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SOLID WASTE WATER QUALITY ASSESSMENT TEST (SWAT) AND DATA SUMMARY REPORT FOR RI/FS PHASES 5 AND 6
VOLUME II
APPENDICES A THROUGH K
FINAL

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FINAL
SOLID WASTE WATER QUALITY ASSESSMENT TEST (SWAT) AND DATA SUMMARY REPORT FOR REMEDIAL INVESTIGATION/FEASIBILITY STUDY PHASES 5 AND 6

DATED 30 APRIL 1993

THIS RECORD CONTAINS MULTIPLE VOLUMES WHICH HAVE BEEN ENTERED SEPARATELY

VOLUME I OF II IS FILED AS ADMINISTRATIVE RECORD NO. **N00236.000847**

APPENDICES

A - SWAT GUIDANCE DOCUMENT
B - TO BE CONSIDERED ACTION LEVELS
C - FIELD METHODS
D - SOIL GENERAL CHEMICAL RESULTS
E - BOREHOLE LOGS
F - GEOTECHNICAL LABORATORY REPORTS
G - AQUIFER TESTING PROGRAM
H - GEOPHYSICAL REPORT/DATA
I - STATISTICAL ANALYSIS OF METALS CONCENTRATIONS
J - TIDAL INFLUENCE STUDY DATA TABLES AND CHARTS
K - RADIONUCLIDES DISCUSSION AND SUMMARY

APPENDIX A – SWAT GUIDANCE DOCUMENT

FINAL
SOLID WASTE WATER QUALITY ASSESSMENT TEST AND DATA SUMMARY REPORT FOR REMEDIAL INVESTIGATION/FEASIBILITY STUDY FOR PHASES 5 AND 6

DATED 30 APRIL 1993

TECHNICAL GUIDANCE MANUAL

SOLID WASTE WATER QUALITY ASSESSMENT TEST (SWAT)

PROPOSALS AND REPORTS

SOLID WASTE DISPOSAL PROGRAM
HYDROGEOLOGY SECTION
LAND DISPOSAL BRANCH
DIVISION OF WATER QUALITY
STATE WATER RESOURCES CONTROL BOARD

August 1988

SOLID WASTE ASSESSMENT TEST (SWAT)
PROPOSALS AND REPORTS

TABLE OF CONTENTS

TECHNICAL GUIDANCE MANUAL
SOLID WASTE DISPOSAL PROGRAM

SOLID WASTE WATER QUALITY ASSESSMENT TESTS (SWATs) PROPOSALS AND REPORTS

I. PREFACE

It has long been known that solid waste disposal sites designed to receive only domestic or commercial waste also receive some hazardous waste. It is nearly impossible to prevent some hazardous wastes from entering these sites. For many years, most regulatory agency staff felt that only small quantities of hazardous wastes were received by ordinary solid waste disposal sites. Further, it was largely perceived that this hazardous waste would be diluted or adsorbed by the rubbish to the point where significant quantities, if any, would not reach ground water.

In recent years, however, we have seen scattered indications that hazardous wastes in ordinary disposal sites might be more of a problem than we had anticipated. Solvents and pesticides have been found in ground water under disposal sites and in landfill gases emanating from the soil.

Based on these findings, legislation has been passed which requires all solid waste operators to demonstrate whether these indications of hazardous waste leakage are representative of a serious, widespread problem or are rare exceptions.

II. INTRODUCTION

A. BACKGROUND

In 1984, Section 13273 was added to the Water Code.[1] This Section required the State Water Resources Control Board (State Board) to rank all solid waste disposal sites throughout the State on the basis of the potential threat they may pose to water quality. Further, this Section mandates that these sites be tested to determine whether there is hazardous waste leakage from the site.

The State Board approved a ranked list of approximately 2,100 active and inactive solid waste disposal sites in December, 1985. Revised rankings were adopted by the State Board in October and December, 1986 and December, 1987. The most recently approved list contains over 2,200 sites, consisting of 14 ranks of 150 sites each, and a 15th partially filled rank.

Water Code Section 13273 requires the operators (and/or owners) of solid waste disposal sites to submit a Solid Waste Water Quality Assessment Test (SWAT) report to the appropriate California Regional Water Quality Control Board (Regional Board).[2] The SWAT reports are due the first day of July each year, depending on their ranking, with Rank 1 sites due July 1, 1987 (see Section II.C.).

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[1]Chapter 1532, Statutes of 1984 (sometimes known as the Calderon Act after its author). This law added Sections 66795.53 and -.54 to the California Code of Regulations; Sections 40511, 41805.5, and 4231.5 to the Health and Safety Code; and Section 13273 to the Water Code. There were subsequent amendments to some of these Sections in 1986 and 1987. Copies of all relevant laws are contained in Appendix Number 1.

[2]Under Section 41805.5 of the Health and Safety Code, Air-SWAT reports are required to be submitted to the Air Resources Board. Only Water-SWATs are addressed in this document.

As per Subsection 13273(b), the SWAT report must contain:

1. An analysis of the surface and ground water on, under, and within one mile of a solid waste disposal site to provide a reliable indication of whether there is any leakage of hazardous waste; and

2. A chemical characterization of the soil-pore liquid in those areas which are likely to be affected if the solid waste disposal site is leaking, as compared to geologically similar areas near the solid waste disposal site which have not been affected by leakage of waste discharge.

Subsection 13273(b) states that a qualified professional must certify that the report contains all of the information required above as well as any additional information required by the Regional Board. This certification must be made by a professional meeting the following qualifications:

1. Must be registered or certified as:

   a. A Registered Geologist registered pursuant to Business and Professions (B&P) Code Section 7850, or

   b. A Certified Engineering Geologist certified pursuant to B&P Code Section 7842, or

   c. A Registered Civil Engineer registered pursuant to B&P Code Section 6762, and,

2. Must have at least five years experience in ground water hydrology.

Based on the Regional Board's prior experience with similar investigations and reports, it was recognized that the site operator's preparation of a SWAT investigation proposal was a necessary first step. Although Water Code Section 13273 makes no mention of a proposal, Section 13267 of the same code authorizes Regional Boards to require submittal of technical reports. Thus, a SWAT investigation proposal, containing detailed plans for the work required for this program, should be prepared at least a year before the SWAT report due date. Further, the Regional Boards are urged to require that the proposal be prepared by a person having the same qualifications as required for the certification of a SWAT report.

B. PURPOSE

This Technical Guidance Manual (Manual) addresses the contents of the SWAT proposals and reports. It draws upon two draft technical guidance documents, dated March and October, 1986, as well as various guidance memoranda, literature, and other relevant sources.

The Manual provides guidance for:

1. The preparation of adequate SWAT proposals and SWAT reports to meet the requirements set forth in Water Code Section 13273, and

2. The review of SWAT proposals and reports by Regional Board staff.

The Manual's contents are <u>not</u> regulations; thus site specific considerations should dictate how closely the Manual's procedures are followed. However, the Regional Boards may wish to ask the site owner/operator to justify any omissions on the basis that local circumstances make them unnecessary and that the final results will not be compromised. (For example, a site having average ground water levels above most of the refuse will not need unsaturated zone monitoring since there is no unsaturated zone.)

Use of procedures different than those suggested in this Manual should also be justified on the basis that the proposed substitute procedure will provide data that is equally or more reliable than that discussed in the Manual. For example, a newly developed lysimeter design might be substituted for the current procedures if it is more suitable for the soils underlying the site.

It is intended that this Manual be a dynamic document. As significant advances in the fields of ground, vadose zone, and surface water sampling and other germane subjects are developed, addenda or corrections to this Manual will be prepared and distributed.

C. WAIVERS

The SWAT law contains one clause for which waivers for the SWAT work may be granted. Water Code Subsection 13273(c) states, "If the regional board determines that the information specified in paragraph (1) [surface and ground water sampling] or (2) [soil-pore liquid sampling] is not needed because other information demonstrates that hazardous wastes are migrating into the water, the regional board may waive the requirement to submit this information specified in paragraphs (1) and (2) of subdivision (b)." Thus, for those sites where existing monitoring systems or other available data indicate that there is hazardous waste leakage, the Regional Board may grant a waiver.

In those cases where hazardous waste is leaking from the site, ongoing investigations should be capable of determining the extent of the leakage and whether there are any additional leakage areas. These investigations are covered under Subchapter 15 and Water Code Sections 13301 and 13304.

If a waiver is granted, the Regional Board must notify the California Department of Health Services (DHS) and must take remedial action pursuant to Chapter 5 (Section 13300 et. seq.).

D. INCORPORATION OF SUBCHAPTER 15 REQUIREMENTS

The technical requirements of the SWAT program and Subchapter 15[3] have a substantial overlap. Owners of active solid waste disposal sites were required to submit to the Regional Board by mid-1985 a proposed monitoring program that would meet the requirements of Articles 5 and 9 of Subchapter 15. Wherever such a program was implemented, it should have met all or most of the SWAT requirements. There are, however, some important differences between the two programs:

1. Water Code Section 13273 is written in language that can be interpreted as requiring only a single sample per sampling point. Since almost all of California has distinctly wet and dry seasons, water quality may likewise have a seasonal variation. During and immediately following the wet season, infiltrating rainfall may dilute and reduce the mineral concentrations of existing vadose zone and ground water. On the other hand, following the infiltration of precipitation from a major storm through waste, a distinct "slug" of degraded water may be found moving toward or within the zone of

[3]California Code of Regulations, Title 23, Chapter 3, Subchapter 15, "Disposal of Waste to Land".

saturation. A further complication is that a "slug" of leachate may take many months to move from the site to a particular monitoring well. Therefore, the general rule should be that a reliable indication of ground water quality can only be obtained from a suite of at least four quarterly samples. Any site operator submitting sample data that does not meet the above criteria must demonstrate that his site is different from the general rule stated above.

2. Subchapter 15 only mandates water quality monitoring of active sites. The SWAT law makes no distinction between active and inactive sites.

3. Subchapter 15's requirements for unsaturated (vadose) zone sampling apply only "if feasible". The SWAT law contains no such exception.

Disposal site operators with active sites on the State Board's ranked SWAT list should comply with the monitoring requirements in Subchapter 15 at the same time they complete the SWAT report. Disposal site operators should contact their Regional Boards for site specific information on Subchapter 15 compliance. Disposal site operators in the process of implementing Subchapter 15 requirements may find that many of their SWAT Program requirements will have been satisfied with their Subchapter 15 efforts. In these cases, the required SWAT will summarize the ongoing Subchapter 15 efforts and report on the specific hazardous waste test results required by the Regional Board. Hence, for all references contained in this guidance, unless otherwise noted, refer to code sections found in Title 23, Chapter 3, Subchapter 15 of the California Code of Regulations.

III. SWAT PROPOSALS

The purpose of a SWAT proposal is threefold:

- Provide to the Regional Board all relevant background information and supporting data for the proposed SWAT investigation.
- Provide to the Regional Board an outline of the investigation plan, including the location, design, and rationale for all monitoring and sampling stations.
- Provide the site operator an early opportunity to adjust the SWAT investigation plans in order to meet the mandates of the law and the requirements of the Regional Board.

In most cases, a preliminary (pre-proposal) hydrogeologic assessment of the site will be necessary. This should include a thorough inventory of all available site and regional data, such as existing maps and literature, well data, water quality analyses, etc. If additional background information is needed, the operator may wish to install piezometers or exploratory boreholes, do site specific geologic mapping, or take other measures to establish hydraulic gradients, aquifer characteristics, etc. The Regional Board staff may wish to confer with the site operator at this stage to ensure that the necessary preliminary assessment work is being done.

The following sections (III.A through III.F) provide an outline of the items which should be addressed in the SWAT proposal. It is expected that much of the requested data will not be available for older and/or smaller sites. In such cases, the Regional Boards should determine whether any of the omitted data are critical for successful completion of the SWAT report. In such cases, they should require that these data or equivalent alternative data be obtained by the site operator.

Site data previously submitted to the Regional Board under another program need not be resubmitted; however, it must be clearly and accurately referenced.

A. GENERAL SITE INFORMATION

This section is designed to give all relevant background data concerning the disposal site.

1. SITE NAME: Include the preferred name and all previous names used for the facility.

2. SITE LOCATION: Data submitted should include both general information necessary for determining where the site is located and, also, data showing where on the site property waste has been placed. All of the following should be submitted:

    a. A scaled map showing the relationship of the site to highways, communities and other cultural features.

    b. A street address, if available, or general location.

    c. Township, range, section, and fractional section, if available.

    d. County Assessor's parcel map showing site boundaries.

    e. Other types of maps or descriptive matter that provide equivalent information useful for specifying the site and waste location.

3. **OWNERS/OPERATORS:** Include current property owner(s) and site operator(s) of the facility. Include names, current mailing addresses and telephone numbers.

4. **CURRENT PERMITS AND/OR REGULATORY ORDERS:** Reference all relevant permits and orders (copies need not be submitted unless specifically requested by the Regional Board).

5. **SITE HISTORY:**

    a. **Identify names and current addresses, and duration of involvement for all past site owners and operators.**

    b. **Describe past and present modes of operation used at the site.**

6. WASTE DISPOSAL HISTORY:

   a. Include a description of the types, quantities, physical states, concentrations, and disposal locations of wastes contained in the site. This should include information for all previous operations. Wastes and waste constituents should be specifically identified according to the most descriptive nomenclature. This should include, if possible, reference numbers for listings established by DHS in Section 66680, Title 22, California Code of Regulations.

   b. Include a description of waste disposal methods specifying waste mixing and management practices.

7. SITE CONSTRUCTION DETAILS (Section 2596(a)(1)):

   a. Include detailed information on liners including:

      (1) Liner material specifications and testing.

      (2) Method of placement and other construction details.

      (3) Quality assurance/quality control procedures.

      (4) Subsequent inspections, repairs, etc.

   b. If a leachate collection and removal system pursuant to Section 2557 is present, include construction details and specifications along with a representative analysis of leachate. Include a summary of all previous analyses.

8. SITE CLOSURE DETAILS:

   a. Date operations ceased.

   b. Date closure plan was approved. (If site closure was phased, provide map showing closure dates for each portion of the site.)

   c. Details on final treatment processes (mixing, chemical treatment, burial, removal, etc.).

   d. Quantity and quality of all waste left in place.

e. Cover specifications (same details as for liners, 7a. above). Specify if cover is final cover.

f. Description of landfill gas collection system and gas condensate disposal method.

g. Description of occurrences of settlement or cracking.

9. CURRENT AND PROPOSED LAND USE:

Describe the present and proposed (if known) land use of the disposal site property and the present and proposed land use patterns existing within 0.5 mile of the disposal site.

B. SITE ASSESSMENT

This section is designed to describe the geology and hydrogeology of the site as necessary to justify all monitoring station locations and designs (Section 2596(a)).

1. GEOLOGIC OVERVIEW

a. REGIONAL DATA:

(1) Excerpts of all relevant published geologic information that is referenced in the SWAT proposal.

(2) Topographic maps, geologic maps, and air photos (if available) of the disposal site area. Include locations of all springs, seeps, and surface flows within one mile of the facility boundaries.

(3) Regional geologic cross sections.

(4) Regional soil surveys (available through the U.S. Soil Conservation Service) within one mile of the facility boundaries.

(5) All available well logs within one mile of the facility boundaries, along with a map showing locations and functions of all wells (i.e., monitoring, production, etc.).

b. SITE-SPECIFIC DATA:

(1) Surface and subsurface geologic maps, and a description of the geologic structure of the waste site, including the lithology, thickness, strike, and dip of bedding; the location, attitude, and condition (tight, open, clay- or gypsum-filled, etc.) of any fractures or faults; the nature, type (anticlinal, synclinal, etc.), and orientation of any folds; and all other structural data relevant to ground water and pollutant movement.

(2) Logs and a location map of all monitoring and other wells drilled for this facility (see Appendix 3: Geologic Well Log Description).

(3) Trench logs (if available).

(4) Geologic cross-sections: These sections should be both perpendicular to, and along the regional structure.

2. HYDROGEOLOGIC OVERVIEW

a. **REGIONAL DATA:** Include a summary of all relevant published regional hydrologic and hydrogeologic information. If referenced reports are not readily available, copies of the appropriate data should be submitted (Section 2595(c)).

b. **SITE-SPECIFIC DATA:** Include the following:

(1) **Well logs and completion reports from pilot holes, wells, or any prior piezometer construction (see Appendix 3: Geologic Well Log Description).**

(2) **All prior water level measurement data (see Appendix 5: Piezometer Design and Placement).**

(3) **All prior analytical data from surface waters, ground waters or vadose zone soil pore liquids under or adjacent to the landfill (see Appendix 5: Physical Analysis of Soil Samples).**

C. PROPOSED MONITORING/SAMPLING STATIONS

1. SURFACE WATER SAMPLING: Proposed locations and sampling methodology together with supporting rationale for each.

2. VADOSE ZONE SAMPLING: Proposed locations and vadose zone sampling methodology together with supporting rationale for each (see Appendix 6: Vadose Zone Monitoring) (Section 2559).

3. GROUND WATER SAMPLING: Proposed locations and ground water monitoring well design, along with supporting rationale for each (see Appendix 7: Monitoring Well Design and Placement) [Section 2555(c),(d),(e),(f),(g) & Section 2596(a)].

D. PROPOSED SAMPLING PROCEDURES

Full details should be provided on all proposed surface, vadose, and ground water sampling methods (see Appendix 2: Sampling Procedures) (Section 2855).

E. PROPOSED CHEMICAL ANALYTICAL METHODS

An important consideration in implementing the SWAT program is the assumption that solid waste disposal sites will contain some wastes that were not expected to be present. It is easy to picture circumstances where site users have brought in hazardous wastes, knowingly or unknowingly, for disposal at a site intended for common domestic waste only. Therefore, the chemical analytical methods used must be aimed not at the determination of what is known to be present, but rather, what might be present (see Appendix 2, Section G: Methods of Analyses).

F. PROPOSED QUALITY ASSURANCE/QUALITY CONTROL (QA/QC) PROCEDURES

One of the responsibilities of the operator is to ensure the reliability and validity of field and analytical laboratory data gathered as part of the overall ground water monitoring program.

The operator's sampling and analysis plan must explicitly describe the QA/QC program that will be used in the field and laboratory. (see Appendix 2, Section H: Quality Assurance/Quality Control).

IV. SWAT REPORTS

All SWAT reports will be thoroughly reviewed to determine whether they fully comply with the law and provide adequate data to support the required findings. Matters of special importance include:

A. **DOES THE REPORT CONTAIN AN EXECUTIVE SUMMARY OF THE KEY FINDINGS AND CONCLUSIONS?** The SWAT report's executive summary should contain the following:

1. For each type of sampling (monitoring) method (surface, vadose zone, and ground water):
   - Number of monitoring points.
   - Number of sampling events per monitoring point.
   - Evidence of waste leakage (hazardous, non-hazardous, or none).
2. Is there evidence of hazardous waste in the waste disposal site?

B. **IS THE PERSON CERTIFYING THE REPORT QUALIFIED?** Water Code Subsection 13273(b) states:

> "(b)...a registered geologist, ...a certified engineering geologist, ...or a civil engineer, ...who has at least five years' experience in groundwater hydrology, shall certify that the report contains all of the following information ...."

The report must contain clear evidence that the person certifying the report fully meets the above requirements. The person's license number and expiration date should be given together with a thorough description of their qualifying experience.

C. **IS ALL THE REQUIRED INFORMATION PROVIDED?** Water Code Subsection 13273(b) continues with a description of required data:

> "(1) An analysis of the surface and groundwater on, under, and within one mile of the solid waste disposal

site to provide a reliable indication whether there is any leakage of hazardous waste."

"(2) A chemical characterization of the soil-pore liquid in those areas which are likely to be affected if the solid waste disposal site is leaking, as compared to geologically similar areas near the solid waste disposal site which have not been affected by leakage or waste discharge."

Emphasis should be placed on the following considerations:

1. **ARE YOU CONVINCED THAT THE MONITORING STATIONS PROVIDE RELIABLE DATA ON THE CHEMICAL CHARACTER OF THE WATER?**

   Do all monitoring stations comply with Subchapter 15, Articles 5 and 9? Does the sampling program provide representative samples of ground water, surface water (if appropriate), and unsaturated zone water from all significant potential pollutant escape routes? Are the sampling points capable of intercepting pollutant movement that occurs for only a short period each year (i.e., after a heavy rainfall or as a result of nearby seasonal heavy pumping)?

2. **DOES THE REPORT PROVIDE ADEQUATE DATA FROM THE FOLLOWING LIST TO VALIDATE THE FINAL LOCATION AND AS-BUILT DESIGN FOR EACH MONITORING POINT?**

   - Site improvements and locations of waste.
   - Site geology.
   - Site hydrogeology.
   - Site soils data.
   - Other relevant information.

   Enough data should be provided so that the reviewer, given the same information, would select the same monitoring network locations and designs as those constructed. The report should include geologic cross-sections, ground water gradient data, and other supporting rationale for the location, depth, and methods for each sampling point. This discussion also should support the numbers of monitoring points relative to the size, shape, and location of each significant potential escape route.

Much of this information may have been included in the proposal; however, initial assessment of site conditions may prove to be significantly different than actual subsurface conditions discovered during drilling and exploration. If actual conditions are similar to those initially described, a brief discussion here with reference to the proposal would be appropriate.

3. **DOES THE REPORT DESCRIBE ADEQUATE INSTALLATION QUALITY CONTROL AND QUALITY ASSURANCE MEASURES TO ENSURE THAT ALL MONITORING STATIONS WILL WORK PROPERLY?**

   Improperly installed stations can be a vehicle for movement of pollutants into heretofore clean aquifers. In addition, if they produce non-representative samples (i.e., diluted or de-gassed) they can lead to erroneous data and a false sense of security. An incorrectly installed lysimeter that cannot obtain a water sample gives false data on the presence of water in the formation and prevents one from obtaining data on its quality. The SWAT report should contain as-built details and rationale for locations and construction designs for all sampling (monitoring) stations.

4. **WERE THE SAMPLING METHODS APPROPRIATE TO OBTAIN RELIABLE AND REPRESENTATIVE DATA?**

   The sampling procedures should have been capable of obtaining fresh, representative samples of the water with no significant loss of volatile organic chemicals or undue dilution of the samples.

5. **WERE APPROPRIATE CHEMICAL ANALYTICAL AND QUALITY CONTROL METHODS USED?**

   The analytical methods used should have been capable of providing data on any significant quantities of hazardous substances that could be leaking from the disposal site. Have standard quality control procedures (blanks, spikes, etc.) been employed?

Did the analytical laboratory have the appropriate certifications?

6. **HAVE ENOUGH SAMPLES BEEN TAKEN TO PROVIDE INDICATION OF ANY SEASONAL VARIATIONS OF WATER QUALITY?**

This is especially important where pollutant movement is related to periods of heavy rainfall. Unless exceptional circumstances are demonstrated, quarterly samples should be required.

D. **DOES THE REPORT CONTAIN A REASONABLE INTERPRETATION OF THE BASIC DATA INDICATING WHETHER HAZARDOUS WASTE IS LEAKING FROM THE SOLID WASTE DISPOSAL SITE?**

- There should be a full description of the chemical quality of surface, vadose zone, and ground water under and adjacent to the waste disposal site.
- The report must contain all relevant analytical data, not just a summary of results.
- Chemical data should be accompanied by a description of the analytical methods used and a discussion of all quality control measures, including chain-of-custody documents, spikes, blanks, etc.
- Are the SWAT report conclusions consistent with the findings and conclusions of the Air-SWAT report?

1. **DETERMINATION OF LEAKAGE**

As discussed above, chemical analytical work must be aimed at a determination of what constituents might be present. If a chemical constituent is found that is not naturally occurring in water (e.g., vinyl chloride) and is absent from upgradient waters, these facts alone indicate the heavy probability of site leakage. In some cases, a positive determination of whether leakage has occurred may require a statistical analysis of data from upgradient and downgradient wells.

2. FINDING OF HAZARDOUS WASTE LEAKAGE

Water Code Subsection 13273(e) requires the Regional Board to make a finding whether any hazardous waste has migrated into the water. The question of whether a water sample from one of the site's monitoring (sampling) points is hazardous can be answered by referring to the California Code of Regulations, Title 22, Article 11, Sections 66693 et seq.

More frequently, however, sample analyses will indicate the presence of hazardous constituents listed in Title 22, Article 9, Section 66680 rather than hazardous waste, per se. Most of the constituents will be at concentrations below the Soluble Threshold Limit Concentration (STLC) or equivalent levels. When this occurs, all the circumstances of the determination must be examined. Certainly, any finding of a hazardous waste constituent at levels above background concentrations is a cause of concern.

In some cases, hazardous waste will be the source of the pollutants found at the monitoring point. Preferring to err on the safe side, assume that significant dilution and/or attenuation of the hazardous waste constituent has occurred.

In those cases where it is questionable that the pollutant source <u>is</u> hazardous waste in the disposal site, continued monitoring is critical. It must be determined whether the given chemical concentrations are indicative of a hazardous waste source which will continue to degrade the water, or are temporal or naturally occurring constituents which do not indicate a problem.

E. REJECTION OF INADEQUATE REPORTS

Water Code Section 13273 states:

"(d) The regional board shall examine the report submitted pursuant to subdivision (b) and determine whether the number, location, and design of the wells and the soiling (sic) testing could detect any leachate buildup, leachate migration, or hazardous waste migration. If the regional board determines that the monitoring program could detect the leachate and hazardous waste, the regional board shall take the action specified in subdivision (e). If the regional board determines that the monitoring program was inadequate, the regional board shall require the solid waste disposal site to correct the monitoring program and resubmit the solid waste assessment test based on the results from the corrected program."

The SWAT report must meet all the criteria set forth in Section 13273. A SWAT report should be returned for modifications if:

- The report fails to fulfill any of the law's requirements.
- It lacks the required professional certification, as per Subsection 13273(b).
- It is not complete in its sampling of ground water, surface water (if applicable), and unsaturated zone water, as required by Subsections 13273(b)(1) and (2); both with regard to space (consider three-dimensions!) and time.
- It does not provide adequate rationale for the location and design of each monitoring station to allow the Regional Board to make the determination specified in Subsection 13273(d).
- It does not provide convincing evidence that supports its conclusions regarding hazardous waste leakage and does not allow the Regional Board to make the determination specified in Subsection 13273(e).

APPENDIX 1: APPLICABLE LAWS
A. GOVERNMENT CODE

TITLE 7.3.	Solid Waste Management, Resource Recovery, and Recycling
CHAPTER 3.	Enforcement Program
ARTICLE 4.	Administrative Enforcement and Remedies Available to an Enforcement Agency

Section
66796.53. **Enforcement order or action; explanatory and justifying statement to other agencies; time; inspection of site; receipt of complaint by wrong agency; action by agency or written explanation required**

(a) At least 10 days before issuing an enforcement order which is not for an emergency, within 5 days after issuing an enforcement order for an emergency, and within 15 days after discovering a violation of a state law, regulation, or permit, or a local ordinance, rule, regulation, license, or permit, for a solid waste disposal site which is likely to result in an enforcement action, the following agencies shall provide a written statement providing an explanation of, and justification for, the enforcement order or a description of the violation in the following manner:

(1) The enforcement agency shall provide the statement to the local California regional water quality control board, the local air pollution control district or air quality management district, and the State Department of Health Services.

(2) A California regional water quality control board shall provide the statement to the enforcement agency, the local air pollution control district or air quality management district, and the State Department of Health Services.

(3) An air pollution control district or an air quality management district shall provide the statement to the enforcement agency, the California regional water quality control board, and the State Department of Health Services.

(4) The State Department of Health Services shall provide the statement to the enforcement agency, the local California regional water quality control board, and the local air pollution control district or air quality management district.

(b) Within 10 days after receiving a notice of the issuance of, or the proposal to issue, an enforcement order, pursuant to subdivision (a), the local California regional water quality control board, the enforcement agency, the local air pollution control district or the air quality management district, and the State Department of Health Services shall inspect the solid waste disposal site to determine whether any state law, regulation, or permit, which that board or agency is authorized to enforce, is being violated.

(c) If any board or agency specified in subdivision (a) receives a complaint concerning a solid waste disposal site and the board or agency determines that it is not authorized to take action concerning the complaint, the board or agency shall refer the complaint within 10 days of receipt to another state agency which it determines is authorized to take action.

(d) If any agency or board specified in subdivision (a) receives a complaint concerning a solid waste disposal site which the agency or board does not refer to another state agency pursuant to subdivision (c), or if such an agency or board receives a complaint referred to it by another agency or board pursuant to subdivision (c), the agency or board shall either take enforcement action concerning that facility or provide the person who filed the complaint with a written statement within 10 days explaining why an enforcement action would not be appropriate.

HISTORY:

+Added Stats. 1984, ch. 1532, Section 1.

GOVERNMENT CODE

Section
66796.54. **Report to the legislature; extent of hazardous wastes; potential effects on water quality; accuracy of tests**

(a) On or before January 1, 1989, January 1, 1990, and January 1, 1991, the State Water Resources Control Board shall submit a report to the Legislature summarizing the extent of hazardous waste in solid waste disposal sites and the potential effects these hazardous wastes may have upon the quality of waters of the state, and recommending actions needed to protect the quality of water. Each report shall summarize the data from those solid waste water quality assessment test reports which have been submitted during the preceding year to California regional water quality control boards pursuant to Section 13273 of the Water Code, and shall evaluate the accuracy of the solid waste water quality assessment tests conducted.

(b) On or before July 1, 1988, and July 1, 1989, the State Air Resources Board shall submit a report to the Legislature summarizing the extent of hazardous waste in solid waste disposal sites and the potential effects these hazardous wastes may have upon the ambient air quality of the state, and recommending actions needed to protect the quality of air. The reports submitted on July 1, 1988, and July 1, 1989, shall summarize the data from the solid waste air quality assessment test reports submitted to air quality maintenance districts and air pollution control districts on or before July 1, 1987, and January 1, 1988, respectively, pursuant to Section 41805.5 of the Health and Safety Code, and shall evaluate the accuracy of the solid waste assessment tests conducted.

HISTORY:

+Added Stats. 1986, ch. 1055, Section 3, effective September 24, 1986, operative January 1, 1987.

+Former Section: Former Section 66796.54, similar to the present section was added by Stats. 1984, ch. 1532, Section 2, amended by Stats. 1986, ch. 971, Section 1, and repealed by Stats. 1986, ch. 1055, Section 1, effective September 24, 1986.

B. WATER CODE

DIVISION 7. Water Quality
CHAPTER 4. Regional Water Quality Control
ARTICLE 4. Waste Discharge Requirements

Section
13273. **Solid waste disposal sites; ranking based on threat to water quality; submission of water quality assessment test reports by rank; waiver; evaluation; procedure upon discovery of inadequate monitoring or contamination of the water; revision of discharge requirements**

(a) The state board shall, on or before January 1, 1986, rank all solid waste disposal sites, as defined in Section 66714.1 of the Government Code, based upon the threat which they may pose to water quality. On or before July 1, 1987, the operators of the first 150 solid waste disposal sites ranked on the list shall submit a solid waste water quality assessment test to the appropriate Regional Board for its examination pursuant to subdivision (d). On or before July 1 of each succeeding year, the operators of the next 150 solid waste disposal sites ranked on the list shall submit a solid waste water quality assessment test to the appropriate regional board for its examination pursuant to subdivision (d).

(b) Before a solid waste water quality assessmenttest report may be submitted to the regional board, a registered geologist, registered pursuant to Section 7850 of the Business and Professions Code, a certified engineering geologist, certified pursuant to Section 7842 of the Business and Professions Code, or a civil engineer registered pursuant to Section 6762 of the Business and Professions Code, who has at least five years' experience in groundwater hydrology, shall certify that the report contains all of the following information and any other information which the state board may, by regulation, require:

(1) An analysis of the surface and groundwater on, under, and within one mile of the solid waste disposal site to provide a reliable indication whether there is any leakage of hazardous waste.

(2) A chemical characterization of the soil-pore liquid in those areas which are likely to be affected if the solid waste

disposal site is leaking, as compared to geologically similar areas near the solid waste disposal site which have not been affected by leakage or waste discharge.

(c) If the regional board determines that the information specified in paragraph (1) or (2) is not needed because other information demonstrates that hazardous wastes are migrating into the water, the regional board may waive the requirement to submit this information specified in paragraphs (1) and (2) of subdivision (b). The regional board shall also notify the State Department of Health Services, and shall take appropriate remedial action pursuant to Chapter 5 (commencing with Section 13300).

(d) The regional board shall examine the report submitted pursuant to subdivision (b) and determine whether the number, location, and design of the wells and the soiling testing could detect any leachate buildup, leachate migration, or hazardous waste migration. If the regional board determines that the monitoring program could detect the leachate and hazardous waste, the regional board shall take the action specified in subdivision (e). If the regional board determines that the monitoring program was inadequate, the regional board shall require the solid waste disposal site to correct the monitoring program and resubmit the solid waste assessment test based upon the results from the corrected monitoring program.

(e) The regional board shall examine the approved solid waste assessment test report and determine whether any hazardous waste migrated into the water. If the regional board determines that hazardous waste has migrated into the water, it shall notify the State Department of Health Services and the California Waste Management Board and shall take appropriate remedial action pursuant to Chapter 5 (commencing with Section 13300).

(f) When a regional board revises the waste discharge requirements for a solid waste disposal site, the regional board shall consider the information provided in the solid waste assessment test report and any other relevant site-specific engineering data provided by the site operator for that solid waste disposal site as part of a report of waste discharge.

HISTORY:

+Added Stats. 1984, ch. 1532, Section 6; Amended Stats. 1986, ch. 971, Section 3.

WATER CODE

Section
13273.1. Solid waste assessment questionnaires

(a) Except as provided in subdivision (b), an operator of a solid waste disposal site may submit a solid waste assessment questionnaire to the appropriate regional board at least 24 months prior to the site's solid waste water quality assessment test due date as established pursuant to Section 13273. The regional board shall require the operator to submit any additional information, as needed, or require onsite verification of the solid waste assessment questionnaire data in order to render a decision pursuant to subdivision (c).

(b) Any solid waste disposal site which is larger than 50,000 cubic yards or is known or suspected to contain hazardous substances, other than household hazardous wastes, shall be prohibited from submitting a solid waste assessment questionnaire under this section.

(c) The regional board shall complete a thorough analysis of each solid waste assessment questionnaire submitted pursuant to this section by a date 18 months prior to the solid waste assessment test due date. Based upon this analysis, the regional board shall determine whether or not the site has discharged hazardous substances which will impact the beneficial uses of water. If the regional board determines that the site has not so discharged hazardous substances, the regional board shall notify the operator that the operator is not required to prepare a solid waste water quality assessment test pursuant to Section 13273.

(d) If the regional board does not make the determination specified in subdivision (c), the operator shall submit all, or a portion of, a solid waste water quality assessment test. The regional board shall notify the operator of this determination and indicate if all, or what portion of, a solid waste water quality assessment test shall be required. The operator shall submit the solid waste water quality assessment test, or a portion thereof, by the date established pursuant to Section 13273.

(e) The state board shall develop a solid waste assessment questionnaire and guidelines for submittal no later than three months after the effective date of this statute adding this section. The questionnaire shall contain, but not be limited to, a characterization of the wastes, size of the site, age of the site, and other appropriate factors.

(f) Those operators of solid waste disposal sites listed by the state board pursuant to Section 13273 in Rank 3 and seeking an exemption under this section shall submit their solid waste assessment questionnaire no later than July 1, 1988. If the regional board does not make the determination specified in subdivision (c), the regional board shall require the operator to submit all, or a portion of, a solid waste water quality assessment test by July 1, 1990.

HISTORY:

+Added Stats. 1987, ch. 932, Section 2, effective September 22, 1987.

Section 13273.2. Reevaluation of solid waste disposal site status; requirement to submit or revise solid waste water quality assessment test

Notwithstanding subdivision (b) of Section 13273.1, a regional board may reevaluate the status of any solid waste disposal site ranked pursuant to Section 13273, including those sites exempted pursuant to Section 13273.1, and may require the operator to submit or revise a solid waste water quality assessment test after July 1, 1989. The regional board shall give written notification to the operator that a solid waste assessment test is required and the due date. This section shall not require submittal of a solid waste water quality assessment test by a date earlier than established in accordance with Section 13273.

HISTORY:

+Added Stats. 1987, ch. 932, Section 3, effective September 22, 1987.

Section
13273.3. Operator defined

As used in Sections 13273, 13273.1, and 13273.2, "operator" means a person who operates or manages, or who has operated or managed, the solid waste disposal site. If the operator of the solid waste disposal site no longer exists, or is unable, as determined by the regional board, to comply with the requirements of Section 13273, 13273.1, or 13273.2, "operator" means any person who owns or who has owned the solid waste disposal site.

HISTORY:

+Added Stats. 1987, ch. 932, Section 4, effective September 22, 1987.

C. HEALTH AND SAFETY CODE

DIVISION 26. Air Resources
PART 4. Nonvehicular Air Pollution Control
CHAPTER 3. Emission Limitations
ARTICLE 2. Nonagricultural Burning

Section 41805.5. Solid waste air quality assessment test report; contents; questionnaires; exemptions

(a) Except as provided in subdivisions (b) and (c), the operator of a solid waste disposal site shall submit to the district on or before July 1, 1987, a solid waste air quality assessment test report that contains all of the following:

(1) Test results to determine if there is any underground landfill gas migration beyond the solid waste disposal site's perimeter.

(2) Analyses for specified air contaminants in the ambient air adjacent to the solid waste disposal site to determine the effect of the site on air quality.

(3) Chemical characterization test results to determine the composition of gas streams immediately above the solid waste disposal site, or immediately above the solid waste disposal site and within the solid waste disposal site, as appropriate, as determined by the district.

(4) Any other information which the district board may require, by emergency regulation.

The solid waste air quality assessment test report shall be prepared in accordance with the guidelines developed by the state board pursuant to subdivision (d).

(b) The operator of an inactive solid waste disposal site shall complete and submit the screening questionnaire, developed pursuant to subdivision (e), to the district on or before November 1, 1986, unless the operator is required to submit a report containing the same information specified in subdivision (a) pursuant to a federal, state, or district order, or unless exempted pursuant to subdivision (c). The district shall evaluate the submitted screening questionnaires in accordance with the guidelines developed pursuant to subdivision (e) and shall determine whether the operator of the site be required to submit all, or a portion of, the information required to be reported in a solid waste air quality assessment test report. The district shall notify the operator in writing on or before January 1, 1987, of the information identified in subdivision (a) to be submitted for the site. After receiving this notification, the operator of the inactive solid waste disposal site shall submit a solid waste air quality assessment test report containing the required information on or before January 1, 1988, to the district.

(c) A district may exempt from subdivisions (a) and (b) a solid waste disposal site or inactive solid waste disposal site which has accepted or now contains only inert and nondecomposable solids. To receive an exemption, the operator of the site shall submit, on or before November 1, 1986, a copy of all permits, all waste discharge requirements pertinent to the site, and any other data necessary for the district to determine whether an exemption should be granted to the site.

(d) On or before February 1, 1987, the state board, in coordination with the districts, shall develop and publish test guidelines for the solid waste air quality assessment report specifying the air contaminants to be tested for and identifying acceptable testing, analytical, and reporting methods to be employed in completing the report.

(e) On or before October 1, 1986, the state board, in coordination with the districts, shall develop and publish a screening questionnaire for inactive solid waste disposal sites and guidelines for evaluating the questionnaire by the districts pursuant to subdivision (b). The screening questionnaire and guidelines shall require an inactive solid waste disposal site to be evaluated based on the nature and age of materials in the site, the quantity of materials in the site, the size of the site, and other appropriate factors. The guidelines for evaluating the screening questionnaire shall require a district to weigh heavily the proximity of the site to residences, schools, and other sensitive areas, and to pay particular attention to potential adverse impacts on facilities such as hospitals and schools, and on residential areas, within one mile of the site's perimeter.

(f) A district may reevaluate the status of a solid waste disposal site, including sites exempted pursuant to subdivision (c), and require the operator to submit or revise a solid waste air quality assessment test report after January 1, 1987. The district shall give written notification to the operator of the solid waste disposal site that a solid waste air quality assessment test report is to be submitted, or that the existing report is to be revised, and the date by which the report is to be submitted.

(g) A district shall evaluate any solid waste air quality assessment test reports submitted pursuant to subdivisions (a), (b), and (f), and determine if the report's testing, analytical and reporting methods comply with the guidelines developed pursuant to subdivision (d). If the district determines that the solid waste air quality assessment test report complies with the guidelines, it shall evaluate the data. If the district determines, after evaluation of the report and consultation with the state department and the California Waste Management Board, that levels of one or more specified air contaminants pose a health risk to human beings or a threat to the environment, the district shall take appropriate remedial action.

(h) If a district determines that a solid waste air quality assessment test report does not comply with the guidelines developed pursuant to subdivision (d), the district shall provide the operator of the site with a written notice specifying the inadequacies of the report and shall require the operator to correct the deficiencies and resubmit the report by a date determined by the district.

(i) For the purpose of this section, the following definitions apply:

(1) "Inactive solid waste disposal site" means a solid waste disposal site which has not received any solid waste for disposal after January 1, 1984.

(2) "Landfill gas" means any untreated, raw gas derived through a natural process from the decomposition of organic waste deposited in a solid waste disposal site or from the evolution of volatile species in the waste.

(3) "Operator" means the person who operates or manages, or who has operated or managed, the solid waste disposal site. If the operator of the solid waste disposal site no longer exists, or is unable, as determined by the district, to comply with the requirements of this section, "operator" means any person who owns or who has owned the solid waste disposal site.

(4) "Perimeter" means the outer boundary of the entire solid waste disposal site property.

(5) "Solid waste disposal site" means a place, location, tract of land, area, or premises in use, or which has been used, for the landfill disposal of solid waste, as defined in Section 66719 of the Government Code, or hazardous waste, as defined in Section 66714.8 of the Government Code, or both.

(6) "Specified air contaminants" means substances determined to be air contaminants by the state board in coordination with the districts. The state board and the districts shall consider determining the following compounds to be air contaminants for purposes of this paragraph: benzene, chloroethene, 1,2-dibromoethane, 1,2-dichloroethane benzyl chloride, chlorobenzene, dichlorobenzene, 1,1-dichloroethene, dichloromethane, formaldehyde, hydrogen sulfide, tetrachloroethylene, tetrachloromethane, toluene, 1,1,1-trichloroethane, trichloroethylene, trichloromethane, xylene, and any other substance deemed appropriate by the state board or a district.

HISTORY:

+Added Stats. 1984, ch. 1532, Section 4. Added Stats. 1986, ch. 1055, Section 5, effective September 24, 1986; Amended Stats. 1987, ch. 932, Section 1, effective September 22, 1987.

+Former Section: Former Section 41808.5, similar to the present section, was repealed by Stats. 1986, ch. 1055, Section 4, effective September 24, 1986.

APPENDIX 2: SAMPLING AND ANALYSIS PROCEDURES

The operator should specify the indicator parameters and waste constituents to be monitored after considering the following factors:

- The possible types, quantities, and concentrations of constituents in wastes at the waste site.
- The mobility, stability, and persistence of possible waste constituents or their reaction products.

A. FREQUENCY OF SAMPLING

Water quality sampling should consist of measuring indicator parameters (temperature, electrical conductivity, pH) and testing for various waste constituents quarterly for one year. The sampling for an entire year should account for errors in sampling and analyses as well as seasonal fluctuations. The site operator should take a minimum of one sample from each sampling point for each sampling event.

B. SAMPLING PLAN

The site operator should prepare a formal sampling plan addressing all elements contained in this section. Water levels should be noted before each sampling event. The plan should include appropriate quality control/quality assurance practices including standards, laboratory blanks, duplicates, and spiked samples.

C. GROUND WATER SAMPLE COLLECTION

1. **WELL PURGING:** The chemical properties of water that has been sitting inside the well bore for an expended period of time may differ substantially from that of the formation water. Therefore, it is a common practice to pump from three to five well volumes of water from the well prior to sampling.

   The purging rate should never be fast enough to cause water to vigorously cascade down the sides of the screen.

Low yield aquifers may require substantial time to obtain several well volumes. This could lead to degassing of the formation water. These aquifers may need to be sampled with varying purged volumes over time to determine adequate purging values. A low yield aquifer which has only one casing volume of fluid removed should have the sample tested for pH, temperature, and specific conductance. After recovery, the well should be retested for these parameters. If full recovery of the well exceeds two hours, the sample for retesting should be collected as soon as a sufficient sample is available, but within two hours of the original sampling.

2. **SAMPLING DEVICES:** The sole task of a sampling device is to obtain a thoroughly representative, reliable sample of the formation water. It is recommended that an individual sampling device be dedicated to each well to save the time, cost, and difficulty of decontaminating the equipment between well sampling. It is critical that there be no significant gain or loss of chemical constituents. It is especially critical to prevent the loss (degassing) of volatile organic constituents such as vinyl chloride and other related chemicals. Extreme care should be taken when transferring the sample from the sampling device to the sample container. Loss of volatiles can be minimized by using a "bottom-emptying device", which eliminates the need to turn the sampling device upside down.

   Acceptable sampling devices for these parameters include fluorocarbon resin or stainless steel bailers, syringe bailers, or bladder pumps.

   a. **BAILERS:** A bailer consists of a tube with a check ball valve at the bottom or bottom and top. The single check ball valve model is not capable of sampling discrete intervals. It is difficult to transfer the sample from the bailer to the sample container without contaminating the sample, especially in tubes that are not designed for using a bottom-emptying device.

   b. **SYRINGE BAILERS:** A syringe bailer pulls the sample into the bailer tube either by direct movement of a plunger in the tube or a pump on the surface moving the plunger. This delivers a highly representative sample.

c. **BLADDER PUMPS:** Bladder pumps have a flexible bladder inside a rigid body. Rhythmical inflation and deflation of the bladder causes the fluid to rise to the surface. A sampling tube attached to the intake of the pump retains the sample, which may then be withdrawn from the well and transferred to an appropriate sample vial.

D. SURFACE WATER SAMPLE COLLECTION

Surface water sampling methods also vary according to the circumstances. Deeper water bodies are normally sampled with a bailer or "thief" type sampler. Shallow water bodies or seeps must be sampled by construction of a small "pond". After it has filled, the sample bottle can be immersed in the water and filled.

All surface waters and springs **within a mile** both up-gradient and downgradient from the disposal site should be sampled. Perennial streams should be sampled quarterly. Intermittent streams should also be sampled when water is present, but not during storm events or other periods of high flow. A map showing all sampling points must be included in the report.

Under circumstances where the water body originates on the site, consider your upgradient sample as the springs or seeps (rising water) at the headwaters of the stream. If there is no evidence of rising water, presume that the upgradient water quality is that of the precipitation in the area.

E. SAMPLE STORAGE

Different methods of sample storage are used depending on whether the sample is being tested for metals or organic chemicals.

1. **METAL ANALYSES:** For metal analyses, the containers should be washed in non-phosphate detergent and tap water, and rinsed with a 1:1 mixture of nitric acid and tap water, a 1:1 mixture of hydrochloric acid and tap water, and Type II reagent water. Only fluoro-

carbon resin or polyethylene containers with polypropylene caps should be used.

Metal analysis samples should be split into two portions. The first portion should be filtered through a 0.45 micron membrane filter, then transferred to a container, and preserved with nitric acid with pH less than 2. The remaining sample should be treated the same way; however, without filtration. (Cr(VI) should not be acidified.)

2. **ORGANIC CHEMICALS:** For organic chemicals, glass bottles with fluorocarbon resin-lined caps should be used. The containers should be washed first with a non-phosphate detergent in hot water, then rinsed with tap water, distilled water, acetone, and pesticide-quality hexane.

3. **OTHERS:** Storage of other constituents such as pesticides, extractable organic chemicals, etc., require specific methods of treatment beyond the scope of this document.

In some cases heating and/or treatment of storage containers with chromic acid may have occurred and the presence of chromic acid may result in a sampling error. Residue analysis from clean containers should be available before sampling, if necessary, to document the presence of chromic acid.

F. SAMPLE PRESERVATION

- After transferring the sample from the sampling device to a container, it should not be re-transferred from one container to another as loss of organic material and aeration may occur.

- No headspace should exist in samples for total organic halogens, total organic carbon, and volatile organic chemicals.

- Organic samples should not be filtered.

- An estimate of the turbidity (NTU's) should be made for turbid samples.

G. METHODS OF ANALYSES

The testing program should include a pollutant scan including U.S. Environmental Protection Agency (EPA) methods 601/602. Laboratory orders should request that all peaks be reported. The Regional Board has the option of requiring EPA methods 624/625 (instead of 601/602) or to identify peaks found in initial testing. The Regional Board may also wish to require additional analyses when circumstances indicate that constituents not detected by these tests may be present (see 40 CFR, Part 136 for information on the various analysis methods).

An Inductively Coupled Plasma-Emission Spectroscopy (ICP) scan (EPA Method 6010) or Atomic Absorption Spectroscopy (AA), covered under EPA's 7000 series, should be run for metals and salts. As a minimum, the following substances should be reported from ICP metals procedure: Ag, As, Ba, Be, Ca, Cd, Cr, Cr(VI), Co, Cu, Fe, Hg, K, Mn, Mo, Na, Ni, Pb, Se, Sb, Tl, V, and Zn. Due to the limited detection limits of the ICP metals method for As, Cr(VI), Hg, Mg, and Se, the AA method may be used to analyze for these five elements, if conditions warrant.

For initial screening, performing an electrolyte scan or testing conductivity upgradient and downgradient could indicate whether leaching has occurred.

The analytical laboratory performing the chemical analysis must be a hazardous waste testing laboratory certified by the Hazardous Materials Laboratory of DHS.

H. QUALITY ASSURANCE/QUALITY CONTROL

The following QA/QC procedures are excerpted in part from "Department of Health Services Procedures for Conducting a Comprehensive Ground Water Monitoring Evaluation of Hazardous Waste Disposal Facilities" (July, 1986) and EPA's RCRA publication, "Ground-Water Monitoring Technical Enforcement Guidance Document" (September, 1986).

1. <u>Field QA/QC Program</u>

Various types of field blanks should be used to verify that the sample collection and handling process has not affected the quality of the samples. The operator's sampling plan should provide for the routine collection and analysis of two types of Quality Control blanks: trip blanks and equipment blanks. These should be:

Trip Blank: Each time a group of bottles is prepared for use in the field, one bottle of each type (e.g., glass, fluorocarbon resin, polyethylene) should be selected from the batch and filled with deionized water. The bottles filled with the blank should be transported to the sampling location and returned to the laboratory in a manner identical to the handling procedure used for the samples. One trip blank per sampling event is recommended.

Any contaminants found in the trip blanks could be attributed to (1) interaction between the sample and the container, (2) contaminated rinse water, or (3) a handling procedure that alters the sample analysis results.

Equipment Blank: To ensure that the nondedicated sampling device has been effectively cleaned (in the laboratory or field), the device should be filled with deionized water (or pump deionized water through the device). The water should then be transferred to the sample bottle(s), and returned to the laboratory for analysis. Handling procedures should be identical to those used for ground water samples. A minimum of one equipment blank for each day that ground water monitoring wells are sampled is recommended.

The results of the analyses of the blanks should not be used to correct the ground water data. If contaminants are found in the blanks, the concentration levels of any contaminant should be noted and the source of the contamination should be identified. Corrective action, including resampling, should be initiated.

All field equipment that will be used should be calibrated prior to field use and recalibrated in the field before measuring each sample. The SWAT proposal should describe a program for ensuring proper calibration of field equipment. Other QA/QC practices such as sampling equipment decontamination procedures and chain-of-custody procedures should also be described in the proposal.

2. <u>Laboratory QA/QC Program</u>

Any sample analyses performed for the SWAT should be done only at a certified laboratory. When a commercial laboratory is used to conduct analyses of ground water samples, the operator must ensure that the laboratory of choice is exercising a proper QA/QC program. The QA/QC program used by the laboratory analyzing samples must conform to that described in the SWAT proposal.

The sampling and analysis plan should provide for the use of standards, laboratory blanks, duplicates, and spiked samples for calibration and identification of potential matrix interferences. The quality control program for the laboratory must ensure that the following actions are completed:

Calibration of laboratory instruments to within acceptable limits according to EPA or manufacturer's specifications before, after, and during use. Reference standards must be used when necessary.

Periodic inspection, maintenance, and servicing (as necessary) of all laboratory instruments and equipment.

The use of reference standards and quality control samples (e.g., checks, spikes, laboratory blanks, duplicates, splits), as necessary, to determine the accuracy and precision of procedures, instruments, and operators.

The use of adequate statistical procedures (e.g., quality control charts) to monitor precision and accuracy of the data and to establish acceptable limits.

A continuous review of results to identify and correct problems within the measurement system (e.g., instrumentation problems, inadequate operator training, inaccurate measurement methodologies).

Documentation of the performance of systems and operations.

Regular participation in external laboratory evaluations to determine the accuracy and overall performance of the laboratory. This should include performance evaluation and interlaboratory comparison studies and formal field unit/laboratory evaluations and inspections.

3. Chain-of-Custody

An owner must include plans for "chain-of-custody" in the sampling and analysis plan to assure the integrity of the sample from the time of collection until it has been analyzed. Adequate chain-of-custody can be described as the ability to trace the possession and handling of samples from the time of collection through analysis and final disposition.

A chain-of-custody program must include:

Sample labels which prevent misidentification of samples;

Sample seals to preserve the integrity of the sample from the time it is collected until it is opened in the laboratory;

Field log book to record information about each sample collected during the ground water monitoring program;

Chain-of-custody-record to establish the documentation necessary to trace sample possession from the time of collection to ultimate disposition;

Sample analysis request sheets which serve as official communication to the laboratory of the particular analysis(es) required for each sample and provide further evidence that the chain-of-custody is complete; and

Laboratory log book which is maintained at the laboratory and records all pertinent information about the sample.

APPENDIX 3: GEOLOGIC WELL LOG DESCRIPTION[4]

The geologic well log gives meaning to analytical results and is the cornerstone of site characterization. A geologic well log should be a complete description of the materials penetrated and a history of activities associated with the drilling. The geologic log should be constructed as drilling advances.

If the observations or data recorded on the geologic log need to be changed or modified, the changes should be made by drawing a single line through the words or phrase which is to be changed and the new notation made. Erasures should not be made on a geological well log. Erasing notations can result in the loss of valuable information and the change may prove to be less accurate than the initial observation. A geologic log of a boring should, at a minimum, contain the following elements:

1) Key Names:

   Name of drilling contractor.

   Name of driller.

   Name and employer of person logging the boring, and

   Name of service companies called onto site, (e.g., electric logging, cementing, etc.).

2) Make and model of drilling equipment.

3) Drilling method.

4) Method of sample collection and preparation.

5) Sampling interval(s).

6) Complete and detailed lithologic description of materials penetrated.

7) Depth interval and estimated rate of discharge for all encountered ground water.

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[4]Modified from The California Site Mitigation Decision Tree Manual, DHS, May, 1986, pages 3-23 and 3-24.

8) Transient data such as penetration rate (ASTM D1586), bit pressure, drilling fluid weight and viscosity, drill chatter, adjustments made to the drilling machine or drilling procedure, problems or successes and other incidental information that may provide an indication of subsurface conditions.

9) Dates of starting and completion for all phases of the well drilling and construction (e.g., sampling, cementing, etc.).

10) As-built drawings of wells, piezometer, or other devices constructed or installed in the borehole.

APPENDIX 4: PHYSICAL ANALYSIS OF SOIL SAMPLES

Several tests should be performed to determine possible transport pathways and relative rates of leakage. This information, along with the other requested data, should help to determine where leak migration is most likely to occur. Thus, the correct monitoring layout and design can be achieved for both vadose and ground water monitoring.

The first analyses should be for grain size distribution (sieve analysis: ASTM D 422-630). The report should contain the following information:

1) Maximum size of particles.

2) Percentage retained on each sieve.

3) Description of sand and gravel particles (shape and hardness).

4) Specific gravity (ASTM D 854-83).

The pH (ASTM G51-77) of the discrete soil intervals should be submitted. This should be performed by a pH meter.

Soil moisture content (ASTM D 2216-80) should be submitted for discrete soil intervals.

Cation exchange capacity (EPA Method 9080) should be determined to aid in design of vadose zone monitoring. This test consists of replacing the original adsorbed nutrients by barium, potassium, or ammonium ions and determination of the amount of ions adsorbed.

Permeability of on-site soils should be determined by testing nearby soils that have characteristics similar to soils underlying the disposal area. Permeability should be determined by laboratory and field methods.

The laboratory permeability test method (ASTM D 2434) is designed for granular soils and is not as reliable for fine-grained soils. Granular soils should also have their permeability determined by field methods.

An infiltrometer is recommended for permeability determination of fine-grained soils. A double-ring infiltrometer (ASTM D 3385-75) is the preferred method. The report should contain a description of the soils underlying the infiltration test site down to the water table, temperature and pH of fluid used, and difference in rates of flow for inner ring and annular space between rings. Although this test is usually used only on man-made clay liners, it may have some applicability for fine grained solid waste disposal site soils.

APPENDIX 5: PIEZOMETER DESIGN AND PLACEMENT

The purpose of piezometers is to measure ground water gradients (pressure). They may also be used as sampling wells (monitoring wells) in some cases. If so, this should be stated as such in the SWAT proposal. However, this section will focus solely on ground water gradient measurement.

Piezometers should be capable of determining horizontal and vertical components of flow for the uppermost saturated zone. Seasonal and temporal variations should be accounted for. The well screen should be not more than ten feet in length and often may be as short as one foot. Piezometers screened through the water table may have a screen length of up to 20 feet; however, it should be documented by water level data that a significant variation in water table elevations over time necessitates this modification. The filter pack should not extend more than two feet above the screen.

The location and elevation of the top of the well casing should be surveyed to an accuracy of 0.01 feet and permanently marked. The water level measurements should have the same accuracy. The survey mark should be placed on the casing and may need to be resurveyed periodically.

Piezometer water level measurements of all points in the piezometer network should be taken as close together timewise as possible, preferably within a few hours,[5] and definitely within a 24 hour time span. This is necessary to minimize temporal variations in the water level.

The inside diameter of the piezometer casing may be as small as one inch. However, if this well also serves as a monitoring well, a larger size casing is necessary (see Appendix 7: Monitoring Well Design And Placement). Also, most pressure transducers require a one and one-quarter inch or larger inside diameter casing.

A minimum of three piezometers screened at the same depth is needed to determine horizontal gradients. Clustered single completion piezometers are recommended for determination of

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[5]Where piezometers are located near surface waters having significant water level changes (such as tides or flood flows), tide tables or stream gage data should be provided over the sampling period.

vertical gradients. Each cluster should be installed at one location according to the following guidelines:

- aquifers 50 feet or less in thickness: two depth-staggered piezometers.

- aquifers 50 to 100 feet in thickness: three depth-staggered piezometers.

Piezometer construction should follow the same guidelines as monitoring well construction except for screen length. These guidelines are outlined in Appendix 7: Monitoring Well Design And Placement.

A map showing all piezometer locations and ground water flow directions and equipotential lines (flow net) should be included in the SWAT report along with a full description of piezometer placement and design.

APPENDIX 6: VADOSE ZONE MONITORING

A. INTRODUCTION

Water Code Subsection 13273(b),(2) requires a chemical characterization of the soil-pore liquid in those areas which are likely to be affected if the solid waste disposal site is leaking, as compared to geologically similar areas near the solid waste disposal site which have not been affected by leakage or waste discharge.

Vadose zone (unsaturated zone) monitoring is especially useful where thick unsaturated zones underlie disposal facilities. The contaminant plume may be identified and leakage stopped long before a ground water monitoring well would show any evidence of a problem.

B. PRESSURE/VACUUM LYSIMETERS

1. DESCRIPTION:

The best device for obtaining water samples from the vadose zone is the pressure/vacuum lysimeter. This device consists of a closed cylindrical chamber made of inert material. The soil water intake portion (cup) is made of a porous material of low permeability. Soil moisture is drawn by vacuum into the chamber and collected by access tubes.

Lysimeters may be placed in either shallow trenches or in borings (either vertical or drilled at an angle below the landfill). The lysimeters should be put in place with a silica flour filter pack to provide continuity with the surrounding formation.

The placement of lysimeters is critical. These devices should be installed at locations which will optimize their efficiency in relation to fluid movement in the vadose zone. The lysimeter should be placed in fine-grained soils (silt or clay) as these materials tend to absorb fluid. Moisture in the vadose zone tends to move rapidly through porous soils thus requiring an excessive vacuum to obtain useful quantities of soil-pore fluid.

Although fluid transport tends to be vertical in the vadose zone, migration will also occur laterally along geologic contacts. Fluid movement also often occurs along small cracks and irregularities.

2. PRELIMINARY WORK:

Continuous soil coring should be performed prior to designing a vadose zone monitoring system. Soils data must be obtained to identify the best depths for placement of the lysimeter. The structure, lithology and soil characteristics of the vadose zone must be determined for correct lysimeter placement. This information can be derived from continuous soil cores. A complete lithologic and soil analysis of the cores should be performed (see Appendix 4: Physical Analysis Of Soil Samples, and ASTM D 422-63 and D 854-83).

3. QUALITY CONTROL PROCEDURES:

Lysimeters have earned an unwarranted reputation among many as being undependable. Much of the problem can be laid to an absence of good quality control work. There is a need for the lysimeter and all tubing to be pressure tested prior to placement in the ground. Further, the whole installation must be field tested after it has been placed at the target location. The system should be placed under vacuum to determine whether there are any significant leaks in the system. Next, the continuity of the lysimeter and its silica flour jacket with the formation should be tested. Distilled water is poured down the tubing and allowed to stand for several days. The lysimeter is then placed under vacuum. If the device fails to produce a relatively steady flow of water, the installation is faulty and should be replaced.

C. ALTERNATIVE DEVICES

Some field conditions create difficulties in using pressure/vacuum lysimeters. These include fractured rock areas or dry gravels. Many have proposed to conduct chemical analyses of soils obtained from drilling. This method fails to obtain representative soil pore fluid samples in that the volatile organic chemicals will be mostly lost.

The following alternative devices do not provide the information required in Subsection 13273(b)(1) (i.e., chemical characterization) but only provide an indication of moisture content. Consultation with the Regional Board is recommended prior to installing an alternative device.

In very dry soils or in granular soils, vacuum/pressure lysimeters may not be able to overcome the soil tension. In this case, tensiometers may be required. A tensiometer consists of an inert cup attached to the bottom of a rigid tube. A smaller tube leads below the sealed top to a recording device. The tensiometer is filled with de-aired water, a solution of ethylene or polyethylene glycol, or a solution of methanol. These devices measure the vacuum that is caused by the fluid leaving the vessel and going into the soil.

Any change in pressure indicates fluid movement through the vadose zone, assuming all components are operating correctly. The same considerations for placement of lysimeters apply to tensiometers.

Soil moisture blocks may be used under some circumstances. These consist of two electrodes embedded in a porous material that is in equilibrium with the soil in the vadose zone. Gypsum, ceramic, capstone, fiberglass, and nylon can be used as the porous material. These devices measure only the presence of moisture and do not yield qualitative results. Calibration curves should be run for each block used. The blocks are tested by being placed in distilled water and the resistance is measured. If it varies more than 50 ohms, the block is defective. The results should be submitted to the Regional Board.

A combination of soil moisture blocks and vacuum/pressure lysimeters may be used. First, soil moisture blocks are installed in a borehole to determine the location of fluid if present. Then a vacuum/pressure lysimeter may be installed in this location to sample the fluid.

Electrical resistivity net methods are not recommended. The results are not reliable except in ideal situations where leachate and soil conductivity are vastly different.

Borehole neutron logs may be used to estimate moisture content. They are the same devices used in downhole geophysical measurements. The device senses the presence of hydrogen atoms surrounding the cased hole. A hole can be slant drilled under the landfill, cased, and covered. At various testing intervals, this device can be lowered down the hole, the presence of water response noted, and determination of fluid migration (and possible leak) made.

D. REFERENCES

For additional information on vadose zone monitoring techniques, the following publications are recommended:

- Morrison, Robert D., Ground Water Monitoring Technology, published by Timco Manufacturing, Inc., Wisconsin, 1983.

- Everett, L.G., L. G. Wilson, and E. W. Hoylman, Vadose Zone Monitoring For Hazardous Waste Sites, published by Kaman Tempo, Santa Barbara, California, 1983.

There are numerous other articles on the various techniques for vadose zone monitoring. As the field of vadose zone sampling is rapidly changing, it is important to review the latest literature.

APPENDIX 7: MONITORING WELL DESIGN AND PLACEMENT

A. INTRODUCTION

The primary purpose of a monitoring well is to obtain representative water quality samples. In most cases, it is also critical that good soil and ground water samples can be obtained during the drilling of the well. In this way, the hydrogeologic database for the site can be augmented.

In some cases, these wells may be utilized for piezometric measurements as well as for aquifer testing.

For most solid waste disposal sites, a minimum of four monitoring wells should be required including at least one upgradient and three downgradient wells. The monitoring wells shall be in full compliance with Section 2555(c), (d).

B. DRILLING METHODS

1. **HOLLOW STEM AUGER:**

A hollow stem auger is the method of choice whenever conditions permit (unconsolidated material and shallow depth). The auger leaves the borehole relatively undisturbed. There is no mud cake formed, therefore, no adverse change in the permeability and chemical characteristics of the formations immediately surrounding the borehole. In addition, continuous coring is more easily accomplished with this method.

2. **CABLE TOOL:**

This drilling technique has been used by well drillers for many decades. It is particularly effective for penetrating cobbles. Its main drawback, however, is the inability to obtain good soil samples.

3. **ROTARY DRILL:**

This drilling technique is widely used in both drilling of oil wells, water wells, and foundation borings. Drilling fluids or compressed air are required to bring the cuttings up to the top of the hole.

This method is particularly useful where resistant geologic formations are present and greater completion depths are required.

Most commonly, drilling mud is circulated as the drilling fluid, forming a mudcake which supports the borehole and reduces caving. Because the mud (or other drilling fluid) may affect formation permeability as well as the chemical characteristics of the aquifer, considerable effort must be employed to clean mud from the borehole and the formation. In many cases, the mud or other fluid cannot be entirely removed; thus, the chemistry of any drilling fluids used should be analyzed in order to determine their effects on ground water samples. Further, it is almost impossible to identify small inflows of ground water.

Less commonly, compressed air is used. The disadvantages of this method are lack of support for the borehole during drilling and substantial air pressure needed to remove the cuttings from the hole. The high-velocity air flow may dry out a seep to the point where it is not recognized.

4. CASING HAMMER:

This tool is operated by driving the casing into the ground at or a short distance behind the drill bit. In this way, caving of the hole is prevented without any degradation of the formation with drilling mud. It is particularly useful for drilling in unconsolidated materials such as gravels and cobbles. Depth limitations are inherent with driving casing due to the friction between the casing and the surrounding formation.

C. WELL DESIGN

Drawings and data should show construction details of monitoring facilities. These data should include:

- map of well locations
- borehole depth
- casing diameter and length
- casing materials (PVC, stainless steel, etc.)

- type, size and position of perforations (provide justification)
- method of joining sections of casing
- description of filter material (provide justification)
- depth and composition of seals
- method of cementing
- method and length of time of development (provide justification)

D. MATERIAL SELECTION

Casing and screen material selection is important for representative sampling results. The material should be chemically inert and should have high tensile and compressive strength. The selection of materials should be based on downhole conditions.

1. POLYVINYL CHLORIDE (PVC):

Drinking water quality PVC casing and screen are often used in shallow, corrosive environments. However, ketones, esters, and aromatic hydrocarbons tend to adsorb and desorb from this material. Thus, determination of absolute concentration is not possible and very low concentrations may not be detected. The relatively weak tensile strength of PVC will usually not allow placement much past 300 feet. The annular space should be larger than the three inches needed to accommodate centralizers (see section on Well Integrity) without placing undue stress on the PVC. No glued joints should be used in the casings; only threaded joints should go into the hole.

2. FLUOROCARBON RESINS (FR):

The FR have the same structural limitations as PVC. However, it is a more inert material and is more resistant to corrosives. Some adsorption and desorption occur here, also, although at a far lesser degree than PVC. Scratching of the FR will cause accelerated adsorption and desorption.

3. STAINLESS STEEL (SS):

Use of SS 316 is often a good choice. It is more chemically resistant overall then PVC and has a high tensile strength. However, it may corrode and leach some trace metals over time. Stainless steel may act as a catalyst in some organic reactions. It may also act as a bacterial substrate and is susceptible to corrosion from chloride. SS 304 is not as resistant to corrosion as SS 316.

The above materials can be combined to create hybrid wells. These consist of more than one material being used in the casing and screen. However, two different metals cannot be installed next to each other due to cathodic corrosion.

The cost of installation is usually given too much priority. Considering the costs for chemical analyses on a 20-year well, the initial construction costs are less than one percent of the total cost.

E. WELL FILTER PACK DESIGN

Proper filter pack[6] design ensures correct screen entrance velocity so volatile organic chemicals will not be stripped out of the water sample. The filter pack also prevents clogging of the perforations. The filter pack design is governed by the aquifer material. A sieve analysis (described in Appendix 4: Physical Analyses of Soil Samples) should be performed on the portion of the aquifer open to the filter pack. If this is not possible, representative samples (at least three) should be taken at similar portions of the aquifer.

The sieve data is plotted on semi-log paper and a curve constructed. The uniformity coefficient (UC) is then calculated.[7] The D70 size is then multiplied by a number between 4 and 9, depending on the UC:

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[6]See The California Site Mitigation Decision Tree Manual, DHS, May, 1986, pages 3-64 through 3-68.

[7]This coefficient is determined by dividing the dimension of the mesh opening of the sieve which retains 40 percent of the sample (D40) by mesh opening which retains 90 percent, (D90).

- If the UC is less than or equal to 2.5, use a multiple of 4 or 5. If 10 percent or more of the formation passes through the 200 sieve, use 4 as the multiplier; otherwise, use 5.

- If the UC is between 2.5 and 5, use a number between 5 and 7. If 10 percent or more of the formation passes through, use 6; otherwise, use 7.

This value is plotted on the graph and a curve parallel to the original curve is constructed.

If the UC is greater than or equal to 5.0, a different method is used. The D70 is multiplied by 6 and 9, and the result plotted. Parallel lines with a UC of less than or equal to 2.5 are constructed. These are the boundaries of the filter pack. If 10 percent or more of the formation passes through the 200 sieve, the filter pack curve is to be near the lower boundary line. If less than 10 percent passes through, the filter pack curve is near the upper boundary line.

The filter pack should be no less than three inches wide and no larger than five inches.

F. SCREEN DESIGN

The screen is designed after the filter pack design is determined. For a filter pack having a UC less than or equal to 2.5, a slot size small enough to keep out 90 percent of the filter pack should be used. If the UC is larger than 2.5, use a slot size small enough to keep out 80 percent of the filter pack.

The entrance velocity through the well screen is a function of the open area of the screen and the pumping rate.[8] The optimal water entrance velocity is 0.1 feet per second or less. If it is any faster, volatile organic chemicals may be stripped away.

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[8]The pumping rate is determined by the transmitting capacity of the screen. Multiply the number of square inches of open area per foot of casing by the conversion factor of .31. This is the capacity of that screen in gallons per minute per foot. Multiply this by the total feet of screen to determine the pumping rate.

G. WELL DEVELOPMENT

For optimum well performance, all fine-grained soil that may have been introduced into the formation during the drilling process should be removed. (Turbid samples indicate that the well was not correctly designed or developed.) The recommended method for well development is the use of vented surge blocks.

H. WELL INTEGRITY

Centralizers are commonly used for centering the well screen and blank casing in the borehole. Without the centralizers in place, it is likely that the casing will be lying against the borehole at many points. These areas thus would not receive a cement grout mixture in sufficient quantity to assure a seal on the well. A poor seal can occur anywhere along the casing and cause surface infiltration and cross-contamination.

The annular space of the well should be at least three inches wide. This allows centralizer placement (as well as filter pack placement). A smaller annular space will put too much stress on the casing and not allow adequate development. In the case of PVC casing, an even larger annular space is required due to PVC's relatively slight tensile strengths. Hollow stem augers do not require the use of centralizers.

Centralizers in all types of wells should be placed every 20 feet on well screens longer than 20 feet in length. The beginning one is set at the bottom. If the screen is less than 20 feet in length, a centralizer should be set at the bottom and the top. The blank casing should have centralizers placed every 40 feet. The centralizers should be lined up to avoid interference with the tremie pipe during cementing. They should be set equidistant around the casing (120°).

I. CEMENTING

A seal should be placed above the filter pack to seal it from the grout[9]. The seal should consist of three to five feet of sodium bentonite placed directly on the filter pack. The bentonite is usually emplaced by a conductor (tremie) pipe or, if only a few feet below the ground surface, poured into the annulus. The bentonite mixture must be allowed sufficient time to hydrate before emplacement of the grout.

Two types of cement are acceptable for grouting of the wells. One is a cement-sand grout, and the other (for situations requiring lower density materials) is a cement-bentonite grout. The cement mixture should be jet mixed, and injected through a tremie pipe into the annular space. All ingredients should be dry, uniform, uncontaminated, and lump free.

The cement-sand grout formulation should consist of API Class A Portland cement, 20-40 grade sand, and potable water. The proportions should be 5.2 gallons of water per 85 pounds of cement (added last) to yield 1.70 cubic feet of grout.

The cement bentonite grout mix may be prepared by either prehydrating the bentonite or dry batching the cement and bentonite.

- The prehydration formulation consists of a 94 pound sack of API Class A Portland cement being added to a smooth jet mixed mixture of API cement-grade bentonite and water (proportions of 10 gallons water/2.0 pounds of bentonite). This yields 1.85 cubic feet of grout.

- Dry batching consists of mixing the cement and bentonite as dry ingredients in a special portable mixing plant. The formulation is 9.1 gallons of water (added at job site), 5.6 pounds of bentonite, and a 94 pound sack of cement, yielding 1.73 cubic feet of grout. If bentonite that is not API cement-

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[9]If grout has been placed below the filter pack, a bentonite seal should likewise be placed on top of the grout below the filter pack.

grade is used, the mixture may be unpumpable. If the driller has had experience with proprietary grouts (i.e., Volclay), use of these grouts may be considered.

The end of the tremie pipe should be submerged in the grout at all times during cementing. The pipe should be maintained full.

Many "E-Loggers" are prepared to conduct a cement bond log to determine the quality of the cementing job. This valuable tool works well with steel casing; however, it gives highly suspect data in PVC-cased wells.

J. WELL CONSTRUCTION

Multiple-screened wells are not recommended for the reasons outlined in Appendix 5: Piezometer Design and Placement.

The diameter of the wells should be related to the drilling conditions, transmissivity of the aquifer and size of the equipment to be lowered down the well. Larger diameter wells generally allow faster purging and have a larger area of influence. Small diameter wells, on the other hand, require far smaller purging quantities.

K. WELL PLACEMENT

At a minimum, four monitoring wells are usually required, one upgradient, and three downgradient from the solid waste disposal site.

The number, location, and depths of background (up-gradient) monitoring wells must be capable of yielding ground water samples that are representative of background ground water quality in the uppermost aquifer beneath the landfill. The wells must be in the area of the aquifer not affected by the facility. Depending on the hydro-geologic characteristics of the site, more than one background well may be needed. In instances where it is impractical to get an upgradient well to serve as a background well (such as in steeply dipping aquifers), it may be possible to monitor a downgradient well. However, it must not be in a portion of the aquifer affected by the facility.

Downgradient wells should be located so as to detect any waste constituents migrating from the landfill as well as seasonal or temporal and naturally or artificially induced variations in ground water flow. The wells should be installed as close as physically possible to the edge of the landfill, ideally at the point where a plume will first enter the ground water. In most cases, this will be the uppermost aquifer; however, conduits (solution channels, open fractures, etc.) may actually provide a faster migration path to a deeper aquifer. These deeper aquifers may require monitoring also.

APPENDIX 8: DETERMINATION OF SUBSURFACE HYDRAULIC CONDUCTIVITY

Subsurface hydraulic conductivities should be determined for the uppermost aquifer and any boundary conditions (confining zones, flow restrictions, etc.) underlying the site. Without this information, proper monitoring well placement is uncertain. Monitoring wells should be screened in areas of greatest flow within the uppermost aquifer.

Field methods provide the most accurate hydraulic conductivity data but should be augmented by laboratory testing. Field hydraulic conductivity and transmissivity testing consists of either single well tests or multiple well tests.

Single well tests involve the addition or removal of a known volume of fluid (or air pressure increase and decrease). Rates of recovery are determined from this well. Multiple well tests consist of the pumping of one well while recording the levels of ground water in adjacent observation wells. The latter method gives more accurate results as it takes into account inhomogeneities in the aquifer. This latter method should always be used, with the single well tests used as supplementary testing.

Packer tests, consisting of packing off a section of borehole and injecting fluid, may also be used to measure hydraulic conductivity. However, these tests only provide semi-quantitative results. It may be difficult in some cases to differentiate confining beds from low yield aquifers. A full description of ground water flow rates should be presented.

The reader is referred to Groundwater And Wells by Fletcher G. Driscoll, 1986, Johnson Division, St. Paul, Minnesota, for a more thorough description of hydraulic conductivity testing.

APPENDIX B – APPLIED ACTION LEVELS

FINAL
SOLID WASTE WATER QUALITY ASSESSMENT
TEST AND DATA SUMMARY REPORT FOR
REMEDIAL INVESTIGATION/FEASIBILITY STUDY
FOR PHASES 5 AND 6

DATED 30 APRIL 1993

APPLIED ACTION LEVELS

NOTE: Applied Action Levels (AALs) are developed according to procedures outlined in **The California Site Mitigation Decision Tree Manual** (CHDS, 1986). AALs are *not* "clean-up numbers," but are intended only for use in the risk appraisal process described in Chapter 7 of **The Decision Tree Manual.** Please refer to the last page of this list for explanatory notes.

Substance	Biological Receptor	AAL_{water} µg/L	AAL_{air} µg/m³	AAL_{soil} contact mg/kg	Test 1 Comment	Test 2 Summation/Comment	Test 3 Summation/Comment
Acenaphthene	Human	20	2			Sum over all media	Sum with **NON-CARCINOGENIC PAHs***
Acenaphthylene	Human	20	2			Sum over all media	Sum with **NON-CARCINOGENIC PAHs***
Aldicarb	Human	20	2			Sum over all media	Sum with **CHOLINESTERASE INHIBITORS**
Aldicarb Sulfone	Human	40	4			Sum over all media	Sum with **CHOLINESTERASE INHIBITORS**
Anthracene	Human	20	2	100		Sum over all media	Sum with **NON-CARCINOGENIC PAHs***
Arsenic	Human	0.01**	0.0002		Detection limit for arsenic in water is 5 µg/l** State ambient air level is 0.002 µg/m³***	Sum over all media	Sum with **CARCINOGENS**
Arsenic	Aquatic	70			Freshwater species		
Arsenic	Aquatic	20			Saltwater species		
Barium	Human	350	5			Sum over all media	Sum with **RENAL TOXINS**
Benzene	Human	0.2	0.07**		Detection limit for benzene in air is 3 µg/m³**	Sum over all media	Sum with **CARCINOGENS**
Benzene	Aquatic	1			Freshwater species		
Benzene	Aquatic	1			Saltwater species		
Benzo(a)pyrene	Human	0.09	0.009			Sum over all media	Sum with **CARCINOGENS**
Cadmium	Aquatic	0.2			Freshwater species		
Cadmium	Aquatic	5			Saltwater species		

* PAHs = Polycyclic Aromatic Hydrocarbons.

** Detection limit as reported by the Hazardous Material Laboratory, CDHS. Contact TSCP Headquarters Toxicologists for guidance when the detection limit for a substance is greater than the health-based criterion.

