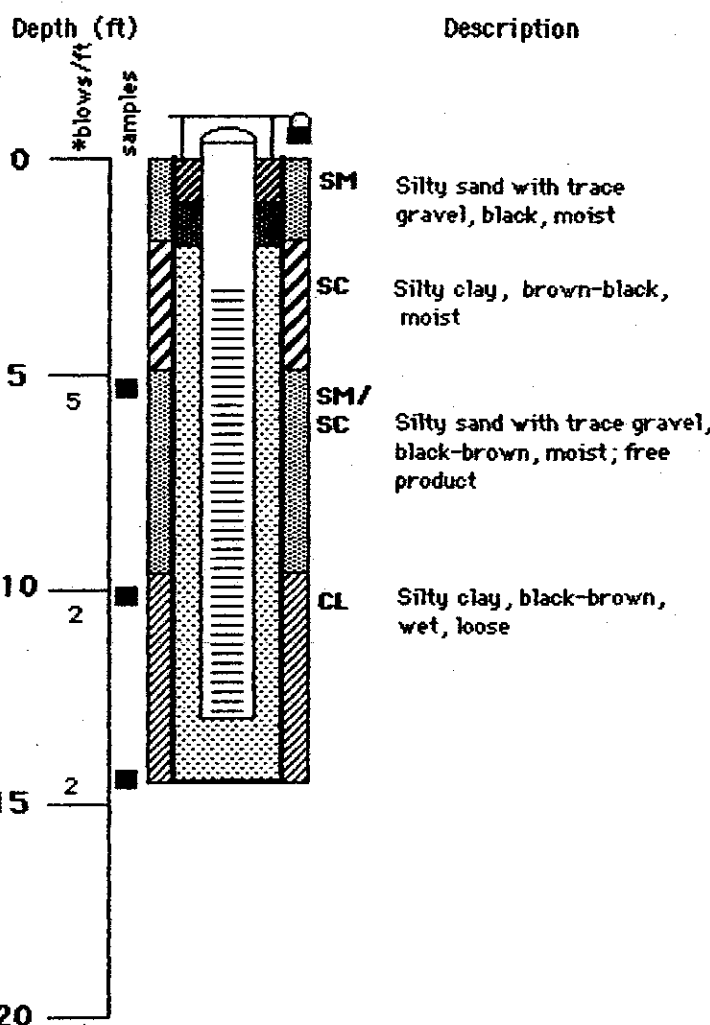
Depth to Intake (ft) -

Static Water Level (ft) -

Pumping Water Level (ft) -

Drawdown (ft) -

Length of Test (Hrs) -



Notes:

* Blows taken using a 140 lb hammer falling 30 inches.

** All soils classified by visual inspection.

WELL CONSTRUCTION KEY

Filter Pack

Bentonite Seal

Cement Grout

DAMES & MOORE

LOG of BORING and MONITORING WELL CONSTRUCTION DETAILS

Project : Chevron/Philadelphia Refinery

Boring/Well No. -BF88

Project No. 113-909-032

Location - Chevron Refinery

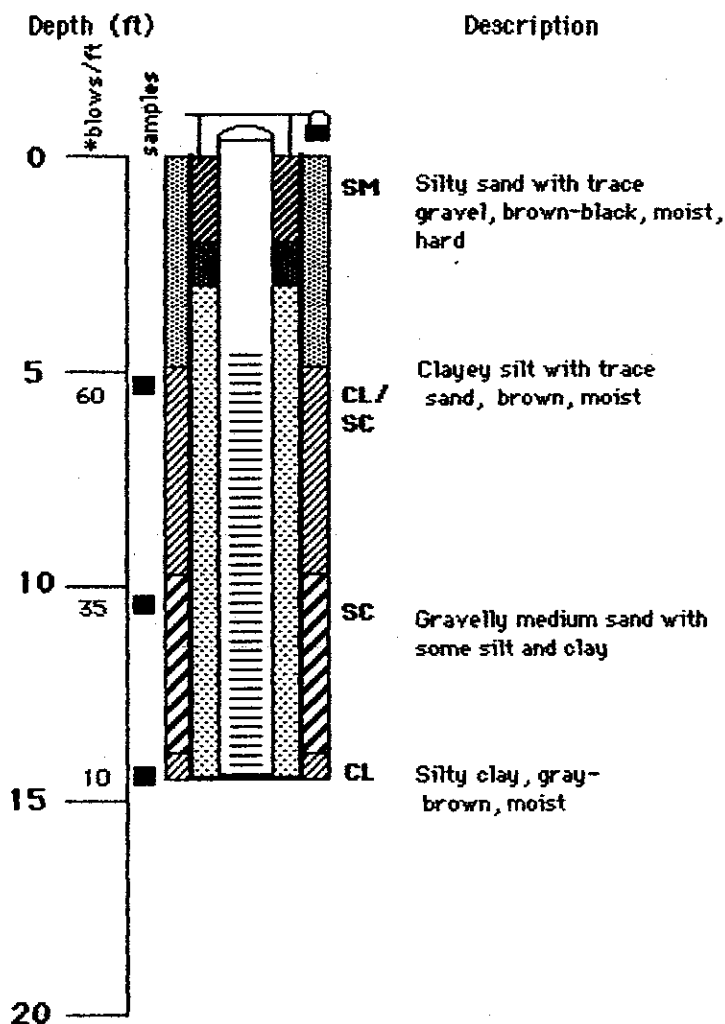
Date M.W. completed 2/26/86

Driller - Drill Consult

Supervising D & M
Engineer/Geologist Dave Wagner

Drilling Completed - 2/26/86

Type of Rig - Hollow Stem Auger



CONSTRUCTION DATA

Borehole Diam. - 7"

Borehole Depth - 14' 6"

Casing/Screen Type - PVC

Casing Diam. - 4"

Casing Depth - 14' 6"

Screen Setting - 4' 6" - 14' 6"

Slot Width - 0.02"

Type of Seal - Bentonite

Type of Filterpack - #2 Sand

Type of Grout - Cement/Bentonite

MEASUREMENTS (NGVD)

Top of Casing Elevation - 12.93'

Static Water Level Elevation - 2.46'

Date Measured - 1/9/87

Surface Elevation - 9.78'

TEST DATA

Pump Type -

Depth to Intake (ft) -

Static Water Level (ft) -

Pumping Water Level (ft) -

Drawdown (ft) -

Length of Test (Hrs) -

Notes:

* Blows taken using a 140 lb hammer falling 30 inches.

** All soils classified by visual inspection.

WELL CONSTRUCTION KEY

Filter Pack

Bentonite Seal

Cement Grout

DAMES & MOORE

LOG of BORING and MONITORING WELL CONSTRUCTION DETAILS

Project : Chevron/Philadelphia Refinery

Boring/Well No. - BF89

Project No. 113-909-032

Location - Chevron Refinery

Date M.W. completed 2/19/86

Driller - Drill Consult

Supervising D & M
Engineer/Geologist T. Helgason

Drilling Completed - 2/19/86

Type of Rig - Hollow Stem Auger

CONSTRUCTION DATA

Borehole Diam. - 7"

Borehole Depth - 13.5'

Casing/Screen Type - PVC

Casing Diam. - 4"

Casing Depth - 13.5'

Screen Setting - 3.5' - 13.5'

Slot Width - 0.02"

Type of Seal - Bentonite

Type of Filterpack - #2 Sand

Type of Grout - Cement/Bentonite

MEASUREMENTS (NGVD)

Top of Casing Elevation - 11.81'

Static Water Level Elevation - 2.61'

Date Measured - 1/9/87

Surface Elevation - 11.57'

TEST DATA

Pump Type -

Depth to Intake (ft) -

Static Water Level (ft) -

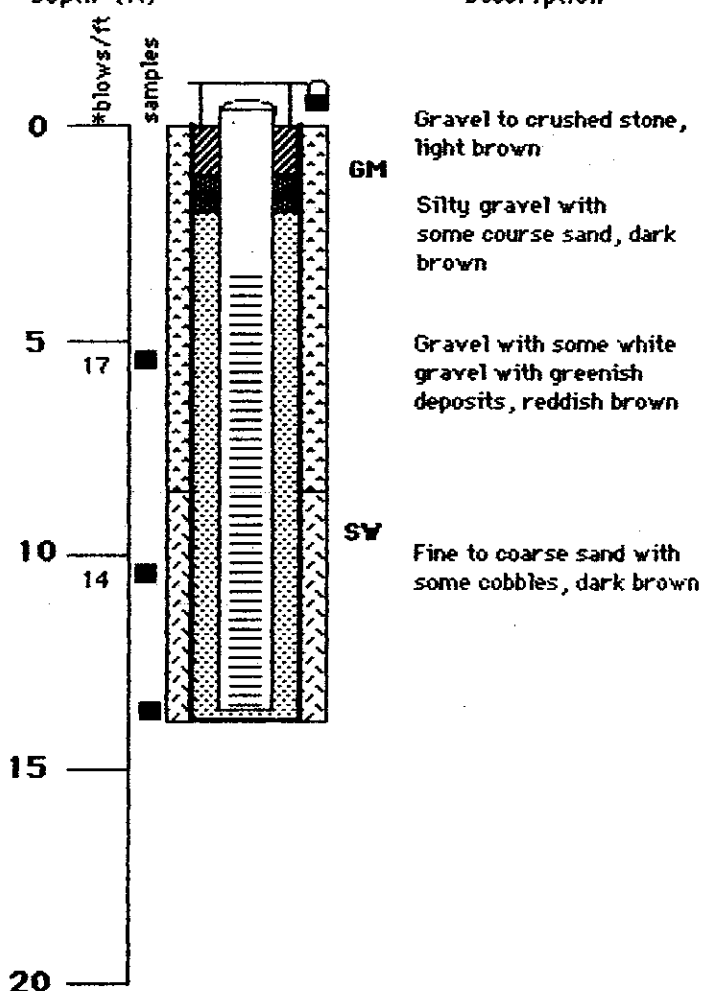
Pumping Water Level (ft) -

Drawdown (ft) -

Length of Test (Hrs) -

Depth (ft)

Description



Notes:

* Blows taken using a 140 lb hammer falling 30 inches.

** All soils classified by visual inspection.

WELL CONSTRUCTION KEY

Filter Pack

Bentonite Seal

Cement Grout

DAMES & MOORE

LOG of BORING and MONITORING WELL CONSTRUCTION DETAILS

Project : Chevron/Philadelphia Refinery

Boring/Well No. - BF90

Project No. 113-909-032

Location - Chevron Refinery

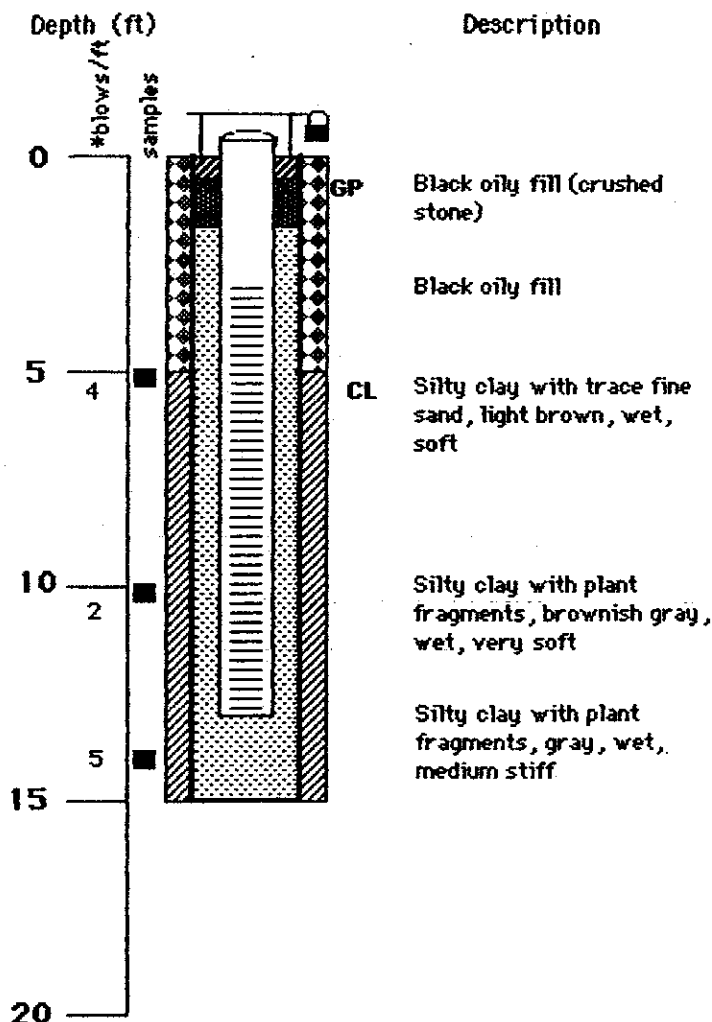
Date M.W. completed 2/19/86

Driller - Drill Consult

Supervising D & M
Engineer/Geologist E. J. Fillo

Drilling Completed - 2/19/86

Type of Rig - Hollow Stem Auger



CONSTRUCTION DATA

Borehole Diam. - 7"

Borehole Depth - 15'

Casing/Screen Type - PVC

Casing Diam. - 4"

Casing Depth - 13'

Screen Setting - 3' - 13'

Slot Width - 0.02"

Type of Seal - Bentonite

Type of Filterpack - #2 Sand

Type of Grout - Cement/Bentonite

MEASUREMENTS (NGVD)

Top of Casing Elevation - 9.68'

Static Water Level Elevation - 8.33'

Date Measured - 1/9/87

Surface Elevation - 9.44'

TEST DATA

Pump Type -

Depth to Intake (ft) -

Satic Water Level (ft) -

Pumping Water Level (ft) -

Drawdown (ft) -

Length of Test (Hrs) -

Notes:

* Blows taken using a 140 lb hammer falling 30 inches.

** All soils classified by visual inspection.

WELL CONSTRUCTION KEY

Filter Pack

Bentonite Seal

Cement Grout

DAMES & MOORE

LOG of BORING and MONITORING WELL CONSTRUCTION DETAILS

Project : Chevron/Philadelphia Refinery

Boring/Well No. - BF99

Project No. 113-950-032

Location - Chevron Refinery

Date M.W. completed 10/21/86

Driller - Lambert, Inc.

Supervising D & M Geologist David Wagner

Drilling Completed - 10/21/86

Type of Rig - Hollow Stem Auger

CONSTRUCTION DATA

Borehole Diam. - 10"

Borehole Depth - 35'

Casing/Screen Type - PVC

Casing Diam. - 4"

Casing Depth - 19.5'

Screen Setting - 9.5' - 19.5'

Slot Width - 0.02"

Type of Seal - Bentonite

Type of Filterpack - #2 Sand

Type of Grout -

MEASUREMENTS (NGVD)

Top of Casing Elevation - 13.37'

Static Water Level Elevation - 2.28'

Date Measured - 1/14/87

Surface Elevation - 12.62'

TEST DATA

Pump Type -

Depth to Intake (ft) -

Static Water Level (ft) -

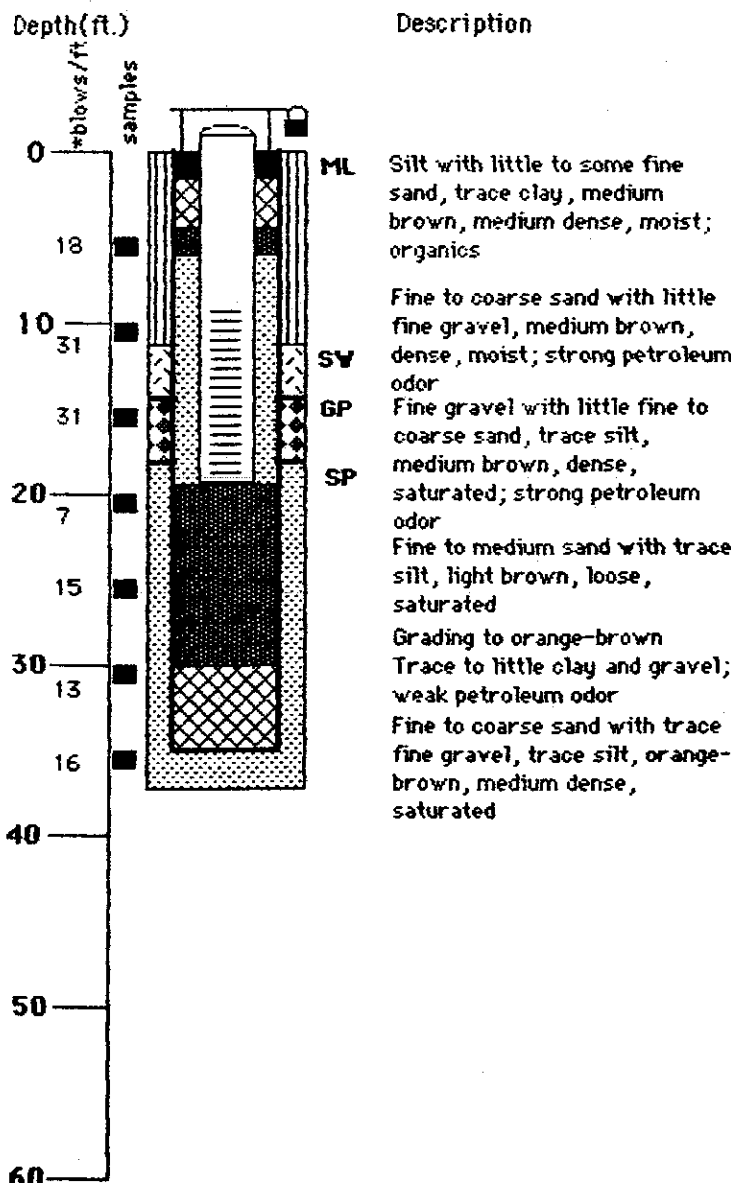
Pumping Water Level (ft) -

Drawdown (ft) -

Length of Test (Hrs) -

WELL CONSTRUCTION KEY

FILTER PACK
BENTONITE SEAL
BENTONITE GROUT
CAVE IN MATERIAL
CONCRETE



Notes:

* Blows taken using a 140 lb hammer falling 30 inches.

** All soils classified by visual inspection.

DAMES & MOORE

LOG of BORING and MONITORING WELL CONSTRUCTION DETAILS

Project : Chevron/Philadelphia Refinery

Boring/Well No. - BF100

Project No. 113-950-032

Location - Chevron Refinery

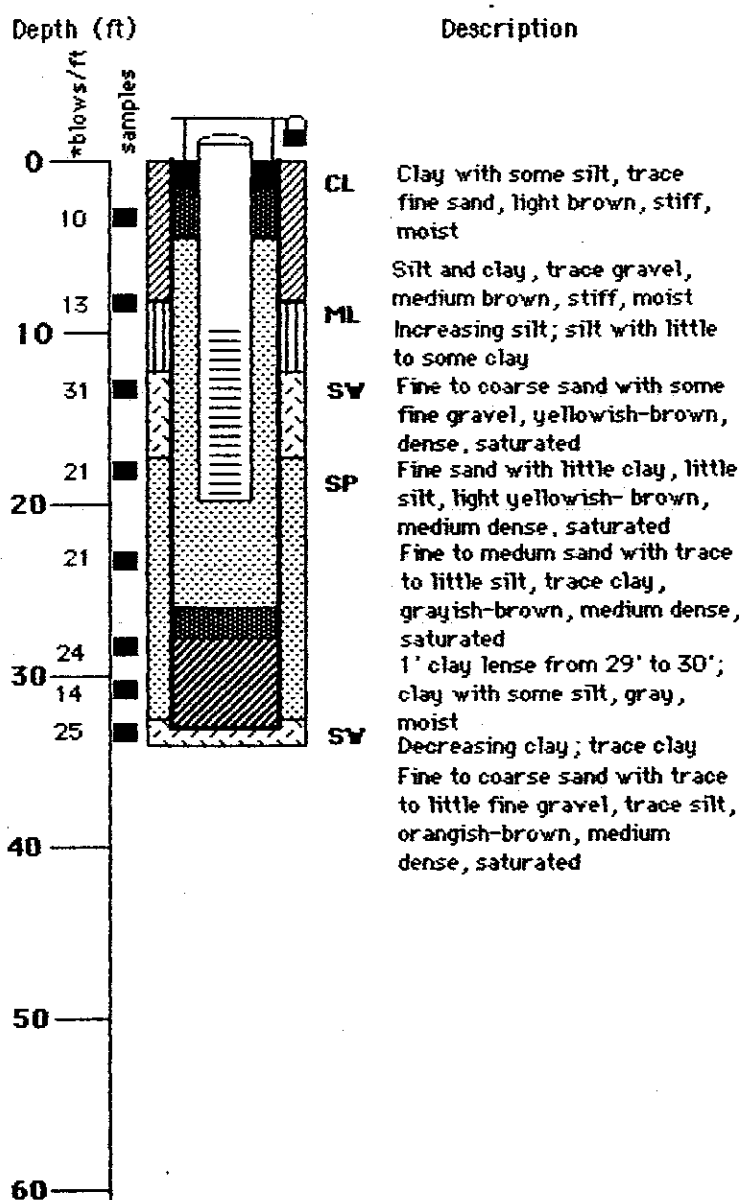
Date M.W. completed 10/17/86

Driller - Lambert, Inc.

Supervising D & M Geologist David Wagner

Drilling Completed - 10/17/86

Type of Rig - Hollow Stem Auger



CONSTRUCTION DATA

Borehole Diam. - 10"

Borehole Depth - 33'

Casing/Screen Type - PVC

Casing Diam. - 4"

Casing Depth - 19.5'

Screen Setting - 9.5' - 19.5'

Slot Width - 0.02"

Type of Seal - Bentonite

Type of Filterpack - #2 Sand

Type of Grout - Bentonite

MEASUREMENTS (NGVD)

Top of Casing Elevation - 14.62'

Static Water Level Elevation - 1.79'

Date Measured - 1/14/87

Surface Elevation - 11.46'

TEST DATA

Pump Type -

Depth to Intake (ft) -

Static Water Level (ft) -

Pumping Water Level (ft) -

Drawdown (ft) -

Length of Test (Hrs) -

WELL CONSTRUCTION KEY

- FILTER PACK
- BENTONITE SEAL
- BENTONITE GROUT
- CAVE IN MATERIAL
- CONCRETE

Notes:

* Blows taken using a 140 lb hammer falling 30 inches.

** All soils classified by visual inspection.

DAMES & MOORE

LOG of BORING and MONITORING WELL CONSTRUCTION DETAILS

Project : Chevron/Philadelphia Refinery

Boring/Well No. - BF101

Project No. 113-950-032

Location - Chevron Refinery

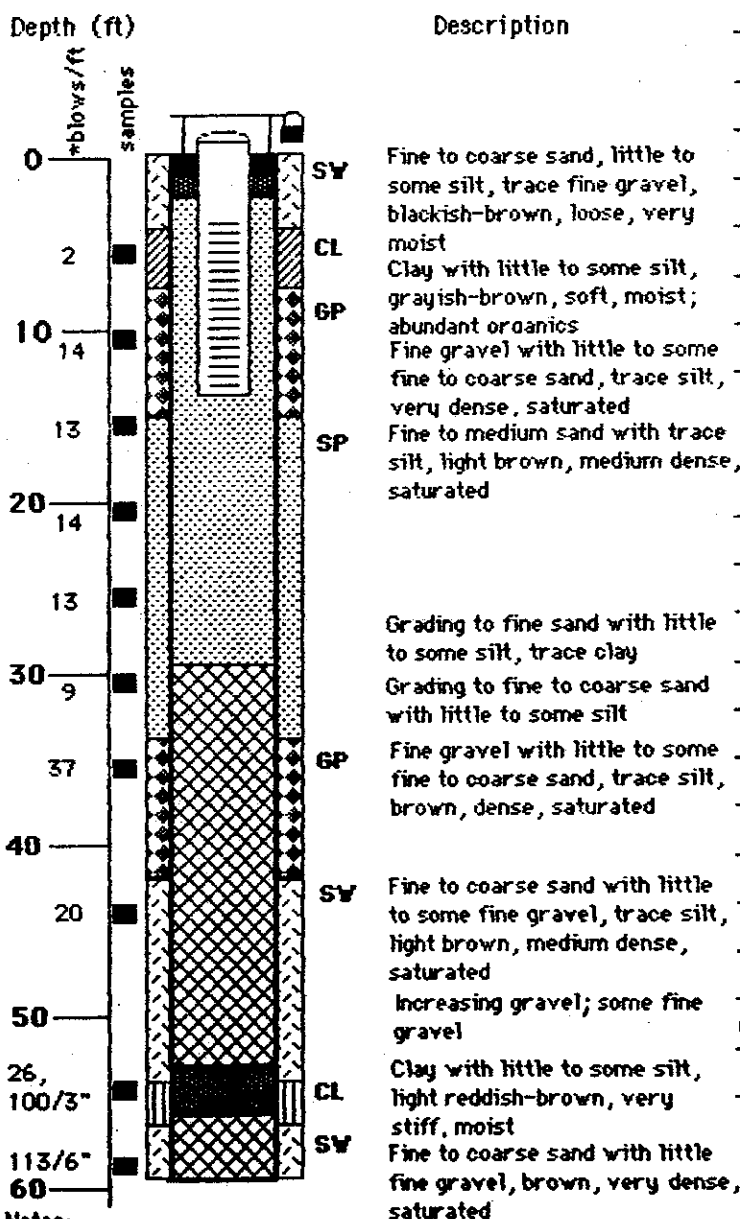
Date M.W. completed 10/15/86

Driller - Lambert, Inc.

Supervising D & M Geologist David Wagner

Drilling Completed - 10/15/86

Type of Rig - Hollow Stem Auger



CONSTRUCTION DATA

Borehole Diam. - 10"

Borehole Depth - 59'

Casing/Screen Type - PVC

Casing Diam. - 4"

Casing Depth - 13'

Screen Setting - 3' - 13'

Slot Width - 0.02"

Type of Seal - Bentonite

Type of Filterpack - #2 Sand

Type of Grout -

MEASUREMENTS(NGVD)

Top of Casing Elevation - 9.03'

Static Water Level Elevation - 2.19'

Date Measured - 1/14/87

Surface Elevation - 6.12'

TEST DATA

Pump Type -

Depth to Intake (ft) -

Satic Water Level (ft) -

Pumping Water Level (ft) -

Drawdown (ft) -

Length of Test (Hrs) -

WELL CONSTRUCTION KEY

FILTER PACK

BENTONITE SEAL

BENTONITE GROUT

CAVE IN MATERIAL

CONCRETE

Notes:

* Blows taken using a 140 lb hammer falling 30 inches.

** All soils classified by visual inspection.

DAMES & MOORE

LOG of BORING and MONITORING WELL CONSTRUCTION DETAILS

Project : Chevron/Philadelphia Refinery

Boring/Well No. - BF 102

Project No. 113-950-032

Location - Chevron Refinery

Date M.W. completed 10/10/86

Driller - Lambert, Inc.

Supervising D & M Geologist David Wagner

Drilling Completed - 10/10/86

Type of Rig - Hollow Stem Auger

CONSTRUCTION DATA

Borehole Diam. - 10"

Borehole Depth - 15'

Casing/Screen Type - PVC

Casing Diam. - 4"

Casing Depth - 13'

Screen Setting - 3' - 13'

Slot Width - 0.02"

Type of Seal - Bentonite

Type of Filterpack - #2 Sand

Type of Grout -

MEASUREMENTS (NGVD)

Top of Casing Elevation - 8.40'

Static Water Level Elevation - 4.95'

Date Measured - 1/14/87

Surface Elevation - 5.40'

TEST DATA

Pump Type -

Depth to Intake (ft) -

Static Water Level (ft) -

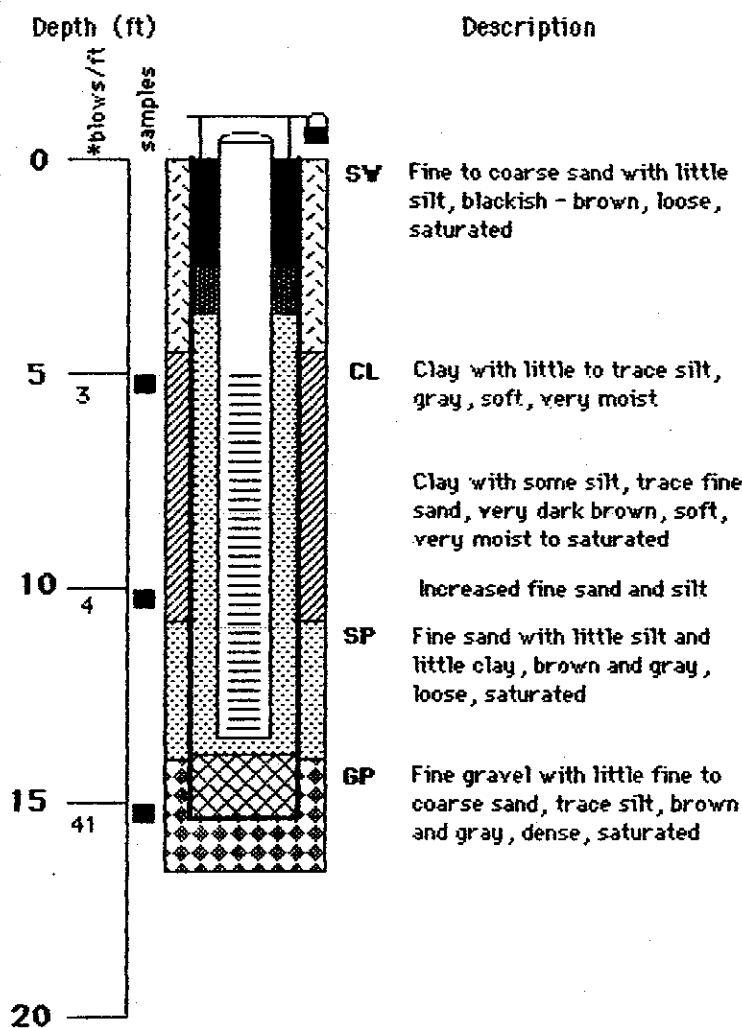
Pumping Water Level (ft) -

Drawdown (ft) -

Length of Test (Hrs) -

WELL CONSTRUCTION KEY

| | |
|------------------|--|
| FILTER PACK | |
| BENTONITE SEAL | |
| CONCRETE | |
| CAVE IN MATERIAL | |



Notes:

* Blows taken using a 140 lb hammer falling 30 inches.

** All soils classified by visual inspection.

DAMES & MOORE

LOG of BORING and MONITORING WELL CONSTRUCTION DETAILS

Project: Chevron/Philadelphia Refinery

Boring/Well No. - BF103

Project No. 113-950-032

Location - Chevron Refinery

Date M.W. completed 10/8/86

Driller - Lambert, Inc.