*** See Proposed Identification of Inorganic Arsenic as a Toxic Air Contaminant, May 1990.

Substance	Biological Receptor	AAL_{water} µg/L	AAL_{air} µg/m³	AAL_{soil} contact mg/kg	Test 1 Comment	Test 2 Summation/Comment	Test 3 Summation/Comment
Chloroform	Human	6	0.6			Sum over all media	Sum with **CARCINOGENS**
Chromium (III)	Human	50,000	50			Sum over all media	No toxic effects at the highest dose tested; Test 3 not applicable
Chromium	Aquatic	50			Freshwater species		
Chromium	Aquatic	2			Saltwater species		
Copper	Human	4,000*	200		Above 1,300 µg/L, Cu in water produces bad taste/color*	Sum over all media	Sum with **HEMATOPOIETIC TOXINS**
Copper	Aquatic	4			Freshwater species		
Copper	Aquatic	6			Saltwater species		
Cyanide (as CN^-)	Human	1,000	50			Sum over all media	Sum with **THYROID TOXINS**
2,4-D (2,4-Dichloro-phenoxyacetic acid)	Human	40	4			Sum over all media	Sum with **RENAL TOXINS**
Diazinon	Human	30	3			Sum over all media	Sum with **CHOLINESTERASE INHIBITORS**
Dicofol	Human	1	0.1			Sum over all media	Sum with **CARCINOGENS**
Dioxins							
2, 3, 7, 8-TCDD	Human	0.000002	0.0000001			Sum over all media	Sum with **CARCINOGENS**
2, 3, 7, 8P$_5$CDD	Human	0.000004	0.0000002			Sum over all media	Sum with **CARCINOGENS**
2, 3, 7, 8-H$_6$CDD	Human	0.00002	0.000001			Sum over all media	Sum with **CARCINOGENS**
2, 3, 7, 8-H$_7$CDD	Human	0.0002	0.00001			Sum over all media	Sum with **CARCINOGENS**
2, 3, 7, 8-OCDD	Human	0.002	0.0001			Sum over all media	Sum with **CARCINOGENS**
Ethylbenzene	Human	2,000	100			Sum over all media	Sum with **DEVELOPMENTAL TOXINS**
Fluoranthene	Human	20	2			Sum over all media	Sum with **NON-CARCINOGENIC PAHs****
Fluorene	Human	20	2			Sum over all media	Sum with **NON-CARCINOGENIC PAHs****
Heptachlor	Human	0.1	0.01			Sum over all media	Sum with **CARCINOGENS**
Heptachlor Epoxide	Human	0.02	0.002			Sum over all media	Sum with **CARCINOGENS**

* For Test 1, use AAL_{water} = 1,300 µg/L, based on organoleptic data. For tests 2 and 3, use AAL_{water} = 4,000 µg/L, a health-based criterion.

** PAHs = Polycyclic Aromatic Hydrocarbons.

Substance	Biological Receptor	AAL_{water} µg/L	AAL_{air} µg/m³	AAL_{soil} contact mg/kg	Test 1 Comment	Test 2 Summation/Comment	Test 3 Summation/Comment
n-Hexane	Human	100	200			Sum over all media	Sum with **NEUROTOXINS***
Lead	Aquatic	10			Freshwater species		
Lead	Aquatic	4			Saltwater species		
Lindane	Human	0.2	0.02			Sum over all media	Sum with **CARCINOGENS**
Malathion	Human	800	80			Sum over all media	Sum with **CHOLINESTERASE INHIBITORS**
Mercury (Inorganic)	Human	2	0.07			Sum over all media	Sum with **RENAL TOXINS**
Methyl Ethyl Ketone (2-Butanone)	Human	2,000	300			Sum over all media	Sum with **DEVELOPMENTAL TOXINS**
Methyl n-butyl Ketone	Human	30	4			Sum over all media	Sum with NEUROTOXINS
Naphthalene	Human	20	2			Sum over all media	Causes serum chemistry aberrations; Sum with **NON-CARCINOGENIC PAHs****
Naphthalene	Aquatic	600			Freshwater species		
Naphthalene	Aquatic	700			Saltwater species		
Nickel	Human	400	0.1		AAL_{air} not for nickel carbonyl or nickel subsulfide	Test 2 not applicable	Test 3 applicable to air only; Sum with **PULMONARY TOXINS**
Nickel	Aquatic	1			Freshwater species		
Nickel	Aquatic	8			Saltwater species		
Paraquat	Human	200	4			Sum over all media	Sum with **PULMONARY TOXINS**
Parathion, Ethyl	Human	40	0.3			Sum over all media	Sum with **CHOLINESTERASE INHIBITORS**
Paratholn, Methyl	Human	66	7			Sum overall media	Sum with **CHOLINESTERASE INHIBITORS**
Pentachlorophenol	Human	2	0.2			Sum over all media	Sum with **CARCINOGENS**
Pentachlorophenol	Aquatic	5			Freshwater species		
Pentachlorophenol	Aquatic	10			Saltwater species		
Phenanthrene	Human	20	2	100		Sum over all media	Sum with **NON-CARCINOGENIC PAHs****
Phenol	Human	5,000	400			Sum over all media	Sum with **RENAL TOXINS**
Pyrene	Human	20	2			Sum over all media	Sum with **NON-CARCINOGENIC PAHs****

* AAL for n-hexane may need to be reduced when methyl ethyl ketone (MEK) is also present. (MEK may potentiate the neurotoxicity of n-hexane). Contact TSCP Headquarters Toxicologists for guidance.

** PAHs = Polycyclic Aromatic Hydrocarbons.

Substance	Biological Receptor	AAL_{water} µg/L	AAL_{air} µg/m³	AAL_{soil} contact mg/kg	Test 1 Comment	Test 2 Summation/Comment	Test 3 Summation/Comment
Silver	Human	200	2			Sum over all media	Causes **ARGYRIA**; Test 3 not applicable
Silver	Aquatic	1			Freshwater species		
Silver	Aquatic	6			Saltwater species		
Tetrachlorophenols	Human	875	88			Sum over all media	
Toluene	Human	2,000	200			Sum over all media	Sum with **DEVELOPMENTAL TOXINS**
Toluene	Aquatic	90			Freshwater species		
Toluene	Aquatic	20			Saltwater species		
1,1,1-Trichloro-ethane	Human	300	300			Sum over all media	Sum with **HEPATOTOXINS**
Trichloroethylene	Human	7	7			Sum over all media	Sum with **CARCINOGENS**
Vinyl Chloride	Human	0.5	0.1			Sum over all media	Sum with **CARCINOGENS**
Xylene (all isomers)	Human	2,000	400	30,000		Sum over all media	Sum with **DEVELOPMENTAL TOXINS**
Xylene	Aquatic	40			Freshwater species		
Xylene	Aquatic	70			Saltwater species		
Zinc	Human	8,000	800			Sum over all media	Sum with **HEMATOPOIETIC TOXINS**
Zinc	Aquatic	30			Freshwater species		
Zinc	Aquatic	10			Saltwater species		

APPLIED ACTION LEVELS AND RISK APPRAISAL MECHANISM

The **California Site Mitigation Decision Manual** (CDHS, 1986) describes a standardized approach to setting waste site mitigation criteria. One of the major elements in the risk assessment process is specifying how exposure criteria, known as Applied Action Levels (AALs) will be developed. The AALs listed in this table represent the established exposure criteria for the specified biological receptors (human or aquatic species) for each substance of each medium (water, air, or soil). With this information, the Risk Appraisal Mechanism (described in Chapter 7 of **The Decision Tree Manual**) is ready to be used to answer the question: "Are the sensitive biological receptors of concern at significant risk?"

The evaluation of risk associated with exposure to contaminants on a hazardous waste site can be accomplished by applying a series of three risk appraisal tests. If any of the tests fail, it is concluded that a sensitive biological receptor of concern is considered at significant risk for an adverse impact. This should initiate a risk management process leading to a decision on whether a remedial action is warranted.

Test 1: The first test in the risk appraisal process evaluates single chemical/single medium exposure. It determines whether a biological receptor receives an excessive exposure to any toxic substance via contact with a contaminated medium (e.g., water, air, soil, or biota). The test compares the level of exposure to a chemical in a medium, abbreviated as C_{medium}, with the AAL criterion for that chemical in the same medium, AAL_{medium}, i.e.,

$$\frac{C_{medium}}{AAL_{medium}}$$

If the resulting value is greater than one, then the test fails, the biological receptor is considered to be at risk of an adverse impact, and a risk management process should be initiated.

Test 2: The second test in the risk appraisal process evaluates single chemical/multiple media exposure. It determines whether a biological receptor receives an excessive exposure to any toxic substance via contact with all pertinent media exposure. The exposures via various media are assumed to be cumulative unless an exception is noted in the Test 2 Comment. Test 2 is:

$$\frac{C_{water}}{AAL_{water}} + \frac{C_{air}}{AAL_{air}} + \frac{C_{soil}}{AAL_{soil\ contact}}$$

If the sum above exceeds unity, then the test fails, the receptor is considered to be at risk of an adverse impact, and a risk management process should be initiated.

Test 3: The third test in the risk appraisal process evaluates multiple chemical/multiple media exposure. It determines whether a biological receptor receives an excessive exposure in all pertinent media to an aggregate of substances which produce the ***same toxic manifestation*** upon which the AALs for these substances are based. Test 3 in this table assumes additivity of such exposures, and appropriate summation is indicated in the Test 3 Comment. This test can be expressed as:

$$\frac{C_{water,1}}{AAL_{water,1}} + \frac{C_{air,1}}{AAL_{air,1}} + \frac{C_{soil,1}}{AAL_{soil\ contact,1}} +$$
$$\frac{C_{water,2}}{AAL_{water,2}} + \frac{C_{air,2}}{AAL_{air,2}} + \frac{C_{soil,2}}{AAL_{soil\ contact,2}} + \ldots + \frac{C_{medium,n}}{AAL_{medium,n}}$$

Test 3 is undertaken for each group of chemicals which produce the same toxic effect. If the sum for any group exceeds unity, then the test fails, the biological receptor is considered to be at risk of an adverse effect, and a risk management process should be initiated.

The risk appraisal mechanism repeats Test 1 through Test 3 for all toxic substances and the identified sensitive biological receptor(s) at a waste site. When any cumulative ratio of concentrations over AALs is greater than 1, then the receptor of concern is considered at risk of an adverse effect, and a risk management process should be initiated.

APPENDIX C
FIELD METHODS

1.0 UTILITY CLEARANCE

All proposed borehole locations were located by JMM and cleared for buried utilities or other subsurface obstacles by PWC prior to drilling. If locations were not approved by PWC, the boring location in question was moved to a nearby location that was clear and approved by PWC.

2.0 FIELD DOCUMENTATION

Tasks conducted at NAS Alameda were documented in field notebooks, daily equipment calibration logbooks, lithologic boring logs, well construction logs, well development logs, groundwater sampling logs, chains-of-custody (COC) forms, sample registers, and sample summary manifests. Blank copies of the lithologic boring log, well construction log, groundwater sampling/development log, COCs, and sample summary manifest are attached (Figures C-1, C-2, C-3, C-4, and C-5).

Chronological information for each sampling team concerning start and stop times, daily events and activities, problems, equipment used, crew members, weather, and miscellaneous field observations were recorded in bound field notebooks. If a specific form or log did not exist, information was recorded in these field notebooks. Daily equipment calibrations were recorded in notebooks for each type of equipment. Soil descriptions, sample location depths, geotechnical blow counts and sample depths, time and depth first water encountered, Geiger Mueller readings, and relevant field observations were recorded on the lithologic logs. These lithologic logs along with the well construction logs also recorded the monitoring well screen intervals, blank casing intervals, sand filter pack and bentonite seal depths, grout intervals, surface completion setup, and amount and type of well materials.

Groundwater development and sampling logs recorded measured field parameters. The parameters measured were depth to water, well volume calculations, amount of water purged, turbidity (development only), pH, conductivity, temperature (°C), and water characteristics (color, odor, etc.). Salinity was recorded in some of the wells that appeared to the sampling team to have significant influences from the bay. Duplicate and rinsate sample data was recorded on the groundwater sampling log. COC forms and sample registers were used to track the analytical samples, duplicates, rinsates, and travel blanks. The laboratory provided preprinted COC forms and sample labels allowing the field personnel to record the date, time, and sampler's initials on the labels and COCs. Sample summary manifests were used to inventory samples in each cooler that was shipped daily to the laboratory.

3.0 BOREHOLE DRILLING AND SOIL SAMPLE COLLECTION

Between November 1990 and June 1991, 70 soil borings were drilled at Alameda NAS. Groundwater quality monitoring wells were constructed in all of these borings. Water Development Corporation (WDC) of Woodland, California drilled 58 of the soil borings during CTO No. 107. The remaining soil borings were drilled by Exploration Drilling Services of Redwood City, California, a WDC's subcontractor from November 1990 to December 1990 under Contract Task Order (CTO) No. 085.

3.1 SOIL BORING AND MONITORING WELL NOMENCLATURE

There are four nomenclature designations for the soil borings and monitoring wells based upon well construction. The "A" wells were completed with the screen straddling the water table in the first water-bearing zone in the fill material. The "E" wells were completed with the screen in the first water-bearing zone at the base of the fill material, top of the confining Holocene Bay Mud clay unit. The "B" wells were completed with the screen in the second water-bearing zone at the top of the Late Pleistocene/Holocene Alluvial/Eolian deposits (Merritt Sand equivalent) below the base of the Holocene Bay Mud. The "C" wells were completed with the screen in the second water-bearing zone at the base of the Late Pleistocene/Holocene Alluvial/Eolian deposits above the top of the Late Pleistocene Estuarine deposits (San Antonio Formation equivalent). To evaluate the hydrogeology of the area, many of the wells were clustered within 10 feet of each other. The well locations map for actual well locations and clusters are shown in Figure 2.2 of the main text of this report.

3.2 DRILLING METHODS

Three different types of well drilling methods were used to drill and install these soil borings and groundwater monitoring wells. During CTO No. 085, six shallow "A" borings were drilled using a GEFCO CF-15 mud rotary rig with hollow-stem continuous-flight augers. Six deeper "B" borings were also drilled using this rig and method to an approximate depth of 20 to 30 feet below ground surface so that low carbon steel conductor casing could be installed prior to penetrating the second water-bearing zone to prevent any possible cross contamination between the two water-bearing zones. The mud rotary rig circulation setup was then used to the total depth of each of these "B" borings.

During CTO No. 107, the 58 soil borings were drilled using an all-terrain vehicle mounted CME 750 hollow-stem continuous-flight auger (HSA) rig with 8-inch outside-diameter (OD) auger flights and a truck-mounted air rotary casing hammer (ARCH) rig with a 7-inch OD roller tri-cone bit. The HSA rig was used to drill 34 shallow "A" and 14 shallow "E" borings, and the ARCH rig was used for the four intermediate "B" and the six deep "C" borings.

3.3 SOIL SAMPLE COLLECTION AND LITHOLOGIC DESCRIPTION

During both phases of drilling, the soil borings were continuously sampled. The HSA method employed the use of either a 5-foot long, 3-inch inside-diameter (ID) stainless steel continuous core barrel samplers or a 1.5-foot long, 2.5-inch-ID stainless steel California modified split-spoon sampler. The split spoon samplers were primarily used in the second phase to collect geotechnical samples and were advanced using a 140-lb hammer with a 30-inch drop. However, due to drilling conditions and time constraints with the ARCH rig, samples were not always collected continuously on all "B" and "C" borings. Instead, the analytical and geotechnical samples were collected using a 2-foot-long, 2.5-inch-ID stainless steel split-spoon sampler that was advanced using a 300-lb hammer with a 30-inch drop.

Once the sample was retrieved, the samplers were opened and placed in clean plastic-covered troughs or on clean aluminum foil. The soil was described by the site geologist in terms of color, consistency, grain size, and percentages of various constituents as well as according to ASTMs Unified Soil Classification System. Plans originally indicated that each individual soil boring would be logged, but due to time constraints and some drilling difficulties, approval was granted to completely log each soil boring cluster. This was achieved by first drilling the shallow "A" and/or "E" soil borings, then the deeper "B" and/or "C" soil borings. Lithologic description for the "B" or "C" borings would start at the depth where the "A" or "E" borings description ended.

As the geologist was describing the soil sample, a small portion would be placed in a plastic reclosable bag for field screening with a photoionization detector (PID). The bag was labeled with depth and time and allowed to sit for 15 minutes. After 15 minutes, the sample was checked with a PID and the reading recorded on the lithologic log.

Soil samples were collected as soon as possible after the samplers were opened. During CTO No. 085, seven surface soil samples and one duplicate sample were collected from each of the six well clusters. Three subsurface soil samples within the vadose zone were collected from each of the Runway Area borings (M103A, M-105-A, M-108-A). According to the approved SWAT work plan approximately three soil samples were collected from each well cluster during CTO No. 107. One surface soil and two subsurface soil samples from the vadose zone and the first and/or second water-bearing zone were collected. The surface soil sample was collected at the ground surface or immediately beneath any asphalt or concrete present.

Once the PID screening sample was removed from the sampler, two 8-oz. clear glass jars and two 500-ml amber glass jars with Teflon-lined lids were filled with soil. The 8-oz. jars were for volatile organic compounds so they were filled as quickly as possible with zero head space to inhibit volatilization. Duplicates were collected on approximately 10 percent of the samples. Wherever possible, the analytical and duplicate samples were taken from the same sampler. If there was not sufficient sample recovery, the remainder of the duplicate was taken from the next sampler. As soon as the bottles were filled and labeled, the samples were placed in coolers with ice.

3.4 GEOTECHNICAL SAMPLE COLLECTION

One to two geotechnical samples were retained from each boring. To collect a geotechnical sample, the split-spoon sampler was lined with three or four clean 6-inch long, 2.5-inch OD brass sleeves. Once the sample was retrieved, the sleeve ends were lined with clean aluminum foil, capped with tightly fitting plastic caps, and labeled with the date, boring name, and depth. Geotechnical samples were collected from both saturated and unsaturated soil and all the major lithologies that were encountered. Emphasis was placed on collecting geotechnical samples from the screened intervals and the confining units at the base of the "C" and "E" borings. Selected geotechnical samples from the aquitard and screened intervals were sent to a geotechnical laboratory for analyses. Samples sent in for analyses are listed on Tables 7-1, 8-1, and 9-1.

Borings that were abandoned due to drilling difficulties were grouted to the surface at the completion of drilling. Grout consisted of neat cement with approximately 5 percent bentonite powder. The grout was installed through tremie pipes to ensure that all water in the boring was displaced and that the boring did not collapse.

3.5 DECONTAMINATION

Proper decontamination is important to ensure that analytical samples are representative and that there is no cross contamination. Prior to moving to a new boring or cluster location, the drill rig, augers, drill tools, and samplers were steam cleaned with the base's approved water source. Before drilling each day, the rig geologist inspected the drill rig for oil, fuel, and hydraulic fluid leaks that could contaminate the samples or site. The area around and over each borehole location was covered with a clean plastic tarp prior to placing the drilling rig and equipment to prevent possible surface contamination from the subsurface soil cuttings.

During drilling, the drillers cleaned the samplers between samples with a four-step decontamination system using two buckets and two hand sprayers. The first step was a bucket containing Liquinox detergent and water from the approved base source. The second step was a bucket containing rinse water from the approved source. The third step was a hand spray pump containing deionized water supplied by Alhambra Water Co.; and the fourth step was a hand spray pump containing laboratory-grade isopropyl alcohol. The runoff deionized water and isopropyl alcohol were contained in buckets and placed with the generated waste water. Equipment blanks were collected every other day to monitor the quality of the decontamination system. Blanks were collected by pouring deionized water through a decontaminated split-spoon sampler into the water sample containers.

3.6 HEALTH AND SAFETY MONITORING

Besides field screening the soil samples, the PID was used for health and safety monitoring. While drilling, readings were collected from the worker's breathing zone every 5 to 10 minutes and recorded in the field log book.

Simultaneously, readings were collected and recorded from a combustible gas indicator, a total particulate monitor, a noise dosimeter, and a Geiger Mueller meter. Personal radiation dosimeters were worn by all field personnel. All instruments were calibrated daily in accordance to manufacturer's instructions and recorded in individual instrument calibration log books.

During at least the first 15 minutes of drilling, all personnel around the drill rig within the exclusion zone wore modified level C protection. Once it was determined from the monitoring instruments that the breathing zone was within limits for level D work, protection was downgraded to a modified level D. Modified level C protection included the wearing of tyvek (polycoat if encountering liquids was expected), rubber or leather steel-toed boots and boot covers, nitrile under and over gloves, hard hat, safety glasses, hearing protection, and half-face or full-face respirator with organic vapor/high efficiency particulate absolute cartridges. Modified level D protection included all of the modified level C protection requirements except the respirators. Respirator cartridges were changed daily and the downgrading to level D was considered optional for each field worker. Due to the proximity of the runway, all field personnel were provided with hearing protection to be worn while on base near the runway or other high noise generating areas.

4.0 WELL CONSTRUCTION

Seventy wells were installed in Sites 1 and 2, and the Runway Area during CTO No. 085 and CTO No. 107 investigations. Figure 2-2 illustrates the monitoring well locations and clusters. As discussed in Section 2.1 of this appendix, "A", "B", "C", and "E" wells were constructed based upon location within the first and second water bearing zones. Boring logs in Appendix E summarize the monitoring well construction data for these wells.

During monitoring well installation, 10-foot screen intervals were primarily used. When aquitards were encountered, shorter screen intervals were used. For purposes of this field program the geologist considered clay layers greater than 1-foot-thick to be aquitards. Monitoring wells that do not have 10-foot screen intervals are M-002A, M-020E, M-021E, M-010B, and M-103B.

All 70 of these monitoring wells were completed flush to ground surface using flush-mounted Christie boxes and locking steel stove pipes. The monitoring wells were constructed of 2-inch diameter, schedule 40 PVC well casing, points, expandable caps, and 0.010-inch slotted screens. Low carbon steel conductor casing, 0.188 inches thick, was used on six of the "B" wells installed during CTO No. 085. All monitoring well joints were flush threaded and watertight and no solvent or glue was used. Well construction materials used included #2/16 sand for the screen filter pack interval, 1/4 inch bentonite pellets for the seal, and neat cement with 5 percent bentonite for the grout. Some wells were drilled past the eventual total well depth. In these wells, bentonite chips were used to backfill the borehole to the appropriate depth prior to installing casing.

Monitoring wells installed using the ARCH and HSA method were constructed inside the drill casing or auger flights. The drill casing or auger flights were slowly pulled up while the sand, bentonite, or grout was added to the annular space. The sand level in the auger or drill çasing was constantly monitored with a weighted tagline to ensure that a small amount of sand remained in the augers at all times to prevent borehole sloughing. Centralizers were used on the deeper "B" and "C" wells to assure plume monitoring wells. When flowing sands were encountered, water from the base's approved source was added to the borehole prior to installing the casing. The water provided hydraulic head to keep the sand from flowing into the augers during well construction. The amount of water added to the borehole was estimated so that during development, this water could be removed in addition to the three well volumes. Monitoring wells installed using the mud rotary method during CTO 085 are discussed in detail in the CTO No. 085 West Beach Landfill and Runway Areas Interim Data Report Final, August 1991.

Filter pack thickness ranged from 1 to 6 feet above the top of the screen. The bentonite seal thickness ranged from 1 to 3 feet and grout, installed through a tremie pipe, to the surface. However, there was concern about the hydrating properties of bentonite in the brackish groundwater encountered at NAS Alameda. To assure that a proper hydrated bentonite seal formed prior to installing the grout, a small cup of bentonite pellets was hydrated with the same water from the well simultaneously with the seal installation. The seal was considered complete when the pellets in the cup were hydrated.

A State of California-licensed surveyor then surveyed the top of the well casing and ground surface relative to the State Plane Coordinate System (Zone 3, NAD 27) with a horizontal control accuracy of 0.1 foot, and the Mean Low Low Tide markers with a vertical control accuracy of 0.01 foot.

4.1 WELL DEVELOPMENT

Well development techniques included bailing and swabbing by WDC using a SMEAL rig, decontaminated stainless steel bailers, and a waste water tank on a 16-foot trailer. Water levels and total well depths were measured prior to development to calculate well bore volumes. Initially, 20 to 30 gallons of water were bailed from the well which was then swabbed for 20 to 30 minutes. After swabbing, well bailing continued. Water was removed until the turbidity of the water decreased and measured field parameters became stable. However, a minimum three well borehole volumes were removed. All bailer, bailer parts, and steel-cable assembly were steam cleaned between wells. Field parameters were measured at the beginning of development and every 10 gallons afterward.

5.0 QUARTERLY GROUNDWATER SAMPLE COLLECTION

Groundwater samples were collected from the 70 wells installed during CTO No. 085 and CTO No. 107. The quarterly rounds were conducted as follows: first round from June 17, 1991 to July 19, 1991; the second round from September 19, 1991 to October 14, 1991; the third round from January 14, 1992 to February 8, 1992; and the fourth round from March 24, 1992 to April 27, 1992.

Groundwater sampling followed a six-step procedure described below. Equipment used and calibrated daily included Orion 250A pH meters, YSI conductivity meters, water level indicators, dual-phase indicators, and a PID. A tape measure, litmus pH paper, and centigrade thermometer were readily available in case of equipment malfunction.

1. The water level was measured relative to top of casing and the volume of the water in the well casing and filter interval was computed.

2. Each well was purged a minimum of three wellbore volumes prior to sampling. Decontaminated Teflon bailers, peristaltic pumps, or a 2-inch Grunfos pump with check valves was used. If a well purged dry, it was allowed to recover to approximately 80 percent of its original water level. The well would be purged dry a total of three times before sampling. While purging, field parameters and miscellaneous field observations were recorded initially and at least every well volume. Purging was considered adequate when the field parameter measurements became stable.

3. After purging was completed, sample bottles were labeled. Samples were collected with the same bailer used for purging or a decontaminated bailer if a pump was used. Glass and plastic water sample containers with Teflon-lined lids were used. The analysis type, container, and minimum required number of bottles are listed in Table C-1. All samples were collected from the bottom of the screen interval of each well. Only new clean nylon rope or a decontaminated steel-cable reel assembly setup was used to lower and raise the bailer and/or pumps. Duplicate samples were collected from 10 percent of the "A", "B", "C", and "E" wells. Rinsate samples were collected every other day prior to purging or sampling. The rinsate sample was collected by pouring deionized water into a Teflon bailer used to collect the analytical sample.

4. The samples for dissolved metals were filtered at each well location using disposable 0.45 micron filters. Acid and base preservatives were added to water containers as instructed by the laboratory immediately after sample collection. The following preservatives used were nitric acid in the dissolved metals and radionuclide samples; sulfuric acid in oil & grease, TRPH, and nutrient samples; and sodium hydroxide in the cyanide samples. The pH in each water container was checked with litmus paper after the preservatives were added. The aromatic volatile sample bottles were pre-preserved by the laboratory with hydrochloric acid and pH was not checked in accordance to VOA requirement listed in SW846. All sample bottles for each well were supplied by the laboratory in sample kits. The same procedure applied to all the rinsate and duplicate samples. All duplicate samples were collected after the well sample had been collected with the exception of the aromatic volatile sample.

5. At the end of each day, samples were packed for shipment to the lab as described in Section 9.0 of this appendix.

6. Proper decontamination procedures were used to insure that all equipment that may potentially come in contact with the sample were clean to avoid cross contamination. All bailers, bailer parts, pumps, pump parts, metal vessels, and water level probes were washed in a Liquinox and approved

water source solution, rinsed and steam cleaned with the approved water source, and then given a deionized water rinse prior to using in another well. The bailers and bailer parts were given a final isopropyl alcohol rinse during the first and second quarters of sampling. However, due to suspected isopropyl alcohol contamination in samples, this rinse was stopped for the third and fourth quarters. To further minimize time spent decontaminating equipment, an adequate supply of Teflon bailers was available to do a complete day of sampling. These bailers were cleaned according to the protocol stated above and wrapped in clean poly-tubing.

However, a slight variation to the decontamination procedure was used on the pumps. A Liquinox solution was circulated through the pump and hosing, followed by a deionized water rinse. Enough deionized water was used to ensure that the Liquinox solution was removed. The outside of the Grunfos pump and hosing was steam cleaned and rinsed with deionized water. The outside of the peristaltic pumps and hosing were rinsed with deionized water between wells and steam cleaned at the end of each day.

Due to the length of quarterly groundwater sampling, various field modifications were made. During the first round of quarterly sampling, JMM's Smeal #3 was used to purge and sample all wells using the bailing method and Teflon bailers. Tide charts were consulted and all monitoring wells suspected of being influenced by the tides were purged after the daily high high tide. Samples were collected as the tide moved out (ebb tide) within the range of 2 feet above or below sea level datum. Bay tide lag times were also considered. Most sampling occurred during the evening/night hours. Transportable light sources were used to provide adequate illumination to conduct this field work. Monitoring wells M-108A and M-108B were not sampled since the endangered Least Terns were in the mating season. These wells are located next to the Least Tern Sanctuary.

During the second round of quarterly sampling, JMM's Smeal #3 was used, along with a 2-inch stainless steel Grunfos pump. All purging and sampling from this second round to the fourth round occurred during regular daylight hours and tides were not monitored. The pump was used to purge the wells. However, near the end of the second quarter sampling effort, the pump was not operable and all shallow wells were then hand bailed while deeper wells were bailed using Smeal #3.

Sampling during the third round of quarterly sampling was delayed approximately one month due to the laboratory being closed for renovations. JMM's Smeal #3 was used along with a 2-inch stainless steel Grunfos pump. However, the pump was not operable after the first week of sampling and all shallow wells were then hand bailed while deeper wells were bailed using Smeal #3.

The fourth quarter sampling began as originally scheduled. A 2-inch stainless steel Grunfos pump and a variety of 1, 2, and 3-stage peristaltic pumps were used to purge the monitoring wells. The Grunfos pump was used in all the deeper "B" and "C" wells. The peristaltic pumps were used in the shallow "A" and "E" wells. Rather than place all volatile samples with the travel blank canister upon shipping as done in the first three quarters, the volatile travel blank canister was opened and placed with all volatile samples immediately after collection. The volatile canister was sealed upon shipment to the laboratory.

6.0 SURFACE SOIL SAMPLING

Surface soil samples were collected in Site 1 (1943-1956 Disposal Area) and Site 2 (West Beach Landfill) on a 200-foot by 200-foot grid. Samples were not taken on the runway or water covered areas. Sixty-nine surface soil samples were collected at Site 1 by Canonie. One-hundred-fifty surface soil samples, 15 duplicates and three resampled locations were collected from May 6, 1991 to May 16, 1991 at Site 2.

The Site 2 grid was surveyed and staked prior to sampling by John Koch Land Surveyors. The ground surface at each location, relative to the State Plane Coordinate System (Zone 3, NAD 27), was surveyed with a horizontal accuracy of 0.1 feet and vertical accuracy of 0.01 feet. To improve map accuracy, two known locations in the Northeast and Southeast corners of Site 2 were later surveyed using aerial photography.

Before and during sampling, each Site 2 surface sample location was monitored with a Geiger Mueller meter and PID. No radiation or volatile hits were detected. Two 500-ml amber glass jars with Teflon-lined lids were filled with surface soil at each location using decontaminated stainless steel bowls, trowels, spoons, and a shovel. All samples were placed in coolers with ice immediately after collection. Decontamination procedures for surface soil sampling in Site 2 included a Liquinox solution wash, deionized water rinse, and an isopropyl alcohol rinse.

7.0 WETLANDS SURFACE WATER AND SEDIMENT SAMPLING

Sediment and surface water samples were collected in the designated wetland area located in Site 2. Surface water samples were collected from May 22, 1991 to May 29, 1991 at 23 locations in the water bodies present. All surface water samples were collected during this one time period rather than over two separate time periods as stated in the SWAT work plan. Each location was marked with a wooden stake for later surveying. Sediment sampling from the wetland area followed the completion of the surface water sampling task. Sediment samples were collected from May 30, 1991 to May 31, 1991. The 12 sediment samples collected were paired with 12 of the locations of the surface water samples.

7.1 WETLAND SURFACE WATER

To collect the wetland surface water samples, a fiberglass rowboat was used to locate the sampling team in the water bodies present at Site 2. The water bodies present ranged in depth from a few inches to approximately 5 to 6 feet. A decontaminated dipper was used to collect and pour the water sample into the water sample containers. The analysis type, container, and minimum required number of bottles are listed in Table C-2. All samples were placed in coolers with ice after collection.

7.2 WETLAND SEDIMENT SAMPLING

A decontaminated stainless steel Ponar grab sampler was used to collect sediment samples where the water was deep; and in areas where the water was shallow, a decontaminated shovel. The rowboat was used to locate the sampling team. Collected sediment from each location was placed into a decontaminated stainless steel bowl prior to filling the sample containers. All samples were placed in coolers with ice after collection. Decontamination procedures for sediment sampling in Site 2 included a Liquinox solution wash and deionized water rinse. However, the Ponar grab sampler was steam cleaned prior to the deionized water rinse.

8.0 WASTE HANDLING

All soil, water, and solid waste generated during borehole drilling, monitoring well development and sampling, and other sampling tasks were contained transported to a central decontamination area on the NAS Alameda base airfield near the field trailer. This waste was transported on base in 1.5 or 3.0 yard bins, 55-gallon drums, or in a dedicated waste water tank prior to being transferred. Soil was placed in DOT approved roll-off bins and water in DOT approved Baker Tanks. Any excess water in the bins containing soil was siphoned off into the Baker Tanks. Water from equipment decontamination was pumped directly into the Baker Tanks from the decontamination pad. Solid waste (personal protective equipment, plastic, etc.) that was potentially contaminated from drilling was placed in labeled 55-gallon drums. This solid waste material was later found to be suitable for disposal in a municipal landfill. The soil and water will be properly disposed when waste characterization laboratory results are received.

9.0 SOIL SAMPLE SHIPMENT

At the end of each day, all collected samples were carefully re-packed into the coolers with frozen blue ice. Included in each cooler was a sample summary manifest, a travel blank (with volatile samples only), and a COC form. The coolers were taped shut and tamper-evident tape placed over the lid openings. These coolers were taken daily to the local Federal Express office for overnight shipment to the NISSA-approved laboratory. However, on occasions, delivery times to Federal Express were not met and samples were received one day later. In these cases, additional ice was packed into the coolers to ensure that the samples were received cold. Soil samples collected during CTO No. 085 were sent to Analytical Technology, Inc. of San Diego, California. All soil and water samples collected during CTO No. 107 were sent to Environmental Science and Engineering, Inc. of Gainesville, Florida.

10.0 IN-SITU PERMEABILITY TESTING (SLUG TESTS)

Falling and rising head slug tests were performed in each monitoring well to determine the in-situ permeabilities of the water-bearing zones. Equipment used to conduct these tests included continuous data loggers

(Hermit 1000B and 2000C), 10 psi pressure transducers, water level indicators, and slug bars. The slug bars were constructed of flush-threaded 5-foot lengths of 0.1-foot diameter PVC pipe. The pipe was filled with clean sand and both ends capped with a watertight seal. The slug bars, transducers, and water level indicators were decontaminated between wells using a Liquinox solution wash, approved source water rinse, deionized water rinse, and a final isopropyl alcohol rinse. New nylon rope was used between wells. Depending on the well depth and water column, varying slug bar lengths of 5, 10, and 15 feet were used.

Water level and total well depth readings were recorded and water columns calculated. The transducers were placed no deeper than 20 feet below the water surface and the cable securely anchored outside of the well with duct tape to prevent movement. Preference was to keep the transducer as close to 10-feet below the water surface as possible. However, in the shallow wells with less than 10 feet of water column, the transducer was placed approximately one-half to 1-foot above the bottom of the well. In a few of the wells, the water column was less than 5-feet thick. Since the shortest slug bar was 5-feet in length, care was taken to measure the rope and slug bar and record the submerged slug bar length.

Immediately prior to activating the continuous data logger for data collection and "instantaneously" inserting or removing the slug bar, a static water level reading was recorded. The slug bar was inserted into the well and completely submerged. The water in the well was then allowed to recover to the static water level. In most wells, recovery was within a few minutes. However, many of the wells were tidally influenced. So if recovery was within a few inches, it was considered complete and the data logger programmed for the next test. In wells which recovery was slow, the water level was allowed to recover to at least 80 percent of its original level before the test was stopped. The data logger recorded the change in water levels until the well recovered to static or near static conditions.

Data from the data logger was transferred to a computer. Data were plotted and analyzed using the Bouwer and Rice method for unconfined aquifers and Cooper et. al. method for confined aquifers. Both falling and rising head data were collected. However, falling head data were collected for most of the wells but not analyzed since questions concerning its accuracy exists. Slug test results, assumptions, and methodology are presented in Appendix G.

11.0 TIDAL INFLUENCE STUDY

The work plan for the NAS Alameda Remedial Investigation/Feasibility Study (RI/FS) prepared by Canonie Environmental (Canonie) included a brief description of a minimal tidal influence study. However, the scope was expanded to include a larger number of wells to ascertain overall groundwater gradients and to evaluate potential connections between the underlying aquifers. The objectives of this study were to determine the magnitude and extent of tidal influences on groundwater levels in the shallow water bearing zone (fill material), and the second water-bearing zones around Sites 1, 2, and the Runway Area.

The tidal influence study was conducted from April 16, 1992 to April 19, 1992 during the monthly high and low tides. Water level data was recorded every 15 minutes continuously for 72 hours on 26 data loggers (Hermit 1000B and 2000C) using 57 10-psi pressure transducers in 55 monitoring wells and two marine tidal stations. The monitoring wells used in this study are listed in Table C-3.

The two marine tidal stations provided the baseline water level changes in the tide for this study. These stations were installed at Pier 4 in the Oakland Harbor and in the dock area of Building 15 at the Sea Plane Lagoon. Schedule 40 PVC casing and 0.010-inch slotted screen was used at these stations to keep the transducers from moving during the 72 hour test. A barometric pressure transducer was also used at the Pier 4 location. Barricades were placed at all the well locations to protect the monitoring equipment.

The data loggers were coded, assigned monitoring wells, transducers, and accordingly programmed. All data loggers were synchronized within 30 seconds. This data was recorded on a master data summary log.

Prior to installing transducers in each of the wells, water levels were recorded. Once transducers were placed in each of the wells respective to the data logger being used, transducer calibrations were performed. The calibration consisted of reading the water level off the data logger, then pulling the transducer up approximately 1 foot and reading the new water level. If the change in head was approximately the 1 foot, it was assumed that the transducer was functioning properly. If the change in head did not reflect the 1 foot, the transducer was checked for silted vents. All transducers used appeared to be functioning properly. Once the transducers were calibrated, they were securely anchored to prevent movement and the data collection began. After the last data logger was activated, the 72-hour continuous water level monitoring began.

Manual water level readings were recorded twice from M-008A, M-011A, M-106A, M-107A, M-110A, and M-111A monitoring wells on April 17 and 18, 1992. After the 72 hours were completed, data loggers were collected and transducers cleaned, and data was transferred to a computer. A time-weighted average head was calculated for each well to help determine the average direction of groundwater flow, define groundwater flow patterns, potentiometric head distribution, and hydraulic gradients. An understanding of these flow components is useful to assess the potential for chemical transport at Sites 1 and 2.

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TABLES

APPENDIX C – FIELD METHODS

FINAL
SOLID WASTE WATER QUALITY ASSESSMENT TEST AND DATA SUMMARY REPORT FOR REMEDIAL INVESTIGATION/FEASIBILITY STUDY FOR PHASES 5 AND 6

DATED 30 APRIL 1993

TABLE C-1

ESE LABORATORY ANALYSIS FRACTION CODES

Type	Code	Preservative	Container	Analysis Type
Soils	SS	4°C	G, 500 ml	All except Volatiles
	SV	4°C	G, 60 ml	Volatiles
Water	B	4°C, NaOH, pH>12	P, 1-4 L	Cyanides
	C	4°C	P, 1-4 L	Various Inorganics
	EC	4°C	G, 1 L	Chlorinated Pesticides
	F	--	P, 4 L	Collected prior to Field Filtering
	MS	4°C	G, 1 L	GCMS Extractable Organics
	NF	HNO_3, pH<2	P, 1 L	Metals (Dissolved) Mercury (Dissolved)
	O	4°C, H_2SO_4, pH<2	G, 1 L	TRPH
	R	HNO_3, pH<2	P, 1-4 L	Radionuclides
	S	4°C, H_2SO_4, pH<2	P, 1 L	Nutrients
	TEM	--	P, 1 L	Asbestos
	VP	4°C, HCl, pH<2	G, 3x60 ml	Aromatic Volatiles

Notes: G - glass containers with Teflon-lined lids.
- volatile bottles with Teflon-lined rubber septa.

P - plastic container with Teflon-lined lids.
L - Liter
ml - milliliter
GCMS - Gas Chromatograph Mass Spectrometer
TRPH - Total Recoverable Petroleum Hydrocarbons

Samples preserved with provided reagents as instructed above (VPs are pre-preserved).
Chain of Custodys (COCs) indicate the number of actual bottles for each analysis code that were shipped to the laboratory. See the attached blank sample COC.

TABLE C-2

MONITORING WELLS USED IN TIDAL INFLUENCE STUDY
APRIL 1992

Well Cluster	Shallow Wells (First Water-Bearing Zone)		Deep Wells (Second Water-Bearing Zone)	
Site 1, 1943-1956 Disposal Area Wells				
M-001	A	E	B	
M-003	A			
M-004	A			
M-005	A			
M-006	A			
M-007	A			C
M-009	A			
M-025	A	E		C
M-026	A	E		
M-027	A	E	B	C
M-028	A	E		
M-029	A	E		
Site 2, West Beach Landfill (WBL) Wells				
M-010	A		B	
M-012	A		B	
M-013	A			C
M-014	A		B	
M-015	A			
M-016	A			
M-018	A	E		
M-020	A	E	B	
M-021	A	E		
M-023	A	E	B	
Runway Area Wells				
M-101	A			
M-102	A			
M-103	A		B	
M-104	A			C
M-105	A		B	
M-108	A		B	
M-109	A			
Marine Tidal Stations				
Oakland Channel (Pier 4) - transducer and barometric pressure gauge.				
Sea Plane Lagoon (Bldg. 15)				

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FIGURES

APPENDIX C – FIELD METHODS

FINAL
SOLID WASTE WATER QUALITY ASSESSMENT TEST AND DATA SUMMARY REPORT FOR REMEDIAL INVESTIGATION/FEASIBILITY STUDY FOR PHASES 5 AND 6

DATED 30 APRIL 1993

Figure C-1

James M. Montgomery
Consulting Engineers Inc.

Boring #	MW#	Sheet		of	
Project:					
Job #	Site:				
Logged By:	Proj. Eng:	Edited By:			
Drilling Contractor:					
Drill Rig Type/Method:					
Drillers Name:					
Borehole Diam./Drill Bit Type		Total Depth			
		Ref Elev			
Hammer Wt:	Drop:				
Start Time:	Date:				
Completion Time:	Date:				
Backfille Time:	Date:				

Sketch Map of Site Area With Drilling Locations

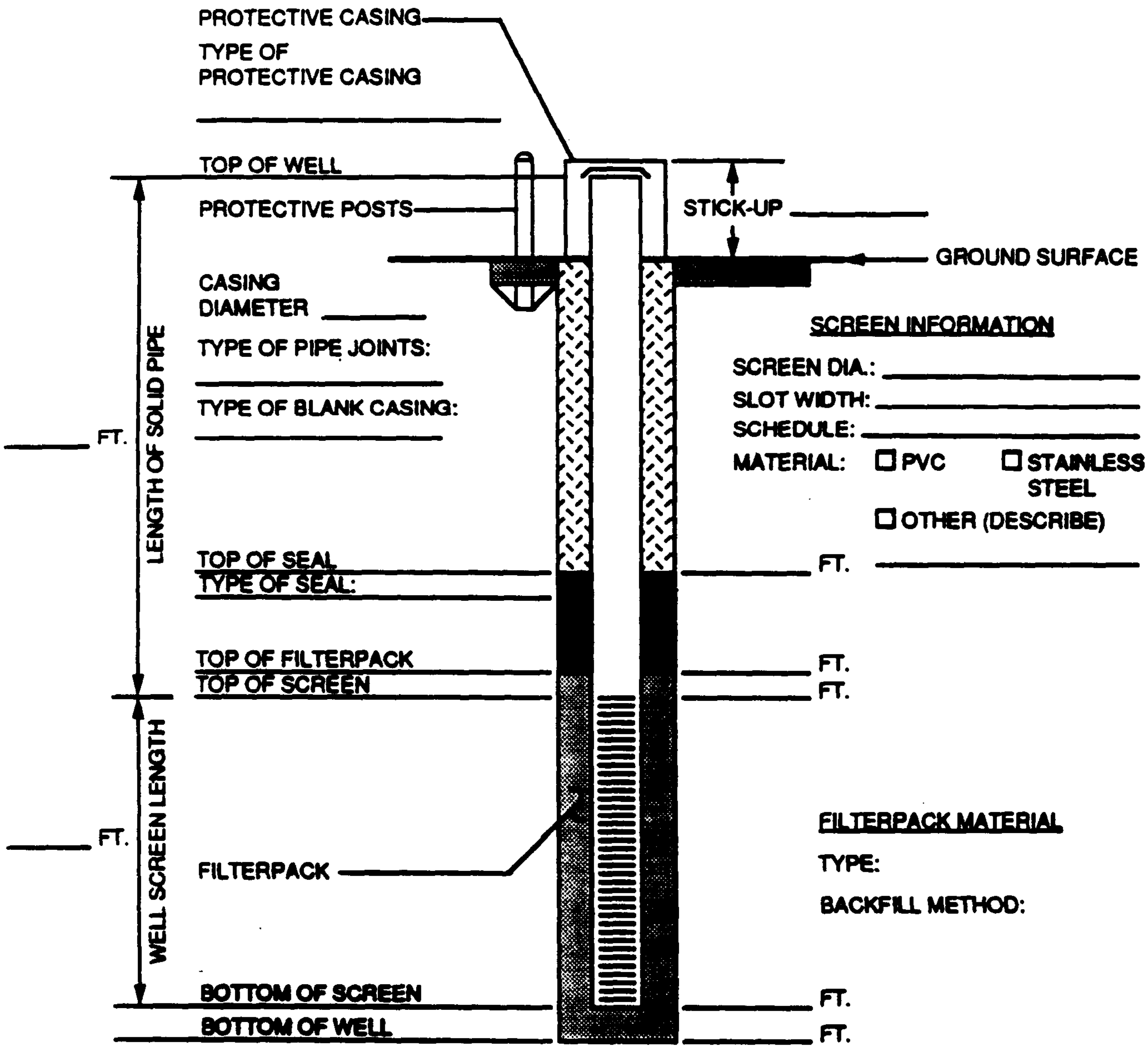
	1st Water			
Boring Depth (ft.)				
Casing Depth (ft.)				
Water Depth (ft.)				
Time				
Date				

PID/OVA	Sampler Type & Depth	Blow Counts / 6 in.	Advance	Recovered (in.)		Casing Type & Size	Annulus Filler	Depth: Sample Recovery	Depth: Feet	Graphics	
									1		
									2		
									3		
									4		
									5		
									6		
									7		
									8		
									9		
									10		
									11		
									12		

Figure C-2

ELEVATION GROUNDWATER	Job No.		PROJECT
DATE INSTALLED	STARTED	COMPLETED	LOCATION (Coordinates or Station)
Installed by:			Drillers NAME
TOTAL DEPTH OF HOLE	JMM NAME		HOLE NO. (As shown on drawing title and file number)

GROUND MONITORING WELL CONSTRUCTION DIAGRAM



COMMENTS, EXPECTED MATERIAL USE CALCULATIONS:

JMM James M. Montgomery
Consulting Engineers Inc.

Page __ of __

GROUNDWATER SAMPLING / WELL DEVELOPMENT LOG

Client____________________
Site____________________
Well number________________
Job number________________

Total well depth *__
Well diameter______
Borehole diameter__

Min number well vol to be purged__________
Vol per ft casing (gal)______________
Vol per ft borehole (gal)____________
(less casing and filter pack)

Date__________

Static water level (ft)*__________
Standing water column(ft)_________

Amt one well vol(gal)________
Total gal to be purged_______

Development method____________________
Presampling purging method______________
Sampling method____________________

* All measurements taken from:___Top of casing, ___Protective casing,___Ground level

TIME	AMOUNT PURGED (gal)	FIELD PARAMETERS MEASURED							COMMENTS	FIELD TECHNICIAN
		EC	pH	TEMP	TURBIDITY	PID				

Figure C-3

Environ tal Science & Engineering 08-29-91 FIELD LOGSHEET *** FIELD GROUP: A
PROJECT NUMBER 3914042 0201 PROJECT NAME: JMM/ALAMEDA NAS-CTO-107 LAB COORD. JACKIE HARG

ESE #	SITE/STA	HAZ?	FRACTIONS (CIRCLE)	DATE	TIME	PARAMETER LIST	FIELD PH STD UNITS	SP COND UMHOS/CM	H2O TEMP C	SITE TYPE	DEPTH FEET
*1	M-001A-		B C EC EC F MS / MS MS NF O O O R / S TEMVP VP VP VP VP			ALQ1.1					
*2	M-001B-		B C EC EC F MS / MS MS NF O O O R / S TEMVP VP VP VP VP			ALQ1.1					
*3	M-001E-		B C EC EC F MS / MS MS NF O O O R / S TEMVP VP VP VP VP			ALQ1.1					
*4	M-002A-		B C EC EC F MS / MS MS NF O O O R / S TEMVP VP VP VP VP			ALQ1.1					
*5	M-002E-		B C EC EC F MS / MS MS NF O O O R / S TEMVP VP VP VP VP			ALQ1.1					
*6	M-003A-		B C EC EC F MS / MS MS NF O O O R / S TEMVP VP VP VP VP			ALQ1.1					
*7	M-004A-		B C EC EC F MS / MS MS NF O O O R / S TEMVP VP VP VP VP			ALQ1.1					

NOTE -CHANGE OR ENTER SITE ID AS NECESSARY; UP TO 9 ALPHANUMERIC CHARACTERS MAY BE USED
-CIRCLE FRACTIONS COLLECTED. ENTER DATE,TIME,FIELD DATA (IF REQUIRED), HAZARD CODE AND NOTES
-HAZARD CODES: **I**=IGNITABLE **C**=CORROSIVE **R**=REACTIVE **T**=TOXIC WASTE **H**=OTHER ACUTE HAZARD; IDENTIFY SPECIFICS IF KNOWN
-PLEASE RETURN COMPLETED LOGSHEETS WITH SAMPLES TO Environmental Science & Engineering, Inc.

RELINQUISHED BY: (NAME/ORGANIZATION/DATE/TIME)	VIA:	REC'D BY (NAME/ORGANIZATION/DATE/TIME)
1		
2		
3		

SAMPLER: MORE SAMPLES TO BE SHIPPED? ___ IF YES, ANTICIPATED # ___ TO SHIP ON __/__/__
SAMPLE CUSTODIAN: Custody Seals Intact? ___ Samples Iced? ___ Preservations Audited? ___ Problems? ___

Figure C-4

Figure C-5

Job No. ________________

CTO - ____
ALAMEDA NAVAL AIR STATION
SUMMARY OF SAMPLE SHIPMENT TO ESE

Page ___ of ___

	Sample I.D.	Depth (feet)	Sample Type (H2O/Soil)	ESE Sample No.	Type and No. of Containers	Date Sampled	Time
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							
21							
22							
23							
24							
25							
26							
27							
28							
				TOTAL:			

Cooler No.: ________________ Fed. Express No.: ________________

Date Shipped: ________________ Completed By: ________________

Received by (ESE): ________________ Date Received: ________________

Attach COC and include this form in each cooler.

APPENDIX D – SOIL GENERAL CHEMICAL RESULTS

FINAL
SOLID WASTE WATER QUALITY ASSESSMENT TEST AND DATA SUMMARY REPORT FOR REMEDIAL INVESTIGATION/FEASIBILITY STUDY FOR PHASES 5 AND 6

DATED 30 APRIL 1993

Appendix D - Runway Area - Soil Samples in Fill Material - General Chemicals

Parameter Reported	M-101A-000 05/30/91 0.0 ft	M-101A-004 06/03/91 2.0 ft	M-102A-000 05/30/91 0.0 ft	M-102A-004 06/03/91 2.0 ft	M-103A-000 12/12/90 5.5 ft	M-103B-000 11/28/90 0.5 ft	M-104A-002 05/30/91 0.5 ft
Physical Parameters-Lab							
% Solids (% Of Wet Wt	99.2	87.1	99.8	83.7	82.9	98.4	89.4
Moisture (% Wet Wt)	0.8	12.9	< 0.5	16.3	NA	NA	10.6
Ph, (Std.Units)	NA	9.2	NA	8.4	7.5	6.0	8
Total Organic Carbon (% Dry Wt)							
Carbon,TOC,As %Om/1.724	NA	0.522	NA	0.174	222	NA	0.696
Organic Content,Total At 440 C	NA	0.9	NA	0.3	NA	NA	1.2
Asbestos (%)							
Asbestos,Total	NA	NFAD	NA	NFAD	ND	NA	NFAD
Radiochemicals (Pci/G-Dry)							
Alpha,Gross	1.3	4.9	1.8	1	0.5	1.0	1.1
Alpha,Gross, Count Error	0.6	1.38	0.5	0.48	0.3	0.7	0.56
Beta,Gross	1.01	< 0.344	3.62	0.597	1.6	3.8	< 0.336
Beta,Gross,Count Error	0.6	1	0.6	0.6	1.0	1.2	0.6
Radium 226	2J	1J	0.9J	2J	0.31	0.5	3J
Radium 226, Count Error	0.37	0.31	0.29	0.42	0.10	0.1	0.46
Radium 228	< 0.3	< 0.3	0.4UJ	< 0.3	< 0.3	0.6	0.4UJ
Radium 228, Count Error	0.4	0.4	0.4	0.4	0	0.2	0.4

Notes: NA = Not analyzed
UJ = Qualified, estimated not detected
J = Qualified, estimated value
R = Qaulified, not usable
< = Analyte reported below detection limit

Appendix D - Runway Area - Soil Samples in Fill Material - General Chemicals

Parameter Reported	M-106A-003 06/03/91 2.0 ft	M-107A-000 05/16/91 0.0 ft	M-107A-002 06/03/91 0.5 ft	M-108A-000 06/03/91 0.5 ft	M-108B-000 06/03/91 0.5 ft	M-37 (DUP) 06/03/91 0.5 ft	M-109A-000 05/16/91 0.0 ft
Physical Parameters-Lab							
% Solids (% Of Wet Wt	82.6	98.6	96.9	82.3	97.1	97.0	94.7
Moisture (% Wet Wt)	17.4	1.4	3.1	NA	NA	NA	5.3
Ph, (Std.Units)	8.3	NA	8.2	8.6	7.2	7.9	NA
Total Organic Carbon (% Dry Wt)							
Carbon,TOC,As %Om/1.724	0.116	NA	0.174	333	NA	NA	NA
Organic Content,Total At 440 C	0.2	NA	0.3	NA	NA	NA	NA
Asbestos (%)							
Asbestos,Total	NFAD	NA	NFAD	ND	NA	NA	NA
Radiochemicals (Pci/G-Dry)							
Alpha,Gross	1.1	3.5	2.5	< 0.6	1.1	1.6	0.5
Alpha,Gross, Count Error	0.48	0.77	0.62	0	0.8	0.9	0.75
Beta,Gross	< 0.363	2.8	0.516	2.0	4.5	5.0	1.67
Beta,Gross,Count Error	0.6	0.9	0.6	1.0	1.2	1.2	0.7
Radium 226	2J	2J	2J	0.64	0.4	0.4	5J
Radium 226, Count Error	0.4	0.5	0.43	0.14	0.1	0.1	0.72
Radium 228	< 0.3	< 0.3	< 0.3	< 0.3	< 0.2	< 0.2	< 0.3
Radium 228, Count Error	0.4	0.4	0.5	0	0	0	0.4

Notes: NA = Not analyzed
UJ = Qualified, estimated not detected
J = Qualified, estimated value
R = Qaulified, not usable
< = Analyte reported below detection lin

Appendix D - Runway Area - Soil Samples from Second Water-Bearing Zone - General Chemicals

Parameter Reported	M-104C-062 05/29/91 62.0 ft
Physical Parameters-Lab	
% Solids (% Of Wet Wt	81.4
Moisture (% Wet Wt)	18.6
Ph, (Std.Units)	8.9
Total Organic Carbon (% Dry Wt)	
Carbon,TOC,As %Om/1.724	0.348
Organic Content,Total At 440 C	0.6
Asbestos (%)	
Asbestos,Total	NFAD
Radiochemicals (Pci/G-Dry)	
Alpha,Gross	1.2
Alpha,Gross, Count Error	0.49
Beta,Gross	0.369
Beta,Gross,Count Error	0.6
Radium 226	3
Radium 226, Count Error	0.52
Radium 228	< 0.3
Radium 228, Count Error	0.4

Notes: NA = Not analyzed
UJ = Qualified, estimated not detected
J = Qualified, estimated value
R = Qaulified, not usable
< = Analyte reported below detection limit

Appendix D - Site 1 Disposal Area - Soil Samples in Fill Material- General Chemicals

Parameter Reported	M-001A-013 04/24/91 13.0 ft	M-001B-000 04/24/91 0.0 ft	M-001E-005 04/26/91 5.0 ft	M-002A-000 05/16/91 0.0 ft	Duplicate M-002A-000 05/16/91 0.0 ft	M-002A-006 05/23/91 6.0 ft	M-002E-022 05/23/91 22.0 ft
Physical Parameters-Lab							
% Solids (% Of Wet Wt	73.9	94.6	80.9	97.9	97.9	94.9	67.5
Moisture (% Wet Wt)	26.1	5.4	19.1	2.1	2.1	5.1	32.5
Ph (Std.Units)	7	NA	6.9	NA	NA	9.1	8.5
Total Organic Carbon (% Dry Wt)							
Carbon,TOC,As %Om/1.724	0.383	NA	3.36	NA	NA	< 0.058	0.116
Organic Content,Total At 440 C	0.7	NA	5.8	NA	NA	< 0.1	0.2
Asbestos (%)							
Asbestos,Total	NFAD	NA	6	NA	NA	NFAD	NFAD
Radiochemicals (Pci/G-Dry)							
Alpha,Gross	1.7	2.9	4.7	5.5	4.3	0.5	7
Alpha,Gross, Count Error	1.53	0.9	1.69	1.18	1.36	0.47	1.94
Beta,Gross	< 0.406	1.2	3	3.75	5.12	2.24	1.67
Beta,Gross, Count Error	2.8	0.9	1.9	0.8	0.8	0.7	1.1
Radium 226	< 0.1	0.1	0.1	4	3	8	9
Radium 226, Count Error	0.15	0.14	0.14	0.57	0.57	0.79	0.95
Radium 228	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Radium 228, Count Error	0.4	0.4	0.4	0.4	0.4	0.4	0.4

Notes: NA = Not analyzed
UJ = Qualified, estimated not detected
J = Qualified, estimated value
R = Qaulified, not usable
< = Analyte reported below detection limit

Appendix D - Site 1 Disposal Area - Soil Samples in Fill Material- General Chemicals

Parameter Reported	M-003A-000 05/17/91 0.0 ft	M-003A-005 05/23/91 5.0 ft	M-004A-000 05/17/91 0.0 ft	M-004A-004 05/28/91 2.0 ft	M-005A-000 05/17/91 0.0 ft	Duplicate M-005A-000 05/17/91 0.0 ft	M-005A-003 05/29/91 0.5 ft
Physical Parameters-Lab							
% Solids (% Of Wet Wt	98.8	85.3	97.5	75.5	98.7	98.8	96.9
Moisture (% Wet Wt)	1.2	14.7	2.5	24.5	1.3	1.2	3.1
Ph (Std.Units)	NA	9	NA	9.2	NA	NA	9
Total Organic Carbon (% Dry Wt)							
Carbon,TOC,As %Om/1.724	NA	0.116	NA	1.1	NA	NA	0.696
Organic Content,Total At 440 C	NA	0.2	NA	1.9	NA	NA	1.2
Asbestos (%)							
Asbestos,Total	NA	NFAD	NA	NFAD	NA	NA	NFAD
Radiochemicals (Pci/G-Dry)							
Alpha,Gross	4	2.8	2.8	3.6	2.8	3.1	1.4
Alpha,Gross, Count Error	1.12	0.79	0.97	1.72	0.81	0.91	0.72
Beta,Gross	2.74	0.739	2.74	1.19	3.41	2.84	0.413
Beta,Gross, Count Error	0.7	0.8	0.7	0.9	0.8	0.8	0.5
Radium 226	4	5	3	4	3	1UJ	2
Radium 226, Count Error	0.54	0.68	0.5	0.62	0.5	0.29	0.36
Radium 228	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Radium 228, Count Error	0.4	0.4	0.5	0.4	0.5	0.4	0.4

Notes: NA = Not analyzed
UJ = Qualified, estimated not detected
J = Qualified, estimated value
R = Qaulified, not usable
< = Analyte reported below detection lin

Appendix D - Site 1 Disposal Area - Soil Samples in Fill Material- General Chemicals

Parameter Reported	M-006A-000 05/17/91 0.0 ft	M-006A-005 05/29/91 2.5 ft	M-007A-000 05/17/91 0.0 ft	M-007A-004 05/29/91 1.0 ft	M-008A-000 05/17/91 0.0 ft	M-008A-004 05/29/91 0.5 ft	M-009A-000 05/16/91 0.0 ft
Physical Parameters-Lab							
% Solids (% Of Wet Wt	97.5	89.7	95.5	85.6	96.8	84.2	93.9
Moisture (% Wet Wt)	2.5	10.3	4.5	14.4	3.2	15.8	6.1
Ph (Std.Units)	NA	8.5	NA	9.1	NA	7.6	NA
Total Organic Carbon (% Dry Wt)							
Carbon,TOC,As %Om/1.724	NA	0.522	NA	0.348	NA	0.29	NA
Organic Content,Total At 440 C	NA	0.9	NA	0.6	NA	0.5	NA
Asbestos (%)							
Asbestos,Total	NA	NFAD	NA	NFAD	NA	NFAD	NA
Radiochemicals (Pci/G-Dry)							
Alpha,Gross	4.6	1.2	1.3	0.7	3.1	0.8	0.6
Alpha,Gross, Count Error	1.14	0.56	0.6	0.47	0.75	0.36	0.51
Beta,Gross	3.12	2.56	< 0.314	< 0.350	2.74	< 0.356	1.51
Beta,Gross, Count Error	0.8	0.8	0.8	0.5	0.9	0.6	0.6
Radium 226	2UJ	2	4	2	2UJ	3	2UJ
Radium 226, Count Error	0.35	0.43	0.61	0.42	0.49	0.46	0.45
Radium 228	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Radium 228, Count Error	0.5	0.4	0.5	0.4	0.5	0.4	0.5

Notes: NA = Not analyzed
UJ = Qualified, estimated not detected
J = Qualified, estimated value
R = Qaulified, not usable
< = Analyte reported below detection lin

Appendix D - Site 1 Disposal Area - Soil Samples in Fill Material- General Chemicals

Parameter Reported	M-009A-003 05/30/91 2.0 ft	M-025A-004 05/24/91 4.0 ft	M-025C-000 04/25/91 0.0 ft	M-025E-022 05/24/91 22.0 ft	M-026A-000 04/25/91 0.0 ft	M-026A-004 05/02/91 2.0 ft	M-026E-020 05/02/91 15.0 ft
Physical Parameters-Lab							
% Solids (% Of Wet Wt	88.2	92.5	91.8	80.8	95	89.9	83
Moisture (% Wet Wt)	11.8	7.5	8.2	19.2	5	10.1	17
Ph (Std.Units)	9.2	9.4	NA	9.5	NA	9.3	8.8
Total Organic Carbon (% Dry Wt)							
Carbon,TOC,As %Om/1.724	0.522	0.348	NA	0.696	NA	0.696	0.638
Organic Content,Total At 440 C	0.9	0.6	NA	1.2	NA	1.2	1.1
Asbestos (%)							
Asbestos,Total	NFAD	NFAD	NA	NFAD	NA	NFAD	NFAD
Radiochemicals (Pci/G-Dry)							
Alpha,Gross	1.5	2.1	1.4	1.9	0.9	3.3	0.8
Alpha,Gross, Count Error	0.57	0.65	0.72	0.62	0.61	0.89	0.41
Beta,Gross	< 0.340	0.432	1.86	< 0.371	0.989	0.867	0.542
Beta,Gross, Count Error	0.6	0.5	0.8	0.6	0.9	0.8	0.7
Radium 226	3	3	0.2	3	< 0.1	1UJ	1UJ
Radium 226, Count Error	0.54	0.52	0.16	0.53	0.13	0.33	0.28
Radium 228	< 0.3	< 0.3	< 0.3	1	< 0.3	0.3	< 0.3
Radium 228, Count Error	0.4	0.5	0.5	0.6	0.5	0.4	0.4

Notes: NA = Not analyzed
UJ = Qualified, estimated not detected
J = Qualified, estimated value
R = Qaulified, not usable
< = Analyte reported below detection lin

Appendix D - Site 1 Disposal Area - Soil Samples in Fill Material- General Chemicals

Parameter Reported	Duplicate M-026E-020 05/02/91 15.0 ft	M-027A-003 05/13/91 0.5 ft	M-027B-005 04/29/91 5.5 ft	M-027C-000 04/25/91 0.0 ft	M-027C-090 05/31/91 88.0 ft	M-027E-019 05/13/91 16.5 ft	M-028A-000 04/25/91 0.0 ft
Physical Parameters-Lab							
% Solids (% Of Wet Wt	80	93	82.5	94.7	78	78.6	98.7
Moisture (% Wet Wt)	20	7	17.5	5.3	22	21.4	1.3
Ph (Std.Units)	8.7	8.3	6.9	NA	8.7	9.4	NA
Total Organic Carbon (% Dry Wt)							
Carbon,TOC,As %Om/1.724	0.87	0.522	0.522	NA	0.812	0.348	NA
Organic Content,Total At 440 C	1.5	0.9	0.9	NA	1.4	0.6	NA
Asbestos (%)							
Asbestos,Total	NFAD	NFAD	NFAD	NA	NFAD	NFAD	NA
Radiochemicals (Pci/G-Dry)							
Alpha,Gross	4.5	2.6	1.6	1.8	3.2	1.9	1
Alpha,Gross, Count Error	0.94	0.82	0.78	0.87	1.03	0.66	0.52
Beta,Gross	3.9	0.774	1.79	1.13	1.15	< 0.636	0.314
Beta,Gross, Count Error	0.9	0.7	0.7	1	0.9	0.8	0.6
Radium 226	1UJ	2	2UJ	0.2	7	0.9UJ	0.2
Radium 226, Count Error	0.33	0.39	0.37	0.14	0.76	0.33	0.16
Radium 228	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Radium 228, Count Error	0.4	0.6	0.4	0.5	0.4	0.5	0.4

Notes: NA = Not analyzed
UJ = Qualified, estimated not detected
J = Qualified, estimated value
R = Qaulified, not usable
< = Analyte reported below detection lin

Parameter Reported	M-028A-007 04/30/91 2.5 ft	M-028E-006 05/01/91 3.0 ft	M-029A-000 04/24/91 0.0 ft	M-029A-004 04/29/91 4.0 ft	M-029E-002 04/29/91 2.0 ft
Physical Parameters-Lab					
% Solids (% Of Wet Wt	84.8	76.7	91.8	91.2	93.2
Moisture (% Wet Wt)	15.2	23.3	8.2	8.8	6.8
Ph (Std.Units)	8.4	7.1	NA	7.5	7.9
Total Organic Carbon (% Dry Wt)					
Carbon,TOC,As %Om/1.724	1.16	1.28	NA	0.754	< 0.290
Organic Content,Total At 440 C	2	2.2	NA	1.3	< 0.5
Asbestos (%)					
Asbestos,Total	NFAD	6	NA	TRACE	NFAD
Radiochemicals (Pci/G-Dry)					
Alpha,Gross	6.8	2.3	1.2	1.5	1.9
Alpha,Gross, Count Error	2.7	3.65	0.88	1.55	0.7
Beta,Gross	3.16	4.58	2.43	1.13	1.59
Beta,Gross, Count Error	3	5.7	1.1	2.2	0.7
Radium 226	< 0.1	9	0.2	1UJ	< 0.1
Radium 226, Count Error	0.16	0.79	0.14	0.34	0.11
Radium 228	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Radium 228, Count Error	0.5	0.4	0.5	0.4	0.4

Notes: NA = Not analyzed
UJ = Qualified, estimated not detected
J = Qualified, estimated value
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Parameter Reported	M-001B-057 05/10/91 57.0 ft	M-007C-078 06/03/91 78.0 ft	Duplicate M-007C-078 06/03/91 78.0 ft	M-025C-080 05/22/91 80.0 ft	M-027C-090 05/31/91 88.0 ft
Physical Parameters-Lab					
% Solids (% Of Wet Wt	82.6	79.8	83.4	85.4	78
Moisture (% Wet Wt)	17.4	20.2	16.6	14.6	22
Ph (Std.Units)	6.2	7.3	8.3	8	8.7
Total Organic Carbon (% Dry Wt)					
Carbon,TOC,As %Om/1.724	< 0.290	0.406	0.464	0.116	0.812
Organic Content,Total At 440 C	< 0.5	0.7	0.8	0.2	1.4
Asbestos (%)					
Asbestos,Total	NFAD	NFAD	NFAD	NFAD	NFAD
Radiochemicals (Pci/G-Dry)					
Alpha,Gross	1	1.6	2.3	5.7	3.2
Alpha,Gross, Count Error	0.73	0.63	0.72	1.41	1.03
Beta,Gross	< 0.605	0.501	1.44	4.92	1.15
Beta,Gross, Count Error	1.2	0.6	0.7	0.9	0.9
Radium 226	2UJ	4	3	3	7J
Radium 226, Count Error	0.52	0.63	0.6	0.54	0.76
Radium 228	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Radium 228, Count Error	0.4	0.4	0.4	0.4	0.4

Notes: NA = Not analyzed
UJ = Qualified, estimated not detected
J = Qualified, estimated value
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< = Analyte reported below detection limit

Appendix D - Site 2 West Beach Landfill - Wetland Sediment Samples - General Chemical

Parameter Reported	301SD 05/31/91 0.0 ft	302SD 05/31/91 0.0 ft	303SD 05/31/91 0.0 ft	304SD 05/31/91 0.0 ft	305SD 05/31/91 0.0 ft	306SD 05/30/91 0.0 ft	307SD 05/30/91 0.0 ft	308SD 05/30/91 0.0 ft	309SD 05/30/91 0.0 ft
Physical Parameters-Lab									
% Solids (% Of Wet Wt)	81.2	59.3	65	52.7	53.3	72.9	52.9	75.9	50
Moisture (% Wet Wt)	18.8	40.7	35	47.3	46.7	27.1	47.1	24.1	50
Total Organic Carbon (% Dry Wt)									
Carbon,TOC,As %Om/1.724	0.58	1.74	1.97	2.49	2.44	0.986	3.36	0.812	2.96
Organic Content,Total At 440 C	1.0	3.0	3.4	4.3	4.2	1.7	5.8	1.4	5.1

Appendix D - Site 2 West Beach Landfill - Wetland Sediment Samples - General Chemical

Parameter Reported	310SD 05/30/91 0.0 ft	Duplicate 310SD 05/30/91 0.0 ft	311SD 05/30/91 0.0 ft	312SD 05/30/91 0.0 ft	Count	Max	Min
Physical Parameters-Lab							
% Solids (% Of Wet Wt)	55.3	50.4	77.2	52.3	13	81.2	50
Moisture (% Wet Wt)	44.7	49.6	22.8	47.7	13	50	18.8
Total Organic Carbon (% Dry Wt)							
Carbon,TOC,As %Om/1.724	3.02	4.29	0.232	1.39	13	4.29	0.232
Organic Content,Total At 440 C	5.2	7.4	0.4	2.4	13	7.4	0.4

Appendix D - Site 2 West Beach Landfill - Surface Soil Samples - General Chemicals

Parameter Reported	A-201 05/06/91 0.0 ft	A-202 05/06/91 0.0 ft	Resample A-202 05/28/91 0.0 ft	A-203 05/06/91 0.0 ft	Resample A-203 05/28/91 0.0 ft	A-204 05/07/91 0.0 ft	A-205 05/07/91 0.0 ft	A-206 05/07/91 0.0 ft	A-207 05/07/91 0.0 ft	A-208 05/07/91 0.0 ft
Physical Parameters-Lab										
% Solids (% Of Wet Wt	98.1	98.7	NA	82.9	NA	97.8	91.1	97	90.7	94.2
Moisture (% Wet Wt)	1.9	1.3	0.6	17.1	1.2	2.2	8.9	3	9.3	5.8
Radiochemicals (Pci/G-Dry)										
Alpha,Gross	1.9	3	NA	2.8	NA	2.5	1.9	1.4	1.8	2
Alpha,Gross, Count Error	0.94	1.17	NA	0.94	NA	0.64	0.58	0.47	0.6	0.56
Beta,Gross	0.479	3	NA	2.53	NA	1.11	2.39	0.659	1.69	1.11
Beta,Gross, Count Error	1	1.4	NA	1.2	NA	0.6	0.6	0.6	0.7	0.5
Radium 226	2UJ	2UJ	NA	1UJ	NA	3	2	1UJ	2	2
Radium 226, Count Error	0.36	0.39	NA	0.32	NA	0.46	0.41	0.31	0.4	0.39
Radium 228	0.8	0.4	NA	0.4	NA	0.3	0.5	< 0.3	< 0.3	0.4
Radium 228, Count Error	0.4	0.4	NA	0.4	NA	0.4	0.5	0.5	0.4	0.4

Notes: NA = Not analyzed
UJ = Qualified, estimated not detected
J = Qualified, estimated value
R = Qualified, not usable
< = Analyte reported below detection limit

Parameter Reported	Duplicate A-208 05/07/91 0.0 ft	A-209 05/07/91 0.0 ft	A-210 05/07/91 0.0 ft	B-201 05/07/91 0.0 ft	B-202 05/07/91 0.0 ft	B-203 05/07/91 0.0 ft	B-204 05/07/91 0.0 ft	B-205 05/07/91 0.0 ft	B-206 05/07/91 0.0 ft	B-207 05/07/91 0.0 ft
Physical Parameters-Lab										
% Solids (% Of Wet Wt	95.2	87.8	92	92.9	88.1	92.3	83.9	92.2	92.8	94.9
Moisture (% Wet Wt)	4.8	12.2	8	7.1	11.9	7.7	16.1	7.8	7.2	5.1
Radiochemicals (Pci/G-Dry)										
Alpha,Gross	1.3	1.2	1.4	2.7	3.3	3.1	5.6	2.5	7.3	2.6
Alpha,Gross, Count Error	0.53	0.47	0.51	0.86	1.02	1.19	2.15	1.08	2.26	0.95
Beta,Gross	1.58	1.2	1.11	0.538	2.95	2.93	6.08	2.17	2.69	1.48
Beta,Gross, Count Error	0.6	0.5	0.6	0.6	0.8	0.9	1.1	0.8	0.9	0.7
Radium 226	1UJ	1UJ	2	2	2	2	3	2	1UJ	1UJ
Radium 226, Count Error	0.3	0.34	0.46	0.47	0.39	0.42	0.52	0.38	0.3	0.31
Radium 228	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	0.4	< 0.3	< 0.3	< 0.3
Radium 228, Count Error	0.3	0.4	0.5	0.5	0.4	0.5	0.5	0.5	0.4	0.4

Notes: NA = Not analyzed
UJ = Qualified, estimated not de
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Appendix D - Site 2 West Beach Landfill - Surface Soil Samples - General Chemicals

Parameter Reported	B-208 05/07/91 0.0 ft	B-209 05/07/91 0.0 ft	Duplicate B-209 05/07/91 0.0 ft	B-210 05/07/91 0.0 ft	C-200 05/07/91 0.0 ft	C-201 05/07/91 0.0 ft	C-202 05/07/91 0.0 ft	C-203 05/07/91 0.0 ft	Duplicate C-203 05/07/91 0.0 ft	C-204 05/07/91 0.0 ft
Physical Parameters-Lab										
% Solids (% Of Wet Wt	93.3	92.4	89.6	99.4	90	98.2	94.6	96.8	97.5	91.2
Moisture (% Wet Wt)	6.7	7.6	10.4	0.6	10	1.8	5.4	3.2	2.5	8.8
Radiochemicals (Pci/G-Dry)										
Alpha,Gross	10.9	2.2	3.1	1.2	4.1	5	1	4	3	2
Alpha,Gross, Count Error	1.61	0.76	0.89	0.4	1.44	1.02	0.74	1.34	0.98	0.88
Beta,Gross	3.64	< 0.541	3.24	0.503J	5	2.75	2.85	3.72	2.8	2.85
Beta,Gross, Count Error	0.9	0.6	0.8	0.5	1	0.8	0.6	0.8	0.8	0.7
Radium 226	1UJ	2	4	2	4	2UJ	4	5	2	4
Radium 226, Count Error	0.31	0.4	0.65	0.39	0.67	0.42	0.66	0.66	0.38	0.67
Radium 228	< 0.3	< 0.3	0.3UJ	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Radium 228, Count Error	0.4	0.5	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4

Notes: NA = Not analyzed
UJ = Qualified, estimated not de
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< = Analyte reported below dete

Parameter Reported	C-205 05/07/91 0.0 ft	C-206 05/07/91 0.0 ft	C-207 05/07/91 0.0 ft	C-208 05/07/91 0.0 ft	C-209 05/07/91 0.0 ft	C-210 05/07/91 0.0 ft	D-200 05/08/91 0.0 ft	D-201 05/08/91 0.0 ft	D-202 05/08/91 0.0 ft	D-203 05/08/91 0.0 ft
Physical Parameters-Lab										
% Solids (% Of Wet Wt	93.3	97.4	91.2	91.5	96.1	98.3	97.1	94.7	99.1	95
Moisture (% Wet Wt)	6.7	2.6	8.8	8.5	3.9	1.7	2.9	5.3	0.9	5
Radiochemicals (Pci/G-Dry)										
Alpha,Gross	2.4	1.6	3.7	5	1.6	2.1	2.6	1.9	2.1	2.1
Alpha,Gross, Count Error	0.86	0.62	1.54	1.31	0.52	0.61	1.13	0.63	0.81	0.84
Beta,Gross	1.07	2.16	4.39	1.2	< 0.520	< 0.509	0.721	0.528	1.01	2.42
Beta,Gross, Count Error	0.9	0.6	0.9	0.8	0.5	0.6	0.7	0.6	0.5	0.6
Radium 226	3UJ	5	4	4	2	2	4	4	3	3
Radium 226, Count Error	0.57	0.72	0.58	0.61	0.42	0.43	0.54	0.6	0.41	0.46
Radium 228	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Radium 228, Count Error	0.5	0.5	0.4	0.4	0.4	0.4	0.5	0.5	0.4	0.4

Notes: NA = Not analyzed
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Appendix D - Site 2 West Beach Landfill - Surface Soil Samples - General Chemicals

Parameter Reported	D-204 05/08/91 0.0 ft	D-205 05/08/91 0.0 ft	Duplicate D-205 05/08/91 0.0 ft	D-206 05/08/91 0.0 ft	D-207 05/08/91 0.0 ft	D-208 05/08/91 0.0 ft	D-209 05/08/91 0.0 ft	D-210 05/08/91 0.0 ft	E-200 05/09/91 0.0 ft	E-201 05/09/91 0.0 ft
Physical Parameters-Lab										
% Solids (% Of Wet Wt	92.9	96.9	96.4	95.4	93	94.7	91.7	98.4	92.8	93.8
Moisture (% Wet Wt)	7.1	3.1	3.6	4.6	7	5.3	8.3	1.6	7.2	6.2
Radiochemicals (Pci/G-Dry)										
Alpha,Gross	3	2.4	1.2	2.3	1.2	1.1	1	2.7	2.9	2
Alpha,Gross, Count Error	1.08	0.72	0.61	0.84	0.65	0.42	0.55	0.71	0.88	0.71
Beta,Gross	2.05	< 0.516	1.06	1.15	2.8	1.16	2.73	1.73	2.32J	1.49
Beta,Gross, Count Error	0.6	0.6	0.6	0.6	0.6	0.5	0.8	0.6	0.8	0.7
Radium 226	3	3	1UJ	3	4	3	2	3	2UJ	2UJ
Radium 226, Count Error	0.5	0.49	0.34	0.46	0.65	0.49	0.43	0.45	0.34	0.36
Radium 228	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Radium 228, Count Error	0.4	0.4	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.4

Notes: NA = Not analyzed
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J = Qualified, estimated value
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< = Analyte reported below det

Parameter Reported	E-201 05/28/91 0.0 ft	E-202 05/09/91 0.0 ft	E-203 05/09/91 0.0 ft	E-204 05/09/91 0.0 ft	E-205 05/09/91 0.0 ft	Duplicate E-205 05/09/91 0.0 ft	E-206 05/09/91 0.0 ft	E-207 05/09/91 0.0 ft	E-208 05/09/91 0.0 ft	E-209 05/09/91 0.0 ft
Physical Parameters-Lab										
% Solids (% Of Wet Wt	NA	96.7	92.7	87.5	91.2	88.8	94.2	90.1	96.3	92.1
Moisture (% Wet Wt)	7.6	3.3	7.3	12.5	8.8	11.2	5.8	9.9	3.7	7.9
Radiochemicals (Pci/G-Dry)										
Alpha,Gross	NA	3	3.9	4.2	5.2	3.3	3.5	4.3	2.3	2.9
Alpha,Gross, Count Error	NA	0.79	1.53	1.61	2.14	1.63	0.97	1.11	0.92	0.93
Beta,Gross	NA	2.64	4.03	5.14	5.41	6.88	2.98	4.59	2.47	2.88
Beta,Gross, Count Error	NA	0.8	0.9	0.9	0.9	1.1	0.7	0.9	0.8	0.8
Radium 226	NA	3	2UJ	3UJ	5	3UJ	6	5	5	6
Radium 226, Count Error	NA	0.49	0.33	0.46	0.7	0.53	0.8	0.8	0.72	0.8
Radium 228	NA	0.3	< 0.3	< 0.3	0.7UJ	< 0.3	1UJ	0.5UJ	0.8UJ	< 0.3
Radium 228, Count Error	NA	0.4	0.4	0.4	0.3	0.5	0.3	0.3	0.3	0.3