Supervising D & M Geologist David Wagner

Drilling Completed - 10/8/86

Type of Rig - Hollow Stem Auger

CONSTRUCTION DATA

Borehole Diam. - 10"

Borehole Depth - 35'

Casing/Screen Type - PVC

Casing Diam. - 4"

Casing Depth - 14'

Screen Setting - 4' - 14'

Slot Width - 0.02"

Type of Seal - Bentonite

Type of Filterpack - #2 Sand

Type of Grout - Bentonite

MEASUREMENTS (NGVD)

Top of Casing Elevation - 16.73'

Static Water Level Elevation - 2.09'

Date Measured - 1/14/87

Surface Elevation - 13.88'

TEST DATA

Pump Type -

Depth to Intake (ft) -

Static Water Level (ft) -

Pumping Water Level (ft) -

Drawdown (ft) -

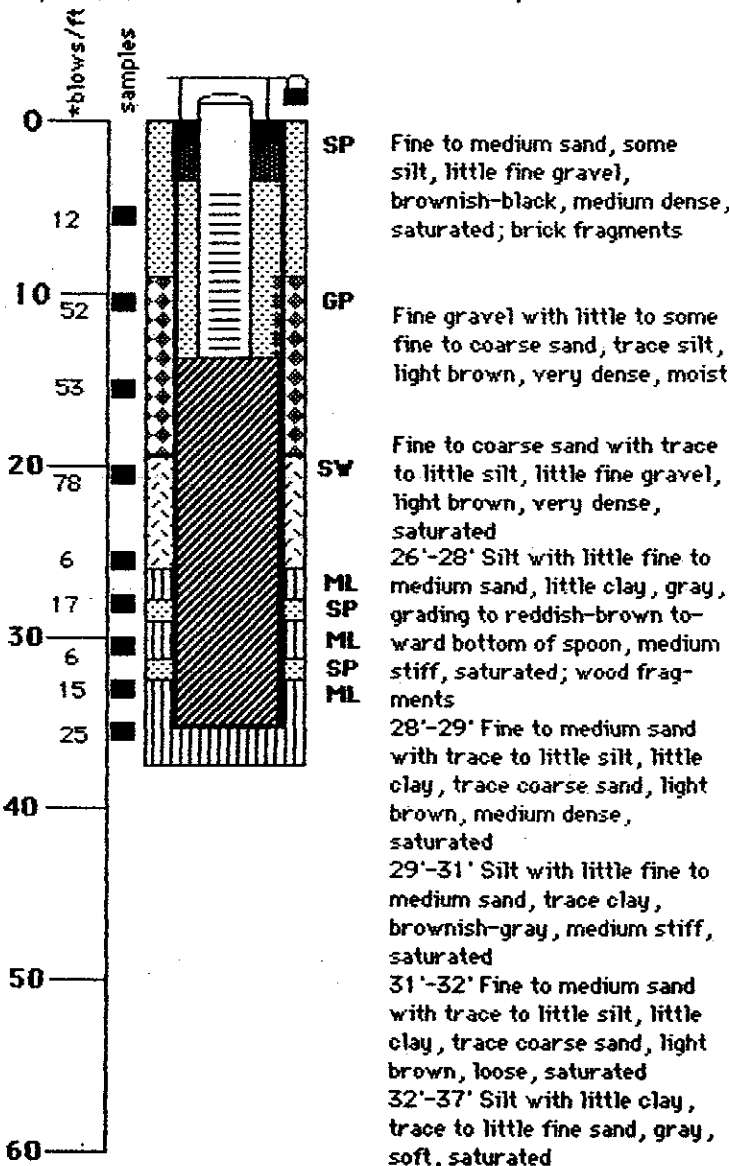
Length of Test (Hrs) -

WELL CONSTRUCTION KEY

FILTER PACK
BENTONITE SEAL
BENTONITE GROUT
CAVE IN MATERIAL
CONCRETE

Depth (ft)

Description


















Notes:

* Blows taken using a 140 lb hammer falling 30 inches.

** All soils classified by visual inspection.

DAMES & MOORE

Unified Soil Classification System

| Major Divisions | | | Graph Symbol | Letter Symbol | Typical Descriptions |
|----------------------|---------------------------|---|---|---------------|--|
| Coarse Grained Soils | Gravel and Gravelly Soils | Clean Gravels (Little or no fines) |  | GW | Well graded gravels, gravel - sand mixtures, little or no fine |
| | | |  | GP | Poorly graded gravels, gravel - sand mixtures, little or no fine |
| | | Gravels with Fines (Appreciable amount of fines) |  | GM | Silty gravels, gravel - sand - silt mixtures |
| | | |  | GC | Clayey gravels, gravel - sand - clay mixtures |
| | Sand and Sandy Soils | Clean Sand (Little or no fines) |  | SW | Well - graded sands, gravelly sands, little or no fines |
| | | |  | SP | Poorly-graded sands, gravelly sands, little or no fines |
| | | Sands with Fines (Appreciable amount of fines) |  | SM | Silty sands, sand - silt mixtures |
| | | |  | SC | Clayey sands, sand - clay mixtures |
| Fine Grained Soils | Sils and Clays | Liquid limit LESS than 50 |  | ML | Inorganic silts and very fine sands or clayey silts with slight plasticity |
| | | |  | CL | Inorganic clays of low to medium plasticity |
| | | |  | OL | Organic silts and organic silty clays of low plasticity |
| | Sils and Clays | Liquid limit GREATER than 50 |  | MH | Inorganic silts, micaceous or diatomaceous fine sand or silty soils |
| | | |  | CH | Inorganic clays of high plasticity, fat clays |
| | | |  | OH | Organic clays of medium to high plasticity, organic silts |
| Highly Organic Soils | | |  | PT | Peat, humus, swamp soils with high organic contents |

Notes:

1. Dual symbols are used to indicate borderline classifications.
2. When shown on the boring logs, the following terms are used to describe the consistancy of cohesive soils and the relative compactness of cohesionless soils.

Cohesive Soils

(approximate shearing strength in KSF)

| | |
|--------------|------------------|
| very soft | less than 0.25 |
| soft | 0.25 to 0.5 |
| medium stiff | 0.5 to 1.0 |
| stiff | 1.0 to 2.0 |
| very stiff | 2.0 to 4.0 |
| hard | greater than 4.0 |

Cohesionless Soils

| | |
|--------------|---|
| very loose | These are usually based on an examination of soil samples, penetration resistance, and soil density data. |
| loose | |
| medium dense | |
| dense | |
| very dense | |



Dames & Moore

APPENDIX D

Product Bail Test Data and
Pumping Test Data

Product Bail Test Data

PRODUCT BAIL TEST DATA
CHEVRON/GULF PHILADELPHIA REFINERYMONITORING WELL A24

| <u>Date</u> | <u>Time After Removal of Product</u> | <u>Depth to Product (ft)</u> | <u>Depth to Water (ft)</u> | <u>Product Thickness (ft)</u> |
|-------------|--|--------------------------------------|------------------------------------|---------------------------------------|
| 12/8/86 | Static Levels | 1.73 | 6.63 | 4.90 |
| 12/8/86 | * 0 | 6.22 | 6.81 | 0.59 |
| | 0'20" | 6.07 | 6.44 | 0.37 |
| | 1' | 5.82 | 6.17 | 0.35 |
| | 1'35" | 5.59 | 5.96 | 0.37 |
| | 2'10" | 5.35 | 5.75 | 0.40 |
| | 2'45" | 5.19 | 5.60 | 0.41 |
| | 3'15" | 5.03 | 5.45 | 0.42 |
| | 3'45" | 4.81 | 5.30 | 0.49 |
| | 4'30" | 4.71 | 5.03 | 0.32 |
| | 5' | 4.56 | 5.00 | 0.44 |
| | 5'50" | 4.37 | 4.82 | 0.45 |
| | 6'50" | 4.17 | 4.66 | 0.49 |
| | 8' | 3.97 | 4.47 | 0.50 |
| | 10' | 3.66 | 4.19 | 0.53 |
| | 12' | 3.42 | 3.97 | 0.55 |
| | 15' | 3.14 | 3.71 | 0.57 |
| | 18' | 3.01 | 3.54 | 0.53 |
| | 21' | 2.83 | 3.40 | 0.57 |
| | 25' | 2.69 | 3.31 | 0.62 |
| | 29' | 2.63 | 3.25 | 0.62 |
| | 33' | 2.59 | 3.21 | 0.62 |

PRODUCT BAIL TEST DATA
CHEVRON/GULF PHILADELPHIA REFINERY

MONITORING WELL A24

| <u>Date</u> | <u>Time After Removal of Product</u> | <u>Depth to Product (ft)</u> | <u>Depth to Water (ft)</u> | <u>Product Thickness (ft)</u> |
|-------------|--|--------------------------------------|------------------------------------|---------------------------------------|
| 12/8/86 | 38' | 2.55 | 3.18 | 0.63 |
| | 43' | 2.54 | 3.18 | 0.64 |
| | 48' | 2.54 | 3.18 | 0.64 |
| | 55' | 2.54 | 3.18 | 0.64 |
| | 60' | 2.53 | 3.20 | 0.66 |
| | 90' | 2.53 | 3.21 | 0.67 |
| | 120' | 2.55 | 3.24 | 0.69 |
| | 180' | 2.52 | 3.22 | 0.70 |
| | 240' | 2.51 | 3.24 | 0.73 |
| | 300' | 2.50 | 3.25 | 0.75 |
| | 360' | 2.49 | 3.26 | 0.77 |
| | 420' | 2.52 | 3.30 | 0.78 |
| | 460' | 2.54 | 3.35 | 0.81 |
| 12/9/86 | 1,525' | 2.34 | 3.41 | 1.07 |
| | 1,620' | 2.24 | 3.35 | 1.11 |
| 12/10/86 | 2,820' | 2.08 | 3.56 | 1.48 |
| | 3,100' | 2.06 | 3.67 | 1.61 |
| 12/11/86 | 4,740' | 2.03 | 4.02 | 1.99 |
| 12/12/86 | 5,855' | 1.96 | 4.18 | 2.22 |
| 12/13/86 | 10,010' | 2.19 | 4.77 | 2.58 |

Notes:

* Time "0" began after the removal of the following quantities:

Product Removed - Approximately 4 gallons

Water Removed - Approximately 6 gallons

PRODUCT BAIL TEST DATA
CHEVRON/GULF PHILADELPHIA REFINERYMONITORING WELL B39

| <u>Date</u> | <u>Time After Removal of Product</u> | <u>Depth to Product (ft)</u> | <u>Depth to Water (ft)</u> | <u>Product Thickness (ft)</u> |
|-------------|--|--------------------------------------|------------------------------------|---------------------------------------|
| 12/8/86 | Static Level | 1.90 | 4.53 | 2.63 |
| 12/8/86 | * 0 | 2.42 | 2.60 | 0.18 |
| | 0'15" | 2.39 | 2.58 | 0.19 |
| | 0'30" | 2.37 | 2.58 | 0.21 |
| | 1' | 2.36 | 2.56 | 0.20 |
| | 1'30" | 2.35 | 2.55 | 0.20 |
| | 1'50" | 2.34 | 2.54 | 0.20 |
| | 2'30" | 2.33 | 2.53 | 0.20 |
| | 3'05" | 2.32 | 2.53 | 0.21 |
| | 3'30" | 2.32 | 2.53 | 0.21 |
| | 4' | 2.32 | 2.53 | 0.21 |
| | 5' | 2.31 | 2.53 | 0.22 |
| | 6' | 2.30 | 2.50 | 0.20 |
| | 8' | 2.29 | 2.51 | 0.22 |
| | 10' | 2.28 | 2.50 | 0.22 |
| | 15' | 2.27 | 2.52 | 0.25 |
| | 20' | 2.26 | 2.52 | 0.26 |
| | 25' | 2.25 | 2.52 | 0.27 |
| | 30' | 2.25 | 2.52 | 0.27 |
| | 40' | 2.24 | 2.52 | 0.28 |
| | 50' | 2.24 | 2.52 | 0.28 |
| | 80' | 2.23 | 2.54 | 0.31 |

PRODUCT BAIL TEST DATA
CHEVRON/GULF PHILADELPHIA REFINERYMONITORING WELL B39

| <u>Date</u> | <u>Time After Removal of Product</u> | <u>Depth to Product (ft)</u> | <u>Depth to Water (ft)</u> | <u>Product Thickness (ft)</u> |
|-------------|--|--------------------------------------|------------------------------------|---------------------------------------|
| 12/8/86 | 110' | 2.22 | 2.54 | 0.32 |
| | 170' | 2.21 | 2.54 | 0.33 |
| | 230' | 2.21 | 2.54 | 0.33 |
| | 325' | 2.25 | 2.59 | 0.34 |
| 12/9/86 | 1,215' | 2.09 | 2.51 | 0.42 |
| | 1,365' | 2.03 | 2.47 | 0.44 |
| | 1,455' | 1.94 | 2.39 | 0.45 |
| 12/10/86 | 2,640' | 1.74 | 2.26 | 0.52 |
| | 2,925' | 1.76 | 2.29 | 0.53 |
| 12/11/86 | 4,585' | 1.81 | 2.39 | 0.58 |
| 12/12/86 | 5,725' | 1.75 | 2.33 | 0.58 |
| 12/15/86 | 10,370' | 2.08 | 2.67 | 0.59 |

Notes:

* Time "0" began after the removal of the following quantities:

Product Removed - Approximately 1 gallon

Water Removed - Approximately 2 gallons

0665R

Pumping Test Data

PUMPING TEST 1Time - Drawdown Data
Chevron/Gulf Philadelphia RefineryMonitoring Well A24

| <u>Date of Test</u> | <u>Time After Start Of Pump</u> | <u>Depth To Product (ft)</u> | <u>Drawdown (ft)</u> |
|---------------------|---|--------------------------------------|--------------------------|
| 1/8/87 | 0" | 2.13 | 0 |
| | 25" | 2.22 | 0.09 |
| | 50" | 2.28 | 0.15 |
| | 45" | 2.33 | 0.20 |
| | 1' | 2.37 | 0.24 |
| | 1'30" | 2.45 | 0.32 |
| | 2' | 2.51 | 0.38 |
| | 2'30" | 2.56 | 0.43 |
| | 3' | 2.61 | 0.48 |
| | 3'30" | 2.65 | 0.52 |
| | 4' | 2.69 | 0.56 |
| | 5' | 2.76 | 0.63 |
| | 6' | 2.80 | 0.67 |
| | 7' | 2.83 | 0.70 |
| | 8' | 2.87 | 0.74 |
| | 9' | 2.90 | 0.77 |
| | 10' | 2.92 | 0.79 |
| | 11' | 2.94 | 0.81 |
| | 12' | 2.95 | 0.82 |
| | 13' | 2.97 | 0.84 |
| | 15' | 3.00 | 0.87 |
| | 17' | 3.02 | 0.89 |
| | 19' | 3.04 | 0.91 |
| | 21' | 3.06 | 0.93 |
| | 23' | 3.06 | 0.93 |
| | 25' | 3.07 | 0.94 |
| | 27' | 3.10 | 0.97 |
| | 30' | 3.14 | 1.01 |
| | 33' | 3.14 | 1.01 |
| | 36' | 3.16 | 1.03 |
| | 40' | 3.17 | 1.04 |
| | 44' | 3.20 | 1.07 |
| | 50' | 3.11 | 0.96 |
| | 55' | 3.07 | 0.94 |
| | 60' | 3.10 | 0.97 |
| | 65' | 3.20 | 1.07 |
| | 70' | 3.24 | 1.13 |
| | 75' | 3.27 | 1.14 |

PUMPING TEST 1Time - Drawdown Data
Chevron/Gulf Philadelphia RefineryMonitoring Well A24

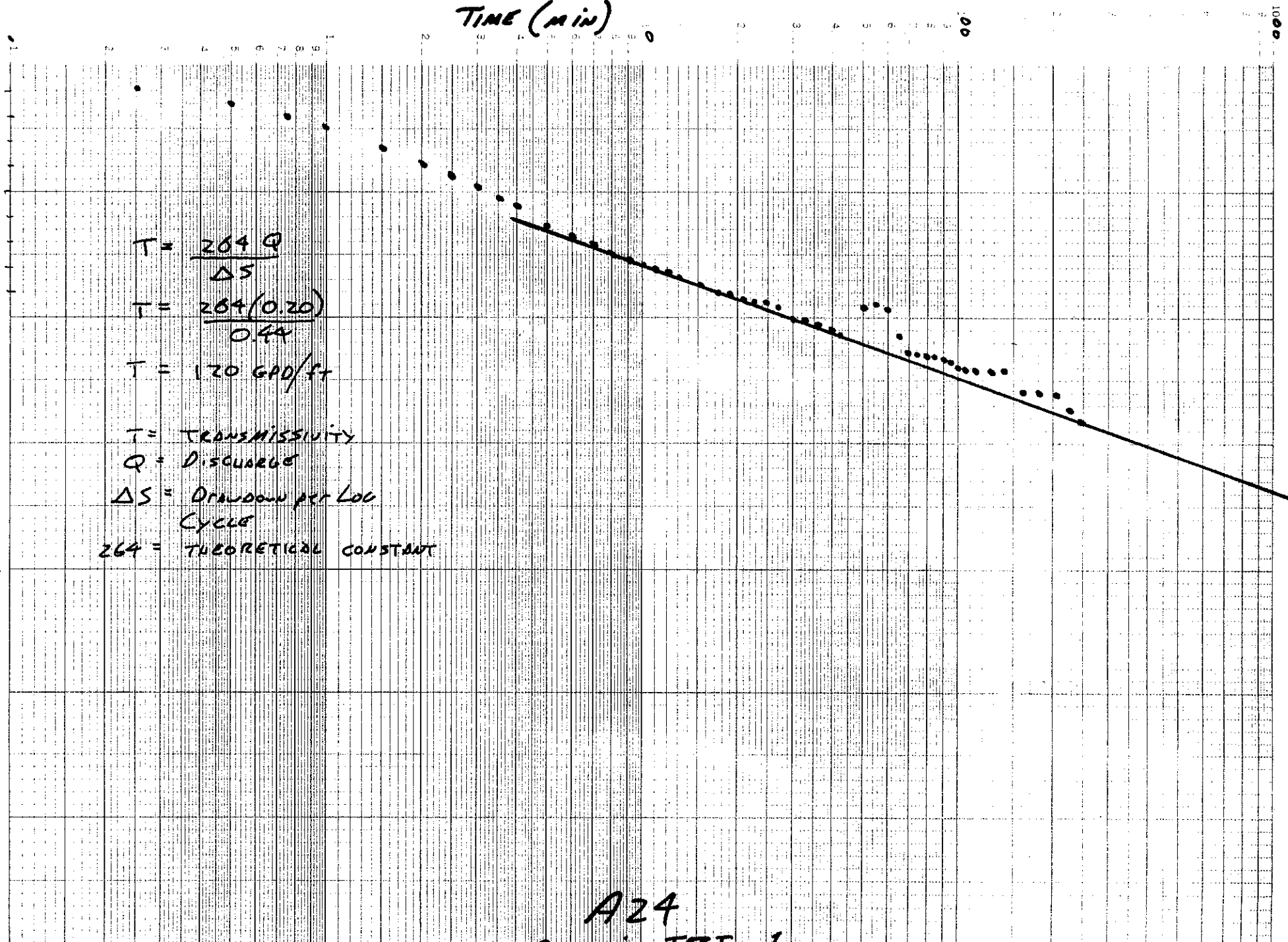
| <u>Date of Test</u> | <u>Time After Start Of Pump</u> | <u>Depth To Product (ft)</u> | <u>Drawdown (ft)</u> |
|---------------------|---|--------------------------------------|--------------------------|
| 1/8/87 | 80' | 3.28 | 1.15 |
| | 85' | 3.29 | 1.16 |
| | 91' | 3.30 | 1.17 |
| | 95' | 3.30 | 1.17 |
| | 100' | 3.33 | 1.20 |
| | 106' | 3.33 | 1.20 |
| | 115' | 3.33 | 1.20 |
| | 128' | 3.33 | 1.20 |
| | 140' | 3.34 | 1.21 |
| | 162' | 3.41 | 1.28 |
| | 187' | 3.47 | 1.29 |
| | 207' | 3.47 | 1.29 |
| | 226' | 3.50 | 1.37 |
| | 242' | 3.54 | 1.42 |

Discharge Rate = 0.20 gpm

0671R

TIME (min)

Drawdown (ft)



A24

Pumpkin TEST 1

CONFIDENTIAL

PUMPING TEST 2

TIME - DRAWDOWN DATA
 MONITORING WELL - A24
 CHEVRON/GULF PHILADELPHIA REFINERY

MONITORING WELL A-24

| Date | Minutes After Start of Pump | Depth to Product (ft) | Depth to Water (ft) | Drawdown (ft) | Product Thickness (ft) |
|---------|-----------------------------------|-----------------------------|---------------------------|------------------|------------------------------|
| 1/20/87 | 0" | 1.88 | 7.40 | 0 | 5.52 |
| | 15" | 1.91 | | .03 | |
| | 30" | 2.01 | | .13 | |
| | 45" | 2.10 | | .22 | |
| | 1' | 2.18 | | .30 | |
| | 1.5' | 2.32 | | .44 | |
| | 5'15" | 2.84 | | .96 | |
| | 6'15" | 2.86 | | .98 | |
| | 7'45" | 2.92 | | 1.04 | |
| | 8'45" | 2.98 | | 1.10 | |
| | 10'15" | 3.05 | | 1.17 | |
| | 11'45" | 3.09 | | 1.21 | |
| | 13'15" | 3.16 | | 1.28 | |
| | 15'41" | 3.23 | | 1.35 | |
| | 17'12" | 3.28 | | 1.40 | |
| | 18'58" | 3.33 | | 1.45 | |
| | 20'55" | 3.41 | | 1.53 | |
| | 22'24" | 3.47 | | 1.59 | |
| | 23'51" | 3.54 | | 1.66 | |
| | 25'22" | 3.61 | | 1.73 | |
| | 26'52" | 3.67 | | 1.79 | |
| | 30'55" | 3.77 | | 1.89 | |
| | 41'52" | 3.93 | | 2.05 | |
| | 52'01" | 4.05 | | 2.17 | |
| | 62'10" | 4.11 | | 2.23 | |
| | 73'31" | 4.22 | | 2.34 | |
| | 92'58" | 4.36 | | 2.48 | |
| | 115'25" | 4.41 | | 2.53 | |
| | 146'06" | 4.48 | | 2.60 | |
| | 176'01" | 4.57 | | 2.69 | |
| | 223'0" | 4.60 | | 2.72 | |
| | 277'08" | 4.66 | | 2.78 | |
| | 342'16" | 4.67 | 11.05 | 2.79 | 6.38 |
| | 403'26" | 4.76 | | 2.88 | |
| | 429'05" | 4.78 | | 2.90 | |
| 1/21/87 | 1365' | 4.77 | 12.22 | 2.89 | 7.45 |
| | 1460' | 6.00** | 6.16* | 4.12 | 0.16 |
| | 1800' | 6.09 | 6.55 | 4.21 | 0.46 |
| 1/22/87 | 2820' | 5.82 | 6.84 | 3.94 | 1.02 |

Discharge Rate = 0.26 Gallons Per Minute

* = 4.5 - 5 Gallons of Product Removed

** = Pump was shut down several times for no more than two minutes at a time.

PUMPING TEST 2

TIME - DRAWDOWN DATA
TRENCH WELL AND PIEZOMETERS
CHEVRON/GULF PHILADELPHIA REFINERY

| <u>Date</u> | <u>Trench Well</u> | | | <u>Piezometer P1</u> | | | <u>Piezometer P2</u> | | |
|-------------|--------------------------------------|---------------------------|------------------|--------------------------------------|---------------------------|------------------|--------------------------------------|---------------------------|------------------|
| | Minutes After Start of Pump | Depth to Water (ft) | Drawdown (ft) | Minutes After Start of Pump | Depth to Water (ft) | Drawdown (ft) | Minutes After Start of Pump | Depth to Water (ft) | Drawdown (ft) |
| 1/20/87 | 0 | 2.93 | 0 | 0 | 4.98 | 0 | 0 | 3.34 | 0 |
| | 350 '47" | 2.95 | .02 | 278 '45" | 5.03 | .05 | 347 '48" | 3.35 | .01 |
| | | | | 347 '17" | 5.05 | .07 | | | |
| 1/21/87 | | | | 406 '26" | 4.69 | +.29 | | | |
| | | | | 430 '43" | 4.96 | +.02 | | | |
| | 1370' | 2.99 | .06 | 1370' | 5.26 | .28 | 1370' | 3.57 | .22 |
| | | | | 1800' | 4.86 | +.17 | 1800' | 3.44 | .09 |
| | | | | | | | | | |

Discharge Rate = 0.26 Gallons Per Minute
* = 4.5 - 5 Gallons of Product Removed

0673R

PUMPING TEST 2

TIME - DRAWDOWN DATA
 PIEZOMETERS
 CHEVRON/GULF PHILADELPHIA REFINERY

| <u>Date</u> | <u>Piezometer P3</u> | | | <u>Piezometer P4</u> | | |
|-------------|--|--|--------------------------------|--|--|--------------------------------|
| | <u>Minutes</u> <u>After</u> <u>Start of</u> <u>Pump</u> | <u>Depth to</u> <u>Water</u> <u>(ft)</u> | <u>Drawdown</u> <u>(ft)</u> | <u>Minutes</u> <u>After</u> <u>Start of</u> <u>Pump</u> | <u>Depth to</u> <u>Water</u> <u>(ft)</u> | <u>Drawdown</u> <u>(ft)</u> |
| 1/20/87 | 0 | 4.73 | 0 | 0 | 0.68 | 0 |
| | 348'51" | 4.74 | .01 | 349'39" | 0.70 | .02 |
| 1/21/87 | 1370' | 4.77 | .04 | 1370' | 0.73 | .05 |
| | 1800' | 4.86 | .13 | 1800' | 0.79 | .11 |

Discharge Rate = 0.26 Gallons Per Minute
 * = 4.5 - 5 Gallons of Product Removed

0673R

PUMPING TEST 2

TIME - DRAWDOWN DATA
PIEZOMETERS
CHEVRON/GULF PHILADELPHIA REFINERY

| Date | Piezometer P5 | | | Piezometer P6 | | | Piezometer P7 | | | Piezometer P8 | | |
|---------|--------------------------------------|---------------------------|------------------|--------------------------------------|---------------------------|------------------|--------------------------------------|---------------------------|------------------|--------------------------------------|---------------------------|---------------|
| | Minutes After Start of Pump | Depth to Water (ft) | Drawdown (ft) | Minutes After Start of Pump | Depth to Water (ft) | Drawdown (ft) | Minutes After Start of Pump | Depth to Water (ft) | Drawdown (ft) | Minutes After Start of Pump | Depth to Water (ft) | Drawd (ft) |
| 1/20/87 | 0" | 1.36 | 0 | 0" | 2.10 | 0 | 0" | 1.63 | 0 | 0" | 2.43 | 0 |
| | 1'50" | 1.36 | 0 | 2'10" | 2.0 | +.1 | 2'18" | 1.63 | 0 | 2'37" | 2.43 | 0 |
| | 6'38" | 1.35 | +.01 | 6'55" | 2.10 | 0 | 7'13" | 1.63 | 0 | 7'27" | 2.43 | 0 |
| | 9'06" | 1.36 | 0 | 9'20" | 2.10 | 0 | 9'40" | 1.63 | 0 | 9'58" | 2.43 | 0 |
| | 1'04" | 1.36 | 0 | 12'18" | 2.10 | 0 | 12'30" | 1.63 | 0 | 12'50" | 2.43 | 0 |
| | 16'04" | 1.37 | .01 | 16'20" | 2.11 | .01 | 12' | 1.63 | 0 | 16'51" | 2.43 | 0 |
| | 19'45" | 1.39 | .03 | 20' | 2.11 | .01 | 20'10" | 1.64 | .01 | 20'30" | 2.43 | 0 |
| | 22'45" | 1.40 | .04 | 23' | 2.11 | .01 | 23'10" | 1.64 | .01 | 23'27" | 2.435 | .0 |
| | 25'39" | 1.405 | .045 | 26' | 2.11 | .01 | 26'15" | 1.63 | 0 | 26'33" | 2.435 | .0 |
| | 31'12" | 1.42 | .06 | 31'22" | 2.11 | .01 | 31'38" | 1.63 | 0 | 31'54" | 2.435 | .0 |
| | 42'09" | 1.44 | .08 | 42'25" | 2.115 | .015 | 42'50" | 1.635 | .005 | 43'06" | 2.435 | .0 |
| | 52'20" | 1.49 | .13 | 52'35" | 2.12 | .02 | 53' | 1.63 | 0 | 53'25" | 2.435 | .0 |
| | 62'56" | 1.49 | .13 | 63'20" | 2.12 | .02 | 63'40" | 1.63 | 0 | 63'55" | 2.435 | .0 |
| | 74'00" | 1.49 | .13 | 74'20" | 2.125 | .025 | 74'40" | 1.63 | 0 | 74'55" | 2.435 | .0 |
| | 93'16" | 1.45 | .09 | 93'35" | 2.14 | .04 | 94' | 1.64 | .01 | 94'12" | 2.44 | .0 |
| | 115'45" | 1.52 | .16 | 116' | 2.15 | .05 | 116'20" | 1.64 | .01 | 116'36" | 2.44 | .0 |
| | 146'26" | 1.55 | .19 | 146'75" | 2.17 | .07 | 147' | 1.64 | .01 | 147'10" | 2.44 | .0 |
| | 176'25" | 1.51 | .15 | 176'50" | 2.18 | .08 | 177'05" | 1.61 | +.02 | 177'22" | 2.45 | .0 |
| | 223'26" | 1.56 | .20 | 223'50" | 2.21 | .11 | 224'05" | 1.66 | .03 | 224'27" | 2.45 | .0 |
| | 277'28" | 1.50 | .14 | 277'50" | 2.23 | .13 | 278'05" | 1.67 | .04 | 278'22" | 2.46 | .0 |
| | 345'04" | 1.50 | .14 | 345'25" | 2.26 | .16 | 346' | 1.70 | .07 | 346'18" | 2.46 | .0 |
| | 403'55" | 1.48 | .12 | 404'15" | 2.28 | .18 | 404'50" | 1.71 | .08 | 405'05" | 2.47 | .0 |
| | 429'24" | 1.48 | .12 | 429'50" | 2.28 | .18 | 430'02" | 1.72 | .09 | 430'19" | 2.47 | .0 |
| 1/21/87 | 1365' | 1.58 | .22 | 1366' | 2.44 | .34 | 1366' | 2.18 | .55 | 1367' | 2.58 | .1 |
| | 1800' | 1.59 | .23 | 1800' | 24.9 | .8 | 1800' | 2.42 | .79 | 1800' | 2.65 | .2 |

Discharge Rate = 0.26 Gallons Per Minute

* = 4.5 - 5 Gallons of Product Removed

0673R

Drawdown (ft)

TIME (MIN)

$$T = \frac{264 Q}{\Delta S}$$

$$T = \frac{264 (0.26)}{0.32}$$

$$T = 214 \text{ GPD/ft}$$

T = TRANSMISSIVITY

Q = DISCHARGE

ΔS = DRAWDOWN PER LOG
CYCLE

264 = THEORETICAL CONSTANT

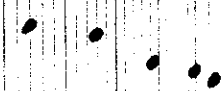
P6
PUMPING TEST 2
Time-Drawdown Plot

Drawdown (ft)

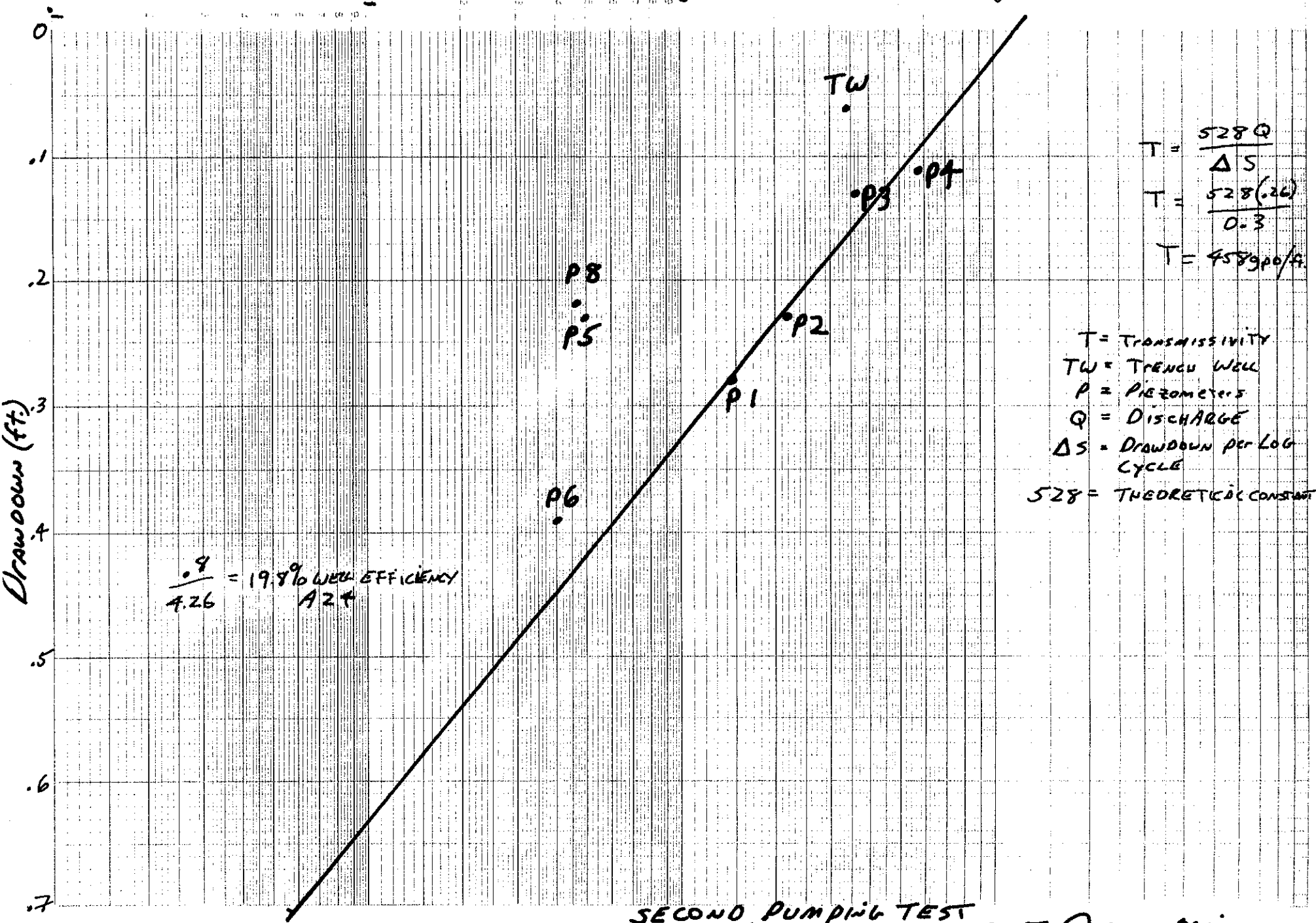
Semi-Logarithmic
Circles x 10 to the inch

TIME (MIN)

P7
Pumping TEST 2
TIME - DRAWDOWN PLOT



DISTANCE FROM CENTER OF A24 (ft.)



$$T = \frac{528Q}{\Delta S}$$

$$T = \frac{528(.26)}{0.3}$$

$$T = 458 \text{ gpo/ft.}$$

T = TRANSMISSIVITY
TW = TRENCH WELL
P = PIEZOMETERS
Q = DISCHARGE
 ΔS = DRAWDOWN per LOG CYCLE
528 = THEORETICAL CONSTANT

PUMPING TEST 3

TIME-DRAWDOWN DATA
CHEVRON/GULF PHILADELPHIA REFINERY

Monitoring Well A24

| <u>Date</u> | <u>Time After Start of Pump</u> | <u>Depth to Product (ft)</u> | <u>Drawdown (ft)</u> |
|-------------|---|--------------------------------------|--------------------------|
| 2/2/87 | 0" | 4.91 | 0 |
| | 15" | 4.96 | 0.05 |
| | 30" | 5.05 | 0.14 |
| | 45" | 5.13 | 0.22 |
| | 1' | 5.23 | 0.32 |
| | 1'30" | 5.42 | 0.51 |
| | 2' | 5.59 | 0.68 |
| | 2'30" | 5.76 | 0.85 |
| | 3' | 5.90 | 0.99 |
| | 3'30" | 6.05 | 1.14 |
| | 4' | 6.18 | 1.27 |
| | 4'30" | 6.29 | 1.38 |
| | 5' | 6.38 | 1.47 |
| | 6' | 6.55 | 1.64 |
| | 7' | 6.68 | 1.77 |
| | 8' | 6.79 | 1.88 |
| | 9' | 6.89 | 1.98 |
| | 10' | 7.00 | 2.09 |
| | 11' | 7.10 | 2.19 |
| | 12' | 7.20 | 2.29 |
| | 14' | 7.40 | 2.49 |
| | 16' | 7.64 | 2.73 |
| | 18' | 7.77 | 2.86 |
| | 20' | 7.97 | 3.06 |

Discharge Rate = 0.14 GPM

0668R

Drawdown (ft)

TIME (MIN)

$$T = \frac{264 Q}{\Delta S}$$

$$T = \frac{264 (0.14)}{3.25}$$

$$T = 11.53 \text{ GPD/FT}$$

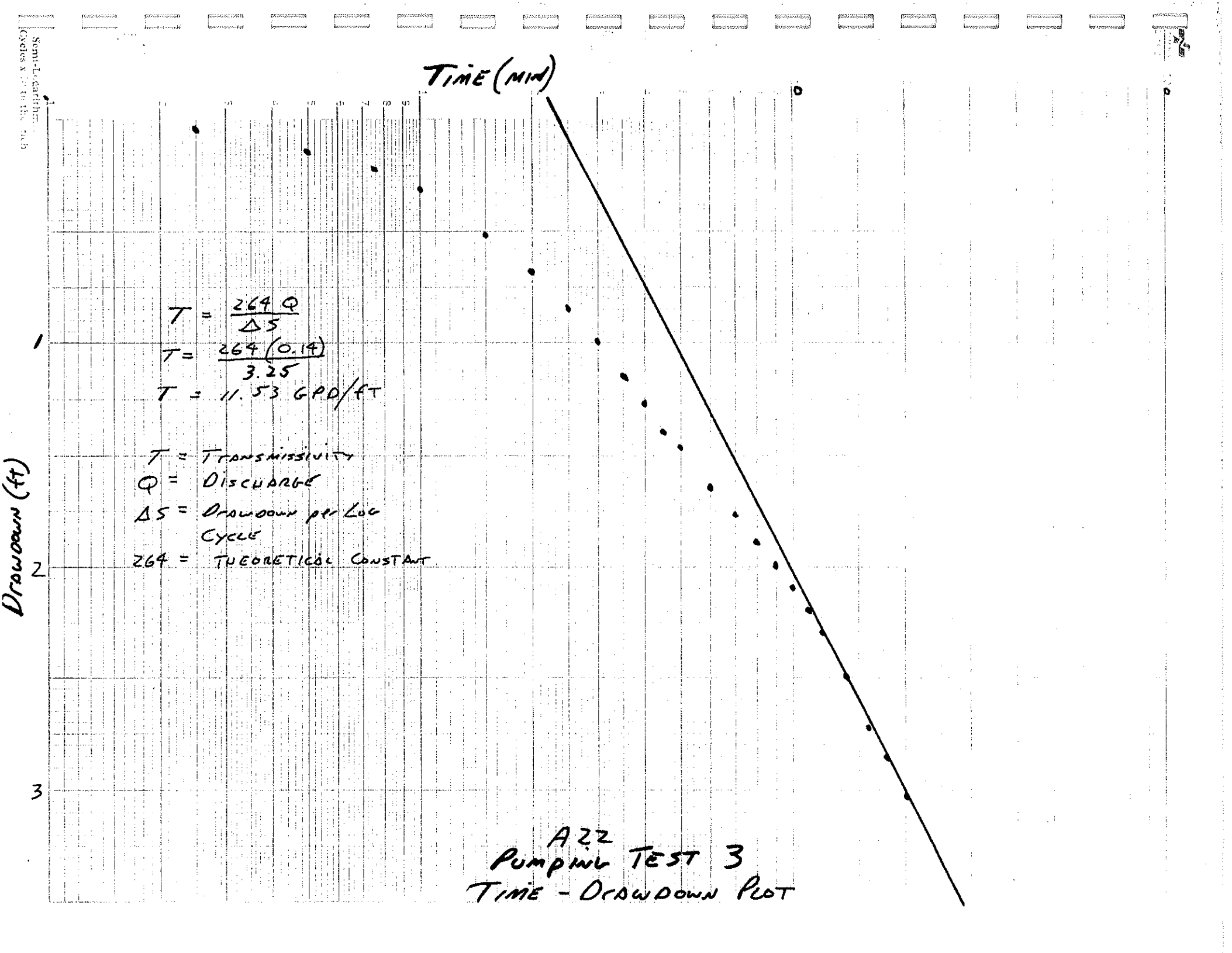
T = TRANSMISSIVITY

Q = DISCHARGE

ΔS = DRAWDOWN per LOG
CYCLE

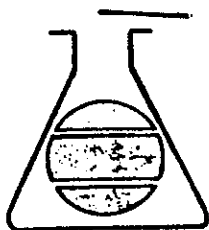
264 = THEORETICAL CONSTANT

A22
PUMPING TEST 3
TIME - DRAWDOWN PLOT



APPENDIX E

Laboratory Data - Lead Analysis
Main Plant, Schuylkill River Tank Farm,
and Darby Creek Tank Farm



CENTURY LABORATORIES, INC.

P.O. Box 248/1501 Grandview Avenue/MidAtlantic Park, Thorofare, NJ 08086
Phone: (609) 848-3939 NJ 800-222-0589

March 10, 1986

DAMES & MOORE
6 Commerce Drive
Cranford, N.J. 07016

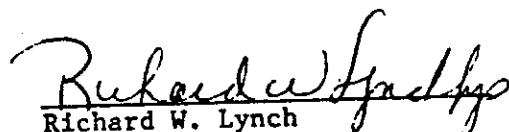
SAMPLES REC'D: 3/6/86

PROJECT: CHEVRON REFINERY

ATTN: Mr. Robvogel

CERTIFICATE OF ANALYSIS

| <u>ANALYSIS NO.</u> | <u>SAMPLE IDENTIFICATION</u> | <u>TOTAL LEAD(mg/kg)</u> |
|---------------------|------------------------------|--------------------------|
| E3169 | MTP-12B | 1080 |
| E3170 | DTP-2B | 14 |
| E3171 | MTP-11B | 912 |
| E3172 | MTP-11A | 956 |
| E3173 | STP-4A | 316 |
| E3174 | MTP-12A | 652 |
| E3175 | DTP-1B | 83 |
| E3176 | STP-4B | 379 |
| E3177 | DTP-2A | 37 |
| E3178 | DTP-1A | 52 |


Richard W. Lynch
Laboratory Director

NOTE: See Appendix F, Test Pit Logs for Sample Locations.

DAMES & MOORE CHAIN-OF-CUSTODY RECORD

| | | | | | | | | | | | |
|--|------|-------------------|-------------|-------------------|---------------|-----------------------------|---------|--|--|--|--|
| Sample Source & Client <u>Chevron Refinery</u> | | | | | | Field Personnel (Signature) | | | | | |
| Project Title | | | | | Job No. | | | | | | |
| Date | Time | Sample I.D. No. | Sample Type | No. of Containers | Sampling Site | | Remarks | | | | |
| 3/6/86 | 1245 | STP 2B | | | | | | | | | |
| | | MTP 12B | SOIL | 1 | Chevron Ref. | | | | | | |
| | | OTP 2B | " | | " | | | | | | |
| | | MTP 11B | " | | " | | | | | | |
| | | MTP 11A | " | | " | | | | | | |
| | | STP 4A | " | | " | | | | | | |
| | | MTP 12A | " | | " | | | | | | |
| | | OTP 1B | " | | " | | | | | | |
| | | STP 4B | " | | " | | | | | | |
| | | OTP 2A | | | | | | | | | |
| | | OTP 2A | " | | " | | | | | | |
| | | OTP 1A | " | | " | | | | | | |
| | | | | | | | | | | | |
| | | OTP 3A | EMPTY | | | | | | | | |
| | | OTP 3B | | | | | | | | | |

| | | | | | | | | | | | |
|--|----------------|---------------|---|------|------|---------------------------------|------|------|-----------------------------|------|------|
| Relinquished by: (Signature) <i>Robert Noy</i> | Date 3-6-86 | Time 12:50 | Received by: (Signature) <i>Maylor Hendry</i> | Date | Time | Relinquished by: (Signature) | Date | Time | Received by: (Signature) | Date | Time |
| Relinquished by: (Signature) | Date | Time | Received by: (Signature) | Date | Time | Relinquished by: (Signature) | Date | Time | Received by: (Signature) | Date | Time |
| Relinquished by: (Signature) | Date | Time | Received by: (Signature) | Date | Time | Relinquished by: (Signature) | Date | Time | Received by: (Signature) | Date | Time |

DATA MANAGEMENT SUMMARY REPORT
(DM-OL) - All Parameters Tested, Samples Linked by Order

DATE: 01/10/87
PAGE: 1

Chain of Custody Data Required for ETC Data Management Summary Report

| | | | |
|-----------------------|------------------------|-------------------|--------------------------|
| See Below | DAMES AND MOORE | CHEVPPASLP | See Below |
| ETC Sample No. | Company | Facility | Sample Point Date |

| | | Sample Points, Sampling Dates, and ETC Sample No.'s | | | | | | | |
|--------------------|-------|---|-----------------------------|-----------------------------|----------------------------|----------------------------|-----------------------------|-----------------------------|-----------------------------|
| Parameters | Units | S TB221A 861211 P8323 | S TB221B 861211 P8322 | S TB224B 861211 P8326 | S TB238 861211 P8324 | S TB242 861211 P8325 | S TB245B 861211 P8673 | S TB309A 861212 P8672 | S TB309B 861212 P8331 |
| Groundwater Metals | | | | | | | | | |
| Lead | ug/kg | 589000 | 52300 | 558000 | 1610000 | 2970000 | 230000 | 935000 | 725000 |

DATA MANAGEMENT SUMMARY REPORT
(DM-OL) - All Parameters Tested, Samples Linked by Order

DATE: 01/10/87
PAGE: 2

Chain of Custody Data Required for ETC Data Management Summary Report

| | | | |
|-----------------------|------------------------|-------------------|--------------------------|
| See Below | DAMES AND MOORE | CHEVPPASLP | See Below |
| ETC Sample No. | Company | Facility | Sample Point Date |

| | | Sample Points, Sampling Dates, and ETC Sample No.'s | | | | | | |
|--------------------|-------|---|-----------------------------|-----------------------------|----------------------------|--|--|--|
| Parameters | Units | S TB311 861212 P8328 | S TB313A 861212 P8329 | S TB313B 861212 P8330 | S TB328 861212 P8327 | | | |
| Groundwater Metals | | | | | | | | |
| Lead | ug/kg | 310000 | 370000 | 130000 | 735000 | | | |

DATA MANAGEMENT SUMMARY REPORT
(DM-OL) - All Parameters Tested, Samples Linked by Order

DATE: 01/11/87
PAGE: 1

Chain of Custody Data Required for ETC Data Management Summary Report

| | | | |
|-----------------------|------------------------|-------------------|-------------------------------|
| See Below | DAMES AND MOORE | CHEVPPASLP | See Below |
| <i>ETC Sample No.</i> | <i>Company</i> | <i>Facility</i> | <i>Sample Point Date</i> |

| | | Sample Points, Sampling Dates, and ETC Sample No.'s | | | | | | | |
|--------------------|-------|---|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|
| Parameters | Units | S TB202A 861211 N9596 | S TB202B 861211 N9603 | S TB206A 861211 N9600 | S TB206B 861211 N9597 | S TB209A 861211 N9604 | S TB209B 861211 N9599 | S TB226A 861215 N9585 | S TB226B 861215 N9584 |
| Groundwater Metals | | | | | | | | | |
| Lead | ug/kg | 88600 | 310000 | 340000 | 420000 | 330000 | 671000 | 370000 | 130000 |

Footnotes: BMDL=Below Method Detection Limit ND=Parameter not detected '-'=Parameter not tested

DATA MANAGEMENT SUMMARY REPORT
(DM-OL) - All Parameters Tested, Samples Linked by Order

DATE: 01/11/87
PAGE: 2

Chain of Custody Data Required for ETC Data Management Summary Report

| | | | |
|-----------------------|------------------------|-------------------|--------------------------|
| See Below | DAMES AND MOORE | CHEVPPASLP | See Below |
| ETC Sample No. | Company | Facility | Sample Point Date |

| | | Sample Points, Sampling Dates, and ETC Sample No.'s | | | | | | | |
|--------------------|-------|---|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|---------------------------|
| Parameters | Units | S TB243A 861211 N9593 | S TB243B 861211 N9589 | S TB244A 861210 N9573 | S TB244A 861211 N9601 | S TB244B 861210 N9575 | S TB245A 861211 N9595 | S TB246A 861211 N9588 | TB246B 861210 N9571 |
| Groundwater Metals | | | | | | | | | |
| Lead | ug/kg | 1370000 | 1490000 | 390000 | 17000000 | 360000 | 190000 | 1440000 | 1390000 |

DATA MANAGEMENT SUMMARY REPORT
(DM-OL) - All Parameters Tested, Samples Linked by Order

DATE: 01/11/87
PAGE: 3

Chain of Custody Data Required for ETC Data Management Summary Report

| | | | |
|-----------------------|------------------------|-------------------|--------------------------|
| See Below | DAMES AND MOORE | CHEVPPASLP | See Below |
| ETC Sample No. | Company | Facility | Sample Point Date |

| | | Sample Points, Sampling Dates, and ETC Sample No.'s | | | | | | | |
|--------------------|-------|---|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|
| Parameters | Units | S 1B251A 861211 N9587 | S 1B251B 861211 N9594 | S 1B276A 861210 N9574 | S 1B276B 861210 N9572 | S 1B277A 861210 N9576 | S 1B277B 861210 N9570 | S 1B286A 861210 N9577 | S 1B286B 861210 N9578 |
| Groundwater Metals | | | | | | | | | |
| Lead | ug/kg | 370000 | 594000 | 4950000 | 3220000 | 1120000 | 340000 | 1630000 | 480000 |

DATA MANAGEMENT SUMMARY REPORT (DM-OL) - All Parameters Tested, Samples Linked by Order

DATE: 01/11/87
PAGE: 4

Chain of Custody Data Required for ETC Data Management Summary Report

| | | | |
|-----------------------|------------------------|-------------------|--------------------------|
| See Below | DAMES AND MOORE | CHEVPPASLP | See Below |
| ETC Sample No. | Company | Facility | Sample Point Date |

| | | Sample Points, Sampling Dates, and ETC Sample No.'s | | | | | | | |
|--------------------|-------|---|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|
| Parameters | Units | S TB289A 861208 N9590 | S TB290A 861208 N9591 | S TB290B 861208 N9592 | S TB426A 861208 N9566 | S TB426B 861208 N9567 | S TB430A 861208 N9568 | S TB430B 861208 N9569 | S TB438A 861208 N9563 |
| Groundwater Metals | | | | | | | | | |
| Lead | ug/kg | 1970000 | 857000 | 370000 | 531000 | 340000 | 1760000 | 170000 | 510000 |

Notes: BMDL=Below Method Detection Limit ND=Parameter not detected '-'=Parameter not tested

DATA MANAGEMENT SUMMARY REPORT
(DM-OL) - All Parameters Tested, Samples Linked by Order

DATE: 01/11/87
PAGE: 5

Chain of Custody Data Required for ETC Data Management Summary Report

| | | | |
|----------------|-----------------|------------|-------------------|
| See Below | DAMES AND MOORE | CHEVPPASLP | See Below |
| ETC Sample No. | Company | Facility | Sample Point Date |

| | | Sample Points, Sampling Dates, and ETC Sample No.'s | | | | | | | |
|--------------------|-------|---|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|
| Parameters | Units | S TB438B 861208 N9564 | S TB440A 861208 N9562 | S TB440A 861211 N9602 | S TB440B 861208 N9565 | S TB440B 861211 N9598 | S TP202A 861204 N9555 | S TP202B 861204 N9560 | S TP203A 861204 N9554 |
| Groundwater Metals | | | | | | | | | |
| Lead | ug/kg | 50200 | 140000 | 370000 | 99800 | 51900 | 2000000 | 160000 | 410000 |

DATA MANAGEMENT SUMMARY REPORT
(DM-OL) - All Parameters Tested, Samples Linked by Order

DATE: 01/11/87
PAGE: 6

Chain of Custody Data Required for ETC Data Management Summary Report

| | | | |
|-----------------------|------------------------|-------------------|-----------------------------|
| See Below | DAMES AND MOORE | CHEVPPASLP | See Below |
| ETC Sample No. | Company | Facility | Sample Point Date |

| | | Sample Points, Sampling Dates, and ETC Sample No.'s | | | | | | | |
|--------------------|-------|---|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|
| Parameters | Units | S TP203B 861204 N9558 | S TP205A 861204 N9556 | S TP205B 861204 N9559 | S TP207A 861204 N9557 | S TP207B 861204 N9561 | S TP208A 861204 N9609 | S TP208B 861204 N9611 | S TP215A 861204 N9605 |
| Groundwater Metals | | | | | | | | | |
| Lead | ug/kg | 29000 | 55000 | 41000 | 590000 | 280000 | 925000 | 119000 | 501000 |

DATA MANAGEMENT SUMMARY REPORT
(DM-OL) - All Parameters Tested, Samples Linked by Order

DATE: 01/11/87
PAGE: 7

Chain of Custody Data Required for ETC Data Management Summary Report

| | | | |
|----------------|-----------------|------------|-------------------|
| See Below | DAMES AND MOORE | CHEVPPASLP | See Below |
| ETC Sample No. | Company | Facility | Sample Point Date |

| | | Sample Points, Sampling Dates, and ETC Sample No.'s | | | | | | |
|--------------------|-------|---|-----------------------------|-----------------------------|--|--|--|--|
| Parameters | Units | S TP215B 861204 N9606 | S TP223A 861204 N9608 | S TP223B 861204 N9612 | | | | |
| Groundwater Metals | | | | | | | | |
| Lead | ug/kg | 15000 | 180000 | 120000 | | | | |

Footnotes: BMDL=Below Method Detection Limit ND=Parameter not detected '-'=Parameter not tested

APPENDIX F

Test Pit Logs

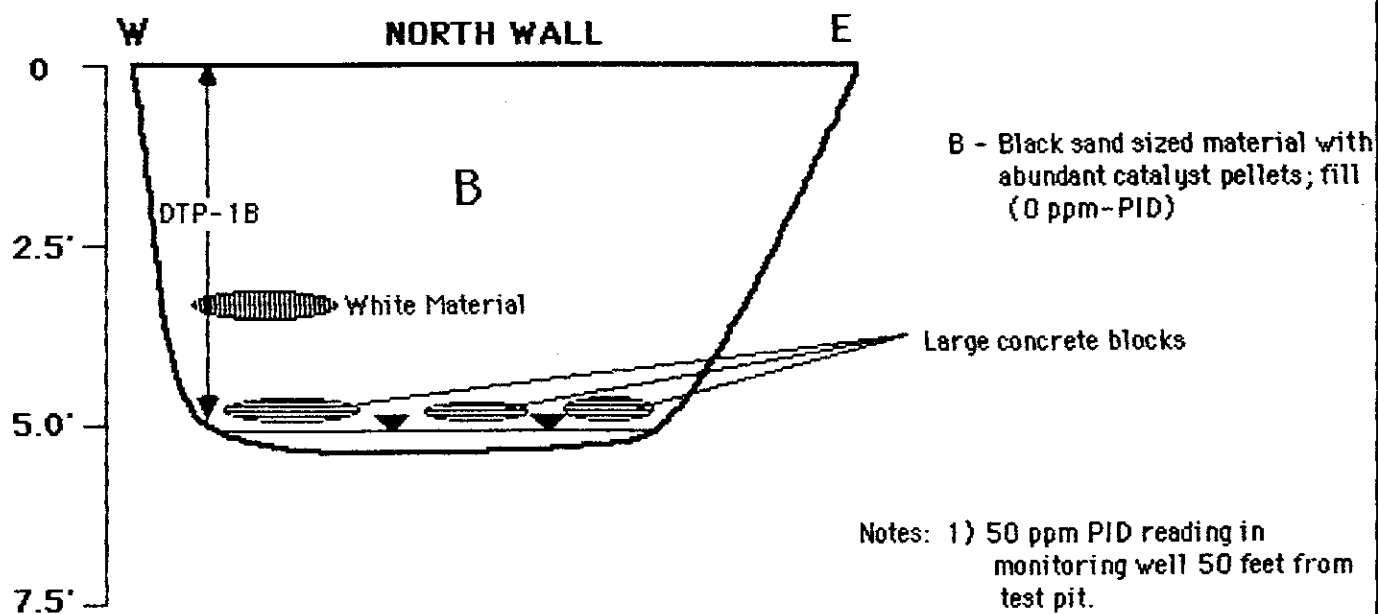
Darby Creek Tank Farm, Schuylkill River Tank Farm,
and Ballfields

TEST PIT LOG

CHEVRON - GULF PHILADELPHIA REFINERY

DTP-1B

"DARBY CREEK TANK FARM"



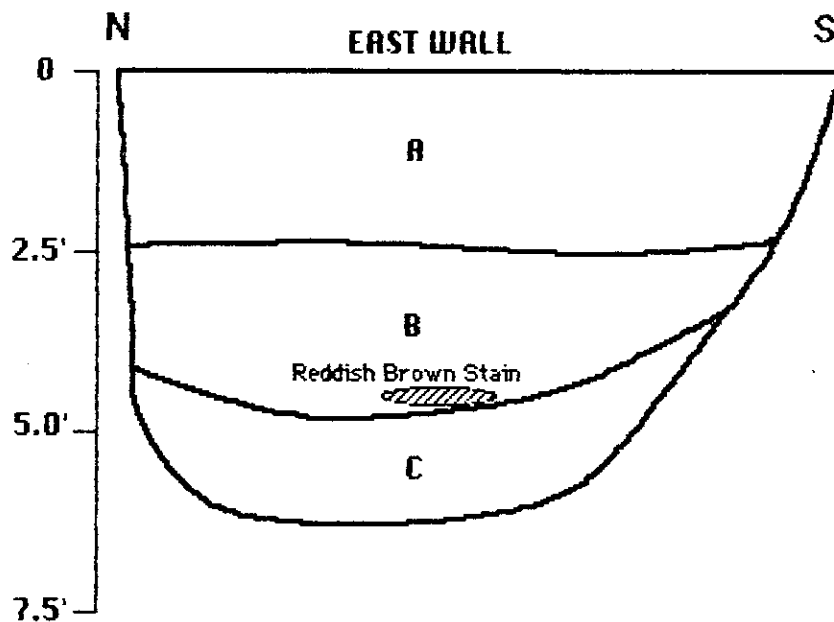
Sample: DTP - 1B (Composite 0' - 5')

DAMES & MOORE

TEST PIT LOG

CHEVRON - GULF PHILADELPHIA REFINERY

DTP-2
"DARBY CREEK TANK FARM"



Samples: DTP - 2A (Unit A Composite)

DTP - 2B (Unit B Composite)

Notes: 1) 0 ppm PID reading in pit.

2) See site map for test pit location.

3) Test pit completed on 3/5/86.

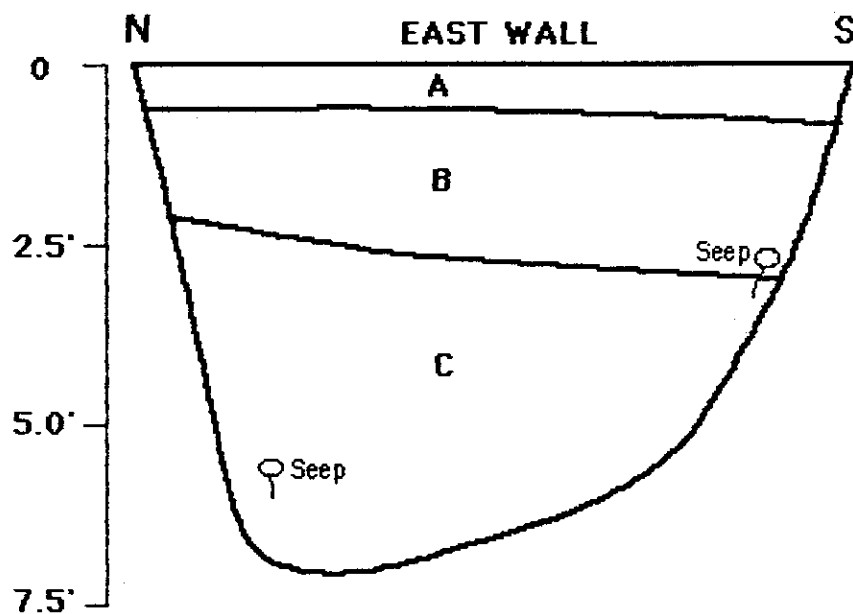
DAMES & MOORE

TEST PIT LOG

CHEVRON - GULF PHILADELPHIA REFINERY

STP-4

"SCHUYLKILL RIVER TANK FARM"



A - Reddish brown tank bottoms.

B - Sand, silt, clay and gravel,
light gray; fill

C - Silty clay, dark gray

Samples: STP - 4A (Unit A Composite)

STP - 4B (Unit B Composite)

Notes: 1) 0 ppm PID reading in pit.

2) See site map for test pit
location.

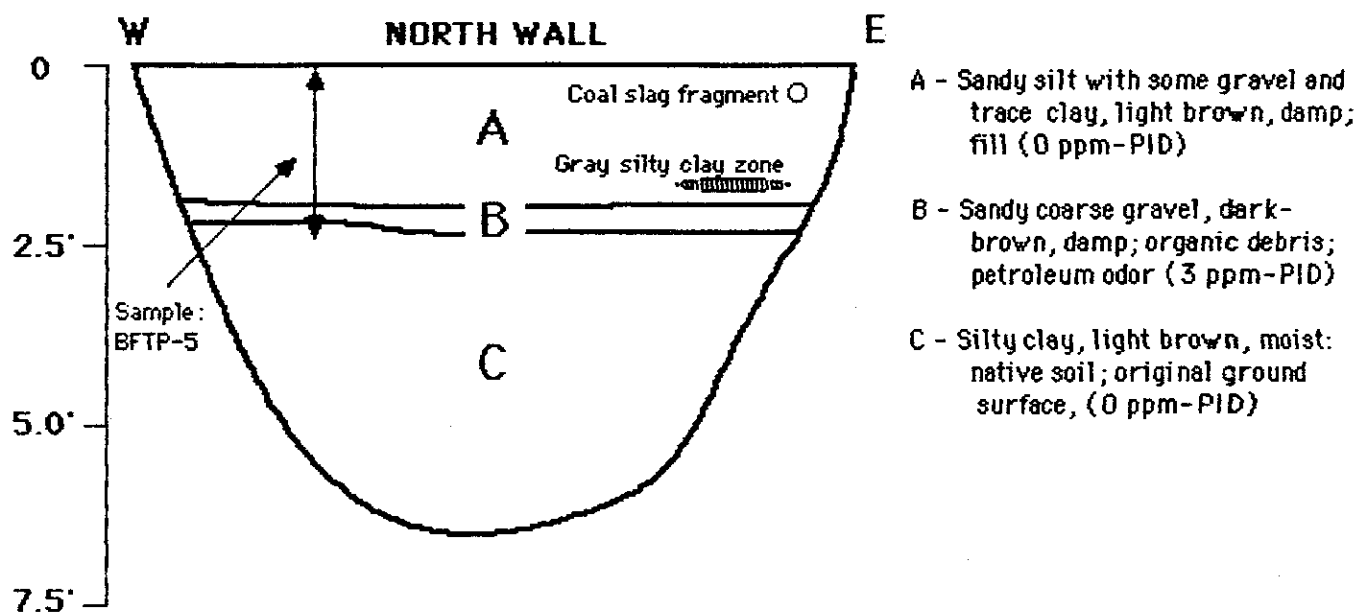
3) Test pit completed on
3/5/86

DAMES & MOORE

TEST PIT LOG

CHEVRON - GULF PHILADELPHIA REFINERY

BFTP-5
"BALLFIELDS"



Sample: BFTP-5: (ETC#L3583)
composite sample

Notes: 1) See site map for test pit
location.