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Appendix D - Site 2 West Beach Landfill - Surface Soil Samples - General Chemicals

Parameter Reported	E-210 05/08/91 0.0 ft	F-200 05/09/91 0.0 ft	F-201 05/09/91 0.0 ft	F-202 05/09/91 0.0 ft	Duplicate F-202 05/09/91 0.0 ft	F-203 05/09/91 0.0 ft	F-204 05/09/91 0.0 ft	F-205 05/09/91 0.0 ft	F-206 05/09/91 0.0 ft	F-207 05/09/91 0.0 ft
Physical Parameters-Lab										
% Solids (% Of Wet Wt	97.7	89.4	74.5	82.4	82.8	94.9	85.1	89.1	96.5	92.4
Moisture (% Wet Wt)	2.3	10.6	25.5	17.6	17.2	5.1	14.9	10.9	3.5	7.6
Radiochemicals (Pci/G-Dry)										
Alpha,Gross	1.5	1UJ	3.1	2.2	1.3	2.2	4.5	6.4	1.9	1.9
Alpha,Gross, Count Error	0.6	0.56	0.94	0.7	0.57	0.66	1.52	1.59	0.64	0.71
Beta,Gross	1.22	1.97	1.3	< 0.364	< 0.362	1.26	3.38	3.4	0.881	2.24
Beta,Gross, Count Error	0.6	0.6	0.9	0.7	0.6	0.7	0.9	0.8	0.7	0.7
Radium 226	4	3UJ	3	3	3UJ	4	4	4	3	4
Radium 226, Count Error	0.58	0.54	0.62	0.61	0.58	0.57	0.71	0.7	0.51	0.7
Radium 228	< 0.3	0.4	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	0.5UJ	< 0.3	< 0.3
Radium 228, Count Error	0.4	0.4	0.3	0.3	0.4	0.4	0.3	0.3	0.3	0.3

Notes: NA = Not analyzed
UJ = Qualified, estimated not de
J = Qualified, estimated value
R = Qualified, not usable
< = Analyte reported below dete

Parameter Reported	F-208 05/09/91 0.0 ft	F-209 05/09/91 0.0 ft	F-210 05/09/91 0.0 ft	G-200 05/10/91 0.0 ft	G-201 05/10/91 0.0 ft	G-202 05/10/91 0.0 ft	G-203 05/10/91 0.0 ft	G-204 05/10/91 0.0 ft	G-205 05/10/91 0.0 ft	G-206 05/10/91 0.0 ft
Physical Parameters-Lab										
% Solids (% Of Wet Wt	89.8	97.4	94.5	98.1	82.1	67.4	64.5	92.9	89	84.5
Moisture (% Wet Wt)	10.2	2.6	5.5	1.9	17.9	32.6	35.5	7.1	11	15.5
Radiochemicals (Pci/G-Dry)										
Alpha,Gross	3.4	1.7	2.8	3.2	3.9	9.2	8.3	3.6	3.9	6.6
Alpha,Gross, Count Error	1.12	0.61	0.8	0.91	1.71	3.68	4.68	1.09	1.19	2
Beta,Gross	3.22	1.33	1.47	1.95	5.54	8.78	9.38	2.33	3.08	5.5
Beta,Gross, Count Error	0.8	0.6	0.7	0.7	0.9	1.5	1.7	0.7	0.8	0.9
Radium 226	5	3	3	3	3	3	4	2	3	4
Radium 226, Count Error	0.75	0.64	0.56	0.46	0.62	0.62	0.68	0.43	0.52	0.57
Radium 228	0.4UJ	0.3UJ	0.6UJ	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Radium 228, Count Error	0.3	0.3	0.3	0.5	0.4	0.3	0.3	0.3	0.3	0.3

Notes: NA = Not analyzed
UJ = Qualified, estimated not de
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< = Analyte reported below dete

Appendix D - Site 2 West Beach Landfill - Surface Soil Samples - General Chemicals

Parameter Reported	G-207 05/10/91 0.0 ft	G-208 05/09/91 0.0 ft	Duplicate G-208 05/09/91 0.0 ft	G-209 05/09/91 0.0 ft	G-210 05/09/91 0.0 ft	H-200 05/10/91 0.0 ft	H-201 05/10/91 0.0 ft	H-202 05/10/91 0.0 ft	H-203 05/10/91 0.0 ft	H-204 05/10/91 0.0 ft
Physical Parameters-Lab										
% Solids (% Of Wet Wt	98.2	98.3	98.2	98.7	96.1	98.1	70	65.7	75.7	61.3
Moisture (% Wet Wt)	1.8	1.7	1.8	1.3	3.9	1.9	30	34.3	24.3	38.7
Radiochemicals (Pci/G-Dry)										
Alpha,Gross	2.1	1.7	1.5	1.9	1.2	1.3	3.5	5.8	14.1	13.8
Alpha,Gross, Count Error	0.68	0.57	0.51	0.66	0.57	0.75	2.34	2.02	4.02	4.73
Beta,Gross	0.916	0.366	0.916	1.57	0.739	0.795	6.47	5.53	10.4	12.5
Beta,Gross, Count Error	0.6	0.6	0.5	0.6	0.7	0.7	1.1	1.1	1.4	1.9
Radium 226	1UJ	2	4	2	2	2	5	5	6	5
Radium 226, Count Error	0.36	0.32	0.54	0.39	0.41	0.4	0.71	0.84	0.7	0.75
Radium 228	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Radium 228, Count Error	0.3	0.3	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.3

Notes: NA = Not analyzed
UJ = Qualified, estimated not d
J = Qualified, estimated value
R = Qualified, not usable
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Parameter Reported	H-205 05/10/91 0.0 ft	H-206 05/10/91 0.0 ft	H-207 05/10/91 0.0 ft	H-208 05/10/91 0.0 ft	H-209 05/10/91 0.0 ft	H-210 05/10/91 0.0 ft	Duplicate H-210 05/10/91 0.0 ft	I-200 05/13/91 0.0 ft	I-201 05/13/91 0.0 ft	I-202 05/13/91 0.0 ft
Physical Parameters-Lab										
% Solids (% Of Wet Wt	83.6	96.3	92.1	90.1	96.7	95.8	95.5	92.3	71.7	82.7
Moisture (% Wet Wt)	16.4	3.7	7.9	9.9	3.3	4.2	4.5	7.7	28.3	17.3
Radiochemicals (Pci/G-Dry)										
Alpha,Gross	8.8	3.2	6	6.9	2.7	7.1	3.7	0.8	4.6	6.8
Alpha,Gross, Count Error	2.89	0.84	1.32	2.94	0.91	2.65	0.94	0.86	1.53	2.2
Beta,Gross	7.89	4.25	3.87	7.14	2.77	5.28	2.09	2.69	3.49	5
Beta,Gross, Count Error	1.2	0.9	1.1	0.9	0.8	0.8	0.7	0.7	1	1.1
Radium 226	4	3	2	5	1UJ	2	3UJ	4UJ	12	2
Radium 226, Count Error	0.56	0.46	0.45	0.69	0.3	0.39	0.64	0.7	1.35	0.41
Radium 228	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Radium 228, Count Error	0.3	0.3	0.3	0.3	0.2	0.4	0.4	0.4	0.4	0.6

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Appendix D - Site 2 West Beach Landfill - Surface Soil Samples - General Chemicals

Parameter Reported	I-203 05/13/91 0.0 ft	I-204 05/13/91 0.0 ft	I-205 05/13/91 0.0 ft	I-206 05/13/91 0.0 ft	I-207 05/13/91 0.0 ft	I-208 05/13/91 0.0 ft	Duplicate I-208 05/13/91 0.0 ft	I-209 05/13/91 0.0 ft	I-210 05/13/91 0.0 ft	J-200 05/13/91 0.0 ft
Physical Parameters-Lab										
% Solids (% Of Wet Wt	79.9	83.7	81.3	87.5	95.6	95.7	96.7	94.7	95.4	93
Moisture (% Wet Wt)	20.1	16.3	18.7	12.5	4.4	4.3	3.3	5.3	4.6	7
Radiochemicals (Pci/G-Dry)										
Alpha,Gross	13.6	7	6.8	5.3	1.2	2	2.2	1.3	1.9	1.3
Alpha,Gross, Count Error	3.38	2.75	1.97	1.26	0.52	0.63	0.79	0.74	0.73	0.86
Beta,Gross	6.01	7.29	5.9	4.11	1.15	1.12	1.99	1.9	1.15	0.753
Beta,Gross, Count Error	1.4	1.3	1	1	0.6	0.7	0.7	0.7	0.7	0.8
Radium 226	9	8	10	3	4	0.6UJ	2	4	3	4
Radium 226, Count Error	1.08	0.88	1.11	0.47	0.52	0.21	0.39	0.54	0.5	0.6
Radium 228	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Radium 228, Count Error	0.4	0.4	0.4	0.4	0.4	0.6	0.5	0.4	0.4	0.4

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UJ = Qualified, estimated not de
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Parameter Reported	J-201 05/13/91 0.0 ft	Duplicate J-201 05/13/91 0.0 ft	J-202 05/13/91 0.0 ft	J-204 05/13/91 0.0 ft	J-205 05/13/91 0.0 ft	J-206 05/13/91 0.0 ft	J-207 05/13/91 0.0 ft	J-208 05/13/91 0.0 ft	J-209 05/13/91 0.0 ft	J-210 05/13/91 0.0 ft
Physical Parameters-Lab										
% Solids (% Of Wet Wt	75.6	74.3	74.2	77.4	71.1	80.1	87.2	94.6	92	86.2
Moisture (% Wet Wt)	24.4	25.7	25.8	22.6	28.9	19.9	12.8	5.4	8	13.8
Radiochemicals (Pci/G-Dry)										
Alpha,Gross	2.1	9.3	2.4	3.5	6.6	2.9	2.4	3.6	3	4.6
Alpha,Gross, Count Error	0.79	2.83	0.94	1.03	2.57	0.87	0.92	1.16	0.87	1.62
Beta,Gross	3.57	5.38	4.31	5.04	7.57	7.37	3.9	2.96	0.543	3.02
Beta,Gross, Count Error	0.9	1.3	1.1	0.9	1.6	1	0.8	0.7	0.7	0.9
Radium 226	3	4	5	3	3	3	3	2	3	3
Radium 226, Count Error	0.48	0.71	0.69	0.56	0.53	0.52	0.52	0.45	0.52	0.43
Radium 228	< 0.3	< 0.3	0.5UJ	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Radium 228, Count Error	0.4	0.4	0.4	0.4	0.5	0.5	0.4	0.4	0.4	0.4

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Appendix D - Site 2 West Beach Landfill - Surface Soil Samples - General Chemicals

Parameter Reported	K-200 05/14/91 0.0 ft	K-201 05/14/91 0.0 ft	K-202 05/14/91 0.0 ft	K-203 05/14/91 0.0 ft	K-204 05/14/91 0.0 ft	K-205 05/14/91 0.0 ft	K-206 05/14/91 0.0 ft	K-207 05/14/91 0.0 ft	K-208 05/14/91 0.0 ft	K-209 05/14/91 0.0 ft
Physical Parameters-Lab										
% Solids (% Of Wet Wt	87.2	96.4	96.6	95.1	96.9	83.6	83.7	88.8	96.6	95.8
Moisture (% Wet Wt)	12.8	3.6	3.4	4.9	3.1	16.4	16.3	11.2	3.4	4.2
Radiochemicals (Pci/G-Dry)										
Alpha,Gross	2.9	2.9	2	1.6	1.8	6.6	1.9	2.4	2.3	1.5
Alpha,Gross, Count Error	0.92	0.73	0.68	0.53	0.62	2.03	0.84	0.79	0.75	0.63
Beta,Gross	0.459	< 0.311	1.35	< 0.315	< 0.310	3.83	1.08	2.14	1.83	1.25
Beta,Gross, Count Error	0.7	0.6	0.6	0.6	0.6	0.8	0.7	0.7	0.7	0.7
Radium 226	3	2	2	2	4	13	10	7	3	7
Radium 226, Count Error	0.46	0.34	0.4	0.39	0.73	1.3	1.18	0.9	0.46	0.94
Radium 228	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Radium 228, Count Error	0.4	0.5	0.5	0.4	0.4	0.4	0.4	0.4	0.6	0.4

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Parameter Reported	Duplicate K-209 05/14/91 0.0 ft	K-210 05/15/91 0.0 ft	L-200 05/14/91 0.0 ft	L-201 05/14/91 0.0 ft	L-202 05/14/91 0.0 ft	L-203 05/14/91 0.0 ft	L-204 05/14/91 0.0 ft	Duplicate L-204 05/14/91 0.0 ft	L-205 05/14/91 0.0 ft
Physical Parameters-Lab									
% Solids (% Of Wet Wt	83.1	95	94.6	78	96	97	92.8	94.7	91.9
Moisture (% Wet Wt)	16.9	5	5.4	22	4	3	7.2	5.3	8.1
Radiochemicals (Pci/G-Dry)									
Alpha,Gross	3	2.4	1.1	< 0.4	1.4	1.5	0.6	0.8	1
Alpha,Gross, Count Error	0.96	0.63	0.53	2.18	0.42	0.62	0.43	0.42	0.54
Beta,Gross	< 0.361	0.632	1.9	< 0.385	3.54	< 0.309	0.431	< 0.317	< 0.326
Beta,Gross, Count Error	0.7	0.5	0.7	0.8	0.7	0.7	0.8	0.6	0.5
Radium 226	3UJ	4	4	8	4	4	3UJ	5	4
Radium 226, Count Error	0.6	0.69	0.57	1	0.65	0.61	0.53	0.73	0.7
Radium 228	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Radium 228, Count Error	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4

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Appendix D - Site 2 West Beach Landfill - Surface Soil Samples - General Chemicals

Parameter Reported	L-206 05/14/91 0.0 ft	L-207 05/14/91 0.0 ft	L-208 05/14/91 0.0 ft	L-209 05/14/91 0.0 ft	L-210 05/15/91 0.0 ft	M-201 05/15/91 0.0 ft	M-202 05/15/91 0.0 ft	M-203 05/15/91 0.0 ft	M-204 05/15/91 0.0 ft
Physical Parameters-Lab									
% Solids (% Of Wet Wt	89.4	60.8	96.9	88.6	93.4	89.9	95.5	92.1	83.7
Moisture (% Wet Wt)	10.6	39.2	3.1	11.4	6.6	10.1	4.5	7.9	16.3
Radiochemicals (Pci/G-Dry)									
Alpha,Gross	3.4	4.1	0.8	3.2	1.2	1.2	0.8	3.1	2.3
Alpha,Gross, Count Error	1.12	1.65	0.93	1.13	0.86	1.11	0.63	0.87	0.62
Beta,Gross	0.895	3.49	0.619	1.24	1.39	3.23	0.628	0.543	< 0.597
Beta,Gross, Count Error	0.8	1.1	0.6	0.7	0.6	0.9	0.6	0.7	0.7
Radium 226	2UJ	2	2UJ	4	4	7	4	6	2J
Radium 226, Count Error	0.48	0.54	0.38	0.64	0.71	0.98	0.68	0.77	0.44
Radium 228	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	0.5UJ	0.5UJ	< 0.3
Radium 228, Count Error	0.4	0.5	0.4	0.4	0.5	0.5	0.4	0.4	0.5

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Parameter Reported	M-205 05/15/91 0.0 ft	M-206 05/15/91 0.0 ft	M-207 05/15/91 0.0 ft	Duplicate M-207 05/15/91 0.0 ft	M-208 05/15/91 0.0 ft	M-209 05/15/91 0.0 ft	M-210 05/15/91 0.0 ft	N-200 05/15/91 0.0 ft	N-201 05/15/91 0.0 ft
Physical Parameters-Lab									
% Solids (% Of Wet Wt	87.7	84.6	60.6	86.4	94.6	82.5	87.5	96.1	98
Moisture (% Wet Wt)	12.3	15.4	39.4	13.6	5.4	17.5	12.5	3.9	2
Radiochemicals (Pci/G-Dry)									
Alpha,Gross	1.5	1.8	4.8	1.7	3	5.7	3.1	0.6	2
Alpha,Gross, Count Error	0.68	0.59	4.46	0.58	0.85	1.94	1.37	0.73	1.02
Beta,Gross	< 0.342	< 0.355	5.78	< 0.347	< 0.317	5.7	2.29	0.624	< 0.306
Beta,Gross, Count Error	0.6	0.6	1.3	0.6	0.6	1.1	0.9	0.6	0.6
Radium 226	4	3J	7	4	6	2	7	7	4UJ
Radium 226, Count Error	0.68	0.67	1.07	0.59	0.77	0.42	0.95	0.94	0.61
Radium 228	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Radium 228, Count Error	0.4	0.5	0.4	0.5	0.3	0.6	0.4	0.4	0.4

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Appendix D - Site 2 West Beach Landfill - Surface Soil Samples - General Chemicals

Parameter Reported	Duplicate N-201 05/15/91 0.0 ft	N-202 05/15/91 0.0 ft	N-203 05/15/91 0.0 ft	N-204 05/15/91 0.0 ft	N-205 05/16/91 0.0 ft	N-206 05/16/91 0.0 ft	N-207 05/16/91 0.0 ft	Duplicate N-207 05/16/91 0.0 ft	N-208 05/16/91 0.0 ft
Physical Parameters-Lab									
% Solids (% Of Wet Wt	98	90.7	97.4	96.2	96.5	96	98.2	98.5	98.7
Moisture (% Wet Wt)	2	9.3	2.6	3.8	3.5	4	1.8	1.5	1.3
Radiochemicals (Pci/G-Dry)									
Alpha,Gross	2.2	2.9	3.1	2	2.3	1.8	4	2.1	4.2
Alpha,Gross, Count Error	0.92	1.32	1.03	0.62	0.83	0.63	1.22	0.91	1.01
Beta,Gross	1.02	2.43	2.01	0.624	0.415	0.417	0.305	< 0.305	< 0.304
Beta,Gross, Count Error	0.8	0.8	0.7	0.6	0.6	0.6	0.8	0.7	0.6
Radium 226	6	5	2	5	9	4UJ	4UJ	2UJ	2UJ
Radium 226, Count Error	0.83	0.88	0.41	0.76	1.04	0.6	0.64	0.41	0.52
Radium 228	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Radium 228, Count Error	0.4	0.4	0.5	0.4	0.4	0.4	0.4	0.5	0.4

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Parameter Reported	N-209 05/16/91 0.0 ft	N-210 05/16/91 0.0 ft
Physical Parameters-Lab		
% Solids (% Of Wet Wt	97.9	99.2
Moisture (% Wet Wt)	2.1	0.8
Radiochemicals (Pci/G-Dry)		
Alpha,Gross	0.5	3.1
Alpha,Gross, Count Error	0.51	0.81
Beta,Gross	< 0.306	0.302
Beta,Gross, Count Error	0.5	0.6
Radium 226	2UJ	3
Radium 226, Count Error	0.51	0.49
Radium 228	< 0.3	< 0.3
Radium 228, Count Error	0.4	0.6

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Parameter Reported	M-011A-000 05/16/91 0.0 ft	M-011A-004 05/28/91 2.0 ft	M-012B-000 12/1/90 0.5 ft	M-013A-003 05/28/91 1.5 ft	M-013C-000 05/16/91 0.0 ft	M-014B-000 12/1/90 0.5 ft	M-015A-000 05/16/91 0.0 ft
Physical Parameters-Lab							
% Solids (% Of Wet Wt)	98.2	89.7	98.4	90.8	98.3	99.1	96.8
Moisture (% Wet Wt)	1.8	10.3	NA	9.2	1.7	NA	3.2
Ph (Std.Units)	NA	8.7	7.4	7.6	NA	6.3	NA
Total Organic Carbon (% Dry Wt)							
Carbon,TOC,As %Om/1.724	NA	0.29	NA	0.232	NA	NA	NA
Organic Content,Total At 440 C	NA	0.5	NA	0.4	NA	NA	NA
Asbestos (%)							
Asbestos,Total	NA	NFAD	NA	NFAD	NA	NA	NA
Radiochemicals (Pci/G-Dry)							
Alpha,Gross	3.9	2.5	< 0.6	2.2	1.1	1.5	1.4
Alpha,Gross, Count Error	0.84	0.67	0	0.55	0.54	0.8	0.61
Beta,Gross	0.764	5.57	1.7	0.661	< 0.305	1.0	0.713
Beta,Gross, Count Error	0.7	0.9	1.1	0.7	0.7	0.5	0.6
Radium 226	3J	4J	0.79	3J	4J	0.67	3J
Radium 226, Count Error	0.55	0.62	0.28	0.52	0.62	0.21	0.61
Radium 228	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Radium 228, Count Error	0.5	0.5	0	0.5	0.4	0	0.5

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J = Qualified, estimated value
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Appendix D - Site 2 West Beach Landfill - Soil Samples in Fill Material - General Chemicals

Parameter Reported	M-015A-005 05/28/91 2.0 ft	M-016A-000 05/16/91 0.0 ft	M-016A-004 05/22/91 4.0 ft	M-016A-004 08/09/91 4.0 ft	M-017A-000 05/16/91 0.0 ft	M-017A-005 05/22/91 5.0 ft	M-018A-000 05/03/91 0.0 ft
Physical Parameters-Lab							
% Solids (% Of Wet Wt)	94	93.8	96.3	BK	94	95.7	96.7
Moisture (% Wet Wt)	6	6.2	3.7	3.8	6	4.3	3.3
Ph (Std.Units)	8.3	NA	8	NA	NA	9	NA
Total Organic Carbon (% Dry Wt)							
Carbon,TOC,As %Om/1.724	0.232	NA	0.116	NA	NA	0.116	NA
Organic Content,Total At 440 C	0.4	NA	0.2	NA	NA	0.2	NA
Asbestos (%)							
Asbestos,Total	NFAD	NA	NFAD	NA	NA	NFAD	NA
Radiochemicals (Pci/G-Dry)							
Alpha,Gross	0.6	3.2	1.2	NA	2.1	1.5	1.4
Alpha,Gross, Count Error	0.43	0.9	0.51	NA	0.78	0.56	0.8
Beta,Gross	0.638	2.96	< 0.519	NA	2.84	0.94	2.74
Beta,Gross, Count Error	0.5	0.7	0.6	NA	0.8	0.6	1.2
Radium 226	4J	3J	4	NA	4J	4	0.2
Radium 226, Count Error	0.55	0.59	0.51	NA	0.76	0.53	0.16
Radium 228	< 0.3	< 0.3	< 0.3	NA	< 0.3	< 0.3	< 0.3
Radium 228, Count Error	0.5	0.5	0.4	NA	0.5	0.4	0.4

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Parameter Reported	M-018A-006 05/22/91 3.0 ft	M-018E-046 05/21/91 45.0 ft	Duplicate M-018E-046 05/21/91 45.0 ft	M-019A-000 05/03/91 0.0 ft	M-019E-004 05/20/91 4.0 ft	M-019E-034 05/20/91 34.0 ft	M-020A-004 05/16/91 3.0 ft
Physical Parameters-Lab							
% Solids (% Of Wet Wt)	96.5	82.2	85.8	96.8	95.1	83.6	95.6
Moisture (% Wet Wt)	3.5	17.8	14.2	3.2	4.9	16.4	4.4
Ph (Std.Units)	8	8.3	8.3	NA	9.3	9.2	9.7
Total Organic Carbon (% Dry Wt)							
Carbon,TOC,As %Om/1.724	0.058	< 0.058	1.04	NA	0.348	0.058	< 0.290
Organic Content,Total At 440 C	0.1	< 0.1	1.8	NA	0.6	0.1	< 0.5
Asbestos (%)							
Asbestos,Total	NFAD	NFAD	NFAD	NA	NFAD	NFAD	NFAD
Radiochemicals (Pci/G-Dry)							
Alpha,Gross	1.3	2.4	1.5	1.5	2.2	1	2
Alpha,Gross, Count Error	0.53	1	0.71	0.82	0.66	0.54	0.64
Beta,Gross	< 0.518	< 0.608	0.991	1.91	1.86	0.61	< 0.314
Beta,Gross, Count Error	0.7	1.4	0.6	1	0.8	0.6	0.7
Radium 226	3	3	2	< 0.1	2	2	3J
Radium 226, Count Error	0.46	0.55	0.42	0.11	0.42	0.51	0.49
Radium 228	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Radium 228, Count Error	0.4	0.4	0.4	0.4	0.4	0.4	0.4

Notes: NA = Not analyzed
UJ = Qualified, estimated not detected
J = Qualified, estimated value
R = Qaulified, not usable
< = Analyte reported below detection li

Appendix D - Site 2 West Beach Landfill - Soil Samples in Fill Material - General Chemicals

Parameter Reported	M-020B-000 05/03/91 0.0 ft	M-020B-058 05/20/91 57.0 ft	M-020E-033 05/16/91 32.0 ft	M-021A-005 05/15/91 3.0 ft	M-021C-000 05/03/91 0.0 ft	M-021C-092 05/16/91 92.0 ft	M-021E-034 05/14/91 34.0 ft
Physical Parameters-Lab							
% Solids (% Of Wet Wt)	97.1	82.7	81.7	90.8	94.7	65.5	80.9
Moisture (% Wet Wt)	2.9	17.3	18.3	9.2	5.3	34.5	19.1
Ph (Std.Units)	NA	8.8	8.7	9.2	NA	8.3	9.5
Total Organic Carbon (% Dry Wt)							
Carbon,TOC,As %Om/1.724	NA	0.464	< 0.290	< 0.058	NA	< 0.290	0.406
Organic Content,Total At 440 C	NA	0.8	< 0.5	< 0.1	NA	< 0.5	0.7
Asbestos (%)							
Asbestos,Total	NA	NFAD	NFAD	NFAD	NA	NFAD	NFAD
Radiochemicals (Pci/G-Dry)							
Alpha,Gross	4.3	1	2.1	0.9	3.5	5.3	1.5
Alpha,Gross, Count Error	1.2	0.52	0.69	0.51	1.05	2.09	0.53
Beta,Gross	3.53	< 0.605	< 0.367	0.628	< 0.317	43.5	< 0.618
Beta,Gross, Count Error	1.1	0.6	0.7	0.7	1.6	3.1	0.7
Radium 226	0.2	2	3J	1UJ	0.2	5J	2J
Radium 226, Count Error	0.17	0.37	0.58	0.32	0.13	0.81	0.41
Radium 228	< 0.3	< 0.3	< 0.3	< 0.3	0.6	< 0.3	< 0.3
Radium 228, Count Error	0.5	0.4	0.5	0.6	0.5	0.5	0.5

Notes: NA = Not analyzed
UJ = Qualified, estimated not detected
J = Qualified, estimated value
R = Qaulified, not usable
< = Analyte reported below detection li

Parameter Reported	M-022A-005 05/10/91 2.0 ft	Duplicate M-022A-005 05/10/91 2.0 ft	M-022B-000 05/03/91 0.0 ft	M-022E-035 05/09/91 32.0 ft	M-023A-000 05/03/91 0.0 ft	M-023A-004 05/07/91 3.5 ft	M-023E-025 05/08/91 20.0 ft
Physical Parameters-Lab							
% Solids (% Of Wet Wt)	83.7	85.1	89.9	87.1	95.1	90.3	81.9
Moisture (% Wet Wt)	16.3	14.9	10.1	12.9	4.9	9.7	18.1
Ph (Std.Units)	8.4	8.7	NA	8.7	NA	8.6	9
Total Organic Carbon (% Dry Wt)							
Carbon,TOC,As %Om/1.724	0.29	0.812	NA	< 0.290	NA	< 0.290	< 0.290
Organic Content,Total At 440 C	0.5	1.4	NA	< 0.5	NA	< 0.5	< 0.5
Asbestos (%)							
Asbestos,Total	2	NFAD	NA	NFAD	NA	NFAD	NFAD
Radiochemicals (Pci/G-Dry)							
Alpha,Gross	2.5J	2.2J	1.5	4J	1.1	2.3	3
Alpha,Gross, Count Error	1.19	0.82	0.87	1.03	1.1	0.82	1.04
Beta,Gross	3.23J	2J	2.86	2.64J	3.38	< 0.332	3.02
Beta,Gross, Count Error	1	0.7	1	0.9	1.7	0.6	0.7
Radium 226	3UJ	4J	< 0.1	3J	0.2	3J	4J
Radium 226, Count Error	0.57	0.63	0.12	0.57	0.12	0.48	0.71
Radium 228	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Radium 228, Count Error	0.4	0.4	0.4	0.4	0.5	0.4	0.5

Notes: NA = Not analyzed
UJ = Qualified, estimated not detected
J = Qualified, estimated value
R = Qaulified, not usable
< = Analyte reported below detection li

Parameter Reported	M-024A-000 05/03/91 0.0 ft	M-024A-003 05/03/91 1.0 ft	M-024E-010 05/06/91 10.0 ft	M-024E-019 05/06/91 17.2 ft
Physical Parameters-Lab				
% Solids (% Of Wet Wt)	96.2	92.3	81.1	82.2
Moisture (% Wet Wt)	3.8	7.7	18.9	17.8
Ph (Std.Units)	NA	8.1	8.5	9.2
Total Organic Carbon (% Dry Wt)				
Carbon,TOC,As %Om/1.724	NA	< 0.290	NA	0.522
Organic Content,Total At 440 C	NA	< 0.5	NA	0.9
Asbestos (%)				
Asbestos,Total	NA	NFAD	NA	NFAD
Radiochemicals (Pci/G-Dry)				
Alpha,Gross	1.7	1.8	NA	5.2
Alpha,Gross, Count Error	1.08	0.96	NA	1.68
Beta,Gross	2.15	0.791	NA	1.48
Beta,Gross, Count Error	1.3	1.3	NA	0.8
Radium 226	0.3	0.9	NA	6J
Radium 226, Count Error	0.14	0.26	NA	0.75
Radium 228	< 0.3	< 0.3	NA	< 0.3
Radium 228, Count Error	0.5	0.4	NA	0.4

Notes: NA = Not analyzed
UJ = Qualified, estimated not detected
J = Qualified, estimated value
R = Qaulified, not usable
< = Analyte reported below detection li

Parameter Reported	M-013C-070 05/24/91 70.0 ft	M-020B-058 05/20/91 57.0 ft	M-021C-092 05/16/91 92.0 ft
Physical Parameters-Lab			
% Solids (% Of Wet Wt)	81.4	82.7	65.5
Moisture (% Wet Wt)	18.6	17.3	34.5
Ph (Std.Units)	8.2	8.8	8.3
Total Organic Carbon (% Dry Wt)			
Carbon,TOC,As %Om/1.724	< 0.290	0.464	< 0.290
Organic Content,Total At 440 C	< 0.5	0.8	< 0.5
Asbestos (%)			
Asbestos,Total	NFAD	NFAD	NFAD
Radiochemicals (Pci/G-Dry)			
Alpha,Gross	1	1	5.3
Alpha,Gross, Count Error	0.49	0.52	2.09
Beta,Gross	< 0.369	< 0.605	43.5
Beta,Gross, Count Error	0.6	0.6	3.1
Radium 226	5	2	5J
Radium 226, Count Error	0.74	0.37	0.81
Radium 228	< 0.3	< 0.3	< 0.3
Radium 228, Count Error	0.5	0.4	0.5

Notes: NA = Not analyzed
UJ = Qualified, estimated not detected
J = Qualified, estimated value
R = Qaulified, not usable
< = Analyte reported below detection limit

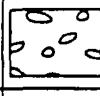
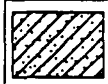
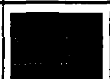
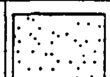
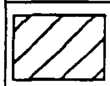
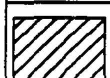
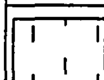
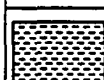
N00236.000848
ALAMEDA POINT
SSIC NO. 5090.3

APPENDIX E – BOREHOLE LOGS

FINAL
SOLID WASTE WATER QUALITY ASSESSMENT TEST AND DATA SUMMARY REPORT FOR REMEDIAL INVESTIGATION/FEASIBILITY STUDY FOR PHASES 5 AND 6

DATED 30 APRIL 1993

LEGEND

MAJOR DIVISIONS			GRAPH SYMBOL	LETTER SYMBOL	SECONDARY DESCRIPTIONS
COARSE GRAINED SOILS (GRAINS VISIBLE TO NAKED EYE) MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	GRAVEL AND GRAVELLY SOILS MORE THAN 50% OF COARSE FRACTION >.187" (4.75mm)	CLEAN GRAVELS (<15% FINES)		GW	WELL-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
				GP	POORLY GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
		GRAVELS WITH FINES (>15% FINES)		GM	SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES
				GC	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES
	SAND AND SANDY SOILS MORE THAN 50% OF COARSE FRACTION < .187" (4.75mm)	CLEAN SAND (<15% FINES)		SW	WELL GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
				SP	POORLY-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
		SANDS WITH FINES (>15% FINES)		SM	SILTY SANDS, SAND-SILT MIXTURES
				SC	CLAYEY SANDS, SAND-CLAY MIXTURES
FINE GRAINED SOILS (GRAINS NOT VISIBLE TO NAKED EYE) MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILTS AND CLAYS	LOW PLASTICITY FINES (Modifiers used at 30%)		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OR LOW PLASTICITY
	SILTS AND CLAYS	HIGH PLASTICITY FINES		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

Contact

Gradational Contact

Water Table

Screened Interval

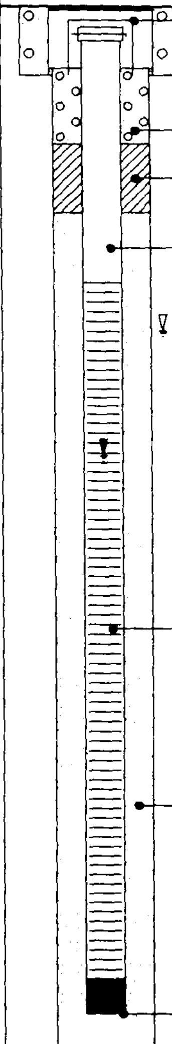
UNIFIED SOIL CLASSIFICATION SYSTEM

JAMES M. MONTGOMERY
CONSULTING ENGINEERS, INC.
365 LENNON LANE, WALNUT CREEK, CALIFORNIA, 94598 / (415) 975-3400

BORING/WELL NUMBER M-001A
CLIENT PRC/US NAVY
DATE STARTED 4/25/91 COMPLETED 4/26/91
PROJECT/JMM PROJECT NO. NAS ALAMEDA/2738.0213
REF. ELEVATION 7.25 SURFACE ELEVATION
GEOLOGIST CINDY FONG

DEPTH feet	SAMPLE	SAMP. NO.	BLOWS/6 IN	HNU-PID meter units	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION
0–1.8						GW	sandy GRAVEL (GW), light brown (7.5YR 6/3), loose, dry to moist, medium sand, granule to pebble clasts, fill
2						GW	sandy GRAVEL (GW), black (7.5YR 2/0), loose, medium sand, granule to cobble clasts, high est K, broken glass, wood and metal fragments, fill
4						SP	SAND (SP), brownish yellow (10YR 6/6), medium dense, very coarse, angular sand, high est K, fill, (cuttings)
5–6				0		GW SW	SAND and GRAVEL (SW/GW), black (7.5YR 2/0), very loose, trace of fines, medium to very coarse sand, broken glass and metal fragments (up to 2-3"), fill
8–9						CL	CLAY (CL), grey (2.5YR 5/0), (cuttings)
10		GEO-TECH	11 6 13			GW SW	SAND and GRAVEL (SW/GW), black (7.5YR 2/0), loose, trace fines, medium to very coarse sand, broken glass and metal fragments (up to 2-3"), moderate est K, fill
13							@ 13 feet-same as above, nails also in debris, fill
15							TOTAL DEPTH 15 feet
19							Note: All samples were screened with a Geiger-Mueller meter; no radiation was detected.

COMMENTS



DRILLING METHOD/RIG TYPE AUGER/CME 750
DRILLING CONTRACTOR/DRILLER WATER DEV./M. PETERSON
HOLE DIAMETER 8.0 INCHES
BIT TYPE HOLLOW STEM AUGER
TOTAL DEPTH OF BORING 15 FEET
WELL COMPLETION DEPTH 14.5

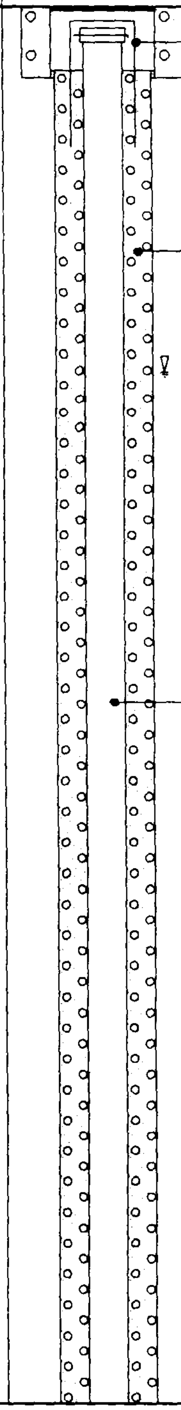
JAMES M. MONTGOMERY
CONSULTING ENGINEERS, INC.

365 LENNON LANE, WALNUT CREEK, CALIFORNIA, 94598 / (415) 975-3400

BORING/WELL NUMBER M-001B
CLIENT PRC/US NAVY
DATE STARTED 5/09/91 COMPLETED 5/13/91
PROJECT/JMM PROJECT NO. NAS ALAMEDA/2738.0213
REF. ELEVATION 7.79 SURFACE ELEVATION
GEOLOGIST D. KRAMER/R. HALKET

DEPTH feet	SAMPLE	SAMP. NO.	BLOWS/6 IN	HNU-PID meter units	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION
0–2.5	X			0		SM	silty SAND (SM), dark olive brown (2.5Y 3/3), loose, dry, medium sand, gravel up to 1.5 inches in diameter, moderate est K, contains nails, glass, wire, metal fragments, fill
2.5–7.5	X			0		SC	clayey SAND (SC), black (7.5YR N2/0), loose, dry, 30% fines, fine sand, trace gravel, low est K, nails, glass, wood, brick, fill
6							@ 6 feet-same as above, wet
7.5–12.5	X					SM	silty SAND (SM), black (7.5YR N2/0), medium dense, wet, 20 to 25% fines, medium sand, <10% gravel, moderate est K, nails and wire, fill
10	X		>50	8			@ 10 feet-same as above, dense
12.5–15.5	X		11 12 4 5 6 1	34.5		SW	SAND (SW), very dark gray (2.5YR N3/0), loose, wet, trace fines, medium to coarse sand, <10% gravel, moderate est K, glass, wire, wood, brick, paper, fill
15.5–20	X					SM	silty SAND (SM), black (7.5YR N2/0), loose, wet, 20 to 30% fines, fine sand, moderate est K, plant material and brick fragments, glass
17.5	X		1 1 for 18"				@ 17.5 feet-same as above, very loose

COMMENTS



CHRISTY BOX, PROTECTIVE STEEL CASING, LOCKING CAP

GROUT

WATER LEVEL @ 5.21 feet on 5/30/91

2-inch ID, SCH 40 PVC CASING

DRILLING METHOD/RIG TYPE SS-15-II/ARCH
DRILLING CONTRACTOR/DRILLER WATER DEV./K. CHIVRELLE
HOLE DIAMETER 7.25 INCHES
BIT TYPE 7" TRICONE AIR ROTARY CASING HAMMER
TOTAL DEPTH OF BORING 77 FEET
WELL COMPLETION DEPTH 72.5

JAMES M.MONTGOMERY
CONSULTING ENGINEERS,INC.
365 LENNON LANE, WALNUT CREEK, CALIFORNIA, 94598 / (415) 975-3400

RING/WELL NUMBER M-001B — CLIENT PRC/US NAVY
DATE STARTED 5/09/91 COMPLETED 5/13/91 — PROJECT/JMM PROJECT NO. NAS ALAMEDA/2738.0213
REF. ELEVATION 7.79 SURFACE ELEVATION — GEOLOGIST D. KRAMER/R. HALKET

DEPTH feet	BLOWS/6 IN	HNU-PID meter units	SOIL CLASS	GEOLOGIC DESCRIPTION	COMMENTS
	2	0	SC	clayey SAND (SC), very dark gray (2.5Y 3/0), loose, wet, 30 to 40% fines, fine sand, low est K, nails, asphalt, fill	
	2, 2		CL		
	2, 2			CLAY to silty CLAY (CL), dark gray (2.5Y N4/0), soft, damp to wet, medium to coarse shell fragments, low est K, possible burn zone at 21 feet (black color, ash)	
22	2, 2			@ 22 feet-same as above, 22 to 23 feet, fill ash, 23 to 23.5 feet, medium to coarse shell fragments	
24	2, 3, 5	0		@ 24 feet-same as above, 24 to 25 feet, fill ash, 25.5 to 26 feet, shell fragments	GROUT
26	5, 1, 2			CLAY to silty CLAY (CL), dark gray (2.5Y N4/0), soft, wet, low est K	
	3, 2			@ 27 feet-same as above, increasing silt, medium stiff to stiff	
28	2, 2, 2, 6			@ 28 feet-same as above, oyster shell fragments, low est K	
30	2	0		@ 30 feet-same as above, approximately 10 to 20% shell fragments	2-inch ID, SCH 40 PVC CASING
	2, 2			@ 31 feet-same as above, kerosene odor	
32	2, 2, 3, 2			silty CLAY (CL), dark gray (2.5Y N4/0), soft to medium stiff, moist to wet, coarse to medium shell fragments (1 to 5%), low est K, kerosene odor	
34	2, 3, 6				
	4, 11		ML	sandy SILT (ML), olive gray (5Y 3/1), medium dense, 20 to 30% fine sand, 5 to 10% coarse shell fragments, low est K, kerosene odor	
36	3, 6, 9, 19		SP	SAND (SP), dark olive gray (5Y 3/2), medium dense, wet, trace fines, fine sand, high est K, quartz and feldspar grains	
38					

LOG OF SOIL BORINGM-001B (continued)

JAMES M. MONTGOMERY
CONSULTING ENGINEERS, INC.
365 LENNON LANE, WALNUT CREEK, CALIFORNIA, 94598 / (415) 975-3400

BORING/WELL NUMBER M-001B
DATE STARTED 5/09/91 COMPLETED 5/13/91
REF. ELEVATION 7.79 SURFACE ELEVATION
CLIENT PRC/US NAVY
PROJECT/JMM PROJECT NO. NAS ALAMEDA/2738.0213
GEOLOGIST D. KRAMER/R. HALKET

DEPTH feet	SAMPLE	SAMP. NO.	BLOWS/6 IN	HNU-PID meter units	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	COMMENTS
				0		SP		
							SAND (SP), dark olive gray (5Y 3.2), medium dense, wet, trace fines, fine sand, high est K, quartz and feldspar grains	
42								GROUT
44								
				0				
46								
							@ 47 feet-same as above (cuttings)	2-inch ID, SCH 40 PVC CASING
48								
50				0				
52							@ 52 feet-same as above (cuttings)	
								BENTONITE PELLET SEAL
54						SM	silty SAND (SM), olive yellow (2.5Y 6/6), loose, wet, 15 to 25% fines, very fine to fine sand, moderate est K	
56		CHEM	14	0				
			17					
		CHEM	14				@ 57 feet-same as above, medium dense, 5 to 10% fines, moderate to high est K	FILTER PACK, #2-16 SAND
			12					
58			7					
			25					
			17					
			41					

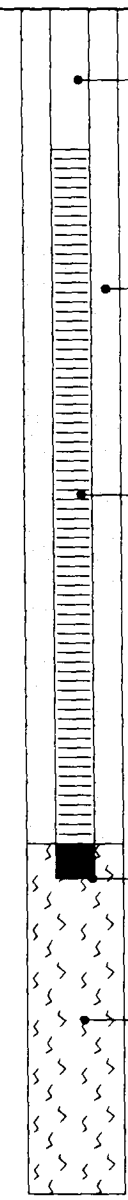
LOG OF SOIL BORINGM-001B (continued)

JAMES M.MONTGOMERY
CONSULTING ENGINEERS,INC.
365 LENNON LANE, WALNUT CREEK, CALIFORNIA, 94598 / (415) 975-3400

BORING/WELL NUMBER M-001B
DATE STARTED 5/09/91 COMPLETED 5/13/91
REF. ELEVATION 7.79 SURFACE ELEVATION
CLIENT PRC/US NAVY
PROJECT/JMM PROJECT NO. NAS ALAMEDA/2738.0213
GEOLOGIST D. KRAMER/R. HALKET

DEPTH feet	SAMPLE	SAMP. NO.	BLOWS/6 IN	HNU-PID meter units	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION
		GEO-TECH	7 14 21 31	0		SM	silty SAND (SM), olive yellow (2.5Y 6/6), loose, wet, 15 to 25% fines, very fine to fine sand, moderate est K, kerosene odor
62							
64							
66			6 12 20 50	38			@ 66 feet-same as above
68							
70							
72							
74							
							@ 75 feet-same as above (cuttings)
76							
							TOTAL DEPTH 77 feet
78							
							Note: All samples were screened with a Geiger-Mueller meter; no radiation was detected.

COMMENTS



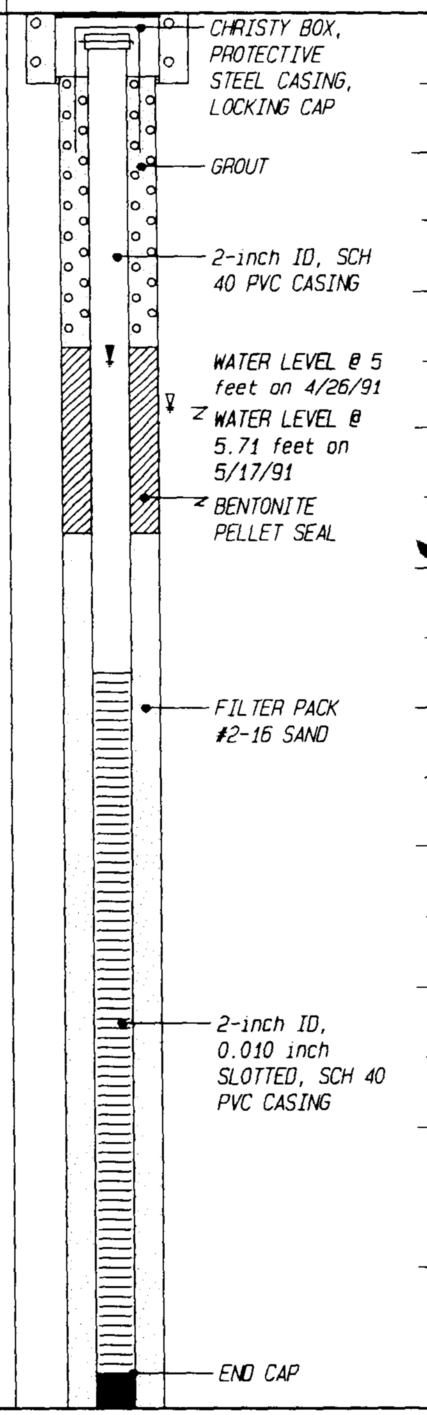
JAMES M. MONTGOMERY
CONSULTING ENGINEERS, INC.

365 LENNON LANE, WALNUT CREEK, CALIFORNIA, 94598 / (415) 975-3400

BORING/WELL NUMBER M-001E
CLIENT PRC/US NAVY
DATE STARTED 4/26/91 COMPLETED 4/26/91
PROJECT/JMM PROJECT NO. NAS ALAMEDA/2738.0213
REF. ELEVATION 7.97 SURFACE ELEVATION
GEOLOGIST DONNA COURINGTON

DEPTH feet	SAMPLE	SAMP. NO.	BLOWS/6 IN	HNU-PID meter units	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION
				0		SM	silty SAND (SM), dark olive brown (2.5Y 3/3), loose, dry, medium sand, gravel up to 1.5 inches in diameter, moderate est K, contains nails, glass, wire, metal fragments, fill
2						SC	clayey SAND (SC), black (7.5YR N2/0), loose, dry, 30% fines, fine sand, trace gravel, low est K, nails, glass, wood, brick, fill
4		CHEM		0			
6							@ 6 feet-same as above, wet
8						SM	silty SAND (SM), black (7.5YR N2/0), medium dense, wet, 20 to 25% fines, medium sand, <10% gravel, moderate est K, nails and wire, fill
10			>50	8			@ 10 feet-same as above, very dense
12			11 12 4 5 6 1	34.5		SW	SAND (SW), very dark gray (2.5YR N3/0), loose, wet, trace fines, medium to coarse sand, <10% gravel, moderate to high est K, glass, wire, wood, brick, paper, fill, sheen on water from split spoon sampler
16						SM	silty SAND (SM), black (7.5YR N2/0), wet, fine sand, 20 to 30% fines, moderate est K, plant material, brick and glass fragments
18			1 1 for 18"				@ 17.5 feet-same as above, very loose

COMMENTS



DRILLING METHOD/RIG TYPE AUGER/CME 750
DRILLING CONTRACTOR/DRILLER WATER DEV./M. PETERSON
HOLE DIAMETER 8.0 INCHES
BIT TYPE HOLLOW STEM AUGER
TOTAL DEPTH OF BORING 29 FEET
WELL COMPLETION DEPTH 20

JAMES M. MONTGOMERY
CONSULTING ENGINEERS, INC.

365 LENNON LANE, WALNUT CREEK, CALIFORNIA, 94598 / (415) 975-3400

BORING/WELL NUMBER M-001E
CLIENT PRC/US NAVY
DATE STARTED 4/26/91 COMPLETED 4/26/91
PROJECT/JMM PROJECT NO. NAS ALAMEDA/2738.0213
REF. ELEVATION 7.97 SURFACE ELEVATION
GEOLOGIST DONNA COURINGTON

DEPTH feet	SAMPLE	SAMP. NO.	BLOWS/6 IN	HNU-PID meter units	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	COMMENTS
			8 1			SC	clayey SAND (SC), very dark gray (2.5Y 3/0), loose, wet, 30 to 40% fines, fine sand, nails, asphalt, fill	
22			1 1 2			CL	silty CLAY (CL), very dark gray (2.5Y N3/0), very soft, wet, fines, shell fragments, trace plant material	
			0	0			@ 23 feet-same as above, one inch of shell hash with silty fine sand and gravel	
24								1/4 inch BENTONITE PELLETS FOR SEAL
			0 0				silty CLAY (CL), very dark gray (7.5YR 4/0), very soft, wet, fines	
26			0				@ 26 feet-same as above, abundant large shell fragments	
			0					
28		GEO-TECH	0 0				@ 28 feet-same as above, permeability sample	
							TOTAL DEPTH 29 feet	BOTTOM OF BORING 29 feet
30								
32								
34								
36								
38								
							Note: All samples were screened with a Geiger-Mueller meter; no radiation was detected.	

LOG OF SOIL BORINGM-001E (continued)

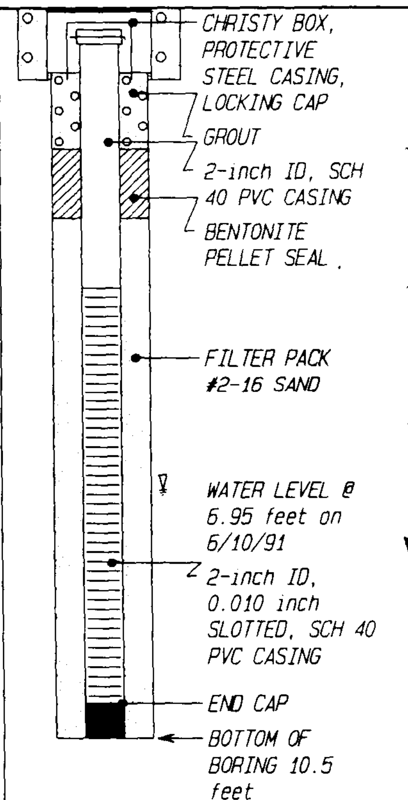
JAMES M. MONTGOMERY
CONSULTING ENGINEERS, INC.
365 LENNON LANE, WALNUT CREEK, CALIFORNIA, 94598 / (415) 975-3400

BORING/WELL NUMBER M-002A
DATE STARTED 6/4/91 COMPLETED 6/4/91
REF. ELEVATION 9.17 SURFACE ELEVATION
CLIENT PRC/US NAVY
PROJECT/JMM PROJECT NO. NAS ALAMEDA/2738.0213
GEOLOGIST CRAIG FANSHIER

DEPTH feet	SAMPLE	SAMP. NO.	BLOWS/6 IN	HNU-PID meter units	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION
0–2			DRILL to 3.5'			SP	SAND (SP), grayish brown (2.5Y 5/2), loose, dry, <5% fines, fine to medium sand, 10% gravel up to 1/2 inch, fill, (cuttings)
4	■	CHEM	3 5	0			gravelly SAND (SP), olive brown (2.5Y 4/3), loose, dry, trace of silt, 10% gravel, shell fragments, fill
	■	GEO-TECH	3 2 1	0		ML	clayey SILT (ML), very dark grayish brown (2.5Y 3/2), loose, dry, 55 to 65% fines, 25 to 35% fine sand, roots, fill
6	☒		3 3 4 6	0		SP	SAND (SP), reddish brown (5Y 4/3), loose, moist, trace fines, fine to medium sand, high est K @ 6.5 feet-same as above, wet
8–10			1 0 1			CL	CLAY (CL), dark gray (5Y 1/1), very soft, wet
10.5							TOTAL DEPTH 10.5 feet

Note: All samples were screened with a Geiger-Mueller meter; no radiation was detected.

COMMENTS



DRILLING METHOD/RIG TYPE AUGER/CME 750
HOLE DIAMETER 8.0 INCHES
TOTAL DEPTH OF BORING 10.5 FEET
DRILLING CONTRACTOR/DRILLER WATER DEV./M. PETERSON
BIT TYPE HOLLOW STEM AUGER
WELL COMPLETION DEPTH 10.5

JAMES M. MONTGOMERY
CONSULTING ENGINEERS, INC.

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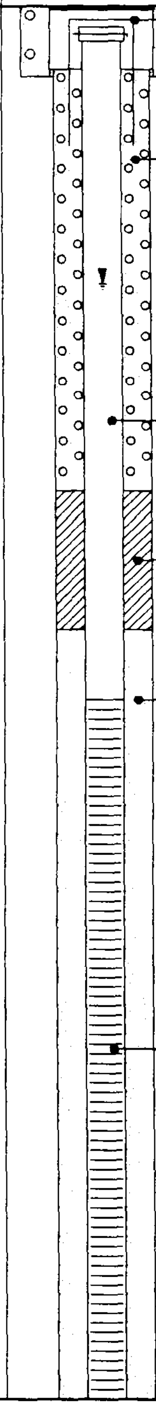
BORING/WELL NUMBER M-002E
CLIENT PRC/US NAVY
DATE STARTED 5/23/91 COMPLETED 5/23/91
PROJECT/JMM PROJECT NO. NAS ALAMEDA/2738.0213
REF. ELEVATION 8.98 SURFACE ELEVATION
GEOLOGIST CRAIG FANSHIER

DEPTH feet	SAMPLE	SAMP. NO.	BLOWS/6 IN	HNU-PID meter units	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION
			4			SP	SAND (SP), loose, dry, very fine to fine sand, 10% gravel, fill
			7				
2			7				@ 2 feet-same as above, shell fragments
			3	0		ML	sandy SILT (ML), very dark grayish brown (10YR 3/2), medium stiff, moist, trace clay, very fine to medium sand, low est K, rootlets, shell fragments, fill
			3				
			3				
4			2				
			1				
			1				
			2				@ 5.5 feet-same as above, very dark gray (2.5Y 3/2), increasing percent clay to 20%
6			2				
			3			SP	SAND (SP), olive brown (2.5Y 4/3), loose, wet, trace fines, fine to medium sand, fill
			3			ML	clayey SILT (ML), very dark gray (2.4Y N3/0), trace very fine sand
			4			SP	SAND (SP), olive (5Y 4/3), loose, wet, fine to medium sand, color change to dark gray (5Y 4/1) at 8 feet, shell fragments, fill
8			5				
			1			CL	CLAY (CL), dark gray (5Y 4/1), soft, wet, 10 to 20% silt, fill
			0				
			1				
10			1	0			
			5				
			10				
12			3				
			5				@ 12 feet-same as above, 1/2 inch angular rock fragments, fill
			10				
			16				
			20				
14			50				
			4	0			@ 15 feet-same as above, increasing percent gravel to 15%, shell fragments, fill
			8				
16			55				
			16				
			5				
			6				
18			25	0			@ 18 feet-same as above, rock, shell and woodchip fragments, fill
			12				
			10				

COMMENTS



- CHRISTY BOX, PROTECTIVE STEEL CASING, LOCKING CAP
- GROUT
- WATER LEVEL @ 4 feet on 5/23/91
- 2-inch ID, SCH 40 PVC CASING
- BENTONITE PELLET SEAL
- FILTER PACK #2-16 SAND
- WATER LEVEL @ 11.42 feet on 5/30/91
- 2-inch ID, 0.010 inch SLOTTED, SCH 40 PVC CASING

DRILLING METHOD/RIG TYPE AUGER/CME 750
DRILLING CONTRACTOR/DRILLER WATER DEV./M. PETERSON
HOLE DIAMETER 8.0 INCHES
BIT TYPE HOLLOW STEM AUGER
TOTAL DEPTH OF BORING 23 FEET
WELL COMPLETION DEPTH 20.5

JAMES M.MONTGOMERY
CONSULTING ENGINEERS, INC.
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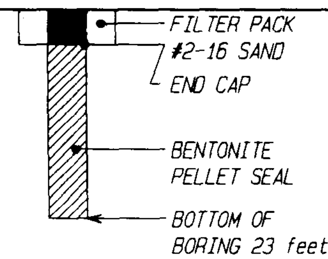
BORING/WELL NUMBER M-002E
DATE STARTED 5/23/91 COMPLETED 5/23/91
REF. ELEVATION 8.98 SURFACE ELEVATION
CLIENT PRC/US NAVY
PROJECT/JMM PROJECT NO. NAS ALAMEDA/2738.0213
GEOLOGIST CRAIG FANSHIER

DEPTH feet	SAMPLE	SAMP. NO.	BLOWS/6 IN	HNU-PID meter units	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	COMMENTS
		CHEM	2 6 27			CL	CLAY (CL), dark gray (5Y 4/1), soft, wet, 10 to 20% silt, fill	
22		GEO-TECH	25 12 1					
							TOTAL DEPTH 23 feet	
24								
26								
28								
30								
32								
34								
36								
38								
							Note: All samples were screened with a Geiger-Mueller meter; no radiation was detected.	



LOG OF SOIL BORINGM-002E (continued)

JAMES M. MONTGOMERY
CONSULTING ENGINEERS, INC.
365 LENNON LANE, WALNUT CREEK, CALIFORNIA, 94598 / (415) 975-3400

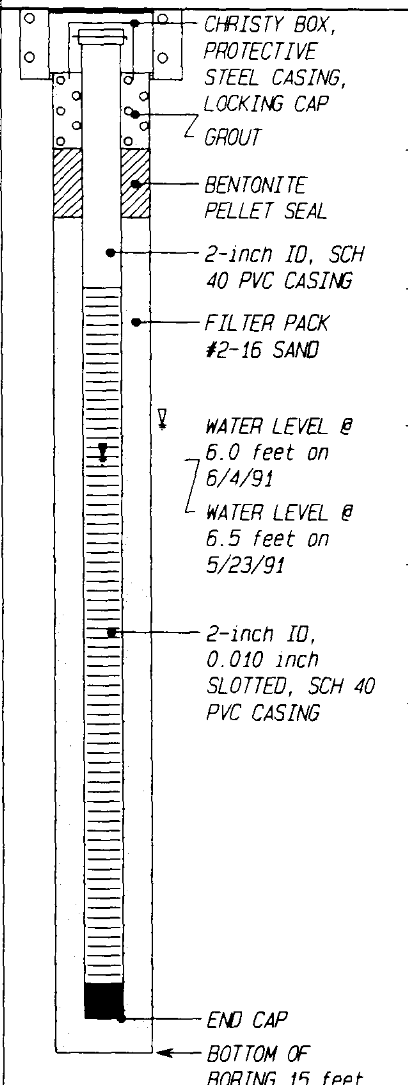
BORING/WELL NUMBER M-003A
DATE STARTED 5/23/91 COMPLETED 5/23/91
REF. ELEVATION 9.03 SURFACE ELEVATION

CLIENT PRC/US NAVY
PROJECT/JMM PROJECT NO. NAS ALAMEDA/2738.0213
GEOLOGIST CRAIG FANSHIER

DEPTH feet	SAMPLE	SAMP. NO.	BLOWS/6 IN	HNU-PID meter units	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION
						SP	
			11	0			gravelly SAND (SP), dark grayish brown (2.5Y 4/2), loose, dry, trace silt, fine to medium sand, pebble to cobble gravel clasts, fill
			10				
			4				
2		CHEM	2	0			@ 2 feet-asphalt and sand, fill
			1				
			2				
4		CHEM	2	0			SAND (SP), very dark grayish brown (2.5Y 3/2), loose, moist, trace fines, medium sand, high est K, shell fragments, fill
			2				
			4				
			4	0			@ 5 feet-same as above, wet
			5				
6			6				
			4	0			SAND (SP), very dark gray (5Y 3/1), loose, wet, trace fines, medium sand, high est K
			3				
			7				
8			4	0			
			8				
			6				
10		GEO-TECH	4	0			
			5				
			4				@ 11 feet-same as above, silty SAND (SP), lens, olive (5Y 4/3), shell fragments, high est K
12			3	0			
14			4	0			@ 14 feet-same as above
			4				
			5				
							TOTAL DEPTH 15 feet
16							
18							

Note: All samples were screened with a Geiger-Mueller meter; no radiation was detected.

COMMENTS



DRILLING METHOD/RIG TYPE AUGER/CME 750
HOLE DIAMETER 8.0 INCHES
TOTAL DEPTH OF BORING 15 FEET

DRILLING CONTRACTOR/DRILLER WATER DEV./M. PETERSON
BIT TYPE HOLLOW STEM AUGER
WELL COMPLETION DEPTH 14.5

JAMES M. MONTGOMERY
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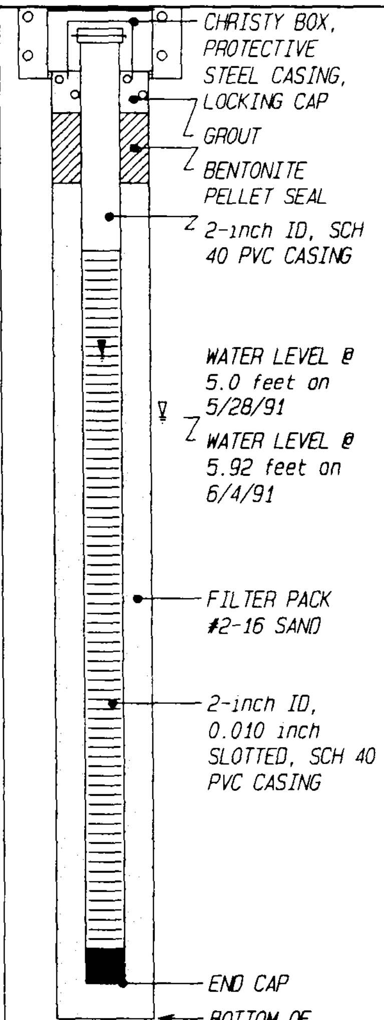
BORING/WELL NUMBER M-004A
DATE STARTED 5/28/91 COMPLETED 5/28/91
REF. ELEVATION 8.49 SURFACE ELEVATION
CLIENT PRC/US NAVY
PROJECT/JMM PROJECT NO. NAS ALAMEDA/2738.0213
GEOLOGIST CRAIG FANSHIER

DEPTH feet	SAMPLE	SAMP. NO.	BLOWS/6 IN	HNU-PID meter units	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION
			8			SW	gravelly SAND (SW), grayish brown (2.5Y 5/2), loose, dry, 10 to 15% fines, fine to medium sand, pebble to cobble gravel clasts, moderate est K, wood chips, shell fragments, fill
			10	0			
			6				
2		CHEM	4				
			4	0			
			3				
		CHEM	3			SP	SAND (SP), dark gray (5Y 4/1), loose, wet, medium sand, small shell fragments, wood, roots, fill
4			2	0			
			3				
			3				
			2	0		SM	silty SAND (SM), very dark gray (5Y 3/1), loose, wet, very fine to fine sand, shell fragments, moderate to low est K
6			2			SP	SAND (SP), dark gray (5Y 4/1), loose, wet, medium sand, small shell fragments
			3				
			5	0			
			6				
8			3				
			4	0			
			2				
10		GEO-TECH	2				
			1	0			
			3			ML	silty CLAY (ML), trace of sand
			4			SP	SAND (SP), dark gray (5Y 4/1), loose, wet, medium sand, small shell fragments
12			4	0			
			4				
			4			SM	silty SAND (SM), very dark gray (5Y 3/1), loose, wet, 10 to 20% fines, fine to medium sand, moderate to low est K
			3				
14			4				
							TOTAL DEPTH 14.5 feet
16							
18							

Note: All samples were screened with a Geiger-Mueller meter; no radiation was detected.

COMMENTS



DRILLING METHOD/RIG TYPE AUGER/CME 750
HOLE DIAMETER 8.0 INCHES
TOTAL DEPTH OF BORING 14.5 FEET
DRILLING CONTRACTOR/DRILLER WATER DEV./M. PETERSON
BIT TYPE HOLLOW STEM AUGER
WELL COMPLETION DEPTH 14

JAMES M. MONTGOMERY
CONSULTING ENGINEERS, INC.
365 LENNON LANE, WALNUT CREEK, CALIFORNIA, 94598 / (415) 975-3400

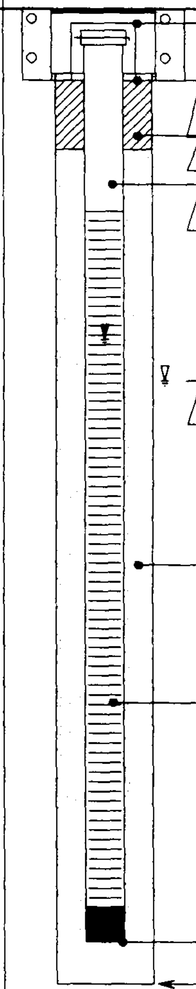
BORING/WELL NUMBER M-005A
DATE STARTED 5/29/91 COMPLETED 5/29/91
REF. ELEVATION 8.75 SURFACE ELEVATION

CLIENT PRC/US NAVY
PROJECT/JMM PROJECT NO. NAS ALAMEDA/2738.0213
GEOLOGIST CRAIG FANSHIER

DEPTH feet	SAMPLE	SAMP. NO.	BLOWS/6 IN	HNU-PID meter units	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION
		CHEM	7	0		SP	gravelly SAND (SP), olive brown (2.5Y 4/3), loose, dry, trace fines, fine to medium sand, 10 to 25% gravel, angular clasts, moderate to high est K, fill
			12				
2			11				
		CHEM	4	0			
			11				
			8			GM	sandy GRAVEL (GM), dark yellowish brown (10YR 4/4), trace fines, medium sand, pebble to cobble clasts, high est K, fill
4		CHEM	8	0			
			26				
			20				
			8	0			
			22				
6			24				
			50/3"	0			
8			7	0			silty GRAVEL (GM), very dark gray (5Y 3/1), dense, wet, 15 to 20% silt, very fine to fine sand, granule to cobble clasts, angular, moderate est K, fill
			10				
			16				
10			50/5"				
		GEO-TECH	21				@ 11.5 feet-same as above
12			50				
14							TOTAL DEPTH 14 feet
16							
18							

Note: All samples were screened with a Geiger-Mueller meter; no radiation was detected.

COMMENTS



DRILLING METHOD/RIG TYPE AUGER/CME 750
HOLE DIAMETER 8.0 INCHES
TOTAL DEPTH OF BORING 14 FEET

DRILLING CONTRACTOR/DRILLER WATER DEV./M. PETERSON
BIT TYPE HOLLOW STEM AUGER
WELL COMPLETION DEPTH 13.4

JAMES M. MONTGOMERY
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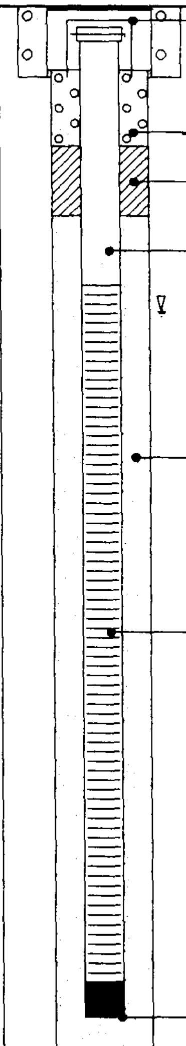
BORING/WELL NUMBER M-006A
DATE STARTED 5/29/91 COMPLETED 5/29/91
REF. ELEVATION 8.50 SURFACE ELEVATION
CLIENT PRC/US NAVY
PROJECT/JMM PROJECT NO. NAS ALAMEDA/2738.0213
GEOLOGIST CRAIG FANSHIER

SAMP. NO.	BLOWS/6 IN	HNU-PID meter units	SOIL CLASS	GEOLOGIC DESCRIPTION
	15, 22, 22	0	SM	silty SAND (SM), dark olive brown (2.5Y 3/2), 15 to 20% fines, fine sand
CHEM	15, 22, 18	0	SP	SAND (SP), dark grayish brown (2.5Y 4/2), dense, dry, trace fines, medium sand, trace gravels, moderate to high est K
CHEM	14, 18, 15	0		@ 3 feet-same as above, color change to dark yellowish brown (10YR 3/4)
	4, 4, 6	0		SAND (SP), very dark gray (5Y 3/1), loose, wet, medium sand, shell fragments, wood fragments, oily black staining around grains, fill
	4, 6, 9	0		
	7, 7, 7	0		@ 8.5 feet-same as above, slight rainbow sheen on sample
GEO-TECH	4, 7, 12	0		
	12, 24, 11	0		
	2, 1, 1	0	CL	CLAY (CL), very dark gray (2.5Y 3/0), very soft, wet, trace silt, trace very fine sand, low est K
				TOTAL DEPTH 15 feet

DEPTH feet: 2, 4, 6, 8, 10, 12, 14, 16, 18

Note: All samples were screened with a Geiger-Mueller meter; no radiation was detected.

COMMENTS



DRILLING METHOD/RIG TYPE AUGER/CME 750
HOLE DIAMETER 8.0 INCHES
TOTAL DEPTH OF BORING 15 FEET
DRILLING CONTRACTOR/DRILLER WATER DEV./M. PETERSON
BIT TYPE HOLLOW STEM AUGER
WELL COMPLETION DEPTH 14.5

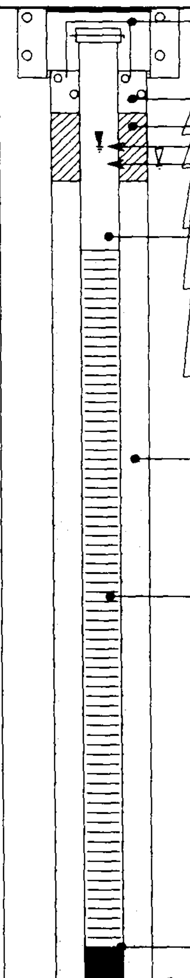
JAMES M. MONTGOMERY
CONSULTING ENGINEERS, INC.

365 LENNON LANE, WALNUT CREEK, CALIFORNIA, 94598 / (415) 975-3400

BORING/WELL NUMBER M-007A
DATE STARTED 5/29/91 COMPLETED 5/29/91
REF. ELEVATION 6.44 SURFACE ELEVATION
CLIENT PRC/US NAVY
PROJECT/JMM PROJECT NO. NAS ALAMEDA/2738.0213
GEOLOGIST CRAIG FANSHIER

DEPTH feet	SAMPLE	SAMP. NO.	BLOWS/6 IN	HNU-PID meter units	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION
						SP	SAND (SP), dark reddish brown (5YR 3/2), loose, dry, 10% silt, medium sand, rootlets, fill
		CHEM	9	0		SP	SAND (SP), dark grayish brown (10YR 4/2), medium dense, moist, trace fines, medium sand, angular
			10				
2			12				
		CHEM	4	0			@ 2.5 feet-same as above, color change to dark olive gray (5Y 3/2), wet
			6				
			7				@ 3 feet-same as above, 5 to 10% shell fragments
4			5	0			
			6				
			5				
			15	0			
6			25				
			15				
			1	0			@ 7 feet-same as above, flowing sand
		GEO-TECH	2				
			4				
			9	0			
			9				@ 9 feet-same as above, 10 to 15% shell fragments
			11				
10			9				
			6				
			6				
			4				
12			2				@ 12 feet-1/2 inch silt lens
			4				
							SAND (SP), dark grayish brown (10YR 4/2), medium dense, wet, trace fines, medium sand, angular
14							TOTAL DEPTH 14 feet
16							
18							
							Note: All samples were screened with a Geiger-Mueller meter; no radiation was detected.

COMMENTS



DRILLING METHOD/RIG TYPE AUGER/CME 750
HOLE DIAMETER 8.0 INCHES
TOTAL DEPTH OF BORING 14 FEET
DRILLING CONTRACTOR/DRILLER WATER DEV./M. PETERSON
BIT TYPE HOLLOW STEM AUGER
WELL COMPLETION DEPTH 14

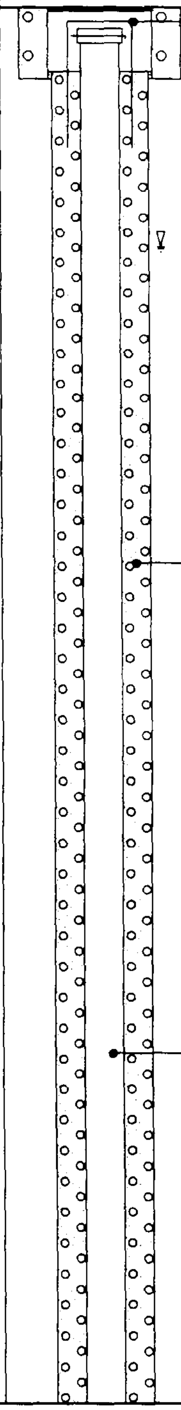
JAMES M. MONTGOMERY
CONSULTING ENGINEERS, INC.

365 LENNON LANE, WALNUT CREEK, CALIFORNIA, 94598 / (415) 975-3400

BORING/WELL NUMBER M-007C
DATE STARTED 6/3/91 COMPLETED 6/4/91
REF. ELEVATION 6.51 SURFACE ELEVATION
CLIENT PRC/US NAVY
PROJECT/JMM PROJECT NO. NAS ALAMEDA/2738.0213
GEOLOGIST RICH HALKET

DEPTH feet	SAMPLE	SAMP. NO.	BLOWS/6 IN	HNU-PID meter units	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION
0						SP	SAND (SP), dark reddish brown (5YR 3/2), loose, dry, 10% silt, medium sand, rootlets
1–2.5	X		9, 10, 12	0		SP	SAND (SP), dark grayish brown (10YR 4/2), medium dense, moist, trace fines, medium sand, angular
2.5–4	X		4, 6, 7				@ 2.5 feet-same as above, color change to dark olive gray (5Y 3/2)
4–5.5	X		5, 6, 7	0			
5.5–7	X		15, 25, 15				
7–8.5	X		1, 2, 4				@ 7 feet-flowing sands
8.5–10	X		9, 9, 11				@ 9 feet-same as above, 1 to 2 inch shell lens, 10 to 15% shells in sand matrix
10–11.5	X		9, 6, 6	0			
11.5–13	X		4, 2, 4				@ 12 feet-same as above, 1/2 inch silt lens, coarsens downward
14						SM	silty SAND (SM), dark gray (2.5Y 4/1), loose, wet, 40 to 50% fines, very fine to fine sand, low to moderate est K, trace oyster shells, occasional clay rich zones
15–17	X		1, 1, 1, 1	0			
17–19	X		1, 1, 1, 1				

COMMENTS



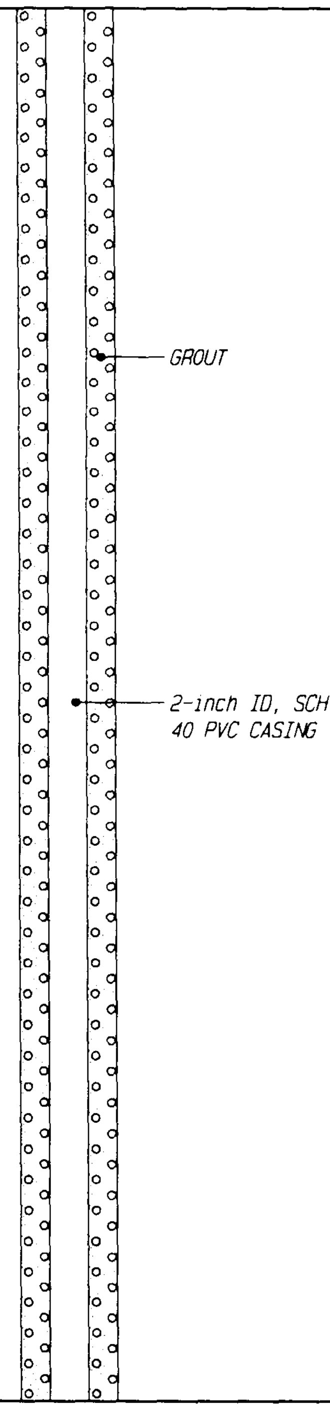
DRILLING METHOD/RIG TYPE SS-15-II/ARCH
HOLE DIAMETER 7.25 INCHES
TOTAL DEPTH OF BORING 87 FEET
DRILLING CONTRACTOR/DRILLER WATER DEV./K. CHIVRELLE
BIT TYPE 7" TRICONE AIR ROTARY CASING HAMMER
WELL COMPLETION DEPTH 82.5

JAMES M. MONTGOMERY
CONSULTING ENGINEERS, INC.
365 LENNON LANE, WALNUT CREEK, CALIFORNIA, 94598 / (415) 975-3400

BORING/WELL NUMBER M-007C
DATE STARTED 6/3/91 COMPLETED 6/4/91
REF. ELEVATION 6.51 SURFACE ELEVATION
CLIENT PRC/US NAVY
PROJECT/JMM PROJECT NO. NAS ALAMEDA/2738.0213
GEOLOGIST RICH HALKET

DEPTH feet	SAMPLE	SAMP. NO.	BLOWS/6 IN	HNU-PID meter units	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION
						SM	silty SAND (SM), dark gray (2.5Y 4/1), loose, wet, 40 to 50% fines, very fine to fine sand, low to moderate est K, trace oyster shells, occasional clay rich zones
22							
24	X		1 1 1 1	0			@ 24 feet-same as above, 30 to 35% fines
26			1 1 1 1				@ 27 feet-same as above, 40 to 45% fines
28							
30							
32							
34	X		2 3 3 5	0			
	X		1 2 3 7			SP	SAND (SP), loose, wet, 10 to 15% fines, very fine to fine sand, high est K
36							
38							

COMMENTS



JAMES M. MONTGOMERY CONSULTING ENGINEERS, INC.