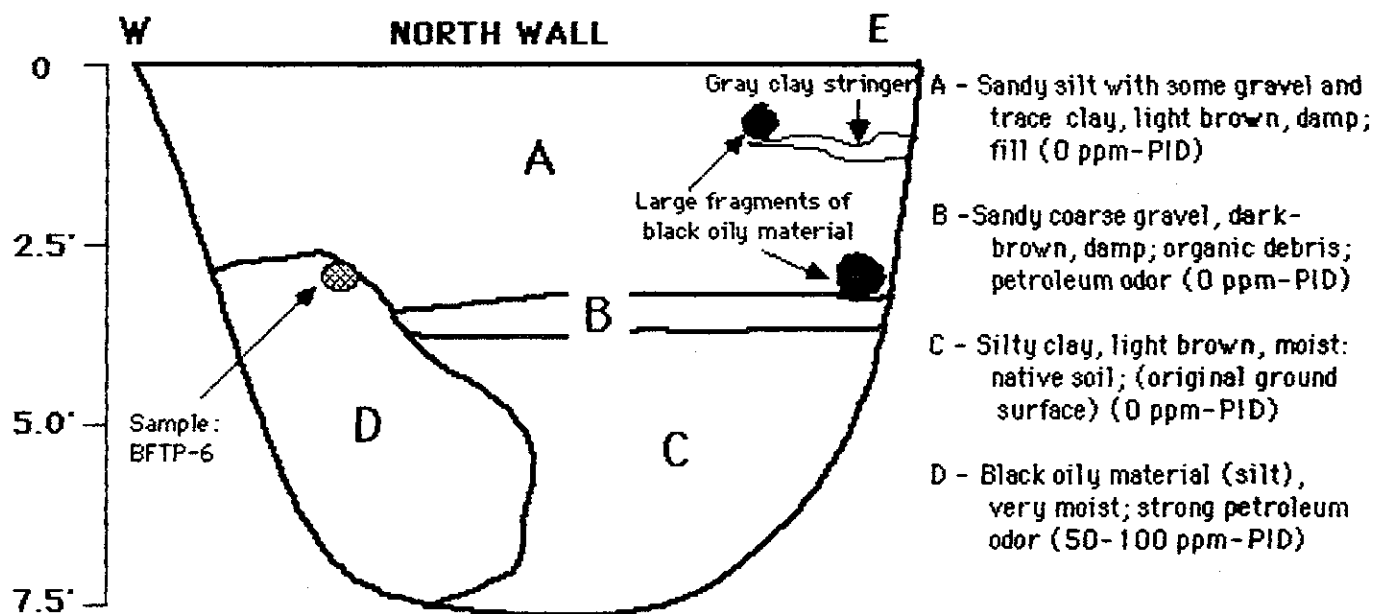
2) Test pit completed on 3/4/86.

DAMES & MOORE

TEST PIT LOG

CHEVRON - GULF PHILADELPHIA REFINERY

BFTP-6
"BALLFIELDS"



Sample: BFTP-6: (ETC #L3592):

Notes: 1) See site map for test pit location.

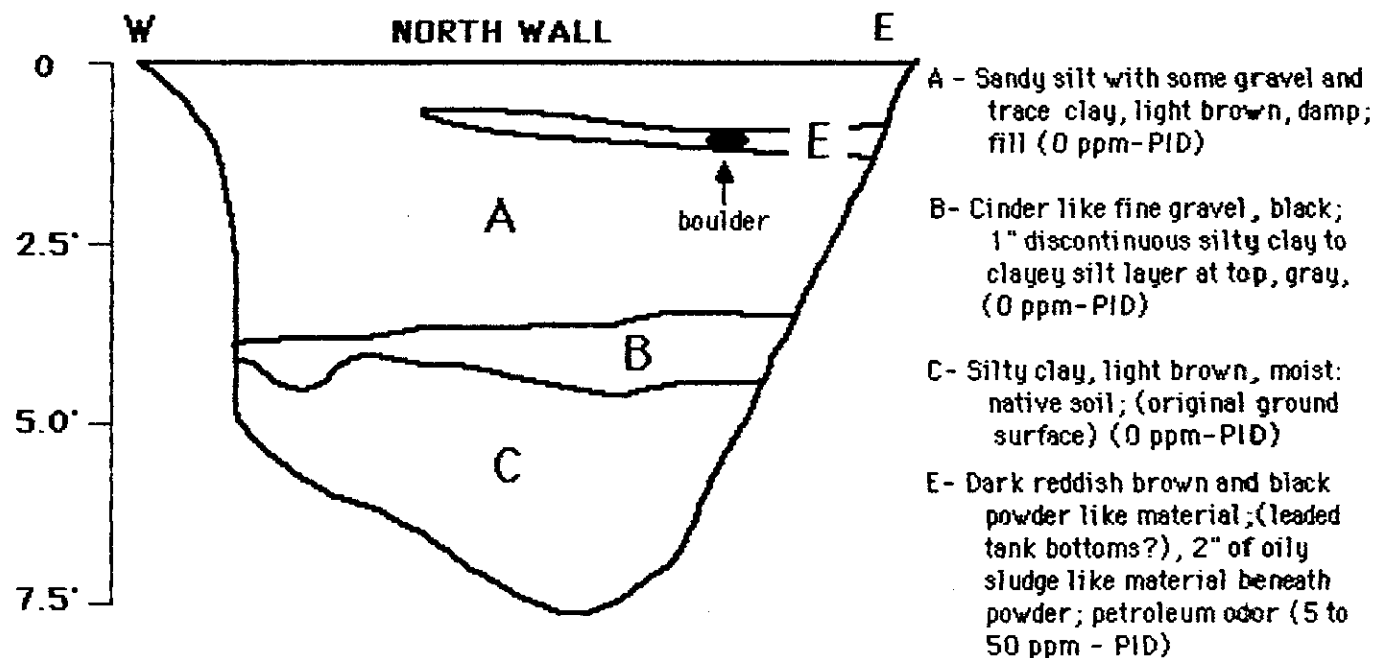
2) Test pit completed on 3/4/86.

DAMES & MOORE

TEST PIT LOG

CHEVRON - GULF PHILADELPHIA REFINERY

BFTP-7
"BALLFIELDS"



Sample: BFTP-7: (ETC #L3584): composite of units B and C.

Notes: 1) See site map for test pit location.

2) Test pit completed on 3/4/86.

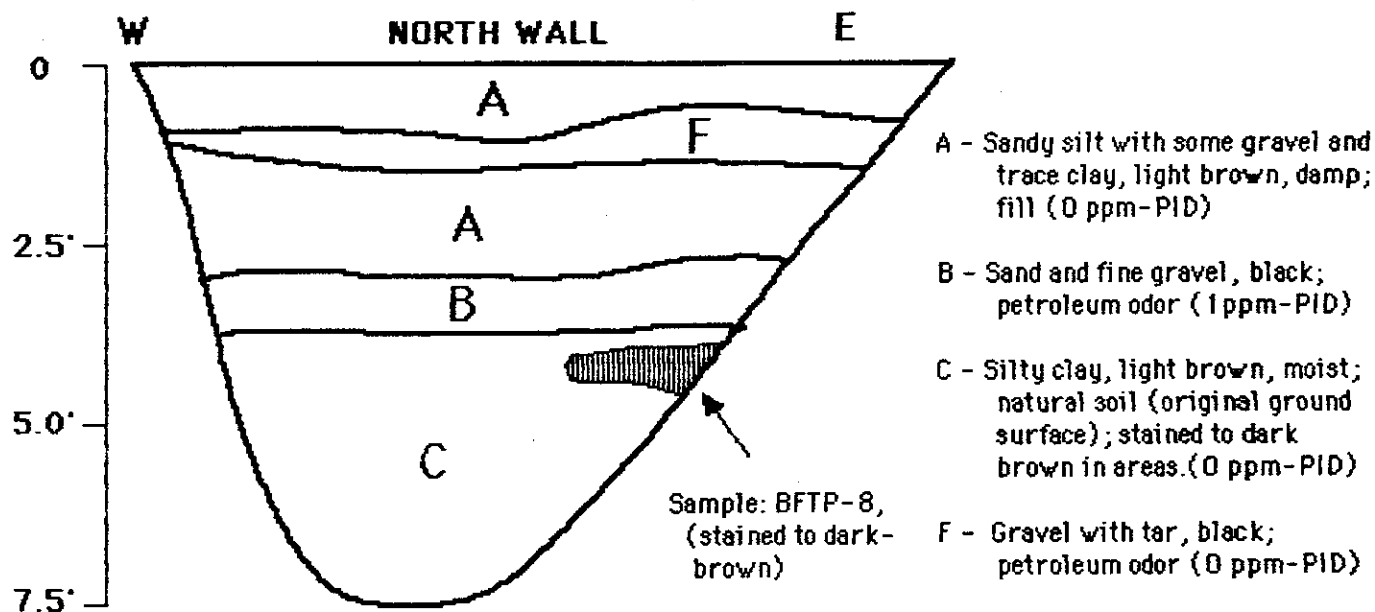
3) Mound with large pieces of coal tar residue with wood chips present just east of the test pit.

DAMES & MOORE

TEST PIT LOG

CHEVRON - GULF PHILADELPHIA REFINERY

BFTP-8
"BALLFIELDS"



Sample: BFTP-8: (ETC#L3589)

Notes: 1) See site map for test pit location.

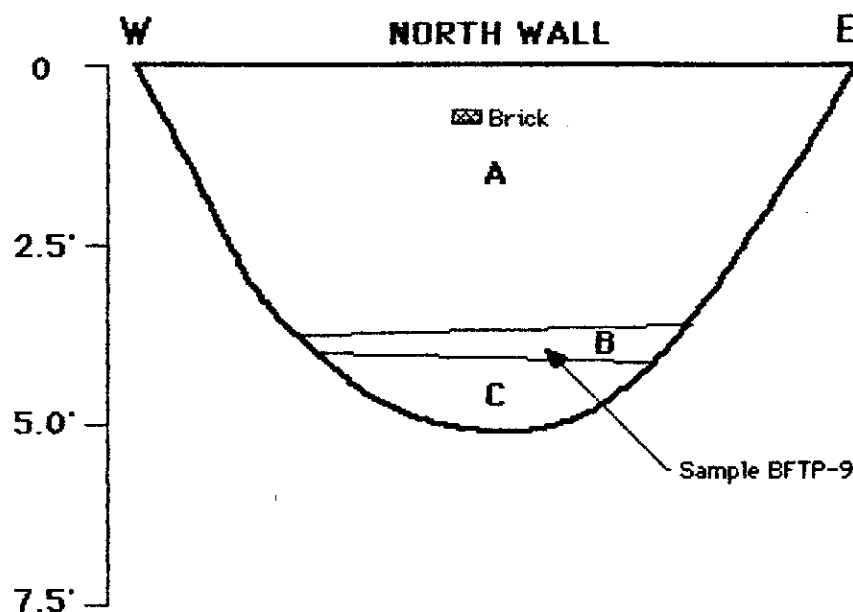
2) Test pit completed on 3/4/86.

DAMES & MOORE

TEST PIT LOG

CHEVRON - GULF PHILADELPHIA REFINERY

BFTP-9
"BALLFIELDS"



A - Sandy clay with gravel, light brown, moist; fill (0 ppm-PID)

B - Cinder like sand and fine gravel; petroleum odor (0 ppm-PID)

C - Clayey silt, light brown, very moist to wet; natural soil? (0 ppm-PID)

Sample: BFTP-9; (ETC #L3590)

Notes: 1) See site map for test pit location.

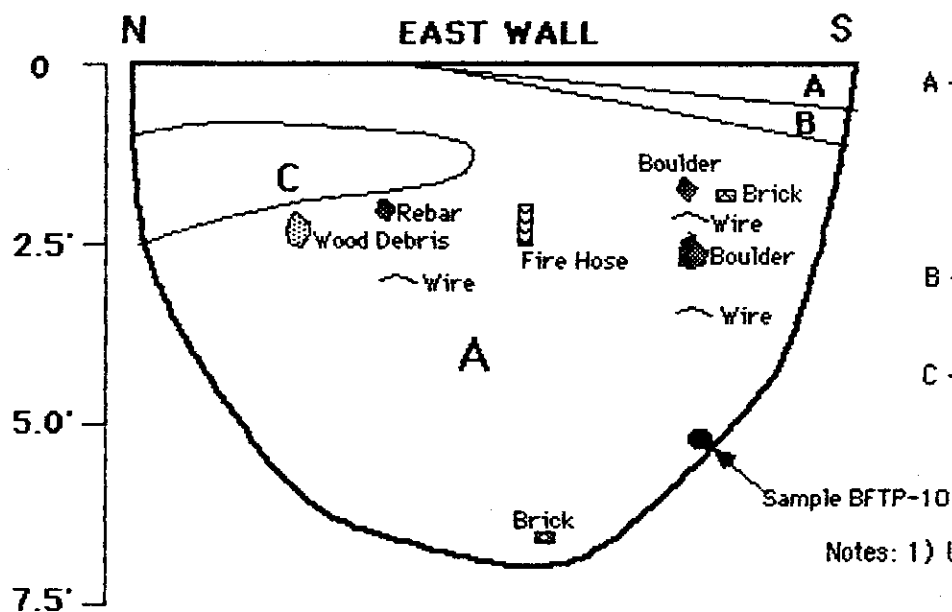
2) Test pit completed on 3/4/86.

DAMES & MOORE

TEST PIT LOG

CHEVRON - GULF PHILADELPHIA REFINERY

BFTP-10
"BALLFIELDS"



A - Gravel, sand, silt, and clay with abundant debris, brownish-black; bricks, wire, wood, boulders, rebar, ect.; fill; petroleum odor (1 ppm-PID)

B - Silt with little clay, light-brown, damp; fill (0 ppm-PID)

C - Medium sand, light gray with dark gray laminations, damp; fill (0 ppm-PID)

Sample: BFTP-10; (ETC #L3591)

Notes: 1) Unit C makes up the opposite wall from a depth of 1 to 4 feet.

2) See site map for test pit location.

3) Test pit completed on 3/4/86.

4) Units are not correlative to any units encountered in test pits BFTP-5 through BFTP-9.

DAMES & MOORE

APPENDIX G

SLUGT Test Data Forms and
Laboratory Permeability and Hydrometer Test Data

SLUGT Test Data Forms

DAMES & MOORE
SLUG TEST DATA FORM

Observation/Monitoring Well No. A-14

Inner Diameter in inches of
portion of well (screen or
casing) in which water-level
recovery occurred 4"

Inner Diameter in inches of the
screen or open portion of the
hole 4"

Diameter of drilled hole in
inches 10"

Slug used -- diameter (in.)
-- length (in.) Small

Job No. 00113-909

Client Chevron

Site Main Plant

D&M Investigators D. Wagner/
E. J. Fille

Date 3/27/86

Time 10:30 AM

Whether test is falling head
(slug entering water column)
or rising head (slug being
pulled out of well) Both

From Top
of Brass

Top of
product:
3.92'

Bottom of
product =
3.93'

| Time After Introduction (Removal) of Slug | Mark Held or Nearest Foot Mark (ft) | Subtract or Add (ft) | Add or Subtract Correction Factor (ft) | Depth to Water, Below Top of Casing (ft) | Difference Between SWL and Depth to Water at t > 0 (ft) | Comments |
|--|--|-------------------------------|---|---|---|--------------------------|
| 0 | | | | 3.92' | | Static Water Level (SWL) |
| 20" | | | | 3.64' | 0.28 | 0.01' product PRESENT |
| 30" | | | | 3.65' | 0.27 | |
| 40" | | | | 3.66' | 0.26 | |
| 50" | | | | 3.665' | 0.255 | |
| 60" | | | | 3.67' | 0.25 | |
| 70" | | | | 3.68' | 0.24 | |
| 80" | | | | 3.685' | 0.235 | |
| 90" | | | | 3.69' | 0.23 | |
| 120 | 2.0' | | | 3.71' | 0.21 | |
| 150 | 2.5' | | | 3.72' | 0.20 | |
| 180 | 3.0' | | | 3.73' | 0.19 | |
| 210 | 3.5' | | | 3.745' | 0.175 | |
| 240 | 4.0' | | | 3.76' | 0.16 | |
| 300 | 5.0' | | | 3.77' | 0.15 | |
| 360 | 6.0' | | | 3.79' | 0.14 | |
| 420 | 7.0' | | | 3.81' | 0.12 | |
| 540 | 9.0' | | | 3.83' | 0.10 | |
| 660 | 11.0' | | | 3.85' | 0.08 | |
| 780 | 13.0' | | | 3.86' | 0.07 | |
| 900 | 15.0' | | | 3.88' | 0.05 | |
| 1080 | 18.0' | | | 3.90' | 0.04 | |
| 1260 | 21.0' | | | 3.90' | 0.04 | |
| 1440 | 24.0' | | | 3.905' | 0.015 | |
| 1740 | 29.0' | | | 3.915' | 0.005 | |
| 2040 | 34.0' | | | 3.92' | 0.00 | |
| 17" | | | | 4.29' | 0.37 | |
| 25" | | | | 4.28' | 0.36 | |
| 30" | | | | 4.28' | 0.36 | |
| 40" | | | | 4.26' | 0.34 | |

(Introduce
slug) →

(Remove
slug) →

DAMES & MOORE
SLUG TEST DATA FORM

Observation/Monitoring Well No. A-24

Inner Diameter in inches of
portion of well (screen or
casing) in which water-level
recovery occurred 4"

Inner Diameter in inches of the
screen or open portion of the
hole 4"

Diameter of drilled hole in
inches 10"

Slug used — diameter (in.) _____
— length (in.) Small

Job No. 00113-909

Client Chercon

Site Winn Plant

D&M Investigators D. Wagner /
E. J. F. Ito

Date 3/27/86

Time 9:40 AM

Whether test is falling head
(slug entering water column)
or rising head (slug being
pulled out of well) Both

Top of Brass

Top of Product
2.66'

Bottom of
Product
3.63'

| Time After Introduction (Removal) of Slug | Mark Held or Nearest Foot Mark (ft) | Subtract or Add (ft) | Add or Subtract Correction Factor (ft) | Depth to Water, Below Top of Casing (ft) | Difference Between SWL and Depth to Water at t > 0 (ft) | Comments |
|--|--|-------------------------------|---|---|---|--------------------------|
| 0 | | | | 2.66' | 0.00 | Static Water Level (SWL) |
| 10" | | | | 2.3 | 0.36 | |
| 20" | | | | 2.44' | 0.22 | |
| 30" | | | | 2.45' | 0.21 | |
| 40" | | | | 2.48' | 0.18 | |
| 50" | | | | 2.50' | 0.16 | |
| 60" | | | | 2.52' | 0.14 | |
| 70" | | | | 2.54" | 0.12 | |
| 80" | | | | 2.55' | 0.11 | |
| 90" | | | | 2.56' | 0.10 | |
| 120" | 2.0' | | | 2.59' | 0.07 | |
| 150" | 2.5' | | | 2.60' | 0.06 | |
| 180" | 3.0' | | | 2.61' | 0.05 | |
| 210" | 3.5' | | | 2.62' | 0.04 | |
| 240" | 4.0' | | | 2.63' | 0.03 | |
| 270" | 4.5' | | | 2.635' | 0.025 | |
| 300" | 5.0' | | | 2.64' | 0.02 | |
| 360" | 6.0' | | | 2.645' | 0.015 | |
| 420" | 7.0' | | | 2.65' | 0.01 | |
| 480" | 8.0' | | | 2.655' | 0.005 | |
| 540" | 9.0' | | | 2.655' | 0.005 | |
| 600" | 10.0' | | | 2.655' | 0.005 | |
| 660" | 11.0' | | | 2.66' | 0.00 | |
| 0" | | | | 2.66' | 0.00 | |
| 30" | | | | 2.85' | 0.19 | |
| 40" | | | | 2.83' | 0.17 | |
| 50" | | | | 2.82' | 0.16 | |
| 60" | | | | 2.99' | 0.13 | |
| 70" | | | | 2.78" | 0.12 | |
| 80" | | | | 2.77" | 0.11 | |

(Introduce
Slug) →

(Remove
Slug) →

Job No. _____

Client Cheriton

Site _____

D&M Investigators _____

Date 3/27/86

Time 7:15

Whether test is falling head
(slug entering water column)
or rising head (slug being
pulled out of well)

— length (in.)

[illegible]

DAMES & MOORE
SLUG TEST DATA FORM

Observation/Monitoring Well No. B-39

Inner Diameter in inches of portion of well (screen or casing) in which water-level recovery occurred 4"

Inner Diameter in inches of the screen or open portion of the hole 4"

Diameter of drilled hole in inches 10"

Slug used — diameter (in.) _____

— length (in.) Small

Job No. 0013-329 → from 329

Client Chyron

Site Mar. Plant

D&M Investigators D. Wagner / E.J. Fillo

Date 3/26/86

Time 8:00 AM

Whether test is falling head (slug entering water column) or rising head (slug being pulled out of well) Both

Static H₂O level = 2.68'

SLUG NOT FULLY SUBMERGED

2.68' Top of Bore Casing
3.58'

| Time After Introduction (Removal) of Slug | Mark Held or Nearest Foot Mark (ft) | Subtract or Add (ft) | Add or Subtract Correction Factor (ft) | Depth to Water, Below Top of Casing (ft) | Difference Between SWL and Depth to Water at t > 0 (ft) | Comments |
|---|-------------------------------------|----------------------|--|--|---|--------------------------|
| 0 | | | | <u>2.68'</u> | | Static Water Level (SWL) |
| -10" | | | | <u>2.57'</u> | <u>0.11</u> | |
| -20" | | | | <u>2.58'</u> | <u>0.10</u> | |
| -30" | | | | <u>2.59'</u> | <u>0.09</u> | |
| -40" | | | | <u>2.61'</u> | <u>0.07</u> | |
| -50" | | | | <u>2.62'</u> | <u>0.06</u> | |
| -60" | | | | <u>2.63'</u> | <u>0.05</u> | |
| 90" | <u>1.5'</u> | | | <u>2.64'</u> | <u>0.04</u> | |
| 120" | <u>2.0'</u> | | | <u>2.65'</u> | <u>0.03</u> | |
| 150" | <u>2.5'</u> | | | <u>2.66'</u> | <u>0.02</u> | |
| 180" | <u>3.0'</u> | | | <u>2.665'</u> | <u>0.015</u> | |
| 210" | <u>3.5'</u> | | | <u>2.67'</u> | <u>0.01</u> | |
| 240" | <u>4.0'</u> | | | <u>2.67'</u> | <u>0.01</u> | |
| 300" | <u>5.0'</u> | | | <u>2.67'</u> | <u>0.01</u> | |
| 360" | <u>6.0'</u> | | | <u>2.67'</u> | <u>0.01</u> | |
| 420" | <u>7.0'</u> | | | <u>2.675'</u> | <u>0.005</u> | |
| 480" | <u>8.0'</u> | | | <u>2.675'</u> | <u>0.005</u> | |
| 540" | <u>9.0'</u> | | | <u>2.675'</u> | <u>0.005</u> | |
| 600" | <u>10.0'</u> | | | <u>2.675'</u> | <u>0.005</u> | |
| 660" | <u>11.0'</u> | | | <u>2.675'</u> | <u>0.005</u> | |
| 720" | <u>12.0'</u> | | | <u>2.68'</u> | <u>0.00</u> | |
| 780" | <u>13.0'</u> | | | <u>2.68'</u> | <u>0.00</u> | |
| 840" | <u>14.0'</u> | | | <u>2.68'</u> | <u>0.00</u> | |
| 900" | <u>15.0'</u> | | | <u>2.68'</u> | <u>0.00</u> | |
| 960" | <u>16.0'</u> | | | <u>2.68'</u> | <u>0.00</u> | |
| 1020" | <u>17.0'</u> | | | <u>2.68'</u> | <u>0.00</u> | |
| → 0" | | | | <u>2.68'</u> | <u>0.00</u> | |
| 10" | | | | <u>2.79'</u> | <u>0.11</u> | |
| 20" | | | | <u>2.78'</u> | <u>0.10</u> | |
| 30" | | | | <u>2.77'</u> | <u>0.09</u> | |

(Introduce →
slug)

(Remove
slug) →

SLUG TEST DATA FORM

Job No. _____

Client Chevron

Site Nor Plant

D&M Investigators D. Wagner /

E. J. Fild

Date _____

Time _____

Whether test is falling head
(slug entering water column)
or rising head (slug being
pulled out of well)

- length (in.) Small[illegible]

DAMES & MOORE
SLUG TEST DATA FORM

Observation/Monitoring Well No. B-48

Inner Diameter in inches of
portion of well (screen or
casing) in which water-level
recovery occurred 4"

Inner Diameter in inches of the
screen or open portion of the
hole 4"

Diameter of drilled hole in
inches 10"

Slug used — diameter (in.) _____
— length (in.) Small

Job No. 00113-909

Client Creiron

Site Main Plant

D&M Investigators D. Wagner /
E. J. Filio

Date 3/27/86

Time 1:00 PM

Whether test is falling head
(slug entering water column)
or rising head (slug being
pulled out of well) Both

Warren
George

Top of water
(from top
of brass)
1.06'

| Time After Introduction (Removal) of Slug | Mark Held or Nearest Foot Mark (ft) | Subtract or Add (ft) | Add or Subtract Correction Factor (ft) | Depth to Water, Below Top of Casing (ft) | Difference Between SWL and Depth to Water at t > 0 (ft) | Comments |
|--|--|-------------------------------|---|---|---|--------------------------|
| 0" | | | | 1.06' | | Static Water Level (SWL) |
| 10" | | | | 0.73' | 0.33 | |
| 20" | | | | 0.75' | 0.31 | |
| 30" | | | | 0.76' | 0.30 | |
| 40" | | | | 0.77' | 0.29 | |
| 50" | | | | 0.775' | 0.285 | |
| 60" | | | | 0.78' | 0.28 | |
| 70" | | | | 0.79' | 0.27 | |
| 80" | | | | 0.80' | 0.26 | |
| 90" | | | | 0.80' | 0.26 | |
| 120" 20' | | | | 0.81' | 0.25 | |
| 20' | — | — | — | — | — | |
| 150' 25' | | | | 0.83' | 0.23 | |
| 180 3.0' | | | | 0.835' | 0.225 | |
| 210 3.5' | | | | 0.85' | 0.21 | |
| 240 4.0' | | | | 0.86' | 0.20 | |
| 270 4.5' | | | | 0.86' | 0.19 | |
| 300 5.0' | | | | 0.87' | 0.18 | |
| 360 6.0' | | | | 0.88' | 0.17 | |
| 420 7.0' | | | | 0.895' | 0.165 | |
| 8.0' | — | — | — | — | — | |
| 540 9.0' | | | | 0.91' | 0.15 | |
| 660 11.0' | | | | 0.925' | 0.145 | |
| 780 13.0' | | | | 0.935' | 0.135 | |
| 900 15.0' | | | | 0.95' | 0.11 | |
| 080 18.0' | | | | 0.955' | 0.105 | |
| 1260 21.0' | | | | 0.96' | 0.10 | |
| 1440 24.0' | | | | 0.97' | 0.09 | |
| 1620 27.0' | | | | 0.975' | 0.085 | |
| 1960 32.0' | | | | 0.98' | 0.08 | |

→
negative
slug

DAMES & MOORE
SLUG TEST DATA FORM

Observation/Monitoring Well No. B-48

Inner Diameter in inches of
portion of well (screen or
casing) in which water-level
recovery occurred 4"

Inner Diameter in inches of the
screen or open portion of the
hole 4"

Diameter of drilled hole in
inches 10"

Slug used — diameter (in.)
— length (in.) Small

Job No. 00113-909

Client Chevron

Site Main Plant

D&M Investigators D. Wagner /
E.J. Fillo

Date 3/27/86

Time _____

Whether test is falling head
(slug entering water column)
or rising head (slug being
pulled out of well) _____

2220"
2520
2820"
Remove slug) →

2220"
2520
2820"
120"
150
180
210
240
270
300
360
420
480
540
660
780
900
1080
1260

| Time After Introduction (Removal) of Slug | Mark Held or Nearest Foot Mark (ft) | Subtract or Add (ft) | Add or Subtract Correction Factor (ft) | Depth to Water, Below Top of Casing (ft) | Difference Between SWL and Depth to Water at t > 0 (ft) | Comments |
|--|--|-------------------------------|---|---|---|--------------------------|
| 37.0' | | | | 0.99' | 0.07 | Static Water Level (SWL) |
| 42.0' | | | | 0.99' | 0.07 | |
| 47.0' | | | | 0.99' | 0.07 | |
| 0" | | | | 0.99' | 0.00 | |
| 10" | | | | 1.33' | 0.34 | |
| 20" | | | | 1.33' | 0.34 | |
| 40" | | | | 1.29' | 0.30 | |
| 50" | | | | 1.28' | 0.29 | |
| 60" | | | | 1.275' | 0.285 | |
| 70" | | | | 1.27' | 0.28 | |
| 80" | | | | 1.26' | 0.27 | |
| 90" | | | | 1.255' | 0.265 | |
| 2.0' | | | | 1.235' | 0.245 | |
| 2.5' | | | | 1.22' | 0.23 | |
| 3.0' | | | | 1.21' | 0.22 | |
| 3.5' | | | | 1.20' | 0.21 | |
| 4.0' | | | | 1.19' | 0.20 | |
| 4.5' | | | | 1.18' | 0.19 | |
| 5.0' | | | | 1.17' | 0.18 | |
| 6.0' | | | | 1.15' | 0.16 | |
| 7.0' | | | | 1.14' | 0.15 | |
| 8.0' | | | | 1.13' | 0.14 | |
| 9.0' | | | | 1.12' | 0.13 | |
| 11.0' | | | | 1.10' | 0.11 | |
| 13.0' | | | | 1.085' | 0.095 | |
| 15.0' | | | | 1.08' | 0.09 | |
| 18.0' | | | | 1.065' | 0.075 | |
| 21.0' | | | | 1.06' | 0.07 | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

DAMES & MOORE
SLUG TEST DATA FORM

Observation/Monitoring Well No. C-54

Inner Diameter in inches of
portion of well (screen or
casing) in which water-level
recovery occurred 4"

Inner Diameter in inches of the
screen or open portion of the
hole 4"

Diameter of drilled hole in
inches 7"

Slug used — diameter (in.)
— length (in.) Small

Job No. 00113-909

Client Chevron

Site Main Plant

D&M Investigators D. Wagner /
E. J. Fillo

Date 3/27/86

Time 2:30 PM

Whether test is falling head
(slug entering water column)
or rising head (slug being
pulled out of well) Both