365 LENNON LANE, WALNUT CREEK, CALIFORNIA, 94598 / (415) 975-3400

BORING/WELL NUMBER M-007C
DATE STARTED 6/3/91 COMPLETED 6/4/91
REF. ELEVATION 6.51 SURFACE ELEVATION
CLIENT PRC/US NAVY
PROJECT/JMM PROJECT NO. NAS ALAMEDA/2738.0213
GEOLOGIST RICH HALKET

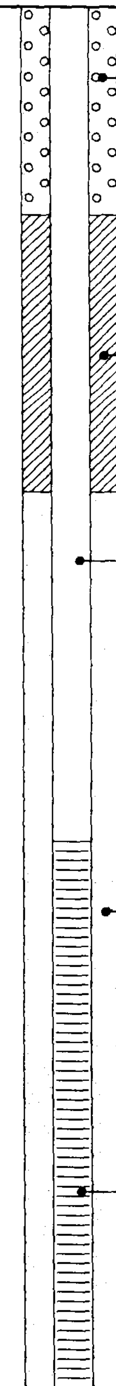
DEPTH feet	SAMPLE	SAMP. NO.	BLOWS/6 IN	HNU-PID meter units	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	COMMENTS
						SP	SAND (SP), loose, wet, 10 to 15% fines, very fine to fine sand, high est K, occasional clay rich zones, trace oyster shells	
42			2, 4, 9, 9	0				
44			3, 5, 7, 11	0		SM	silty SAND (SM), brown (10YR 4/3), medium dense, moist, 15 to 20% fines, fine to medium sand, moderate est K	GROUT
46								
48								
50								2-inch ID, SCH 40 PVC CASING
52			20, 30, 23, 27	0		SP	SAND (SP), grayish brown (10YR 5/2), dense, wet, 10 to 15% fines, fine to medium sand, moderate est K	
54								
56								
58			15, 22, 38, 45					

LOG OF SOIL BORINGM-007C (continued)

JAMES M. MONTGOMERY
CONSULTING ENGINEERS, INC.
365 LENNON LANE, WALNUT CREEK, CALIFORNIA, 94598 / (415) 975-3400

BORING/WELL NUMBER M-007C CLIENT PRC/US NAVY
DATE STARTED 6/3/91 COMPLETED 6/4/91 PROJECT/JMM PROJECT NO. NAS ALAMEDA/2738.0213
REF. ELEVATION 6.51 SURFACE ELEVATION GEOLOGIST RICH HALKET

DEPTH feet	SAMPLE	SAMP. NO.	BLOWS/6 IN	HNU-PID meter units	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	COMMENTS
			9	0		SP		
			17					
			22				SAND (SP), grayish brown (10YR 5/2), dense, wet, 10 to 15% fines, fine to medium sand, moderate est K	GROUT
62			22					
64								
								BENTONITE PELLET SEAL
66								
							@ 67 feet-same as above, (cuttings)	
								2-inch ID, SCH 40 PVC CASING
70								
72							@ 72 feet-same as above, heaving sands, (cuttings)	
								FILTER PACK, #2-16 SAND
74						SM	silty SAND (SM), dark gray (2.5Y 4/0), dense, wet, 15 to 20% fines, very fine to fine sand, moderate est K, (cuttings)	
76								
		CHEM	2	0				2-inch ID, 0.010 inch SLOTTED, SCH 40 PVC CASING
78			3					
			11					
			38					
			2					
			4					



JAMES M. MONTGOMERY
CONSULTING ENGINEERS, INC.

365 LENNON LANE, WALNUT CREEK, CALIFORNIA, 94598 / (415) 975-3400

BORING/WELL NUMBER M-007C
CLIENT PRC/US NAVY
DATE STARTED 6/3/91 COMPLETED 6/4/91
PROJECT/JMM PROJECT NO. NAS ALAMEDA/2738.0213
REF. ELEVATION 6.51 SURFACE ELEVATION
GEOLOGIST RICH HALKET

DEPTH feet	SAMPLE	SAMP. NO.	BLOWS/6 IN	HNU-PID meter units	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	COMMENTS
			37	0		SM	silty SAND (SM), dark gray (2.5Y 4/0), dense, wet, 15 to 20% fines, very fine to fine sand, moderate est K	2-inch ID, 0.010 inch SLOTTED, SCH 40 PVC CASING
			50					
82						CL	CLAY (CL), dark gray (2.5Y 4/0), very hard, moist, trace of fine sand, low est K, (cuttings)	END CAP
		GEO-TECH	3					
84			4					FILTER PACK, #2-16 SAND
			5					
			11					
			9	0				
86			5					
			8					
			16					
							TOTAL DEPTH 87 feet	BOTTOM OF BORING 87 feet
88								
90								
92								
94								
96								
98								

Note: All samples were screened with a Geiger-Mueller meter; no radiation was detected.

LOG OF SOIL BORINGM-007C (continued)

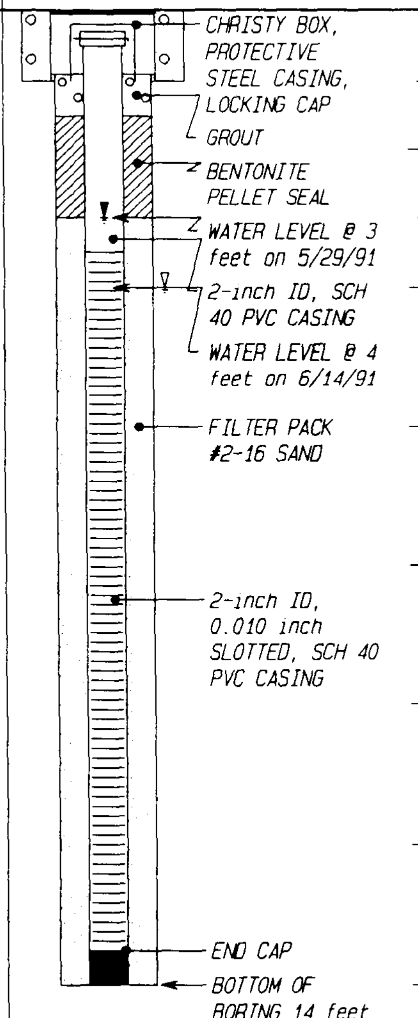
JAMES M. MONTGOMERY
CONSULTING ENGINEERS, INC.
365 LENNON LANE, WALNUT CREEK, CALIFORNIA, 94598 / (415) 975-3400

BORING/WELL NUMBER M-008A
CLIENT PRC/US NAVY
DATE STARTED 5/29/91 COMPLETED 5/29/91
PROJECT/JMM PROJECT NO. NAS ALAMEDA/2738.0213
REF. ELEVATION 7.45 SURFACE ELEVATION
GEOLOGIST CRAIG FANSHIER

DEPTH feet	SAMPLE	SAMP. NO.	BLOWS/6 IN	HNU-PID meter units	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION
		CHEM	5			SP	SAND (SP), light olive brown (2.5Y 5/3), loose, moist, medium sand, high est K
			7	0			
			8				
2		CHEM	3				
			3	0			
			3				
			2				
4			3	0			@ 4 feet-same as above, trace of fines
			2				
			3				
			2	0			
6			1				
			1				
			1	0			@ 7 feet-same as above
			1				
8			10			GW	GRAVEL (GW), 1-inch layer, cobble clasts, angular, gray sand matrix, (rig behavior)
			5			SP	
			5				
10		GEO-TECH	5				SAND (SP), dark olive gray (5Y 3/2), loose, wet, trace of fines, fine to medium sand, high est K
			5				
			7				
			7				
12			1				@ 12 feet-same as above, shell fragments
			1				
			10				
14							TOTAL DEPTH 14 feet
16							
18							

Note: All samples were screened with a Geiger-Mueller meter; no radiation was detected.

COMMENTS



DRILLING METHOD/RIG TYPE AUGER/CME 750
DRILLING CONTRACTOR/DRILLER WATER DEV./M. PETERSON
HOLE DIAMETER 8.0 INCHES
BIT TYPE HOLLOW STEM AUGER
TOTAL DEPTH OF BORING 14 FEET
WELL COMPLETION DEPTH 14

JAMES M. MONTGOMERY
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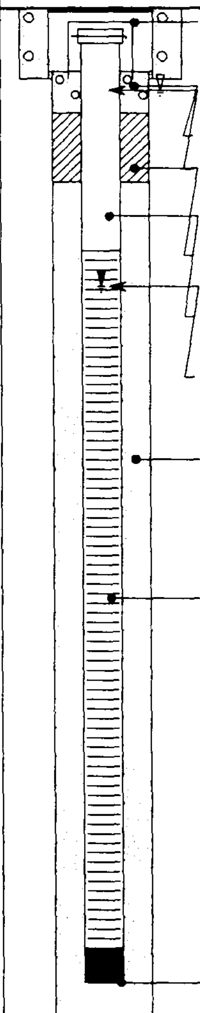
BORING/WELL NUMBER M-009A
CLIENT PRC/US NAVY
DATE STARTED 5/30/91 COMPLETED 5/30/91
PROJECT/JMM PROJECT NO. NAS ALAMEDA/2738.0213
REF. ELEVATION 5.43 SURFACE ELEVATION
GEOLOGIST CRAIG FANSHIER

DEPTH feet	SAMPLE	SAMP. NO.	BLOWS/6 IN	HNU-PID meter units	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION
			14	0		SP	SAND (SP), very dark gray (5Y 3/1), medium dense, moist, medium sand, high est K
			14				
			20				
2		CHEM	9	0			SAND (SP), olive brown (2.5Y 4/3), medium dense, moist, medium sand, subrounded, high est K
			18				
			20				
4			18	0			
			15				
			12				
			1	0			@ 5 feet-same as above
6			1				
			1	0		CL	silty CLAY (CL), olive brown (2.5Y 3/7), 40% silt
			4			SP	CLAY (CL), dark olive gray (5Y 3/2), wet
8			5				SAND (SP), gray (5Y 3/2), loose, wet, medium sand, high est K
			2	0			
			6				SAND (SP), olive (5Y 4/2), loose, wet, trace fines, fine to coarse sand, high est K
			5				
10			8	0			@ 10 feet-same as above, fine to medium sand, 10 to 15% fines
		GEO-TECH	6				
			4				
12			3				
			3				
			1				
			2	0		SM	silty SAND (SM), olive gray (5Y 4/2), loose, wet, trace fines, very fine to medium sand, slight bedding, moderate est K
14			3				
			2				
							TOTAL DEPTH 14.5 feet
16							
18							

Note: All samples were screened with a Geiger-Mueller meter; no radiation was detected.

COMMENTS



DRILLING METHOD/RIG TYPE AUGER/CME 750
DRILLING CONTRACTOR/DRILLER WATER DEV./M. PETERSON
HOLE DIAMETER 8.0 INCHES
BIT TYPE HOLLOW STEM AUGER
TOTAL DEPTH OF BORING 14.5 FEET
WELL COMPLETION DEPTH 14

JAMES M.MONTGOMERY
CONSULTING ENGINEERS, INC.

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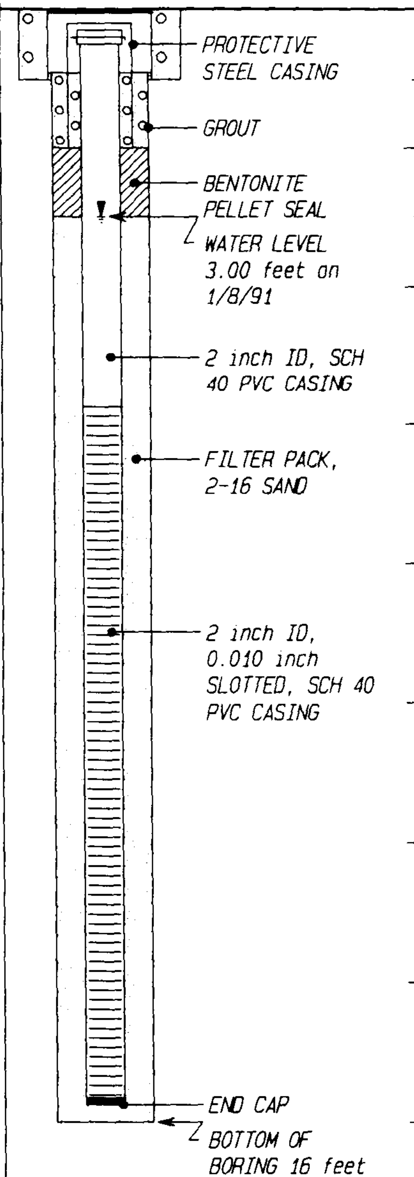
BORING/WELL NUMBER M-10A
CLIENT PRC/US NAVY
DATE STARTED 12/17/90 COMPLETED 12/17/90
PROJECT/JMM PROJECT NO. NAS ALAMEDA/2738.0143
REF. ELEVATION 6.20 SURFACE ELEVATION
GEOLOGIST CRAIG STEVENS

DEPTH feet	SAMPLE	SAMP. NO.	BLOWS/6 IN	HNU-PID meter units	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION
0						SP	SAND (SP), tan, loose, dry, fine sand
3						SM	silty SAND (SM), mottled green and brown, loose, wet
4.6				0			
5							@ 5 feet-same as above, green
6							@ 6 feet-same as above, green with some black zones
9						SC	clayey SAND (SC), green brown, loose, wet, fine sand
9.6				0			
12						SM	silty SAND (SM), green brown, loose to medium dense, wet, very fine to fine sand
14.6				0			
16							TOTAL DEPTH 16 feet
19							Note: All samples were screened with a Geiger-Mueller meter; no radiation was detected.

COMMENTS



DRILLING METHOD/RIG TYPE AUGER/GEFCO CF-15
DRILLING CONTRACTOR/DRILLER WATER DEV CORP/D.KRUGER
HOLE DIAMETER 7.88 INCHES
BIT TYPE SOLID STEM AUGER
TOTAL DEPTH OF BORING 16 FEET
WELL COMPLETION DEPTH 15.75

JAMES M. MONTGOMERY
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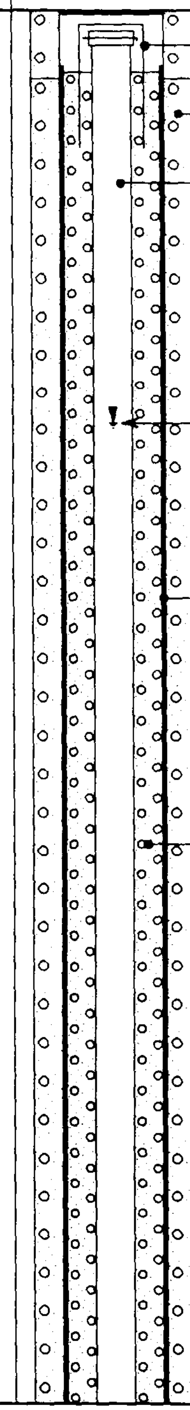
BORING/WELL NUMBER M-10B
CLIENT PRC/US NAVY
DATE STARTED 12/01/90 COMPLETED 12/14/90
PROJECT/JMM PROJECT NO. NAS ALAMEDA/2738.0143
REF. ELEVATION 6.58 SURFACE ELEVATION
GEOLOGIST CRAIG STEVENS

DEPTH feet	SAMPLE	SAMP. NO.	BLOWS/6 IN	HNU-PID meter units	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	COMMENTS
0		GRAB M10B				SP	SAND (SP), tan, loose, dry, fine sand	PROTECTIVE STEEL CASING
							same as above, moist	GROUT
2								2 inch ID, SCH 40 PVC CASING
3						SM	silty SAND (SM), mottled green and brown, loose, wet	
4				0				
5							@ 5 feet-same as above, green	
6							@ 6 feet-same as above, green with some black zones	WATER LEVEL 5.98 feet on 1/9/91
8								CONDUCTOR CASING, LOW CARBON STEEL, 0.188 inches
9				0		SC	clayey SAND (SC), green brown, loose, wet, fine sand	
10								
12						SM	silty SAND (SM), green brown, loose to medium dense, wet, very fine to fine sand	GROUT
14								
15				0				
16								
18								
20				0				



DRILLING METHOD/RIG TYPE MUD ROT./GEFCO CF-15
DRILLING CONTRACTOR/DRILLER WATER DEV CORP/D.KRUGER
HOLE DIAMETER 12.25/7.88 INCHES
BIT TYPE ROLLER CONE
TOTAL DEPTH OF BORING 86 FEET
WELL COMPLETION DEPTH 43.35

JAMES M. MONTGOMERY
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365 LENNON LANE, WALNUT CREEK, CALIFORNIA, 94598 / (415) 975-3400

BORING/WELL NUMBER M-10B
DATE STARTED 12/01/90 COMPLETED 12/14/90
REF. ELEVATION 6.58 SURFACE ELEVATION

CLIENT PRC/US NAVY
PROJECT/JMM PROJECT NO. NAS ALAMEDA/2738.0143
GEOLOGIST CRAIG STEVENS

DEPTH feet	SAMPLE	SAMP. NO.	BLOWS/6 IN	HNU-PID meter units	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	COMMENTS
						SM	silty SAND (SM), green brown, loose to medium dense, wet, fine sand	GROUT
22				0				CONDUCTOR CASING, LOW CARBON STEEL, 0.188 inches
24				0				GROUT
26				0				
				0		CL	CLAY (CL), dark gray green, stiff, wet, slight H2S/organic decay odor	2 inch ID, SCH 40 PVC CASING
							@ 29.2-one foot layer of clayey gravel (rig behavior)	
30						SM	@ 30.2-same as above, dark grey	BENTONITE PELLET SEAL
							silty SAND (SM), dark gray, medium dense, wet	
32								
				0		GC	gravelly CLAY (CL), dark gray, dense, wet, fine gravel (to 1")	
34				0				FILTER PACK, 2-16 SAND
						SM	silty SAND (SM), dark gray, loose to medium dense, wet, trace shell fragments	
36				0				
38				0		SP	gravelly SAND (SP), dark gray, dense, wet, fine sand	2 inch ID, 0.010 inch SLOTTED, SCH 40 PVC CASING
				0		SM	silty SAND (SM), dark gray, loose to medium dense, wet, trace shell fragments	

LOG OF SOIL BORINGM-10B (continued)

JAMES M. MONTGOMERY
CONSULTING ENGINEERS, INC.
365 LENNON LANE, WALNUT CREEK, CALIFORNIA, 94598 / (415) 975-3400

BORING/WELL NUMBER M-10B
DATE STARTED 12/01/90 COMPLETED 12/14/90
REF. ELEVATION 6.58 SURFACE ELEVATION
CLIENT PRC/US NAVY
PROJECT/JMM PROJECT NO. NAS ALAMEDA/2738.0143
GEOLOGIST CRAIG STEVENS

DEPTH feet	SAMPLE	SAMP. NO.	BLOWS/6 IN	HNU-PID meter units	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	COMMENTS
						SM		
						SM	silty SAND (SM), dark gray green, loose, wet, fine sand, trace fine gravel	FILTER PACK, 2-16 SAND
				0				
42								2 inch ID, 0.010 inch SLOTTED, SCH 40 PVC CASING
								END CAP
44								
							silty CLAY (CL), gray green, soft to medium stiff, wet, fines, trace sand, trace coarse gravel	
				0		CL		
46				0				
48							from 48 to 51 feet-flowing sand or soft clay (rig behavior)	
50								BENTONITE PELLET SEAL
52							from 52 to 55 feet-soft clay or flowing sand (rig behavior)	
54								
				0				
56							clayey SAND (SC), gray green, loose to medium dense, wet, 20-45% fines, very fine sand	
				0		SC		
58								
				0				

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BORING/WELL NUMBER M-10B
CLIENT PRC/US NAVY
DATE STARTED 12/01/90 COMPLETED 12/14/90
PROJECT/JMM PROJECT NO. NAS ALAMEDA/2738.0143
REF. ELEVATION 6.58 SURFACE ELEVATION
GEOLOGIST CRAIG STEVENS

DEPTH feet	SAMPLE	SAMP. NO.	BLOWS/6 IN	HNU-PID meter units	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	COMMENTS
						SC	clayey SAND (SC), gray green, soft to medium dense, 20 to 45% fines, very fine sand	
						CL	silty CLAY (CL), gray green, stiff, wet, fines	
62								
64				0		SC	clayey SAND (SC), gray green, medium dense, wet, trace shell fragments	
							@ 64.5 and 65.5 feet-one inch layers of clay (CL) gray green, stiff	
66								
70								BENTONITE PELLET SEAL
72								
							@ 73 feet-sandy clay layer	
74						SM	silty SAND (SM), gray green, medium dense, wet, fine to medium sand, trace shell fragments	
76								
78								

LOG OF SOIL BORINGM-10B (continued)

JAMES M.MONTGOMERY
CONSULTING ENGINEERS,INC.
365 LENNON LANE, WALNUT CREEK, CALIFORNIA, 94598 / (415) 975-3400

BORING/WELL NUMBER M-10B
DATE STARTED 12/01/90 COMPLETED 12/14/90
REF. ELEVATION 6.58 SURFACE ELEVATION
CLIENT PRC/US NAVY
PROJECT/JMM PROJECT NO. NAS ALAMEDA/2738.0143
GEOLOGIST CRAIG STEVENS

DEPTH feet	SAMPLE	SAMP. NO.	BLOWS/6 IN	HNU-PID meter units	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	COMMENTS
						SM	silty SAND (SM), gray green, medium dense, wet, fine to medium sand, trace shell fragments	
82						CL	CLAY (CL), gray green, very stiff, moist to wet, fines, 10 to 15% plant material and organic stringers, linear partings (pockets, gaps) in clay, organic stringers are lamelli	BENTONITE PELLET SEAL
84								
86							TOTAL DEPTH 86 feet	BOTTOM OF BORING 86 feet
88								
90								
92								
94								
96								
98							Note: All samples were screened with a Geiger-Mueller meter; no radiation was detected.	

LOG OF SOIL BORINGM-10B (continued)

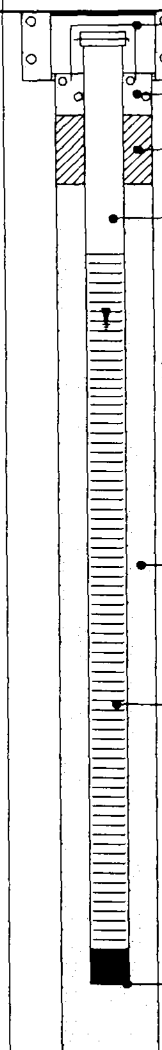
JAMES M. MONTGOMERY
CONSULTING ENGINEERS, INC.
365 LENNON LANE, WALNUT CREEK, CALIFORNIA, 94598 / (415) 975-3400

BORING/WELL NUMBER M-011A
CLIENT PRC/US NAVY
DATE STARTED 5/28/91 COMPLETED 5/28/91
PROJECT/JMM PROJECT NO. NAS ALAMEDA/2738.0213
REF. ELEVATION 7.08 SURFACE ELEVATION
GEOLOGIST CRAIG FANSHIER

DEPTH feet	SAMP. NO.	BLOWS/6 IN	HNU-PID meter units	SOIL CLASS	GEOLOGIC DESCRIPTION
0–1.5		9, 16, 18	0	SP	SAND (SP), dark brown (7.5YR 3/3), medium dense, dry, 10 to 15% fines, fine to medium sand, moderate to high est K
1.5–3	CHEM	14, 23, 22	0		SAND (SP), olive brown (2.5Y 4/3), medium dense, moist, medium sand, 10% fines, medium high est K, trace shell fragments
3–4.5	CHEM	13, 21, 24	0		
4.5–6		4, 10, 12	0		@ 6 feet-same as above, 1 inch silty lens
6–7.5		8, 4, 3	0		SAND (SP), dark gray (5Y 4/1), loose, wet, 10% fines, medium to coarse sand, high est K
7.5–9		4, 5, 4	0		
10–11.5	GEO-TECH	3, 4, 5	0		@ 11 feet-same as above
11.5–13		3, 2, 3			
13–14.5		8, 10, 10			@ 14 feet-same as above
15					TOTAL DEPTH 15 feet

Note: All samples were screened with a Geiger-Mueller meter; no radiation was detected.

COMMENTS



DRILLING METHOD/RIG TYPE AUGER/CME 750
DRILLING CONTRACTOR/DRILLER WATER DEV./M. PETERSON
HOLE DIAMETER 8.0 INCHES
BIT TYPE HOLLOW STEM AUGER
TOTAL DEPTH OF BORING 15 FEET
WELL COMPLETION DEPTH 14

JAMES M. MONTGOMERY
CONSULTING ENGINEERS, INC.
365 LENNON LANE, WALNUT CREEK, CALIFORNIA, 94598 / (415) 975-3400

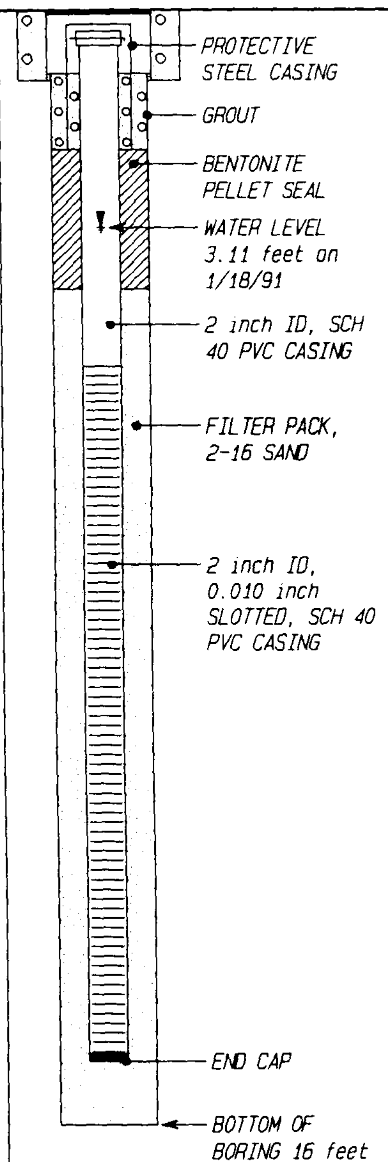
BORING/WELL NUMBER M-12A
DATE STARTED 12/05/90 COMPLETED 12/05/90
REF. ELEVATION 9.06 SURFACE ELEVATION

CLIENT PRC/US NAVY
PROJECT/JMM PROJECT NO. NAS ALAMEDA/2738.0143
GEOLOGIST CRAIG STEVENS

DEPTH feet	SAMPLE	SAMP. NO.	BLOWS/6 IN	HNU-PID meter units	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION
0				0		SP	SAND (SP), tan, loose, dry, fine to medium sand
2							@ 2 feet-same as above, damp
4							@ 4 feet-same as above, green brown, loose, moist
6				0			@ 6 feet-same as above, medium dense, wet
8							
10							
11							@ 11 feet-same as above, medium dense, some gravel
12							SAND (SP), green brown, medium dense, wet, fine to medium sand
14							
16				0			TOTAL DEPTH 16 feet
18							

Note: All samples were screened with a Geiger-Mueller meter; no radiation was detected.

COMMENTS



DRILLING METHOD/RIG TYPE AUGER/GEFCO CF-15
HOLE DIAMETER 7.88 INCHES
TOTAL DEPTH OF BORING 16 FEET

DRILLING CONTRACTOR/DRILLER WATER DEV CORP/D.KRUGER
BIT TYPE SOLID STEM AUGER
WELL COMPLETION DEPTH 15.1

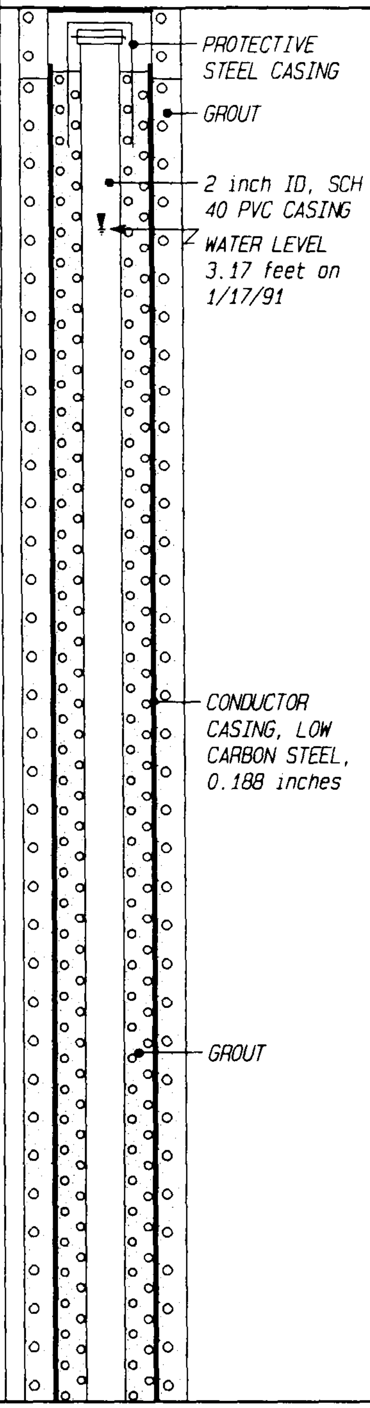
JAMES M. MONTGOMERY
CONSULTING ENGINEERS, INC.

365 LENNON LANE, WALNUT CREEK, CALIFORNIA, 94598 / (415) 975-3400

BORING/WELL NUMBER M-12B
CLIENT PRC/US NAVY
DATE STARTED 12/02/90 COMPLETED 12/05/90
PROJECT/JMM PROJECT NO. NAS ALAMEDA/2738.0143
REF. ELEVATION 8.89 SURFACE ELEVATION
GEOLOGIST CRAIG STEVENS

DEPTH feet	SAMPLE	SAMP. NO.	BLOWS/6 IN	HNU-PID meter units	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION
0		GRAB M12B		0		SP	SAND (SP), tan, loose, dry, fine to medium sand
2							@ 2 feet-same as above, damp
4							@ 4 feet-same as above, green brown, loose, moist
6			12 20 44 14 18 27 14 25 37 7 16 22 8 5	0			@ 6 feet-same as above, medium dense, wet
11							@ 11 feet-same as above, medium dense, some gravel
12							SAND (SP), green brown, medium dense, wet, fine to medium sand
16				0		SP	@ 16 feet-same as above, olive green, trace silt, fine sand
18				0		SC	clayey SAND (SC), olive green, soft, wet, very fine sand
19						SM	silty SAND (SM), olive green, loose to medium dense, wet, fine sand

COMMENTS



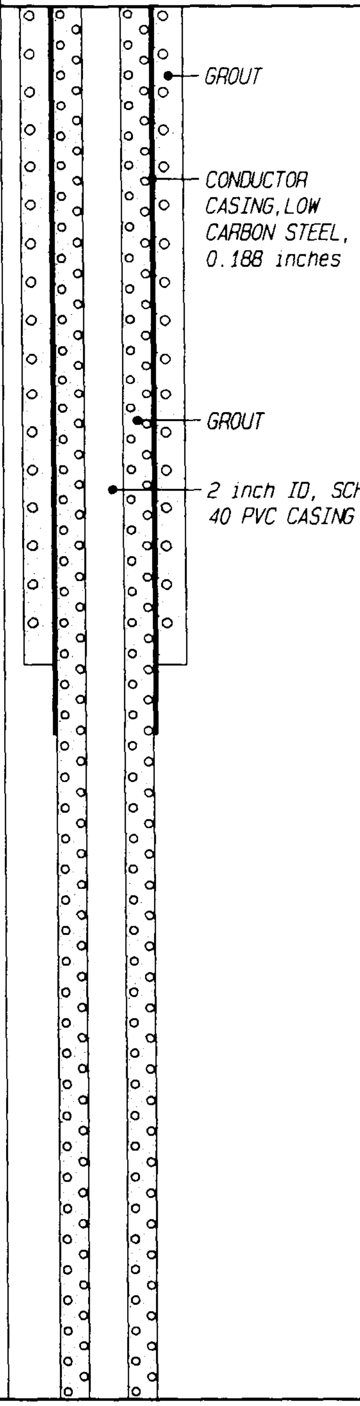
DRILLING METHOD/RIG TYPE MUD ROT./GEFCO CF-15
DRILLING CONTRACTOR/DRILLER WATER DEV CORP/D. KRUGER
HOLE DIAMETER 12.25/7.88 INCHES
BIT TYPE ROLLER CONE
TOTAL DEPTH OF BORING 74 FEET
WELL COMPLETION DEPTH 73.4

JAMES M. MONTGOMERY
CONSULTING ENGINEERS, INC.
365 LENNON LANE, WALNUT CREEK, CALIFORNIA, 94598 / (415) 975-3400

BORING/WELL NUMBER M-12B
DATE STARTED 12/02/90 COMPLETED 12/05/90
REF. ELEVATION 8.89 SURFACE ELEVATION
CLIENT PRC/US NAVY
PROJECT/JMM PROJECT NO. NAS ALAMEDA/2738.0143
GEOLOGIST CRAIG STEVENS

DEPTH feet	SAMPLE	SAMP. NO.	BLOWS/6 IN	HNU-PID meter units	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION
22							
24				0		SM	
25							@ 25 feet-gravelly zone (rig behavior)
26							
27			12			CL	gravelly CLAY (CL), olive green, soft, wet, coarse gravel (to 2 inches)
28			14 30 28			GC	clayey GRAVEL (GC), olive green, soft, wet, fine gravel (to 1 inch)
29			9 28			CL	gravelly CLAY (CL), olive green, soft, wet, fine gravel (to 1 inch)
30			30			GC	clayey GRAVEL (GC), olive green, soft, wet, fine gravel (to 1 inch)
31			9 8			SC	clayey SAND (SC), olive green, medium dense, wet, fine sand
32			11	0		SM	silty SAND (SM), dark gray green, medium dense, moist to wet, fine to medium sand, trace shell fragments, organic decay odor
33							@ 32 feet-same as above, trace shell fragments, slight organic decay odor
34				0			@ 34 feet, same as above, no shell fragments
36							
38							

COMMENTS



LOG OF SOIL BORINGM-12B (continued)

JAMES M. MONTGOMERY
CONSULTING ENGINEERS, INC.

365 LENNON LANE, WALNUT CREEK, CALIFORNIA, 94598 / (415) 975-3400

BORING/WELL NUMBER M-12B
DATE STARTED 12/02/90 COMPLETED 12/05/90
REF. ELEVATION 8.89 SURFACE ELEVATION
CLIENT PRC/US NAVY
PROJECT/JMM PROJECT NO. NAS ALAMEDA/2738.0143
GEOLOGIST CRAIG STEVENS

DEPTH feet	SAMPLE	SAMP. NO.	BLOWS/6 IN	HNU-PID meter units	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	COMMENTS
42				0		SM	silty SAND (SM), dark gray green, medium dense, wet, very fine sand, trace shell fragments	2 inch ID, SCH 40 PVC CASING
44				0		CL	silty CLAY (CL), dark gray green, soft, wet, fines	
						SC	clayey SAND (SC), dark gray green, medium dense, wet, very fine sand, trace shell fragments, slight organic odor	
46				0				
48							@ 47.5 feet-same as above, loose	
				0			@ 49 feet-same as above, fine to medium sand	
50								GROUT
52				0				
				0				
54						SM	silty SAND (SM), light gray green, medium dense, wet, medium sand	
56								BENTONITE PELLET SEAL
58				0				FILTER PACK, 2-16 SAND
							@ 59.5 feet-same as above, olive green, moist to wet, dense to very dense	

LOG OF SOIL BORINGM-12B (continued)

JAMES M. MONTGOMERY
CONSULTING ENGINEERS, INC.

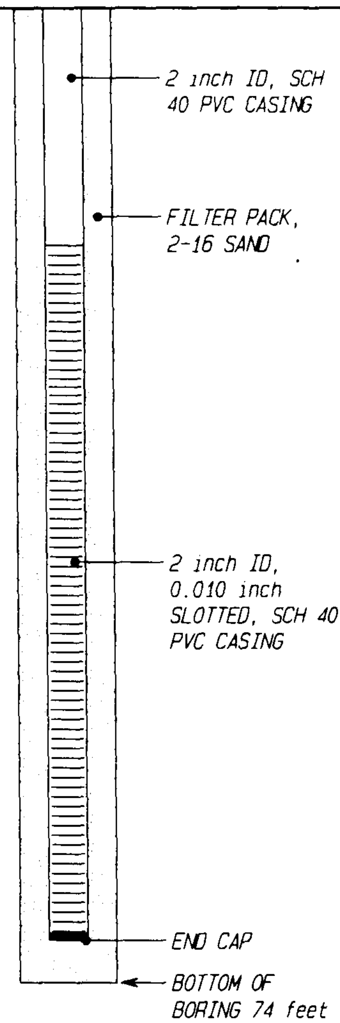
365 LENNON LANE, WALNUT CREEK, CALIFORNIA, 94598 / (415) 975-3400

BORING/WELL NUMBER M-12B
DATE STARTED 12/02/90 COMPLETED 12/05/90
REF. ELEVATION 8.89 SURFACE ELEVATION

CLIENT PRC/US NAVY
PROJECT/JMM PROJECT NO. NAS ALAMEDA/2738.0143
GEOLOGIST CRAIG STEVENS

DEPTH feet	SAMPLE	SAMP. NO.	BLOWS/6 IN	HNU-PID meter units	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION
						SM	silty SAND (SM), light gray green, medium dense, wet, medium sand
62							@ approximately 62 feet-mottling with orange brown spots
							@ 62.2 feet-same as above, orange brown
64							@ 64.3 feet-same as above, medium dense, wet
66				0			@ 66 feet-rust-red laminations present
68							
				0			@ 69 feet-same as above, very dense, moist, no rust-red laminations
				0			
70							
72							
74							TOTAL DEPTH 74 feet
76							
78							

COMMENTS



Note: All samples were screened with a Geiger-Mueller meter; no radiation was detected.

LOG OF SOIL BORINGM-12B (continued)

JAMES M. MONTGOMERY
CONSULTING ENGINEERS, INC.

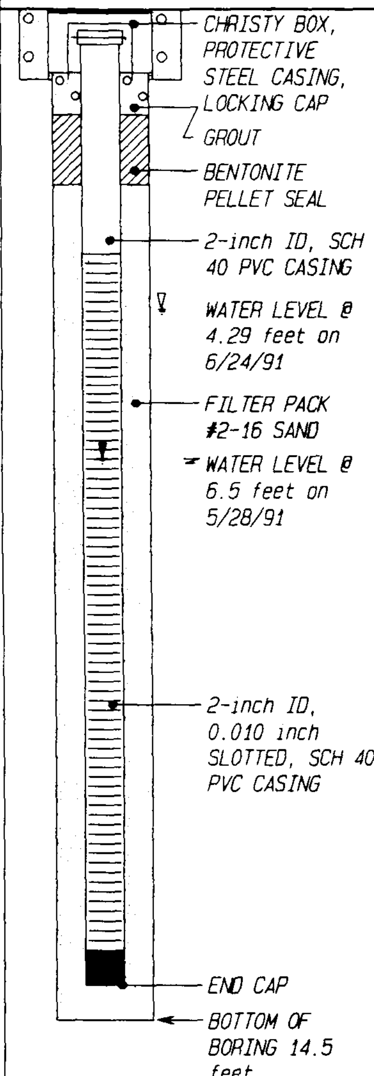
365 LENNON LANE, WALNUT CREEK, CALIFORNIA, 94598 / (415) 975-3400

BORING/WELL NUMBER M-013A
DATE STARTED 5/28/91 COMPLETED 5/28/91
REF. ELEVATION 8.64 SURFACE ELEVATION
CLIENT PRC/US NAVY
PROJECT/JMM PROJECT NO. NAS ALAMEDA/2738.0213
GEOLOGIST CRAIG FANSHIER

DEPTH feet	SAMP. NO.	BLOWS/6 IN	HNU-PID meter units	SOIL CLASS	GEOLOGIC DESCRIPTION
		5	0	SP	SAND (SP), light olive brown (2.5YR 5/3), loose, dry, fine to coarse sand, high est K
		8			
	CHEM	9			
2	CHEM	4	0		
		4			
		6			
		4	0		
4		6			
		9			
		4	0		@ 5 feet-same as above
		6			
6		6			
		5	0		
		6			
		8			
8		7	0		@ 8 feet-same as above, color change to olive brown (2.5YR 4/3)
		9			
		11			@ 9 feet-shell fragments
10	GEO-TECH	7			
		5			
		6			
		5			
12		5	0		
		5			
		5			
		4			
14		3			@ 14 feet-same as above
					TOTAL DEPTH 14.5 feet
16					
18					

Note: All samples were screened with a Geiger-Mueller meter; no radiation was detected.

COMMENTS



DRILLING METHOD/RIG TYPE AUGER/CME 750
HOLE DIAMETER 8.0 INCHES
TOTAL DEPTH OF BORING 14.5 FEET
DRILLING CONTRACTOR/DRILLER WATER DEV./M. PETERSON
BIT TYPE HOLLOW STEM AUGER
WELL COMPLETION DEPTH 14

JAMES M. MONTGOMERY
CONSULTING ENGINEERS, INC.

365 LENNON LANE, WALNUT CREEK, CALIFORNIA, 94598 / (415) 975-3400

BORING/WELL NUMBER M-013C
DATE STARTED 5/24/91 COMPLETED 5/29/91
REF. ELEVATION 8.52 SURFACE ELEVATION

CLIENT PRC/US NAVY
PROJECT/JMM PROJECT NO. NAS ALAMEDA/2738.0213
GEOLOGIST RICH HALKET

DEPTH feet	SAMPLE	SAMP. NO.	BLOWS/6 IN	HNU-PID meter units	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	COMMENTS
			5	0		SP	SAND (SP), light olive brown (2.5Y 5/3), loose, dry, fine to coarse sand, high est K	CHRISTY BOX, PROTECTIVE STEEL CASING, LOCKING CAP
			8					
			9					
2								
			4	0				
			4					
			6					GROUT
			4	0				
4								
			6					
			9					
			4	0			@ 5 feet-same as above	WATER LEVEL @ 5.17 feet on 6/21/91
			6					
6								
			6					
			5	0				WATER LEVEL @ 6.5 feet on 5/24/91
			6					
			8					
8								
			7	0			@ 8 feet-same as above, color change to olive brown (2.5Y 4/3), shell fragments	
			9					
			11					
10								2 inch ID, SCH 40 PVC CASING
			7					
			5					
			6					
			5					
12								
			5	0			@ 12 feet-same as above	
			5					
			5					
			4					
14								
			3					
			4	0.2			SAND (SP), brown (10YR 5/3), medium dense, wet, 10 to 15% fines, very fine to fine sand, moderate to high est K	
			4					
16								
			4					
			3					
			4	0.4				
			4					
18								
			4					
			3					
							@ 19 feet-same as above	

DRILLING METHOD/RIG TYPE SS-15-II/ARCH
HOLE DIAMETER 7.25 INCHES
TOTAL DEPTH OF BORING 87 FEET

DRILLING CONTRACTOR/DRILLER WATER DEV./K. CHIVRELLS
BIT TYPE 7" TRICONE AIR ROTARY CASING HAMMER
WELL COMPLETION DEPTH 79.5

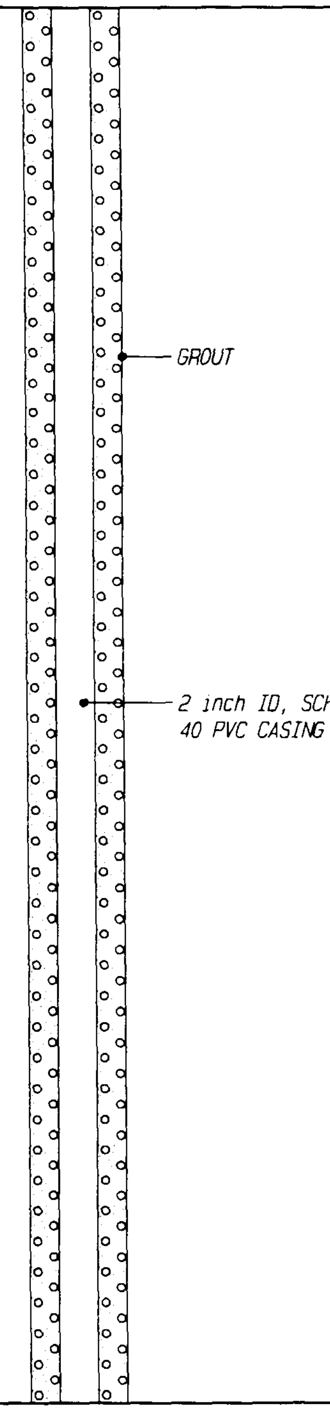
JAMES M. MONTGOMERY
CONSULTING ENGINEERS, INC.

365 LENNON LANE, WALNUT CREEK, CALIFORNIA, 94598 / (415) 975-3400

BORING/WELL NUMBER M-013C
DATE STARTED 5/24/91 COMPLETED 5/29/91
REF. ELEVATION 8.52 SURFACE ELEVATION

CLIENT PRC/US NAVY
PROJECT/JMM PROJECT NO. NAS ALAMEDA/2738.0213
GEOLOGIST RICH HALKET

DEPTH feet	SAMPLE	SAMP. NO.	BLOWS/6 IN	HNU-PID meter units	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	COMMENTS
22						SP	SAND (SP), brown (10YR 5/3), medium dense, wet, 10 to 15% fines, very fine to fine sand, moderate to high est K	
24	X		13 18 14 24	0		GC	clayey GRAVEL (GC), gray (5Y 5/1), medium dense, wet, 10-25% fines, low to moderate est K, granule clasts	GROUT
26	X		7 4 2 4	0.2				
28								
30						SM	(rig behavior/cuttings)	2 inch ID, SCH 40 PVC CASING
32								
34	X		1 1 1 1	0.2			silty SAND (SM), green gray (5Y 4/2), loose, wet, 15 to 20% fines, very fine to fine sand, moderate est K, heaving sand	
36								
38							@ 39 feet-same as above (cuttings), heaving sands	



LOG OF SOIL BORINGM-013C (continued)

JAMES M. MONTGOMERY
CONSULTING ENGINEERS, INC.
365 LENNON LANE, WALNUT CREEK, CALIFORNIA, 94598 / (415) 975-3400

BORING/WELL NUMBER M-013C
DATE STARTED 5/24/91 COMPLETED 5/29/91
REF. ELEVATION 8.52 SURFACE ELEVATION
CLIENT PRC/US NAVY
PROJECT/JMM PROJECT NO. NAS ALAMEDA/2738.0213
GEOLOGIST RICH HALKET

DEPTH feet	SAMPLE	SAMP. NO.	BLOWS/6 IN	HNU-PID meter units	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	COMMENTS
						SM	silty SAND (SM), green gray (5Y 4/2), loose, wet, 15 to 20% fines, very fine to fine sand, moderate est K, heaving sand	
42								
44								GROUT
46								
48							@ 48 feet-same as above (cuttings), heaving sands	
50								2 inch ID, SCH 40 PVC CASING
			5					
			6				silty SAND (SM), tan (5Y 5/4), very dense, wet, 15 to 20% fines, very fine to fine sand, moderate est K	
52			10					
			16					
			8					
			11					
54		CHEM	19					
			24					
56								
58								

JAMES M. MONTGOMERY
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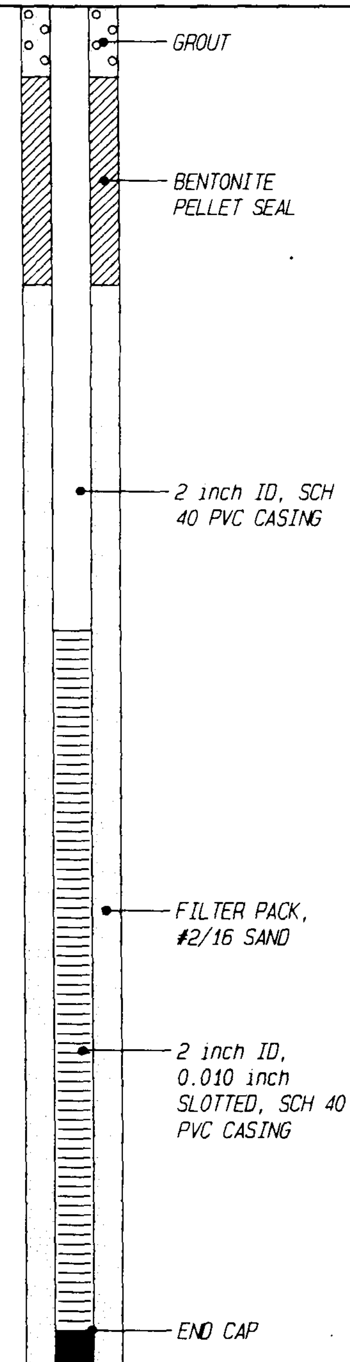
BORING/WELL NUMBER M-013C
DATE STARTED 5/24/91 COMPLETED 5/29/91
REF. ELEVATION 8.52 SURFACE ELEVATION
CLIENT PRC/US NAVY
PROJECT/JMM PROJECT NO. NAS ALAMEDA/2738.0213
GEOLOGIST RICH HALKET

DEPTH feet	SAMPLE	SAMP. NO.	BLOWS/6 IN	HNU-PID meter units	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION
			10			SM	silty SAND (SM), tan (5Y 5/4), very dense, wet, 15 to 20% fines, very fine to fine sand, moderate est K
			26				
			27				
			47				
62		GEO-TECH	10				
			10				
			21				
64							
66							
68							
		CHEM	16				
			18				
70			12				@ 70 feet-same as above, medium dense
			11				
72							
74							
76							@ 76 feet-same as above (cuttings), heaving sands
78							

COMMENTS



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BORING/WELL NUMBER M-013C
DATE STARTED 5/24/91 COMPLETED 5/29/91
REF. ELEVATION 8.52 SURFACE ELEVATION
CLIENT PRC/US NAVY
PROJECT/JMM PROJECT NO. NAS ALAMEDA/2738.0213
GEOLOGIST RICH HALKET

DEPTH feet	SAMPLE	SAMP. NO.	BLOWS/6 IN	HNU-PID meter units	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	COMMENTS
						SM	silty SAND (SM), tan (5Y 5/4), very dense, wet, 15 to 20% fines, very fine to fine sand, moderate est K	FILTER PACK, #2-16 SAND
82						CL		
	X		4				CLAY (CL), very dark gray (5Y 3/1), hard, damp, fines, low est K	
84			8					
			8					
			8			SC	clayey SAND (SC), very dark gray (5Y 3/1), very dense, damp, 40 to 50% fines, very fine to fine sand, low est K	
	X		4					
			8			CL	CLAY (CL), very dark gray (5Y 3/1), hard, damp trace of fines, low est K	
86			8					
			8					
							TOTAL DEPTH 87 feet	BOTTOM OF BORING 87 feet
88								
90								
92								
94								
96								
98								
							Note: All samples were screened with a Geiger-Mueller meter; no radiation was detected.	

LOG OF SOIL BORINGM-013C (continued)

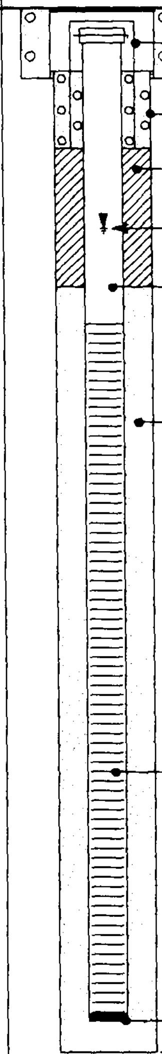
JAMES M. MONTGOMERY
CONSULTING ENGINEERS, INC.

365 LENNON LANE, WALNUT CREEK, CALIFORNIA, 94598 / (415) 975-3400

BORING/WELL NUMBER M-14A
CLIENT PRC/US NAVY
DATE STARTED 12/17/90 COMPLETED 12/17/90
PROJECT/JMM PROJECT NO. NAS ALAMEDA/2738.0143
REF. ELEVATION 8.45 SURFACE ELEVATION
GEOLOGIST CRAIG STEVENS

DEPTH feet	SAMPLE	SAMP. NO.	BLOWS/6 IN	HNU-PID meter units	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION
				0		SP	SAND (SP), light tan, loose, dry, fine to medium sand
2							@ 2 feet-same as above, damp
							@ 3 feet-same as above, moist
4							@ 4 feet-same as above, green-brown, moist
							@ 5 feet-same as above, green-brown, moist to wet
6							@ 6 feet-same as above, wet
							@ 8 feet-same as above, light green
				0			
				.7			
10							
				0.5			
				1			
12							@ 12 feet-same as above, 5 to 10% fines
				1			
				2.2			
14							
				2			
							TOTAL DEPTH 15 feet
16							
18							
							Note: All samples were screened with a Geiger-Mueller meter; no radiation was detected.

COMMENTS



DRILLING METHOD/RIG TYPE AUGER/GEFCO CF-15
DRILLING CONTRACTOR/DRILLER WATER DEV CORP/D.KRUGER
HOLE DIAMETER 7.88 INCHES
BIT TYPE SOLID STEM AUGER
TOTAL DEPTH OF BORING 15.0 FEET
WELL COMPLETION DEPTH 14.55

JAMES M. MONTGOMERY
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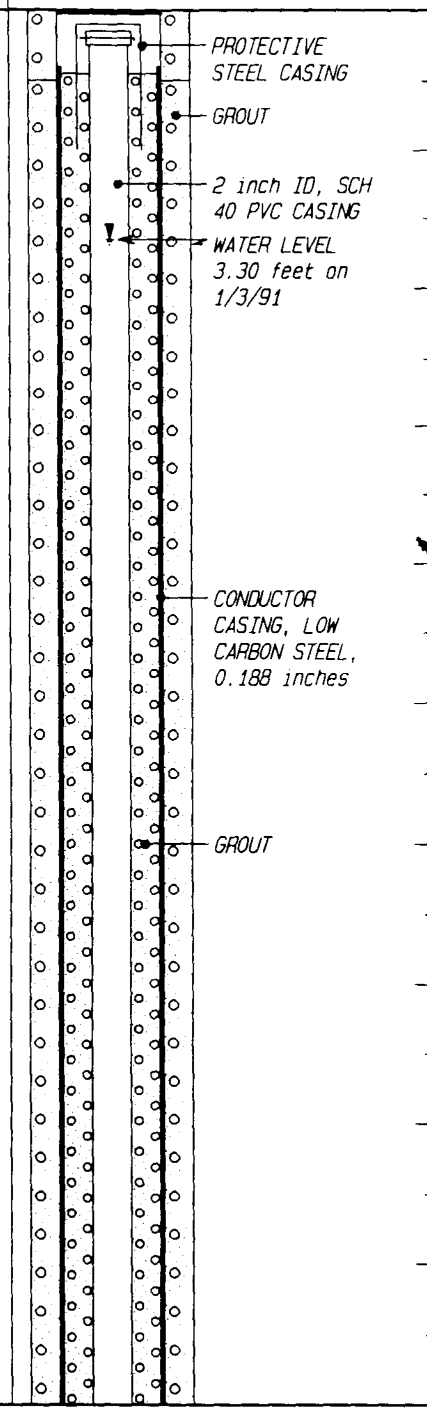
365 LENNON LANE, WALNUT CREEK, CALIFORNIA, 94598 / (415) 975-3400

BORING/WELL NUMBER M-14B
DATE STARTED 12/03/90 COMPLETED 12/14/90
REF. ELEVATION 8.50 SURFACE ELEVATION
CLIENT PRC/US NAVY
PROJECT/JMM PROJECT NO. NAS ALAMEDA/2738.0143
GEOLOGIST CRAIG STEVENS

DEPTH feet	SAMPLE	SAMP. NO.	BLOWS/6 IN	HNU-PID meter units	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION
		GRAB M14B		0		SP	SAND (SP), light tan, loose, dry, fine to medium sand
2							@ 2 feet-same as above, damp
							@ 3 feet-same as above, moist
4							@ 4 feet-same as above, green brown, moist
							@ 5 feet-same as above, green brown, moist to wet
6							@ 6 feet-same as above, wet
8							@ 8 feet-same as above, light green
				0			
				0.7			
10							
				0.5			
				1			
12							@ 12 feet-same as above, 5 to 10% fines
				1			
				2.2			
14							
				2			
				1.9			
16							
				1.2			
				1.4			
18							
				0			
				0			

COMMENTS

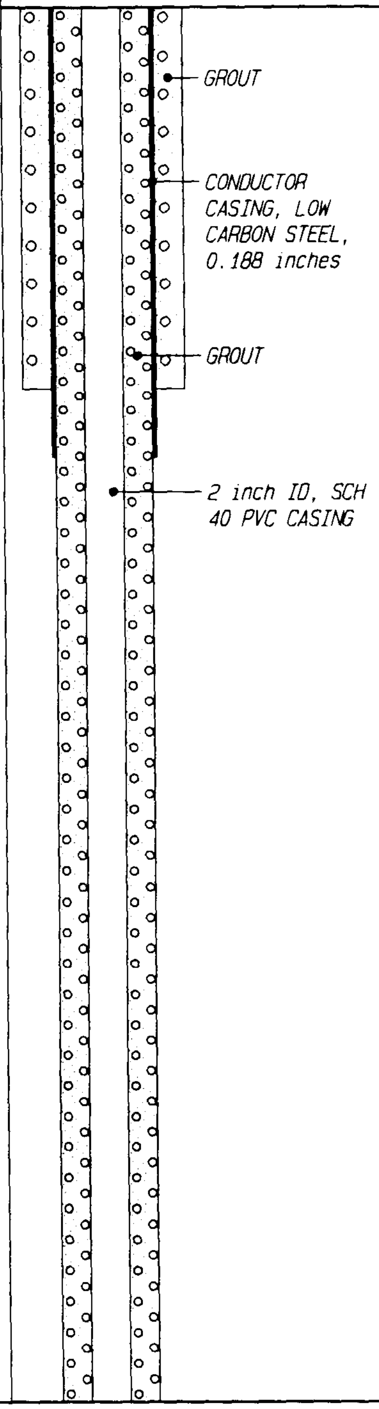


DRILLING METHOD/RIG TYPE MUD ROT./GEFCO CF-15
HOLE DIAMETER 12.25/7.88 INCHES
TOTAL DEPTH OF BORING 61 FEET
DRILLING CONTRACTOR/DRILLER WATER DEV CORP/D.KRUGER
BIT TYPE ROLLER CONE
WELL COMPLETION DEPTH 59.4

JAMES M. MONTGOMERY
CONSULTING ENGINEERS, INC.
365 LENNON LANE, WALNUT CREEK, CALIFORNIA, 94598 / (415) 975-3400

BORING/WELL NUMBER M-14B
CLIENT PRC/US NAVY
DATE STARTED 12/03/90 COMPLETED 12/14/90
PROJECT/JMM PROJECT NO. NAS ALAMEDA/2738.0143
REF. ELEVATION 8.50 SURFACE ELEVATION
GEOLOGIST CRAIG STEVENS

DEPTH feet	SAMPLE	SAMP. NO.	BLOWS/6 IN	HNU-PID meter units	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	COMMENTS
				0		SP	@ 20 feet-possible flowing sand (rig behavior)	GROUT
22				0		SC	clayey SAND (SC), gray green, soft, wet, fines, trace silt, fine sand	CONDUCTOR CASING, LOW CARBON STEEL, 0.188 inches
						CL	silty CLAY (CL), gray green, soft, wet, slight H2S/organic decay odor	
24				0		SM	silty SAND (SM), dark gray green, medium dense, wet, slight H2S odor, trace shell fragments, fine to medium sand	GROUT
26				0		SC	clayey SAND (SC), dark gray green, soft, wet, very fine sand, 20 to 30% shell fragments, slight H2S odor	2 inch ID, SCH 40 PVC CASING
				0		SM	silty SAND (SM), dark gray green, medium dense, wet, fines, fine sand, trace shell fragments	
30				0			@ 29.5 feet-3 inch silty clay bed with 1 foot of abundant shells	
32				0		SP	SAND (SP), gray green, loose to medium dense, wet, up to 10% fines, fine to medium sand, trace shell fragments	
34				0				
36				0		SC	clayey SAND (SC), gray green, medium dense, wet, fines, fine sand, trace shell fragments	
38				0				
				0				



LOG OF SOIL BORINGM-14B (continued)

JAMES M. MONTGOMERY
CONSULTING ENGINEERS, INC.
365 LENNON LANE, WALNUT CREEK, CALIFORNIA, 94598 / (415) 975-3400

BORING/WELL NUMBER M-14B
DATE STARTED 12/03/90 COMPLETED 12/14/90
REF. ELEVATION 8.50 SURFACE ELEVATION

CLIENT PRC/US NAVY
PROJECT/JMM PROJECT NO. NAS ALAMEDA/2738.0143
GEOLOGIST CRAIG STEVENS

DEPTH feet	SAMPLE	SAMP. NO.	BLOWS/6 IN	HNU-PID meter units	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	COMMENTS
						SC	clayey SAND (SC), gray green, medium dense, wet, fine sand, trace shell fragments	GROUT
42				0				
								BENTONITE PELLET SEAL
44				0		SM	silty SAND (SM), bright green, dense to very dense, moist to wet, very fine to fine sand	2 inch ID, SCH 40 PVC CASING
							@ 45 feet-same as above, yellow brown	
46				0				
				0				
48							@ 48 feet-same as above, rust colored mottling	
							@ 49 feet-same as above, loose to medium dense	
50				0			silty SAND (SM), orange/yellow brown, medium dense, wet, trace clay, fine sand	FILTER PACK, 2-16 SAND
52				0			@ 52 feet-same as above, solid rust color	
54								
				0				2 inch ID, 0.010 inch SLOTTED, SCH 40 PVC CASING
56								
58								
								END CAP

LOG OF SOIL BORINGM-14B (continued)

JAMES M.MONTGOMERY
CONSULTING ENGINEERS,INC.

365 LENNON LANE, WALNUT CREEK, CALIFORNIA, 94598 / (415) 975-3400

BORING/WELL NUMBER M-14B
DATE STARTED 12/03/90 COMPLETED 12/14/90
REF. ELEVATION 8.50 SURFACE ELEVATION
CLIENT PRC/US NAVY
PROJECT/JMM PROJECT NO. NAS ALAMEDA/2738.0143
GEOLOGIST CRAIG STEVENS

DEPTH feet	SAMPLE	SAMP. NO.	BLOWS/6 IN	HNU-PID meter units	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	COMMENTS
						SM	silty SAND (SM), orange/yellow brown, medium dense, wet, trace clay, fine sand	FILTER PACK, 2-16 SAND
							TOTAL DEPTH 61 feet	BOTTOM OF BORING 61 feet
62								
64								
66								
70								
72								
74								
76								
78								
							Note: All samples were screened with a Geiger-Mueller meter; no radiation was detected.	

LOG OF SOIL BORINGM-14B (continued)

JAMES M. MONTGOMERY
CONSULTING ENGINEERS, INC.
365 LENNON LANE, WALNUT CREEK, CALIFORNIA, 94598 / (415) 975-3400

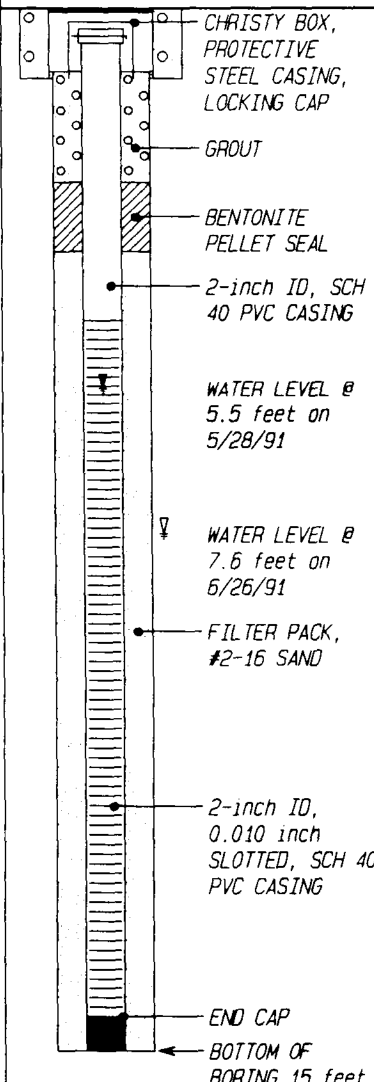
BORING/WELL NUMBER M-015A
DATE STARTED 5/28/91 COMPLETED 5/28/91
REF. ELEVATION 8.61 SURFACE ELEVATION
CLIENT PRC/US NAVY
PROJECT/JMM PROJECT NO. NAS ALAMEDA/2738.0213
GEOLOGIST CRAIG FANSHIER

SAMP. NO.	BLOWS/6 IN	HNU-PID meter units
	5	0
	11	
	12	
CHEM	6	0
	7	
	8	
CHEM	7	0
	6	
	7	
	4	0
	4	
	4	
	5	0
	6	
	7	
	7	0
	7	
	9	
	4	0
GEO-TECH	1	
	1	
	1	0
	4	
	2	
	2	
	2	
	5	

DEPTH feet	SOIL CLASS	GEOLOGIC DESCRIPTION
0	FL	FILL (FL), gravelly sand
0.5	SP	SAND (SP), light olive brown (2.5Y 5/3), loose, moist, medium sand, high est K
6	SM	silty SAND (SM), olive brown (2.5Y 4/3), loose, wet, 15 to 20% fines, fine to medium sand, moderate est K
7	SP	SAND (SP), olive brown, (2.5Y 4/3), loose, wet, trace fines, medium sand, high est K
8.5	SM	SAND (SM), olive brown (2.5Y 4/3), loose, wet, 15 to 20% fines, fine to medium sand, moderate est K
9	SP	SAND (SP), light olive brown (2.5Y 5/3), medium dense, wet, medium sand, high est K
14		@ 14 feet-same as above
15		TOTAL DEPTH 15 feet

Note: All samples were screened with a Geiger-Mueller meter; no radiation was detected.

COMMENTS



DRILLING METHOD/RIG TYPE AUGER/CME 750
HOLE DIAMETER 8.0 INCHES
TOTAL DEPTH OF BORING 15 FEET
DRILLING CONTRACTOR/DRILLER WATER DEV./M. PETERSON
BIT TYPE HOLLOW STEM AUGER
WELL COMPLETION DEPTH 15

JAMES M. MONTGOMERY
CONSULTING ENGINEERS, INC.

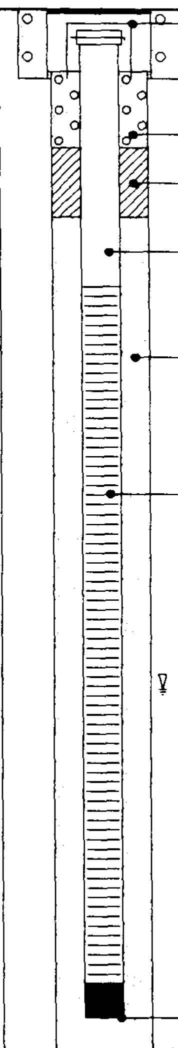
365 LENNON LANE, WALNUT CREEK, CALIFORNIA, 94598 / (415) 975-3400

BORING/WELL NUMBER M-016A
CLIENT PRC/US NAVY
DATE STARTED 5/22/91 COMPLETED 5/22/91
PROJECT/JMM PROJECT NO. NAS ALAMEDA/27[illegible]0213
REF. ELEVATION 10.04 SURFACE ELEVATION
GEOLOGIST CRAIG FANSHIER

DEPTH feet	SAMP. NO.	BLOWS/6 IN	HNU-PID meter units	SOIL CLASS	GEOLOGIC DESCRIPTION
0–1.5		14, 9, 11	0	SP	SAND (SP), grayish brown (2.5Y 4/2), loose, dry, 10% fines, very fine to medium sand, 10% gravel, high est K
1.5–3		10, 12, 10	0		SAND (SP), grayish brown (2.5Y 5/2), loose, dry, trace fines, fine to medium sand, high est K
3–4.5	CHEM	9, 11, 10	0		
4.5–6		3, 7, 7	0		@ 4.5 feet-same as above, moist
6–7.5		7, 7, 6	0		@ 6 feet-same as above, damp
7.5–9		3, 5, 4	0		SAND (SP), black (2.5Y 2/0), loose, saturated, trace fines, fine to medium sand, subrounded
10–11.5	GEO-TECH	3, 4, 1			
11.5–13		4, 4, 3			SAND (SP), very dark gray (5Y 3/1), loose, wet, trace fines, medium sand, subrounded, high est K
13–14.5		4, 3, 3			
15					TOTAL DEPTH 15 feet

Note: All samples were screened with a Geiger-Mueller meter; no radiation was detected.

COMMENTS



DRILLING METHOD/RIG TYPE AUGER/CME 750
DRILLING CONTRACTOR/DRILLER WATER DEV./M. PETERSON
HOLE DIAMETER 8.0 INCHES
BIT TYPE HOLLOW STEM AUGER
TOTAL DEPTH OF BORING 15 FEET
WELL COMPLETION DEPTH 14.5

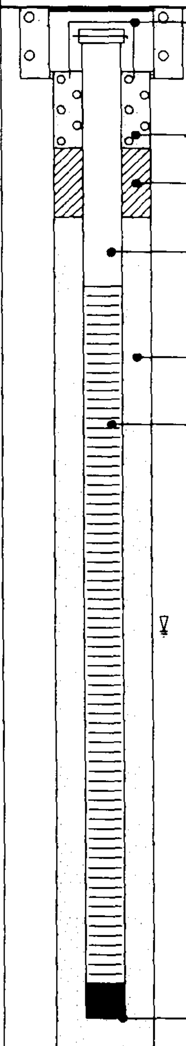
JAMES M. MONTGOMERY
CONSULTING ENGINEERS, INC.

365 LENNON LANE, WALNUT CREEK, CALIFORNIA, 94598 / (415) 975-3400

BORING/WELL NUMBER M-017A
DATE STARTED 5/22/91 COMPLETED 5/22/91
REF. ELEVATION 10.21 SURFACE ELEVATION

CLIENT PRC/US NAVY
PROJECT/JMM PROJECT NO. NAS ALAMEDA/2738.0213
GEOLOGIST CRAIG FANSHIER

DEPTH feet	SAMPLE	SAMP. NO.	BLOWS/6 IN	HNU-PID meter units	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	COMMENTS
						GP		CHRISTY BOX, PROTECTIVE STEEL CASING, LOCKING CAP
			7	0			sandy GRAVEL (GP), loose, dry, fine to medium sand, fill	
			6			CL	silty CLAY (CL), verydark gray (10YR 3/1), medium stiff, dry, 40% silt, low est K	
			5			SP	SAND (SP), dark grayish brown (2.5Y 4/2), loose, dry, fine to medium sand, high est K	GROUT
2								
			5					BENTONITE PELLET SEAL
			7					
			5					2-inch ID, SCH 40 PVC CASING
			6	0				
4								
		CHEM	5	0				
			7					FILTER PACK #2-16 SAND
			5	0			@ 5 feet-same as above, slight layering	
			6					
6								2-inch ID, 0.010 inch SLOTTED, SCH 40 PVC CASING
			7					
			5	0				
			6					
			7					
8								
			5	0				
			6					
			7				SAND (SP), very dark gray (5Y 3/1), loose, wet, trace fines, fine to medium sand, trace shell fragments	WATER LEVEL @ 9.0 feet on 6/19/91
10								
			2	0				
		GEO-TECH	1			CL	silty CLAY (CL), very dark gray (2.5Y 3/0), soft, wet	
			5			SP	SAND (SP), very dark olive gray (5Y 3/2), loose, wet, trace fines, medium sand, high est K	
			2					
12								
			5				SAND (SP), dark olive gray (5Y 3/2), loose, wet, trace fines, medium sand, mostly rounded	
			5					
			2					
			1					
14								
			1					END CAP
							TOTAL DEPTH 15 feet	BOTTOM OF BORING 15 feet
16								
18								
							Note: All samples were screened with a Geiger-Mueller meter; no radiation was detected.	



DRILLING METHOD/RIG TYPE AUGER/CME 750
HOLE DIAMETER 8.0 INCHES
TOTAL DEPTH OF BORING 15 FEET

DRILLING CONTRACTOR/DRILLER WATER DEV./M. PETERSON
BIT TYPE HOLLOW STEM AUGER
WELL COMPLETION DEPTH 14.5

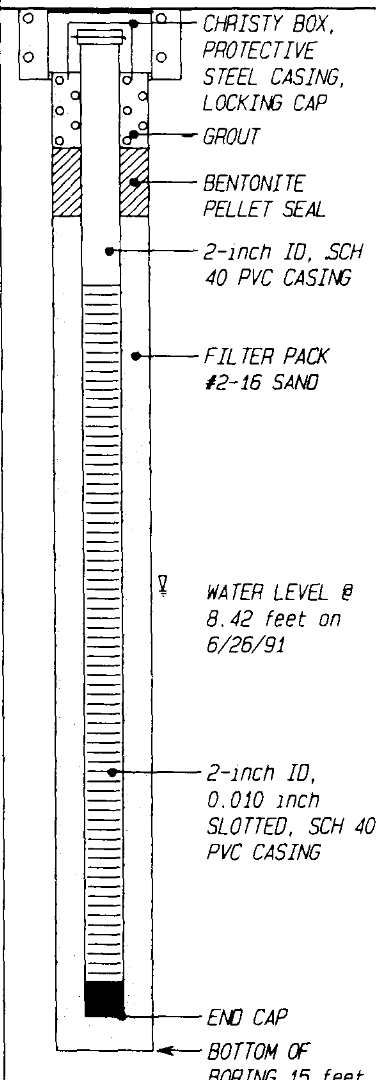
JAMES M. MONTGOMERY
CONSULTING ENGINEERS, INC.
365 LENNON LANE, WALNUT CREEK, CALIFORNIA, 94598 / (415) 975-3400

BORING/WELL NUMBER M-018A
DATE STARTED 5/22/91 COMPLETED 5/22/91
REF. ELEVATION 8.98 SURFACE ELEVATION

CLIENT PRC/US NAVY
PROJECT/JMM PROJECT NO. NAS ALAMEDA/2738.0213
GEOLOGIST CRAIG FANSHIER

DEPTH feet	SAMPLE	SAMP. NO.	BLOWS/6 IN	HNU-PID meter units	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION
0						SP	gravelly SAND (SP), loose, dry, very fine to fine sand, high est K
							SAND (SP), olive brown (2.5Y 4/3), loose, dry to moist, fine to medium sand, slight subrounded to rounded, moderate est K
2							
3	■	CHEM	6	0			SAND (SP), olive brown (2.5Y 4/3), loose, dry, fine sand, trace fines, moderate to high est K
4			6				
			7				
			6				
5			6	0			
			7				
6							@ 6 feet-same as above, moist
8							
10	■	GEO-TECH	4	0			SAND (SP), dark olive gray (5Y 3/2), loose, wet, 10% silt, fine to medium sand, angular, shell fragments
			2				
			5				
12							
14							
15							TOTAL DEPTH 15 feet
16							
18							
							Note: All samples were screened with a Geiger-Mueller meter; no radiation was detected.

COMMENTS



DRILLING METHOD/RIG TYPE AUGER/CME 750
HOLE DIAMETER 8.0 INCHES
TOTAL DEPTH OF BORING 15 FEET

DRILLING CONTRACTOR/DRILLER WATER DEV./M. PETERSON
BIT TYPE HOLLOW STEM AUGER
WELL COMPLETION DEPTH 14.5

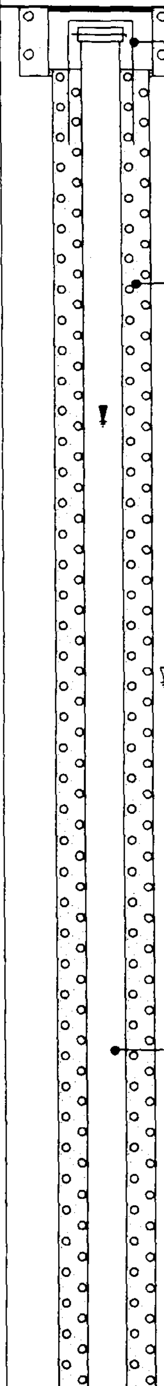
JAMES M. MONTGOMERY
CONSULTING ENGINEERS, INC.
365 LENNON LANE, WALNUT CREEK, CALIFORNIA, 94598 / (415) 975-3400

BORING/WELL NUMBER M-018E
DATE STARTED 5/21/91 COMPLETED 5/21/91
REF. ELEVATION 8.68 SURFACE ELEVATION

CLIENT PRC/US NAVY
PROJECT/JMM PROJECT NO. NAS ALAMEDA/2738.0213
GEOLOGIST CRAIG FANSHIER

DEPTH feet	SAMPLE	SAMP. NO.	BLOWS/6 IN	HNU-PID meter units	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION
						SP	
			7	0			gravelly SAND (SP), loose, dry, very fine to fine sand, pebble to cobble gravel clasts, high est K
			10				
			9				SAND (SP), olive brown (2.5Y 4/3), loose, dry, trace fines, fine to medium sand, subrounded to rounded, moderate est K
2		CHEM	5				
			4				
			5				
		CHEM	3				
4			5				
			3	0			@ 4.5 feet-same as above
			5				
			4				
6			5				
			7				
			4				
			5				
8			3				SAND (SP), olive brown (5Y 4/3), loose, moist, trace fines, medium sand, angular to subrounded
			2				
			2				
10						CL	silty CLAY (CL), olive brown (5Y 4/3), brown mottling, soft, moist, 50% silt, low est K
			2	0		SP	SAND (SP), olive brown (5Y 4/3), loose, wet, trace fines, medium sand, trace shell fragments, high est K
			4				
			5				
			2				
12			1				
			1				
			1				SAND (SP), dark olive gray (5Y 3/2), very loose, wet, medium sand, angular to subangular, high est K
			0				
14			1				
			3	0			
16			1				
			1				
			2				
			1				
18			1				
			4				@ 18 feet-same as above, fine sand
			2				
			3				
			5	0			

COMMENTS



DRILLING METHOD/RIG TYPE AUGER/CME 750
HOLE DIAMETER 8.0 INCHES
TOTAL DEPTH OF BORING 50 FEET

DRILLING CONTRACTOR/DRILLER WATER DEV./M. PETERSON
BIT TYPE HOLLOW STEM AUGER
WELL COMPLETION DEPTH 46.5

JAMES M. MONTGOMERY
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365 LENNON LANE, WALNUT CREEK, CALIFORNIA, 94598 / (415) 975-3400

BORING/WELL NUMBER M-018E
DATE STARTED 5/21/91 COMPLETED 5/21/91
REF. ELEVATION 8.68 SURFACE ELEVATION
CLIENT PRC/US NAVY
PROJECT/JMM PROJECT NO. NAS ALAMEDA/2738.0213
GEOLOGIST CRAIG FANSHIER

DEPTH feet	SAMPLE	SAMP. NO.	BLOWS/6 IN	HNU-PID meter units	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	COMMENTS
			5			SP		
			5					
			5					GROUT
22			6					
			8				SAND (SP), very dark gray (5Y 3/1), loose, wet, 5 to 10% fines, very fine to fine sand, trace shell fragments, high est K	
			2					
			3			SM	silty SAND (SM), very dark gray (5Y 3/1), loose, wet, 15 to 25% fines, very fine to fine sand, moderate est K	
24			3					
			3	0				
			3					
			4			CL	1-inch CLAY lens, black, soft, wet	2-inch ID, SCH 40 PVC CASING
26						SW	SAND (SW), very dark gray (5Y 3/1), loose, wet, fine to coarse sand, high est K	
						SP		
			5				SAND (SP), very dark gray (5Y 3/1), loose, wet, trace fines, fine to medium sand, subrounded to rounded, black clay balls	
			5					
			7					
			10					
			12					
			17					
30			9	0				
			6				@ 30 feet-same as above, very dark grayish brown (2.5Y 3/2	
			5					
32			3					BENTONITE PELLET SEAL
		CHEM	3					
			4				@ 33 feet-same as above	
34		GEO-TECH	6					
			9					
			7	0				
		DUP	3					FILTER PACK, #2/16 SAND
			3					
36			5					
		DUP	6					
			9				SAND (SP), very dark gray (5Y 3/1), loose, wet, 10% fines, fine to medium sand, high est K	
			10					
38			20					2-inch ID, 0.010 inch SLOTTED, SCH 40 PVC CASING
			28					
			30					

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BORING/WELL NUMBER M-018E
CLIENT PRC/US NAVY
DATE STARTED 5/21/91 COMPLETED 5/21/91
PROJECT/JMM PROJECT NO. NAS ALAMEDA/2738.0213
REF. ELEVATION 8.68 SURFACE ELEVATION
GEOLOGIST CRAIG FANSHIER

DEPTH feet	SAMP. NO.	BLOWS/6 IN	HNU-PID meter units	SOIL CLASS	GEOLOGIC DESCRIPTION	COMMENTS
		13	0	SP		FILTER PACK #2/16 SAND
		14		SM	silty SAND (SM), very dark gray (5Y 3/1), medium dense, 15 to 20% fines, very fine to fine sand, moderate est K	
		15				
		17				
42		27		SP	@ 42 feet-same as above, decreasing percent fines to < 10%	
		38	0			2-inch ID, 0.010 inch SLOTTED, SCH 40 PVC CASING
	GEO-TECH	11				
44		24				
		16				
	CHEM	17				
46		12				END CAP
		18				
	DUP	18		SC	clayey SAND (SC), very dark gray (5Y 3/1), hard, moist, 15% fines, medium sand, subrounded to rounded, low est K, hematite staining	
		27				
48		36				
		27				
		29				
		40				
50					TOTAL DEPTH 50 feet	BOTTOM OF BORING 50 feet
52						
54						
56						
58						

Note: All samples were screened with a Geiger-Mueller meter; no radiation was detected.