Longer

Top of PVC

| Time After Introduction (Removal) of Slug | Mark Held or Nearest Foot Mark (ft) | Subtract or Add (ft) | Add or Subtract Correction Factor (ft) | Depth to Water, Below Top of Casing (ft) | Difference Between SWL and Depth to Water at > 0 (ft) | Comments |
|--|--|-------------------------------|---|---|---|--------------------------|
| 0 | | | | 1.71' | | Static Water Level (SWL) |
| 10" | | | | 1.35' | 0.36 | |
| 20" | | | | 1.39' | 0.32 | |
| 30" | | | | 1.42' | 0.29 | |
| 40" | | | | 1.44' | 0.27 | |
| 50" | | | | 1.46' | 0.25 | |
| 60" | | | | 1.48' | 0.23 | |
| 70" | | | | 1.49' | 0.22 | |
| 80" | | | | 1.51' | 0.20 | |
| 90" | | | | 1.52' | 0.19 | |
| 120" | 2.0' | | | 1.56' | 0.15 | |
| 50" | 2.5' | | | 1.58' | 0.13 | |
| 80" | 3.0' | | | 1.60' | 0.11 | |
| 210" | 3.5' | | | 1.61' | 0.10 | |
| 240" | 4.0' | | | 1.62' | 0.09 | |
| 270" | 4.5' | | | 1.63' | 0.08 | |
| 300" | 5.0' | | | 1.635' | 0.075 | |
| 360" | 6.0' | | | 1.645' | 0.065 | |
| 420" | 7.0' | | | 1.65' | 0.06 | |
| 480" | 8.0' | | | 1.655' | 0.055 | |
| 540" | 9.0' | | | 1.655' | 0.055 | |
| 660" | 11.0' | | | 1.66' | 0.05 | |
| 780" | 13.0' | | | 1.68' | 0.03 | |
| 900" | 15.0' | | | 1.69' | 0.02 | |
| 1080" | 18.0' | | | 1.70' | 0.01 | |
| 1260" | 21.0' | | | 1.70' | 0.01 | |
| 1440" | 24.0' | | | 1.70' | 0.01 | |
| 0" | | | | 1.70' | 0.01 | |
| 10" | | | | 2.01' | 0.31 | |
| 120" | | | | 1.98' | 0.28 | |

(Introduce →
(slug))

Top of
Water
1.71'

(Remove slug) →

SLUG TEST DATA FORM

Whether test is falling head
(slug entering water column)
or rising head (slug being
pulled out of well)

120"
150"
180"
210"
240"
270"
300"
330"

DAMES & MOORE
SLUG TEST DATA FORM

Observation/Monitoring Well No. D-68

Inner Diameter in inches of
portion of well (screen or
casing) in which water-level
recovery occurred 4"

Inner Diameter in inches of the
screen or open portion of the
hole 4"

Diameter of drilled hole in
inches 7"

Slug used — diameter (in.)
— length (in.) Small

Job No. 00113-909-032

Client Chevron

Site Darby Creek

D&M Investigators D. Wagner /
E.J. Fillo

Date 4/1/86

Time 9:00 AM

Whether test is falling head
(slug entering water column)
or rising head (slug being
pulled out of well) Both

| Time After Introduction (Removal) of Slug | Mark Held or Nearest Foot Mark (ft) | Subtract or Add (ft) | Add or Subtract Correction Factor (ft) | Depth to Water, Below Top of Casing (ft) | Difference Between SWL and Depth to Water at t > 0 (ft) | Comments |
|--|--|-------------------------------|---|---|---|--------------------------|
| 0 | | | | 4.72' | | Static Water Level (SWL) |
| 20" | | | | 4.34' | 0.38 | |
| 30" | | | | 4.34' | 0.38 | |
| 40" | | | | 4.35' | 0.37 | |
| 50" | | | | 4.35' | 0.37 | |
| 60" | | | | 4.36' | 0.36 | |
| 70" | | | | 4.36' | 0.36 | |
| 80" | | | | 4.365' | 0.355 | |
| 90" | | | | 4.37' | 0.35 | |
| 120" | | | | 4.38' | 0.34 | |
| 150" | | | | 4.39' | 0.33 | |
| 180" | | | | 4.395' | 0.325 | |
| 210" | | | | 4.405' | 0.315 | |
| 240" | | | | 4.415' | 0.305 | |
| 300" | | | | 4.430' | 0.29 | |
| 360" | | | | 4.445' | 0.275 | |
| 420" | | | | 4.46' | 0.26 | |
| 540" | | | | 4.48' | 0.24 | |
| 660" | | | | 4.50' | 0.22 | |
| 780" | | | | 4.52' | 0.20 | |
| 900" | | | | 4.54' | 0.18 | |
| 1080" | | | | 4.56' | 0.16 | |
| 1260" | | | | 4.58' | 0.14 | |
| 1420" | | | | 4.60' | 0.12 | |
| 1600" | | | | 4.61' | 0.11 | |
| 1780" | | | | 4.62' | 0.10 | |
| 1940" | | | | 4.63' | 0.09 | |
| 2340" | | | | 4.64' | 0.08 | |
| 2700" | | | | 4.65' | 0.07 | |
| 3060" | | | | 4.66' | 0.06 | |
| 3420" | | | | 4.67' | 0.05 | |

Introduce →
slug

from top
of PVC =
4.72' PP

4.73 - H₂O

30 PTS.
FALLING HEAD

product =
0.01

SLUG TEST DATA FORM

Job No. 00113-909-032

Client *Chevron*

Site Darby Creek

D&M Investigators D. Wagner

E. J. Fillo

Date 4/1/86

Time 8:40 AM

Whether test is falling head
(slug entering water column)
or rising head (slug being
pulled out of well) *B*

→ length (in.)

of rising head (slug being pulled out of well) Both

Static H_2O
From top of
PVC casing
3.59'

| (Sec) Time After Introduction (Removal) of Slug | Mark Held or Nearest Foot Mark (ft) | Subtract or Add (ft) | Add or Subtract Correction Factor (ft) | Depth to Water, Below Top of Casing (ft) | Difference Between SWL and Depth to Water at $t > 0$ (ft) | Comments |
|---|--|-------------------------------|---|---|---|--------------------------|
| 0 | | | | 3.59' | | Static Water Level (SWL) |
| 20" | | | | 3.20' | 0.39 | |
| 30" | | | | 3.20' | 0.39 | |
| 40" | | | | 3.20' | 0.39 | |
| 50" | | | | 3.20' | 0.39 | |
| 60" | | | | 3.20' | 0.39 | |
| 70" | | | | 3.20' | 0.39 | |
| 80" | | | | 3.20' | 0.39 | |
| 90" | | | | 3.20' | 0.39 | |
| 2.00' | | | | 3.20' | 0.39 | |
| 2.50' | | | | 3.20' | 0.39 | |
| 3.50' | | | | 3.21' | 0.38 | |
| 4.00' | | | | 3.21' | 0.38 | |
| 5.00' | | | | 3.21' | 0.38 | |
| 0" | | | | 3.21' | 0.38 | |
| 20" | | | | 3.61' | 0.40 | |
| 30" | | | | 3.61' | 0.40 | |
| 40" | | | | 3.61' | 0.40 | |
| 50" | | | | 3.61' | 0.40 | |
| 60" | | | | 3.61' | 0.40 | |
| 70" | | | | 3.61' | 0.40 | |
| 80" | | | | 3.61' | 0.40 | |
| 90" | | | | 3.61' | 0.40 | |
| 2.00' | | | | 3.61' | 0.40 | |
| 2.50' | | | | 3.61' | 0.40 | |
| 3.00' | | | | 3.61' | 0.40 | |
| 4.00' | | | | 3.61' | 0.40 | |
| 5.00' | | | | 3.61' | 0.40 | |

(Introduce slug) →

120

150

210

240

300

(Remove S_{-i}) \rightarrow

120

150

180

240

300

DAMES & MOORE
SLUG TEST DATA FORM

Observation/Monitoring Well No. S-75

Job No. 00113-909-032

Inner Diameter in inches of
portion of well (screen or
casing) in which water-level
recovery occurred 4"

Client Chevron

Site S.R.T.F.

Inner Diameter in inches of the
screen or open portion of the
hole 4"

D&M Investigators D. Wagner /

E.J. Fillo

Diameter of drilled hole in
inches 7"

Date 4/1/86

Time 12:50 PM

Slug used — diameter (in.)

— length (in.)

Large

Whether test is falling head
(slug entering water column)
or rising head (slug being
pulled out of well) Both

| Time After Introduction (Removal) of Slug | Mark Held or Nearest Foot Mark (ft) | Subtract or Add (ft) | Add or Subtract Correction Factor (ft) | Top of Steel Depth to Water, Below Top of Casing (ft) | Difference Between SWL and Depth to Water at t > 0 (ft) | Comments |
|--|--|-------------------------------|---|--|---|--------------------------|
| 0 | | | | 10.31' | | Static Water Level (SWL) |
| 20" | | | | 8.44' | 1.87 | |
| 30" | | | | 8.45' | 1.86 | |
| 40" | | | | 8.46' | 1.85 | |
| 50" | | | | 8.465' | 1.845 | |
| 60" | | | | 8.47' | 1.84 | |
| 70" | | | | 8.48' | 1.83 | |
| 80" | | | | 8.485' | 1.825 | |
| 90" | | | | 8.49' | 1.82 | |
| 120 | 2.00' | | | 8.505' | 1.805 | |
| 150 | 2.50' | | | 8.515' | 1.795 | |
| 180 | 3.00' | | | 8.525' | 1.785 | |
| 210 | 3.50' | | | 8.535' | 1.775 | |
| 240 | 4.00' | | | 8.545' | 1.765 | |
| 270 | 4.50' | | | 8.550' | 1.76 | |
| 300 | 5.00' | | | 8.560' | 1.75 | |
| 360 | 6.00' | | | 8.570' | 1.74 | |
| 420 | 7.00' | | | 8.580' | 1.73 | |
| 480 | 8.00' | | | 8.590' | 1.72 | |
| 540 | 9.00' | | | 8.600' | 1.71 | |
| 660 | 11.00' | | | 8.615' | 1.695 | |
| 780 | 13.00' | | | 8.63' | 1.68 | |
| 1080 | 18.00' | | | 8.655' | 1.655 | |
| 1800 | 30.00' | | | 8.710' | 1.6 | |
| 3300 | 55.00' | | | 8.820' | 1.49 | |
| 6400 | 115.00' | | | 9.02' | 1.29 | |
| 7500 | 125.00' | | | 9.06' | 1.25 | |
| 0" | | | | 9.06' | 1.25 | |
| 35" | | | | 10.93' | 1.87 | |

Introduce slug →

Remove slug →

DAMES & MOORE
SLUG TEST DATA FORM

Observation/Monitoring Well No. S-75

40

4"

7¹³

(Large)

(Large)

Job No. 00113-909-032

Client *Cher Rom*

Site S. R. T. F.

D&M Investigators D. Wagner

E. J. Fille

Date 4/1/86

Time

Whether test is falling head
(slug entering water column)
or rising head (slug being
pulled out of well)

Both

WHAT a
Day.

[illegible]

DAMES & MOORE
SLUG TEST DATA FORM

Observation/Monitoring Well No. S-82

Inner Diameter in inches of
portion of well (screen or
casing) in which water-level
recovery occurred 4"

Inner Diameter in inches of the
screen or open portion of the
hole 4"

Diameter of drilled hole in
inches 7"

Slug used — diameter (in.)
— length (in.) Small

Job No. 00113-909-032

Client Crevron

Site S.S.T.F.

D&M Investigators D. Wagner /
E.J. Fillo

Date 4/1/86

Time _____

Whether test is falling head
(slug entering water column)
or rising head (slug being
pulled out of well) Both

| Time After Introduction (Removal) of Slug | Mark Held or Nearest Foot Mark (ft) | Subtract or Add (ft) | Add or Subtract Correction Factor (ft) | Depth to Water, Below Top of Casing (ft) | Difference Between SWL and Depth to Water at t > 0 (ft) | Comments |
|--|--|-------------------------------|---|---|---|--------------------------|
| 0" | | | 1.54' | 1.66' | 0.12 | Static Water Level (SWL) |
| 10" | | | | 1.57' | 0.09 | |
| 20" | | | | 1.57' | 0.09 | |
| 30" | | | | 1.60' | 0.06 | |
| 40" | | | | 1.62' | 0.04 | |
| 50" | | | | 1.62' | 0.04 | |
| 60" | | | | 1.625' | 0.035 | |
| 70" | | | | 1.63' | 0.03 | |
| 80" | | | | 1.63' | 0.03 | |
| 90" | | | | 1.635' | 0.025 | |
| 120 | | | | 1.635' | 0.025 | |
| 150 | | | | 1.635' | 0.025 | |
| 180 | | | | 1.640' | 0.02 | |
| 210 | | | | 1.640' | 0.02 | |
| 240 | | | | 1.640' | 0.02 | |
| 270 | | | | 1.640' | 0.02 | |
| 300 | | | | 1.640' | 0.02 | |
| 360 | | | | 1.640' | 0.02 | |
| 420 | | | | 1.640' | 0.02 | |
| 540 | | | | 1.640' | 0.02 | |
| 1260 | | | | 1.640' | 0.02 | |
| 0" | | | | 1.640' | 0.02 | |
| 15" | | | | 1.8' | 0.16 | |
| 20" | | | | 1.75' | 0.11 | |
| 30" | | | | 1.71' | 0.07 | |
| 40" | | | | 1.69' | 0.05 | |
| 50" | | | | 1.68' | 0.04 | |
| 60" | | | | 1.66' | 0.02 | |
| 70" | | | | 1.65' | 0.01 | |
| 80" | | | | 1.65' | 0.01 | |
| 90" | | | | 1.65' | 0.01 | |

H₂O from
top of
pvc =
1.66'

product =
0.01

Introduce →
slug)

(Remove slug) →

SLUG TEST DATA FORM

120
150
180
210
240
270
300

Laboratory Permeability and Hydrometer Test Data

PROJECT CHEVRONJOB. NO. 00113-950-032

LOCATION OF PROJECT _____

BORING NO. A 21 D SAMPLE NO. _____DESCRIPTION OF SOIL CLAYEY SILTSDEPTH OF SAMPLE 19.5-21.5'

CHECKED BY _____

| | | | |
|---|------------------------|---------------------|--|
| X | ATTERBERG LIMITS | | |
| X | MOISTURE & DENSITY | | |
| X | SIEVE | GRAIN SIZE ANALYSIS | |
| X | HYDROMETER | | |
| | RELATIVE DENSITY | | |
| | COMPACTION | | |
| X | PERMEABILITY | | |
| | CONSOLIDATION | | |
| | VANE SHEAR | | |
| | SPECIFIC GRAVITY | | |
| | DIRECT SHEAR | | |
| | UNCONFINED COMPRESSION | | |
| | TRIAxIAL COMPRESSION | | |
| | | MIS. TESTS | |
| | | | |
| | | | |

Non-PLASTIC

FLEX-WALL

BY L. S. HANNADATE 1-13-87

NATURAL MOISTURE

| DISH | <u>D-5</u> | DENSITY | |
|-----------------------|---------------|------------------------|--|
| WT OF DISH + WET SOIL | <u>405.21</u> | NUMBER OF RINGS | |
| WT OF DISH + DRY SOIL | <u>282.37</u> | WT OF RINGS + WET SOIL | |
| WT OF MOISTURE | <u>122.84</u> | WT OF RINGS | |
| WT OF DISH | <u>7.96</u> | WT OF WET SOIL | |
| WT OF DRY SOIL | <u>274.41</u> | FIELD DENSITY | |
| MOISTURE CONTENT | <u>44.8</u> | DRY DENSITY | |

HYGROSCOPIC MOISTURE

| | |
|-----------------------|--|
| DISH | |
| WT OF DISH + WET SOIL | |
| WT OF DISH + DRY SOIL | |
| WT OF MOISTURE | |
| WT OF DISH | |
| WT OF DRY SOIL | |
| MOISTURE CONTENT | |

SOIL AIR-DRIED IN PAN NUMBER D-5

PAN NUMBER

| U.S. STAND. SIEVE NO. | WT. OF SOIL RETAIN UNCORR. | WT. OF SOIL RETAIN CORR. | PERCENT RETAIN. | CUMULATIVE PERCENT RETAINED | PERCENT FINER |
|-----------------------|----------------------------|--------------------------|-----------------|-----------------------------|---------------|
| LARGER | | | | | |
| 3" (76.2) | | | | | |
| 1 1/2" (38.1) | | | | | |
| 3/4" (19.1) | | | | | |
| 1/2" (12.7) | | | | | |
| 3/8" (9.5) | | | | | |
| NO. 4 (4.75) | | | | | |
| NO. 10 (2.00) | | | | | |
| PAN | | | | | |
| TOTAL | | | | | |

PAN NUMBER

D-13

| | | | | | |
|-----------------|-------------|--------------|--------------|-------------|--------------|
| NO. 20 (0.84) | | | | | |
| NO. 40 (0.42) | | | | | |
| NO. 60 (0.25) | <u>0</u> | | <u>0</u> | <u>0</u> | <u>100</u> |
| NO. 100 (0.149) | <u>0.62</u> | | <u>0.95</u> | <u>0.95</u> | <u>99.05</u> |
| NO. 200 (0.074) | <u>2.71</u> | | <u>4.17</u> | <u>5.12</u> | <u>94.88</u> |
| PAN | | <u>61.67</u> | <u>94.88</u> | <u>100</u> | |
| TOTAL | <u>65.0</u> | | | | |

HYDROMETER ANALYSIS

BY L. SHANNON DATE 1-15-87

HYDROMETER NO. 152H

G_s OF SOLIDS = _____ a = _____

DISPERSING AGENT CALGON

AMOUNT 125 ML WT. OF SOIL, W_s 65.0

ZERO CORRECTION _____

MENISCUS CORRECTION _____

BEAKER NUMBER THIRTEEN

JAR NUMBER 3

| DATE | TIME OF READING | ELAPSED TIME, MIN | TEMP., °C | ACTUAL HYD. READING R _a | CORR. HYD. READING R _c | % FINER | HYD. CORR. ONLY FOR MENISCUS, R _c | L | $\frac{L}{t}$ | K | D, mm |
|---------|-----------------|-------------------|-----------|------------------------------------|-----------------------------------|---------|--|---|---------------|---|-------|
| 1-16-87 | 1025 | 0 | | | | | | | | | |
| | 1027 | 2 | | 32 | | 41.54 | | | | | .031 |
| | 1030 | 5 | | 24 | | 29.23 | | | | | .022 |
| | 1040 | 15 | | 21 | | 24.22 | | | | | .013 |
| | 1055 | 30 | | 18 | | 20.0 | | | | | .009 |
| | 1105 | 60 | | 15.5 | | 16.15 | | | | | .007 |
| | 1035 | 20 | | 13 | | 12.31 | | | | | .003 |
| 1-17-86 | 1025 | 1440 | | 10.5 | | 8.46 | | | | | .001 |
| | | | | | | | | | | | |
| | | | | | | | | | | | |

SPECIFIC GRAVITY OF SOIL SOLIDS (G_s)

BY _____ DATE _____

| | | |
|--|--|--|
| FLASK NUMBER | | |
| WT. FLASK + WATER + SOIL = W _{bws} | | |
| TEMPERATURE, °C | | |
| WT. FLASK + WATER ^b = W _{bw} | | |
| WT. OF DRY SOIL = W _s | | |
| W _w = W _s + W _{bw} - W _{bws} | | |
| G _s = aW _s /W _w | | |

AVERAGE SPECIFIC GRAVITY OF SOIL SOLIDS (G_s) = _____

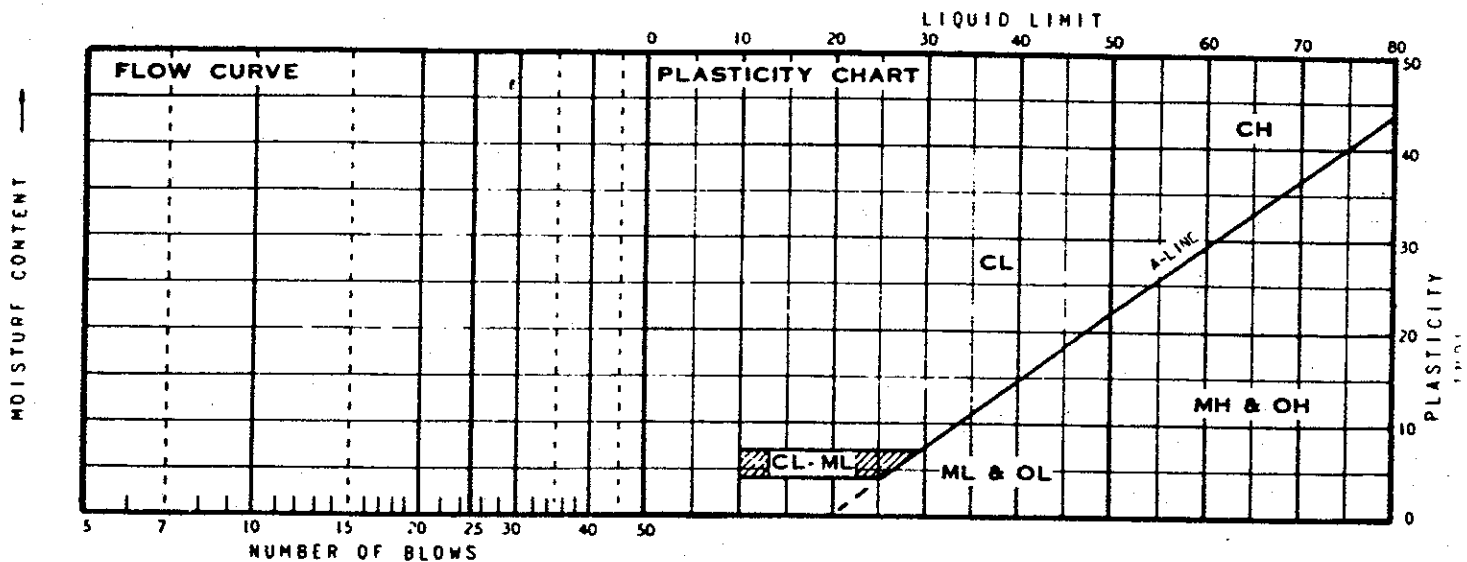
PLASTIC LIMIT

BY _____ DATE _____

| DETERMINATION | 1 | 2 | 3 | 4 |
|-----------------------|---|---|---|---|
| DISH | | | | |
| WT OF DISH + WET SOIL | | | | |
| WT OF DISH + DRY SOIL | | | | |
| WT OF MOISTURE | | | | |
| WT OF DISH | | | | |
| WT OF DRY SOIL | | | | |
| MOISTURE CONTENT | | | | |

LIQUID LIMIT

| DETERMINATION | 1 | 2 | 3 | 4 |
|-----------------------|---|---|---|---|
| DISH | | | | |
| NUMBER OF BLOWS | | | | |
| WT OF DISH + WET SOIL | | | | |
| WT OF DISH + DRY SOIL | | | | |
| WT OF MOISTURE | | | | |
| WT OF DISH | | | | |
| WT OF DRY SOIL | | | | |
| MOISTURE CONTENT | | | | |



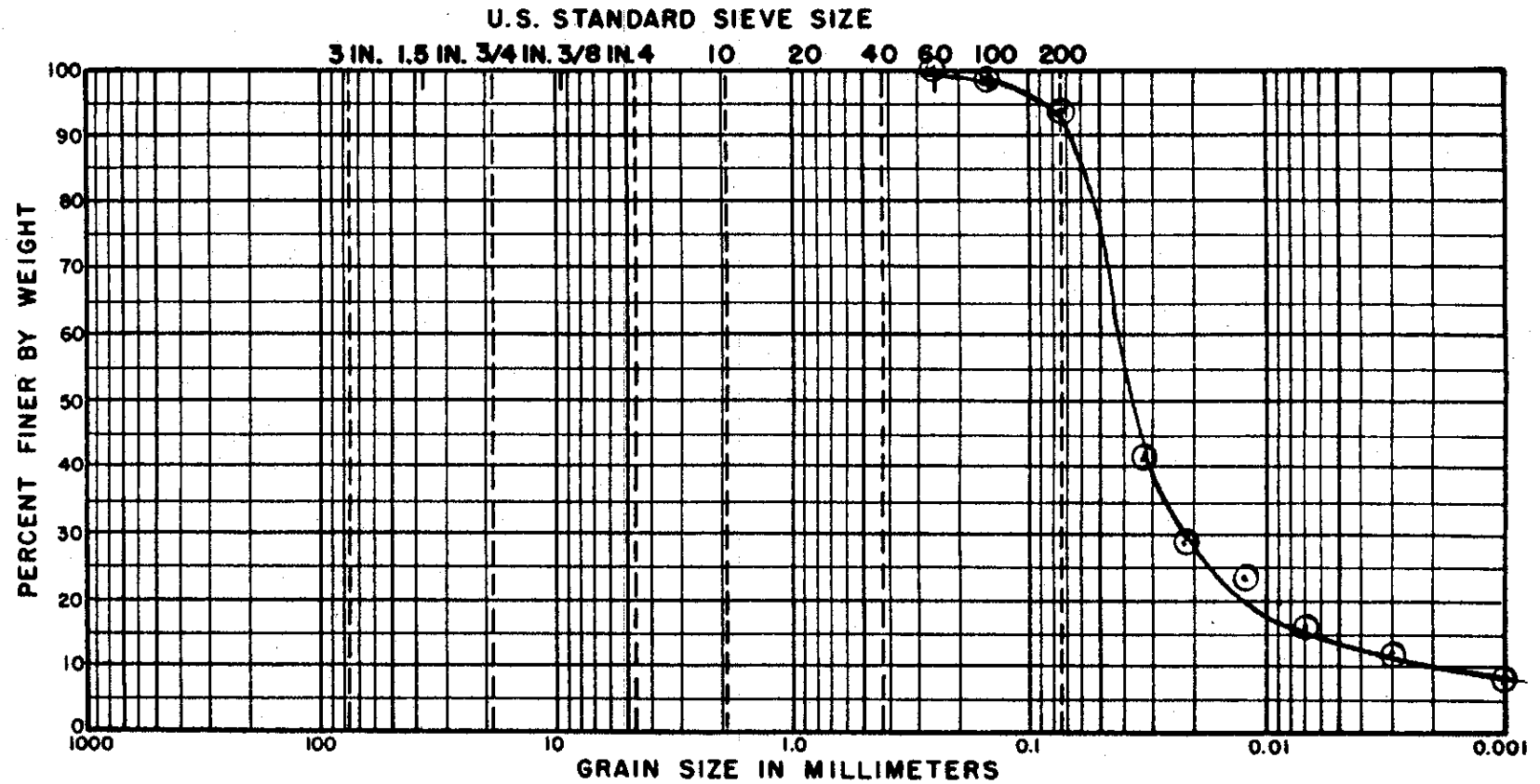
| LIQUID LIMIT | PLASTIC LIMIT | PLASTICITY INDEX |
|--------------|---------------|------------------|
| | | |

FIELD CLASSIFICATION _____

LABORATORY CLASSIFICATION _____

FILE 02113-950-032
 BY L.S. DATE 1-18-67
 CHECKED BY _____ DATE _____

REVISIONS
 BY _____ DATE _____
 BY _____ DATE _____
 PLATE _____ OF _____



| | DEPTH | COBBLES | | GRAVEL | | SAND | | | SILT OR CLAY | | | |
|------|-----------|---------|------|--------|--------|------|----|----|--------------|--|--|--|
| | | COARSE | FINE | COARSE | MEDIUM | FINE | LL | PL | PI | | | |
| A21D | 195-21.5' | | | | | | | | | | | |

GRADATION CURVE

PROJECT CHEVRONJOB. NO. 00113-950

LOCATION OF PROJECT _____

BORING NO. B4BD SAMPLE NO. _____DESCRIPTION OF SOIL SILTY CLAYDEPTH OF SAMPLE 30-32'

CHECKED BY _____

| | | | |
|-------------------------------------|------------------------|---------------------|--|
| <input checked="" type="checkbox"/> | ATTERBERG LIMITS | | |
| <input checked="" type="checkbox"/> | MOISTURE & DENSITY | | |
| <input checked="" type="checkbox"/> | SIEVE | GRAIN SIZE ANALYSIS | |
| <input checked="" type="checkbox"/> | HYDROMETER | | |
| | RELATIVE DENSITY | | |
| | COMPACTION | | |
| <input checked="" type="checkbox"/> | PERMEABILITY | | |
| | CONSOLIDATION | | |
| | VANE SHEAR | | |
| | SPECIFIC GRAVITY | | |
| | DIRECT SHEAR | | |
| | UNCONFINED COMPRESSION | | |
| | TRIAxIAL COMPRESSION | | |
| | | MIS. TESTS | |
| | | | |
| | | | |

→ FLEX WALL

BY L. SHANNONDATE 12-3-86

NATURAL MOISTURE

| DISH | H | DENSITY | |
|-----------------------|--------|------------------------|--|
| WT OF DISH + WET SOIL | 132.42 | NUMBER OF RINGS | |
| WT OF DISH + DRY SOIL | 96.0 | WT OF RINGS + WET SOIL | |
| WT OF MOISTURE | 36.42 | WT OF RINGS | |
| WT OF DISH | 27.84 | WT OF WET SOIL | |
| WT OF DRY SOIL | 68.16 | FIELD DENSITY | |
| MOISTURE CONTENT | 53.4 | DRY DENSITY | |

HYGROSCOPIC MOISTURE

| | |
|-----------------------|--|
| DISH | |
| WT OF DISH + WET SOIL | |
| WT OF DISH + DRY SOIL | |
| WT OF MOISTURE | |
| WT OF DISH | |
| WT OF DRY SOIL | |
| MOISTURE CONTENT | |

SOIL AIR-DRIED IN PAN NUMBER 14-16

PAN NUMBER

| U.S. STAND. SIEVE NO. | WT. OF SOIL RETAIN UNCORR. | WT. OF SOIL RETAIN CORR. | PERCENT RETAIN. | CUMULATIVE PERCENT RETAINED | PERCENT FINER |
|-----------------------------|----------------------------------|--------------------------------|--------------------|-----------------------------------|------------------|
| LARGER | | | | | |
| 3" (76.2) | | | | | |
| 1½" (38.1) | | | | | |
| ¾" (19.1) | | | | | |
| ½" (12.7) | | | | | |
| ¼" (6.35) | | | | | |
| NO. 4 (4.76) | | | | | |
| NO. 10 (2.00) | | | | | |
| PAN | | | | | |
| TOTAL | 130.94 | | | | |

PAN NUMBER

LS-16

| | | | | | |
|-----------------|------|-------|-------|------|-------|
| NO. 20 (0.84) | | | | | |
| NO. 40 (0.42) | | | | | |
| NO. 60 (0.25) | 0 | | 0 | 0 | 100 |
| NO. 100 (0.149) | 0.17 | | 0.26 | 0.26 | 99.74 |
| NO. 200 (0.074) | 0.10 | | 0.15 | 0.41 | 99.59 |
| PAN | | 64.73 | 99.58 | | |
| TOTAL | 65.0 | | | | |

HYDROMETER ANALYSIS

BY L SHANNON DATE 12-14-86

HYDROMETER NO. 152H

G_s OF SOLIDS = _____

DISPERSING AGENT CALGON

AMOUNT 125 ML WT. OF SOIL, W_s 65.0

ZERO CORRECTION _____

MENISCUS CORRECTION _____

BEAKER NUMBER 01

JAR NUMBER 5

| DATE | TIME OF READING | ELAPSED TIME, MIN | TEMP., °C | ACTUAL HYD. READING R _a | CORR. HYD. READING R _c | % FINER | HYD. CORR. ONLY FOR MENISCUS, R _c | L | $\frac{L}{t}$ | K | D, mm |
|----------|-----------------|-------------------|-----------|------------------------------------|-----------------------------------|---------|--|---|---------------|---|-------|
| 12-15-86 | 1307 | 0 | | | | | | | | | |
| | 1309 | 2 | | 55 | | 79.92 | | | | | .027 |
| | 1312 | 5 | | 48 | | 66.15 | | | | | .018 |
| | 1322 | 15 | | 41 | | 55.38 | | | | | .011 |
| | 1337 | 30 | | 35 | | 46.15 | | | | | .008 |
| | 1407 | 60 | | 30 | | 38.46 | | | | | .006 |
| | 1512 | 250 | | 23.5 | | 28.12 | | | | | .003 |
| 12-16-86 | 1307 | 1440 | | 17.5 | | 19.23 | | | | | .001 |
| | | | | | | | | | | | |
| | | | | | | | | | | | |

SPECIFIC GRAVITY OF SOIL SOLIDS (G_s)

BY _____ DATE _____

| | | |
|--|--|--|
| FLASK NUMBER | | |
| WT. FLASK + WATER + SOIL = W _{bws} | | |
| TEMPERATURE, °C | | |
| WT. FLASK + WATER ^b = W _{bw} | | |
| WT. OF DRY SOIL = W _s | | |
| W _w = W _s + W _{bw} - W _{bws} | | |
| G _s = $\frac{aW_s}{W_w}$ | | |

AVERAGE SPECIFIC GRAVITY OF SOIL SOLIDS (G_s) = _____

LIMITS MATERIAL IN PAN NUMBER

PLASTIC LIMIT

BY

L.S.

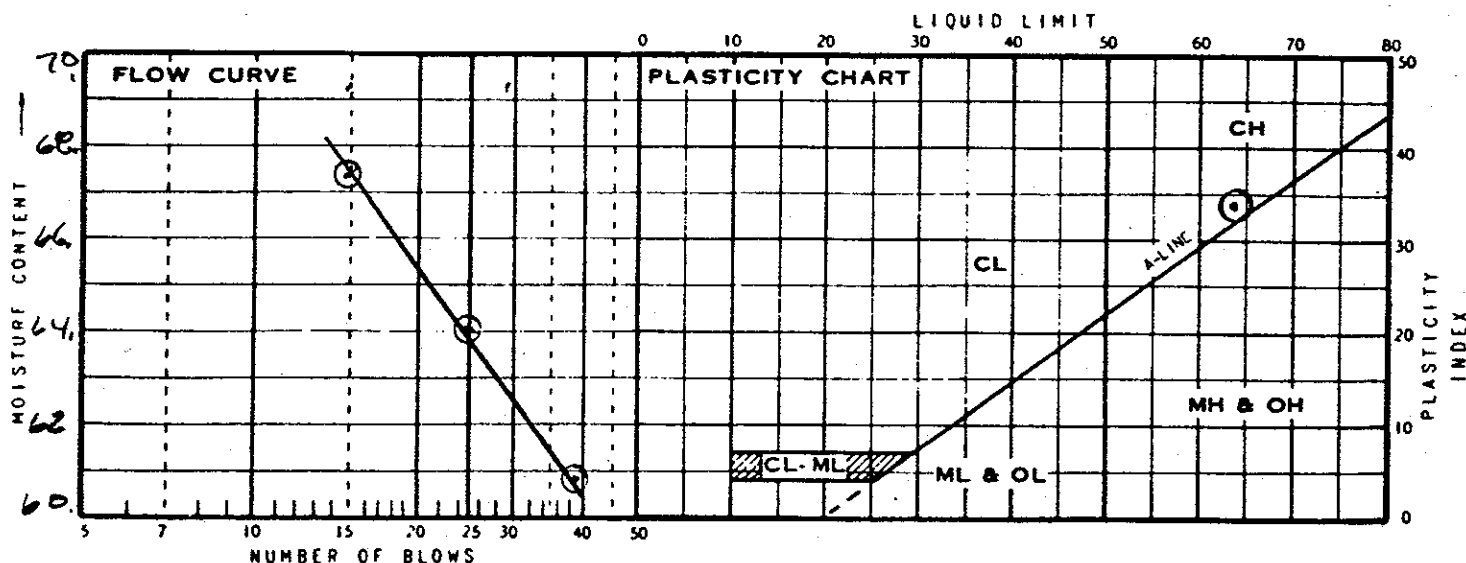
DATE

1-8-87

| DETERMINATION | 1 | 2 | 3 | 4 |
|-----------------------|-------|-------|-------|---|
| DISH | 772 | 36 | 510 | |
| WT OF DISH + WET SOIL | 41.53 | 42.20 | 41.69 | |
| WT OF DISH + DRY SOIL | 39.81 | 40.30 | 40.06 | |
| WT OF MOISTURE | 6.72 | 1.90 | 1.63 | |
| WT OF DISH | 34.24 | 34.08 | 34.45 | |
| WT OF DRY SOIL | 5.57 | 6.22 | 5.61 | |
| MOISTURE CONTENT | 30.9 | 30.5 | 29.1 | |

LIQUID LIMIT

| DETERMINATION | 1 | 2 | 3 | 4 |
|-----------------------|-------|-------|-------|---|
| DISH | A-12 | 233 | E | |
| NUMBER OF BLOWS | 33 | 25 | 15 | |
| WT OF DISH + WET SOIL | 52.33 | 40.02 | 48.90 | |
| WT OF DISH + DRY SOIL | 46.20 | 32.53 | 40.65 | |
| WT OF MOISTURE | 6.13 | 7.49 | 8.23 | |
| WT OF DISH | 36.14 | 20.82 | 28.45 | |
| WT OF DRY SOIL | 10.06 | 11.71 | 12.22 | |
| MOISTURE CONTENT | 60.9 | 64.0 | 67.3 | |



| LIQUID LIMIT | PLASTIC LIMIT | PLASTICITY INDEX |
|--------------|---------------|------------------|
| 64.0 | 30.0 | 34.0 |

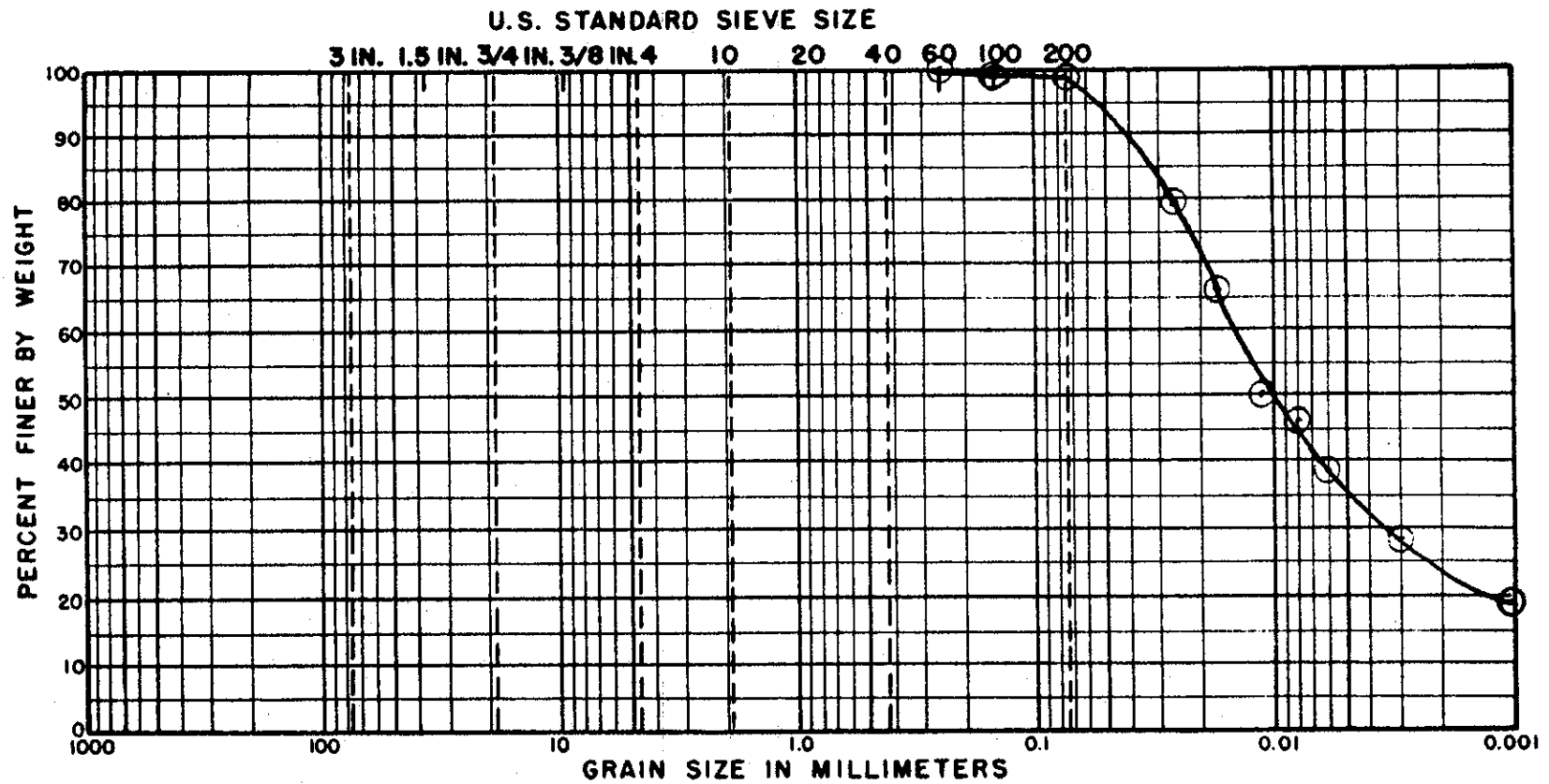
FIELD CLASSIFICATION _____

LABORATORY CLASSIFICATION CH

FILE 00113-930

BY L.S. DATE 12-17-66
CHECKED BY DATE

REVISIONS

BY DATE
BY DATE
PLATE OF

| | COBBLES | GRAVEL | | SAND | | | SILT OR CLAY | | | |
|--------------|----------------|--------|------|---------|--------|------|--------------|--|--|--|
| | | COARSE | FINE | COARSE | MEDIUM | FINE | | | | |
| DEPTH | CLASSIFICATION | | | NAT. WC | LL | PL | PI | | | |
| B 48D 30-32' | | | | | | | | | | |

GRADATION CURVE

PROJECT CHEVRONJOB. NO. 00113-950-032

LOCATION OF PROJECT _____

BORING NO. C50D SAMPLE NO. _____DESCRIPTION OF SOIL CLAYEY SILTDEPTH OF SAMPLE 7.5-9'

CHECKED BY _____

| | | | |
|-------------------------------------|------------------------|---------------------|--|
| <input checked="" type="checkbox"/> | ATTERBERG LIMITS | | |
| <input checked="" type="checkbox"/> | MOISTURE & DENSITY | | |
| <input checked="" type="checkbox"/> | SIEVE | GRAIN SIZE ANALYSIS | |
| <input checked="" type="checkbox"/> | HYDROMETER | | |
| | RELATIVE DENSITY | | |
| | COMPACTION | | |
| <input checked="" type="checkbox"/> | PERMEABILITY | | |
| | CONSOLIDATION | | |
| | VANE SHEAR | | |
| | SPECIFIC GRAVITY | | |
| | DIRECT SHEAR | | |
| | UNCONFINED COMPRESSION | | |
| | TRIAXIAL COMPRESSION | | |
| | | MIS. TESTS | |
| | | | |
| | | | |

FLEX WALL

BY L. SHANNONDATE 1-14-87

NATURAL MOISTURE

| DISH | ACE | DENSITY | |
|-----------------------|-------|------------------------|--|
| WT OF DISH + WET SOIL | 96.46 | NUMBER OF RINGS | |
| WT OF DISH + DRY SOIL | 66.92 | WT OF RINGS + WET SOIL | |
| WT OF MOISTURE | 29.54 | WT OF RINGS | |
| WT OF DISH | 38.34 | WT OF WET SOIL | |
| WT OF DRY SOIL | 28.58 | FIELD DENSITY | |
| MOISTURE CONTENT | 103.4 | DRY DENSITY | |

HYGROSCOPIC MOISTURE

| | |
|-----------------------|--|
| DISH | |
| WT OF DISH + WET SOIL | |
| WT OF DISH + DRY SOIL | |
| WT OF MOISTURE | |
| WT OF DISH | |
| WT OF DRY SOIL | |
| MOISTURE CONTENT | |

SOIL AIR-DRIED IN PAN NUMBER 17-12

PAN NUMBER

| U.S. STAND. SIEVE NO. | WT. OF SOIL RETAIN UNCORR. | WT. OF SOIL RETAIN CORR. | PERCENT RETAIN. | CUMULATIVE PERCENT RETAINED | PERCENT FINER |
|-----------------------------|----------------------------------|-----------------------------------|--------------------|-----------------------------------|------------------|
| LARGER | | | | | |
| 3" (76.2) | | | | | |
| 1½" (38.1) | | | | | |
| ¾" (19.1) | | | | | |
| ½" (12.7) | | | | | |
| ¼" (6.35) | | | | | |
| NO. 4 (4.76) | | | | | |
| NO. 10 (2.00) | | | | | |
| PAN | | | | | |
| TOTAL | 79.70 | | | | |

PAN NUMBER

D-26

| | | | | | |
|-----------------|------|-------|-------|------|-------|
| NO. 20 (0.84) | | | | | |
| NO. 40 (0.42) | | | | | |
| NO. 60 (0.25) | | | | | |
| NO. 100 (0.149) | 0 | | 0 | 0 | 100 |
| NO. 200 (0.074) | 0.28 | | 0.43 | 0.43 | 99.57 |
| PAN | | 64.72 | 99.57 | | |
| TOTAL | 65.0 | | | | |

HYDROMETER ANALYSIS

BY L. SHANNON DATE 1-15-87

HYDROMETER NO. 152H

G_s OF SOILS = _____

DISPERSING AGENT CALGON

AMOUNT 125 ML WT. OF SOIL, W_s 65.0

ZERO CORRECTION _____

MENISCUS CORRECTION _____

BEAKER NUMBER FOURTEEN

JAR NUMBER 4

| DATE | TIME OF READING | ELAPSED TIME, MIN | TEMP., °C | ACTUAL HYD. READING R _a | CORR. HYD. READING R _c | % FINER | HYD. CORR. ONLY FOR MENISCUS, R _c | L | $\frac{L}{t}$ | K | D, mm |
|---------|-----------------|-------------------|-----------|------------------------------------|-----------------------------------|---------|--|---|---------------|---|-------|
| 1-6-87 | 1029 | 0 | | | | | | | | | |
| | 1031 | 2 | | 42 | | 56.92 | | | | | .030 |
| | 1034 | 5 | | 38.5 | | 54.51 | | | | | .020 |
| | 1044 | 15 | | 32.5 | | 42.31 | | | | | .012 |
| | 1059 | 30 | | 28 | | 35.38 | | | | | .009 |
| | 1129 | 60 | | 24 | | 29.23 | | | | | .006 |
| | 1039 | 250 | | 17 | | 18.4 | | | | | .003 |
| 1-17-87 | 1029 | 1440 | | 13 | | 12.31 | | | | | .001 |
| | | | | | | | | | | | |
| | | | | | | | | | | | |

SPECIFIC GRAVITY OF SOIL SOLIDS (G_s)

BY _____ DATE _____

| | | |
|--|--|--|
| FLASK NUMBER | | |
| WT. FLASK + WATER + SOIL = W _{bws} | | |
| TEMPERATURE, °C | | |
| WT. FLASK + WATER ^b = W _{bw} | | |
| WT. OF DRY SOIL = W _s | | |
| W _w = W _s + W _{bw} - W _{bws} | | |
| G _s = $\frac{aW_s}{W_w}$ | | |

AVERAGE SPECIFIC GRAVITY OF SOIL SOLIDS (G_s) = _____

LIMITS MATERIAL IN PAN NUMBER

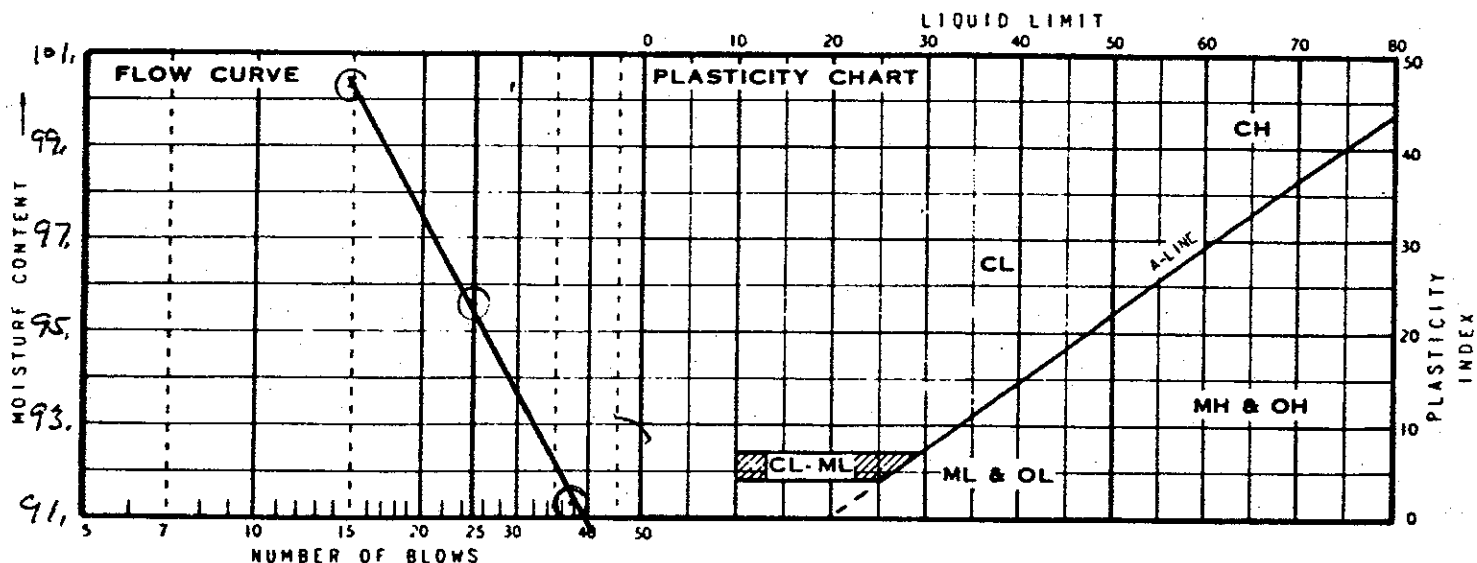
PLASTIC LIMIT

BY L. SHANNON DATE 1-14-87

| DETERMINATION | 1 | 2 | 3 | 4 |
|-----------------------|-------|-------|-------|---|
| DISH | 777 | 23 | AN7 | |
| WT OF DISH + WET SOIL | 43.15 | 45.05 | 41.98 | |
| WT OF DISH + DRY SOIL | 40.19 | 41.90 | 39.70 | |
| WT OF MOISTURE | 2.96 | 3.15 | 2.28 | |
| WT OF DISH | 33.40 | 34.66 | 34.62 | |
| WT OF DRY SOIL | 6.79 | 7.24 | 5.08 | |
| MOISTURE CONTENT | 43.6 | 43.5 | 44.9 | |

LIQUID LIMIT

| DETERMINATION | 1 | 2 | 3 | 4 |
|-----------------------|-------|-------|-------|---|
| DISH | Mon | 710 | A-32 | |
| NUMBER OF BLOWS | 38 | 25 | 15 | |
| WT OF DISH + WET SOIL | 49.78 | 49.33 | 53.60 | |
| WT OF DISH + DRY SOIL | 42.24 | 42.10 | 44.74 | |
| WT OF MOISTURE | 7.54 | 7.23 | 8.86 | |
| WT OF DISH | 33.96 | 34.54 | 35.90 | |
| WT OF DRY SOIL | 8.28 | 7.56 | 8.84 | |
| MOISTURE CONTENT | 91.1 | 95.6 | 100.2 | |



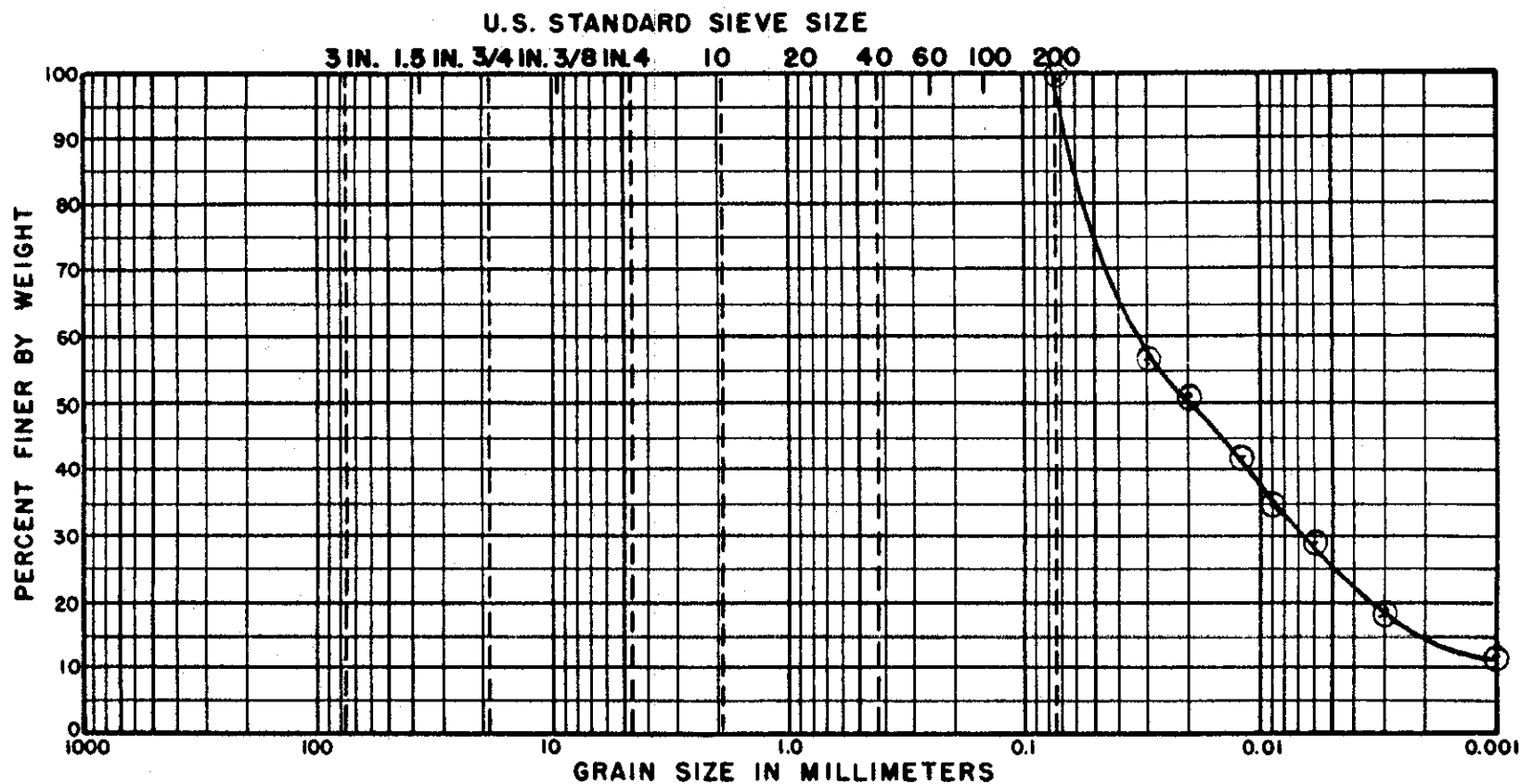
| LIQUID LIMIT | PLASTIC LIMIT | PLASTICITY INDEX |
|--------------|---------------|------------------|
| 95 | 44 | 51 |

FIELD CLASSIFICATION _____

LABORATORY CLASSIFICATION CH

FILE 00113-930-072
 BY L.S. DATE 1-20-87
 CHECKED BY _____ DATE _____

REVISIONS
 BY _____ DATE _____
 BY _____ DATE _____
 PLATE _____ OF _____



| | DEPTH | GRAVEL | | SAND | | | SILT OR CLAY |
|------|--------|--------|------|--------|--------|------|--------------|
| | | COARSE | FINE | COARSE | MEDIUM | FINE | |
| C50D | 7.5-9' | | | | | | |

GRADATION CURVE

PROJECT CHEVRONJOB. NO. 00113-950

LOCATION OF PROJECT _____

BORING NO. C65D SAMPLE NO. _____DESCRIPTION OF SOIL SILTY CLAYDEPTH OF SAMPLE 25-27'

CHECKED BY _____

| | | | |
|---|------------------------|---------------------|--|
| X | ATTERBERG LIMITS | | |
| X | MOISTURE & DENSITY | | |
| X | SIEVE | GRAIN SIZE ANALYSIS | |
| X | HYDROMETER | | |
| | RELATIVE DENSITY | | |
| | COMPACTION | | |
| X | PERMEABILITY | | |
| | CONSOLIDATION | | |
| | VANE SHEAR | | |
| | SPECIFIC GRAVITY | | |
| | DIRECT SHEAR | | |
| | UNCONFINED COMPRESSION | | |
| | TRIAXIAL COMPRESSION | | |
| | | MIS. TESTS | |
| | | | |
| | | | |

→ FLEX WALL

BY L. SHANNONDATE 12-3-86

NATURAL MOISTURE

| | | | |
|-----------------------|--------------|------------------------|--|
| DISH | <u>A-23</u> | DENSITY | |
| WT OF DISH + WET SOIL | <u>89.56</u> | NUMBER OF RINGS | |
| WT OF DISH + DRY SOIL | <u>63.92</u> | WT OF RINGS + WET SOIL | |
| WT OF MOISTURE | <u>25.64</u> | WT OF RINGS | |
| WT OF DISH | <u>27.76</u> | WT OF WET SOIL | |
| WT OF DRY SOIL | <u>36.16</u> | FIELD DENSITY | |
| MOISTURE CONTENT | <u>70.9</u> | DRY DENSITY | |

HYGROSCOPIC MOISTURE

| | |
|-----------------------|--|
| DISH | |
| WT OF DISH + WET SOIL | |
| WT OF DISH + DRY SOIL | |
| WT OF MOISTURE | |
| WT OF DISH | |
| WT OF DRY SOIL | |
| MOISTURE CONTENT | |

SOIL AIR-DRIED IN PAN NUMBER 05

PAN NUMBER

| U.S. STAND. SIEVE NO. | WT. OF SOIL RETAIN UNCORR. | WT. OF SOIL RETAIN CORR. | PERCENT RETAIN. | CUMULATIVE PERCENT RETAINED | PERCENT FINER |
|-----------------------------|----------------------------------|--------------------------------|--------------------|-----------------------------------|------------------|
| LARGER | | | | | |
| 3" (76.2) | | | | | |
| 1½" (38.1) | | | | | |
| ¾" (19.1) | | | | | |
| ½" (12.7) | | | | | |
| ¼" (6.35) | | | | | |
| NO. 4 (4.76) | | | | | |
| NO. 10 (2.00) | | | | | |
| PAN | | | | | |
| TOTAL | <u>36.49</u> | | | | |

PAN NUMBER

AE-8

| | | | | | |
|-----------------|-------------|--------------|--------------|-------------|--------------|
| NO. 20 (0.84) | | | | | |
| NO. 40 (0.42) | | | | | |
| NO. 60 (0.25) | <u>D</u> | | <u>0</u> | <u>0</u> | <u>100</u> |
| NO. 100 (0.149) | <u>0.11</u> | | <u>0.17</u> | <u>0.17</u> | <u>99.83</u> |
| NO. 200 (0.074) | <u>0.18</u> | | <u>0.28</u> | <u>0.45</u> | <u>99.55</u> |
| PAN | | <u>64.71</u> | <u>99.55</u> | | |
| TOTAL | <u>65.0</u> | | | | |

HYDROMETER ANALYSIS

BY L. S. HANNOU DATE 12-14-66

HYDROMETER NO. 152H

G_s OF SOLIDS = _____ a = _____

DISPERSING AGENT CALGON

AMOUNT 125 ML WT. OF SOIL, W_s 65.0

ZERO CORRECTION _____

MENISCUS CORRECTION _____

BEAKER NUMBER FOURTEEN

JAR NUMBER 6

| DATE | TIME OF READING | ELAPSED TIME, MIN | TEMP., °C | ACTUAL HYD. READING R _a | CORR. HYD. READING R _c | % FINER | HYD. CORR. ONLY FOR MENISCUS, R _c | L | $\frac{L}{t}$ | K | D, mm |
|----------|-----------------|-------------------|-----------|------------------------------------|-----------------------------------|---------|--|---|---------------|---|-------|
| 12-15-66 | 1311 | 0 | 0 | 0 | | | | | | | |
| | 1313 | 2 | | 52 | | 72.31 | | | | | .028 |
| | 1316 | 5 | | 47 | | 64.62 | | | | | .018 |
| | 1326 | 15 | | 40 | | 53.85 | | | | | .011 |
| | 1341 | 30 | | 34 | | 44.62 | | | | | .008 |
| | 1411 | 60 | | 28.5 | | 36.46 | | | | | .006 |
| | 1621 | 250 | | 20 | | 25.58 | | | | | .002 |
| 12-16 | 1311 | 1440 | | 14 | | 13.85 | | | | | .001 |
| | | | | | | | | | | | |
| | | | | | | | | | | | |

SPECIFIC GRAVITY OF SOIL SOLIDS (G_s)

BY _____ DATE _____

| | | |
|--|--|--|
| FLASK NUMBER | | |
| WT. FLASK + WATER + SOIL = W _{bws} | | |
| TEMPERATURE, °C | | |
| WT. FLASK + WATER ^b = W _{bw} | | |
| WT. OF DRY SOIL = W _s | | |
| W _w = W _s + W _{bw} - W _{bws} | | |
| G _s = aW _s /W _w | | |