LOG OF SOIL BORINGM-018E (continued)

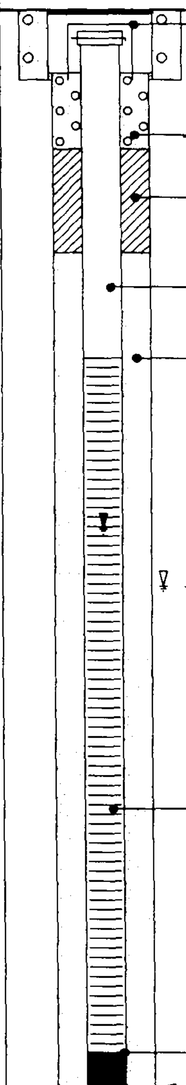
JAMES M. MONTGOMERY
CONSULTING ENGINEERS, INC.
365 LENNON LANE, WALNUT CREEK, CALIFORNIA, 94598 / (415) 975-3400

BORING/WELL NUMBER M-019A
DATE STARTED 5/17/91 COMPLETED 5/17/91
REF. ELEVATION 9.07 SURFACE ELEVATION

CLIENT PRC/US NAVY
PROJECT/JMM PROJECT NO. NAS ALAMEDA/2738.0213
GEOLOGIST DAN KRAMER

DEPTH feet	SAMPLE	SAMP. NO.	BLOWS/6 IN	HNU-PID meter units	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION
						SM	
	X		37	0			SAND (SM), loose, dry, 20 to 30% fines, very fine to fine sand, moderate to high est K
	X		37				
	X		20			SW	gravelly SAND (SW), loose, dry to slightly damp, dry to slightly damp, 15 to 25% fines, fine to medium sand, 10 to 20% gravel, pebble to cobble clasts, moderate to high est K
2	X		7	0		SP	
	X		12				
	X		11				SAND (SP), loose, damp to moist, 10% fines, medium sand, trace gravel, high est K
4	X		9				
	X		9				
	X		8	0			
	X		4				
6	X		5				
	X		8				
	X		5				
	X		4	0			@ 7 feet-wet
8	X		4				
	X		4				
	X		4				
	X		3				
10	X		4	0			
	X		4				
	X		3				
	X		3				
12	X		3				@ 12 feet-same as above
	X		2			SM	silty SAND (SM), loose, wet, 40% fines, very fine sand, low to moderate est K
	X		4	0		SP	
	X		3				SAND (SP), loose, wet, 5 to 10% fines, medium sand, high est K
14	X		4				
							TOTAL DEPTH 15.5 feet
16							
18							
							Note: All samples were screened with a Geiger-Mueller meter; no radiation was detected.

COMMENTS



DRILLING METHOD/RIG TYPE AUGER/CME 750
HOLE DIAMETER 8.0 INCHES
TOTAL DEPTH OF BORING 15.5 FEET

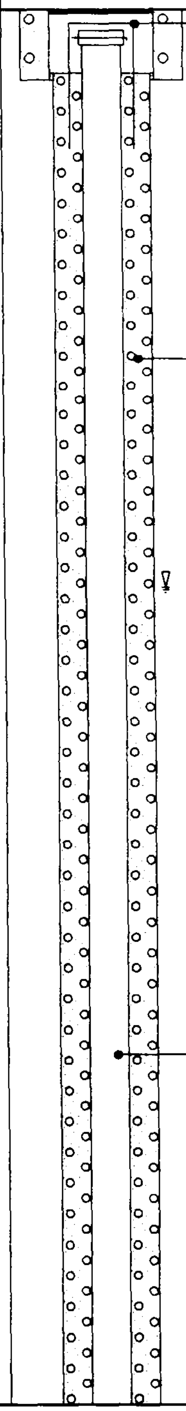
DRILLING CONTRACTOR/DRILLER WATER DEV./M. PETERSON
BIT TYPE HOLLOW STEM AUGER
WELL COMPLETION DEPTH 15.5

JAMES M. MONTGOMERY
CONSULTING ENGINEERS, INC.

365 LENNON LANE, WALNUT CREEK, CALIFORNIA, 94598 / (415) 975-3400

BORING/WELL NUMBER M-019E
DATE STARTED 5/20/91 COMPLETED 5/20/91
REF. ELEVATION 8.79 SURFACE ELEVATION
CLIENT PRC/US NAVY
PROJECT/JMM PROJECT NO. NAS ALAMEDA/2738.0213
GEOLOGIST CRAIG FANSHIER

DEPTH feet	BLOWS/6 IN	HNU-PID meter units	SOIL CLASS	GEOLOGIC DESCRIPTION	COMMENTS
	37	0	SM	SAND (SM), loose, dry, 20 to 30% fines, very fine to fine sand, moderate to high est K	CHRISTY BOX, PROTECTIVE STEEL CASING LOCKING CAP
	37				
	20		SW	gravelly SAND (SW), loose, dry to slightly damp, 15 to 25% fines, fine to medium sand, 10 to 20% gravel, pebble to cobble clasts, moderate to high est K	
2	7		SP		
	12				
	11			SAND (SP), loose, damp to moist, 10% fines, medium sand, trace gravel, high est K	
	9				
4	4				
	5				
	6	0			GROUT
	5				
6	8				
	5				
	4				
	4				
8	4				WATER LEVEL @ 8.33 feet on 7/10/91
				@ 9 feet-same as above	
10	4	0			
	4				
	3				
	3				
12	3				
	2		SM	silty SAND (SM), loose, wet, 30 to 40% fines, very fine sand, low to moderate est K	
	4		SP		
	3			SAND (SP), loose, wet, 5 to 10% fines, medium sand, high est K	
14	4				
	1	0		SAND (SP), olive gray (5Y 4/2), very loose, wet, trace fines, fine to medium sand, high est K	2-inch ID, SCH 40 PVC CASING
	1				
16	1				
	1				
	2			@ 17 feet-same as above, shell fragments	
	3				
18	12				
	12				
	8				



DRILLING METHOD/RIG TYPE AUGER/CME 750
HOLE DIAMETER 8.0 INCHES
TOTAL DEPTH OF BORING 44.5 FEET
DRILLING CONTRACTOR/DRILLER WATER DEV./M. PETERSON
BIT TYPE HOLLOW STEM AUGER
WELL COMPLETION DEPTH 41

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CONSULTING ENGINEERS, INC.

365 LENNON LANE, WALNUT CREEK, CALIFORNIA, 94598 / (415) 975-3400

BORING/WELL NUMBER M-019E
CLIENT PRC/US NAVY
DATE STARTED 5/20/91 COMPLETED 5/20/91
PROJECT/JMM PROJECT NO. NAS ALAMEDA/2738.0213
REF. ELEVATION 8.79 SURFACE ELEVATION
GEOLOGIST CRAIG FANSHIER

DEPTH feet	SAMP. NO.	BLOWS/6 IN	HNU-PID meter units	SOIL CLASS	GEOLOGIC DESCRIPTION	COMMENTS
		4 3 2	0	SP	SAND (SP), olive gray (5Y 4/2), very loose, wet, trace fines, fine to medium sand, high est K	2-inch ID, SCH 40 PVC CASING
22						
		6 6 9			SAND (SP), dark olive gray (5Y 3/2), loose, wet, trace fines, fine to medium sand, shell fragments, high est K, broken glass fragments	
24						
		2 2 4	0			
26						BENTONITE PELLET SEAL
		3 3 5			@ 27 feet-same as above, aligned shell fragments	
				CL	silty CLAY (CL), 4-inch lens	
28		2 1 2		SP	SAND (SP), very dark gray (5Y 3/1), loose, wet, trace fines, medium sand, angular to subrounded, high est K, wood fragments	
30		2 2 8	0	CL	CLAY (CL), very soft, wet, 10 to 20% silt, low est K	FILTER PACK #2-16 SAND
32		7 10 11		SP	SAND (SP), olive (5Y 5/3), loose, moist, trace fines, medium sand, subrounded, moderate est K	
34	CHEM	10 11 14			@ 34 feet-same as above, shell fragments	
	GEO-TECH	6 8 12	0		@ 35.5 feet-same as above, small pieces of wood	2-inch ID, 0.010 inch SLOTTED, SCH 40 PVC CASING
36						
38		6 4 6			SAND (SP), very dark grayish brown (2.5Y 3/2), loose, wet, 10% fines, medium sand, subrounded, moderate to high est K, trace shell fragments	

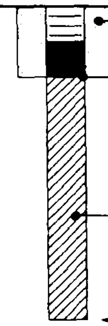
LOG OF SOIL BORINGM-019E (continued)

JAMES M. MONTGOMERY
CONSULTING ENGINEERS, INC.

365 LENNON LANE, WALNUT CREEK, CALIFORNIA, 94598 / (415) 975-3400

BORING/WELL NUMBER M-019E
DATE STARTED 5/20/91 COMPLETED 5/20/91
REF. ELEVATION 8.79 SURFACE ELEVATION
CLIENT PRC/US NAVY
PROJECT/JMM PROJECT NO. NAS ALAMEDA/2738.0213
GEOLOGIST CRAIG FANSHIER

DEPTH feet	SAMPLE	SAMP. NO.	BLOWS/6 IN	HNU-PID meter units	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	COMMENTS
			5 3 3	0		SP	SAND (SP), very dark grayish brown (2.5Y 3/2), loose, wet, 10% fines, medium sand, subrounded, moderate to high est K, trace shell fragments	FILTER PACK #2-16 SAND END CAP
42			2 2 3			CL	slity CLAY (CL), very dark green (5Y 2.5/1), soft, wet, 20% silt, low est K, trace shell fragments	
44		GEO-TECH	3 2 2	0		SC	sandy CLAY (SC), black (5Y 2.5/1), soft, wet, very fine to fine sand, subrounded, low est K	BENTONITE PELLET SEAL
							TOTAL DEPTH 44.5 feet	BOTTOM OF BORING 44.5 feet
46								
48								
50								
52								
54								
56								
58							Note: All samples were screened with a Geiger-Mueller meter; no radiation was detected.	



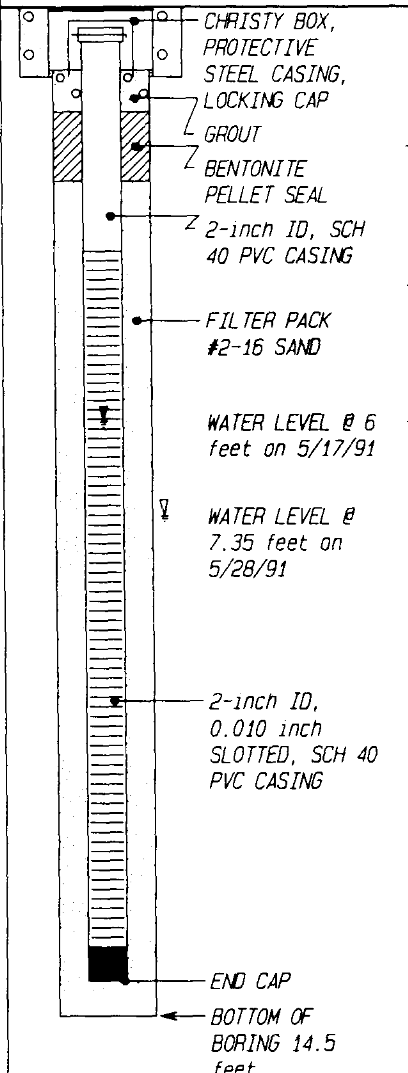
LOG OF SOIL BORINGM-019E (continued)

JAMES M. MONTGOMERY
CONSULTING ENGINEERS, INC.
365 LENNON LANE, WALNUT CREEK, CALIFORNIA, 94598 / (415) 975-3400

BORING/WELL NUMBER M-020A
DATE STARTED 5/17/91 COMPLETED 5/17/91
REF. ELEVATION 8.17 SURFACE ELEVATION
CLIENT PRC/US NAVY
PROJECT/JMM PROJECT NO. NAS ALAMEDA/2738.0213
GEOLOGIST DAN KRAMER

DEPTH feet	SAMP. NO.	BLOWS/6 IN	HNU-PID meter units	SOIL CLASS	GEOLOGIC DESCRIPTION
		11	0	SM	silty SAND (SM), light yellowish brown (10YR 6/4), loose, dry, 20% fnies, fine to medium sand, moderate to high est K
		16			
		20		SP	SAND (SP), brown (10YR 5/3), loose, moist, medium sand, high est K, very thin clay interbeds
2					
		12			
		15			
		14			
4					
		12			
		12			
		14			
		7	0		@ 5 feet-same as above
		6			
6					
		5		ML	silty CLAY (ML), very dark gray (2.5Y N3/0), medium stiff, moist, low est K
		2		SP	SAND (SP), light yellowish brown (10YR 6/4), loose, wet, medium sand, high est K
		3		ML	clayey SILT (ML), black (2.5Y N2/0), medium stiff, wet, 10 to 20% very fine sand, low to moderate est K
		2			
8					
		3			
		4			
		2			
10					
	GEO-TECH	3	0		
		5			
		8		SP	SAND (SP), black (2.5Y N2/0), loose, wet, trace fines, fine to medium sand, high est K
		2			
12					
		2			
		1			
		1		ML	clayey SILT (ML), black (2.5Y N2/0), soft, moist, trace fine sands, low est K
		3			
14					
		2	0	SP	SAND (SP), dark gray (5Y 4/2), loose, wet, 15 to 25% fines, very fine to fine sand, high est K, coarsens downward to fine to medium sand, with 10% fines
					TOTAL DEPTH 14.5 feet
16					
18					
					Note: All samples were screened with a Geiger-Mueller meter; no radiation was detected.

COMMENTS



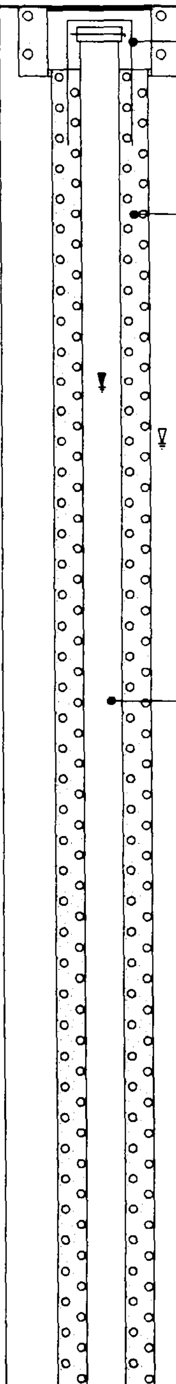
DRILLING METHOD/RIG TYPE AUGER/CME 750
HOLE DIAMETER 8.0 INCHES
TOTAL DEPTH OF BORING 14.5 FEET
DRILLING CONTRACTOR/DRILLER WATER DEV./M. PETERSON
BIT TYPE HOLLOW STEM AUGER
WELL COMPLETION DEPTH 14

JAMES M. MONTGOMERY
CONSULTING ENGINEERS, INC.

365 LENNON LANE, WALNUT CREEK, CALIFORNIA, 94598 / (415) 975-3400

BORING/WELL NUMBER M-020B
DATE STARTED 5/20/91 COMPLETED 5/21/91
REF. ELEVATION 8.35 SURFACE ELEVATION
CLIENT PRC/US NAVY
PROJECT/JMM PROJECT NO. NAS ALAMEDA/2738.0213
GEOLOGIST RICH HALKET

DEPTH feet	SAMPLE	SAMP. NO.	BLOWS/6 IN	HNU-PID meter units	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	COMMENTS
			11	0		SM	silty SAND (SM), light yellowish brown (10YR 6/4), loose, dry, 15 to 25% fines, fine to medium sand, moderate to high est K	CHRISTY BOX, PROTECTIVE STEEL CASING, LOCKING CAP
			16					
			20			SP		
2			12				SAND (SP), brown (10YR 5/3), loose, moist, medium sand, high est K, very thin clay interbeds	
			15					
			14					GROUT
4			12					
			12					
			14					
			7	0			@ 5 feet-same as above	
6			6					WATER LEVEL @ 5.5 feet on 5/20/91
			5			ML	silty CLAY (ML), very dark gray (2.5Y N3/0), medium stiff, moist, low est K	
			2			SP		WATER LEVEL @ 6.33 feet on 5/28/91
			3			ML	SAND (SP), light yellowish brown (10YR 6/4), loose, wet, medium sand, high est K	
8			2					
			3				clayey SILT (ML), black (2.5Y N2/0), medium stiff, wet, 10 to 20% very fine sand, low to moderate est K	
			4					
			2					
10			3	0				2-inch ID, SCH 40 PVC CASING
			5					
			8			SP	SAND (SP), black (2.5Y N2/0), loose, wet, trace fines, fine to medium sand, high est K estimated K	
12			2					
			2					
			1					
			1			ML	clayey SILT (ML), black (2.5Y N2/0), soft moist, trace fine sands, low est K	
14			3					
			2			SP	SAND (SP), dark gray (5Y 4/2), loose, wet, 15 to 25% fines, very fine to fine sand, high est K, coarsens downward to fine to medium sand, with 10% fines	
			2	0				
16			1					
			1					
			1					
			1					
18			1					
			1				@ 18 feet-same as above	
			2					
			1	0				



DRILLING METHOD/RIG TYPE SS-15-II/ARCH
HOLE DIAMETER 7.25 INCHES
TOTAL DEPTH OF BORING 92 FEET
DRILLING CONTRACTOR/DRILLER WATER DEV./K. CHIVRELLE
BIT TYPE 7" TRICONE AIR ROTARY CASING HAMMER
WELL COMPLETION DEPTH 65.5

JAMES M. MONTGOMERY
CONSULTING ENGINEERS, INC.
365 LENNON LANE, WALNUT CREEK, CALIFORNIA, 94598 / (415) 975-3400

BORING/WELL NUMBER M-020B
DATE STARTED 5/20/91 COMPLETED 5/21/91
REF. ELEVATION 8.35 SURFACE ELEVATION
CLIENT PRC/US NAVY
PROJECT/JMM PROJECT NO. NAS ALAMEDA/2738.0213
GEOLOGIST RICH HALKET

DEPTH feet	SAMPLE	SAMP. NO.	BLOWS/6 IN	HNU-PID meter units	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	COMMENTS
			PUSH			SP	SAND (SP), dark gray (5Y 4/2), loose, wet, 15 to 15% fines, very fine to fine sand, high est K, coarsens downward to fine to medium sand, with 10% fines	
22			PUSH					
			PUSH					
24						CL	CLAY (CL), dark gray (5Y 4/1), soft, wet, low est K	
			PUSH					2-inch ID, SCH 40 PVC CASING
26								
			1					
			1					
			2					
28			1			SP	SAND (SP), dark olive gray (5Y 3/2), loose, wet, fine to medium sand, high est K	
			1					
			3			CL	CLAY (CL), dark gray (5Y 4/1), soft, moist, low est K	
30			2	0		SP	SAND (SP), dark olive gray (5Y 5/2), loose, wet, 5% fines, fine to medium sand, high est K	GROUT
			4					
			4					
32			19					
			12					
			7					
			3				@ 33 feet-4-inch thick silty SAND lens, reddish yellow (7.5YR 7/8)	
34			2					
			2					
			1	0		CL	CLAY (CL), black (2.5Y 2/0), soft, wet, low est K, shell fragments to 30%	
36			1					
			2					
			3					
			2	0.2			CLAY (CL), very dark gray (5Y 3/1), medium stiff, damp, low est K	
38			2					
			4					
			4	0.2				
			2	0.2			@ 39 feet-same as above, trace shell fragments	
			2					

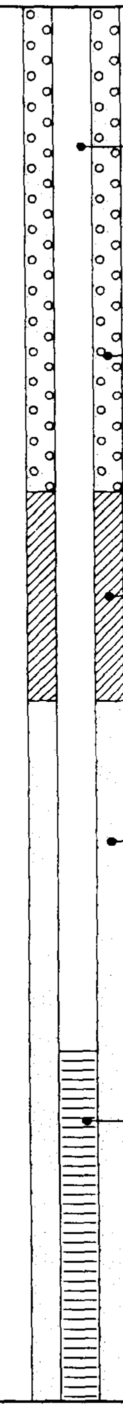
LOG OF SOIL BORINGM-020B (continued)

JAMES M. MONTGOMERY
CONSULTING ENGINEERS, INC.

365 LENNON LANE, WALNUT CREEK, CALIFORNIA, 94598 / (415) 975-3400

BORING/WELL NUMBER M-020B
DATE STARTED 5/20/91 COMPLETED 5/21/91
REF. ELEVATION 8.35 SURFACE ELEVATION
CLIENT PRC/US NAVY
PROJECT/JMM PROJECT NO. NAS ALAMEDA/2738.0213
GEOLOGIST RICH HALKET

DEPTH feet	SAMPLE	SAMP. NO.	BLOWS/6 IN	HNU-PID meter units	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	COMMENTS
			2			CL		
			2				CLAY (CL), very dark gray (5Y 3/1), medium stiff, damp, low est K	
42			DRILL to 46'					2-inch ID, SCH 40 PVC CASING
44								GROUT
46			2					
			2					
			4	0.2		SC	clayey SAND (SC), very dark gray (5Y 3/1), medium dense, damp, 15 to 20% fines, very fine to fine sand, low to moderate est K	
			5					
48			8					BENTONITE PELLET SEAL
			8					
			8	0.2				
			17					
50			DRILL to 55'					
52								FILTER PACK, #2-16 SAND
54							SAND (SC), olive gray (5Y 3/2), medium dense, wet, 10 to 15% fines, very fine to fine sand, moderate est K	
			1	0.2				
56			2					2-inch ID, 0.010 inch SLOTTED, SCH 40 PVC CASING
			2					
			2					
		CHEM	2	0.4				
58			2					
			2					
			2					

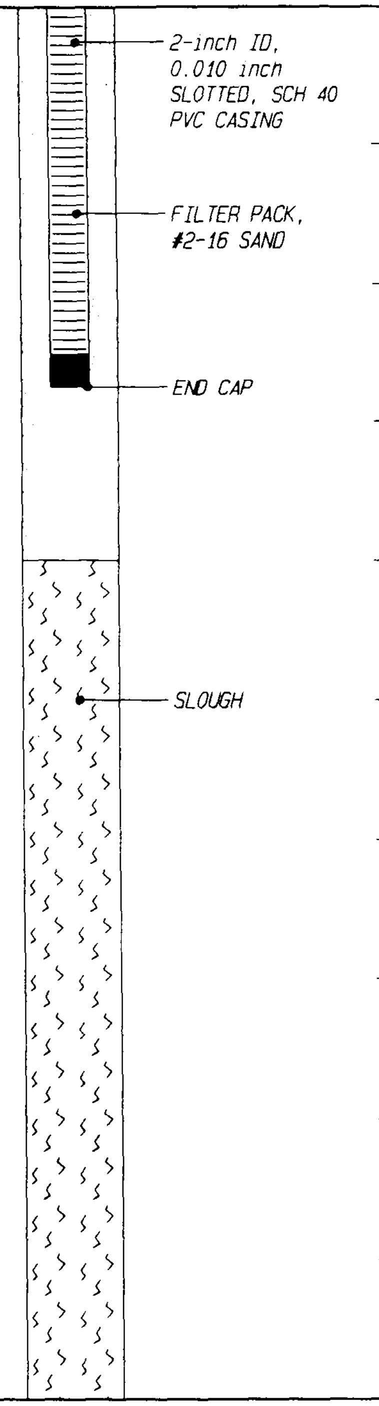


JAMES M. MONTGOMERY
CONSULTING ENGINEERS, INC.
365 LENNON LANE, WALNUT CREEK, CALIFORNIA, 94598 / (415) 975-3400

BORING/WELL NUMBER M-020B
DATE STARTED 5/20/91 COMPLETED 5/21/91
REF. ELEVATION 8.35 SURFACE ELEVATION
CLIENT PRC/US NAVY
PROJECT/JMM PROJECT NO. NAS ALAMEDA/2738.0213
GEOLOGIST RICH HALKET

DEPTH feet	SAMPLE	SAMP. NO.	BLOWS/6 IN	HNU-PID meter units	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION
			DRILL to 67'			SC	SAND (SC), olive gray (5Y 3/2), medium dense, wet, 10 to 15% fines, very fine to fine sand, moderate est K
62							
64							
66							
	X		14	0.2		SM	silty SAND (SM), olive gray (5Y 3/2), very dense, 15 to 20% fines, very fine to fine sand, moderate est K
			27				
68	X		8	0.2			
			12				
70			DRILL to 77'				@ 70 feet-same as above, flowing sands
72							
74							@ 75 feet-same as above, no flowing sands
76							
	X		9	0.2			
78			30				
			DRILL to 83'				

COMMENTS



LOG OF SOIL BORINGM-020B (continued)

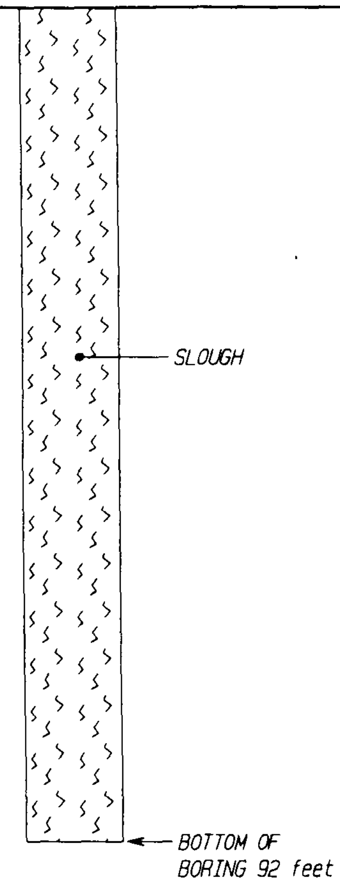
JAMES M. MONTGOMERY
CONSULTING ENGINEERS, INC.
365 LENNON LANE, WALNUT CREEK, CALIFORNIA, 94598 / (415) 975-3400

BORING/WELL NUMBER M-020B
DATE STARTED 5/20/91 COMPLETED 5/21/91
REF. ELEVATION 8.35 SURFACE ELEVATION

CLIENT PRC/US NAVY
PROJECT/JMM PROJECT NO. NAS ALAMEDA/2738.0213
GEOLOGIST RICH HALKET

DEPTH feet	SAMPLE	SAMP. NO.	BLOWS/6 IN	HNU-PID meter units	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION
80–82						SM	silty SAND (SM), olive gray (5Y 3/2), very dense, 15 to 20% fines, very fine to fine sand, moderate est K
83–84	☒		9 10 DRILL to 89'				silty SAND (SM), olive (5Y 5/3), very dense, wet, 15 to 20% fines, fine sand, moderate est K, minor Fe staining
86							
88							
89–90	☒ ■ ☒	GEO-TECH	4 6 9 13 8 10			CL	CLAY (CL), black (5Y 2.5/1), hard, moist, low est K, organic stringers
92							TOTAL DEPTH 92 feet
94							
96							
98							Note: All samples were screened with a Geiger-Mueller meter; no radiation was detected.

COMMENTS



LOG OF SOIL BORINGM-020B (continued)

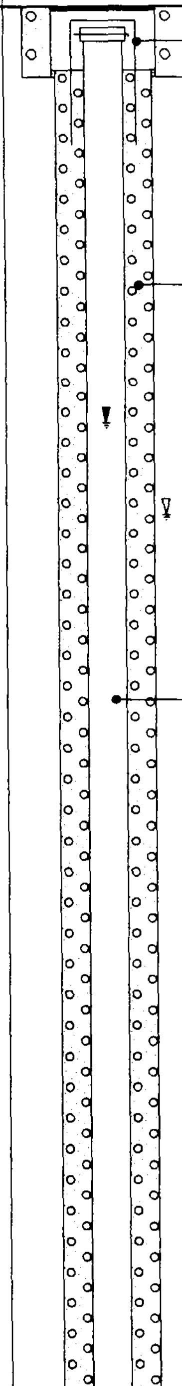
JAMES M. MONTGOMERY
CONSULTING ENGINEERS, INC.

365 LENNON LANE, WALNUT CREEK, CALIFORNIA, 94598 / (415) 975-3400

BORING/WELL NUMBER M-020E
DATE STARTED 5/16/91 COMPLETED 5/16/91
REF. ELEVATION 8.11 SURFACE ELEVATION

CLIENT PRC/US NAVY
PROJECT/JMM PROJECT NO. NAS ALAMEDA/2738.0213
GEOLOGIST DAN KRAMER

DEPTH feet	BLOWS/6 IN	HNU-PID meter units	SOIL CLASS	GEOLOGIC DESCRIPTION	COMMENTS
	11	0	SM	silty SAND (SM), light yellowish brown (10YR 6/4), loose, dry, 15 to 25% fines, fine to medium sand, moderate to high est K	CHRISTY BOX, PROTECTIVE STEEL CASING, LOCKING CAP
	16				
	20		SP	SAND (SP), brown (10YR 5/3), loose, moist, medium sand, high est K, very thin clay interbeds	
2	12				
	15				
	14				
	12				
4	12				GROUT
	14				
	7	0		@ 5 feet-same as above	
	6				
6	5		ML	silty CLAY (ML), very dark gray (2.5Y N3/0), medium stiff, moist, low est K	WATER LEVEL @ 6 feet on 5/16/91
	2		SP	SAND (SP), light yellowish brown (10YR 6/4), loose, wet, medium sand, high est K	
	3		ML		WATER LEVEL @ 7.33 feet on 5/29/91
	2				
8	3			clayey SILT (ML), black (2.5Y N2/0), medium stiff, wet, 10 to 20% very fine sand, low to moderate est K	
	4				
	2				
10	3	0			2-inch ID, SCH 40 PVC CASING
	5				
	8		SP	SAND (SP), black (2.5Y N2/0), loose, wet, trace fines, fine to medium sand, high est K	
	2				
12	2				
	1				
	1		ML	clayey SILT (ML), black (2.5Y N2/0), soft moist, trace fine sands, low est K	
	3				
14	2		SP	SAND (SP), dark gray (5Y 4/2), loose, wet, 15 to 25% fines, very fine to fine sand, high est K, coarsens downward to fine to medium sand, with 10% fines	
	2	0			
	1				
16	1				
	1				
	1				
	1				
18	1			@ 18 feet-same as above	
	2				
	1	0			



DRILLING METHOD/RIG TYPE AUGER/CME 750
HOLE DIAMETER 8.0 INCHES
TOTAL DEPTH OF BORING 39.5 FEET

DRILLING CONTRACTOR/DRILLER WATER DEV./M. PETERSON
BIT TYPE HOLLOW STEM AUGER
WELL COMPLETION DEPTH 35

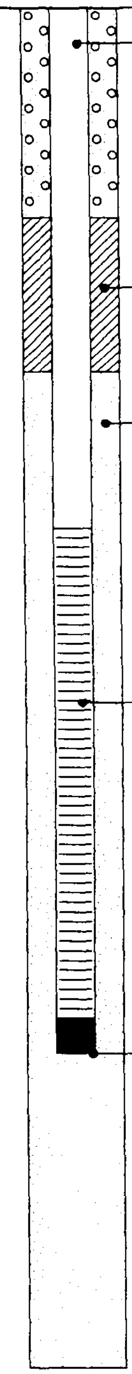
JAMES M. MONTGOMERY CONSULTING ENGINEERS, INC.

365 LENNON LANE, WALNUT CREEK, CALIFORNIA, 94598 / (415) 975-3400

BORING/WELL NUMBER M-020E
CLIENT PRC/US NAVY
DATE STARTED 5/16/91 COMPLETED 5/16/91
PROJECT/JMM PROJECT NO. NAS ALAMEDA/2738.0213
REF. ELEVATION 8.11 SURFACE ELEVATION
GEOLOGIST DAN KRAMER

DEPTH feet	SAMP. NO.	BLOWS/6 IN	HNU-PID meter units	SOIL CLASS	GEOLOGIC DESCRIPTION
20–24		PUSH, PUSH, PUSH		SP	SAND (SP), dark gray (5Y 4/2), loose, wet, 15 to 25% fines, very fine to fine sand, high est K, coarsens downward to fine to medium sand, with 10% fines
24–28		PUSH, 1, 1, 2		CL	CLAY (CL), dark gray (5Y 4/1), soft, wet, low est K
28–29		1, 1		SP	SAND (SP), dark olive gray (5Y 3/2), loose, wet, fine to medium sand, high est K
29–30		3		CL	CLAY (CL), dark gray (5Y 4/1), soft, moist, low est K
30–35	GEO-TECH; CHEM	2, 4, 4, 19, 12, 7, 3, 2, 2	0	SP	SAND (SP), dark olive gray (5Y 5/2), loose, wet, 5% fines, fine to medium sand, high est K @ 33 feet-4-inch thick silty SAND lens, reddish yellow (7.5YR 7/8)
35–39.5	GEO-TECH	1, 1, 2, 3, 3, 1, 2, 1	0, 0	CL	CLAY (CL), black (2.5Y 2/0), soft, wet, low est K, shell fragments to 30% TOTAL DEPTH 39.5 feet Note: All samples were screened with a Geiger-Mueller meter; no radiation was detected.

COMMENTS



LOG OF SOIL BORINGM-020E (continued)

JAMES M. MONTGOMERY
CONSULTING ENGINEERS, INC.

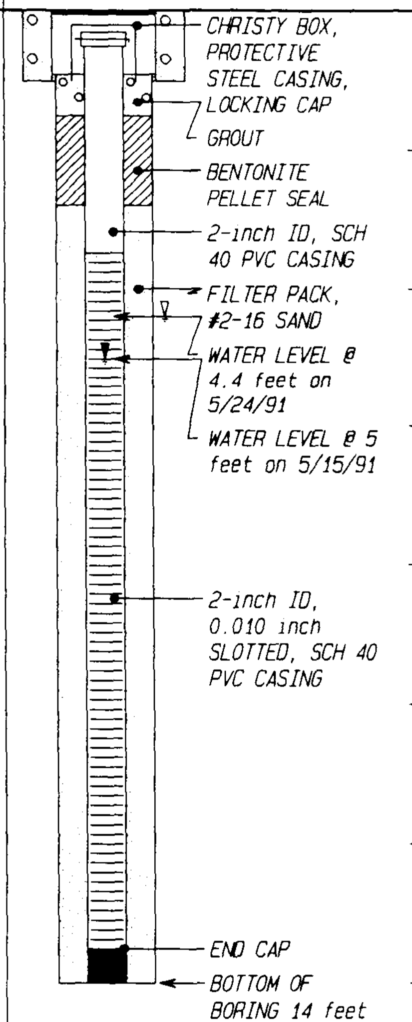
365 LENNON LANE, WALNUT CREEK, CALIFORNIA, 94598 / (415) 975-3400

BORING/WELL NUMBER M-021A
CLIENT PRC/US NAVY
DATE STARTED 5/15/91 COMPLETED 5/15/91
PROJECT/JMM PROJECT NO. NAS ALAMEDA/2738.0213
REF. ELEVATION 6.46 SURFACE ELEVATION
GEOLOGIST DAN KRAMER

DEPTH feet	SAMP. NO.	BLOWS/6 IN	HNU-PID meter units	SOIL CLASS	GEOLOGIC DESCRIPTION
		5		SP	SAND (SP), light yellowish brown (2.5Y 6/3), loose, dry, 15% fines, very fine to medium sand, trace shell fragments, high est K
		9	8		
		11			
2		4			
		5	4		
		6			
		4			
4		4	2		SAND (SP), dark gray (5Y 4/1), loose, wet, medium to coarse sand, thin clay lenses
		5			
		4		SM	silty SAND (SM), very dark gray (5Y 3/1), loose, wet, 20 to 30% fines, fine to medium sand
		4	8		
6		8		GM	gravelly SAND (GM), very dark gray to black (5Y (5Y 3/1, 2/0), loose, wet, fine to medium sand, 20 to 35% gravel, clay nodules and lenses
		3			
		3	5.1		
		6			
8		60/4"	32		
					gravelly SAND (GM), black (2.5Y 2/0), loose, wet, fine to coarse sand, 30 to 45% gravel, moderate est K, weathered concrete fragments
10		9			
		3	2.2		
	GEO-TECH	2			
		9			
12		12	0.7		gravelly sand (GM), black (2.5Y 2/0), loose, wet, very fine to fine sand, 20 to 25% gravel, low to moderate est K, oily waste
		18			
		3			
		5	0		
14		6			TOTAL DEPTH 14 feet
16					
18					

Note: All samples were screened with a Geiger-Mueller meter; no radiation was detected.

COMMENTS



DRILLING METHOD/RIG TYPE AUGER/CME 750
DRILLING CONTRACTOR/DRILLER WATER DEV./M. PETERSON
HOLE DIAMETER 8.0 INCHES
BIT TYPE HOLLOW STEM AUGER
TOTAL DEPTH OF BORING 14 FEET
WELL COMPLETION DEPTH 14

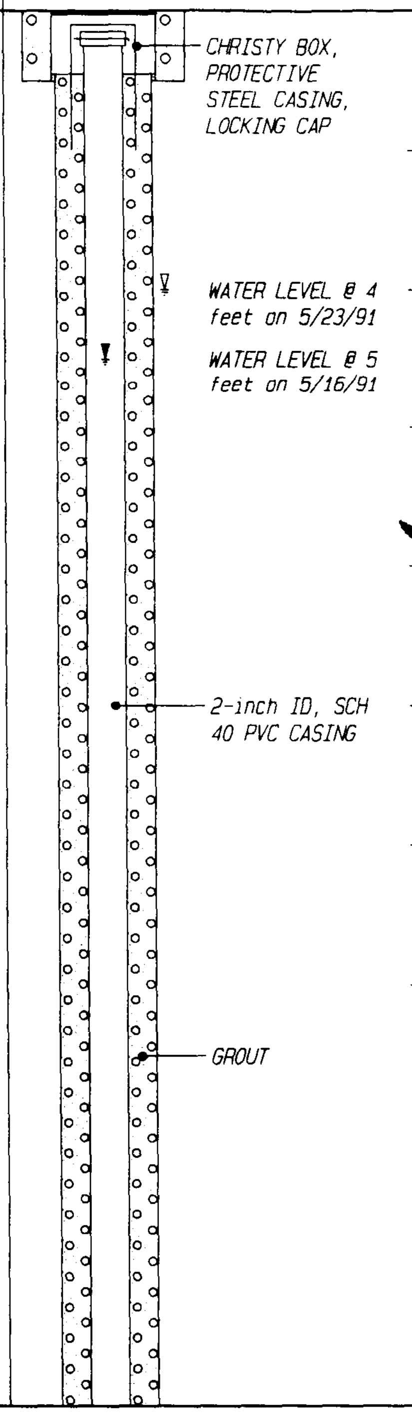
JAMES M. MONTGOMERY
CONSULTING ENGINEERS, INC.

365 LENNON LANE, WALNUT CREEK, CALIFORNIA, 94598 / (415) 975-3400

BORING/WELL NUMBER M-021C
CLIENT PRC/US NAVY
DATE STARTED 5/16/91 COMPLETED 5/17/91
PROJECT/JMM PROJECT NO. NAS ALAMEDA/2738.0213
REF. ELEVATION 6.35 SURFACE ELEVATION
GEOLOGIST RICH HALKET

DEPTH feet	SAMPLE	SAMP. NO.	BLOWS/6 IN	HNU-PID meter units	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION
0			DRILL to 35'			SP	SAND (SP), light yellowish brown (2.5Y 6/3), loose, dry, 15% fines, very fine to medium sand, trace shell fragments, high est K
4							SAND (SP), dark gray (5Y 4/1), loose, wet, medium to coarse sand, thin clay lenses
5						SM	silty SAND (SM), very dark gray (5Y 3/1), loose, wet, 20 to 30% fines, fine to medium sand
6						GM	gravelly SAND (GM), very dark gray to black (5Y 3/1, 2/0), loose, wet, fine to medium sand, 20 to 35% gravel, clay nodules and lenses
9							gravelly SAND (GM), black (2.5Y 2/0), loose, wet, fine to coarse sand, 30 to 45% gravel, moderate est K, weathered concrete fragments
12.5							gravelly SAND (GM), black (2.5Y 2/0), loose, wet, very fine to fine sand, 20 to 25% gravel, low est K, oily waste
14						SM	silty SAND (SM), black (2.5Y 2/0), soft, wet, 25% fines, fine to very fine sand, trace gravel, pebble clasts, moderate est K, thin clay lenses
18						ML	clayey SILT (ML), black (2.5Y 2/0), medium stiff, damp to moist, trace gravel, pebble clasts, low est K, trace wood fragments

COMMENTS



DRILLING METHOD/RIG TYPE SS-15-II/ARCH
DRILLING CONTRACTOR/DRILLER WATER DEV./K. CHIVRELLE
HOLE DIAMETER 7.25 INCHES
BIT TYPE 7" TRICONE AIR ROTATRY CASING HAMMER
TOTAL DEPTH OF BORING 96 FEET
WELL COMPLETION DEPTH 92.5

JAMES M. MONTGOMERY
CONSULTING ENGINEERS, INC.
365 LENNON LANE, WALNUT CREEK, CALIFORNIA, 94598 / (415) 975-3400

BORING/WELL NUMBER M-021C
CLIENT PRC/US NAVY
DATE STARTED 5/16/91 COMPLETED 5/17/91
PROJECT/JMM PROJECT NO. NAS ALAMEDA/2738.0213
REF. ELEVATION 6.35 SURFACE ELEVATION
GEOLOGIST RICH HALKET

DEPTH feet	SAMPLE	SAMP. NO.	BLOWS/6 IN	HNU-PID meter units	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	COMMENTS
				20.8		ML	clayey SILT (ML), black (2.5Y 2/0), medium stiff, damp to moist, trace gravel, pebble clasts, low est K, trace wood fragments	
22						GM	silty GRAVEL (GM), black (2.5Y 2/0), loose, wet, 15 to 20% fines, fine gravel, high est K, trace wood fragments (cuttings)	
24								
								GROUT
26								
28								
30							@ 30 feet-same as above	2-inch ID, SCH 40 PVC CASING
32								
						CL	@ 33 feet-rig behavior	
34								
		GEO-TECH	2	0.8			silty CLAY (CL), very dark gray (5YR 3/1), medium stiff, damp, low est K, trace shell fragments	
36			3					
			4					
			4					
			1	3.4				
38			3					
			4					
			5					

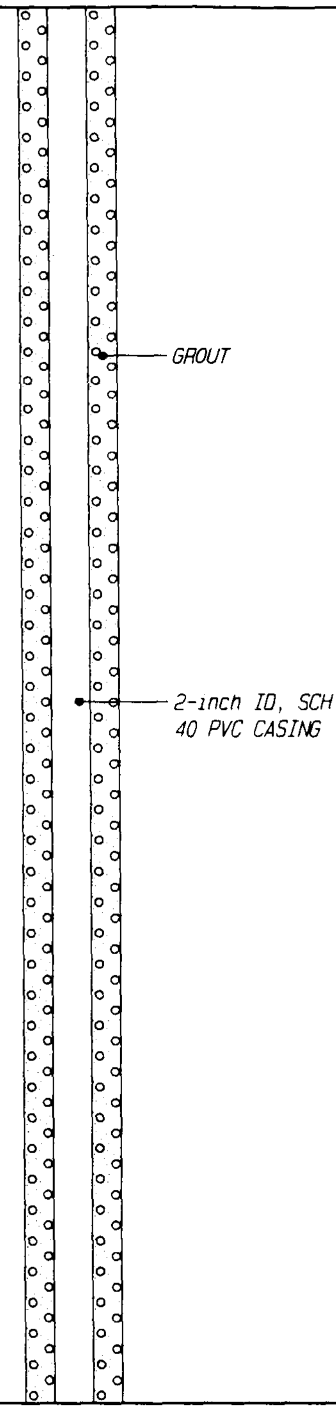
JAMES M. MONTGOMERY
CONSULTING ENGINEERS, INC.

365 LENNON LANE, WALNUT CREEK, CALIFORNIA, 94598 / (415) 975-3400

BORING/WELL NUMBER M-021C
CLIENT PRC/US NAVY
DATE STARTED 5/16/91 COMPLETED 5/17/91
PROJECT/JMM PROJECT NO. NAS ALAMEDA/2738.0213
REF. ELEVATION 6.35 SURFACE ELEVATION
GEOLOGIST RICH HALKET

DEPTH feet	SAMPLE	SAMP. NO.	BLOWS/6 IN	HNU-PID meter units	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION
						CL	silty CLAY (CL), very dark gray (5YR 3/1), medium stiff, damp, low est K, trace shell fragments
42							
44	X		3	13.8			
			3				
			4				
			7				
46			3	12.4			
			3				
			3				
			4				
48							
50							
52						SP	SAND (SP), olive green (5Y 4/2), loose, wet, 10 to 15% fines, very fine to fine sand, high est K (cuttings)
	X		1				
			1				
54			1				
			2				
	X		1				@ 55 feet-same as above, trace shell fragments
			1				
56			2				
			1				
58							
						SC	clayey SAND (SC), olive green (5Y 4/2), medium dense, wet, 25 to 30% fines, very fine to fine sand, moderate est K, trace shell fragments (cuttings)

COMMENTS



LOG OF SOIL BORINGM-021C (continued)

JAMES M. MONTGOMERY
CONSULTING ENGINEERS, INC.
365 LENNON LANE, WALNUT CREEK, CALIFORNIA, 94598 / (415) 975-3400

BORING/WELL NUMBER M-021C
DATE STARTED 5/16/91 COMPLETED 5/17/91
REF. ELEVATION 6.35 SURFACE ELEVATION
CLIENT PRC/US NAVY
PROJECT/JMM PROJECT NO. NAS ALAMEDA/2738.0213
GEOLOGIST RICH HALKET

DEPTH feet	SAMPLE	SAMP. NO.	BLOWS/6 IN	HNU-PID meter units	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	COMMENTS
						SC		
62	X		2, 2, 2, 3				clayey SAND (SC), olive green (5Y 4/2), medium dense, wet, 25 to 30% fines, very fine to fine sand, moderate est K, trace shell fragments	
64	X		4, 9, 9, 18			CL	sandy CLAY (CL), olive green (5Y 4/2), medium dense, wet, 25 to 30% very fine to fine sand, low est K	GROUT
66	X		4, 5, 8, 10	0.8		SC	clayey SAND (SC), olive green (5Y 4/2), medium dense, wet, 35 to 40% fines, very fine to fine sand, low to moderate est K	
68	X		4, 4, 4, 3	1.0		CL	sandy CLAY (CL), olive green (5Y 4/2), stiff, wet, 35 to 45% very fine sand, low est K, trace shell fragments	
70								2-inch ID, SCH 40 PVC CASING
72						SC	@ 72 feet-(cuttings)	
74								BENTONITE PELLET SEAL
	X		1, 1	0.6			clayey SAND (SC), olive green (5Y 4/2), medium dense, wet, 25 to 30% fines, very fine to fine sand, moderate est K	
76			1, 1, 3	0				
78			4, 5, 11					FILTER PACK, #2-16 SAND

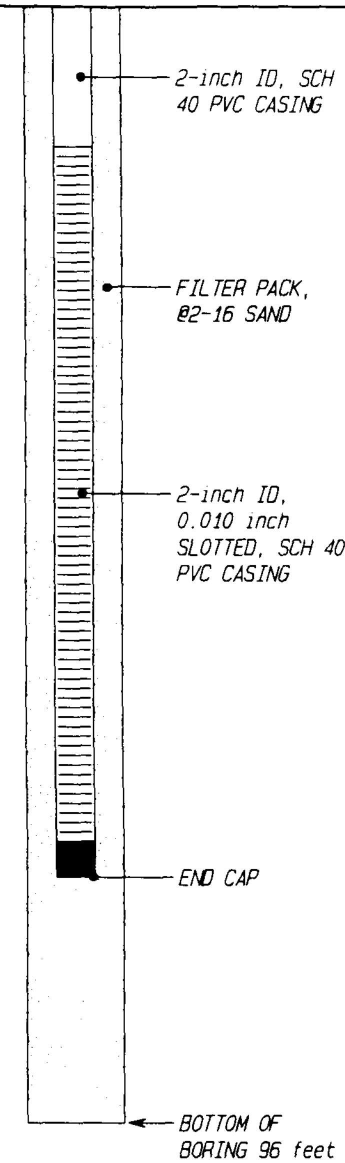
LOG OF SOIL BORINGM-021C (continued)

JAMES M.MONTGOMERY
CONSULTING ENGINEERS, INC.
365 LENNON LANE, WALNUT CREEK, CALIFORNIA, 94598 / (415) 975-3400

BORING/WELL NUMBER M-021C
DATE STARTED 5/16/91 COMPLETED 5/17/91
REF. ELEVATION 6.35 SURFACE ELEVATION
CLIENT PRC/US NAVY
PROJECT/JMM PROJECT NO. NAS ALAMEDA/2738.0213
GEOLOGIST RICH HALKET

DEPTH feet	SAMPLE	SAMP. NO.	BLOWS/6 IN	HNU-PID meter units	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION
						SC	clayey SAND (SC), olive green (5Y 4/2), medium dense, wet, 25 to 30% fines, very fine to fine sand, moderate est K
82							
84				0.4		SP	SAND (SP), olive green (5Y 4/2), loose, wet, very fine to fine sand, high est K, flowing sands (cuttings)
86							
88							@ 88 feet-same as above (cuttings)
90						CL	@ 90 feet-(cuttings)
92		CHEM	2 3 4 3	0.2			CLAY (CL), black (7.5YR N2/), very stiff, damp, low est K
94			3 4 4 3	0.4			
96							TOTAL DEPTH 96 feet
98							
							Note: All samples were screened with a Geiger-Mueller meter; no radiation was detected.

COMMENTS

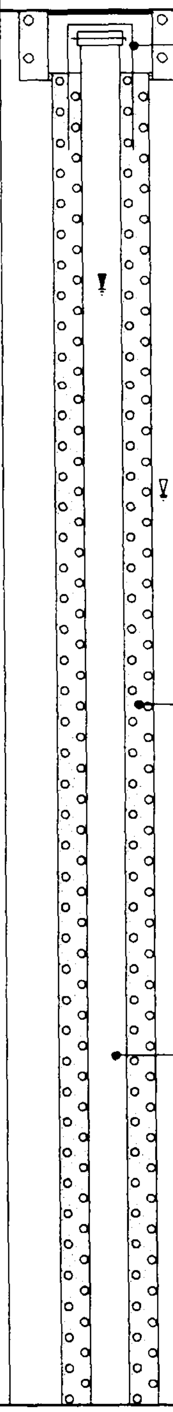


LOG OF SOIL BORINGM-021C (continued)

JAMES M. MONTGOMERY
CONSULTING ENGINEERS, INC.
365 LENNON LANE, WALNUT CREEK, CALIFORNIA, 94598 / (415) 975-3400

BORING/WELL NUMBER M-021E
CLIENT PRC/US NAVY
DATE STARTED 5/13/91 COMPLETED 5/14/91
PROJECT/JMM PROJECT NO. NAS ALAMEDA/2738.0213
REF. ELEVATION 6.72 SURFACE ELEVATION
GEOLOGIST CINDY FONG

DEPTH feet	SAMPLE	SAMP. NO.	BLOWS/6 IN	HNU-PID meter units	SOIL CLASS	GEOLOGIC DESCRIPTION	COMMENTS
0–2	⊠		5, 9, 11	8.0	SP	SAND (SP), light yellowish brown to light olive brown (2.5Y 6/3, 5/3), loose, dry, 15% fines, fine to medium sand, 5 to 10% shell fragments, high est K	CHRISTY BOX, PROTECTIVE STEEL CASING, LOCKING CAP
2	⊠		4, 5, 6	4.0		@ 2 feet-same as above, damp with rootlets, no shell fragments	
4	⊠		4, 4, 5	2.0		SAND (SP), dark gray (5Y 4/1), loose, moist to wet, very fine to coarse sand with 20% clay lenses	WATER LEVEL @ 4 feet on 5/13/91
5–6	⊠		3, 2, 4	8.0	SM	silty SAND (SM), very dark gray (5Y 3/1), loose, wet, 20 to 25% fines, fine to medium sand, clay lenses and concrete waste, trace shell fragments	
7	⊠		3, 3, 6	5.1	GM	gravelly silty SAND (GM), very dark gray (5Y 3/1) to black (2.5Y 2/), loose, wet, fine to medium sand, 20 to 35% gravel, some clay nodules	WATER LEVEL @ 7 feet on 5/22/91
8	⊠		50/4"	32.0		@ 8 to 8.3 feet-concrete, breaks easily	
10	⊠		9, 3, 2	2.2		gravelly SAND (GM), black (2.5Y 2/), loose, wet, fines, fine to coarse sand, 30 to 45% gravel, moderate est K, weathered concrete at bottom of sample, oily waste	GROUT
12	⊠		9, 12, 18	0.7		sandy GRAVELLY (GM), black (2.5Y 2/), loose, wet, fines, 30 to 40% fine to medium coarse sand, moderate est K, oily waste	
13–14			3, 5, 6		GW	gravelly SAND (GW), black (2.5Y 2/), loose, wet, fines, 20 to 25% very fine to fine sand and gravel, low est K, oily waste	
15	⊠		32, 18, 36	0	SM	silty SAND (SM), black (2.5Y 2/), soft, wet, 25% fines, very fine to fine sand, trace gravel (pebbles), moderate to high est K	2-inch ID, SCH 40 PVC CASING
16						@ 16 feet-clay layer	
16.5	⊠		36, 17, 5			@ 16.5 to 18 feet-same as above/clay layer at 17.75 to 18 feet, black, soft, moist to wet, low est K, wood debris at approximately 17.5 feet	
18	⊠		3, 2, 3, 3	0, 1.0	CL	silty CLAY (CL), black, medium stiff, damp to moist, trace gravel (approximately 1 inch pebbles), trace wood matter, low est K	



DRILLING METHOD/RIG TYPE AUGER/CME 750
DRILLING CONTRACTOR/DRILLER WATER DEV./M. PETERSON
HOLE DIAMETER 8.0 INCHES
BIT TYPE HOLLOW STEM AUGER
TOTAL DEPTH OF BORING 41.5 FEET
WELL COMPLETION DEPTH 37.5

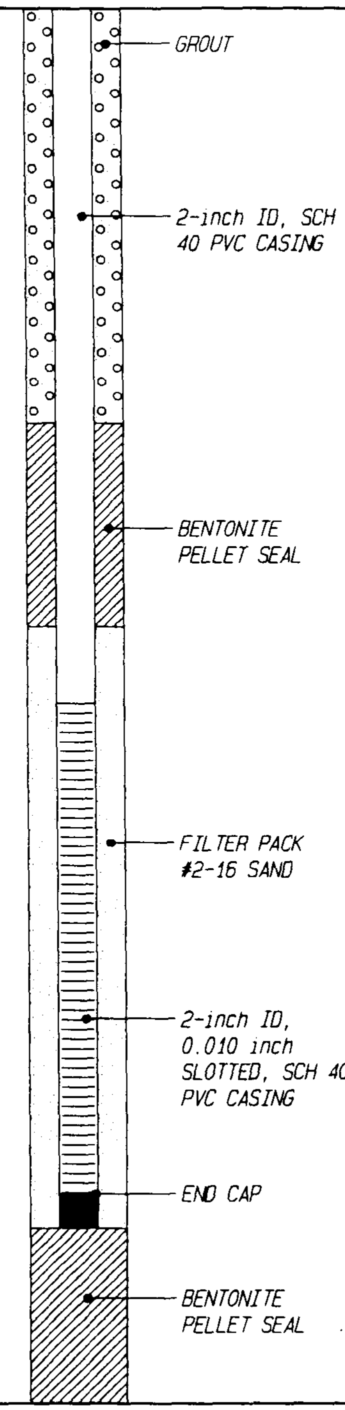
JAMES M. MONTGOMERY
CONSULTING ENGINEERS, INC.

365 LENNON LANE, WALNUT CREEK, CALIFORNIA, 94598 / (415) 975-3400

BORING/WELL NUMBER M-021E
CLIENT PRC/US NAVY
DATE STARTED 5/13/91 COMPLETED 5/14/91
PROJECT/JMM PROJECT NO. NAS ALAMEDA/2738.0213
REF. ELEVATION 6.72 SURFACE ELEVATION
GEOLOGIST CINDY FONG

DEPTH feet	SAMP. NO.	BLOWS/6 IN	HNU-PID meter units	SOIL CLASS	GEOLOGIC DESCRIPTION
		3, 3		CL	@ 19.5 to 20 feet-same as above, rock stuck in sand catcher, no recovery below 20 feet
22		3, 3, 2, 1	1.0	ML	@ 21 to 22.5 feet-same as above, to (ML), moist to wet, slightly more silt, trace fine sand
24, 26		4, 2, 2, 2, 2, 3, 3	1.0	SM	silty SAND (SM), dark olive gray (5Y 3/2), loose, wet, 20% fines, very fine to fine sand, high est K
		2		SP	SAND (SP), light olive gray, (5Y 6/2), loose, wet, 10 to 15% fines, very fine to fine sand, high est K
28		1, 1, 1, 1, 1		ML	silty CLAY (ML), gray, soft, moist, trace very fine to fine sand, low est K
30		1		SM	silty SAND (SM), reddish yellow, loose to medium stiff, wet, 20 to 40% fines, very fine to fine sand, moderate to high est K
32, 34, 36	CHEM; GEO-TECH; GEO-TECH	1, 2, 3, 4, 4, 0, 3, 2, 3, 1, 2, 1, 0, 1	0	SP	SAND (SP), dark olive gray (2.5Y 3/3), loose, wet, trace fines, medium sand, high est K, glass shard @ 35 to 35.5 feet-thin clay layers
38		4, 2, 1, 2, 1, 1		CL	CLAY (CL), dark olive gray to black (2.5Y 3/3 to 2/0), trace fine sand, low est K

COMMENTS



LOG OF SOIL BORINGM-021E (continued)

JAMES M.MONTGOMERY
CONSULTING ENGINEERS, INC.

365 LENNON LANE, WALNUT CREEK, CALIFORNIA, 94598 / (415) 975-3400

BORING/WELL NUMBER M-021E
CLIENT PRC/US NAVY
DATE STARTED 5/13/91 COMPLETED 5/14/91
PROJECT/JMM PROJECT NO. NAS ALAMEDA/2738.0213
REF. ELEVATION 6.72 SURFACE ELEVATION
GEOLOGIST CINDY FONG

DEPTH feet	SAMPLE	SAMP. NO.	BLOWS/6 IN	HNU-PID meter units	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	COMMENTS
	X		1 2 1			CL	CLAY (CL), dark olive gray to black, stiff, moist, trace fine sand, trace shell fragments and wood, low est K	BENTONITE PELLET SEAL
							TOTAL DEPTH 41.5 feet	BOTTOM OF BORING 41.5 feet
42								
44								
46								
48								
50								
52								
54								
56								
58								
							Note: All samples were screened with a Geiger-Mueller meter; no radiation was detected.	

LOG OF SOIL BORINGM-021E (continued)

JAMES M. MONTGOMERY
CONSULTING ENGINEERS, INC.

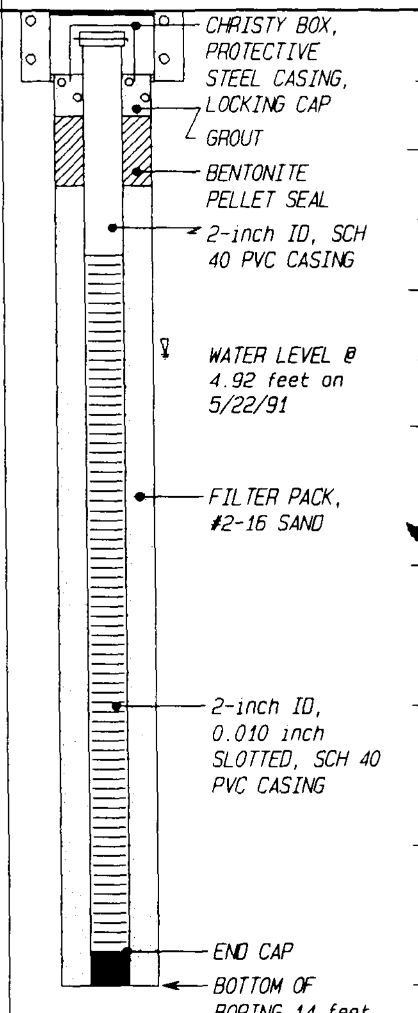
365 LENNON LANE, WALNUT CREEK, CALIFORNIA, 94598 / (415) 975-3400

BORING/WELL NUMBER M-022A
CLIENT PRC/US NAVY
DATE STARTED 5/9/91 COMPLETED 5/9/91
PROJECT/JMM PROJECT NO. NAS ALAMEDA/2738.0213
REF. ELEVATION 5.52 SURFACE ELEVATION
GEOLOGIST CINDY FONG

DEPTH feet	SAMP. NO.	BLOWS/6 IN	HNU-PID meter units	SOIL CLASS	GEOLOGIC DESCRIPTION
				GM	
		16	0.7		sandy GRAVEL (GM), gray brown (2.5Y 5/2), loose dry, 5 to 10% fines, 40% very fine sand, trace rootlets, moderate est K
		12			
		28			
2		12			
		7	2.2		
		13			
	CHEM	45			@ 3.5 feet-0.5-inch clay interbed
4		8	0.7		@ 4 feet-same as above, grayish brown (2.5Y 5/2) loose, wet, trace fines, very fine to medium sand, moderate est K
		3			
		2			
6		4	9.6		
		9			
		14			sandy GRAVEL (GM), black (2.5Y 2/0), loose, wet, trace fines, very fine to medium sand
		11			
		12	8		
8		9	5	SM	
		8			silty SAND (SM), very dark gray (2.5Y N3/), 25% fines, fine to medium sand, moderate to high est K
		4			
	GEO-TECH	9			
10		8			
		7			
		7			@ 11 feet-same as above, slight odor
12		8	9.6		
		9			
		7		SP	SAND (SP), light yellow brown (2.5Y 6/3), loose, wet, fine to medium sand, trace gravel, high est K
		12			
		1			
14					TOTAL DEPTH 14 feet
16					
18					

Note: All samples were screened with a Geiger-Mueller meter; no radiation was detected.

COMMENTS



DRILLING METHOD/RIG TYPE AUGER/CME 750
DRILLING CONTRACTOR/DRILLER WATER DEV./M. PETERSON
HOLE DIAMETER 8.0 INCHES
BIT TYPE HOLLOW STEM AUGER
TOTAL DEPTH OF BORING 14 FEET
WELL COMPLETION DEPTH 14

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BORING/WELL NUMBER M-022E
CLIENT PRC/US NAVY
DATE STARTED 5/9/91 COMPLETED 5/9/91
PROJECT/JMM PROJECT NO. NAS ALAMEDA/2738.0213
REF. ELEVATION 5.29 SURFACE ELEVATION
GEOLOGIST CINDY FONG

SAMP. NO.	BLOWS/6 IN	HNU-PID meter units	SOIL CLASS
	16	0.7	GM
	12		
	28		
	12		
	7	2.2	
	13		
	45		
	8	0.7	
	3		
	2		
	4	9.6	
	9		
	14		
	11		
	12	8	
	9	5	SM
	8		
	4		
GEO-TECH	9		
	8		
	7		
	7		
	8	9.6	
	9		
CHEM	7		SP
	12		
	1		
	15		
	7	4	
	8		
	9		
	4	9.6	
	4		
	2		
	1		
	1	0	
	1		CL
	1		
	1	0	

DEPTH feet: 2, 4, 6, 8, 10, 12, 14, 16, 18

GEOLOGIC DESCRIPTION

sandy GRAVEL (GM), gray brown (2.5Y 5/2), loose dry, 5 to 10% fines, 40% very fine sand, trace rootlets, moderate est K

@ 3.5 feet- 0.5-inch clay interbed

@ 4 feet-same as above, grayish brown (2.5Y 5/2) loose, wet, trace fines, very fine to medium sand, moderate est K

sandy GRAVEL (GM), black (2.5Y 2/0), loose, wet, trace fines, very fine to medium sand

silty SAND (SM), very dark gray (2.5Y N3/), 25% fines, medium to fine sand, moderate to high est K

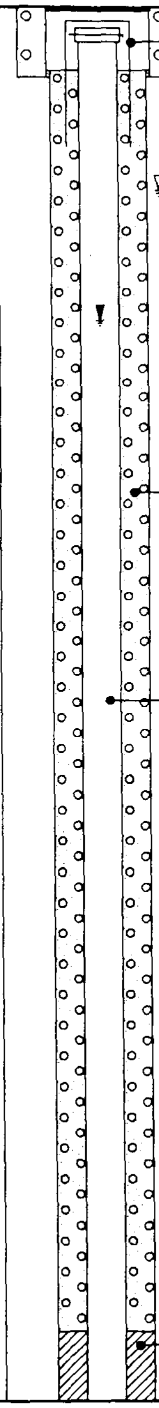
@ 11 feet-same as above, slight odor

SAND (SP), light yellow brown (2.5Y 6/3), loose, wet, fine to medium sand, trace gravel, high est K

@ 16 feet-same as above
color change to dark gray (5Y 4/1), trace shell fragments

CLAY (CL), very dark gray to black (2.5Y 3/0, 2/0), soft, moist, trace of silt, low est K

COMMENTS



DRILLING METHOD/RIG TYPE AUGER/CME 750
DRILLING CONTRACTOR/DRILLER WATER DEV./M. PETERSON
HOLE DIAMETER 8.0 INCHES
BIT TYPE HOLLOW STEM AUGER
TOTAL DEPTH OF BORING 43 FEET
WELL COMPLETION DEPTH 38

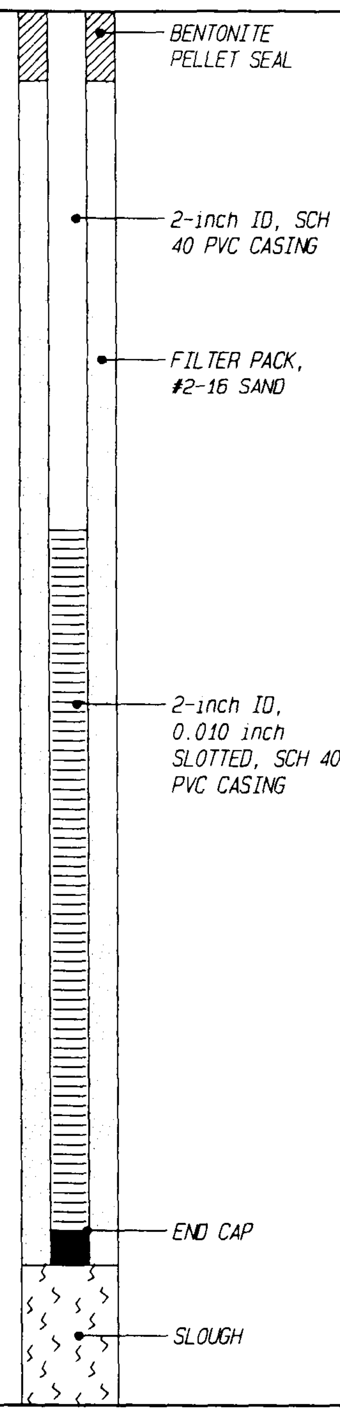
JAMES M. MONTGOMERY
CONSULTING ENGINEERS, INC.

365 LENNON LANE, WALNUT CREEK, CALIFORNIA, 94598 / (415) 975-3400

BORING/WELL NUMBER M-022E
DATE STARTED 5/9/91 COMPLETED 5/9/91
REF. ELEVATION 5.29 SURFACE ELEVATION
CLIENT PRC/US NAVY
PROJECT/JMM PROJECT NO. NAS ALAMEDA/2738.0213
GEOLOGIST CINDY FONG

DEPTH feet	SAMP. NO.	BLOWS/6 IN	HNU-PID meter units	SOIL CLASS	GEOLOGIC DESCRIPTION
		1		CL	
		1			@ 20.5 feet-same as above, increasing percent silt and sand to 20%
		8		GM	
		3			sandy gravel (GM), gray brown (2.5Y 5/2), loose, wet, trace fines, fine to coarse sand, moderate est K
22		14	5.1		
		11			
		8	3.7		
		9			
24		15			@ 24 feet-same as above, gray to dark gray (5Y 4.5/1)
		12			
		9	8.1		
		12			
26		11			
		7	6.6		
		7			
		14			
28		18			@ 28 feet-same as above, gray brown (2.5Y 5/2), stiff
		15			
		12			
		7			
30		10			
		6			
		9	3.6		@ 31 feet-same as above,2-3-inch sand interbed fine to coarse grain
		9			
32	CHEM	9			
		10			
		8			
		9			
34		8	3		
		9			
		7			@ 35 feet-same as above
		6			
36		3			
		3			
		3		CL	silty CLAY (CL), dark gray (2.5Y N4/0), soft, moist, 15% silt, trace shell fragments, low est K, green tinge to the sediment
		2			
38		1	2.2		
		2			
		2			
		1			

COMMENTS



LOG OF SOIL BORINGM-022E (continued)

JAMES M. MONTGOMERY
CONSULTING ENGINEERS, INC.

365 LENNON LANE, WALNUT CREEK, CALIFORNIA, 94598 / (415) 975-3400

BORING/WELL NUMBER M-022E
DATE STARTED 5/9/91 COMPLETED 5/9/91
REF. ELEVATION 5.29 SURFACE ELEVATION

CLIENT PRC/US NAVY
PROJECT/JMM PROJECT NO. NAS ALAMEDA/2738.0213
GEOLOGIST CINDY FONG

DEPTH feet	SAMPLE	SAMP. NO.	BLOWS/6 IN	HNU-PID meter units	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	COMMENTS
			3 3 2 3 3 4			CL	silty CLAY (CL), dark gray (2.5Y N4/0), soft, moist, 15% silt, trace shell fragments, low est K, green tinge to the sediment, sewage odor	SLOUGH
42								
							TOTAL DEPTH 43 feet	BOTTOM OF BORING 43 feet
44								
46								
48								
50								
52								
54								
56								
58							Note: All samples were screened with a Geiger-Mueller meter; no radiation was detected.	

LOG OF SOIL BORINGM-022E (continued)

JAMES M. MONTGOMERY
CONSULTING ENGINEERS, INC.

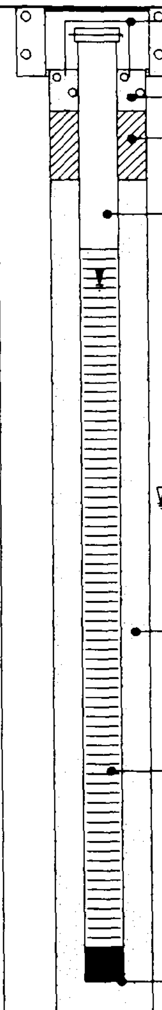
365 LENNON LANE, WALNUT CREEK, CALIFORNIA, 94598 / (415) 975-3400

BORING/WELL NUMBER *M-023A* CLIENT *PRC/US NAVY*
DATE STARTED *5/7/91* COMPLETED *5/7/91* PROJECT/JMM PROJECT NO. *NAS ALAMEDA/2738.0213*
REF. ELEVATION *6.50 SURFACE ELEVATION* GEOLOGIST *CINDY FONG*

DEPTH feet	SAMPLE	SAMP. NO.	BLOWS/6 IN	HNU-PID meter units	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION
						SP	@ 0.5 ft. fill-spud hole
	☒		17	0			gravelly SAND (SP), grayish brown (2.5Y, 5/2), loose to medium dense, dry to damp, 15 to 40% gravel, moderate est K, rootlets, asphalt
			40				
2	☒		50				SAND (SP), very dark grayish brown (2.5Y 3/2) with dark brown stain (2.5Y 4/4), medium dense, damp, low est K
	■	CHEM	5				
4			9				SAND (SP), dark gray (5Y 3/2), medium dense, damp, medium sand, moderate est K, slight odor
			14				
	☒		7	0			
			3				SAND (SP), dark gray to very dark gray (2.5Y 4/0, 3/0), loose, wet, 5% silt, 10 to 15% gravel, moderate to high est K, 30 to 40% wood
6			2				
	☒		3				
			5				
			10				
8	☒		5				SAND (SP), dark gray to very dark gray (2.5Y 4/0, 3/0), loose, damp, 10 to 15% gravel, moderate est K, 10 to 15% wood
			4				
			7				
			0				
10	■	GEO-TECH	4				SAND (SP), black (N2/0, 2.5Y), wet, loose, medium to fine sand, waste (metalic material), 10 to 15% wood, slight odor, green tinge
			4	0			
	☒		12				
			15				
12			12				
			16	0			
	☒		3				
			4				SAND (SP), piece of wood, oil soaked, sheen, strong petroleum odor
14			4				TOTAL DEPTH 14.5 feet
16							
18							

Note: All samples were screened with a Geiger-Mueller meter; no radiation was detected.

COMMENTS



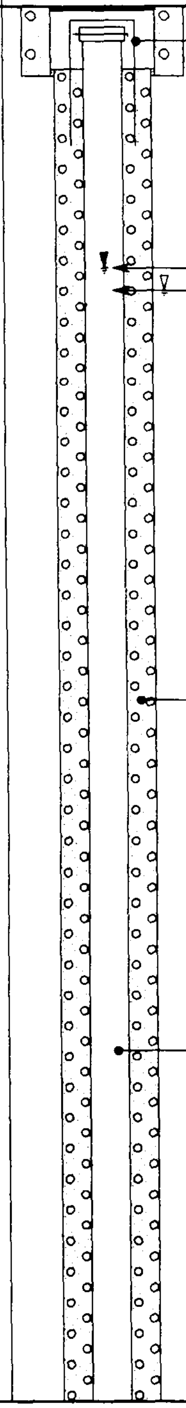
DRILLING METHOD/RIG TYPE *AUGER/CME 750* DRILLING CONTRACTOR/DRILLER *WATER DEV./M. PETERSON*
HOLE DIAMETER *8.0 INCHES* BIT TYPE *HOLLOW STEM AUGER*
TOTAL DEPTH OF BORING *14.5 FEET* WELL COMPLETION DEPTH *14*

JAMES M. MONTGOMERY
CONSULTING ENGINEERS, INC.

365 LENNON LANE, WALNUT CREEK, CALIFORNIA, 94598 / (415) 975-3400

BORING/WELL NUMBER M-023B
DATE STARTED 5/14/91 COMPLETED 5/15/91
REF. ELEVATION 6.40 SURFACE ELEVATION
CLIENT PRC/US NAVY
PROJECT/JMM PROJECT NO. NAS ALAMEDA/2738.0213
GEOLOGIST RICH HALKET

DEPTH feet	SAMPLE	SAMP. NO.	BLOWS/6 IN	HNU-PID meter units	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	COMMENTS
						SM		CHRISTY BOX, PROTECTIVE STEEL CASING, LOCKING CAP
2							silty SAND (SM), black (5YR 2.5/1), loose, dry, 30 to 35% fines, fine sand, low est K, 50 to 70% wood chips, fill, (cuttings)	
4								WATER LEVEL @ 3.75 feet on 5-14-91; WATER LEVEL @ 4.08 feet on 5/21/91
6								
8				8.2			silty SAND (SM), black (5YR 2.5/1), loose, wet, 30 to 35% fines, fine sand, low est K, 50 to 70% wood chips, fill, (cuttings)	
10								GROUT
12								
14							@ 15 feet-as above, (cuttings)	2-inch ID, SCH 40 PVC CASING
16							No cuttings, formation has lots of void space (rig behavior)	
18							@17 feet-possible gravel-rich layer begins (cuttings)	



DRILLING METHOD/RIG TYPE SS-15-II/ARCH
HOLE DIAMETER 7.25 INCHES
TOTAL DEPTH OF BORING 122 FEET
DRILLING CONTRACTOR/DRILLER WATER DEV./K. CHIVRELLE
BIT TYPE 7" TRICONE AIR ROTARY CASING HAMMER
WELL COMPLETION DEPTH 93.5

JAMES M. MONTGOMERY
CONSULTING ENGINEERS, INC.
365 LENNON LANE, WALNUT CREEK, CALIFORNIA, 94598 / (415) 975-3400

BORING/WELL NUMBER M-023B
CLIENT PRC/US NAVY
DATE STARTED 5/14/91 COMPLETED 5/15/91
PROJECT/JMM PROJECT NO. NAS ALAMEDA/2738.0213
REF. ELEVATION 6.40 SURFACE ELEVATION
GEOLOGIST RICH HALKET

DEPTH feet	SAMPLE	SAMP. NO.	BLOWS/6 IN	HNU-PID meter units	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	COMMENTS
						SM		
22							silty SAND (SM), black (5YR 2.5/1), loose, wet, 30 to 35% fines, fine sand, low est K, 50 to 70% wood chips, fill, (cuttings)	
								2-inch ID, SCH 40 PVC CASING
24								
26								
28							silty SAND (SM), black (5YR 2.5/1), loose, wet, 30 to 35% fines, very fine to fine sand, 1 to 5% fine gravel, low est K	
				0				
30								
								GROUT
32								
34								
			1			CL	silty CLAY (CL), dark gray (2.5Y N4/), medium stiff, wet, fines, 5% fine sand, low est K, 25 to 30% fine shell fragments	
			2					
36			2	0			silty CLAY (CL), dark gray (2.5Y N4/), medium stiff, moist, fines, 5 to 10% fine sand, low est K	
			2					
			2					
38			2					
			2					
			2					
			1	0			@ 39 feet-as above, soft	
			1					

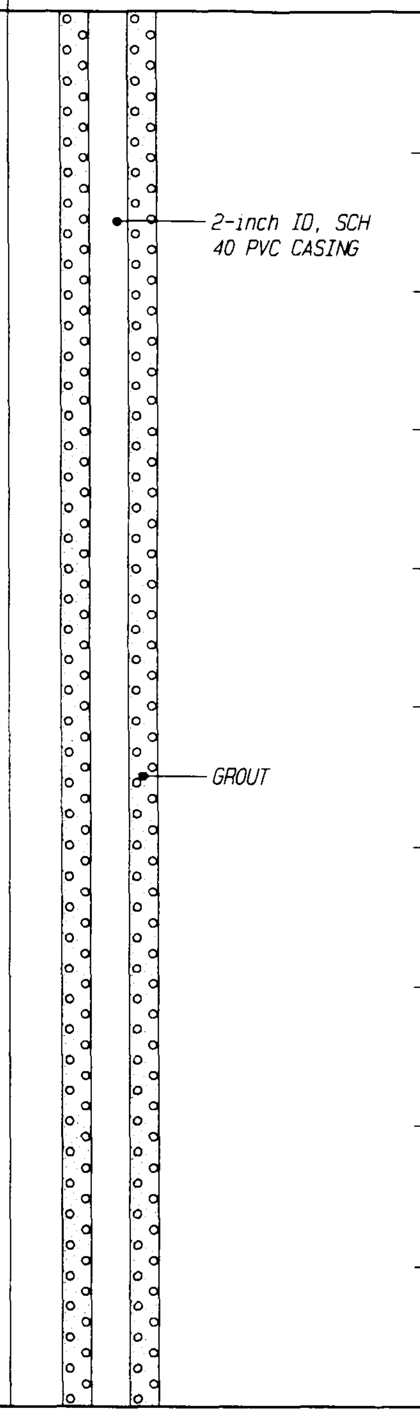
LOG OF SOIL BORINGM-023B (continued)

JAMES M. MONTGOMERY
CONSULTING ENGINEERS, INC.
365 LENNON LANE, WALNUT CREEK, CALIFORNIA, 94598 / (415) 975-3400

BORING/WELL NUMBER M-023B
DATE STARTED 5/14/91 COMPLETED 5/15/91
REF. ELEVATION 6.40 SURFACE ELEVATION
CLIENT PRC/US NAVY
PROJECT/JMM PROJECT NO. NAS ALAMEDA/2738.0213
GEOLOGIST RICH HALKET

DEPTH feet	SAMPLE	SAMP. NO.	BLOWS/6 IN	HNU-PID meter units	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION
	X		2	0		CL	
	X		2				
	X		1				silty CLAY (CL), dark gray (2.5Y N4/), stiff, moist, fines, 5 to 10% fine sand, low est K
	X		1				
42	X		1				
			1	0			
44							
							@ 45 feet-as above (cuttings)
46							
48	X		1				@ 48 feet-fines, 1 to 5% very fine to fine sand
	X		1				
	X		1	0			
	X		1				
50	X		2				
	X		2				
	X		2				
	X		2	0			
52							
							@ 53 feet-as above, cuttings
54							
56							
	X		2	64.2			
58	X		2				
	X		2				
	X		2				
	X		3				
	X		1				

COMMENTS



LOG OF SOIL BORINGM-023B (continued)

JAMES M.MONTGOMERY CONSULTING ENGINEERS, INC.

365 LENNON LANE, WALNUT CREEK, CALIFORNIA, 94598 / (415) 975-3400

BORING/WELL NUMBER M-023B
CLIENT PRC/US NAVY
DATE STARTED 5/14/91 COMPLETED 5/15/91
PROJECT/JMM PROJECT NO. NAS ALAMEDA/2738.0213
REF. ELEVATION 6.40 SURFACE ELEVATION
GEOLOGIST RICH HALKET

DEPTH feet	SAMPLE	SAMP. NO.	BLOWS/6 IN	HNU-PID meter units	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	COMMENTS
			2	524		CL		
			3					
62								
							silty CLAY (CL), dark gray (2.5Y N4/), medium stiff, moist, fines, 5 to 10% fine sand, low est K (cuttings)	2-inch ID, SCH 40 PVC CASING
64								
66			4	2007			@ 66 feet-as above, fines, 15 to 20% very fine sand, 1 to 5% of sand	
			0					
			2					
			2					
68			4	33			@ 68 feet-as above, fines, 10 to 15% very fine sand, 5 to 10% of sand	
			2					
			3					
			4					
70								
								GROUT
72								
74								
			5	12.6		CL / SC	CLAY (CL) and clayey SAND (SC) interbedded, CL: dark gray (2.5Y N4/), very stiff, damp, 5-10% very fine sand, SC: black (5YR 2.5/1), medium dense, damp, 35 to 40% fines, very fine to fine sand, low est K	
76			2					
			2					
			3					
			6	24.3				
			5					
78			9					BENTONITE PELLET SEAL
			9					
			11	19.6			@ 79 feet-as above, (clayey SAND (SC), 25 to 30% fines, fine to medium sand)	
			9					

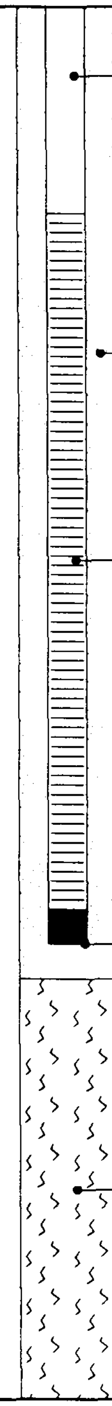
LOG OF SOIL BORINGM-023B (continued)

JAMES M.MONTGOMERY
CONSULTING ENGINEERS, INC.

365 LENNON LANE, WALNUT CREEK, CALIFORNIA, 94598 / (415) 975-3400

BORING/WELL NUMBER M-023B
DATE STARTED 5/14/91 COMPLETED 5/15/91
REF. ELEVATION 6.40 SURFACE ELEVATION
CLIENT PRC/US NAVY
PROJECT/JMM PROJECT NO. NAS ALAMEDA/2738.0213
GEOLOGIST RICH HALKET

DEPTH feet	SAMPLE	SAMP. NO.	BLOWS/6 IN	HNU-PID meter units	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	COMMENTS
			25			CL SC		
			16					
	X		11	81.2		SC	clayey SAND (SC), very dark gray (5YR 3/1), medium dense, wet, 25 to 30% fines, fine sand, moderate est K	2-inch ID, SCH 40 PVC CASING
82			2					
			3					
			5					
84						SP		
								FILTER PACK, #2-16 SAND
86								
							SAND (SP), very dark gray, (5YR 3/1), loose, wet, 10 to 15% fines, fine sand, high est K, (cuttings)	
88								2-inch ID, 0.010 inch SLOTTED, SCH 40 PVC CASING
90								
92								
								END CAP
94								
96								
								NATIVE MATERIAL
98								



LOG OF SOIL BORINGM-023B (continued)

JAMES M. MONTGOMERY
CONSULTING ENGINEERS, INC.
365 LENNON LANE, WALNUT CREEK, CALIFORNIA, 94598 / (415) 975-3400

BORING/WELL NUMBER M-023B
DATE STARTED 5/14/91 COMPLETED 5/15/91
REF. ELEVATION 6.40 SURFACE ELEVATION
CLIENT PRC/US NAVY
PROJECT/JMM PROJECT NO. NAS ALAMEDA/2738.0213
GEOLOGIST RICH HALKET

DEPTH feet	SAMPLE	SAMP. NO.	BLOWS/6 IN	HNU-PID meter units	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	COMMENTS
						SP	SAND (SP), very dark gray, (5YR 3/1), loose, wet, 10 to 15% fines, fine sand, high est K, (cuttings)	
102								
104								
106								
108								
110								NATIVE MATERIAL
112								
114								
116						CL		
118	X		3 3 3 9	36			CLAY (CL), very dark gray (2.5Y N3/), stiff, damp, low est K, trace shell fragments	

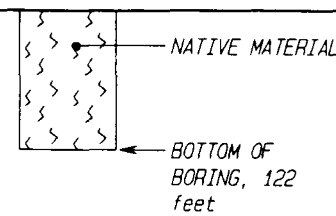
LOG OF SOIL BORINGM-023B (continued)

JAMES M.MONTGOMERY
CONSULTING ENGINEERS, INC.

365 LENNON LANE, WALNUT CREEK, CALIFORNIA, 94598 / (415) 975-3400

BORING/WELL NUMBER *M-023B*
DATE STARTED *5/14/91* COMPLETED *5/15/91*
REF. ELEVATION *6.40 SURFACE ELEVATION*

CLIENT *PRC/US NAVY*
PROJECT/JMM PROJECT NO. *NAS ALAMEDA/2738.0213*
GEOLOGIST *RICH HALKET*

DEPTH feet	SAMPLE	SAMP. NO.	BLOWS/6 IN	HNU-PID meter units	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	COMMENTS
		GEO-TECH	5 6 7 9	27		CL	CLAY (CL), very dark grey (2.5Y N3/), stiff, damp, low est K, trace shell fragments	
122							TOTAL DEPTH 122 feet	
124								
126								
128								
130								
132								
134								
136								
138								

Note: All samples were screened with a Geiger-Mueller meter; no radiation was detected.

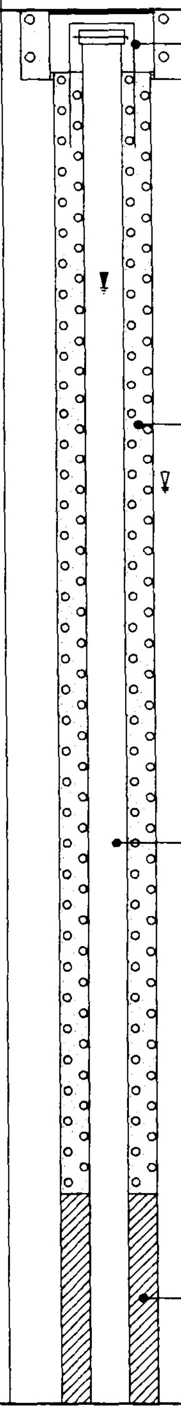
LOG OF SOIL BORINGM-023B (continued)

JAMES M. MONTGOMERY
CONSULTING ENGINEERS, INC.
365 LENNON LANE, WALNUT CREEK, CALIFORNIA, 94598 / (415) 975-3400

BORING/WELL NUMBER M-023E
CLIENT PRC/US NAVY
DATE STARTED 5/7/91 COMPLETED 5/8/91
PROJECT/JMM PROJECT NO. NAS ALAMEDA/2738.0213
REF. ELEVATION 6.23 SURFACE ELEVATION
GEOLOGIST CINDY FONG

DEPTH feet	SAMPLE	SAMP. NO.	BLOWS/6 IN	HNU-PID meter units	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION
			20			SP	gravelly sand (SP), gray brown (2.5Y 5/2), loose dry, medium sand, 40% gravel, moderate to high est K, trace rootlets, rust mottling, fill
			20				
			17				
2							
			4				
			7	0			
			18				
4			5				@ 4.0 feet-same as above, dark gray to very dark gray (2.5Y N2/), moist, coarse gravel up to 4cm in diameter, moderate to high est K, trace of wood, fill
			12				
			7				
			8				
6			9				
			7				
			6			SC	clayey SAND (SC), very dark gray to black (2.5Y N3/), loose, wet, low est K, 10-15% wood chips, fill
8			9				
			7			SP	SAND (SP), dark gray (2.5Y N4/), loose, moist, high est K, trace wood
			10				
			15				
10			10				
			3				@ 10 feet-same as above, medium sand, trace rootlets, green tinge to the sediments
			4				
			3				
			7				
12			2				
			9				
			5				
		GEO-TECH	7				
14			2				
						SM	silty SAND (SM), dark gray (2.5Y N4/), soft, wet, 30 to 40% fines, very fine to medium sand
		CHEM	1				
16			2				
			3				
			1				
			2				
18			2				
			DRILL to 25'				

COMMENTS



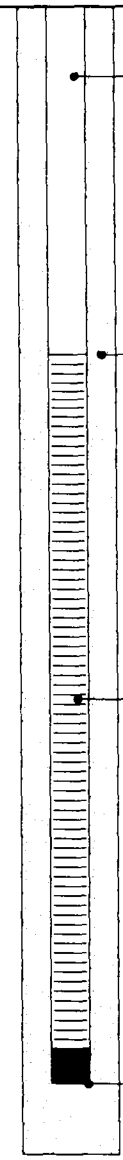
DRILLING METHOD/RIG TYPE AUGER/CME 750
DRILLING CONTRACTOR/DRILLER WATER DEV./M. PETERSON
HOLE DIAMETER 8.0 INCHES
BIT TYPE HOLLOW STEM AUGER
TOTAL DEPTH OF BORING 36.5 FEET
WELL COMPLETION DEPTH 35.5

JAMES M. MONTGOMERY
CONSULTING ENGINEERS, INC.

365 LENNON LANE, WALNUT CREEK, CALIFORNIA, 94598 / (415) 975-3400

BORING/WELL NUMBER M-023E
CLIENT PRC/US NAVY
DATE STARTED 5/7/91 COMPLETED 5/8/91
PROJECT/JMM PROJECT NO. NAS ALAMEDA/2738.0213
REF. ELEVATION 6.23 SURFACE ELEVATION
GEOLOGIST CINDY FONG

DEPTH feet	SAMPLE	SAMP. NO.	BLOWS/6 IN	HNU-PID meter units	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	COMMENTS
20			DRILL to 25'			SM	@ 20 feet-same as above, 10-15% fines, trace shell fragments (flowing sands)	2-inch ID, SCH 40 PVC CASING
22								
24								
25	⊠		4 5 7				@ 25.5 feet- 1 foot silty clay interbed, soft, wet, low est K	FILTER PACK, #2-16 SAND
26								
27	⊠		3 2 3					
29	⊠		2 4 7			SP	SAND (SP), dark gray with green tinge (5Y 4/1), loose, wet, medium sand, high est K, trace shell fragments	2-inch ID, 0.010 inch SLOTTED, SCH 40 PVC CASING
30.5	⊠		14 12 7					
32	⊠		PUSH to 35'					
34								
35	⊠		1/18"	0		ML	CLAY (CL), dark gray (2.5Y 4/0), very soft, moist, low est K, trace shell fragments	END CAP
36.5							TOTAL DEPTH 36.5 feet	BOTTOM OF BORING 36.5 feet
38								
							Note: All samples were screened with a Geiger-Mueller meter; no radiation was detected.	



LOG OF SOIL BORINGM-023E (continued)

JAMES M. MONTGOMERY
CONSULTING ENGINEERS, INC.
365 LENNON LANE, WALNUT CREEK, CALIFORNIA, 94598 / (415) 975-3400

BORING/WELL NUMBER M-024A
CLIENT PRC/US NAVY
DATE STARTED 5/3/91 COMPLETED 5/3/91
PROJECT/JMM PROJECT NO. NAS ALAMEDA/2738.0213
REF. ELEVATION 8.6 SURFACE ELEVATION
GEOLOGIST CINDY FONG

DEPTH feet	SAMPLE	SAMP. NO.	BLOWS/6 IN	HNU-PID meter units	GRAPHIC LOG	SOIL CLASS
						GP
	■	CHEM	18	160		
			12			
2			92			
			30			
			15			
			12			
4			18			
			22			
			16			
			5			
6			4			
			34			
			51			
			72			
8			12			
			8			
			6	3.5		SP
			7			
10	■	GEO-TECH	7			
			6	4.9		
			5			
			3			
12			5			
			9			
			12			
			14			
14			14			
16						
18						

GEOLOGIC DESCRIPTION

sandy GRAVEL (GP), gray brown (2.5Y 5/2), loose to dense, dry, 40% fine to medium sand, wood, rubber, strong odor, fill

sandy GRAVEL (GP), dark gray (5Y 3/2), loose, dry, 30-40% medium sand, wood, rubber, fill

sandy GRAVEL (GP), black (5Y 2.5/1), loose, moist fine to medium sand, high est K, wood, fill

SAND (SP), olive (5Y 4/3), loose, wet, trace fines, fine to medium sand, light gray mottling, moderate est K, green liquid, fill

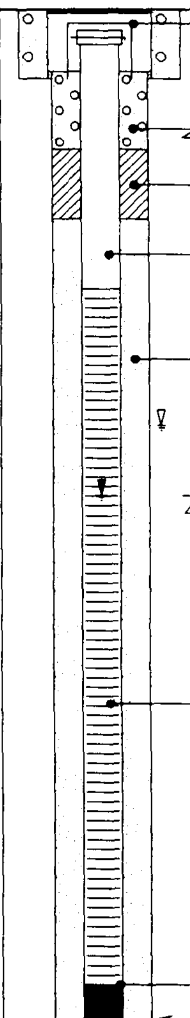
@ 11 feet same as above, black (2.5Y N2/), high est K, fill

@ 13 feet-wood with sand, very dark gray (7.5YR N3/), loose, to medium dense, 45% sand, strong odor, green tinge to formation water, fill

TOTAL DEPTH 14.5 feet

Note: All samples were screened with a Geiger-Mueller meter; no radiation was detected.

COMMENTS



DRILLING METHOD/RIG TYPE AUGER/CME 750
DRILLING CONTRACTOR/DRILLER WATER DEV./M. PETERSON
HOLE DIAMETER 8.0 INCHES
BIT TYPE HOLLOW STEM AUGER
TOTAL DEPTH OF BORING 14.5 FEET
WELL COMPLETION DEPTH 14.5

JAMES M. MONTGOMERY
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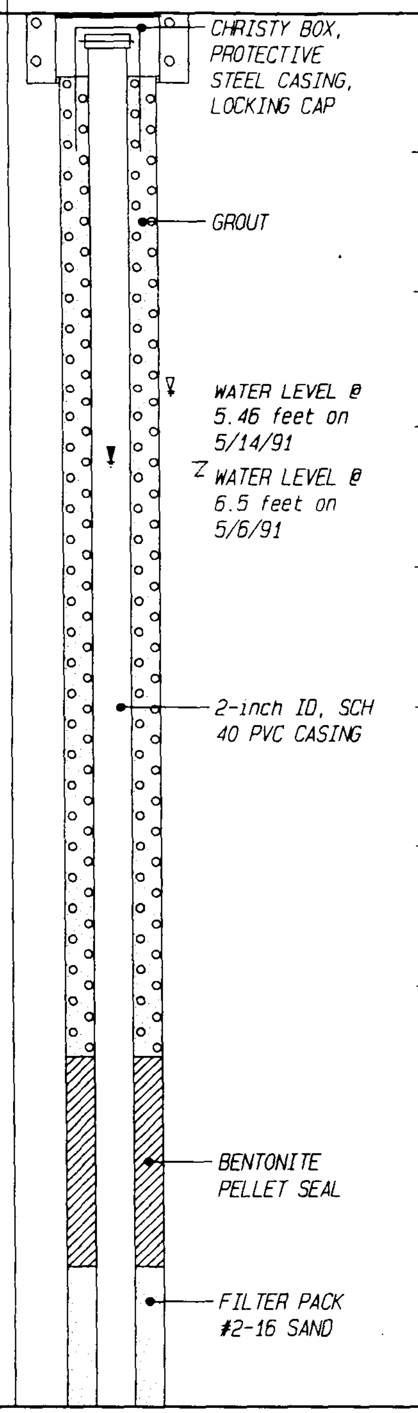
365 LENNON LANE, WALNUT CREEK, CALIFORNIA, 94598 / (415) 975-3400

BORING/WELL NUMBER M-024E
CLIENT PRC/US NAVY
DATE STARTED 5/6/91 COMPLETED 5/6/91
PROJECT/JMM PROJECT NO. NAS ALAMEDA/2738.0213
REF. ELEVATION 8.19 SURFACE ELEVATION
GEOLOGIST CINDY FONG

DEPTH feet	SAMP. NO.	BLOWS/6 IN	HNU-PID meter units	SOIL CLASS	GEOLOGIC DESCRIPTION
		12		GP	sandy GRAVEL (GP), dark gray brown (2.5Y 4/2), loose, damp, moderate est K, wood and broken glass, fill
		12	5.8		
2		10			
		8			
		10			
		9			WOOD with sand, fill
		50			
4					
		7			
		5			
6		4			
		7			
		7	5.2		WOOD with gravelly SAND sand: black (2.5Y 2/0), wet, low to moderate est K, strong odor, green liquid, fill
		6			
8		7			
		8			
		4			
	CHEM	1			
10		2		SP	SAND, very dark gray (2.5Y N3/), loose, wet, medium sand, high est K, green tinge
		6			
		3			
		3	0		
12		2			
		1			
		2	0	CL	CLAY (CL), very dark gray (2.5Y N3/), very soft, wet, trace sand, low est K, strong odor
		1			
14		1			
	GEO-TECH	1			
		1			
16		5		SP	SAND (SP), very dark gray (5Y 3/1), loose, wet, medium sand, high est K, trace shell fragments
	CHEM	5			
		6			
		3			
18		5			
		3			
		6			

COMMENTS



DRILLING METHOD/RIG TYPE AUGER/CME 750
DRILLING CONTRACTOR/DRILLER WATER DEV./M. PETERSON
HOLE DIAMETER 8.0 INCHES
BIT TYPE HOLLOW STEM AUGER
TOTAL DEPTH OF BORING 40 FEET
WELL COMPLETION DEPTH 32.5

JAMES M. MONTGOMERY
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BORING/WELL NUMBER M-024E
CLIENT PRC/US NAVY
DATE STARTED 5/6/91 COMPLETED 5/6/91
PROJECT/JMM PROJECT NO. NAS ALAMEDA/2738.0213
REF. ELEVATION 8.19 SURFACE ELEVATION
GEOLOGIST CINDY FONG

DEPTH feet	SAMPLE	SAMP. NO.	BLOWS/6 IN	HNU-PID meter units	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	COMMENTS
		GEO-TECH	5 3 5			SP	@ 20 feet-same as above, fine to medium sand	2-inch ID, SCH 40 PVC CASING
22			4 4 6					
24			4 4 5				@ 25 feet-same as above, fine to very fine sand	FILTER PACK #2-16 SAND
26								2-inch ID, 0.010 inch SLOTTED, SCH 40 PVC CASING
28			8 9 18	0			SAND (SP), dark gray (5Y 4/1), loose, wet, fine to very fine sand, high est K	
30			5 8 10					
32			2 2 3			CL	sandy CLAY (CL), dark gray (5Y 4/1), soft, moist to wet, fine to medium sand, 40% shell fragments up to 3cm in diameter	END CAP
34			2 1 2 2 2 2				@ 36 feet-same as above, trace of silt, trace of shell fragments	
36			PUSH to 40'					BENTONITE PELLET SEAL
38							TOTAL DEPTH 40 feet	
							Note: All samples were screened with a Geiger-Mueller meter; no radiation was detected.	BOTTOM OF BORING @ 40 feet

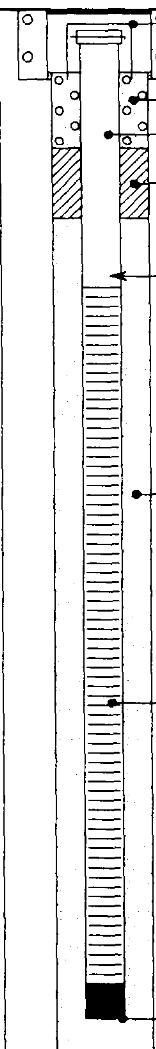
LOG OF SOIL BORINGM-024E (continued)

JAMES M. MONTGOMERY
CONSULTING ENGINEERS, INC.
365 LENNON LANE, WALNUT CREEK, CALIFORNIA, 94598 / (415) 975-3400

BORING/WELL NUMBER M-025A
CLIENT PRC/US NAVY
DATE STARTED 5/24/91 COMPLETED 5/24/91
PROJECT/JMM PROJECT NO. NAS ALAMEDA/2738.0213
REF. ELEVATION 6.78 SURFACE ELEVATION
GEOLOGIST CRAIG FANSHIER

DEPTH feet	SAMPLE	SAMP. NO.	BLOWS/6 IN	HNU-PID meter units	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION
						SP	
1–2	■	CHEM	32 31 20	0			gravelly SAND (SP), very dark brown (2.5Y 3/2), loose, dry, 5% fines, 80% fine to medium sand, 20% 1" to 1/2" gravel, high est K, 2 inch cobble blocked shoe
2.5–4	■	CHEM	5 4 6	0			
10	■	GEO-TECH	14 12 11				gravelly SAND (SP), black (2.5YR 2.5/0), medium dense, wet, 10 to 15% fines, medium to coarse sand, 10% 1/2" rounded gravel, high est K
15							@ 15 feet-same as above (cuttings)
							TOTAL DEPTH 15 feet
							Note: All samples were screened with a Geiger-Mueller meter; no radiation was detected.

COMMENTS



DRILLING METHOD/RIG TYPE AUGER/CME 750
DRILLING CONTRACTOR/DRILLER WATER DEV./M. PETERSON
HOLE DIAMETER 8.0 INCHES
BIT TYPE HOLLOW STEM AUGER
TOTAL DEPTH OF BORING 15 FEET
WELL COMPLETION DEPTH 14.5

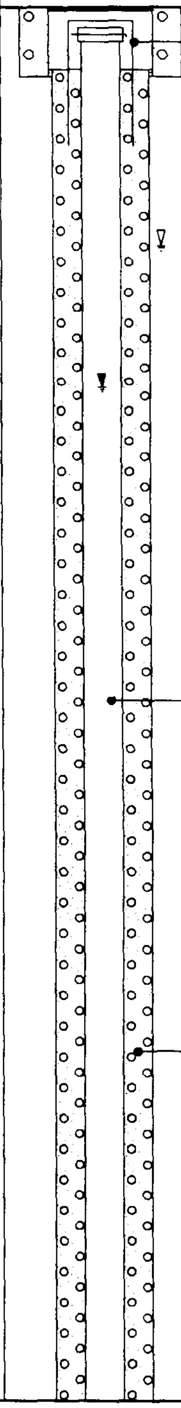
JAMES M.MONTGOMERY
CONSULTING ENGINEERS,INC.

365 LENNON LANE, WALNUT CREEK, CALIFORNIA, 94598 / (415) 975-3400

BORING/WELL NUMBER M-025C
DATE STARTED 5/22/91 COMPLETED 5/23/91
REF. ELEVATION 6.26 SURFACE ELEVATION
CLIENT PRC/US NAVY
PROJECT/JMM PROJECT NO. NAS ALAMEDA/2738.0213
GEOLOGIST RICH HALKET

DEPTH feet	SAMPLE	SAMP. NO.	BLOWS/6 IN	HNU-PID meter units	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION
0–2	X		25, 36, 32			SP	gravelly SAND (SP), very dark grayish brown, (2.5Y 3/2), dense, dry, trace fines, 80% fine to medium sand, 10% gravels 1/2 inch diameter to 2 inches, moderate est K, fill
2–6	X		11, 10, 11, 11, 4, 7, 5, 5				gravelly SAND (SP), very dark reddish brown, (10YR 2/2), medium dense, moist, 10 to 15% fines, fine to medium sand, black asphaltic meterial 2 inches in diameter, 65% sand, 20% gravel 1/4 to 1/2 inch in diameter, moderate est K
							@ 5 feet-same as above, wet
6	X		4, 6, 10			SC	clayey SAND (SC), loose, wet, 20 to 25% fines, fine to medium sand, 10 to 15% gravel, moderate to low est K
8	X		10, 16, 20, 21			SP	SAND (SP), black (2.5YR, 2.5/0), medium dense, wet, 10 to 15% fines, medium to coarse sand, 10 to 20% gravel to 1 inch diameter, high est K
10			6, 8, 7, 6, 5				@ 10 feet-approximately 10% gravel 1/4 to 1/2 inch round to angular
12			6				@12.5 feet-blockage in shoe, appears to be asphalt
14	X		8, 11, 8	0			SAND (SP), very dark gray (5Y 3/1), loose, wet, 5% fines, fine to medium sand, high est K, trace shell fragments
16	X		15, 8, 7, 4, 5, 6	0, 0			
18	X		10, 7, 6	0			@ 19 feet-same as above

COMMENTS



DRILLING METHOD/RIG TYPE SS-15-II/ARCH
HOLE DIAMETER 7.25 INCHES
TOTAL DEPTH OF BORING 87 FEET
DRILLING CONTRACTOR/DRILLER WATER DEV./K. CHIVRELLE
BIT TYPE 7" TRICONE AIR ROTARY CASING HAMMER
WELL COMPLETION DEPTH 80.5

JAMES M. MONTGOMERY
CONSULTING ENGINEERS, INC.

365 LENNON LANE, WALNUT CREEK, CALIFORNIA, 94598 / (415) 975-3400

BORING/WELL NUMBER M-025C   CLIENT PRC/US NAVY

DATE STARTED 5/22/91 COMPLETED 5/23/91   PROJECT/JMM PROJECT NO. NAS ALAMEDA/2738.0213

REF. ELEVATION 6.26 SURFACE ELEVATION   GEOLOGIST RICH HALKET

DEPTH feet	SAMPLE	SAMP. NO.	BLOWS/6 IN	HNU-PID meter units	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	COMMENTS
			6 6 5	0		SP	SAND (SP), very dark gray (5Y 3/1), loose, wet, 5% fines, fine to medium sand, high est K, trace shell fragments	
22			3 4 8 3 3 2	0 0 0		SM	silty SAND (SM), dark olive gray (5Y 3/2), loose, wet, 20 to 30% fines, very fine to medium sand, high est K	2-inch ID, SCH 40 PVC CASING
24								
26			3 3 3 1					
28			1 1 3 1 1 1			CL	CLAY (CL), alternating layers 1 to 3 inches of very dark gray (5Y 3/2) and olive (5Y 4/3), very soft, wet, low est K, sample is bedded, parts along bedding planes	
30			4 4 4	0.4		SP	SAND (SP), dark gray (5Y 4/1), loose, wet, 5 to 10% fines, very fine to fine sand, high est K	GROUT
32			6 3 4 3 2	0.4		CL	silty CLAY (CL), dark gray (2.5Y N4/), medium stiff, wet, 10 to 15% very fine sand, low to moderate est K, trace shell fragments @ 33 feet-same as above, 3-4" sand stringer, very fine to fine sand	
34			DRILL to 39'					
36								
38								
			2 3				@ 39 feet-same as above, fossiliferous oyster bed, moist	

LOG OF SOIL BORINGM-025C (continued)

JAMES M. MONTGOMERY
CONSULTING ENGINEERS, INC.

365 LENNON LANE, WALNUT CREEK, CALIFORNIA, 94598 / (415) 975-3400

BORING/WELL NUMBER M-025C
DATE STARTED 5/22/91 COMPLETED 5/23/91
REF. ELEVATION 6.26 SURFACE ELEVATION
CLIENT PRC/US NAVY
PROJECT/JMM PROJECT NO. NAS ALAMEDA/2738.0213
GEOLOGIST RICH HALKET

DEPTH feet	SAMPLE	SAMP. NO.	BLOWS/6 IN	HNU-PID meter units	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	COMMENTS
	X		4, 8			CL		
42	X		2, 2, 2, 2				silty CLAY (CL), dark gray (2.5Y N4/), medium stiff, wet, 10 to 15% very fine sand, low to moderate est K, trace shell fragments	2-inch ID, SCH 40 PVC CASING
44			DRILL to 48'					
46								
48	X		2, 3, 3, 4				@ 48 feet-same as above, 5-10% oyster shells	
50	X		2, 3, 3, 15				@ 50 feet-same as above	GROUT
52			DRILL to 57'			SC	clayey SAND (SC), dark gray (2.5YR N4/), medium stiff, damp, 20-25% fines, very fine to fine sand, low to moderate est K, trace oyster shells	
54								
55							@ 55 feet-same as above, interbedded clayey sand and clay (cuttings)	
56						SP	SAND (SP), dark olive gray (5Y 3/2), loose, wet, 5-10% fines, fine to very fine sand, moderate est K (cuttings)	
58	X		1, 1, 1, 1					
	X		1, 1				@ 59 feet-same as above, heaving sand	

LOG OF SOIL BORINGM-025C (continued)

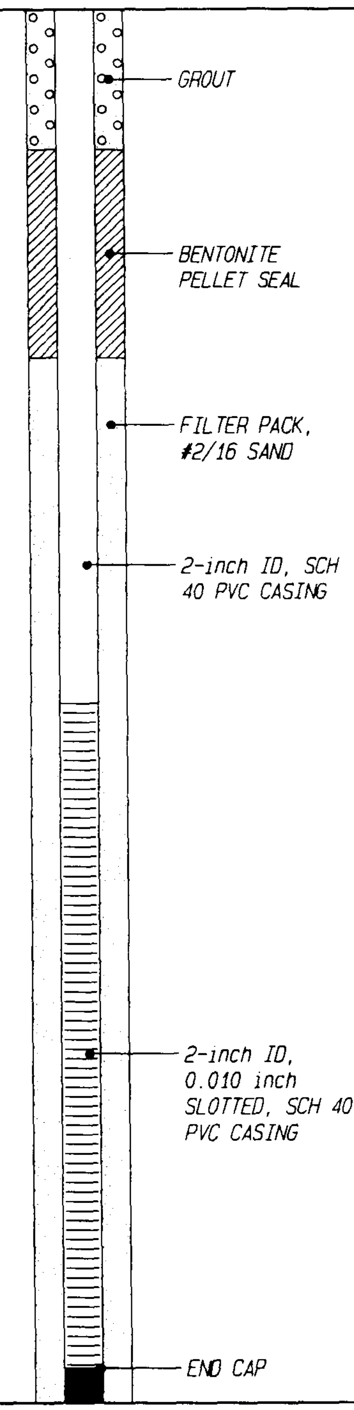
JAMES M. MONTGOMERY
CONSULTING ENGINEERS, INC.

365 LENNON LANE, WALNUT CREEK, CALIFORNIA, 94598 / (415) 975-3400

BORING/WELL NUMBER M-025C
CLIENT PRC/US NAVY
DATE STARTED 5/22/91 COMPLETED 5/23/91
PROJECT/JMM PROJECT NO. NAS ALAMEDA/2738.0213
REF. ELEVATION 6.26 SURFACE ELEVATION
GEOLOGIST RICH HALKET

DEPTH feet	SAMPLE	SAMP. NO.	BLOWS/6 IN	HNU-PID meter units	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION
			1			SP	
			1				SAND (SP), dark olive gray (5Y 3/2), loose, wet, 5-10% fines, fine to very fine sand, moderate est K (cuttings)
62			DRILL to 80'				
64							@ 65 feet-same as above (cuttings)
66							
68							
70							@ 70 feet-same as above (cuttings)
72							
74							
76							@ 77 feet-same as above (cuttings)
78							

COMMENTS



LOG OF SOIL BORINGM-025C (continued)

JAMES M. MONTGOMERY
CONSULTING ENGINEERS, INC.
365 LENNON LANE, WALNUT CREEK, CALIFORNIA, 94598 / (415) 975-3400

BORING/WELL NUMBER M-025C
CLIENT PRC/US NAVY
DATE STARTED 5/22/91 COMPLETED 5/23/91
PROJECT/JMM PROJECT NO. NAS ALAMEDA/2738.0213
REF. ELEVATION 6.26 SURFACE ELEVATION
GEOLOGIST RICH HALKET

DEPTH feet	SAMPLE	SAMP. NO.	BLOWS/6 IN	HNU-PID meter units	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	COMMENTS
		CHEM	12			SP	SAND (SP), dark olive gray (5Y 3/2), loose, wet, 5-10% fines, fine to very fine sand, moderate est K (cuttings)	
			12					
			10			CL	CLAY (CL), black (5Y 2.5/1), hard, damp, fines, low est K	
82			12					
			5					
			6					
		GEO-TECH	10					BENTONITE PELLET SEAL
84			11					
			DRILL to 87'				@ 85 feet-same as above (cuttings)	
86								
							TOTAL DEPTH 87 feet	BOTTOM OF BORING 87 feet
88								
90								
92								
94								
96								
98								
							Note: All samples were screened with a Geiger-Mueller meter; no radiation was detected.	

LOG OF SOIL BORINGM-025C (continued)

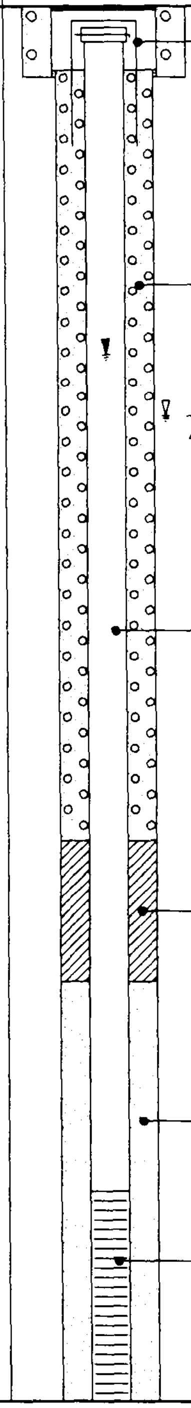
JAMES M.MONTGOMERY
CONSULTING ENGINEERS, INC.

365 LENNON LANE, WALNUT CREEK, CALIFORNIA, 94598 / (415) 975-3400

BORING/WELL NUMBER M-025E
CLIENT PRC/US NAVY
DATE STARTED 5/24/91 COMPLETED 5/24/91
PROJECT/JMM PROJECT NO. NAS ALAMEDA/2738.0213
REF. ELEVATION 6.54 SURFACE ELEVATION
GEOLOGIST CRAIG FANSHIER

DEPTH feet	SAMPLE	SAMP. NO.	BLOWS/6 IN	HNU-PID meter units	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION
			25			SP	gravelly SAND (SP), very dark grayish brown, (2.5Y, 3/2), dense, dry, trace fines, 80% fine to medium sand, 10% gravels 1/2 inch diameter to 2 inches, moderate est K, fill
			36				
			32				
2			11				
			10				
			11				gravelly SAND (SP), very dark reddish brown, (10YR, 2/2), medium dense, moist, 10 to 15% fines, fine to medium sand, black asphaltic material 2 inches in diameter, 65% sand, 20% gravel 1/4 to 1/2 inch in diameter, moderate est K
			11				
4			4				
			7				
			5				
			5				@ 5 feet-same as above, wet
6			4			SC	clayey SAND (SC), loose, wet, 20 to 25% fines, fine to medium sand, 10 to 15% gravel, moderate to low est K
			6				
			10				
			10			SP	SAND (SP), black (2.5YR, 2.5/0), medium dense, wet, 10 to 15% fines, medium to coarse sand, 10 to 20% gravel to 1 inch diameter, high est K
8			16				
			20				
			21				
10			6				@ 10 feet-approximately 10% gravel 1/4 to 1/2 inch round to angular
			8				
			7				
			6				
12			5				
			6				@ 12.5 feet-blockage in shoe, appears to be asphalt
			8				
			11	0			SAND (SP), very dark gray (5Y, 3/1), loose, wet, 5% fines, fine to medium sand, high est K, trace shell fragments
14			8				
			15				
			8	0			
16			7				
			4				
			5	0			
			6				
18			10				
			7	0			@ 19 feet-same as above
			6				

COMMENTS



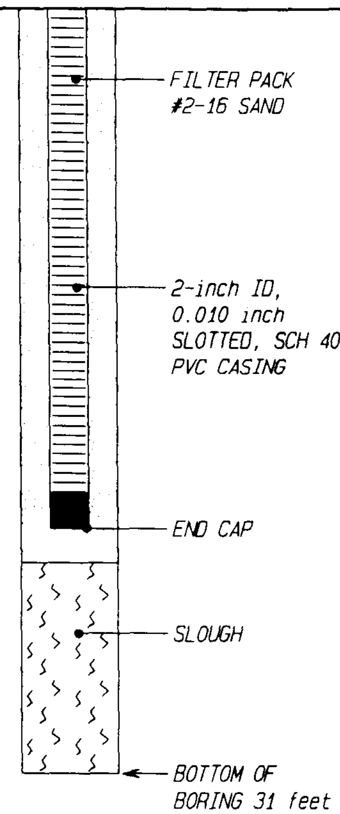
DRILLING METHOD/RIG TYPE AUGER/CME 750
DRILLING CONTRACTOR/DRILLER WATER DEV./M. PETERSON
HOLE DIAMETER 8.0 INCHES
BIT TYPE HOLLOW STEM AUGER
TOTAL DEPTH OF BORING 31 FEET
WELL COMPLETION DEPTH 27.5

JAMES M. MONTGOMERY
CONSULTING ENGINEERS, INC.
365 LENNON LANE, WALNUT CREEK, CALIFORNIA, 94598 / (415) 975-3400

BORING/WELL NUMBER M-025E
DATE STARTED 5/24/91 COMPLETED 5/24/91
REF. ELEVATION 6.54 SURFACE ELEVATION
CLIENT PRC/US NAVY
PROJECT/JMM PROJECT NO. NAS ALAMEDA/2738.0213
GEOLOGIST CRAIG FANSHIER

DEPTH feet	SAMP. NO.	BLOWS/6 IN	HNU-PID meter units	SOIL CLASS	GEOLOGIC DESCRIPTION
	GEO-TECH	6 6 5	0	SP	SAND (SP), very dark gray (5Y, 3/1), loose, wet, 5% fines, fine to medium sand, high est K, trace shell fragments
22	CHEM	3 4 8	0	SM	silty SAND (SM), dark olive gray (5Y, 3/2), loose, wet, 20 to 30% fines, very fine to medium sand, high est K
24		3 3 2	0		
26		3 3 3 1			
28		1 1 3		CL	CLAY (CL), alternating layers 1 to 3 inches of very dark gray (5Y, 3/2) and olive (5Y, 4/3), very soft, wet, low est K, sample is bedded, parts along bedding planes,
30	GEO-TECH	1 1 1 1 1			@ 30 feet-several 1/4 inch lenses of medium sand @ 30.5 feet- several 1/4 inch lenses of shell fragments
32					TOTAL DEPTH 31 feet
34					
36					
38					

COMMENTS



Note: All samples were screened with a Geiger-Mueller meter; no radiation was detected.

LOG OF SOIL BORINGM-025E (continued)

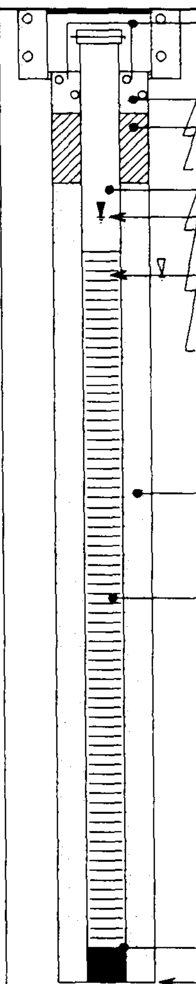
JAMES M. MONTGOMERY
CONSULTING ENGINEERS, INC.
365 LENNON LANE, WALNUT CREEK, CALIFORNIA, 94598 / (415) 975-3400

BORING/WELL NUMBER M-026A
CLIENT PRC/US NAVY
DATE STARTED 5/2/91 COMPLETED 5/2/91
PROJECT/JMM PROJECT NO. NAS ALAMEDA/2738.0213
REF. ELEVATION 6.31 SURFACE ELEVATION
GEOLOGIST CINDY FONG

DEPTH feet	SAMPLE	SAMP. NO.	BLOWS/6 IN	HNU-PID meter units	SOIL CLASS	GEOLOGIC DESCRIPTION
0–3			DRILL to 3'	0	SW	gravelly SAND (SW), dark gray brown (2.5Y 4/2), loose, damp, medium sand, 20% gravel, up to 5cm in diameter, moderate est K, concrete, fill
3–4.5		CHEM	7, 8, 9	0		
4.5–6			11, 12, 14		GW	sandy GRAVEL (GW), olive brown (2.5Y, 5/3), loose to medium dense, wet, 40% fine to coarse sand
6–7.5			3, 6, 9		SP	SAND (SP), gray to very dark gray (2.5Y N3/) with and olive green tinge, loose, wet, fine to medium sand, high est K, shell fragments
7.5–9			5, 7, 12	0		
9–10.5			5, 7, 12			@ 10 feet-same as above, olive gray (5Y 5/2), trace gravel
10.5–12		GEO-TECH	2, 3, 7			
12–13.5			9, 9, 8	0		SAND (SP), light olive gray (5Y 6/2), loose, wet, trace silt, very fine to fine sand, high est K
14						TOTAL DEPTH 14 feet

Note: All samples were screened with a Geiger-Mueller meter; no radiation was detected.

COMMENTS



DRILLING METHOD/RIG TYPE AUGER/CME 750
DRILLING CONTRACTOR/DRILLER WATER DEV./M. PETERSON
HOLE DIAMETER 8.0 INCHES
BIT TYPE HOLLOW STEM AUGER
TOTAL DEPTH OF BORING 14 FEET
WELL COMPLETION DEPTH 14

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BORING/WELL NUMBER M-26E
CLIENT PRC/US NAVY
DATE STARTED 5/2/91 COMPLETED 5/2/91
PROJECT/JMM PROJECT NO. NAS ALAMEDA/2738.0213
REF. ELEVATION 6.29 SURFACE ELEVATION
GEOLOGIST CINDY FONG

DEPTH feet	SAMP. NO.	BLOWS/6 IN	HNU-PID meter units	SOIL CLASS
		DRILL to 3'		SC
				SW
2				
			0	
		5		
		5		
4		4	0	
		4		
		4		
6		8		
		7		
		12		
		14		
8		24		
		26	0	
		22		
		12		SP
10		16	0	
		20		
		4		
		6		
12		13		
		9		
		7		
14		12		
		2		
		3		
		5		
16		3		
		3		
		4	0	
	GEO-TECH	3		
		4		
18		4		
		8		
		5		
		3		
	CHEM	2		

GEOLOGIC DESCRIPTION

clayey SAND (SC), dark gray (10YR 4/1), stiff, dry, low est K, rootlets

gravelly SAND (SW), brown (10YR, 5/3), loose wet, medium sand, 15-20% gravel, fill

SAND (SW), gray (5Y 5/1) with olive green tinge, loose, wet, very fine to medium sand, trace gravel, black mottling, high est K

@ 7.5 feet-same as above, black (2.5Y N2/0), asphalt, metal pieces, wire, fill

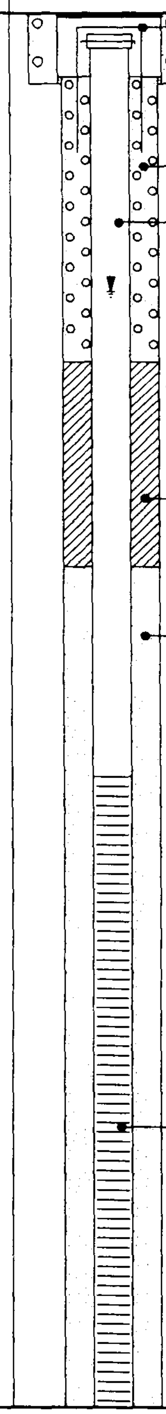
SAND (SP), very dark gray (2.5Y N3/0), loose, wet, medium sand, trace shell fragments, high est K, fill

SAND (SP), gray (5Y 5/1) with green tinge, loose, wet, very fine to fine sand, high est K, fill

SAND (SP), gray to dark gray (5Y 5/1) with a green tinge, medium sand, trace shell fragments, high est K, fill

@ 18 feet-same as above, heaving sands

COMMENTS



DRILLING METHOD/RIG TYPE AUGER/CME 750
DRILLING CONTRACTOR/DRILLER WATER DEV./M. PETERSON
HOLE DIAMETER 8.0 INCHES
BIT TYPE HOLLOW STEM AUGER
TOTAL DEPTH OF BORING 25.5 FEET
WELL COMPLETION DEPTH 21.5

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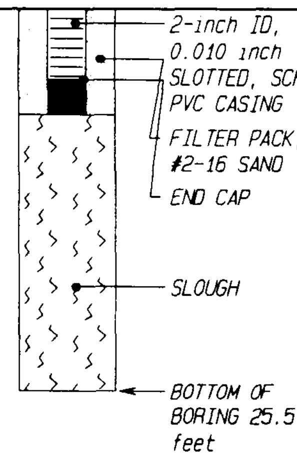
365 LENNON LANE, WALNUT CREEK, CALIFORNIA, 94598 / (415) 975-3400

BORING/WELL NUMBER M-26E
CLIENT PRC/US NAVY
DATE STARTED 5/2/91 COMPLETED 5/2/91
PROJECT/JMM PROJECT NO. NAS ALAMEDA/2738.0213
REF. ELEVATION 6.29 SURFACE ELEVATION
GEOLOGIST CINDY FONG

DEPTH feet	SAMPLE	SAMP. NO.	BLOWS/6 IN	HNU-PID meter units	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	COMMENTS
		CHEM	2			SP		
			1			CL		
			1				CLAY (CL), very dark gray (2.5Y N3/0), very soft, wet, gray mottling, trace sand	
			1					
22			2					
			PUSH to 25.5'					
24				0				
							@ 25 feet-same as above	
26							TOTAL DEPTH 25.5 feet	
28								
30								
32								
34								
36								
38								
							Note: All samples were screened with a Geiger-Mueller meter; no radiation was detected.	

LOG OF SOIL BORINGM-26E (continued)

JAMES M. MONTGOMERY
CONSULTING ENGINEERS, INC.

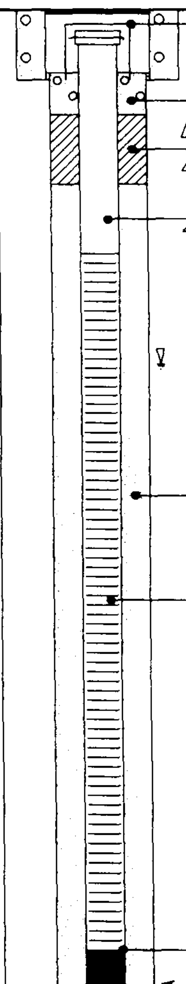
365 LENNON LANE, WALNUT CREEK, CALIFORNIA, 94598 / (415) 975-3400

BORING/WELL NUMBER M-027A
CLIENT PRC/US NAVY
DATE STARTED 5/13/91 COMPLETED 5/13/91
PROJECT/JMM PROJECT NO. NAS ALAMEDA/2738.0213
REF. ELEVATION 7.62 SURFACE ELEVATION
GEOLOGIST CINDY FONG

DEPTH feet	SAMPLE	SAMP. NO.	BLOWS/6 IN	HNU-PID meter units	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION
0–2	X		6, 8, 20	0		SW	gravelly SAND (SW), dark red brown (5YR 3/2), dry medium sand, 15-20% gravel, trace fines, trace glass, moderate est K.
2–5.5							VOID, concrete and steel pier, fill
5.5–14	X		1, 1, 9, 7, 7, 7, 14, 7, 11, 11, 3, 5, 6, 3, 6, 8, 5	0, 0		SP	SAND (SP), very dark gray (5YR 3/1), loose, wet, fine to medium sand, high est K, fill @ 6 feet-same as above, dark gray (2.5Y N4/0) SAND (SP), dark gray (2.5Y N4/0), loose, wet, fine to medium sand, trace shell fragments, high est K @ 11.5 feet-same as above
14							TOTAL DEPTH 14 feet

Note: All samples were screened with a Geiger-Mueller meter; no radiation was detected.

COMMENTS

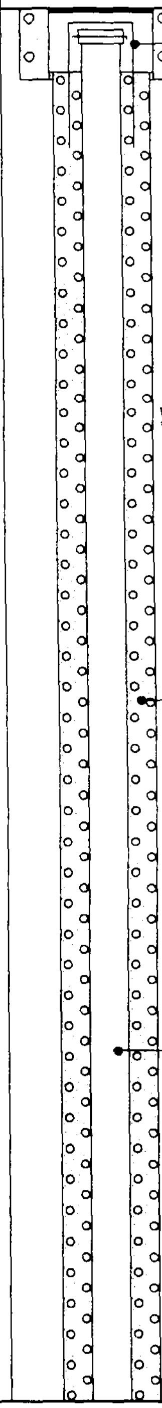


DRILLING METHOD/RIG TYPE AUGER/CME 750
DRILLING CONTRACTOR/DRILLER WATER DEV./M. PETERSON
HOLE DIAMETER 8.0 INCHES
BIT TYPE HOLLOW STEM AUGER
TOTAL DEPTH OF BORING 14 FEET
WELL COMPLETION DEPTH 14

JAMES M. MONTGOMERY
CONSULTING ENGINEERS, INC.
365 LENNON LANE, WALNUT CREEK, CALIFORNIA, 94598 / (415) 975-3400

BORING/WELL NUMBER M-027B
CLIENT PRC/US NAVY
DATE STARTED 4/29/91 COMPLETED 5/03/91
PROJECT/JMM PROJECT NO. NAS ALAMEDA/2738.0213
REF. ELEVATION 7.58 SURFACE ELEVATION
GEOLOGIST DAN KRAMER

DEPTH feet	SAMPLE	SAMP. NO.	BLOWS/6 IN	HNU-PID meter units	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	COMMENTS
0–5			DRILL to 5'				No recovery to 5 feet	CHRISTY BOX, PROTECTIVE STEEL CASING, LOCKING CAP
5–7.5			11 18 5 2	0 0		SP	SAND (SP), dark yellowish brown (10YR 3/6), loose, slightly moist, grades to gray (2.5Y N5/), loose, moist, less than 10% fines, high est K	WATER LEVEL @ 6 feet on 5/15/91
7.5–14		CHEM	2 9 9 13			SW	SAND (SW), very dark gray (5Y 3/1), loose to medium dense, wet, 10 to 15% fines, fine to medium sand, moderate to high est K	GROUT
11.5–13.5			5 8 10 18	0 0 0 0				
14–17.5							SAND (SW), very dark gray (5Y 3/1), loose to medium dense, wet, grades downward to very fine sand, piece of glass in sample, one large bolt, fill	2-inch ID, SCH 40 PVC CASING
17.5–19.5			6 7	55 12.5		CL	CLAY (CL), very dark gray (5Y 3/1), soft, wet, homogenous-no bedding, low est K	
19.5–20			10 13	0 0		SP	SAND (SP), loose, wet, medium grains, fines downward to fine sand, high est K	



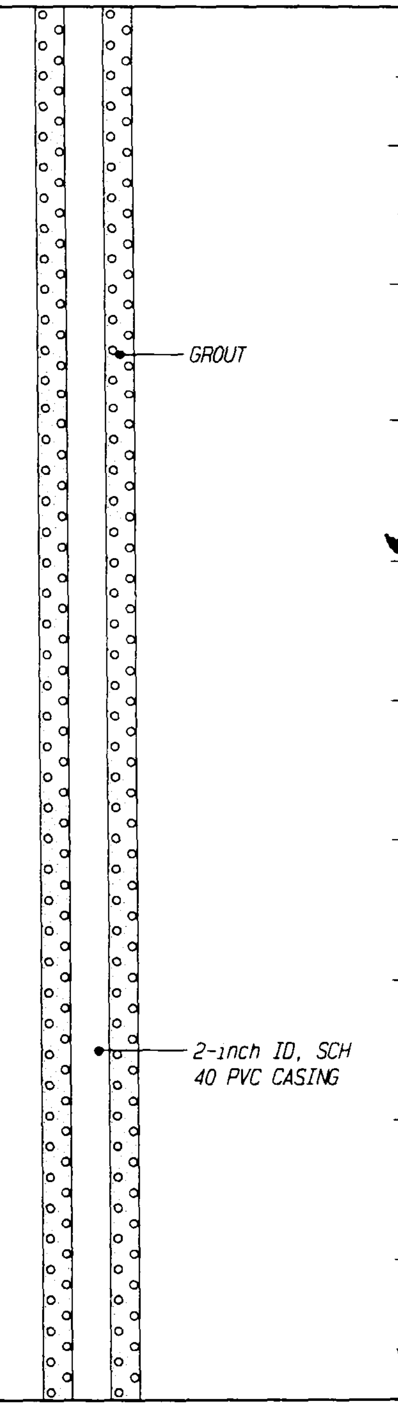
DRILLING METHOD/RIG TYPE SS-15-II/ARCH
DRILLING CONTRACTOR/DRILLER WATER DEV./K. CHIVRELLE
HOLE DIAMETER 7.25 INCHES
BIT TYPE 7" TRICONE AIR ROTARY CASING HAMMER
TOTAL DEPTH OF BORING 72 FEET
WELL COMPLETION DEPTH 66.5

JAMES M. MONTGOMERY
CONSULTING ENGINEERS, INC.

365 LENNON LANE, WALNUT CREEK, CALIFORNIA, 94598 / (415) 975-3400

BORING/WELL NUMBER M-027B
CLIENT PRC/US NAVY
DATE STARTED 4/29/91 COMPLETED 5/03/91
PROJECT/JMM PROJECT NO. NAS ALAMEDA/2738.0213
REF. ELEVATION 7.58 SURFACE ELEVATION
GEOLOGIST DAN KRAMER

DEPTH feet	SAMPLE	SAMP. NO.	BLOWS/6 IN	HNU-PID meter units	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	COMMENTS
			4	0		SP	SAND (SP), light olive brown (2.5Y 5/4), loose, wet, medium grains, trace fines, high est K	
			13					
			5					
			6					
22			1	0				
			3	0		SM	silty SAND (SM), very dark gray (5Y 3/1), medium stiff, wet, trace fines, very fine to fine sand, low est K, shell fragments	
			2	0		SC	@ 23 feet-approximately 1 inch clayey SAND (SC), very dark gray (5Y 3/1)	
			9			SM		
24						ML	clayey SILT (ML), very dark gray (5Y 3/1), soft, low est K, trace shell fragments	GROUT
26								
28								
30								
32								
34			3	0		CL	silty CLAY (CL), very dark gray to black (2.5Y 3/ to 2/), stiff, wet, 10% fine sand	
			3					
			6					2-inch ID, SCH 40 PVC CASING
			8					
36			5	0		ML	clayey SILT (ML), very dark gray (2.5Y 3/), soft, wet, 15% very fine to fine sand, 20% shell material	
			5					
			8			CL	silty CLAY (CL), very dark gray to black (2.5Y 3/ to 2/), soft, wet, trace fine sand, trace oyster shells	
			21					
38			3	0			silty CLAY (CL), very dark gray to black (2.5Y 3/ to 2/), medium stiff, approximately 20% silt, low est K	
			4					
			6					
			7					



LOG OF SOIL BORINGM-027B (continued)

JAMES M. MONTGOMERY
CONSULTING ENGINEERS, INC.
365 LENNON LANE, WALNUT CREEK, CALIFORNIA, 94598 / (415) 975-3400

BORING/WELL NUMBER M-027B
DATE STARTED 4/29/91 COMPLETED 5/03/91
REF. ELEVATION 7.58 SURFACE ELEVATION
CLIENT PRC/US NAVY
PROJECT/JMM PROJECT NO. NAS ALAMEDA/2738.0213
GEOLOGIST DAN KRAMER

DEPTH feet	SAMPLE	SAMP. NO.	BLOWS/6 IN	HNU-PID meter units	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	COMMENTS
	X		3 5 9	0		CL	silty CLAY (CL), iterbedded oyster hash layers several inches thick and sand lenses approximately 1 inch or less, soft to very soft, wet, increase to 15% fine sand at base to medium sand at 41.5 to 42 feet	
42				0		SP	SAND (SP), (5Y 3/1), loose, wet, medium sand, trace fines, some shell fragments, high est K	GROUT
44	X		9 36 50+	0			SAND (SP), medium dense, wet, trace fines, medium sand, high est K	2-inch ID, SCH 40 PVC CASING
						CL	CLAY (CL), layer, approximately 3 to 4 inches containing oyster shell fragments	
46	X		5 12 14 12	0		SP	SAND (SP), dark olive gray (5Y 3/2), medium dense, wet, trace fines, high est K	
48	X		5 9	0				
50								BENTONITE PELLET SEAL
52	X			0 0			SAND (SP), light olive brown (2.5Y 5/4), loose to medium dense, wet, medium sand, high est K	
54	X					SM	silty SAND (SM), gray mottling, moist, moderate est K	FILTER PACK, #2/16 SAND
	X			0		SP	SAND (SP), very dark gray (5Y 3/2), loose to medium dense, trace fines, medium sand, trace oyster shell fragments	
56	X					SM	silty SAND (SM), light olive brown (2.5Y 5/4), medium dense, wet, 15% fines, fine to medium sand, angular to subrounded, moderate to high est K	
58	X	GEO-TECH	4 12 15 13	0			silty SAND (SM), light olive brown (2.5Y 5/4), orange mottling and gray mottling, medium dense, wet, medium sand, moderate to high est K	2-inch ID, 0.010 inch SLOTTED, SCH 40 PVC CASING
	X		2 3	0				

LOG OF SOIL BORINGM-027B (continued)

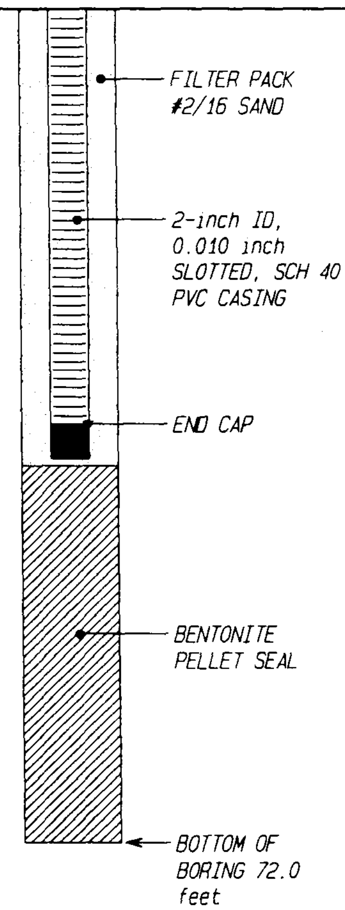
JAMES M. MONTGOMERY
CONSULTING ENGINEERS, INC.

365 LENNON LANE, WALNUT CREEK, CALIFORNIA, 94598 / (415) 975-3400

BORING/WELL NUMBER M-027B
DATE STARTED 4/29/91 COMPLETED 5/03/91
REF. ELEVATION 7.58 SURFACE ELEVATION
CLIENT PRC/US NAVY
PROJECT/JMM PROJECT NO. NAS ALAMEDA/2738.0213
GEOLOGIST DAN KRAMER

DEPTH feet	SAMPLE	SAMP. NO.	BLOWS/6 IN	HNU-PID meter units	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION
	☒		4 6			SM	silty SAND (SM), light olive brown (2.5Y 5/4), orange and gray mottling, medium dense, wet, medium sand, moderate to high est K, silt increases toward base of split spoon from 60 to 61 feet
62						SP	SAND (SP), very dark gray (5Y 3/2), loose, wet, 10% fines, fine to medium sand, high est K
	☒		0 7 7 20	0			
64			0 4 6 51				from 65 to 72 feet-same as above, heaving sands
66							
68							
70							
72							TOTAL DEPTH 72 feet
74							
76							
78							
							Note: All samples were screened with a Geiger-Mueller meter; no radiation was detected.

COMMENTS

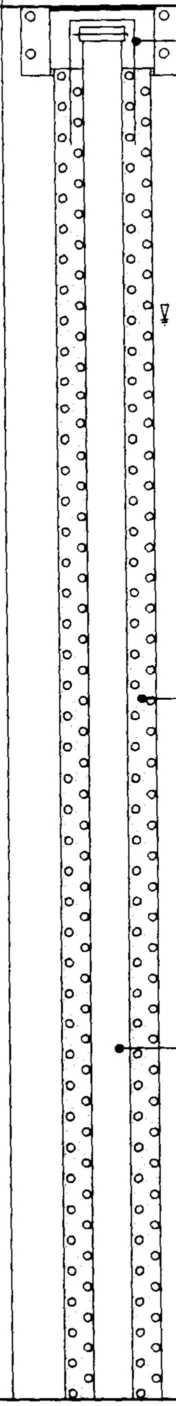


JAMES M. MONTGOMERY
CONSULTING ENGINEERS, INC.
365 LENNON LANE, WALNUT CREEK, CALIFORNIA, 94598 / (415) 975-3400

BORING/WELL NUMBER M-027C
CLIENT PRC/US NAVY
DATE STARTED 5/6/91 COMPLETED 5/7/91
PROJECT/JMM PROJECT NO. NAS ALAMEDA/2738.0213
REF. ELEVATION 7.17 SURFACE ELEVATION
GEOLOGIST DAN KRAMER

DEPTH feet	SAMPLE	SAMP. NO.	BLOWS/6 IN	HNU-PID meter units	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION
0–5			DRILL to 5'				No recovery to 5 feet
5–7.5	X		11 18 5 2	0 0		SP	SAND (SP), dark yellowish brown (10YR 3/6), loose, slightly moist, grades to gray (2.5Y N5/), loose, moist, less than 10% fines, high est K
7.5–11	X		9 9 13			SW	SAND (SW), very dark gray (5Y 3/1), loose to medium dense, wet, 10 to 15% fines, fine to medium sand, moderate to high est K
11.5–13.5	X		5 8 10 18	0 0 0 0			
14							SAND (SW), very dark gray (5Y 3/1), loose to medium dense, wet, grades downward to very fine sand, piece of glass in sample, one large bolt, fill
17						CL	CLAY (CL), very dark gray (5Y 3/1), soft, wet, homogenous-no bedding, low est K
18.5–20	X		6 7 10 13	55 12.5 0 0		SP	SAND (SP), loose, wet, medium grains, fines downward to fine sand, high est K

COMMENTS



DRILLING METHOD/RIG TYPE SS-15-II/ARCH
DRILLING CONTRACTOR/DRILLER WATER DEV./K. CHIVRELLE
HOLE DIAMETER 7.25 INCHES
BIT TYPE 7" TRICONE AIR ROTARY CASING HAMMER
TOTAL DEPTH OF BORING 94 FEET
WELL COMPLETION DEPTH 90.5

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BORING/WELL NUMBER M-027C CLIENT PRC/US NAVY
DATE STARTED 5/6/91 COMPLETED 5/7/91 PROJECT/JMM PROJECT NO. NAS ALAMEDA/2738.0213
REF. ELEVATION 7.17 SURFACE ELEVATION GEOLOGIST DAN KRAMER

DEPTH feet	SAMPLE	SAMP. NO.	BLOWS/6 IN	HNU-PID meter units	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	COMMENTS
			4	0		SP	SAND (SP), light olive brown (2.5Y 5/4), loose, wet, medium grains, trace fines, high est K	
			13					
			5					
22			6					
			1	0				
			3	0		SM	silty SAND (SM), very dark gray (5Y 3/1), medium stiff, wet, trace fines, very fine to fine sand, low est K, shell fragments	
			2	0		SC		
			4			SM		
24			3			ML	@ 23 feet-approximately 1 inch clayey SAND (SC), very dark gray (5Y 3/1)	
			6					
			10				clayey SILT (ML), very dark gray (5Y 3/1), soft, trace shell fragments, low est K	GROUT
			2					
26			2				@ 25 to 26.5 feet-same as above, 20 to 30% medium to coarse shell layer, low to moderate estimated K	
			2					
			3				clayey SILT (ML), dark olive gray, very soft, moist, trace very fine to fine sand, trace shell fragments	
			50					
28			2					
			2					
			2					
			3				@ 29 to 30 feet-same as above, clayey silt with shell hash	
30			2					
			2				@ 30 to 30.5 feet-same as above, clayey silt with shell hash layer, medium to coarse shell fragments, 5 to 10% fine sand with shell layers	
			3					
			3					
32			2					
			2					
			3					
			4					
34			DRILL to 60'					
						CL	silty CLAY (CL), very dark gray to black (2.5Y 3/ to 2/), stiff, wet, 10% fine sand	2-inch ID, SCH 40 PVC CASING
36						ML	clayey SILT (ML), very dark gray (2.5Y 3/), soft, wet, 15% very fine to fine sand, 20% oyster shells	
						CL	silty CLAY (CL), very dark gray to black (2.5Y 3/ to 2/), soft, wet, trace fine sand, trace oyster shells	
38							silty CLAY (CL), very dark gray to black (2.5Y 3/ to 2/), medium stiff, approximately 20% silt, low est K, very soft from rig behavior	

LOG OF SOIL BORINGM-027C (continued)

JAMES M. MONTGOMERY
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365 LENNON LANE, WALNUT CREEK, CALIFORNIA, 94598 / (415) 975-3400

BORING/WELL NUMBER M-027C
CLIENT PRC/US NAVY
DATE STARTED 5/6/91 COMPLETED 5/7/91
PROJECT/JMM PROJECT NO. NAS ALAMEDA/2738.0213
REF. ELEVATION 7.17 SURFACE ELEVATION
GEOLOGIST DAN KRAMER

DEPTH feet	SAMPLE	SAMP. NO.	BLOWS/6 IN	HNU-PID meter units	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	COMMENTS
			DRILL to 60'			CL	silty CLAY (CL), iterbedded oyster hash layers several inches thick and sand lenses approximately 1 inch or less, soft to very soft, wet, increase to 15% fine sand at base to medium sand at 41.5 to 42 feet	
42						SP	SAND (SP), (5Y 3/1), loose, wet, medium sand, trace fines, some shell fragments, high est K	
44							SAND (SP), medium dense, wet, trace fines, medium sand, subangular to subrounded/rounded	GROUT
						CL	CLAY (CL), very soft, clay layer approximately 3 to 4 inches containing oyster shell fragments	
46						SP	SAND (SP), dark olive gray (5Y 3/2), medium dense, wet, trace fines, high est K	
48								
50								
52							SAND (SP), light olive brown (2.5Y 5/4), loose to medium dense, wet, medium sand, high est K	
54						SM	silty SAND (SM), gray mottling, moist, moderate est K	
						SP	SAND (SP), very dark gray (5Y 3/2), loose to medium dense, trace fines, medium sand, trace oyster shell fragments	2-inch ID, SCH 40 PVC CASING
56						SM	silty SAND (SM), light olive brown (2.5Y 5/4), medium dense, wet, 15% fines, fine to medium sand, angular to subrounded, moderate to high est K	
58							silty SAND (SM), light olive brown (2.5Y 5/4), orange mottling and gray mottling, medium dense, wet, medium sand, moderate to high est K	

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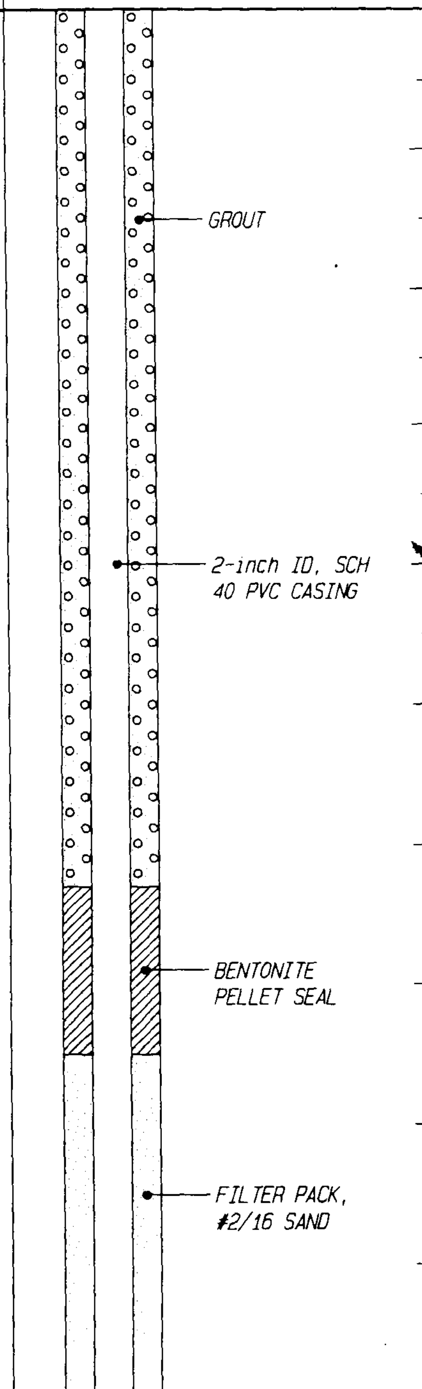
BORING/WELL NUMBER M-027C
DATE STARTED 5/6/91 COMPLETED 5/7/91
REF. ELEVATION *7.17 SURFACE ELEVATION

CLIENT PRC/US NAVY
PROJECT/JMM PROJECT NO. NAS ALAMEDA/2738.0213
GEOLOGIST DAN KRAMER

DEPTH feet	SAMPLE	SAMP. NO.	BLOWS/6 IN	HNU-PID meter units	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	COMMENTS
			6	32.9		SM/SP	SAND (SP), olive gray (5Y 3/2), medium dense, wet, 10 to 15% fines, very fine to fine sand, high est K, silt increases slightly from 61 to 62 feet (25% fines)	
			50					
			21	18.6				
			50					
62			11	15.3		SM	silty SAND (SM), olive (5Y 5/4), medium dense, wet, fine to medium sand, high est K	
			50					
			7	12.2				GROUT
			39					
64			3			SP	SAND (SP), dark olive gray (5Y 3/2), medium dense, wet, 5 to 10% fines, fine to medium sand, high est K, flowing sands	
			13	0				
			DRILL to 87'					
66								
68								2-inch ID, SCH 40 PVC CASING
							@ 69 feet-same as above (cuttings)	
70								
72								
74							SAND (SP), olive gray (5Y 3/2), wet	BENTONITE PELLET SEAL
76								
								FILTER PACK, #2/16 SAND
78								



JAMES M. MONTGOMERY
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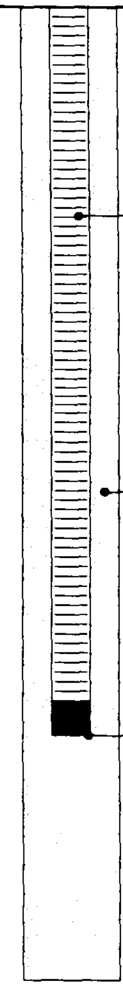
365 LENNON LANE, WALNUT CREEK, CALIFORNIA, 94598 / (415) 975-3400

BORING/WELL NUMBER M-027C
CLIENT PRC/US NAVY
DATE STARTED 5/6/91 COMPLETED 5/7/91
PROJECT/JMM PROJECT NO. NAS ALAMEDA/2738.0213
REF. ELEVATION 7.17 SURFACE ELEVATION
GEOLOGIST DAN KRAMER

DEPTH feet	SAMPLE	SAMP. NO.	BLOWS/6 IN	HNU-PID meter units	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	COMMENTS
						SP	SAND (SP), dark olive gray (5Y 3/2), medium dense, wet, 5 to 10% fines, fine to medium sand, high est K, flowing sands	
82								
84								2-inch ID, 0.010 inch SLOTTED, SCH 40 PVC CASING
						CL SP	@ 85 to 87 feet-CLAY (CL) and SAND (SP), in cuttings	
86								
			3			SP	SAND (SP), dark olive gray (5Y 3/2), medium dense, wet, 15 to 20% fines, very fine to fine sand, moderate to high est K	FILTER PACK #2/16 SAND
88			2					
			2					
			22					
			8					
			6					
90			5			CL	CLAY (CL), dark grey (5Y 4/1), very stiff to hard, moist, clay, silt, trace organic material	END CAP
			6					
		CHEM	7	0				
			11					
92			5				@ 92 feet-same as above, organic material increases from 92 to 94 feet	
			5					
			5					
			6					
94							TOTAL DEPTH 94 feet	BOTTOM OF BORING 94 feet
96								
98								
							Note: All samples were screened with a Geiger-Mueller meter; no radiation was detected.	



LOG OF SOIL BORINGM-027C (continued)

JAMES M. MONTGOMERY
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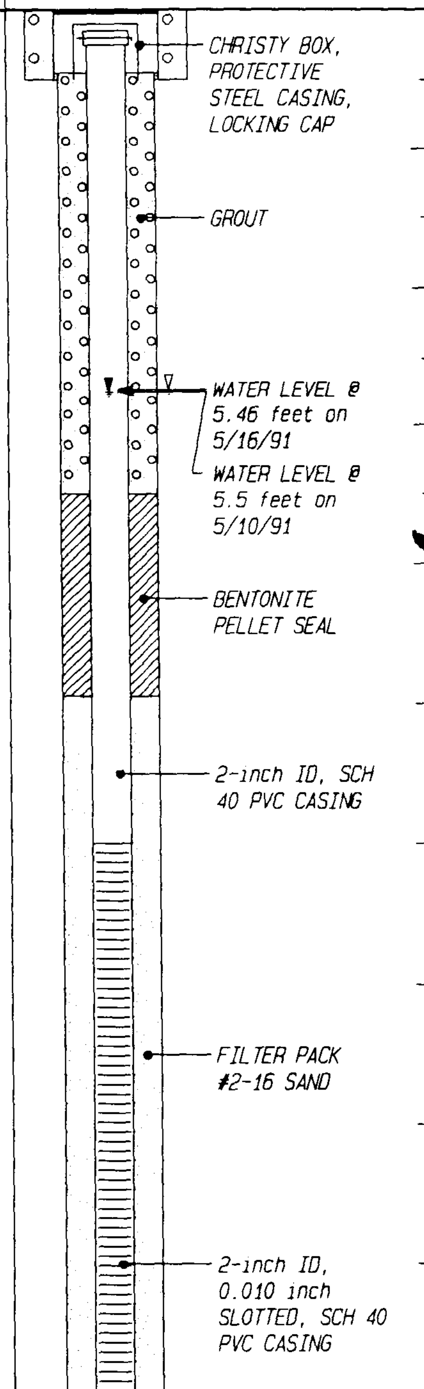
365 LENNON LANE, WALNUT CREEK, CALIFORNIA, 94598 / (415) 975-3400

BORING/WELL NUMBER M-027E
DATE STARTED 5/10/91 COMPLETED 5/13/91
REF. ELEVATION 7.44 SURFACE ELEVATION
CLIENT PRC/US NAVY
PROJECT/JMM PROJECT NO. NAS ALAMEDA/2738.0213
GEOLOGIST CINDY FONG

DEPTH feet	SAMP. NO.	BLOWS/6 IN	HNU-PID meter units	SOIL CLASS	GEOLOGIC DESCRIPTION
		6		SW	gravelly SAND (SW), dark red brown (5YR 3/2), dry medium sand, 15-20% gravel, trace fines, trace glass, moderate est K
		8	0		
		20			
2					
					VOID, concrete and steel pier, fill
4					
		1		SP	SAND (SP), very dark gray (5YR 3/1), loose, wet, fine to medium sand, high est K
6		1			
		9			@ 6 feet-same as above, dark gray (2.5Y N4/0)
		7			
		7			
8		7	0		SAND (SP), dark gray (2.5Y N4/0), loose, wet, fine to medium sand, trace shell fragments, high est K
		14			
		7			
10		11	0		
		11			
		3			
		5			
	CHEM	6			@ 11.5 feet-same as above
12		3			
		6			
		8			
		5			
14		6			@ 14 feet-same as above
		1			
		1			
16		1			
		1			
	CHEM	3			
		5	4.7		SAND (SP), dark gray (2.5Y N4/0), loose, wet, fine to medium sand, trace oyster shell fragments, high est K
		4			
18		3			
		5			
		8			

COMMENTS



DRILLING METHOD/RIG TYPE AUGER/CME 750
HOLE DIAMETER 8.0 INCHES
TOTAL DEPTH OF BORING 29.5 FEET
DRILLING CONTRACTOR/DRILLER WATER DEV./M. PETERSON
BIT TYPE HOLLOW STEM AUGER
WELL COMPLETION DEPTH 22.5

JAMES M. MONTGOMERY
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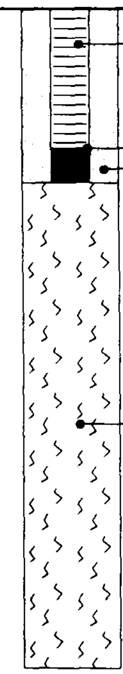
BORING/WELL NUMBER M-027E
DATE STARTED 5/10/91 COMPLETED 5/13/91
REF. ELEVATION 7.44 SURFACE ELEVATION
CLIENT PRC/US NAVY
PROJECT/JMM PROJECT NO. NAS ALAMEDA/2738.0213
GEOLOGIST CINDY FONG

DEPTH feet	SAMPLE	SAMP. NO.	BLOWS/6 IN	HNU-PID meter units	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION
		GEO-TECH	8 10 12			SP	SAND (SP), dark gray (2.5Y N4/0), loose, wet, fine to medium sand, trace oyster shell fragments, high est K
22			8 7 6				
			2 2 2			ML	clayey SILT (ML), dark gray (2.5Y N4/0), soft, moist, low est K
24							
			1 1 1				
26							
			PUSH to 29.5'				
28							
							TOTAL DEPTH 29.5 feet
30							
32							
34							
36							
38							
							Note: All samples were screened with a Geiger-Mueller meter; no radiation was detected.

COMMENTS



LOG OF SOIL BORINGM-027E (continued)

JAMES M. MONTGOMERY
CONSULTING ENGINEERS, INC.
365 LENNON LANE, WALNUT CREEK, CALIFORNIA, 94598 / (415) 975-3400

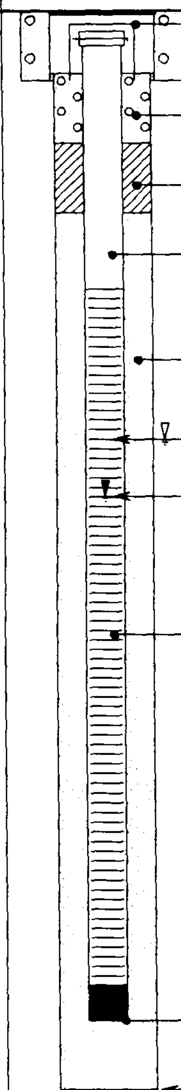
BORING/WELL NUMBER M-028A
DATE STARTED 4/30/91 COMPLETED 4/30/91
REF. ELEVATION 8.55 SURFACE ELEVATION

CLIENT PRC/US NAVY
PROJECT/JMM PROJECT NO. NAS ALAMEDA/2738.0213
GEOLOGIST CINDY FONG

DEPTH feet	SAMP. NO.	BLOWS/6 IN	HNU-PID meter units	SOIL CLASS	GEOLOGIC DESCRIPTION
0–2.5		DRILL to 2.5'		SP	SAND (SP), olive (5Y 5/3), loose to medium dense, fine to medium sand, 20% gravel up to 1.5" in diameter, high est K, rootlets
3–4		7, 8, 9			@ 3 feet-same as above, very dark brown (10YR 2/2), white and blue precipitate, iron staining, rootlets
4–5.5		7, 6, 8			
6		9		GW	3" clayey sand lens, stiff, rootlets
6–8.5		5, 2, 1, 1, 2			sandy GRAVEL (GW), dark gray brown (2.5Y 4/2), loose to dense, wet, fine gravel to 1/2 inch, high est K, assorted metal and concrete fragments, fill
8.5–10		1, 2, 22		SW	gravelly SAND (SW), black (2.5Y N2/0), loose, wet, 70% fine to medium sand, 25% fine to coarse gravel, assorted wood and metal pieces, fill
10–11.5	GEO-TECH	24, 28, 22		SP	SAND (SP), black (2.5Y N2/), medium dense, wet, medium sand, high est K
12.5–14.5		10, 18, 16, 9	28		@ 13 feet-same as above, very dark gray (2.5Y N3/0), shell fragments, 2 inch olive gray clay layer at 13.25 feet
14.5–15.5		10, 8	10		@ 15 feet-same as above
15.5					TOTAL DEPTH 15.5 feet

Note: All samples were screened with a Geiger-Mueller meter; no radiation was detected.