AVERAGE SPECIFIC GRAVITY OF SOIL SOLIDS (G_s) = _____

LIMITS MATERIAL IN PAN NUMBER

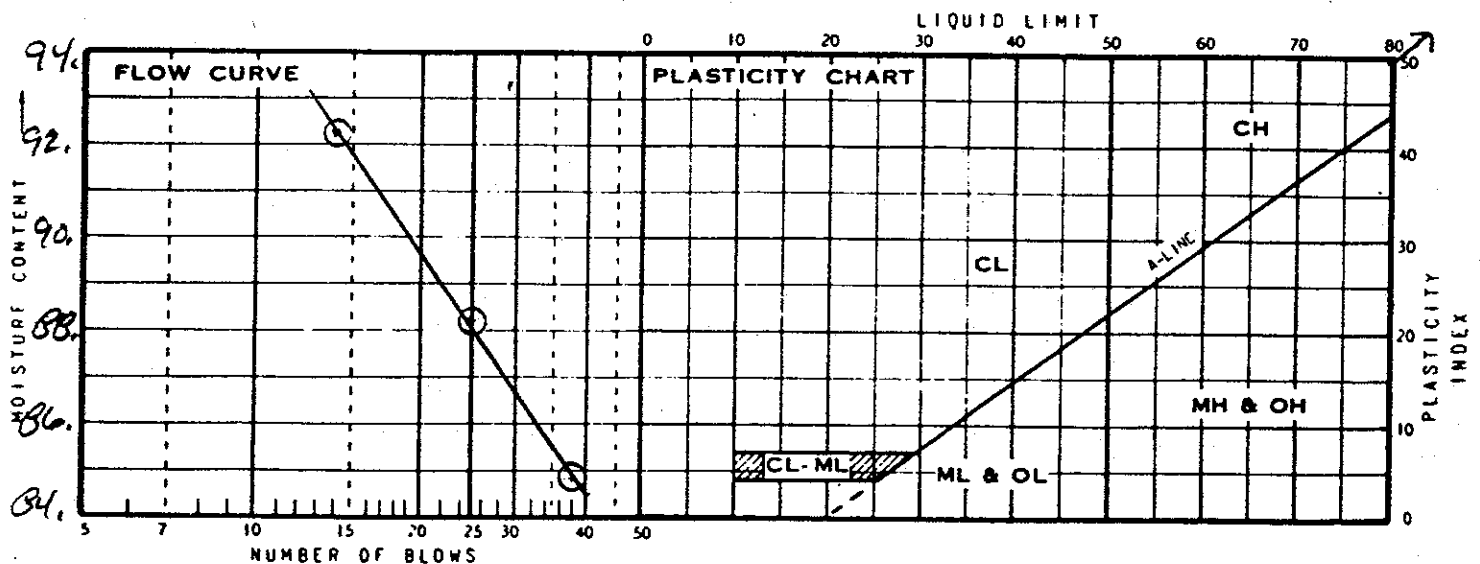
PLASTIC LIMIT

BY L.S.DATE 1-8-87

| DETERMINATION | 1 | 2 | 3 | 4 |
|-----------------------|-------|-------|-------|---|
| DISH | MON | 1 | 207 | |
| WT OF DISH + WET SOIL | 40.90 | 41.08 | 41.28 | |
| WT OF DISH + DRY SOIL | 39.13 | 39.20 | 39.45 | |
| WT OF MOISTURE | 1.77 | 1.88 | 1.83 | |
| WT OF DISH | 33.96 | 33.32 | 34.10 | |
| WT OF DRY SOIL | 5.17 | 5.88 | 5.35 | |
| MOISTURE CONTENT | 34.2 | 32.0 | 34.2 | |

LIQUID LIMIT

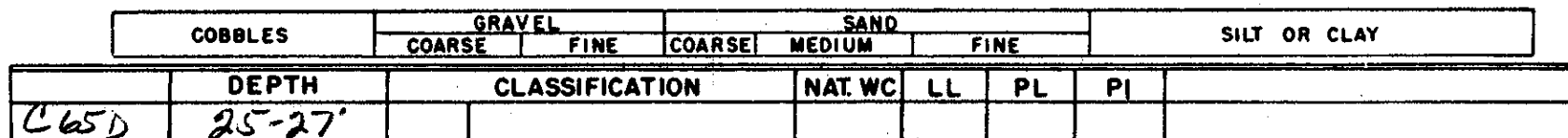
| DETERMINATION | 1 | 2 | 3 | 4 |
|-----------------------|-------|-------|-------|---|
| DISH | J | L | G | |
| NUMBER OF BLOWS | 38 | 25 | 14 | |
| WT OF DISH + WET SOIL | 43.46 | 41.68 | 43.95 | |
| WT OF DISH + DRY SOIL | 36.48 | 35.17 | 36.10 | |
| WT OF MOISTURE | 6.98 | 6.51 | 7.85 | |
| WT OF DISH | 28.26 | 27.79 | 27.59 | |
| WT OF DRY SOIL | 8.22 | 7.38 | 8.51 | |
| MOISTURE CONTENT | 84.9 | 88.2 | 92.2 | |



| LIQUID LIMIT | PLASTIC LIMIT | PLASTICITY INDEX |
|--------------|---------------|------------------|
| 88 | 35 | 53 |

FIELD CLASSIFICATION _____

LABORATORY CLASSIFICATION CH



Dames & Moore

PROJECT CHEVRON

JOB. NO. 00113-032

LOCATION OF PROJECT _____

BORING NO. _____ SAMPLE NO. S104

DESCRIPTION OF SOIL GRAY SILTY CLAY

DEPTH OF SAMPLE 15-17'

CHECKED BY _____

| | | | |
|---|------------------------|---------------------|--|
| X | ATTERBERG LIMITS | | |
| X | MOISTURE & DENSITY | | |
| X | SIEVE | GRAIN SIZE ANALYSIS | |
| X | HYDROMETER | | |
| | RELATIVE DENSITY | | |
| | COMPACTION | | |
| X | PERMEABILITY | | |
| | CONSOLIDATION | | |
| | VANE SHEAR | | |
| | SPECIFIC GRAVITY | | |
| | DIRECT SHEAR | | |
| | UNCONFINED COMPRESSION | | |
| | TRIAXIAL COMPRESSION | | |
| | | MIS. TESTS | |
| | | | |
| | | | |

FLEX-WALL

BY L. SpennDATE 1-5-67

NATURAL MOISTURE

| DISH | <u>A-16</u> | DENSITY | |
|-----------------------|---------------|------------------------|--|
| WT OF DISH + WET SOIL | <u>119.39</u> | NUMBER OF RINGS | |
| WT OF DISH + DRY SOIL | <u>80.48</u> | WT OF RINGS + WET SOIL | |
| WT OF MOISTURE | <u>38.91</u> | WT OF RINGS | |
| WT OF DISH | <u>35.67</u> | WT OF WET SOIL | |
| WT OF DRY SOIL | <u>44.81</u> | FIELD DENSITY | |
| MOISTURE CONTENT | <u>86.8</u> | DRY DENSITY | |

HYGROSCOPIC MOISTURE

| | |
|-----------------------|--|
| DISH | |
| WT OF DISH + WET SOIL | |
| WT OF DISH + DRY SOIL | |
| WT OF MOISTURE | |
| WT OF DISH | |
| WT OF DRY SOIL | |
| MOISTURE CONTENT | |

SOIL AIR-DRIED IN PAN NUMBER D-26

PAN NUMBER

| U.S. STAND. SIEVE NO. | WT. OF SOIL RETAIN UNCORR. | WT. OF SOIL RETAIN CORR. | PERCENT RETAIN. | CUMULATIVE PERCENT RETAINED | PERCENT FINER |
|-----------------------|----------------------------|--------------------------|-----------------|-----------------------------|---------------|
| LARGER | | | | | |
| 3" (76.2) | | | | | |
| 1½" (38.1) | | | | | |
| ¾" (19.1) | | | | | |
| ½" (12.7) | | | | | |
| ¼" (6.35) | | | | | |
| NO. 4 (4.76) | | | | | |
| NO. 10 (2.00) | | | | | |
| PAN | | | | | |
| TOTAL | <u>177.34</u> | | | | |

PAN NUMBER

D-8

| | | | | | |
|-----------------|-------------|--------------|--------------|-------------|--------------|
| NO. 20 (0.84) | | | | | |
| NO. 40 (0.42) | | | | | |
| NO. 60 (0.25) | <u>0</u> | | <u>0</u> | <u>0</u> | <u>100</u> |
| NO. 100 (0.149) | <u>0.98</u> | | <u>1.51</u> | <u>1.51</u> | <u>98.49</u> |
| NO. 200 (0.074) | <u>0.90</u> | | <u>1.38</u> | <u>2.89</u> | <u>97.11</u> |
| PAN | | <u>63.12</u> | <u>97.11</u> | | |
| TOTAL | <u>65.0</u> | | | | |

HYDROMETER ANALYSIS

BY L. S. HANNON DATE 1-12-87

HYDROMETER NO. 1524

G_s OF SOILS = _____ a = _____

DISPERSING AGENT CALGON

AMOUNT 125 ML WT. OF SOIL, W_s 65.0

ZERO CORRECTION _____

MENISCUS CORRECTION _____

BEAKER NUMBER ELEVEN

JAR NUMBER 4

| DATE | TIME OF READING | ELAPSED TIME, MIN | TEMP., °C | ACTUAL HYD. READING R _a | CORR. HYD. READING R _c | % FINER | HYD. CORR. ONLY FOR MENISCUS, R _c | L | $\frac{L}{t}$ | K | D, mm |
|---------|-----------------|-------------------|-----------|------------------------------------|-----------------------------------|---------|--|---|---------------|---|-------|
| 1-13-87 | 1028 | 0 | 20.0 | | | | | | | | |
| | 1030 | 2 | | 43 | | 58.46 | | | | | .030 |
| | 1033 | 5 | | 38 | | 50.77 | | | | | .020 |
| | 1043 | 15 | | 30.5 | | 39.23 | | | | | .012 |
| | 1058 | 30 | | 28 | | 35.38 | | | | | .009 |
| | 1128 | 60 | | 22 | | 26.15 | | | | | .006 |
| | 1238 | 250 | | 15 | | 15.38 | | | | | .003 |
| 1-14-87 | 1028 | 1440 | | | | 9.23 | | | | | .001 |
| | | | | | | | | | | | |
| | | | | | | | | | | | |

SPECIFIC GRAVITY OF SOIL SOLIDS (G_s)

BY _____ DATE _____

| | | |
|--|--|--|
| FLASK NUMBER | | |
| WT. FLASK + WATER + SOIL = W _{bws} | | |
| TEMPERATURE, °C | | |
| WT. FLASK + WATER ^b = W _{bw} | | |
| WT. OF DRY SOIL = W _s | | |
| W _w = W _s + W _{bw} - W _{bws} | | |
| G _s = aW _s /W _w | | |

AVERAGE SPECIFIC GRAVITY OF SOIL SOLIDS (G_s) = _____

LIMITS MATERIAL IN PAN NUMBER _____

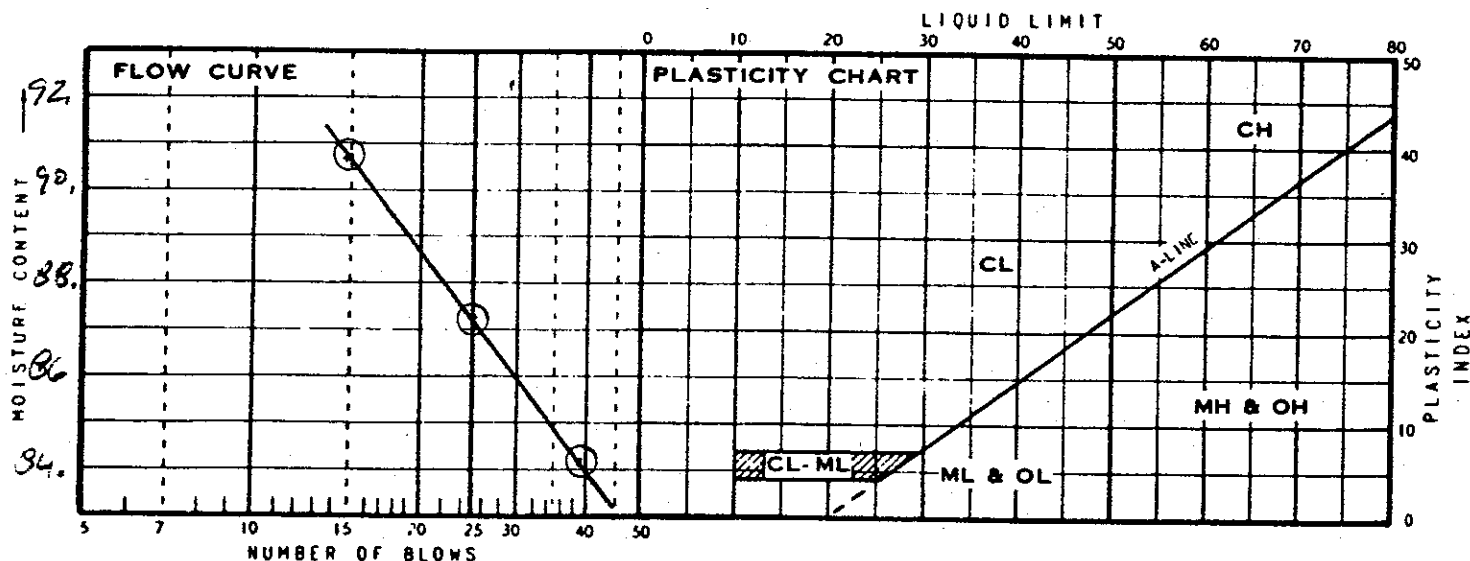
PLASTIC LIMIT

BY L.S.DATE 1-6-87

| DETERMINATION | 1 | 2 | 3 | 4 |
|-----------------------|-------|-------|-------|---|
| DISH | 23 | 774 | 752 | |
| WT OF DISH + WET SOIL | 42.21 | 40.59 | 41.71 | |
| WT OF DISH + DRY SOIL | 40.14 | 38.61 | 39.69 | |
| WT OF MOISTURE | 2.07 | 1.98 | 2.02 | |
| WT OF DISH | 34.72 | 33.40 | 34.48 | |
| WT OF DRY SOIL | 5.42 | 5.21 | 5.21 | |
| MOISTURE CONTENT | 38.2 | 38.0 | 38.8 | |

LIQUID LIMIT

| DETERMINATION | 1 | 2 | 3 | 4 |
|-----------------------|-------|-------|-------|---|
| DISH | 710 | 718 | Mon | |
| NUMBER OF BLOWS | 39 | 25 | 15 | |
| WT OF DISH + WET SOIL | 51.92 | 51.72 | 50.60 | |
| WT OF DISH + DRY SOIL | 43.98 | 43.16 | 42.68 | |
| WT OF MOISTURE | 7.94 | 8.56 | 7.92 | |
| WT OF DISH | 34.54 | 33.34 | 33.96 | |
| WT OF DRY SOIL | 9.44 | 7.82 | 8.72 | |
| MOISTURE CONTENT | 84.1 | 87.2 | 90.8 | |



| LIQUID LIMIT | PLASTIC LIMIT | PLASTICITY INDEX |
|--------------|---------------|------------------|
| 87 | 38 | 49 |

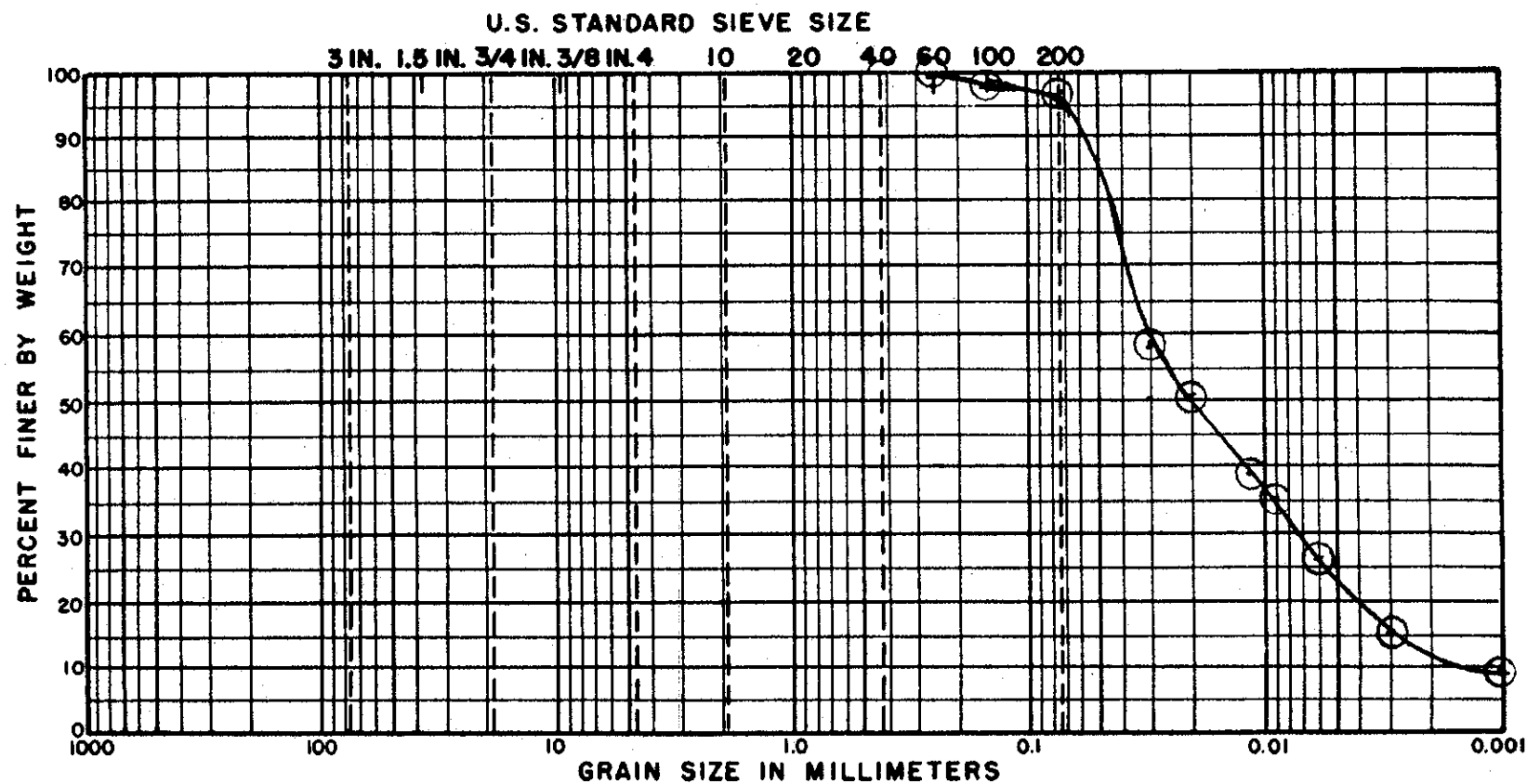
FIELD CLASSIFICATION _____

LABORATORY CLASSIFICATION CH

FILE 02113-920-032
 BY L.S. DATE 1/15/67
 CHECKED BY _____ DATE _____

REVISIONS
 BY _____ DATE _____
 BY _____ DATE _____
 PLATE _____ OF _____

S104 @ 15-17'



| | COBBLES | GRAVEL | | SAND | | | SILT OR CLAY |
|-------|----------------|--------|------|---------|--------|------|--------------|
| | | COARSE | FINE | COARSE | MEDIUM | FINE | |
| DEPTH | CLASSIFICATION | | | NAT. WC | LL | PL | PI |
| | | | | | | | |

GRADATION CURVE

APPENDIX H

Laboratory Reports - Ballfields

Sample I.D. and Locations
Chevron/Gulf Philadelphia Refinery
"Ballfields"

Sample I.D.

Sample Location

| | |
|--------------------------|--|
| S BF88 | Composite of Samples 1, 2 and 3 Collected from Boring BF88 |
| S BF89 | Composite of Samples 1, 2 and 3 Collected from Boring BF89 |
| S BF90 | Composite of Samples 1, 2 and 3 Collected from Boring BF90 |
| S BFBG | Background Sample Collected from a depth of 6 inches to 1 foot (Western Ballfield) at Second Base |
| S BFTP5 through S BFTP10 | Collected from Test Pits BFTP5 through BFTP10 |

0672R

DATA MANAGEMENT SUMMARY REPORT (DM-1L) - All Parameters Present, Samples Linked by Order

DATE: 04/01/
PAGE: 1

Chain of Custody Data Required for ETC Data Management Summary Report

| | | | |
|----------------|-----------------|----------|-------------------|
| See Below | DAMES AND MOORE | DMCHEV | See Below |
| ETC Sample No. | Company | Facility | Sample Point Date |

Sample Points, Sampling Dates, and ETC Sample No's

| Parameters | Units | S BF88 860226 L3585 | S BF89 860219 L3587 | S BF90 860219 L3586 | S BF8G 860304 L3588 | S BF1P10 860304 L3591 | S BF1P5 860304 L3583 | S BF1P6 860304 L3592 | S BF1P7 860304 L3584 |
|------------------------------------|-------|---------------------------|---------------------------|---------------------------|---------------------------|-----------------------------|----------------------------|----------------------------|----------------------------|
| PP Volatile Compounds | | | | | | | | | |
| Benzene | ug/kg | - | 22 | 22 | 22 | 22 | 22 | 7230 | 220 |
| Ethylbenzene | ug/kg | - | 36 | 36 | 36 | 36 | 49.3 | 24200 | 360 |
| Methylene chloride | ug/kg | - | 609 | 286 | 14 | 156 | 14 | 700 | 140 |
| PP Acid Compounds | | | | | | | | | |
| 2,4-Dimethylphenol | ug/kg | 90 | 90 | 427 | 89 | 1200 | 89 | 2500 | 2300 |
| PP Base/Neutral Compounds | | | | | | | | | |
| Acenaphthene | ug/kg | 63 | 63 | 63 | 62 | 410 | 63 | 73300 | 925 |
| Acenaphthylene | ug/kg | 120 | 120 | 120 | 110 | 760 | 120 | 6600 | 590 |
| Anthracene | ug/kg | 63 | 422 | 63 | 62 | 410 | 63 | 43800 | 1880 |
| Benzo(a)anthracene | ug/kg | 260 | 390 | 260 | 260 | 1700 | 260 | 15000 | 1300 |
| Benzo(a)pyrene | ug/kg | 83 | 539 | 83 | 82 | 540 | 158 | 10200 | 1060 |
| Benzo(ghi)perylene | ug/kg | 140 | 140 | 140 | 130 | 890 | 140 | 7700 | 690 |
| bis(2-Ethylhexyl)phthalate | ug/kg | 458 | 330 | 1620 | 532 | 2200 | 330 | 19000 | 1700 |
| Chrysene | ug/kg | 83 | 1260 | 83 | 82 | 540 | 124 | 35600 | 3480 |
| 1,2-Dichlorobenzene | ug/kg | 63 | 63 | 63 | 385 | 410 | 79.7 | 3600 | 320 |
| Fluoranthene | ug/kg | 73 | 312 | 99.3 | 95.3 | 480 | 168 | 4650 | 1050 |
| Fluorene | ug/kg | 63 | 63 | 63 | 104 | 2400 | 63 | 201000 | 35800 |
| Indeno(1,2,3-c,d)pyrene | ug/kg | 160 | 160 | 160 | 150 | 1000 | 160 | 8800 | 790 |
| Naphthalene | ug/kg | 53 | 124 | 53 | 52 | 2200 | 53 | 361000 | 15900 |
| Phenanthrene | ug/kg | 180 | 508 | 180 | 180 | 1200 | 180 | 526000 | 22500 |
| Pyrene | ug/kg | 63 | 359 | 81.6 | 85.5 | 513 | 146 | 20500 | 2810 |
| 1,2,4-Trichlorobenzene | ug/kg | 63 | 63 | 63 | 101 | 410 | 63 | 3600 | 320 |
| GW Met., Pest., & Herb. | | | | | | | | | |
| Arsenic | ug/kg | 10000 | 7000 | 7000 | 7000 | 7000 | 10000 | 20000 | 30000 |
| Barium | ug/kg | 34000 | 43500 | 102000 | 59400 | 152000 | 75600 | 340000 | 109000 |
| Cadmium | ug/kg | 500 | 700 | 700 | 400 | 400 | 400 | 2000 | 400 |
| Chromium | ug/kg | 22000 | 35000 | 75000 | 36000 | 160000 | 31000 | 4650000 | 897000 |
| Lead | ug/kg | 9000 | 95000 | 91000 | 50000 | 140000 | 819000 | 290000 | 190000 |

Footnotes: BMDL=Below Method Detection Limit ND=Parameter not detected '-'=Parameter not tested <= DETECTION LIMIT CONCENTRATION - COMPOUND NOT DETECTED IN THAT SAMPLE

DATA MANAGEMENT SUMMARY REPORT
(DM-1L) - All Parameters Present, Samples Linked by Order

DATE: 04/01/8
PAGE: 2

Chain of Custody Data Required for ETC Data Management Summary Report

See Below

DAMES AND MOORE

DMCHEV

See Below

ETC Sample No.

Company

Facility

Sample Point

Date

Sample Points, Sampling Dates, and ETC Sample No.'s

| Parameters | Units | S BF88 860226 L3585 | S BF89 860219 L3587 | S BF90 860219 L3586 | S BFBG 860304 L3588 | S BFIP10 860304 L3591 | S BFIP5 860304 L3583 | S BFIP6 860304 L3592 | S BFIP7 860304 L3584 |
|---------------------------------|-------|---------------------------|---------------------------|---------------------------|---------------------------|-----------------------------|----------------------------|----------------------------|----------------------------|
| Iron | ug/kg | 31500000 | 17800000 | 23200000 | 24800000 | 29800000 | 21800000 | 34700000 | 61200000 |
| Manganese | ug/kg | 322000 | 318000 | 293000 | 441000 | 417000 | 215000 | 1370000 | 506000 |
| Sodium | ug/kg | 50000 | 100000 | 100000 | 80000 | 1610000 | 90000 | 490000 | 300000 |
| Miscellaneous Parameters | | | | | | | | | |
| Aluminum | ug/kg | 12400000 | 9920000 | 19100000 | 15900000 | 19600000 | 9700000 | 26700000 | 16100000 |
| Antimony | ug/kg | <10000 | <10000 | 10000 | <8000 | <10000 | <8000 | <10000 | <8000 |
| Benzo(b)fluoranthene | ug/kg | <330 | 1040 | <330 | <330 | <2200 | <330 | <19000 | 2360 |
| Beryllium | ug/kg | 600 | 400 | 1000 | 720 | 880 | 400 | 830 | 890 |
| Boron | ug/kg | 10000 | 21000 | 20000 | 10000 | 20000 | 7000 | 34000 | 20000 |
| Calcium | ug/kg | 580000 | 9610000 | 2460000 | 1490000 | 4000000 | 1200000 | 32500000 | 3900000 |
| Cobalt | ug/kg | 8000 | 8000 | 8000 | 6000 | 10000 | 7000 | 100000 | 32000 |
| Copper | ug/kg | 10000 | 22000 | 46000 | 18000 | 47000 | 22000 | 551000 | 416000 |
| Cyanide, Total | mg/kg | <5 | <5 | <5 | <5 | <5 | <5 | 15 | 9 |
| Magnesium | ug/kg | 2080000 | 7360000 | 2930000 | 2510000 | 5150000 | 2630000 | 12900000 | 3210000 |
| Molybdenum | ug/kg | <2000 | <900 | <900 | <1000 | 1000 | <1000 | 5000 | 6000 |
| Nickel | ug/kg | 12000 | 22000 | 19000 | 10000 | 29000 | 19000 | 132000 | 218000 |
| Petroleum Hydrocarbons (IR) | mg/kg | 6 | 880 | 23 | <5 | 200 | <5 | 108000 | 60000 |
| Tin | ug/kg | <6000 | <3000 | 10000 | 5000 | 20000 | <4000 | 20000 | 10000 |
| Titanium | ug/kg | 423000 | 259000 | 395000 | 431000 | 568000 | 498000 | 361000 | 448000 |
| Vanadium | ug/kg | 32000 | 28000 | 45000 | 44000 | 48000 | 45000 | 120000 | 158000 |
| Zinc | ug/kg | 57000 | 214000 | 97400 | 73000 | 233000 | 65000 | 2780000 | 748000 |

Footnotes: BMDL=Below Method Detection Limit ND=Parameter not detected "-"=Parameter not tested

DATA MANAGEMENT SUMMARY REPORT
(DM-1L) - All Parameters Present, Samples Linked by Order

DATE: 04/01/81
PAGE: 3

Chain of Custody Data Required for ETC Data Management Summary Report

| | | | | | | | |
|-----------------------|----------------|------------------------|---------------------|---------------|--|-----------|--|
| See Below | | DAMES AND MOORE | | DMCHEV | | See Below | |
| ETC Sample No. | Company | Facility | Sample Point | Date | | | |

Sample Points, Sampling Dates, and ETC Sample No's

| Parameters | Units | S BF1P8 860304 L3589 | S BF1P9 860304 L3590 | | | | | |
|------------------------------------|-------|----------------------------|----------------------------|--|--|--|--|--|
| PP Volatile Compounds | | | | | | | | |
| Benzene | ug/kg | x 22 | x 22 | | | | | |
| Ethylbenzene | ug/kg | x 36 | x 36 | | | | | |
| Methylene chloride | ug/kg | x 14 | 354 | | | | | |
| PP Acid Compounds | | | | | | | | |
| 2,4-Dimethylphenol | ug/kg | x 88 | x 450 | | | | | |
| PP Base/Neutral Compounds | | | | | | | | |
| Acenaphthene | ug/kg | x 62 | 2880 | | | | | |
| Acenaphthylene | ug/kg | x 110 | 856 | | | | | |
| Anthracene | ug/kg | x 62 | 2940 | | | | | |
| Benzo(a)anthracene | ug/kg | x 250 | 3770 | | | | | |
| Benzo(a)pyrene | ug/kg | x 81 | 2260 | | | | | |
| Benzo(ghi)perylene | ug/kg | x 130 | 1860 | | | | | |
| bis(2-Ethylhexyl)phthalate | ug/kg | x 320 | x 1700 | | | | | |
| Chrysene | ug/kg | x 81 | 4380 | | | | | |
| 1,2-Dichlorobenzene | ug/kg | 191 | 316 | | | | | |
| Fluoranthene | ug/kg | x 71 | 13900 | | | | | |
| Fluorene | ug/kg | 68.9 | 2050 | | | | | |
| Indeno(1,2,3-c,d)pyrene | ug/kg | x 150 | 1660 | | | | | |
| Naphthalene | ug/kg | 568 | 13300 | | | | | |
| Phenanthrene | ug/kg | x 180 | 14000 | | | | | |
| Pyrene | ug/kg | x 62 | 8750 | | | | | |
| 1,2,4-Trichlorobenzene | ug/kg | x 62 | x 320 | | | | | |
| GW Met., Pest., & Herb. | | | | | | | | |
| Arsenic | ug/kg | x 7000 | 110000 | | | | | |
| Barium | ug/kg | 71000 | 106000 | | | | | |
| Cadmium | ug/kg | x 400 | 700 | | | | | |
| Chromium | ug/kg | 22000 | 42000 | | | | | |
| Lead | ug/kg | 30000 | 1860000 | | | | | |

Footnotes: BMDL=Below Method Detection Limit ND=Parameter not detected '-'=Parameter not tested

DATA MANAGEMENT SUMMARY REPORT
(DM-1L) - All Parameters Present, Samples Linked by Order

DATE: 04/01/
PAGE: 4

Chain of Custody Data Required for ETC Data Management Summary Report

| | | | |
|----------------|------------------------|---------------|-------------------|
| See Below | DAMES AND MOORE | DMCHEV | See Below |
| ETC Sample No. | Company | Facility | Sample Point Date |

Sample Points, Sampling Dates, and ETC Sample No.'s

| Parameters | Units | S BF1P8 860304 L3589 | S BF1P9 860304 L3590 | | | | | |
|---------------------------------|-------|----------------------------|----------------------------|--|--|--|--|--|
| Iron | ug/kg | 21800000 | 83400000 | | | | | |
| Manganese | ug/kg | 252000 | 510000 | | | | | |
| Sodium | ug/kg | 80000 | 100000 | | | | | |
| Miscellaneous Parameters | | | | | | | | |
| Aluminum | ug/kg | 18300000 | 31800000 | | | | | |
| Antimony | ug/kg | <10000 | <10000 | | | | | |
| Benzo(b)fluoranthene | ug/kg | < 320 | 7100 | | | | | |
| Beryllium | ug/kg | 1100 | 400 | | | | | |
| Boron | ug/kg | 10000 | 31000 | | | | | |
| Calcium | ug/kg | 550000 | 51000000 | | | | | |
| Cobalt | ug/kg | 8000 | 6000 | | | | | |
| Copper | ug/kg | 18000 | 85000 | | | | | |
| Cyanide, Total | mg/kg | < 5 | 6 | | | | | |
| Magnesium | ug/kg | 1900000 | 30600000 | | | | | |
| Molybdenum | ug/kg | 700 | 5000 | | | | | |
| Nickel | ug/kg | 13000 | 31000 | | | | | |
| Petroleum Hydrocarbons (IR) | mg/kg | < .5 | 470 | | | | | |
| Tin | ug/kg | < 4000 | 10000 | | | | | |
| Titanium | ug/kg | 280000 | 297000 | | | | | |
| Vanadium | ug/kg | 30000 | 42000 | | | | | |
| Zinc | ug/kg | 44000 | 207000 | | | | | |

Footnotes: BMDL=Below Method Detection Limit ND=Parameter not detected '-'=Parameter not tested

March 23, 1986

TABLE 1: QUALITATIVE RESULTS

Tentatively Identified Organic Compounds - GC/MS Analysis Data - Acid Fraction (QR07)

| Chain of Custody Data Required for ETC Data Management Summary Reports | | | | | | |
|--|-----------------|----------|--------------|--------|------|---------------|
| ETC Sample No. | Company | Facility | Sample Point | Date | Time | Elapsed Hours |
| L3585 | DAMES AND MOORE | DMCHEV | S BF88 | 850226 | 0800 | 1 |

[illegible]

March 28, 1986

TABLE 1: QUALITATIVE RESULTS

Tentatively Identified Organic Compounds - GC/MS Analysis Data - Base/Neutral Fraction (QR08)

Chain of Custody Data Required for ETC Data Management Summary Reports

L3585 DAMES AND MOORE DMCHEV S BF88 860226 0800

ETC Sample No. Company Facility Sample Point Date Time Elapsed Hours

| Compound Name | Data | | | Identifiers | | | | |
|-----------------|-------------|----------------------|------|-------------|----------------------------------|-------------------------------|--|--|
| | Scan Number | Retention Time (Min) | M.W. | CAS Number | Empirical Formula | Estimated Concentration ug/kg | | |
| 1 3-Hexen-2-One | 132 | 5.87 | 98 | 763939 | C ₆ H ₁₀ O | 2929 | | |
| 2 Unknown | 288 | 8.10 | - | - | - | 35508 | | |
| 3 Decane * | 422 | 10.02 | 142 | 124185 | C ₁₀ H ₂₂ | 439 | | |
| 4 Unknown | 634 | 13.05 | - | - | - | 556 | | |
| 5 Unknown | 642 | 13.16 | - | - | - | 1575 | | |
| 6 Unknown | 705 | 14.06 | - | - | - | 582 | | |
| 7 Unknown * | 1087 | 19.52 | - | - | - | 543 | | |
| 8 Unknown * | 1304 | 22.63 | - | - | - | 1370 | | |
| 9 9-Tricosene * | 2009 | 32.72 | 322 | 27519024 | C ₂₃ H ₄₆ | 619 | | |

*Compound also present in the Blank.