COMMENTS



DRILLING METHOD/RIG TYPE AUGER/CME 750
HOLE DIAMETER 8.0 INCHES
TOTAL DEPTH OF BORING 15.5 FEET

DRILLING CONTRACTOR/DRILLER WATER DEV./M. PETERSON
BIT TYPE HOLLOW STEM AUGER
WELL COMPLETION DEPTH 14.5

JAMES M. MONTGOMERY
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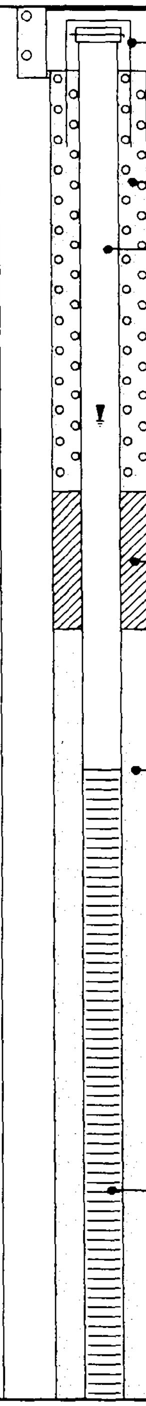
BORING/WELL NUMBER M-028E
CLIENT PRC/US NAVY
DATE STARTED 5/1/91 COMPLETED 5/1/91
PROJECT/JMM PROJECT NO. NAS ALAMEDA/2738.0213
REF. ELEVATION 8.23 SURFACE ELEVATION
GEOLOGIST CINDY FONG

DEPTH feet	SAMPLE	SAMP. NO.	BLOWS/6 IN	HNU-PID meter units	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	COMMENTS
			DRILL to 3'	0		SP	SAND (SP), light olive brown (2.5Y 5/3), loose, moist, medium sand, 20% gravel, rootlets, moderate to high est K	CHRISTY BOX, PROTECTIVE STEEL CASING, LOCKING CAP
2						CL	sandy CLAY (CL) lens, light gray (2.5Y 7/1), stiff, moist, iron mottling	GROUT
4		CHEM	10 10 16 10 12	0		SP	SAND (SP), red brown and black (2.5YR 4/4 and 2.5/1), moist, 20% gravel, rootlets, 4-inch layer blue/white precipitate beginning @ 3.0'	2-inch ID, SCH 40 PVC CASING
6			8 5 8 10				@ 5.5 feet-same as above, assorted refuse, including film negatives, metal chunks (up to 3" long), yellow precipitate, fill	WATER LEVEL @ 6 feet on 5/1/91 and 5/10/91
8			20 22 19 12 27 45	1.3 12.8		GW	sandy GRAVEL (GW), black (5Y, 2.5/1), wet, 40% coarse sand, assorted refuse including, copper wire, metal pieces, film negatives, noticeable oily sheen, moderate est K	BENTONITE PELLET SEAL
10			12 14 14 10 12 18	1.3		SP	SAND (SP), dark gray (2.5Y N3.5/0) with a green/olive tinge, loose to medium dense, wet, medium sand, shell fragments, high est K	FILTER PACK #2-16 SAND
14			7 6 7 6	0.2			@ 14 feet-same as above, flowing sands	
16		GEO-TECH	8 10				@ 16 feet-same as above, color grading to gray (5Y 5/1), 20% shell fragments	2-inch ID, 0.010 inch SLOTTED, SCH 40 PVC CASING
18			7 9 10	0			@ 19 feet-same as above, shell fragments increasing in diameter up to 2 cm	



DRILLING METHOD/RIG TYPE AUGER/CME 750
DRILLING CONTRACTOR/DRILLER WATER DEV./M. PETERSON
HOLE DIAMETER 8.0 INCHES
BIT TYPE HOLLOW STEM AUGER
TOTAL DEPTH OF BORING 29.5 FEET
WELL COMPLETION DEPTH 21.5

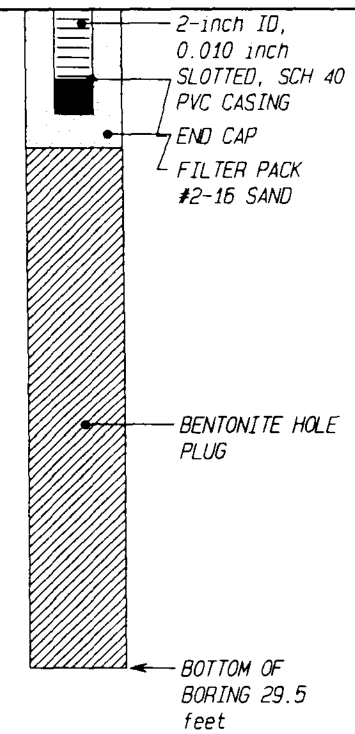
JAMES M. MONTGOMERY
CONSULTING ENGINEERS, INC.
365 LENNON LANE, WALNUT CREEK, CALIFORNIA, 94598 / (415) 975-3400

BORING/WELL NUMBER M-028E
CLIENT PRC/US NAVY
DATE STARTED 5/1/91 COMPLETED 5/1/91
PROJECT/JMM PROJECT NO. NAS ALAMEDA/2738.0213
REF. ELEVATION 8.23 SURFACE ELEVATION
GEOLOGIST CINDY FONG

DEPTH feet	SAMPLE	SAMP. NO.	BLOWS/6 IN	HNU-PID meter units	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION
			2			SP	SAND (SP), gray (5Y 5/1), with a green tinge, loose, wet, medium sand, 15 to 20% medium size shell fragments, high est K
			5				
			3				
			2				0.5 foot clayey SAND interbed, gray (5Y 5/1), loose, wet, fine to medium sand, fine clay lamentations, shell fragments
22			1				
			2				
			1			CL	
24			1				CLAY (CL), dark gray (7.5YR 4/0), soft, moist, 15% silt/fine sand, trace shell fragments, fine laminations, low est K
			2				
			PUSH to 29.5'				
26							
							@ 27 feet-same as above
28							
							CLAY (CL), 6-inch layer of clay with approximately 50% shell fragments
30							TOTAL DEPTH 29.5 feet
32							
34							
36							
38							

Note: All samples were screened with a Geiger-Mueller meter; no radiation was detected.

COMMENTS



LOG OF SOIL BORINGM-028E (continued)

JAMES M. MONTGOMERY
CONSULTING ENGINEERS, INC.

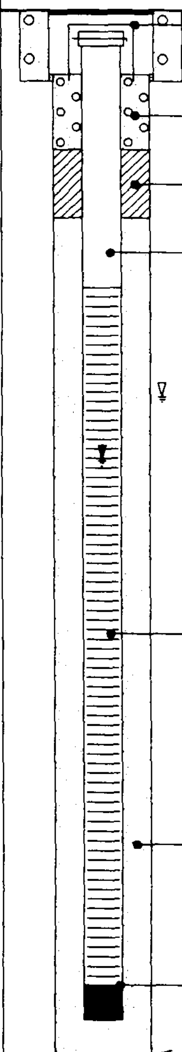
365 LENNON LANE, WALNUT CREEK, CALIFORNIA, 94598 / (415) 975-3400

BORING/WELL NUMBER M-029A
DATE STARTED 4/29/91 COMPLETED 4/29/91
REF. ELEVATION 7.69 SURFACE ELEVATION

CLIENT PRC/US NAVY
PROJECT/JMM PROJECT NO. NAS ALAMEDA/2738.0213
GEOLOGIST CINDY FONG

DEPTH feet	SAMPLE	SAMP. NO.	BLOWS/6 IN	HNU-PID meter units	SOIL CLASS	GEOLOGIC DESCRIPTION
			DRILL to 2.5'		SW / GW	gravelly SAND (SW), brown (10YR 5/3), very loose to loose, medium sand, high est K
2				0		sandy GRAVEL (GW), very dark gray (10YR 3/1), very loose to loose, high est K
			18			
			14			@ 3 feet-same as above, assorted refuse including glass, metal, asphalt, concrete, fill
			14			
4		CHEM	24			
			18			
			50			
			12			
6			10			
			5			
			14	22		sandy GRAVEL (GW), black (5Y 2.5/2), wet, medium sand, metal pieces, wire, wood, high est K, strong petroleum odor, black oil drops, fill
			36			
8			38	1		
			22			
			5			
			7			
10		GEO-TECH	5			@ 10 feet-same as above
			5			
			18			
			9		SP	SAND (SP), very dark gray (2.5Y 3/0), loose, wet, medium sand, subrounded, metal pieces up to 0.75" long, copper wire, high est K, fill
12			12			
			14			
			11			
14			14			
			14			
						TOTAL DEPTH 15 feet
16						
18						
						Note: All samples were screened with a Geiger-Mueller meter; no radiation was detected.

COMMENTS



DRILLING METHOD/RIG TYPE AUGER/CME 750
HOLE DIAMETER 8.0 INCHES
TOTAL DEPTH OF BORING 15 FEET

DRILLING CONTRACTOR/DRILLER WATER DEV./M. PETERSON
BIT TYPE HOLLOW STEM AUGER
WELL COMPLETION DEPTH 14.5

JAMES M. MONTGOMERY
CONSULTING ENGINEERS, INC.

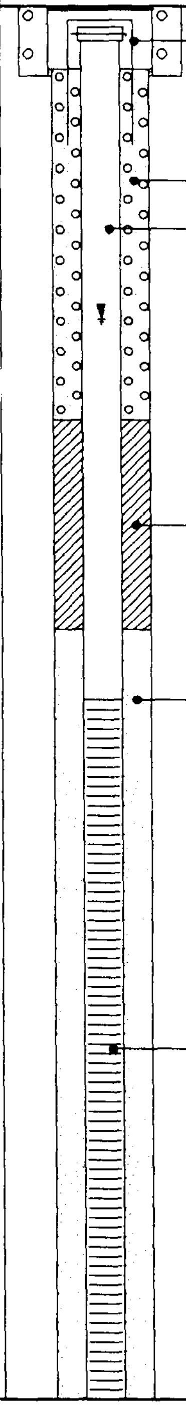
365 LENNON LANE, WALNUT CREEK, CALIFORNIA, 94598 / (415) 975-3400

BORING/WELL NUMBER M-029E
DATE STARTED 4/29/91 COMPLETED 4/30/91
REF. ELEVATION 6.85 SURFACE ELEVATION

CLIENT PRC/US NAVY
PROJECT/JMM PROJECT NO. NAS ALAMEDA/2738.0213
GEOLOGIST CINDY FONG

DEPTH feet	SAMPLE	SAMP. NO.	BLOWS/6 IN	HNU-PID meter units	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION
0			DRILL to 3'			SP	SAND (SP), olive gray (5Y 4/2), loose, damp, medium sand, 15 to 25% gravel
1						SW	
2				0			gravelly SAND (SW), dark olive gray (5Y 3/2), loose, damp, medium sand, 40 to 50% coarse gravel, white precipitate, wood, fill
3			3 2				
4			15 18 14 14				@ 4.5 feet-same as above, mottled, 15% assorted refuse including metal pieces, nails, glass, fill
6			50			SP	SAND (SP), black (7.5YR 2/0), very loose, wet, 70% medium sand, 20 to 25% gravel, metal pieces, nails, wire cable, fill
8							
9			8 27 16				
10			14 33 42				SAND (SP), black (7.5YR 2/0), very loose, wet, medium sand, 10-15% shell fragments, trace metal pieces, glass, high est K, fill
12							
13			8 7 10				
14							@ 14 feet-same as above, loose to medium dense, 10-15% silt, 10% shell fragments
15			14 12 10				
18			4 5 6 6 4			SM	silty SAND (SM), dark gray (2.5Y N4/), loose to medium dense, wet, 20% fines, medium to coarse sand, shell fragments

COMMENTS

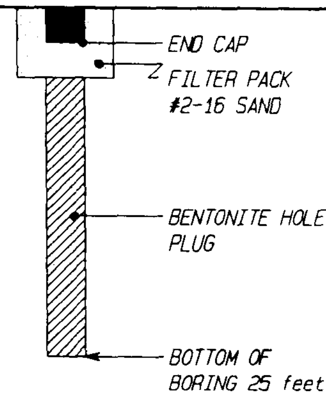


DRILLING METHOD/RIG TYPE AUGER/CME 750
HOLE DIAMETER 8.0 INCHES
TOTAL DEPTH OF BORING 25 FEET

DRILLING CONTRACTOR/DRILLER WATER DEV./M. PETERSON
BIT TYPE HOLLOW STEM AUGER
WELL COMPLETION DEPTH 20.5

JAMES M. MONTGOMERY
CONSULTING ENGINEERS, INC.
365 LENNON LANE, WALNUT CREEK, CALIFORNIA, 94598 / (415) 975-3400

BORING/WELL NUMBER M-029E
CLIENT PRC/US NAVY
DATE STARTED 4/29/91 COMPLETED 4/30/91
PROJECT/JMM PROJECT NO. NAS ALAMEDA/2738.0213
REF. ELEVATION 6.85 SURFACE ELEVATION
GEOLOGIST CINDY FONG

DEPTH feet	SAMPLE	SAMP. NO.	BLOWS/6 IN	HNU-PID meter units	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	COMMENTS
	X		2 PUSH to 25'			CL	silty CLAY (CL), dark gray (5Y 4/1), soft to medium stiff, wet, 10% shell fragments	
22								
							silty CLAY (CL), dark gray (2.5Y 4/0), very soft, moist to wet, laminated, 30% silt, trace shell fragments	
24								
							TOTAL DEPTH 25 feet	
26								
28								
30								
32								
34								
36								
38							Note: All samples were screened with a Geiger-Mueller meter; no radiation was detected.	

LOG OF SOIL BORINGM-029E (continued)

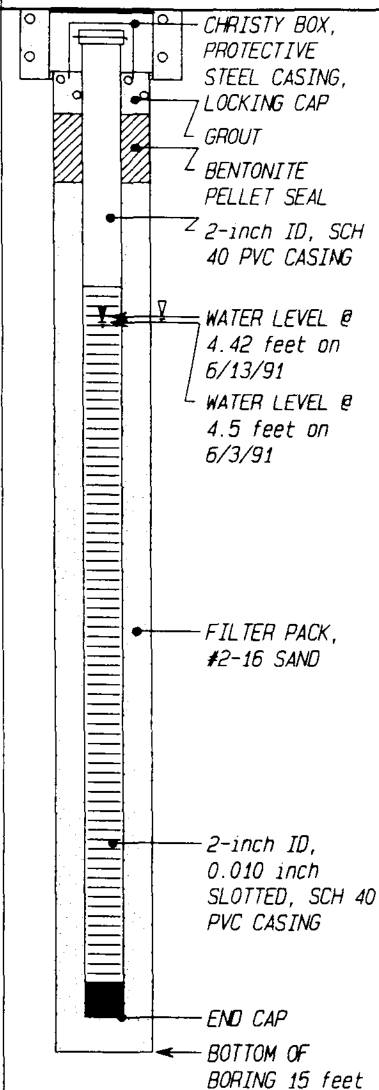
JAMES M. MONTGOMERY
CONSULTING ENGINEERS, INC.

365 LENNON LANE, WALNUT CREEK, CALIFORNIA, 94598 / (415) 975-3400

BORING/WELL NUMBER M-101A
DATE STARTED 6/3/91 COMPLETED 6/3/91
REF. ELEVATION 7.18 SURFACE ELEVATION
CLIENT PRC/US NAVY
PROJECT/JMM PROJECT NO. NAS ALAMEDA/2738.0213
GEOLOGIST CRAIG FANSHIER

DEPTH feet	SAMPLE	SAMP. NO.	BLOWS/6 IN	HNU-PID meter units	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION
						SP	
			8	0			SAND (SP), dark reddish brown (5YR 3/2), medium dense, dry, 10% fines, fine to medium sand, high est K, fill
			18				
			25				
2		CHEM	17	0			
			19				
			24			SC	clayey SAND (SM), very dark gray (5Y, 3/1), dense, slightly moist, 30% fines, fine to medium sand, low est K
4			14	0		SP	
			18				SAND (SP), very dark gray (5Y, 3/1), dense, wet, fine to medium sand, high est K
			18				
			7	0		SM	silty SAND (SM), olive brown (2.5YR, 4/3), dense, wet, 30% fines, 10 to 20% shell fragments, moderate est K
6			2				
			3			SP	
			1	0			@ 6.2 feet-SAND (SP), same as 3.5 feet, loose, wet, 5% fines, medium sand
			2				
			3			CL SC	@ 7.4 feet-one inch silty clay lens and 1/2 inch clayey sand lens, 10% shell fragments, occasional clay ball mixed in
8			4	17		SP	
			2			CL	
			3			SP	silty CLAY (CL), very dark gray (5Y, 3/1), soft, wet, several one inch long brown rust mottled root traces
10		GEO-TECH	3	0			@ 9 feet-as above SAND (SP), with 10 to 20% shell fragments
			5				
			6				
12			3				
			2				
			5				
			10	0			SAND (SP), slightly lighter green tint, dark olive gray (5Y, 3/2), loose to medium dense, wet, some silty sand or very fine sand lenses 1/2 inch thick, very fine sand
14			11				
			5				
							TOTAL DEPTH 15 feet
16							
18							
							Note: All samples were screened with a Geiger-Mueller meter; no radiation was detected.

COMMENTS



DRILLING METHOD/RIG TYPE AUGER/CME 750
HOLE DIAMETER 8.0 INCHES
TOTAL DEPTH OF BORING 15 FEET
DRILLING CONTRACTOR/DRILLER WATER DEV./M. PETERSON
BIT TYPE HOLLOW STEM AUGER
WELL COMPLETION DEPTH 14.5

JAMES M. MONTGOMERY CONSULTING ENGINEERS, INC.

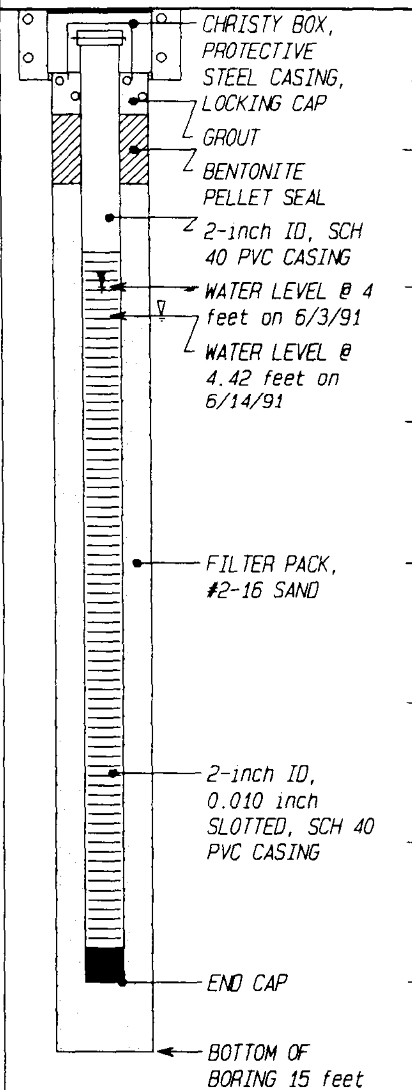
365 LENNON LANE, WALNUT CREEK, CALIFORNIA, 94598 / (415) 975-3400

BORING/WELL NUMBER M-102A
DATE STARTED 6/3/91 COMPLETED 6/3/91
REF. ELEVATION 8.03 SURFACE ELEVATION

CLIENT PRC/US NAVY
PROJECT/JMM PROJECT NO. NAS ALAMEDA/2738.0213
GEOLOGIST CRAIG FANSHIER

DEPTH feet	SAMPLE	SAMP. NO.	BLOWS/6 IN	HNU-PID meter units	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION
0						SP	
			5 8 12	0			SAND (SP), olive brown (2.5Y 4/3), loose, dry, 5% fines, fine to medium sand, high est K
2		CHEM	7 8 9	0			@ 2.5 feet-slightly moist
4			6 7 10	0			@ 4 feet-wet @ 4.5 feet-color change to very dark gray, (5Y 3/1), medium sand
6			2 5 5	0			
			5 6 8	0			@ 7 feet-same as above
8		GEO-TECH	4 5 7	0			@ 8.5 feet-sand, medium to coarse with shells
10			14 12 10 14	0			
12			5 5	0			
			1	0		CL	@ 13.4 feet-one inch silty CLAY lens (CL)
14			2 4			SP	SAND (SP), very dark gray (5Y 3/1), loose, dry, 5% fines, fine to medium sand, high est K
							TOTAL DEPTH 15 feet
16							
18							
							Note: All samples were screened with a Geiger-Mueller meter; no radiation was detected.

COMMENTS



DRILLING METHOD/RIG TYPE AUGER/CME 750
HOLE DIAMETER 8.0 INCHES
TOTAL DEPTH OF BORING 15 FEET

DRILLING CONTRACTOR/DRILLER WATER DEV./M. PETERSON
BIT TYPE HOLLOW STEM AUGER
WELL COMPLETION DEPTH 14

JAMES M. MONTGOMERY
CONSULTING ENGINEERS, INC.

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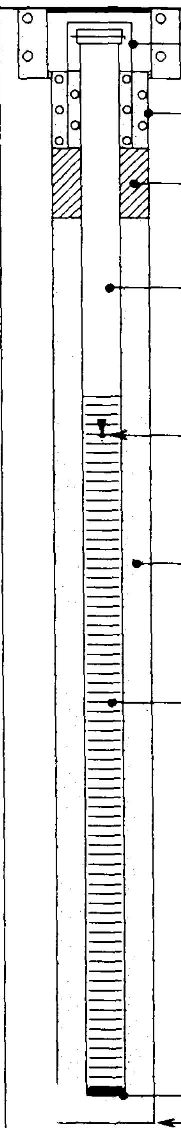
BORING/WELL NUMBER M-103A
CLIENT PRC/US NAVY
DATE STARTED 12/12/90 COMPLETED 12/12/90
PROJECT/JMM PROJECT NO. NAS ALAMEDA/2738.0143
REF. ELEVATION 8.66 SURFACE ELEVATION
GEOLOGIST CRAIG STEVENS

DEPTH feet	SAMPLE	SAMP. NO.	BLOWS/6 IN	HNU-PID meter units	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION
				0		SP	SAND (SP), tan, very loose, dry, fine to medium sand
2				0			
				0			
4							
		M103A GRAB		0			@ 5 feet-same as above, medium dense, moist
6							
							@ 7 feet-same as above, brown, moist to wet
8							@ 8 feet-same as above, wet
10							
12				0			SAND (SP), dark gray green, medium dense, wet, very fine to fine sand, trace shell fragments, slight H2S odor
14				0		SM	silty SAND (SM), dark gray green, loose to medium dense, wet, fine sand, 5 to 15% shell fragments, slight H2S odor, bits of organic matter
16							TOTAL DEPTH 16 feet
18							
							Note: All samples were screened with a Geiger-Mueller meter; no radiation was detected.

COMMENTS



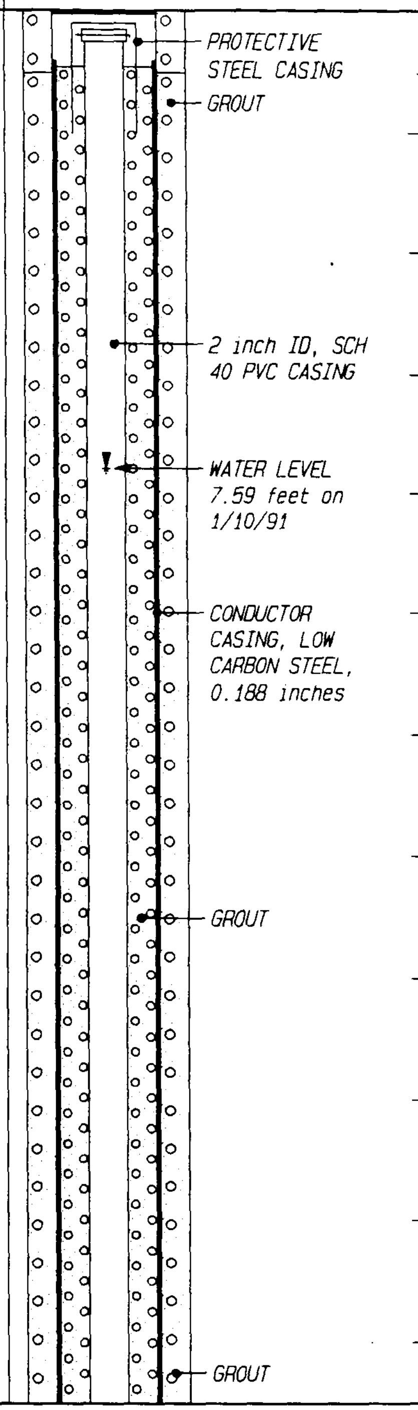
DRILLING METHOD/RIG TYPE AUGER/GEFCO CF-15
DRILLING CONTRACTOR/DRILLER WATER DEV CORP/D. KRUGER
HOLE DIAMETER 7.88 INCHES
BIT TYPE SOLID STEM AUGER
TOTAL DEPTH OF BORING 16 FEET
WELL COMPLETION DEPTH 15.6

JAMES M. MONTGOMERY
CONSULTING ENGINEERS, INC.
365 LENNON LANE, WALNUT CREEK, CALIFORNIA, 94598 / (415) 975-3400

BORING/WELL NUMBER M-103B
DATE STARTED 11/28/90 COMPLETED 12/13/90
REF. ELEVATION 8.89 SURFACE ELEVATION
CLIENT PRC/US NAVY
PROJECT/JMM PROJECT NO. NAS ALAMEDA/2738.0143
GEOLOGIST CRAIG STEVENS

DEPTH feet	SAMPLE	SAMP. NO.	BLOWS/6 IN	HNU-PID meter units	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION
0		GRAB M103B		0		SP	SAND (SP), tan, very loose, dry, fine to medium sand
2				0			
3				0			
5			5 14 21	0			@ 5 feet-same as above, medium dense, moist
7			7 18 21				@ 7 feet-same as above, brown, moist to wet
8			7 14 20				@ 8 feet-same as above, wet
9.5			4 7 8				
11			4 6 7 7				
12				0			SAND (SP), dark gray green, medium dense, wet, very fine to fine sand, trace shell fragments, slight H2S odor
14						SM	silty SAND (SM), dark gray green, loose to medium dense, wet, fine sand, 5 to 15% shell fragments, slight H2S odor, bits of organic matter
15				0			
17.8						CL	silty CLAY (CL), olive green, very soft, wet, fines, slight H2S odor
18.2						SP	SAND (SP), dark gray green, medium dense, wet, trace fines, fine sand, 5 to 10% shell fragments
19.5						CL	silty CLAY (CL), black, very soft, wet, fines, slight H2S odor
20						SP	SAND (SP), gray green, medium dense, wet, fine sand, trace shell fragments, slight H2S odor
22							SAND (SP), gray green, medium dense, wet, fine sand, trace shell fragments, slight H2S odor

COMMENTS



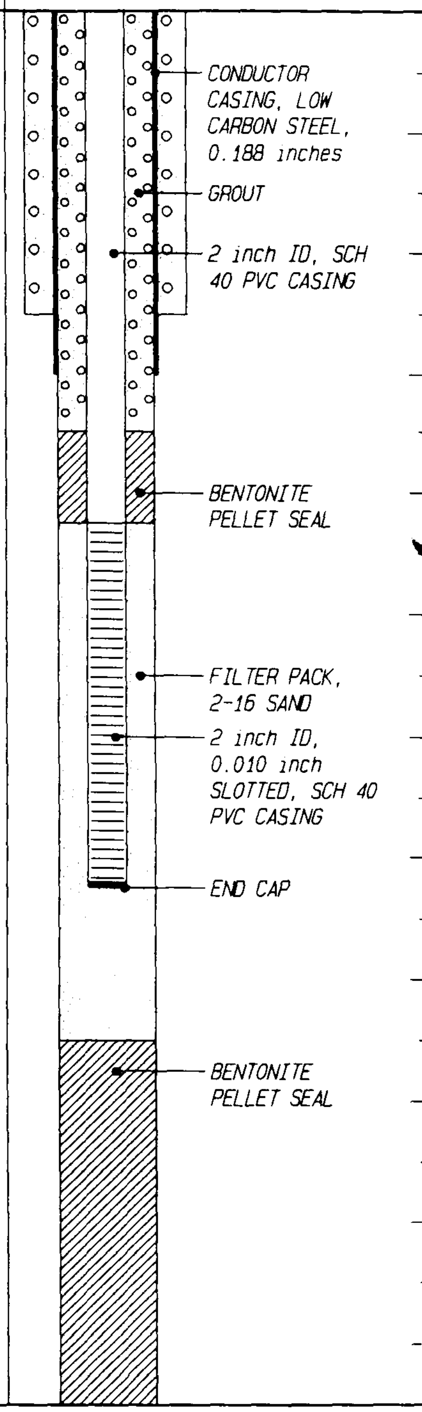
DRILLING METHOD/RIG TYPE MUD ROT./GEFCO CF-15
HOLE DIAMETER 12.25/7.88 INCHES
TOTAL DEPTH OF BORING 75 FEET
DRILLING CONTRACTOR/DRILLER WATER DEV CORP/D.KRUGER
BIT TYPE ROLLER CONE
WELL COMPLETION DEPTH 37.5

JAMES M.MONTGOMERY
CONSULTING ENGINEERS, INC.
365 LENNON LANE, WALNUT CREEK, CALIFORNIA, 94598 / (415) 975-3400

BORING/WELL NUMBER *M-103B*
DATE STARTED *11/28/90* COMPLETED *12/13/90*
REF. ELEVATION *8.89 SURFACE ELEVATION*
CLIENT *PRC/US NAVY*
PROJECT/JMM PROJECT NO. *NAS ALAMEDA/2738.0143*
GEOLOGIST *CRAIG STEVENS*

DEPTH feet	SAMPLE	SAMP. NO.	BLOWS/6 IN	HNU-PID meter units	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION
						SP	@ 23.5 feet-abundant shell fragments
25							@ 26 feet-same as above, 25-40% shell fragments, strong H2S odor
27						SM	silty SAND (SM), gray green, medium dense to loose, wet, fine sand, very strong H2S odor, 5 to 15% shell fragments
						CL	silty sandy CLAY (CL), dark gray green, soft, wet, fines, trace shell fragments, very strong H2S odor
29						SM	silty SAND (SM), gray green, loose to medium dense, wet, fines, fine sand, 15 to 30% shell fragments, very strong H2S odor
31						CL	silty CLAY (CL), gray green, stiff, wet, fines, trace sand, trace shell fragments, very strong H2S odor
				0		SM	silty SAND (SM), gray green, medium dense, wet, 5 to 30% fines, fine sand, 15 to 25% shell fragments, very strong H2S odor
35						SC	clayey SAND (SC), gray green, medium dense, wet, 25 to 45% fines, fine sand, trace shell fragments, very strong H2S odor
37						CL	silty CLAY (CL), gray green, stiff, wet, fines, trace sand, very strong H2S odor
39						SC	clayey SAND (SC), gray green, loose to medium dense, wet, 20 to 30% fines, 15 to 20% shell fragments, very strong H2S odor
41						CL	silty CLAY (CL), gray green, stiff, wet, fines, trace fine sand, 20 to 30% shell fragments, very strong H2S odor
43							silty CLAY (CL), gray green, stiff, wet, fines, trace fine sand, 20 to 30% shell fragments, very strong H2S odor
45							

COMMENTS



LOG OF SOIL BORINGM-103B (continued)

JAMES M. MONTGOMERY
CONSULTING ENGINEERS, INC.
365 LENNON LANE, WALNUT CREEK, CALIFORNIA, 94598 / (415) 975-3400

BORING/WELL NUMBER M-103B
DATE STARTED 11/28/90 COMPLETED 12/13/90
REF. ELEVATION 8.89 SURFACE ELEVATION
CLIENT PRC/US NAVY
PROJECT/JMM PROJECT NO. NAS ALAMEDA/2738.0143
GEOLOGIST CRAIG STEVENS

DEPTH feet	SAMPLE	SAMP. NO.	BLOWS/6 IN	HNU-PID meter units	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	COMMENTS
						CL		
48								
						SC	clayey SAND (SC), gray green, loose to medium dense, wet, 20 to 30% fines, 15 to 20% shell fragments, very strong H2S odor	
						CL	silty CLAY (CL), gray green, stiff, wet, fines, slight H2S odor	
50								
						SC	clayey SAND (SC), loose to medium dense, wet, 10 to 15% shells, slight H2S odor	
52				0		CL	silty CLAY (CL), gray green, stiff, wet, fines, slight H2S odor	
54								BENTONITE PELLET SEAL
56						SC	clayey SAND (SC), gray green, medium dense, wet, trace shell fragments, slight H2S odor	
58								
60						SM	silty SAND (SM), gray green, medium dense, wet	
62						SC	clayey SAND (SC), gray green, medium dense, wet, fine sand, trace shell fragments, slight H2S odor	
64								
66							clayey SAND (SC), gray green, medium dense, wet, fine sand, trace shell fragments, slight H2S odor	
						CL	silty CLAY (CL), gray green, stiff, wet, fines, slight H2S odor	
68							@ 67.7 feet-6 inch thick clayey sand layer	

LOG OF SOIL BORINGM-103B (continued)

JAMES M. MONTGOMERY
CONSULTING ENGINEERS, INC.

365 LENNON LANE, WALNUT CREEK, CALIFORNIA, 94598 / (415) 975-3400

BORING/WELL NUMBER *M-103B* CLIENT *PRC/US NAVY*
DATE STARTED *11/28/90* COMPLETED *12/13/90* PROJECT/JMM PROJECT NO. *NAS ALAMEDA/2738.0143*
REF. ELEVATION *8.89 SURFACE ELEVATION* GEOLOGIST *CRAIG STEVENS*

DEPTH feet	SAMPLE	SAMP. NO.	BLOWS/6 IN	HNU-PID meter units	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	COMMENTS
						CL		*BENTONITE PELLET SEAL*
71				0				
73								
75							TOTAL DEPTH 75 feet	*BOTTOM OF BORING 75 feet*
77								
79								
81								
83								
85								
87								
89								
91							Note: All samples were screened with a Geiger-Mueller meter; no radiation was detected.	

LOG OF SOIL BORINGM-103B (continued)

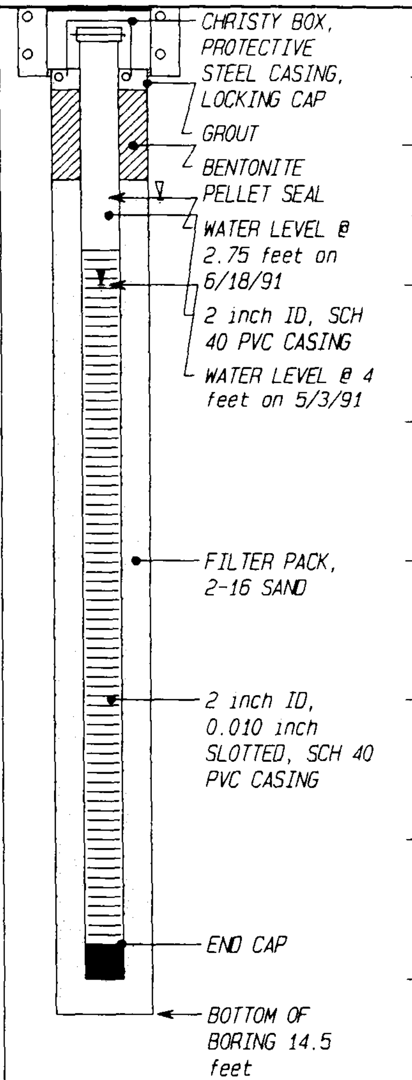
JAMES M. MONTGOMERY
CONSULTING ENGINEERS, INC.

365 LENNON LANE, WALNUT CREEK, CALIFORNIA, 94598 / (415) 975-3400

BORING/WELL NUMBER M-104A
DATE STARTED 5/30/91 COMPLETED 5/30/91
REF. ELEVATION 7.95 SURFACE ELEVATION
CLIENT PRC/US NAVY
PROJECT/JMM PROJECT NO. NAS ALAMEDA/2738.0213
GEOLOGIST CRAIG STEVENS

DEPTH feet	SAMPLE	SAMP. NO.	BLOWS/6 IN	HNU-PID meter units	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION
		CHEM	3 6 8	0		SP	SAND (SP), dark grayish brown (2.5Y 4/2), loose, moist, medium sand, high est K.
2		CHEM	7 9 12	0			
4			7 9 11	0			@ 4 feet-same as above, wet
6			12 6 8	0			
			8 5 8	0			
8			15 11 14	0			@ 8 feet-same as above, shell fragments
10		GEO-TECH	5 8 10	0			SAND (SP), very dark gray (5Y 3/1), medium dense, wet, fine to medium sand, 10% shell fragments, high est K
12		GEO-TECH	5 6 7	0			
14			9 5 5				
							TOTAL DEPTH 14.5 feet
16							
18							
							Note: All samples were screened with a Geiger-Mueller meter; no radiation was detected.

COMMENTS



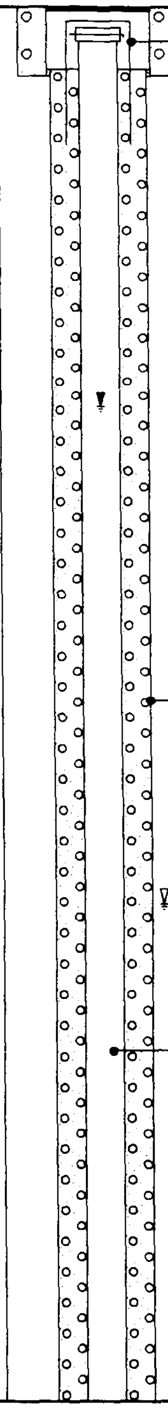
DRILLING METHOD/RIG TYPE HSA/CME 750
HOLE DIAMETER 8 INCHES
TOTAL DEPTH OF BORING 14.5 FEET
DRILLING CONTRACTOR/DRILLER WATER DEV CORP/M. PETERSON
BIT TYPE HOLLOW STEM AUGER
WELL COMPLETION DEPTH 14.5

JAMES M.MONTGOMERY
CONSULTING ENGINEERS, INC.

365 LENNON LANE, WALNUT CREEK, CALIFORNIA, 94598 / (415) 975-3400

BORING/WELL NUMBER M-104C
CLIENT PRC/US NAVY
DATE STARTED 5/29/91 COMPLETED 5/30/91
PROJECT/JMM PROJECT NO. NAS ALAMEDA/2738.0213
REF. ELEVATION 8.01 SURFACE ELEVATION
GEOLOGIST RICH HALKET

DEPTH feet	SAMPLE	SAMP. NO.	BLOWS/6 IN	HNU-PID meter units	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	COMMENTS
						SP		
			3	0			SAND (SP), dark grayish brown (2.5Y 4/2), loose, moist, medium sand, high est K.	CHRISTY BOX, PROTECTIVE STEEL CASING, LOCKING CAP
			6					
			8					
2			7	0				
			9					
			12					
			7	0				
4			9				@ 4 feet-same as above, wet	
			11					
			12	0				
6			6					WATER LEVEL @ 5.8 feet on 5/29/91
			8					
			8	0				
			5					
8			8					
			15	0			@ 8 feet-same as above, shell fragments	
			11					
			14					
10			5	0				GROUT
			8					
			10				SAND (SP), very dark gray (5Y 3/1), medium dense, wet, fine to medium sand, 10% shell fragments, high est K	
12			5	0				
			6					
			7					WATER LEVEL @ 12.92 feet on 6/19/91
			9					
14			5					
			5					
						SM		
			4	0.4			silty SAND (SM), dark gray (2.5Y N4/), medium dense, wet, fine to medium sand, 15-20% fines, moderate est K, trace shell fragments	2-inch ID, SCH 40 PVC CASING
16			4					
			4					
			4					
			4	0.8				
18			7					
			3				@ 18 feet-same as above, 5-10% shell fragments	
			6					
			DRILL to 24'					



DRILLING METHOD/RIG TYPE ARCH
DRILLING CONTRACTOR/DRILLER WATER DEV CORP/K. CHIVRELLE
HOLE DIAMETER 7 INCHES
BIT TYPE 7" TRICONE AIR ROTARY CASING HAMMER
TOTAL DEPTH OF BORING 73 FEET
WELL COMPLETION DEPTH 70

JAMES M.MONTGOMERY
CONSULTING ENGINEERS,INC.
365 LENNON LANE, WALNUT CREEK, CALIFORNIA, 94598 / (415) 975-3400

BORING/WELL NUMBER M-104C
DATE STARTED 5/29/91 COMPLETED 5/30/91
REF. ELEVATION 8.01 SURFACE ELEVATION
CLIENT PRC/US NAVY
PROJECT/JMM PROJECT NO. NAS ALAMEDA/2738.0213
GEOLOGIST RICH HALKET

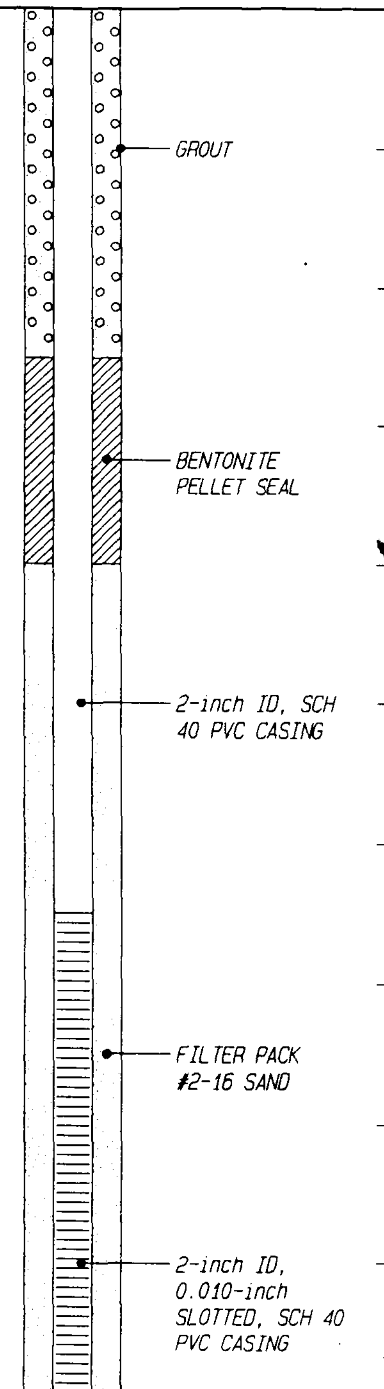
DEPTH feet	SAMPLE	SAMP. NO.	BLOWS/6 IN	HNU-PID meter units	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	COMMENTS
			DRILL to 24'			SM	silty SAND (SM), dark gray (2.5Y N4/), medium dense, wet, fine to medium sand, 15-20% fines, moderate est K, trace shell fragments	
22								
						CL		
24	X		4	0.5			CLAY (CL), dark (2.5Y N3/), stiff, wet, very fine sand, low est K, 15-20% shell fragments	
			3					
			5					
			6					
26	X		3	3				
			3					
			3			SM	silty SAND (SM), dark gray (2.5Y N4/), medium dense, wet, 15-20% fines, very fine to fine sand, low to moderate est K, 5-10% shell fragments	
			4					
			DRILL to 33'					
30								GROUT
32								
	X		5	0.2				
34			5					
			5					
			5					
	X		4				@ 35 feet-same as above	2-inch ID, SCH 40 PVC CASING
36			9					
			7					
			10	0.8				
			DRILL to 42'					
38								

JAMES M. MONTGOMERY
CONSULTING ENGINEERS, INC.
365 LENNON LANE, WALNUT CREEK, CALIFORNIA, 94598 / (415) 975-3400

BORING/WELL NUMBER M-104C
DATE STARTED 5/29/91 COMPLETED 5/30/91
REF. ELEVATION 8.01 SURFACE ELEVATION
CLIENT PRC/US NAVY
PROJECT/JMM PROJECT NO. NAS ALAMEDA/2738.0213
GEOLOGIST RICH HALKET

DEPTH feet	SAMPLE	SAMP. NO.	BLOWS/6 IN	HNU-PID meter units	SOIL CLASS	GEOLOGIC DESCRIPTION
40–43					SM	silty SAND (SM), dark gray (2.5Y N4/), medium dense, wet, 15-20% fines, very fine to fine sand, low to moderate est K, 5-10% shell fragments
42–44	X		5, 5, 5, 5			
43–44.5					CL	sandy CLAY (CL), dark gray (2.5Y N3/), very stiff, very fine sand, low est K, trace shell fragments
44–46	X		2, 2, 3, 3			
44.5–52.5			DRILL to 51'		SM	silty SAND (SM), dark gray (2.5Y N3/), medium dense, wet, 10-15% fines, fine sand, moderate est K, trace shell fragments
51–53	X		4, 3, 4, 5	0.4		@ 51 feet-same as above
52.5–60			2, 3, 3, 3, DRILL to 60'	0.2	CL / SM	CLAY (CL) and silty SAND (SM) interbeds, approximately 0.5 to 0.75 feet thick CLAY: dark gray (2.5Y N3/), very stiff, damp, low est K silty SAND: dark gray (2.5Y N3/), medium dense, wet, 15-20% fines, fine sand, moderate est K

COMMENTS



LOG OF SOIL BORINGM-104C (continued)

JAMES M. MONTGOMERY
CONSULTING ENGINEERS, INC.
365 LENNON LANE, WALNUT CREEK, CALIFORNIA, 94598 / (415) 975-3400

BORING/WELL NUMBER M-104C
CLIENT PRC/US NAVY
DATE STARTED 5/29/91 COMPLETED 5/30/91
PROJECT/JMM PROJECT NO. NAS ALAMEDA/2738.0213
REF. ELEVATION 8.01 SURFACE ELEVATION
GEOLOGIST RICH HALKET

DEPTH feet	SAMPLE	SAMP. NO.	BLOWS/6 IN	HNU-PID meter units	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	COMMENTS
		CHEM	3	0.4		CL SM	CLAY (CL) and silty SAND (SM) interbeds, approximately 0.5 to 0.75 feet thick	2-inch ID, 0.010-inch SLOTTED, SCH 40 PVC CASING
			2				CLAY: dark gray (2.5Y N3/), very stiff, damp, low est K	
			3					
			4				silty SAND: dark gray (2.5Y N3/), medium dense, wet, 15-20% fines, fine sand, moderate est K	
62			2	0.2				FILTER PACK #2/16 SAND
			3					
			4					
			5			CL		END CAP
64			DRILL to 69'				CLAY (CL), dark gray (2.5Y N3/), hard, damp, low est K	
66								
68								BENTONITE SEAL
		GEO-TECH	2				@ 69 feet-same as above	
70			3					BOTTOM OF BORING 70 feet
			2					
			3					
			2				@ 71 feet-same as above, 1-2" silty sand interbeds	
72			3					
			3					
			3					
							TOTAL DEPTH 73 feet	
74								
76								
78								

Note: All samples were screened with a Geiger-Mueller meter; no radiation was detected.

LOG OF SOIL BORINGM-104C (continued)

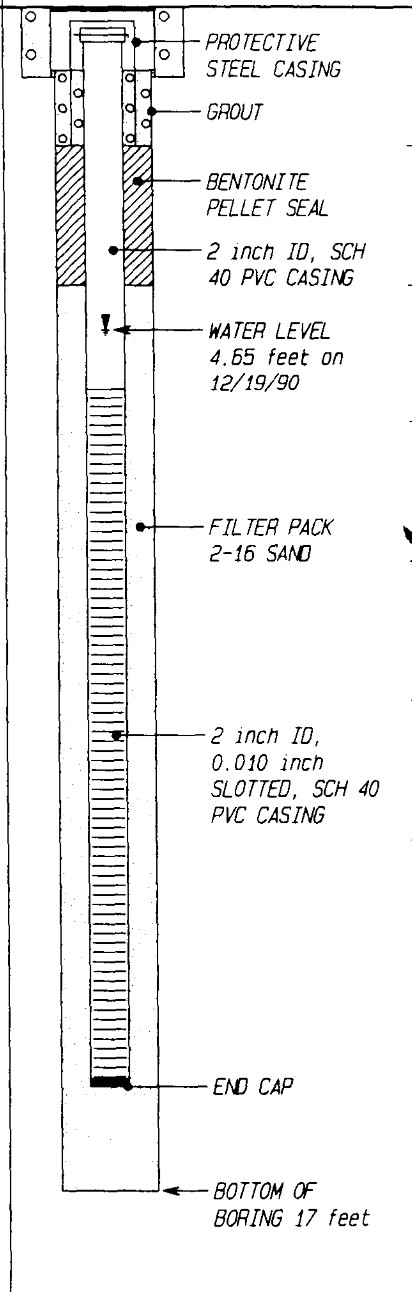
JAMES M. MONTGOMERY
CONSULTING ENGINEERS, INC.
365 LENNON LANE, WALNUT CREEK, CALIFORNIA, 94598 / (415) 975-3400

BORING/WELL NUMBER M-105A
DATE STARTED 12/10/90 COMPLETED 12/11/90
REF. ELEVATION 9.00 SURFACE ELEVATION

CLIENT PRC/US NAVY
PROJECT/JMM PROJECT NO. NAS ALAMEDA/2738.0143
GEOLOGIST CRAIG STEVENS

DEPTH feet	SAMPLE	SAMP. NO.	BLOWS/6 IN	HNU-PID meter units	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION
						SP	SAND (SP), tan, loose, dry, fine to medium sand, high est. K
							@ 1 foot-same as above, damp
2							
							@ 3 feet-same as above, brown, moist
4							
				0			
		GRAB M105A					
6							
8							
10							
12				0			
							no sample recovery, possibly due to wet, flowing, fine sand
14							
16							
				0		SP	SAND (SP), brown, loose, wet, fine to medium sand, high est. K
							TOTAL DEPTH 17 feet
18							
							Note: All samples were screened with a Geiger-Mueller meter; no radiation was detected.

COMMENTS



DRILLING METHOD/RIG TYPE AUGER/GEFCO CF-15
HOLE DIAMETER 7.88 INCHES
TOTAL DEPTH OF BORING 17 FEET

DRILLING CONTRACTOR/DRILLER WATER DEV CORP/D.KRUGER
BIT TYPE SOLID STEM AUGER
WELL COMPLETION DEPTH 15.51

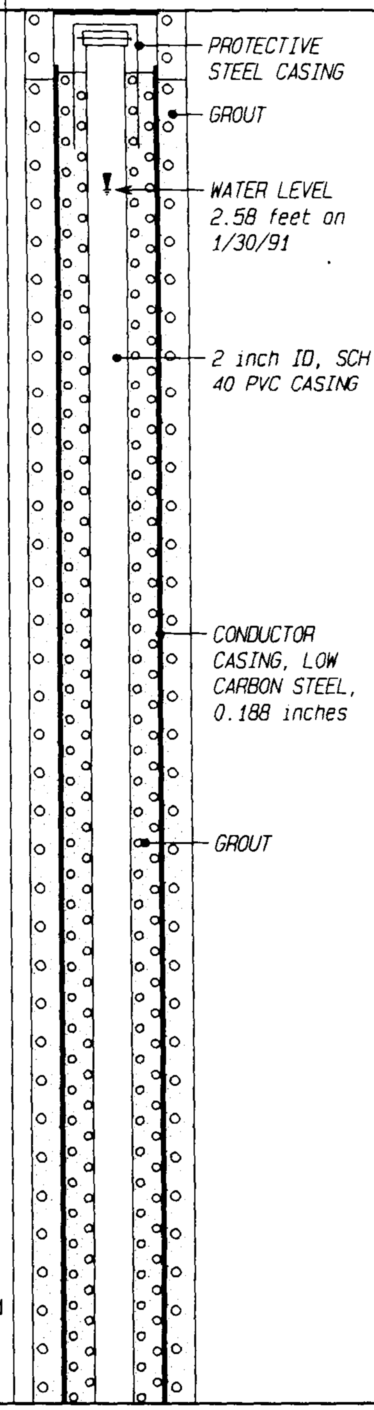
JAMES M. MONTGOMERY
CONSULTING ENGINEERS, INC.

365 LENNON LANE, WALNUT CREEK, CALIFORNIA, 94598 / (415) 975-3400

BORING/WELL NUMBER M-105B
CLIENT PRC/US NAVY
DATE STARTED 1/25/91 COMPLETED 1/25/91
PROJECT/JMM PROJECT NO. NAS ALAMEDA/2738.0143
REF. ELEVATION ˙9.63 SURFACE ELEVATION
GEOLOGIST CRAIG STEVENS

DEPTH feet	SAMPLE	SAMP. NO.	BLOWS/6 IN	HNU-PID meter units	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION
						SP	SAND (SP), tan, loose, dry, fine to medium sand, high est. K
		GRAB M105Br					@ 1 foot-same as above, damp
2							
							@ 3 feet-same as above, brown, moist
4			7				
			10				
			14				
			7	0			
6			8				
			14				
			5				
			10				
8			16				
			4				
			8				
			17				
10			8				
			17				
			25				
			4				
12			8	0			
			11				
							no sample recovery, possibly due to wet, flowing, fine sand
14							
16							
				0		SP	SAND (SP), brown, loose, wet, fine to medium sand, high est. K
18							
				0		SP	SAND (SP), brown, loose, wet, fine to medium sand
						CL	sandy CLAY (CL), tan, very soft, wet, low est. K

COMMENTS



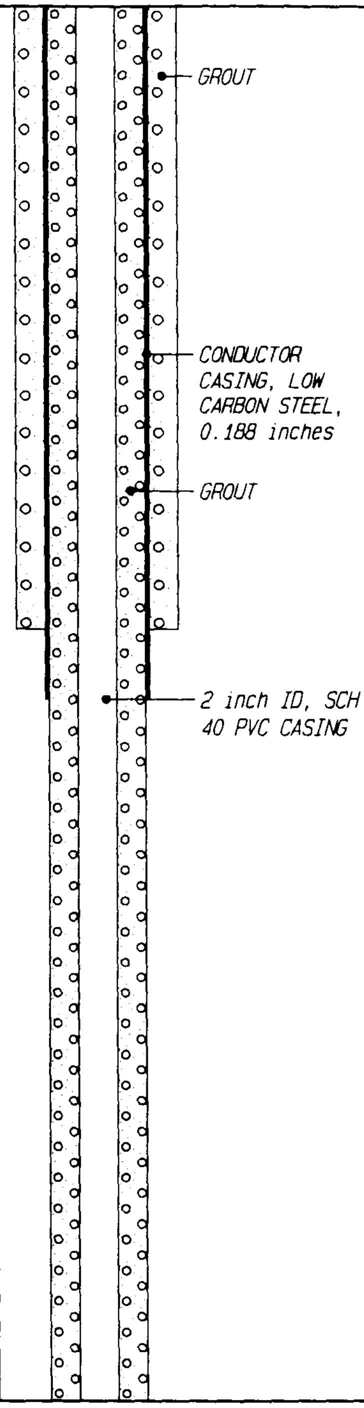
DRILLING METHOD/RIG TYPE AUGER/MOBILE B-53
DRILLING CONTRACTOR/DRILLER WATER DEV CORP/R. DEIKE
HOLE DIAMETER 12.25/7.88 INCHES
BIT TYPE SOLID STEM AUGER
TOTAL DEPTH OF BORING 73 FEET
WELL COMPLETION DEPTH 68.8

JAMES M. MONTGOMERY
CONSULTING ENGINEERS, INC.

365 LENNON LANE, WALNUT CREEK, CALIFORNIA, 94598 / (415) 975-3400

BORING/WELL NUMBER M-105B
DATE STARTED 1/25/91 COMPLETED 1/25/91
REF. ELEVATION 9.63 SURFACE ELEVATION
CLIENT PRC/US NAVY
PROJECT/JMM PROJECT NO. NAS ALAMEDA/2738.0143
GEOLOGIST CRAIG STEVENS

DEPTH feet	SAMPLE	SAMP. NO.	BLOWS/6 IN	HNU-PID meter units	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	COMMENTS
						CL	sandy CLAY (CL), tan, very soft, wet, low est. K	
						SP	SAND (SP), brown, loose to medium dense, wet, trace silt and fine sand, high est. K	GROUT
22						CL	sandy CLAY (CL), tan, very soft, wet, low est. K	
						SP	SAND (SP), brown, loose to medium dense, wet, trace silt and fine sand, high est. K	
						SC	clayey SAND (SC), tan, very soft, wet, low est. K	
24						SP	SAND (SP), brown, medium dense, wet, fine sand, high est. K	
				0.3		CL	CLAY (CL), gray green, soft, wet, low est. K	CONDUCTOR CASING, LOW CARBON STEEL, 0.188 inches
26								GROUT
						SC	clayey SAND (SC), olive green, soft, wet, very fine to fine sand, low est. K	
28								
				0.4				
30						CL	CLAY (CL), olive green, stiff, wet, low est. K	2 inch ID, SCH 40 PVC CASING
32				0				
				0.3		SM	silty SAND (SM), black, medium dense, wet, fine sand, trace shells	
34				2.7				
						SP	SAND (SP), dark gray green, medium dense, wet, fine sand, trace silt and shells, high est. K, slight H2S odor	
36								
38								
				1.9		SM		



LOG OF SOIL BORINGM-105Br (continued)

JAMES M. MONTGOMERY
CONSULTING ENGINEERS, INC.

365 LENNON LANE, WALNUT CREEK, CALIFORNIA, 94598 / (415) 975-3400

BORING/WELL NUMBER M-105B — CLIENT PRC/US NAVY

DATE STARTED 1/25/91 COMPLETED 1/25/91 — PROJECT/JMM PROJECT NO. NAS ALAMEDA/2738.0143

REF. ELEVATION 9.63 SURFACE ELEVATION — GEOLOGIST CRAIG STEVENS

DEPTH feet	HNU-PID meter units	SOIL CLASS	GEOLOGIC DESCRIPTION	COMMENTS
40–41		SM	silty SAND (SM), dark gray green, loose to medium dense, wet, trace clay, very fine sand, low to moderate est. K, slight H2S odor	GROUT
42				
44				
44.6	1.4			
46				2 inch ID, SCH 40 PVC CASING
47	2.5			
48	1.9			
49	2.4			
50				
50.6	2.1			
51	2.7			
52	2.8			
53	3.8			
54	4.6	SP	SAND (SP), green brown, medium dense, wet, fine to medium sand, high est. K	BENTONITE PELLET SEAL
55	0	SM	silty SAND (SM), orange brown, dense, moist, trace clay, fine sand, some rust-colored laminations, low to moderate est. K	
56				FILTER PACK, 2-16 SAND
58				
59				2 inch ID, 0.010 inch SLOTTED, SCH 40 PVC CASING

JAMES M. MONTGOMERY
CONSULTING ENGINEERS, INC.

365 LENNON LANE, WALNUT CREEK, CALIFORNIA, 94598 / (415) 975-3400

BORING/WELL NUMBER M-105B
DATE STARTED 1/25/91 COMPLETED 1/25/91
REF. ELEVATION 9.63 SURFACE ELEVATION
CLIENT PRC/US NAVY
PROJECT/JMM PROJECT NO. NAS ALAMEDA/2738.0143
GEOLOGIST CRAIG STEVENS

DEPTH feet	SAMPLE	SAMP. NO.	BLOWS/6 IN	HNU-PID meter units	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	COMMENTS
						SM	silty SAND (SM), orange brown, dense, moist, trace clay, fine sand, some rust-colored laminations, low to moderate est. K	FILTER PACK, 2-16 SAND
62							@ 61 feet-same as above, varies to wet and dense, some mottling	
64							silty SAND (SM), orange brown, moist to wet, medium dense to dense, trace clay, fine sand, rust-colored mottling, low to moderate est. K	
66								2 inch ID, 0.010 inch SLOTTED, SCH 40 CASING
68							silty SAND (SM), green brown, wet, medium dense	END CAP
70								
72				0			@ approximately 72 feet-some rust colored laminations	
							TOTAL DEPTH 73 feet, hole reamed with 7 7/8 inch bit to 71 feet	BOTTOM OF BORING 73 feet
74								
76								
78								
							Note: All samples were screened with a Geiger-Mueller meter; no radiation was detected.	

LOG OF SOIL BORINGM-105Br (continued)

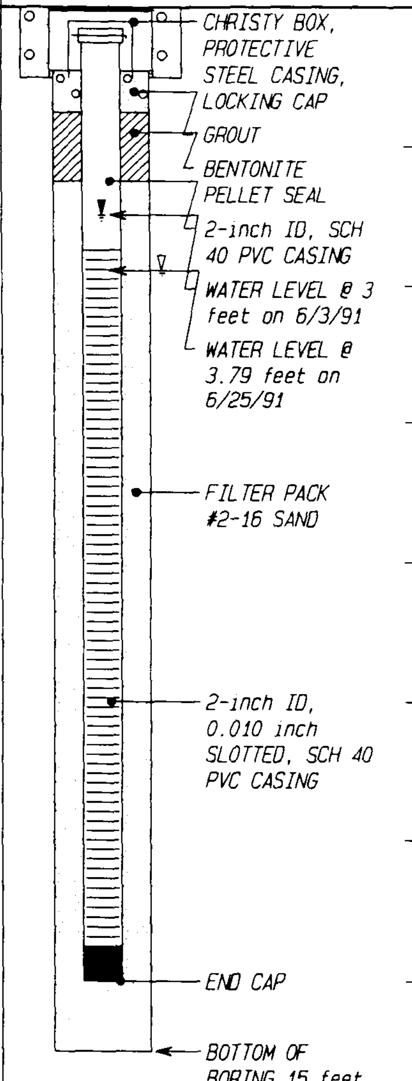
JAMES M. MONTGOMERY
CONSULTING ENGINEERS, INC.
365 LENNON LANE, WALNUT CREEK, CALIFORNIA, 94598 / (415) 975-3400

BORING/WELL NUMBER M-106A
DATE STARTED 6/3/91 COMPLETED 6/3/91
REF. ELEVATION 7.93 SURFACE ELEVATION
CLIENT PRC/US NAVY
PROJECT/JMM PROJECT NO. NAS ALAMEDA/2738.0213
GEOLOGIST CRAIG FANSHIER

DEPTH feet	SAMPLE	SAMP. NO.	BLOWS/6 IN	HNU-PID meter units	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION
			4 6 10	0		SP	SAND (SP), olive brown (2.5Y 4/3), loose, moist, trace fines, 90% medium sand, trace gravel pebble size, high est K
2		CHEM	5 7 8	0			
4			5 6 8	0			
			2 3 5	0			@ 5 feet-same as above
6			1 1 1	0			
8			7 6 6	0			
10		GEO-TECH	9 5 6	0			@ 10 feet-same as above
12			6 3 3	0			
14			3 5 6	0			@ 14 feet-same as above
							TOTAL DEPTH 15 feet
16							
18							

Note: All samples were screened with a Geiger-Mueller meter; no radiation was detected.

COMMENTS



DRILLING METHOD/RIG TYPE AUGER/CME 750
HOLE DIAMETER 8.0 INCHES
TOTAL DEPTH OF BORING 15 FEET
DRILLING CONTRACTOR/DRILLER WATER DEV./M. PETERSON
BIT TYPE HOLLOW STEM AUGER
WELL COMPLETION DEPTH 14

JAMES M. MONTGOMERY
CONSULTING ENGINEERS, INC.

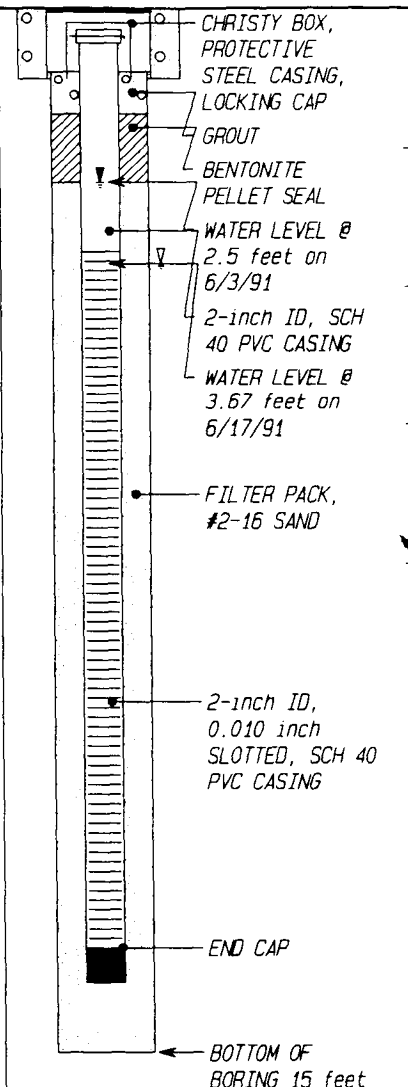
365 LENNON LANE, WALNUT CREEK, CALIFORNIA, 94598 / (415) 975-3400

BORING/WELL NUMBER M-107A
CLIENT PRC/US NAVY
DATE STARTED 6/3/91 COMPLETED 6/3/91
PROJECT/JMM PROJECT NO. NAS ALAMEDA/2738.0213
REF. ELEVATION 6.79 SURFACE ELEVATION
GEOLOGIST CRAIG FANSHIER

DEPTH feet	SAMPLE	SAMP. NO.	BLOWS/6 IN	HNU-PID meter units	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION
0–1.5		CHEM	3, 6, 10	0		SP	SAND (SP), dark grayish brown (2.5Y 4/2), loose, dry to moist @ 1.5 feet, medium sand, high est K
1.5–3			3, 2, 3	0			SAND (SP), very dark gray (5Y 3/1), medium to coarse sand, high est K
3–4.5			3, 2, 2	0			
4.5–6			1, 2, 4	0			@ 5 feet-same as above
6–7.5			1, 1, 1	0			
7.5–9			1, 1, 0	0			
10–11.5		GEO-TECH	3, 3, 2				@ 10 feet-same as above, approximately 10% very fine to fine sand
11.5–13			3, 4, 4				
13–14.5			9, 7, 10	0			@ 14 feet-same as above
15							TOTAL DEPTH 15 feet

Note: All samples were screened with a Geiger-Mueller meter; no radiation was detected.

COMMENTS



DRILLING METHOD/RIG TYPE AUGER/CME 750
DRILLING CONTRACTOR/DRILLER WATER DEV./M. PETERSON
HOLE DIAMETER 8.0 INCHES
BIT TYPE HOLLOW STEM AUGER
TOTAL DEPTH OF BORING 15 FEET
WELL COMPLETION DEPTH 14

JAMES M. MONTGOMERY
CONSULTING ENGINEERS, INC.

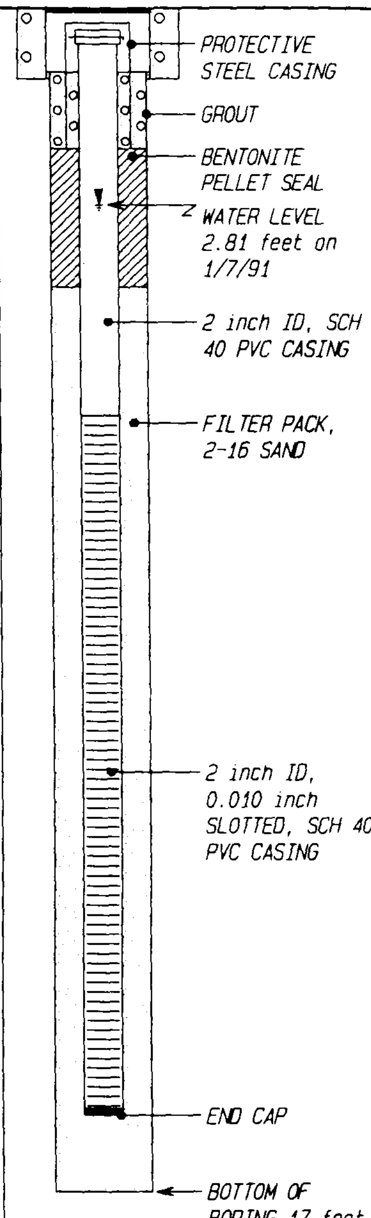
365 LENNON LANE, WALNUT CREEK, CALIFORNIA, 94598 / (415) 975-3400

BORING/WELL NUMBER M-108A
CLIENT PRC/US NAVY
DATE STARTED 12/11/90 COMPLETED 12/11/90
PROJECT/JMM PROJECT NO. NAS ALAMEDA/2738.0143
REF. ELEVATION 9.81 SURFACE ELEVATION
GEOLOGIST CRAIG STEVENS

DEPTH feet	SAMPLE	SAMP. NO.	BLOWS/6 IN	HNU-PID meter units	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION
0						GM	silty GRAVEL (GM), brown, 20% silt and sand
						SP	SAND (SP), brown, loose, moist, occasional gravels (to 3 inches)
5		M108A GRAB		0			@ 5 feet-same as above, is moist
8							@ 8 feet-same as above, wet
						ML	clayey SILT (ML), green brown, dense, wet, fines
						CL	silty CLAY (CL), green brown, soft, wet, fines
						ML	clayey SILT (ML), green brown, soft, wet, fines
						CL	silty CLAY (CL), green brown, dense, moist, fines
						SP	SAND (SP), black green, loose to medium dense, wet, medium sand, trace shell fragments
16							@ 16 feet-same as above, slight H2S odor
17							TOTAL DEPTH 17 feet

Note: All samples were screened with a Geiger-Mueller meter; no radiation was detected.

COMMENTS



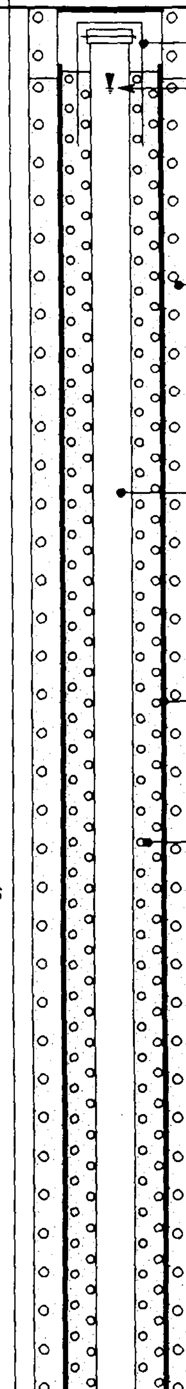
DRILLING METHOD/RIG TYPE AUGER/GEFCO CF-15
DRILLING CONTRACTOR/DRILLER WATER DEV CORP/D.KRUGER
HOLE DIAMETER 7.88 INCHES
BIT TYPE SOLID STEM AUGER
TOTAL DEPTH OF BORING 17 FEET
WELL COMPLETION DEPTH 15.9

JAMES M. MONTGOMERY
CONSULTING ENGINEERS, INC.

365 LENNON LANE, WALNUT CREEK, CALIFORNIA, 94598 / (415) 975-3400

BORING/WELL NUMBER M-108B
CLIENT PRC/US NAVY
DATE STARTED 11/27/90 COMPLETED 12/12/90
PROJECT/JMM PROJECT NO. NAS ALAMEDA/2738.0143
REF. ELEVATION -10.15 SURFACE ELEVATION
GEOLOGIST CRAIG STEVENS

DEPTH feet	SAMPLE	SAMP. NO.	BLOWS/6 IN	HNU-PID meter units	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	COMMENTS
						GM	silty GRAVEL (GM), brown, 20% silt and sand	
		GRAB M108B				SP	SAND (SP), brown, loose, moist, occasional gravels (to 3 inches)	PROTECTIVE STEEL CASING WATER LEVEL 1.15 feet on 1/4/91
2								
4								GROUT
			6	0			@ 5 feet-same as above, moist	
6			6					
			7					
			5					
			7					2 inch ID, SCH 40 PVC CASING
			12					
8			9				@ 8 feet-same as above, wet	
			13					
			17					
			4					
10			5					CONDUCTOR CASING, LOW CARBON STEEL, 0.188 inches
			3			ML	clayey SILT (ML), green brown, dense, wet, fines	
			5			CL	silty CLAY (CL), green brown, soft, wet, fines	
			8			ML		
12			14				clayey SILT (ML), green brown, soft, wet, fines	GROUT
			7			CL	silty CLAY (CL), green brown, dense, moist, fines	
						SP	SAND (SP), black green, loose to medium dense, wet, medium sand, trace shell fragments	
14								
16							@ 16 feet-same as above, slight H2S odor	
18								
							@ 19 feet-4 inches of clayey sand	



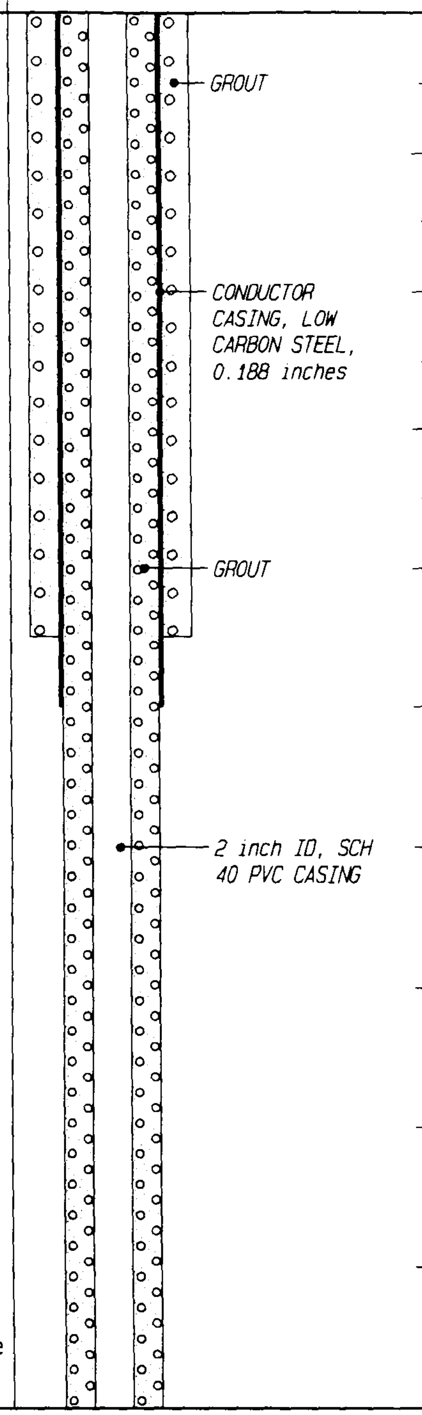
DRILLING METHOD/RIG TYPE MUD ROT./GEFCO CF-15
DRILLING CONTRACTOR/DRILLER WATER DEV CORP/D.KRUGER
HOLE DIAMETER 12.25/7.88 INCHES
BIT TYPE ROLLER CONE
TOTAL DEPTH OF BORING 58 FEET
WELL COMPLETION DEPTH 57.6

JAMES M. MONTGOMERY
CONSULTING ENGINEERS, INC.
365 LENNON LANE, WALNUT CREEK, CALIFORNIA, 94598 / (415) 975-3400

BORING/WELL NUMBER M-108B
DATE STARTED 11/27/90 COMPLETED 12/12/90
REF. ELEVATION 10.15 SURFACE ELEVATION
CLIENT PRC/US NAVY
PROJECT/JMM PROJECT NO. NAS ALAMEDA/2738.0143
GEOLOGIST CRAIG STEVENS

DEPTH feet	SAMPLE	SAMP. NO.	BLOWS/6 IN	HNU-PID meter units	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION
						SP	SAND (SP), gray green, loose to medium dense, wet, fine sand, trace shell fragments
22						ML	clayey SILT (ML), gray green, very soft, wet, 15 to 25%, shell fragments
24							
						SC	clayey SAND (SC), gray green, very soft, wet, very fine sand, 15 to 25% shell fragments, slight H2S odor
26							@ 26 feet-same as above, fine grained sand, trace shell fragments
						SM	silty SAND (SM), gray green, medium dense, wet, very fine sand, trace shell fragments
							@ 29 feet-6 inches of abundant shell fragments
30							
32							@ 31.5 feet-same as above, abundant shell fragments
34						SP	SAND (SP), olive green, medium dense, wet, very fine sand, abundant shells
							@ 35 feet-same as above, organic odor
36							
						SM	silty SAND (SM), gray black, very loose, wet, very fine sand, abundant shell fragments
38						SM	silty SAND (SM), green-orange brown, dense, moist, fine to very fine sand
							@ 39 feet-same as above, mottled green and orange brown, some rust-colored spots

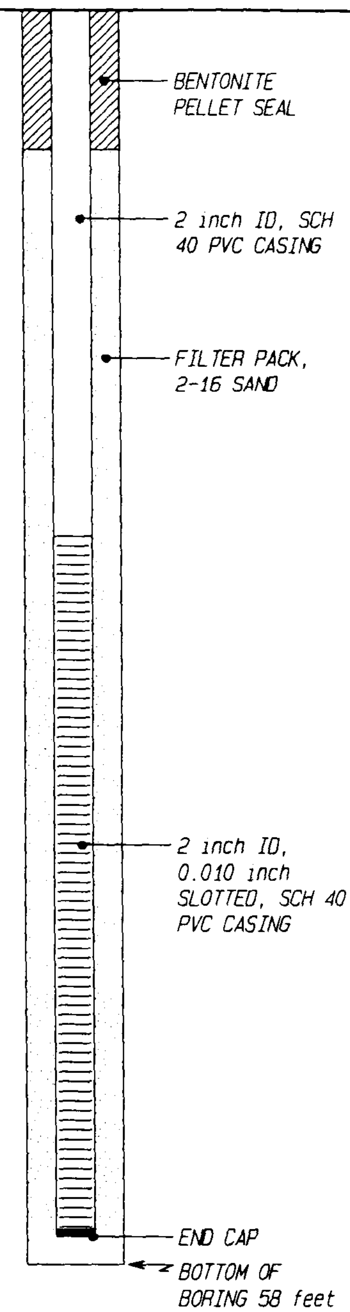
COMMENTS



JAMES M. MONTGOMERY
CONSULTING ENGINEERS, INC.
365 LENNON LANE, WALNUT CREEK, CALIFORNIA, 94598 / (415) 975-3400

BORING/WELL NUMBER M-108B
CLIENT PRC/US NAVY
DATE STARTED 11/27/90 COMPLETED 12/12/90
PROJECT/JMM PROJECT NO. NAS ALAMEDA/2738.0143
REF. ELEVATION 10.15 SURFACE ELEVATION
GEOLOGIST CRAIG STEVENS

DEPTH feet	SAMPLE	SAMP. NO.	BLOWS/6 IN	HNU-PID meter units	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	COMMENTS
						SM	silty SAND (SM), green-orange brown, dense, moist fine to very fine sand	
							@ 41 feet-same as above, less green mottling	
42								
44								
46								
48								
50				0				
52				0				
54								
							@ 55.5 feet-dense zone	
56								
58							TOTAL DEPTH 58 feet	
							Note: All samples were screened with a Geiger-Mueller meter; no radiation was detected.	



LOG OF SOIL BORINGM-108B (continued)

JAMES M. MONTGOMERY CONSULTING ENGINEERS, INC.

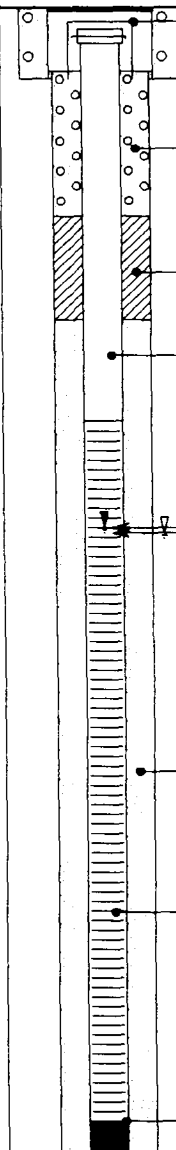
365 LENNON LANE, WALNUT CREEK, CALIFORNIA, 94598 / (415) 975-3400

BORING/WELL NUMBER M-109A
CLIENT PRC/US NAVY
DATE STARTED 5/30/91 COMPLETED 5/30/91
PROJECT/JMM PROJECT NO. NAS ALAMEDA/2738.0213
REF. ELEVATION 13.45 SURFACE ELEVATION
GEOLOGIST CRAIG FANSHIER

DEPTH feet	SAMP. NO.	BLOWS/6 IN	HNU-PID meter units	SOIL CLASS	GEOLOGIC DESCRIPTION
0				SP	
		14	0		SAND (SP), olive brown (2.5Y 4/3), medium dense, moist, medium sand, high est K
		28			
2		18			
		8	0		
		11			
		14			
4		11	0		
		10			@ 5 feet-same as above
		10			
6	CHEM	6			
		7	0		
		7			
		7			
		5	0		
8		7			@ 8 feet-same as above
		2			
		2			
		4		SC	clayey SAND (SC), olive (5Y 4/3), dense, wet fine to medium sand, low est K
10		3	0	SP	SAND (SP), olive brown (2.5Y 4/3), medium dense, wet, high est K, trace shell fragments
	GEO-TECH	5			
		6			
		4	0		
12		4			
		7			
		9	0		
		11			
14		12			@ 14 feet-same as above
		PUSH to 16.5'			
16					
					TOTAL DEPTH 16.5 feet
18					

Note: All samples were screened with a Geiger-Mueller meter; no radiation was detected.

COMMENTS



DRILLING METHOD/RIG TYPE HSA/CME 750
DRILLING CONTRACTOR/DRILLER WATER DEV CORP/M. PETERSON
HOLE DIAMETER 8 INCHES
BIT TYPE HOLLOW STEM AUGER
TOTAL DEPTH OF BORING 16.5 FEET
WELL COMPLETION DEPTH 16.5

JAMES M. MONTGOMERY
CONSULTING ENGINEERS, INC.

365 LENNON LANE, WALNUT CREEK, CALIFORNIA, 94598 / (415) 975-3400

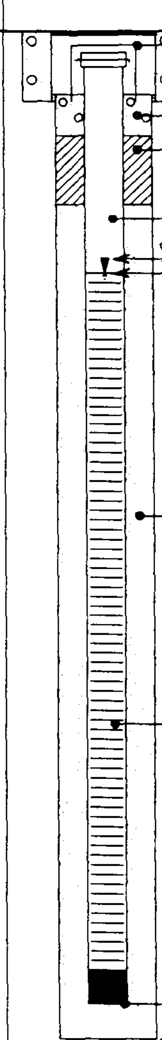
BORING/WELL NUMBER M-110A
CLIENT PRC/US NAVY
DATE STARTED 5/30/91 COMPLETED 5/30/91
PROJECT/JMM PROJECT NO. NAS ALAMEDA/2738.0213
REF. ELEVATION 6.64 SURFACE ELEVATION
GEOLOGIST CRAIG FANSHIER

DEPTH feet	SAMP. NO.	BLOWS/6 IN	HNU-PID meter units
2	CHEM	16	0
		22	
		18	
		3	0
4		6	
		7	
		5	0
6		5	
		6	
		3	0
		4	
8		6	
		9	0
		9	
		10	
10	GEO-TECH	4	0
		3	
		2	
12		2	
		2	
		4	
		2	0
14		2	
		1	
16			
18			

SOIL CLASS	GEOLOGIC DESCRIPTION
FL	Asphalt
GW	GRAVEL (GW), roadbase
SP	SAND (SP), medium sand, low estimated K
SC	CLAYEY SAND (SC), dark yellowish brown (10YR 4/4) dense, moist, 40% clay
SP	SAND (SP), olive (5Y 4/3), dense, moist, fine to medium sand, subrounded to rounded, high est K, @ 3 feet-wet
	SAND (SP), very dark gray (5Y 3/1), loose, wet, medium sand
	@ 10.5 feet-same as above, trace fines, 50% fine sand, 45% medium sand
	@ 12.5 feet-same as above, color change to very dark grey (2.5Y N3/), trace fines, 80% medium sand
CL	silty CLAY (CL), very dark gray (2.5Y N3/), very soft, wet, approximately 60% clay, 40% silt
	TOTAL DEPTH 14.5 feet

Note: All samples were screened with a Geiger-Mueller meter; no radiation was detected.