March 9, 1986

TABLE 1: QUALITATIVE RESULTS

Tentatively Identified Organic Compounds - GC/MS Analysis Data - Volatile Fraction (QR06)

| Chain of Custody Data Required for ETC Data Management Summary Reports | | | | | | |
|--|-----------------|----------|--------------|--------|------|---------------|
| ETC Sample No. | Company | Facility | Sample Point | Date | Time | Elapsed Hours |
| L3587 | DAMES AND MOORE | DMCHEV | S BF89 | 860219 | | |

[illegible]

March 28, 1986

TABLE 1: QUALITATIVE RESULTS

Tentatively Identified Organic Compounds - GC/MS Analysis Data - Base/Neutral Fraction (QR08)

Chain of Custody Data Required for ETC Data Management Summary Reports

L3587 DAMES AND MOORE DMCHEV S BF89 860219

ETC Sample No. Company Facility Sample Point Date Time Elapsed Hours

| Compound Name | Data | | | Identifiers | | Estimated Concen. ug/kg | | |
|-------------------------------------|----------------|----------------------------|------|---------------|----------------------------------|-------------------------------|--|--|
| | Scan Number | Retention Time (Min) | M.W. | CAS Number | Empirical Formula | | | |
| 1 3-Hexen-2-One | 130 | 5.82 | 98 | 763939 | C ₆ H ₁₀ O | 1732 | | |
| 2 Unknown | 222 | 7.14 | - | - | - | 25368 | | |
| 3 Unknown | 640 | 13.11 | - | - | - | 418 | | |
| 4 Unknown * | 1086 | 19.52 | - | - | - | 1190 | | |
| 5 Unknown | 1161 | 20.61 | - | - | - | 1161 | | |
| 6 1,4,6-Trimethyl Naphthalene | 1181 | 20.90 | 170 | 2131422 | C ₁₃ H ₁₄ | 380 | | |
| 7 Unknown | 1202 | 21.20 | - | - | - | 812 | | |
| 8 Unknown | 1303 | 22.66 | - | - | - | 1157 | | |
| 9 2,6,10,14-Tetramethyl-Pentadecane | 1319 | 22.90 | 268 | 1921706 | C ₁₉ H ₄₀ | 1152 | | |
| 10 Unknown | 2686 | 42.82 | - | - | - | 13118 | | |

*Compound also present in the Blank.

Tentatively Identified Organic Compounds - GC/MS Analysis Data - Acid Fraction (QR07)

| Chain of Custody Data Required for ETC Data Management Summary Reports | | | | | | |
|--|-----------------|----------|--------------|--------|------|---------------|
| ETC Sample No. | Company | Facility | Sample Point | Date | Time | Elapsed Hours |
| L3586 | DAMES AND MOORE | DMCHEV | S BF90 | 860219 | | |

[illegible]

March 28, 1986

TABLE 1: QUALITATIVE RESULTS

Tentatively Identified Organic Compounds - GC/MS Analysis Data - Base/Neutral Fraction (QR08)

Chain of Custody Data Required for ETC Data Management Summary Reports

| | | | | | |
|----------------|-----------------|----------|--------------|--------|------------|
| L3586 | DAMES AND MOORE | DMCHEV | S BF90 | 860219 | Elapsed |
| ETC Sample No. | Company | Facility | Sample Point | Date | Time Hours |

| Compound Name | Data | | | Identifiers | | Estimated Concen. ug/kg | | |
|-------------------------------------|----------------|----------------------------|------|---------------|----------------------------------|-------------------------------|--|--|
| | Scan Number | Retention Time (Min) | M.W. | CAS Number | Empirical Formula | | | |
| 1 3-Hexen-2-One | 128 | 5.80 | 98 | 763939 | C ₆ H ₁₀ O | 440 | | |
| 2 Unknown | 227 | 7.22 | - | - | - | 43820 | | |
| 3 Decane * | 423 | 10.02 | 142 | 124185 | C ₁₀ H ₂₂ | 628 | | |
| 4 Unknown | 1062 | 19.17 | - | - | - | 822 | | |
| 5 Unknown | 1087 | 19.53 | - | - | - | 1107 | | |
| 6 Unknown * | 1304 | 22.66 | - | - | - | 5613 | | |
| 7 2,6,10,14-Tetramethyl-Pentadecane | 1317 | 22.84 | 268 | 1921706 | C ₁₉ H ₄₀ | 509 | | |
| 8 Unknown * | 1467 | 25.01 | - | - | - | 656 | | |
| 9 Unknown | 1732 | 28.86 | - | - | - | 472 | | |
| 10 Unknown | 1926 | 31.68 | - | - | - | 496 | | |
| 11 9-Tricosene | 1997 | 32.71 | 322 | 27519024 | C ₂₃ H ₄₆ | 1491 | | |

*Compound also present in the Blank.

March 11, 1986

TABLE 1: QUALITATIVE RESULTS

Tentatively Identified Organic Compounds - GC/MS Analysis Data - Volatile Fraction (QR06)

| Chain of Custody Data Required for ETC Data Management Summary Reports | | | | | | | |
|--|---------------|----------|--------------|--------|------|---------------|--|
| L3583 | DAMES & MOORE | DMCHEV | S BFTP5 | 860304 | | | |
| ETC Sample No. | Company | Facility | Sample Point | Date | Time | Elapsed Hours | |

[illegible]

March 24, 1986

TABLE 1: QUALITATIVE RESULTS

Tentatively Identified Organic Compounds - GC/MS Analysis Data - Base/Neutral Fraction (QR08)

Chain of Custody Data Required for ETC Data Management Summary Reports

| | | | | |
|----------------|-----------------|----------|--------------|-----------------|
| L3583 | DAMES AND MOORE | DMCHEV | S BFTP5 | 860304 |
| ETC Sample No. | Company | Facility | Sample Point | Date Time Hours |

| Compound Name | Data | | | Identifiers | | Estimated Concen. ug/kg | | |
|----------------------------------|----------------|----------------------------|------|---------------|--|-------------------------------|--|--|
| | Scan Number | Retention Time (Min) | M.W. | CAS Number | Empirical Formula | | | |
| 1 Trichloroethylene * | 45 | 2.92 | 130 | 79016 | C ₂ HCl ₃ | 796 | | |
| 2 dimethyl-Pentene | 102 | 3.94 | 98 | - | C ₇ H ₁₄ | 707 | | |
| 3 Unknown * | 151 | 4.81 | - | - | - | 46100 | | |
| 4 Alkane * | 281 | 7.11 | - | - | C _n H _{2n+2} | 538 | | |
| 5 methyl-Naphthalene | 605 | 12.86 | 142 | - | C ₁₁ H ₁₀ | 434 | | |
| 6 Alkene | 963 | 19.22 | - | - | C _n H _{2n} | 613 | | |
| 7 Unknown | 1272 | 24.70 | - | - | - | 468 | | |
| 8 dioctyl ester-Hexanedioic acid | 1459 | 28.02 | 370 | 123795 | C ₂₂ H ₄₂ O ₄ | 779 | | |
| 9 Alkene | 1513 | 28.98 | - | - | C _n H _{2n} | 405 | | |

*Compound also present in the Blank.

March 26, 1986

TABLE 1: QUALITATIVE RESULTS

Tentatively Identified Organic Compounds - GC/MS Analysis Data - Volatile Fraction (QR06)

Chain of Custody Data Required for ETC Data Management Summary Reports

L3592

DAMES AND MOORE

DMCHE V

SBFTP6

860304

ETC Sample No.

Company

Facility

Sample Point

Date

Time

Elapsed
Hours

| Compound Name | Data | | | Identifiers | | Estimated Concen. ug/kg | | |
|---------------------------------------|----------------|----------------------------|------|---------------|----------------------------------|-------------------------------|--|--|
| | Scan Number | Retention Time (Min) | M.W. | CAS Number | Empirical Formula | | | |
| 1 Carbon dioxide * | 7 | 1.24 | 44 | - | CO ₂ | - | | |
| 2 Unknown | 499 | 20.31 | - | - | - | 13900 | | |
| 3 Cyclopentene, 1,3-dimethyl-, trans- | 517 | 21.01 | 98 | 1759586 | C ₇ H ₁₄ | 12800 | | |
| 4 Alkane | 577 | 23.33 | - | - | C _n H _{2n+2} | 33800 | | |
| 5 Alkane | 608 | 24.54 | - | - | C _n H _{2n+2} | 119000 | | |
| 6 Alkane | 623 | 25.12 | - | - | C _n H _{2n+2} | 107000 | | |
| 7 Unknown | 648 | 26.09 | - | - | - | 53000 | | |
| 8 Unknown | 674 | 27.10 | - | - | - | 24100 | | |
| 9 Unknown * | 690 | 27.72 | - | - | - | 9410 | | |
| *Compound also present in the Blank. | | | | | | | | |

[illegible]**TABLE 1: QUALITATIVE RESULTS**

Tentatively Identified Organic Compounds - GC/MS Analysis Data - Acid Fraction (QR07)

Chain of Custody Data Required for ETC Data Management Summary Reports

860304

Elapsed
Hours

[illegible]

March 24, 1986

TABLE 1: QUALITATIVE RESULTS

Tentatively Identified Organic Compounds - GC/MS Analysis Data - Base/Neutral Fraction (QR08)

Chain of Custody Data Required for ETC Data Management Summary Reports

L3592

ETC Sample No.

DAMES AND MOORE

Company

DMCHEV

Facility

S. BFTP6

Sample Point

860304

Date

Time

Hours

| Compound Name | Data | | | Identifiers | | Estimated Concen. ug/kg | | |
|-------------------------------------|----------------|----------------------------|------|---------------|----------------------|-------------------------------|--|--|
| | Scan Number | Retention Time (Min) | M.W. | CAS Number | Empirical Formula | | | |
| 1 dihydro-methyl-1H-Indene Isomer | 455 | 10.19 | 132 | - | C10H12 | 128000 | | |
| 2 dihydro-dimethyl-1H-Indene Isomer | 507 | 11.12 | 146 | - | C11H14 | 128000 | | |
| 3 methyl-Naphthalene Isomer | 615 | 13.04 | 142 | - | C11H10 | 378000 | | |
| 4 methyl-Naphthalene Isomer | 632 | 13.35 | 142 | - | C11H10 | 205000 | | |
| 5 ethyl-Naphthalene Isomer | 712 | 14.78 | 156 | - | C12H12 | 181000 | | |
| 6 dimethyl Naphthalene Isomer | 726 | 15.03 | 156 | - | C12H12 | 356000 | | |
| 7 dimethyl Naphthalene Isomer | 742 | 15.31 | 156 | - | C12H12 | 446000 | | |
| 8 dimethyl Naphthalene Isomer | 759 | 15.62 | 156 | - | C12H12 | 184000 | | |
| 9 trimethyl Naphthalene Isomer | 819 | 16.69 | 170 | - | C13H14 | 191000 | | |
| 10 trimethyl Naphthalene Isomer | 845 | 17.16 | 170 | - | C13H14 | 170000 | | |
| 11 trimethyl Naphthalene Isomer | 858 | 17.39 | 170 | - | C13H14 | 209000 | | |
| 12 Alkane | 892 | 18.00 | - | - | CnH2n+2 | 130000 | | |

March 13, 1986

TABLE 1: QUALITATIVE RESULTS

Tentatively Identified Organic Compounds - GC/MS Analysis Data - Volatile Fraction (QR06)

Chain of Custody Data Required for ETC Data Management Summary Reports

| | | | | | |
|----------------|-----------------|----------|--------------|--------|--------------------|
| L3584 | DAMES AND MOORE | DMCHEV | S BFTP7 | 860304 | |
| ETC Sample No. | Company | Facility | Sample Point | Date | Elapsed Time Hours |

| Compound Name | Data | | | Identifiers | | Estimated | | |
|--------------------------------------|-------------|----------------------|------|-------------|----------------------------------|---------------|--|--|
| | Scan Number | Retention Time (Min) | M.W. | CAS Number | Empirical Formula | Concen. ug/kg | | |
| 1 Carbon dioxide* | 9 | 1.48 | 44 | - | CO ₂ | - | | |
| 2 Alkene | 569 | 23.27 | - | - | C _n H _{2n} | 23000 | | |
| 3 Unknown | 630 | 25.65 | - | - | - | 3080 | | |
| 4 Alkene | 651 | 26.47 | - | - | C _n H _{2n} | 16500 | | |
| 5 Alkene | 667 | 27.09 | - | - | C _n H _{2n} | 17200 | | |
| 6 1,1,2-Trimethyl-cyclohexane | 685 | 27.79 | 126 | 7094260 | C ₉ H ₁₈ | 39100 | | |
| 7 Unknown | 706 | 28.61 | - | - | - | 15100 | | |
| 8 Alkene | 726 | 29.39 | - | - | C _n H _{2n} | 14600 | | |
| 9 Unknown | 750 | 30.33 | - | - | - | 35000 | | |
| 10 Alkane | 808 | 32.59 | - | - | C _n H _{2n+2} | 99000 | | |
| 11 Alkane | 926 | 37.19 | - | - | C _n H _{2n+2} | 26500 | | |
| 12 Ethyl-methyl benzene | 974 | 39.06 | 120 | - | C ₉ H ₁₂ | 78100 | | |
| *Compound also present in the Blank. | | | | | | | | |

TABLE 1: QUALITATIVE RESULTS

March 23, 1986

TABLE 1: QUALITATIVE RESULTS

Chain of Custody Data Required for ETC Data Management Summary Reports

860304

Elapsed
Hours

* Compound also present in the Blank.

March 24, 1986

TABLE 1: QUALITATIVE RESULTS

Tentatively Identified Organic Compounds - GC/MS Analysis Data - Base/Neutral Fraction (QR08)

Chain of Custody Data Required for ETC Data Management Summary Reports

| | | | | |
|----------------|-----------------|----------|--------------|-----------------|
| L3584 | DAMES AND MOORE | DMCHEV | S BFTP7 | 860304 |
| ETC Sample No. | Company | Facility | Sample Point | Date Time Hours |

| Compound Name | Data | | | Identifiers | | | | |
|---------------------------------|-------------|----------------------|------|-------------|---------------------------------|------------------------|--|--|
| | Scan Number | Retention Time (Min) | M.W. | CAS Number | Empirical Formula | Estimated Concn. ug/kg | | |
| 1 Unknown * | 142 | 4.63 | - | - | - | 33600 | | |
| 2 Unknown | 465 | 10.39 | - | - | - | 7000 | | |
| 3 Unknown | 480 | 10.64 | - | - | - | 15800 | | |
| 4 Unknown | 546 | 11.82 | - | - | - | 7970 | | |
| 5 dihydro-dimethyl-1H-Indene | 562 | 12.10 | 146 | - | C ₁₁ H ₁₄ | 8250 | | |
| 6 methyl-Naphthalene Isomer | 611 | 12.98 | 142 | - | C ₁₁ H ₁₀ | 18000 | | |
| 7 methyl-Naphthalene Isomer | 629 | 13.30 | 142 | - | C ₁₁ H ₁₀ | 8190 | | |
| 8 dimethyl-Naphthalene Isomer | 722 | 14.96 | 156 | - | C ₁₂ H ₁₂ | 9050 | | |
| 9 dimethyl-Naphthalene Isomer | 737 | 15.23 | 156 | - | C ₁₂ H ₁₂ | 12700 | | |
| 10 dimethyl-Naphthalene Isomer | 755 | 15.55 | 156 | - | C ₁₂ H ₁₂ | 7780 | | |
| 11 trimethyl Naphthalene Isomer | 869 | 17.59 | 170 | - | C ₁₃ H ₁₄ | 7190 | | |

* Compound also present in the Blank.

MAR 29, 1986

Tentatively Identified Organic Compounds - GC/MS Analysis Data - Volatile Fraction (QR06)

| Chain of Custody Data Required for ETC Data Management Summary Reports | | | | | | |
|--|-----------------|----------|--------------|--------|------|---------------|
| ETC Sample No. | Company | Facility | Sample Point | Date | Time | Elapsed Hours |
| L3589 | DAMES AND MOORE | DMCHEV | S BFTP8 | 860304 | | |

[illegible]**TABLE 1: QUALITATIVE RESULTS**

March 23, 1986

March 23, 1986

TABLE 1: QUALITATIVE RESULTS

Tentatively Identified Organic Compounds - GC/MS Analysis Data - Acid Fraction (QR07)

Chain of Custody Data Required for ETC Data Management Summary Reports

L3589

DAMES AND MOORE

DMCHEV

S BETP8

860304

ETC Sample No.

Company

Facility

Sample Point

Date

Time

Elapsed
Hours

| Compound Name | Data | | | Identifiers | | Estimated Concen. ug/kg | | |
|--------------------------|----------------|----------------------------|------|---------------|---|-------------------------------|--|--|
| | Scan Number | Retention Time (Min) | M.W. | CAS Number | Empirical Formula | | | |
| 1 Dichloromethane | 5 | 2.37 | 84 | 75092 | CH ₂ Cl ₂ | 32800 | | |
| 2 1,1,1-Trichloroethane* | 30 | 2.82 | 132 | 71556 | C ₂ H ₃ Cl ₃ | 856 | | |
| 3 Cyclohexene* | 47 | 3.13 | 82 | 110838 | C ₆ H ₁₀ | 7330 | | |
| 4 4,4-Dimethyl-2-penten | 126 | 4.55 | 98 | 26232984 | C ₇ H ₁₄ | 649 | | |
| 5 Tetrachloroethene* | 135 | 4.71 | 164 | 127184 | C ₂ Cl ₄ | 364 | | |
| 6 Unknown* | 181 | 5.54 | - | - | - | 69400 | | |

* Compound also present in the Blank.

March 24, 1986

TABLE 1: QUALITATIVE RESULTS

Tentatively Identified Organic Compounds - GC/MS Analysis Data - Base/Neutral Fraction (QR08)

Chain of Custody Data Required for ETC Data Management Summary Reports

| | | | | |
|----------------|-----------------|----------|--------------|-----------------|
| L3589 | DAMES AND MOORE | DMCHEV | S BFTP8 | 860304 |
| ETC Sample No. | Company | Facility | Sample Point | Date Time Hours |

| Compound Name | Data | | | Identifiers | | Estimated Concen. ug/kg | | |
|-------------------------------------|----------------|----------------------------|------|---------------|----------------------------------|-------------------------------|--|--|
| | Scan Number | Retention Time (Min) | M.W. | CAS Number | Empirical Formula | | | |
| 1 Trichloroethylene * | 46 | 2.95 | 130 | 79016 | C ₂ HCl ₃ | 435 | | |
| 2 4-methyl-3-Penten-2-one | 104 | 3.98 | 98 | 141797 | C ₆ H ₁₀ O | 1380 | | |
| 3 Unknown * | 153 | 4.85 | - | - | - | 42800 | | |
| 4 dihydro-methyl-1H-Indene Isomer | 444 | 10.02 | 132 | - | C ₁₀ H ₁₂ | 399 | | |
| 5 dihydro-methyl-1H-Indene Isomer | 456 | 10.23 | 132 | - | C ₁₀ H ₁₂ | 652 | | |
| 6 dihydro-dimethyl-1H-Indene Isomer | 508 | 11.16 | 146 | - | C ₁₁ H ₁₄ | 465 | | |
| 7 methyl-Naphthalene Isomer | 611 | 12.99 | 142 | - | C ₁₁ H ₁₀ | 1000 | | |
| 8 methyl-Naphthalene Isomer | 629 | 13.31 | 142 | - | C ₁₁ H ₁₀ | 419 | | |
| 9 dimethyl Naphthalene Isomer | 722 | 14.96 | 156 | - | C ₁₂ H ₁₂ | 456 | | |
| 10 dimethyl Naphthalene Isomer | 737 | 15.23 | 156 | - | C ₁₂ H ₁₂ | 489 | | |
| 11 Alkane | 1458 | 28.03 | - | - | C _n H _{2n+2} | 353 | | |

* Compound also present in the Blank.

MAR 29, 1986

Tentatively Identified Organic Compounds - GC/MS Analysis Data - Volatile Fraction (QR06)

| Chain of Custody Data Required for ETC Data Management Summary Reports | | | | | | |
|--|-----------------|----------|--------------|--------|------|---------------|
| ETC Sample No. | Company | Facility | Sample Point | Date | Time | Elapsed Hours |
| L3590 | DAMES AND MOORE | DMCHEV | S BFT99 | 860304 | | |

| Compound Name | Data | | | Identifiers | | Estimated Concn. ug/kg | | |
|--------------------------------------|----------------|----------------------------|------|---------------|----------------------|------------------------------|--|--|
| | Scan Number | Retention Time (Min) | M.W. | CAS Number | Empirical Formula | | | |
| 1 Carbon dioxide* | 9 | 1.45 | 44 | - | CO ₂ | - | | |
| 2 Unknown | 491 | 20.21 | - | - | - | 166000 | | |
| *Compound also present in the Blank. | | | | | | | | |

TABLE 1: QUALITATIVE RESULTS

Chain of Custody Data Required for ETC Data Management Summary Reports

860304

Elapsed
Hours

* Compound also present in the Blank.

March 24, 1986

TABLE 1: QUALITATIVE RESULTS

Tentatively Identified Organic Compounds - GC/MS Analysis Data - Base/Neutral Fraction (QR08)

Chain of Custody Data Required for ETC Data Management Summary Reports

| | | | | |
|----------------|-----------------|----------|--------------|-----------------|
| L3590 | DAMES AND MOORE | DMCHEV | S BFTP9 | 860304 |
| ETC Sample No. | Company | Facility | Sample Point | Date Time Hours |

| Compound Name | Data | | | Identifiers | | Estimated Concen. ug/kg | | |
|------------------------|----------------|----------------------------|------|---------------|-----------------------------------|-------------------------------|--|--|
| | Scan Number | Retention Time (Min) | M.W. | CAS Number | Empirical Formula | | | |
| 1 Unknown * | 142 | 4.65 | - | - | - | 53700 | | |
| 2 methyl-Naphthalene | 611 | 12.97 | 142 | - | C ₁₁ H ₁₀ | 5050 | | |
| 3 dimethyl-Naphthalene | 722 | 14.94 | 156 | - | C ₁₂ H ₁₂ | 2240 | | |
| 4 Dibenzofuran | 828 | 16.83 | 168 | 132649 | C ₁₂ H ₈ O | 4200 | | |
| 5 methyl-Dibenzofuran | 933 | 18.69 | 182 | - | C ₁₃ H ₁₀ O | 2080 | | |
| 6 Unknown | 1019 | 20.22 | - | - | - | 2950 | | |
| 7 Unknown | 1196 | 23.38 | - | - | - | 2960 | | |

* Compound also present in the Blank.

March 15, 1986

TABLE 1: QUALITATIVE RESULTS

Tentatively Identified Organic Compounds - GC/MS Analysis Data - Volatile Fraction (QR06)

| Chain of Custody Data Required for ETC Data Management Summary Reports | | | | | | | |
|--|-----------------|----------|--------------|--------|------|---------------|--|
| L3591 | DAMES AND MOORE | DMCHEV | S BFTP10 | 860304 | | | |
| ETC Sample No. | Company | Facility | Sample Point | Date | Time | Elapsed Hours | |

| Compound Name | Data | | | Identifiers | | | | |
|--------------------------------------|-------------|----------------------|------|-------------|----------------------------------|--------------------------|--|--|
| | Scan Number | Retention Time (Min) | M.W. | CAS Number | Empirical Formula | Estimated Concent. ug/kg | | |
| 1 Carbon dioxide* | 4 | 1.37 | 44 | - | CO ₂ | | | |
| 2 Pentane | 345 | 14.64 | 72 | 109660 | C ₅ H ₁₂ | 226 | | |
| 3 Alkane | 488 | 20.21 | - | - | C _n H _{2n+2} | 229 | | |
| 4 Alkene | 683 | 27.81 | - | - | C _n H _{2n} | 240 | | |
| 5 Alkene | 807 | 32.65 | - | - | C _n H _{2n} | 523 | | |
| *Compound also present in the Blank. | | | | | | | | |

March 23, 1986

Tentatively Identified Organic Compounds - GC/MS Analysis Data - Acid Fraction (QR07)

| Chain of Custody Data Required for ETC Data Management Summary Reports | | | | | | |
|--|-----------------|----------|--------------|--------|------|---------------|
| ETC Sample No. | Company | Facility | Sample Point | Date | Time | Elapsed Hours |
| L3591 | DAMES AND MOORE | DMCHEV | S-BFTP10 | 850304 | | |

[illegible]

March 24, 1986

TABLE 1: QUALITATIVE RESULTS

Tentatively Identified Organic Compounds - GC/MS Analysis Data - Base/Neutral Fraction (QR08)

Chain of Custody Data Required for ETC Data Management Summary Reports

L3591

DAMES AND MOORE

DMCHEV

S BFTP10

860304

ETC Sample No.

Company

FACILITY

Sample Point

• **Price**

Time Hair

[illegible]

March 28, 1986

TABLE 1: QUALITATIVE RESULTS

Tentatively Identified Organic Compounds - GC/MS Analysis Data - Volatile Fraction (QR06)

Chain of Custody Data Required for ETC Data Management Summary Reports

L3588

DAMES AND MOORE

DMCHEV

S BFBG

860304

ETC Sample No

Company

Facility

Sample Point

Date _____

T. Sime

Hours

[illegible]

March 23, 1986

TABLE 1: QUALITATIVE RESULTS

Tentatively Identified Organic Compounds - GC/MS Analysis Data - Acid Fraction (QR07)

Chain of Custody Data Required for ETC Data Management Summary Reports

L3588

DAMES AND MOORE

DMCHEV

S BF BG 860304

ETC Sample No.

Company

Facility

Sample Point

Date

Time

Elapsed
Hours

| Compound Name | Data | | | Identifiers | | Estimated Concen. ug/kg | | |
|---------------------------|----------------|----------------------------|------|---------------|---|-------------------------------|--|--|
| | Scan Number | Retention Time (Min) | M.W. | CAS Number | Empirical Formula | | | |
| 1 Unknown | 22 | 2.61 | - | - | - | 16400 | | |
| 2 1,1,1,-Trichloroethane* | 34 | 2.82 | 132 | 71556 | C ₂ H ₃ Cl ₃ | 830 | | |
| 3 Cyclohexene* | 51 | 3.14 | 82 | 110838 | C ₆ H ₁₀ | 8220 | | |
| 4 4-Methyl-3-pentan-2-one | 132 | 4.59 | 98 | 141797 | C ₆ H ₁₀ O | 1960 | | |
| 5 Tetrachloroethene* | 140 | 4.73 | 164 | 127184 | C ₂ Cl ₄ | 396 | | |
| 6 Unknown* | 199 | 5.79 | - | - | - | 133000 | | |
| 7 Unknown | 250 | 6.71 | - | - | - | 1010 | | |

* Compound also present in the Blank.

March 24, 1986

TABLE 1: QUALITATIVE RESULTS

Tentatively Identified Organic Compounds - GC/MS Analysis Data - Base/Neutral Fraction (QR08)

Chain of Custody Data Required for ETC Data Management Summary Reports

L3588 DAMES AND MOORE DMCHEV S BFBG 860304
ETC Sample No. Company Facility Sample Point Date Time Hours

| Compound Name | Data | | | Identifiers | | Estimated Concen. ug/kg | | |
|--------------------------|----------------|----------------------------|------|---------------|---------------------------------|-------------------------------|--|--|
| | Scan Number | Retention Time (Min) | M.W. | CAS Number | Empirical Formula | | | |
| 1 Unknown * | 152 | 4.82 | - | - | - | 110300 | | |
| 2 ethyl-dimethyl-Benzene | 386 | 8.98 | 134 | - | C ₁₀ H ₁₄ | 1100 | | |
| 3 Unknown | 450 | 10.12 | - | - | - | 1900 | | |
| 4 Unknown | 460 | 10.30 | - | - | - | 1790 | | |
| 5 Unknown | 511 | 11.21 | - | - | - | 1230 | | |
| 6 Unknown | 548 | 11.86 | - | - | - | 1150 | | |
| 7 methyl-Naphthalene | 613 | 13.02 | 142 | - | C ₁₁ H ₁₀ | 3650 | | |
| 8 methyl-Naphthalene | 630 | 13.32 | 142 | - | C ₁₁ H ₁₀ | 1480 | | |
| 9 dimethyl-Naphthalene | 722 | 14.96 | 156 | - | C ₁₂ H ₁₂ | 1440 | | |
| 10 dimethyl-Naphthalene | 737 | 15.23 | 156 | - | C ₁₂ H ₁₂ | 1540 | | |
| 11 Unknown | 1457 | 28.02 | - | - | - | 1140 | | |

* Compound also present in the Blank

MAR 29, 1986