COMMENTS



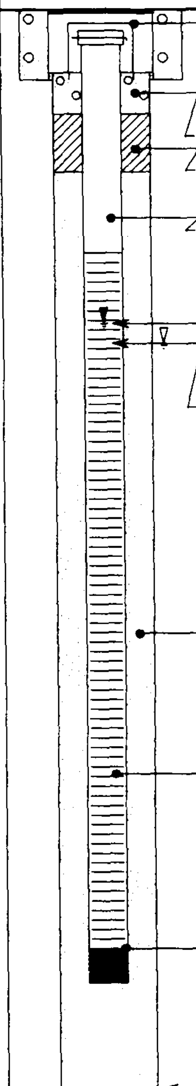
DRILLING METHOD/RIG TYPE AUGER/CME 750
DRILLING CONTRACTOR/DRILLER WATER DEV./M. PETERSON
HOLE DIAMETER 8.0 INCHES
BIT TYPE HOLLOW STEM AUGER
TOTAL DEPTH OF BORING 14.5 FEET
WELL COMPLETION DEPTH 14

JAMES M. MONTGOMERY
CONSULTING ENGINEERS, INC.
365 LENNON LANE, WALNUT CREEK, CALIFORNIA, 94598 / (415) 975-3400

BORING/WELL NUMBER M-111A
DATE STARTED 5/31/91 COMPLETED 5/31/91
REF. ELEVATION 8.63 SURFACE ELEVATION
CLIENT PRC/US NAVY
PROJECT/JMM PROJECT NO. NAS ALAMEDA/2738.0213
GEOLOGIST CRAIG FANSHIER

DEPTH feet	SAMPLE	SAMP. NO.	BLOWS/6 IN	HNU-PID meter units	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION
			9 12 13	0		SP	SAND (SP), olive brown (2.5Y 4/3), loose, dry 90% medium sand, high est K
2		CHEM	8 10 12	0			
4			8 8 8	0			@ 4 feet-same as above, wet
			2 4 6	0			
6			3 4 6	0			@ 6 feet-same as above, medium to coarse sand gray mottling
8			3 5 5	0			@ 8 feet-same as above, color change to dark olive gray (5Y 3/2)
10		GEO-TECH	9 8 8	0			
12			5 2 3	0			SAND (SP), black (5Y 2.5/2, loose, wet, 10% fines, fine to medium sand
14			2			CL	silty CLAY (CL), very dark gray (2.5Y N3/), very soft, wet, 40% silt
			3 3			SP	SAND (SP), very dark gray (2.5Y N3/), loose, wet, 10% fines, medium to coarse sand, trace shell fragments
16							TOTAL DEPTH 15.5 feet
18							
							Note: All samples were screened with a Geiger-Mueller meter; no radiation was detected.

COMMENTS



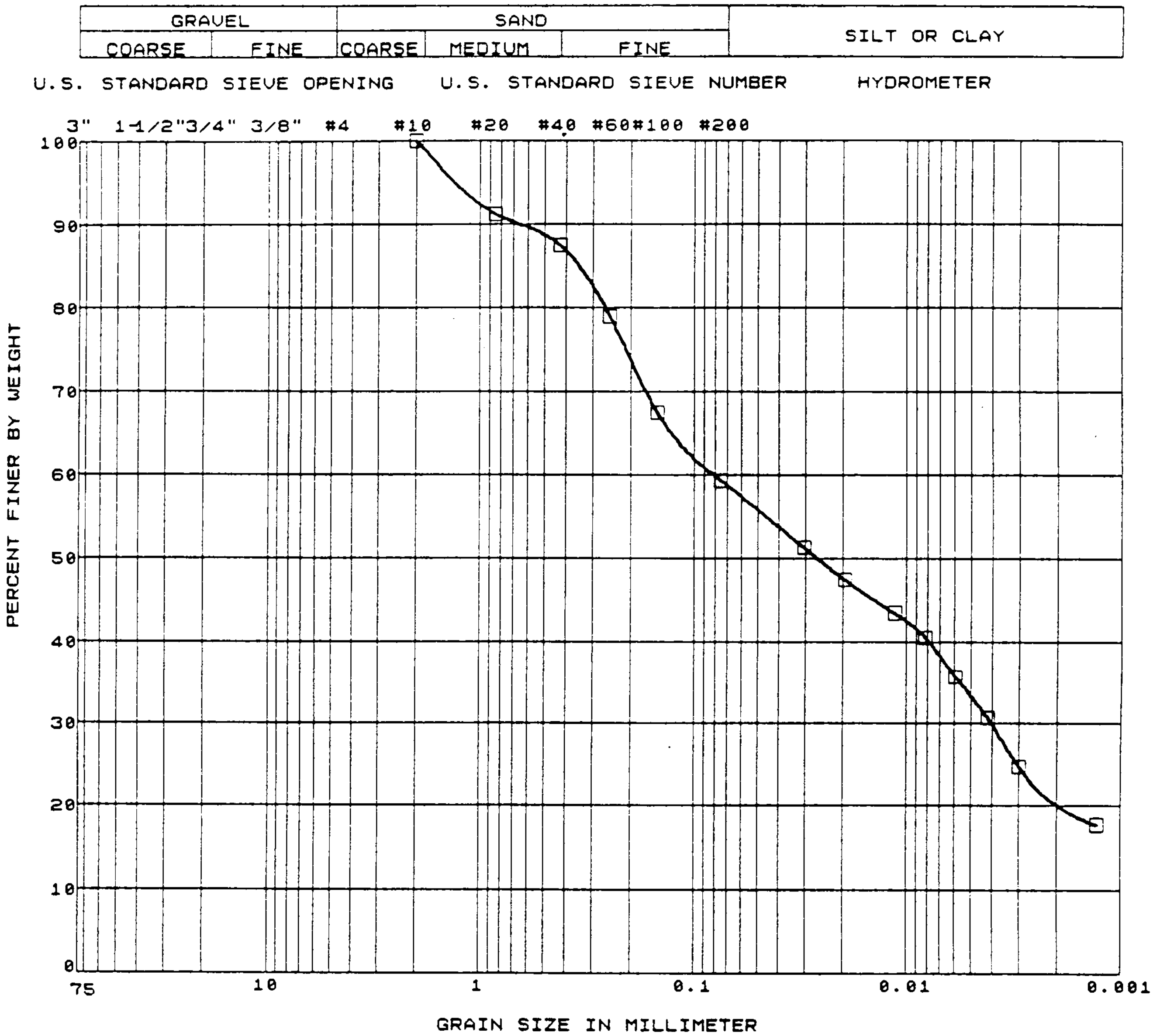
DRILLING METHOD/RIG TYPE HSA/CME 750
HOLE DIAMETER 8 INCHES
TOTAL DEPTH OF BORING 15.5 FEET
DRILLING CONTRACTOR/DRILLER WATER DEV CORP/M. PETERSON
BIT TYPE HOLLOW STEM AUGER
WELL COMPLETION DEPTH 14

N00236.000848
ALAMEDA POINT
SSIC NO. 5090.3

APPENDIX F – GEOTECHNICAL LABORATORY REPORTS

FINAL
SOLID WASTE WATER QUALITY ASSESSMENT TEST AND DATA SUMMARY REPORT FOR REMEDIAL INVESTIGATION/FEASIBILITY STUDY FOR PHASES 5 AND 6

DATED 30 APRIL 1993



SYMBOL	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE TYPE	SOIL TYPE	LIQUID LIMIT	PLASTICITY INDEX
□		M-002E	20.5-21	TUBE			

The Earth Technology Corporation	PROJECT NAME: NAS-Alameda

GRAIN SIZE DISTRIBUTION CURVE

9/91 FIGURE 29

TABLE 1

SUMMARY OF LABORATORY TEST RESULTS

PROJECT NAME: NAS-Alameda

TETC NO: 92-220-7003

PROJECT NUMBER: 2738.0215

CLIENT: James M. Montgomery

DATE: Sept. 27, 1991

SUMMARIZED BY: S. Sayawatana

SAMPLE NO.	DEPTH (ft)	MOISTURE CONTENT ASTM D2216 (%)	DRY DENSITY ASTM D2937 (pcf)	SPECIFIC GRAVITY ASTM D854	CATION EXCHANGE CAPACITY	
					CEC EPA 9080 (meq/100g)	DETECTION LIMIT (meq/100g)
M-001B	60.5-61.5	20.5	109.5	2.73	7.2	3.3
M-013C	62-63	19.5	105.0	2.74	22.7	3.3
M-027B	57.5-58	20.0	110.5	2.73	28.2	3.3
M-001A	10.5-11	-	-	-	26.0	0.3
M-003A	10.5-11	-	-	-	6.1	0.3
M-028A	10.5-11	13.5	108.5	2.71	10.8	0.3
M-026A	11.5-12	22.0	109.0	2.74	4.2	0.3
M-024A	11-11.5	*	*	*	*	*
M-022A	10-10.5	14.5	104.5	2.71	4.6	0.3
M-020A	10.5-11	20.0	104.5	2.81	7.6	0.3
M-018A	10.5-11	18.5	91.0	-	7.5	0.3
M-016A	10.5-11	20.0	110.5	2.70	11.6	0.3
M-015A	10.5-11	22.0	105.0	2.70	5.3	0.3
M-05A	11.5-12.5	**	**	2.60	10.2	0.3
M-023A	11-11.5	26.0	85.5	2.71	5.9	0.3
M-104A	10.5-11	18.0	104.5	2.72	5.7	0.3
M-013A	11-11.5	21.0	115.0	2.73	8.6	0.3
M-011A	10.5-11	19.5	106.0	2.74	6.8	0.3
M-007A	8-8.5	19.5	103.5	2.74	5.5	0.3
M-09A	11-11.5	23.5	96.5	2.74	8.0	0.3

* Missing Sample
** Disturbed Sample

TABLE 2

SUMMARY OF LABORATORY TEST RESULTS

PROJECT NAME: NAS-Alameda

TETC NO: 92-220-7003

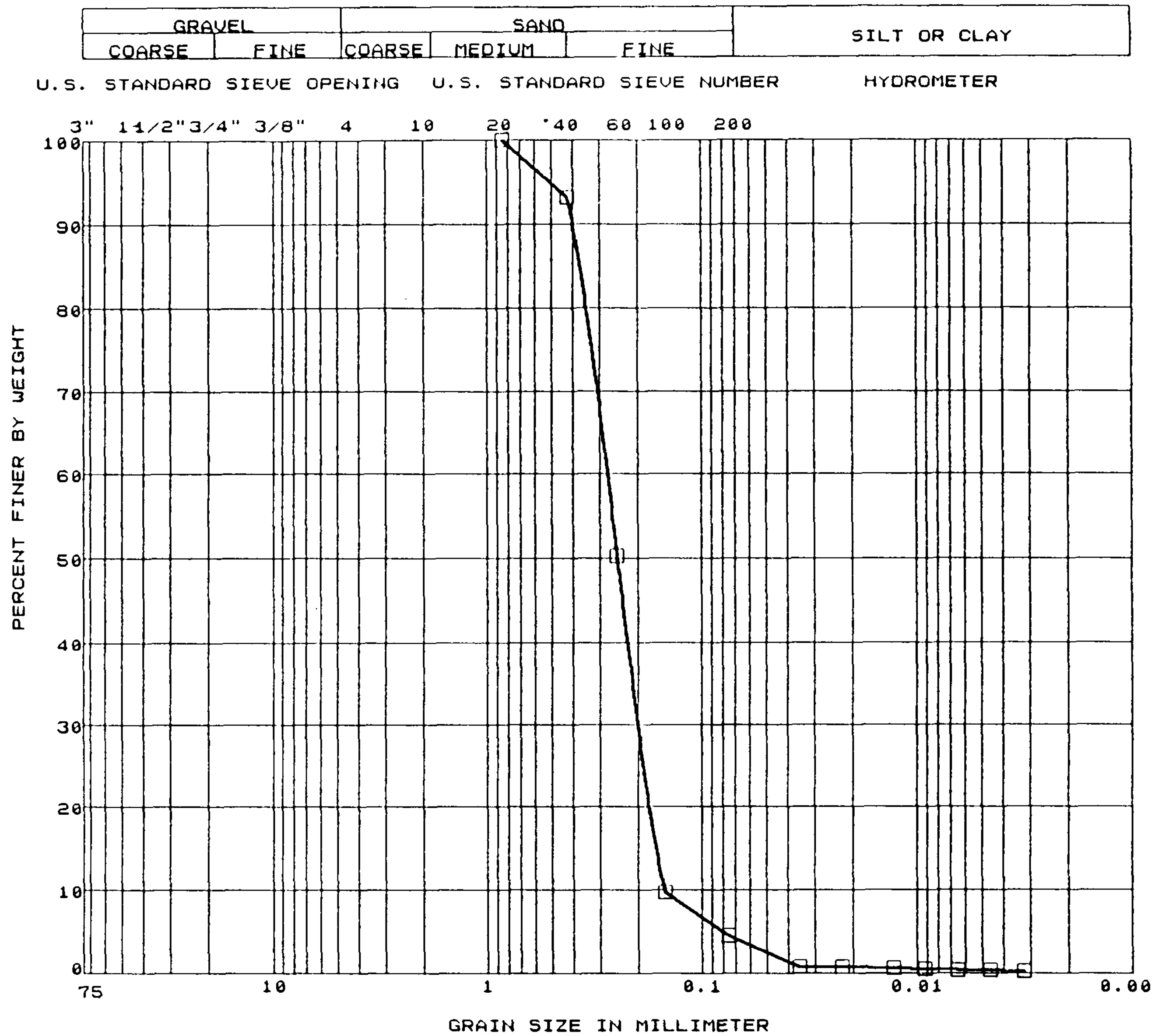
PROJECT NUMBER: 2738.0215

CLIENT: James M. Montgomery

DATE: Sept. 27, 1991

SUMMARIZED BY: S. Sayawatana

SAMPLE NO.	DEPTH (ft)	MOISTURE CONTENT ASTM D2216 (%)	DRY DENSITY ASTM D2937 (pcf)	PERMEABILITY	
				EFFECTIVE STRESSES (psi)	HYDRAULIC CONDUCTIVITY (EPA 9100) (cm/s)
M-022A	10-10.5	14.5	104.0	6	1.50E-05
M-001E	28.5	43.5	78.0	15	3.16E-08
M-002E	20.5	68.5	62.5	10	2.53E-08
M-104C	69-69.5	48.0	74.0	35	2.07E-08
M-027C	91	45.5	74.5	30	4.22E-09
M-025C	83-83.5	29.0	84.0	42	3.13E-09
M-025E	28.5-29	39.0	83.0	15	4.56E-08
M-020B	89.5-90	45.5	75.0	40	3.38E-08
M-020E	37	39.0	81.5	19	3.06E-08
M-024E	15.5-16	78.5	53.0	7	4.20E-07
M-023B	120-120.5	51.5	68.0	40	7.31E-09
M-007C	83.5-84	46.5	74.0	42	4.64E-09
M-013C	83-83.5	47.0	75.5	43	4.93E-09
M-019E	43-43.5	19.0	103.5	25	2.87E-07
M-021C	35.5-36	38.0	84.5	19	2.20E-08



SYMBOL	BORING NO	SAMPLE NO	DEPTH (in)	SAMPLE TYPE	SOIL TYPE	LIQUID LIMIT	PLASTI-CITY INDEX
□		M-001B	60.5-61.5	TUBE			

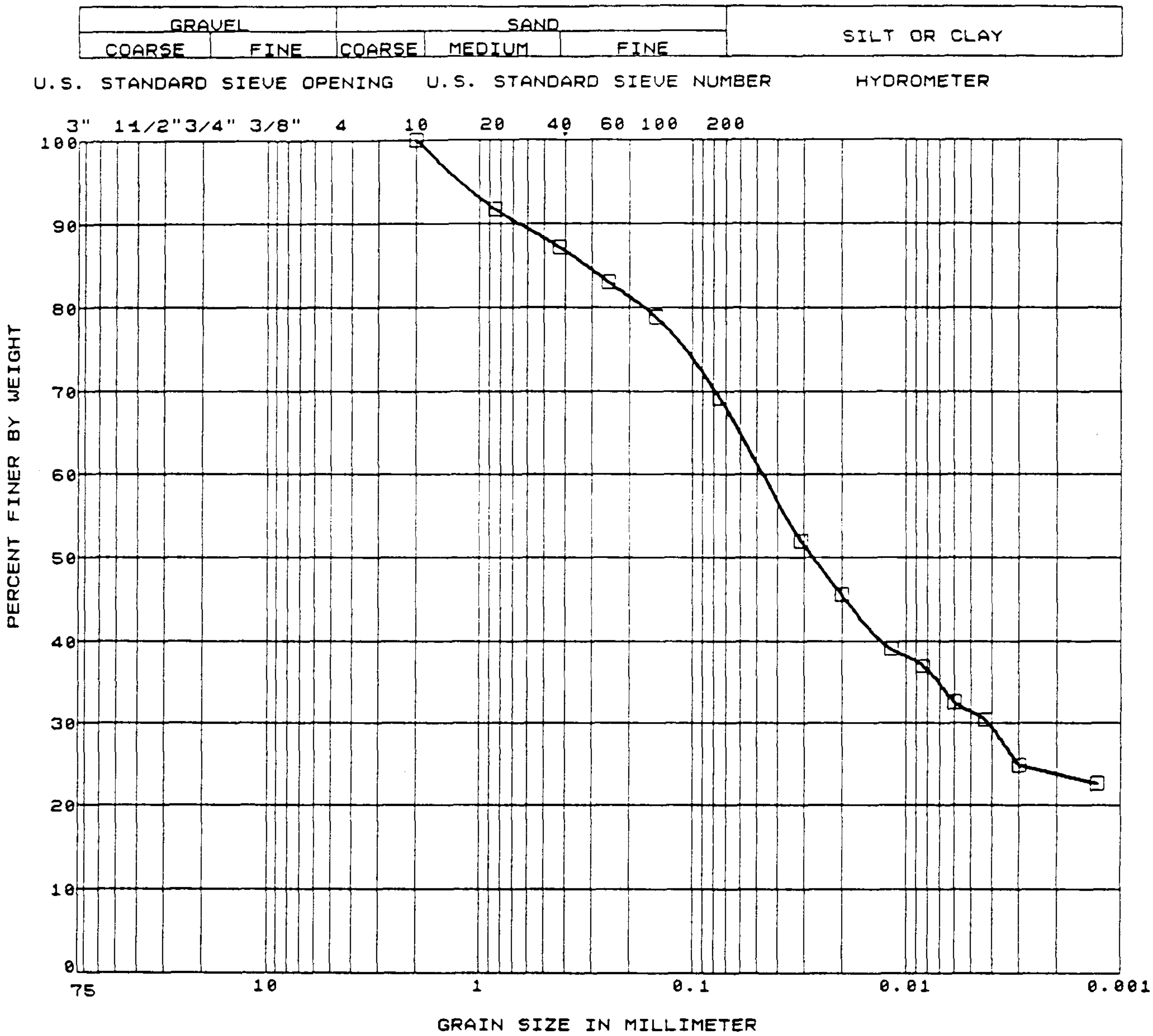
The Earth Technology Corporation

PROJECT NAME:
NAS-Alameda

Grain Size Distribution Curve

9/91

FIGURE 1



SYMBOL	BORING NO	SAMPLE NO	DEPTH (in)	SAMPLE TYPE	SOIL TYPE	LIQUID LIMIT	PLASTI-CITY INDEX
□		M-001E	28.5	TUBE	CL	40	21

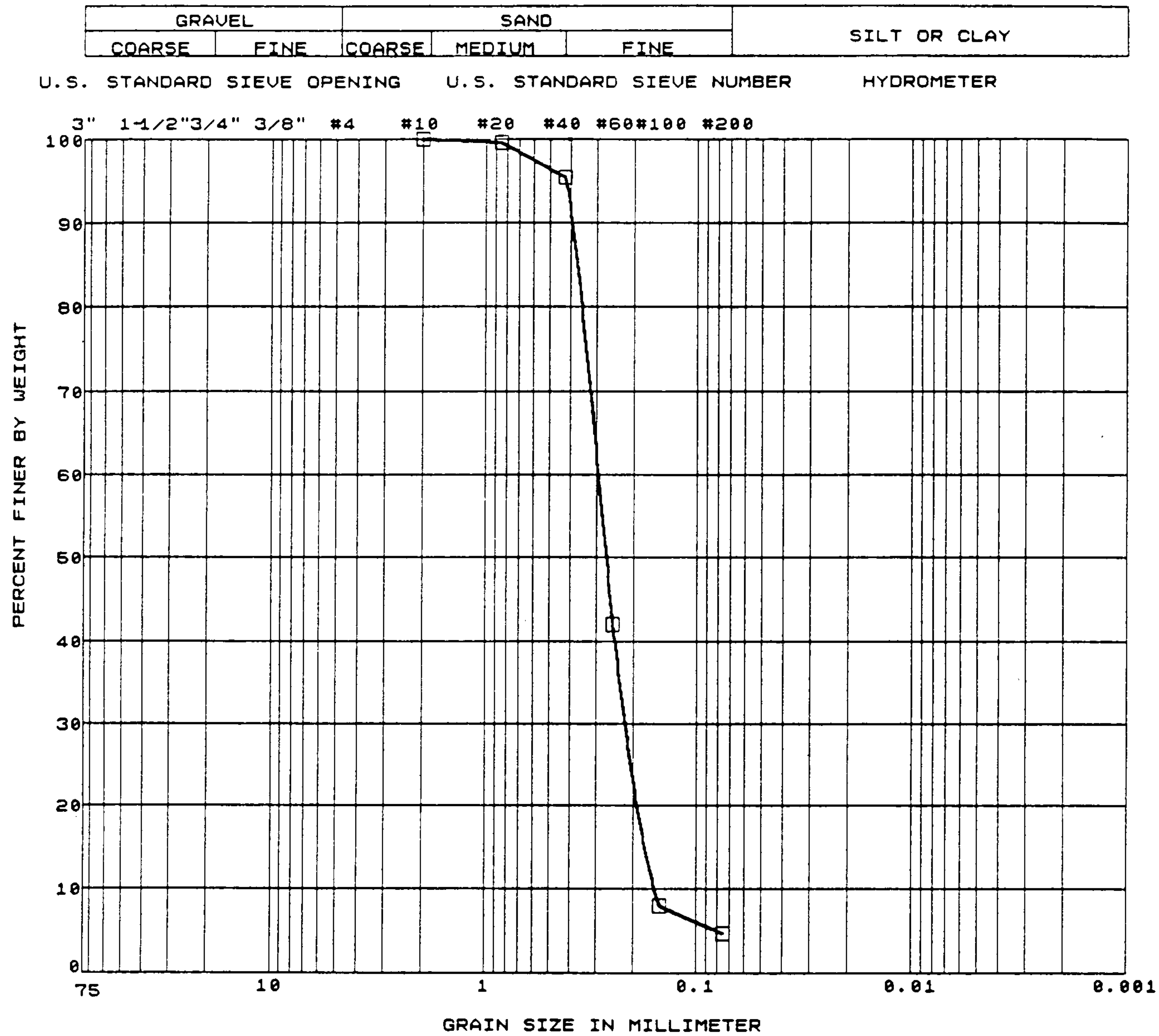
The Earth Technology Corporation

PROJECT NAME: NAS-Alameda

Grain Size Distribution Curve

9/91

FIGURE 28



SYMBOL	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE TYPE	SOIL TYPE	LIQUID LIMIT	PLASTICITY INDEX
□		M-002A	5.5-6	TUBE			

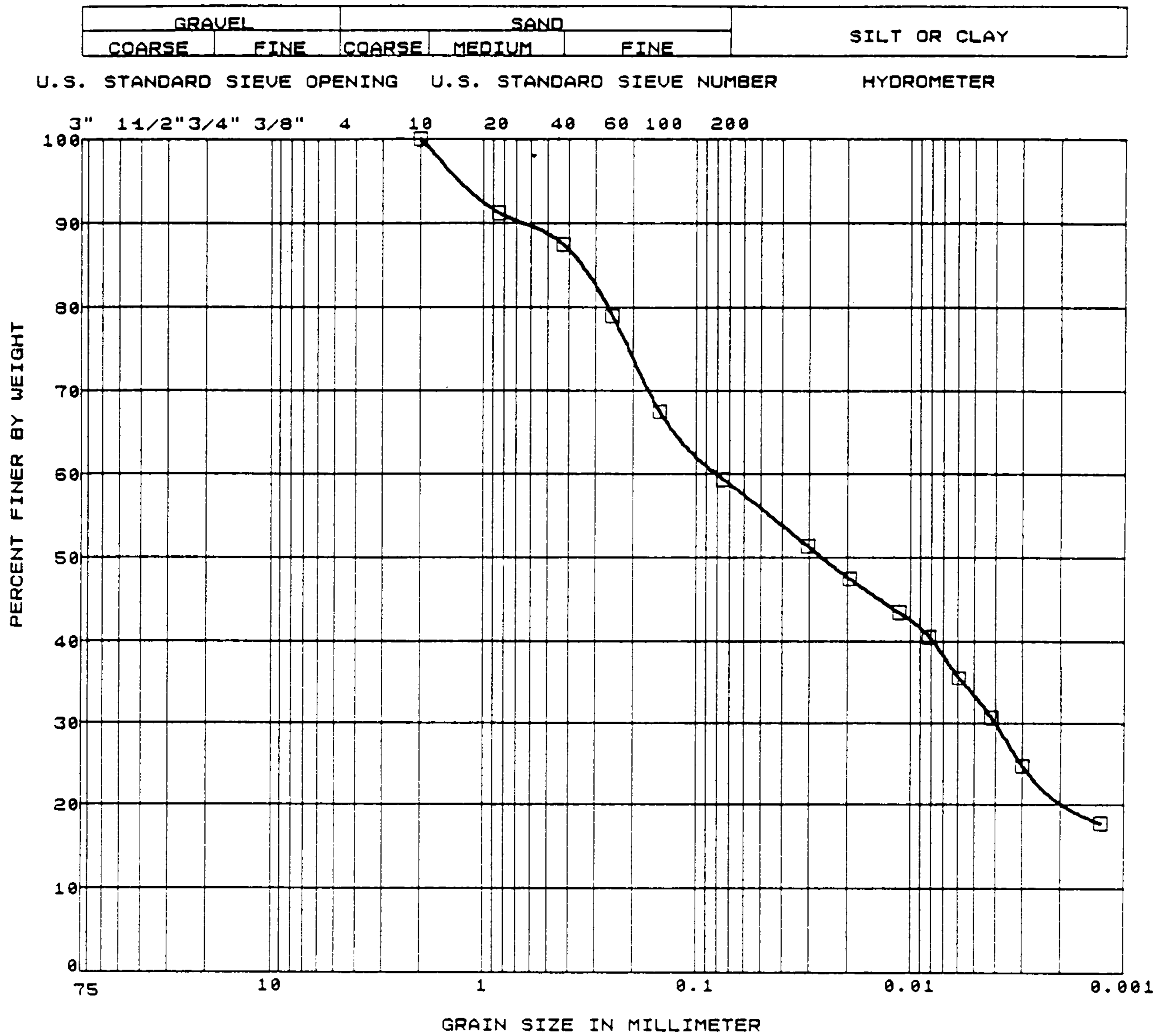
The Earth Technology Corporation

PROJECT NAME: NAS-Alameda

GRAIN SIZE DISTRIBUTION CURVE

9/91

FIGURE 14



SYMBOL	BORING NO	SAMPLE NO	DEPTH (in)	SAMPLE TYPE	SOIL TYPE	LIQUID LIMIT	PLASTI-CITY INDEX
□		M-002E	20.5-21	TUBE	CL	40	21

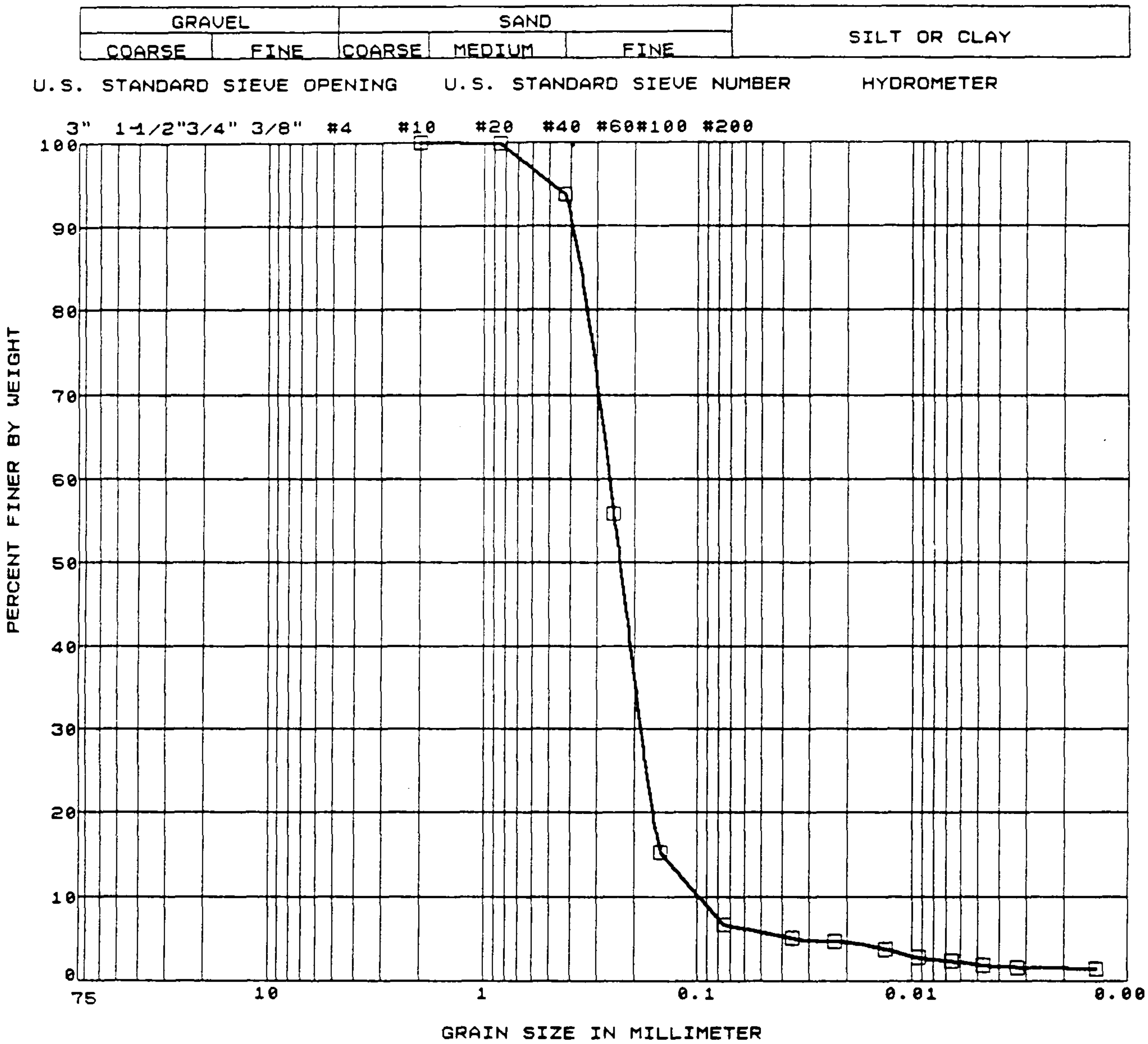
The Earth Technology Corporation

PROJECT NAME:
NAS-Alameda
ST. IMPROVEMENT

Grain Size Distribution Curve

10/91

FIGURE 29

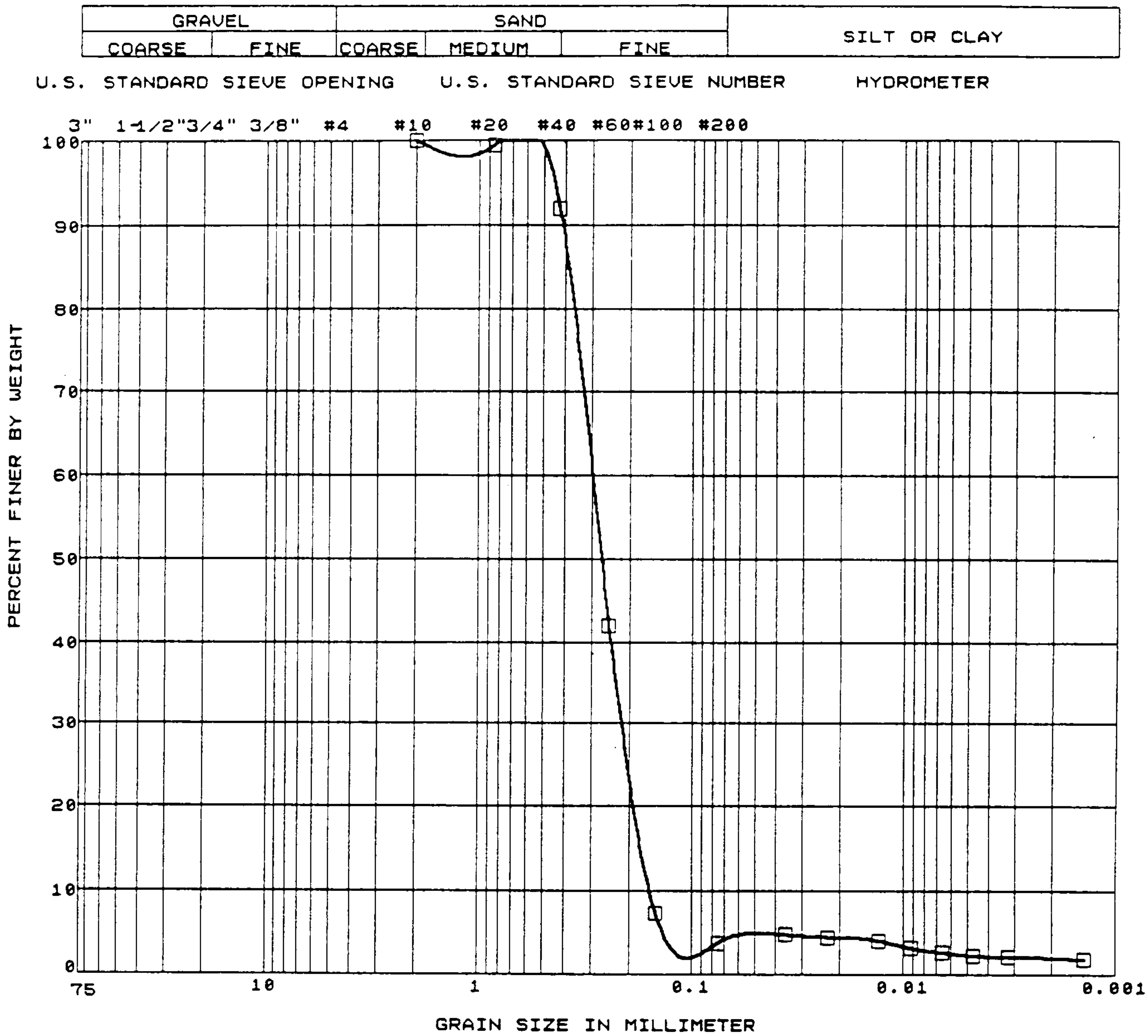


SYMBOL	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE TYPE	SOIL TYPE	LIQUID LIMIT	PLASTI-CITY INDEX
□		M-003A	10.5-11	TUBE			

The Earth Technology Corporation	PROJECT NAME: NAS-Alameda

GRAIN SIZE DISTRIBUTION CURVE

9/91 FIGURE 15



SYMBOL	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE TYPE	SOIL TYPE	LIQUID LIMIT	PLASTICITY INDEX
□		M-04A	10.5-11	TUBE			

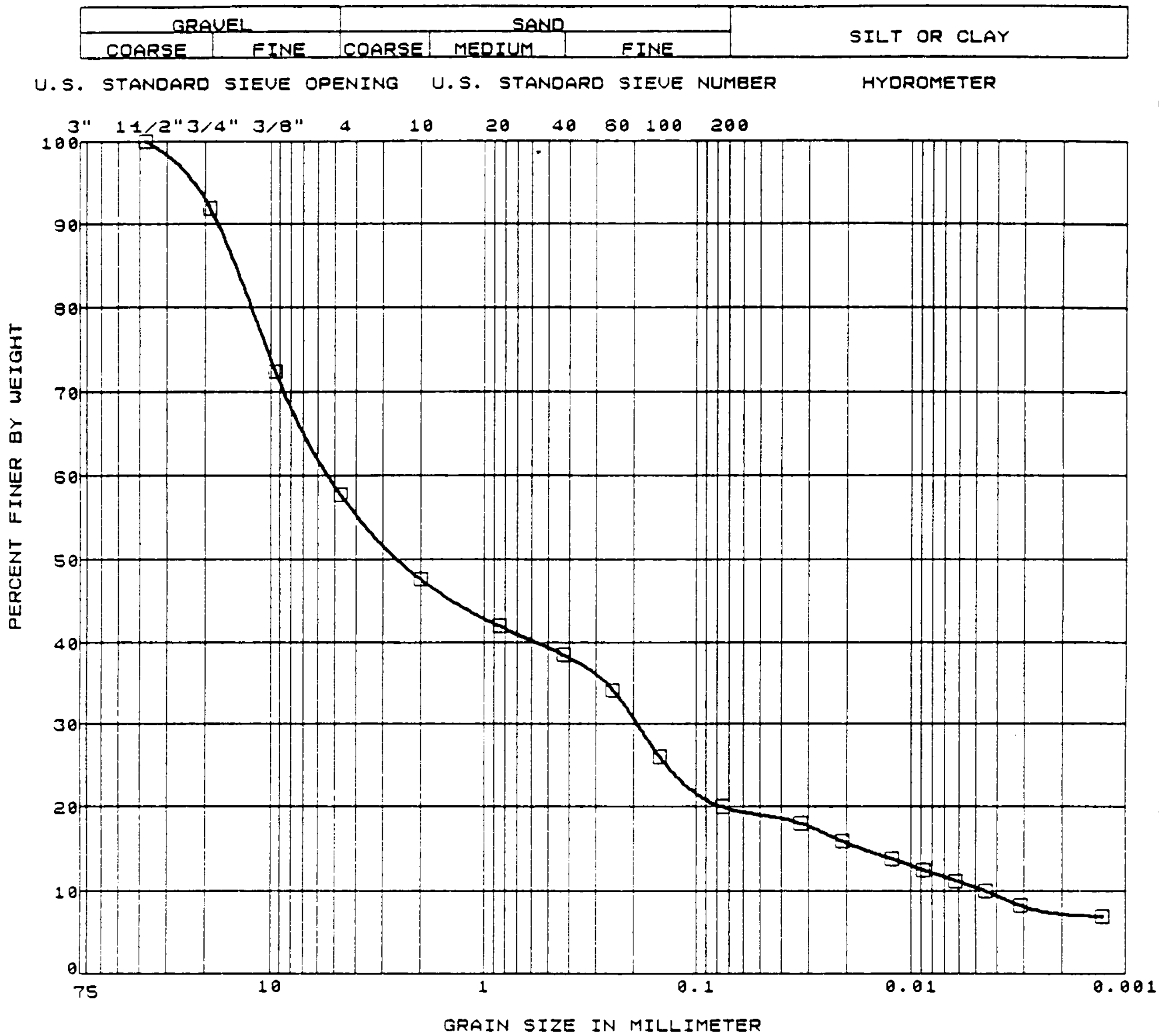
The Earth Technology Corporation

PROJECT NAME: NAS-Alameda

GRAIN SIZE DISTRIBUTION CURVE

9/91

FIGURE 16



SYMBOL	BORING NO	SAMPLE NO	DEPTH (in)	SAMPLE TYPE	SOIL TYPE	LIQUID LIMIT	PLASTI-CITY INDEX
☐		M-05A	11.5-12.5	TUBE			

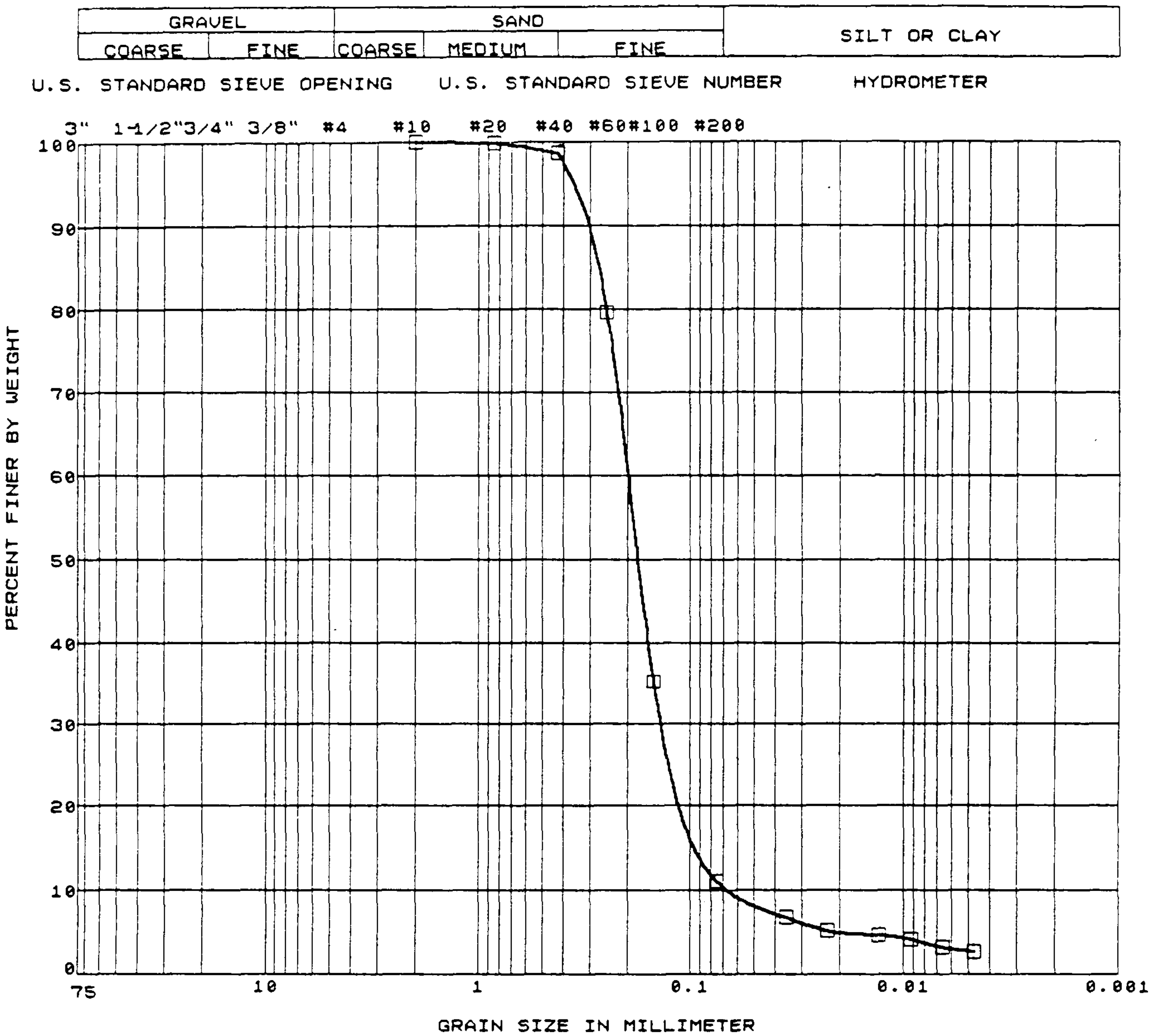
The Earth Technology Corporation

PROJECT NAME: NAS-Alameda

Grain Size Distribution Curve

10/91

FIGURE 10



SYMBOL	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE TYPE	SOIL TYPE	LIQUID LIMIT	PLASTI-CITY INDEX
□		M-06A	10-10.5	TUBE			

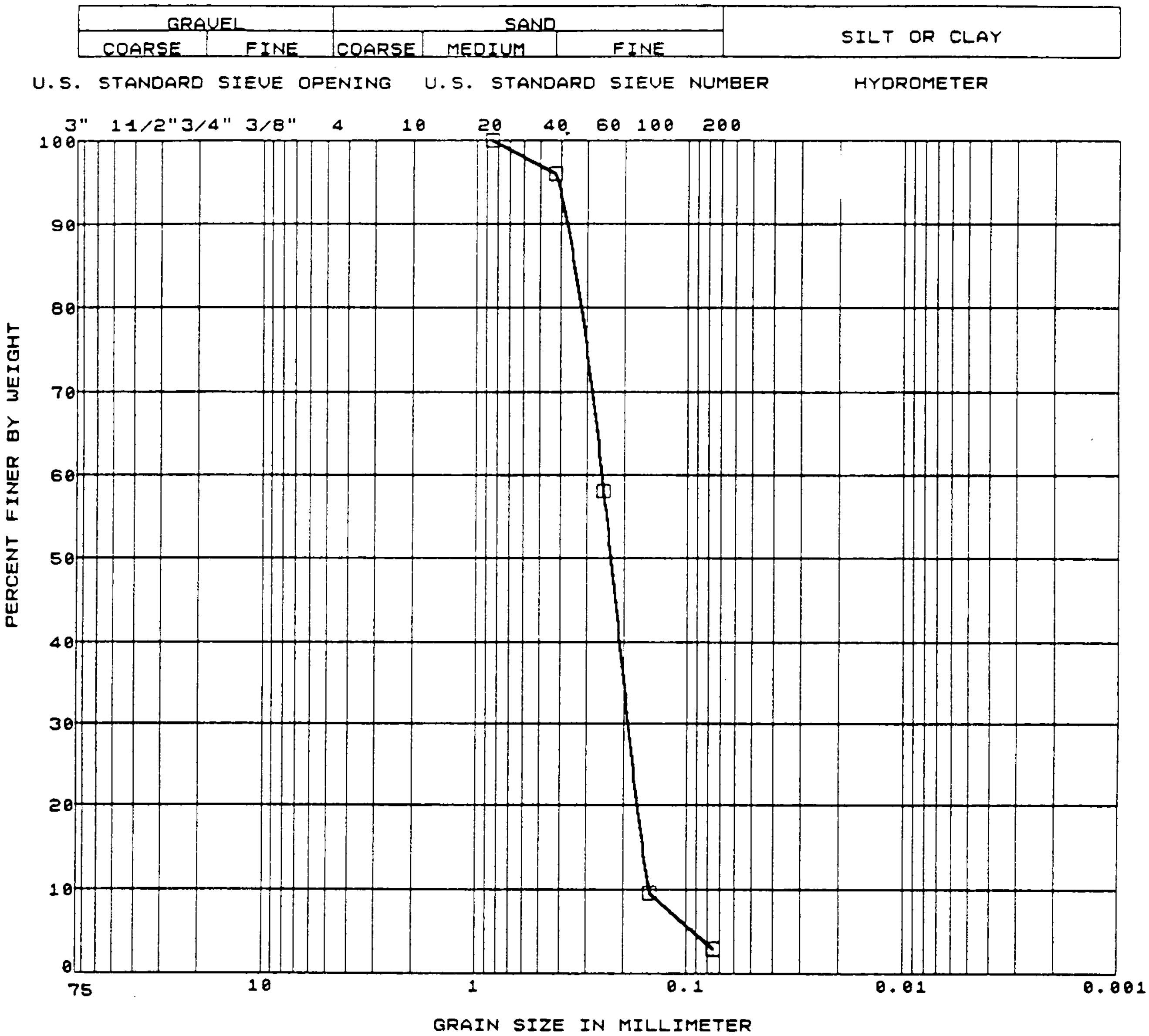
The Earth Technology Corporation

PROJECT NAME: NAS-Alameda

GRAIN SIZE DISTRIBUTION CURVE

9/91

FIGURE 17



SYMBOL	BORING NO	SAMPLE NO	DEPTH (in)	SAMPLE TYPE	SOIL TYPE	LIQUID LIMIT	PLASTI-CITY INDEX
□		M-007A	8-8.5	TUBE			

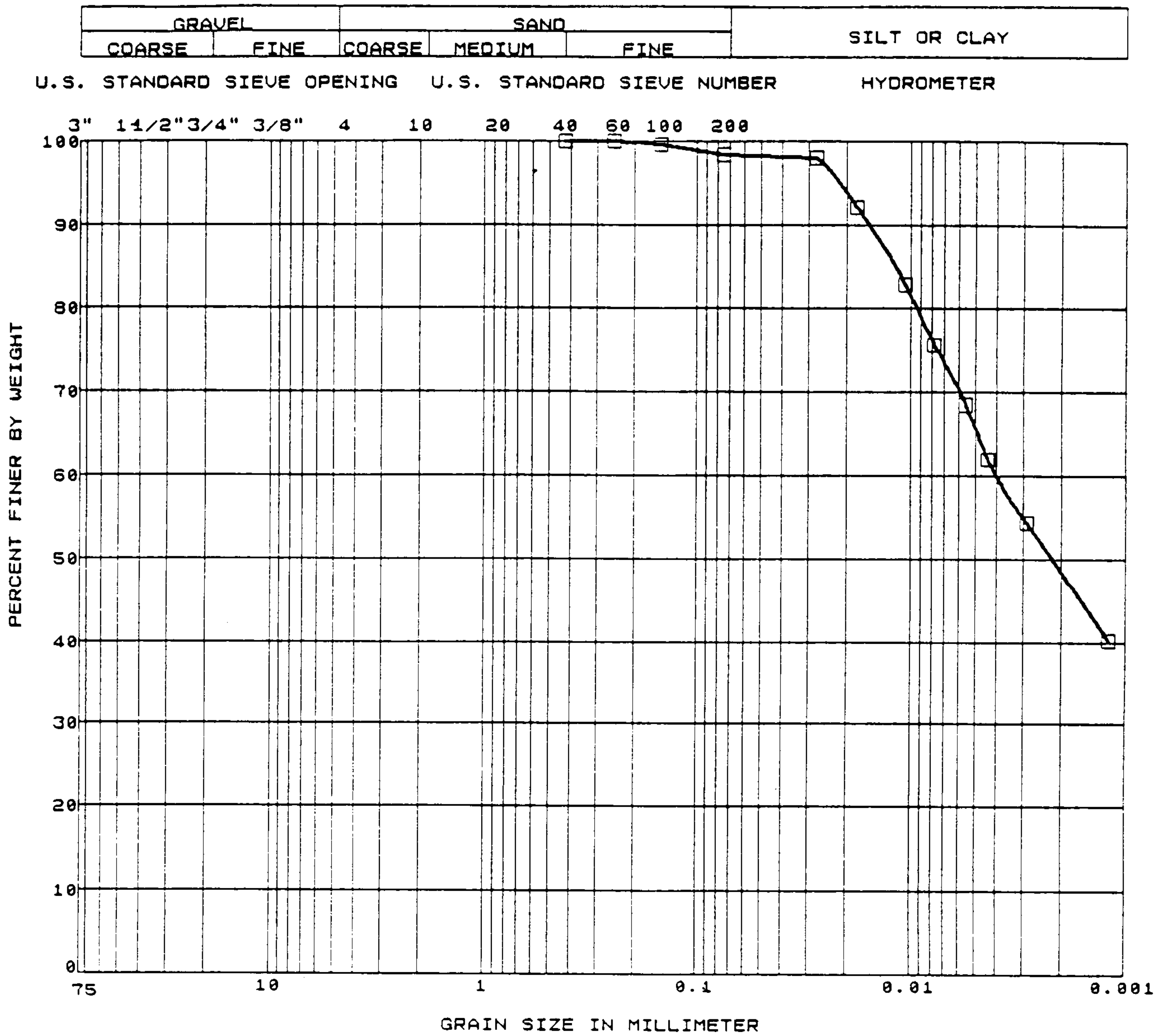
The Earth Technology Corporation

PROJECT NAME: NAS-Alameda

Grain Size Distribution Curve

9/91

FIGURE 13



SYMBOL	BORING NO	SAMPLE NO	DEPTH (in)	SAMPLE TYPE	SOIL TYPE	LIQUID LIMIT	PLASTI-CITY INDEX
□		M-007C	83.5-94	TUBE	CH	59	36

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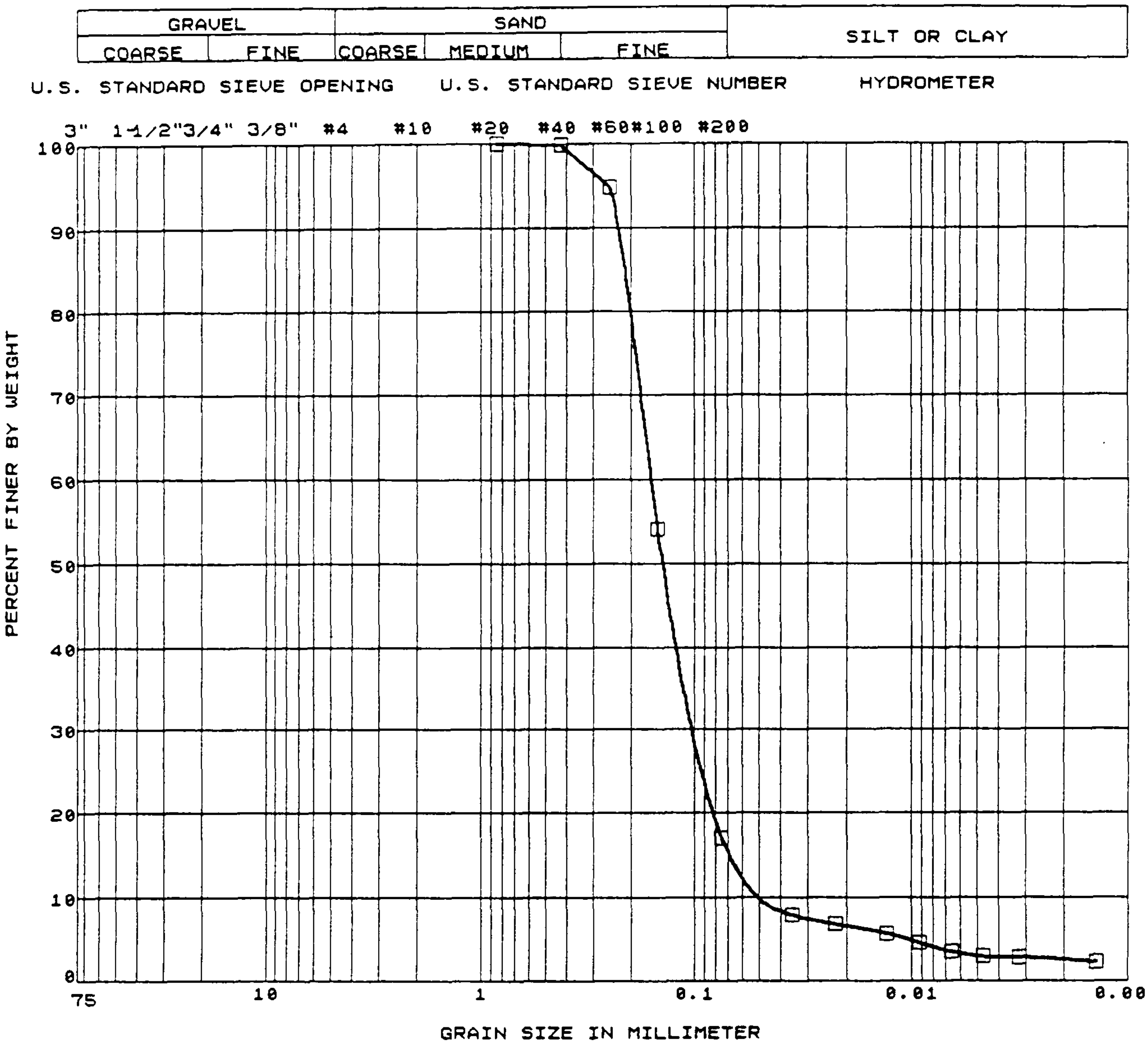
PROJECT NAME: NAS-Alameda

Grain Size Distribution Curve

10/91

FIGURE 36



SYMBOL	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE TYPE	SOIL TYPE	LIQUID LIMIT	PLASTI-CITY INDEX
□		M-08A	10-10.5	TUBE			

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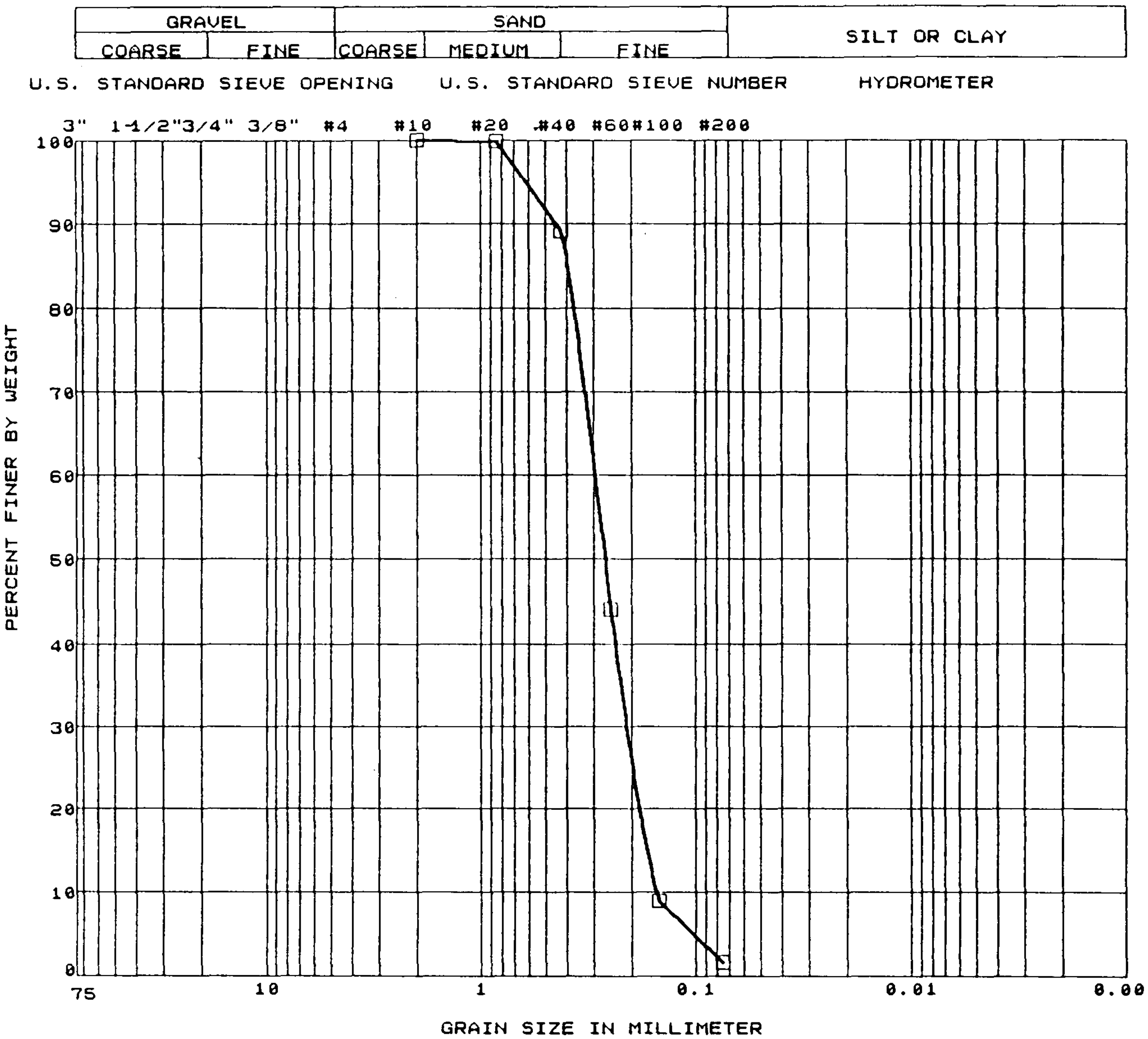
PROJECT NAME: NAS-Alameda

GRAIN SIZE DISTRIBUTION CURVE

9/91

FIGURE 18



SYMBOL	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE TYPE	SOIL TYPE	LIQUID LIMIT	PLASTI-CITY INDEX
□		M-009A	10.5-11	TUBE			

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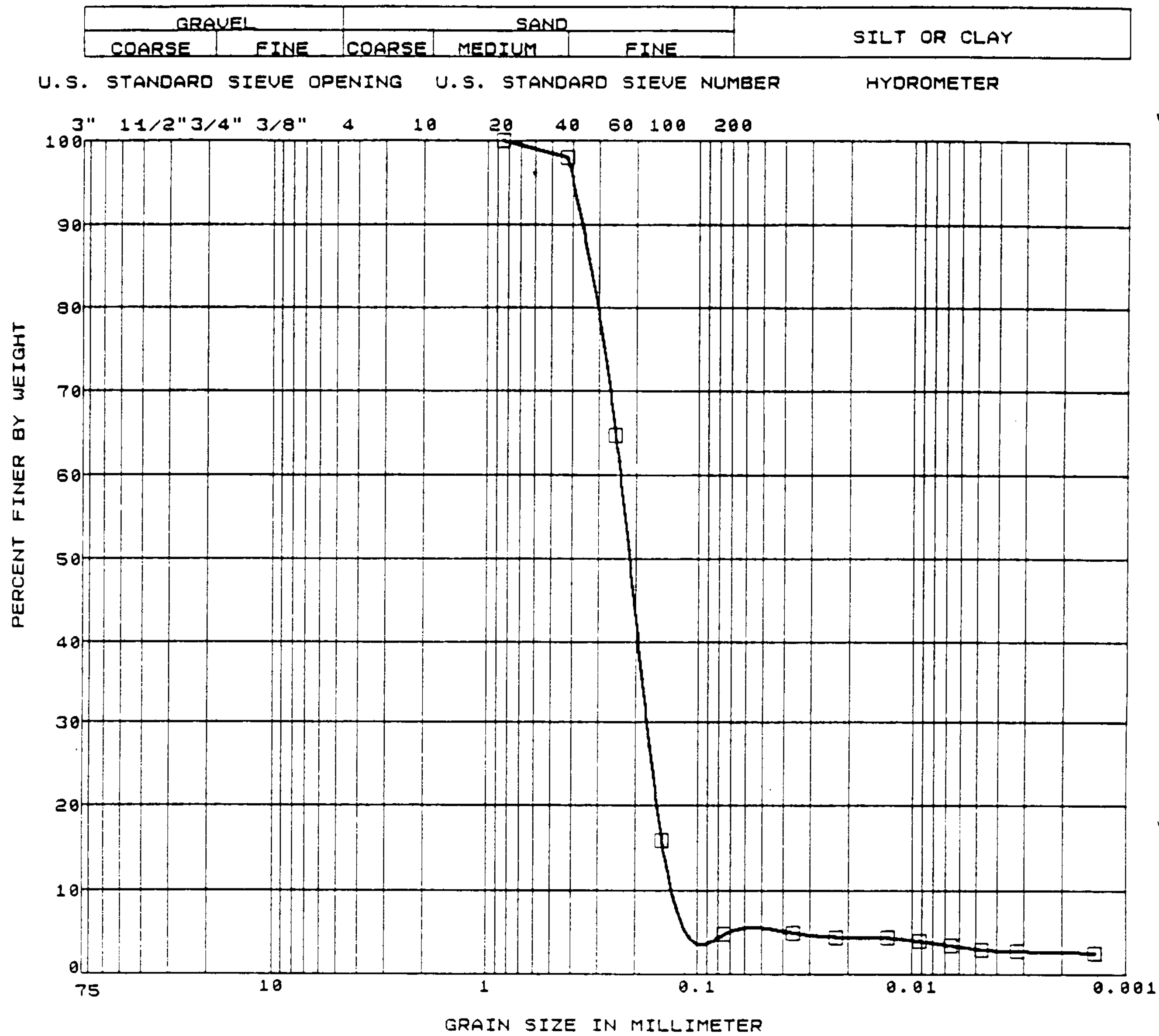
PROJECT NAME: NAS-Alameda

GRAIN SIZE DISTRIBUTION CURVE

9/91

FIGURE 40



SYMBOL	BORING NO	SAMPLE NO	DEPTH (in)	SAMPLE TYPE	SOIL TYPE	LIQUID LIMIT	PLASTI-CITY INDEX
☐		M-011A	10.5-11	TUBE			

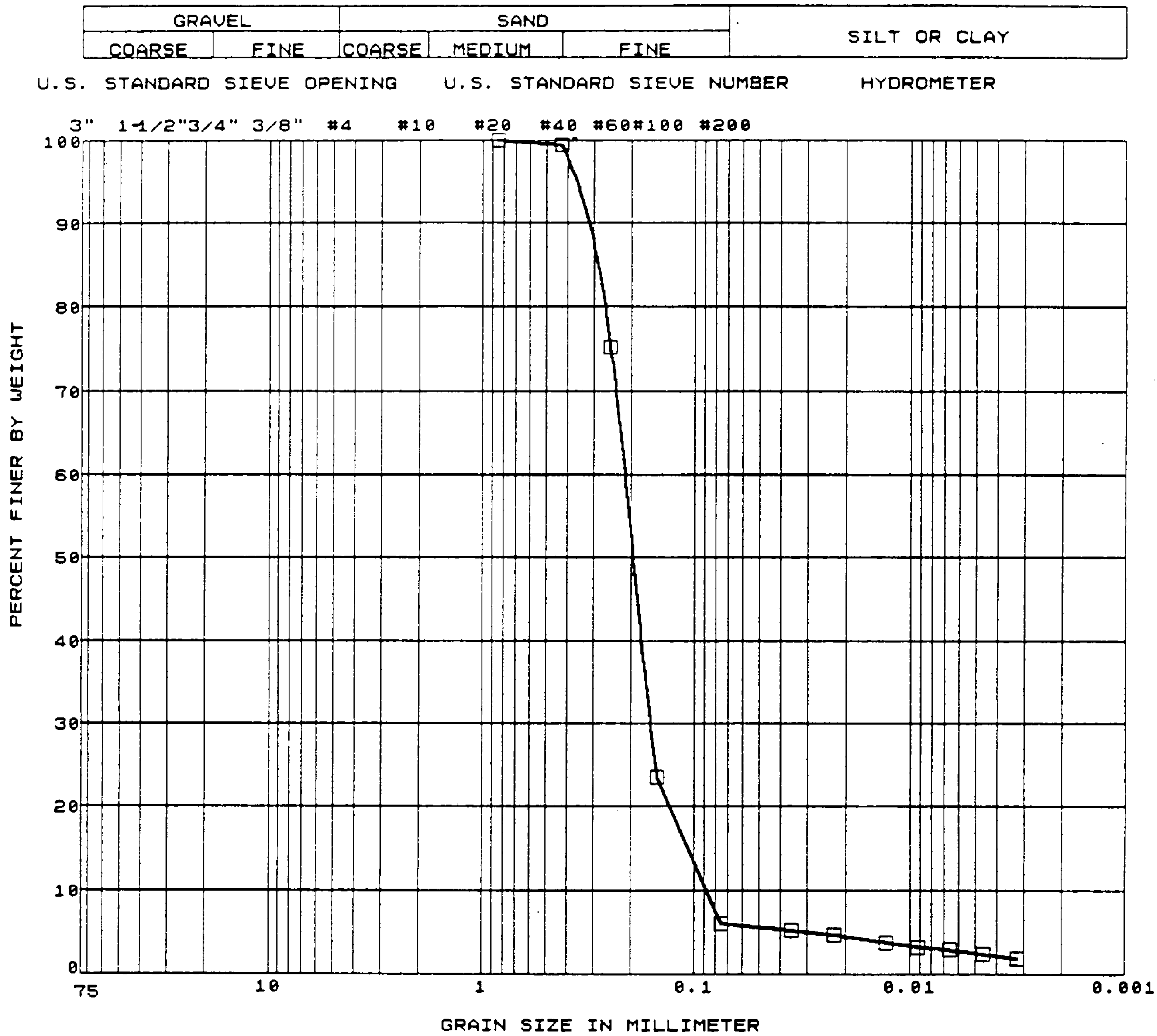
The Earth Technology Corporation

PROJECT NAME: NAS-Alameda

Grain Size Distribution Curve

10/91

FIGURE 41



SYMBOL	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE TYPE	SOIL TYPE	LIQUID LIMIT	PLASTI-CITY INDEX
□		M-013A	11-11.5	TUBE			

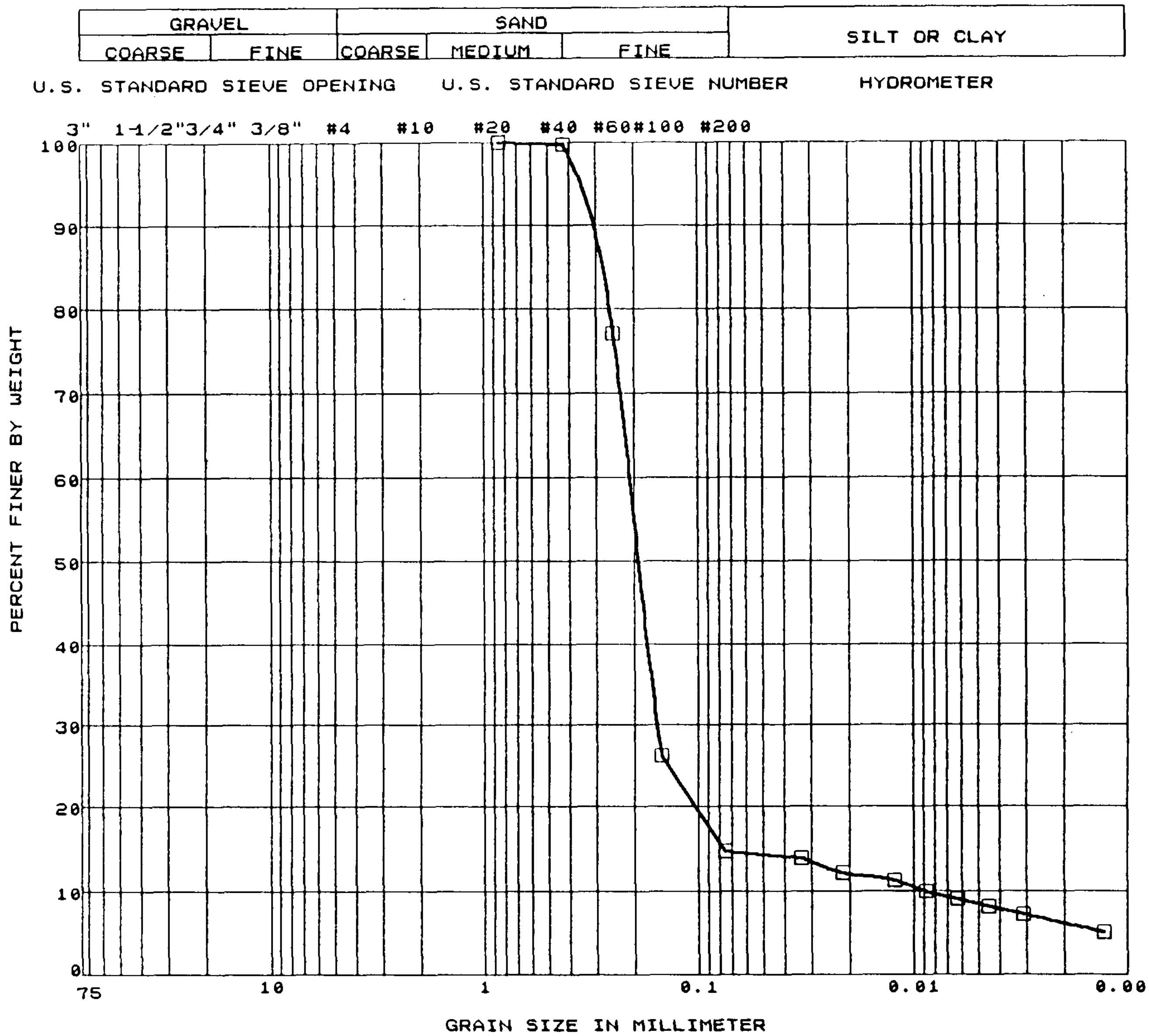
The Earth Technology Corporation

PROJECT NAME: NAS-Alameda

GRAIN SIZE DISTRIBUTION CURVE

9/91

FIGURE 12



SYMBOL	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE TYPE	SOIL TYPE	LIQUID LIMIT	PLASTI-CITY INDEX
□		M-013C	62-63	TUBE			

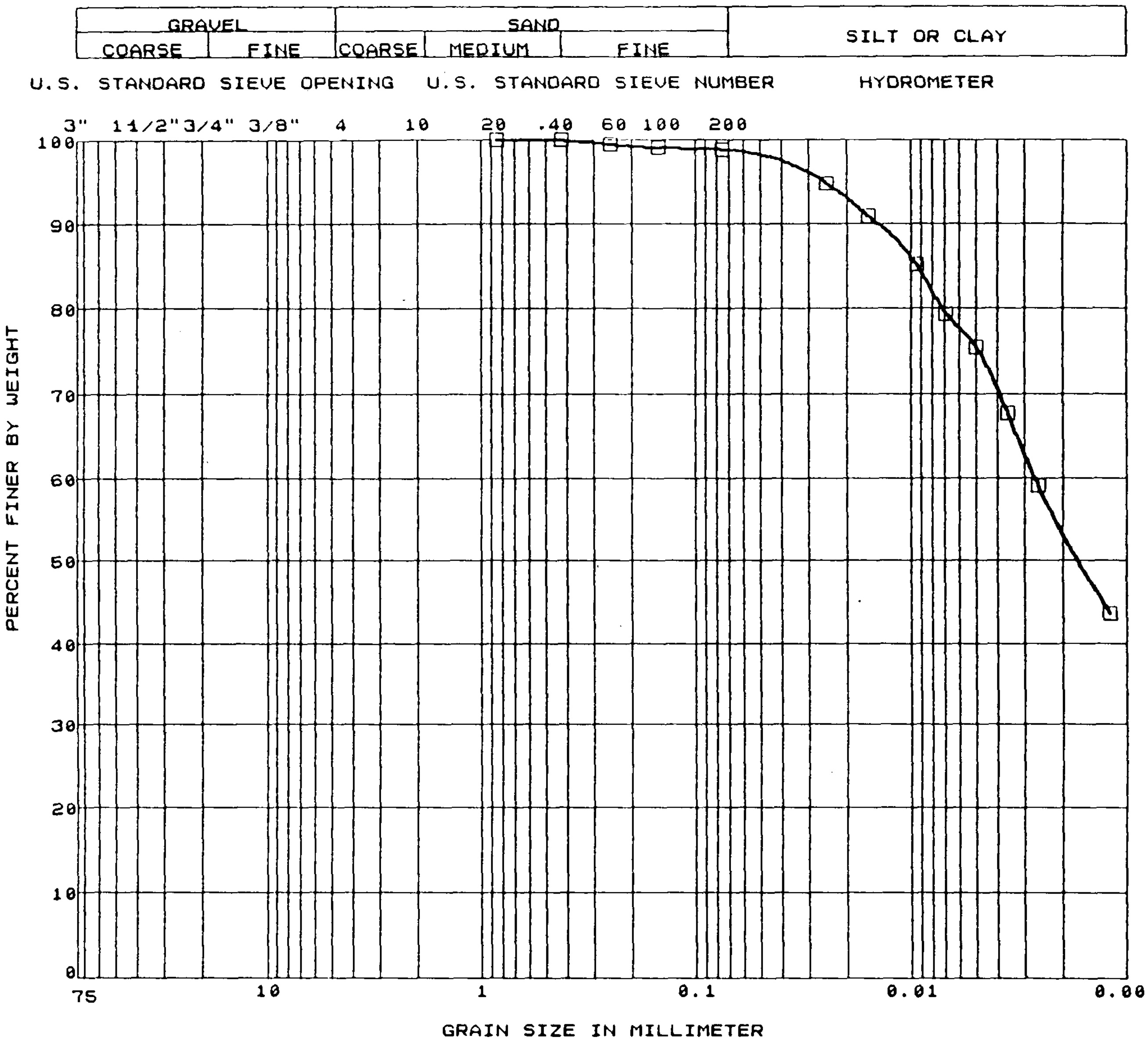
The Earth Technology Corporation

PROJECT NAME: NAS-Alameda

GRAIN SIZE DISTRIBUTION CURVE

9/91

FIGURE 2



SYMBOL	BORING NO	SAMPLE NO	DEPTH (in)	SAMPLE TYPE	SOIL TYPE	LIQUID LIMIT	PLASTI-CITY INDEX
□		M-013C	83-83.5	TUBE	CH	78	49

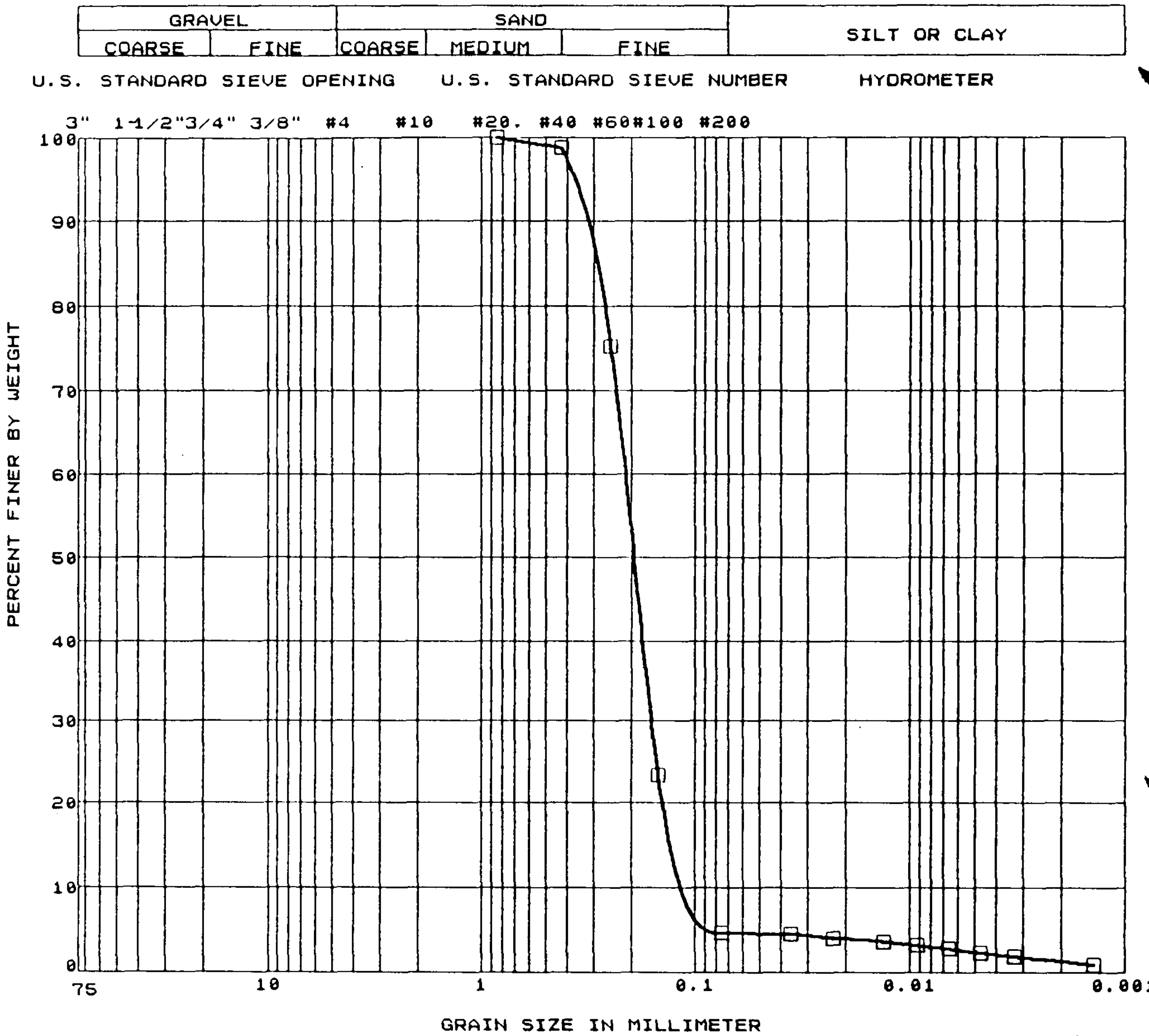
The Earth Technology Corporation

PROJECT NAME: NAS-Alameda

Grain Size Distribution Curve

9/91

FIGURE 37



SYMBOL	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE TYPE	SOIL TYPE	LIQUID LIMIT	PLASTI-CITY INDEX
□		M-015A	10.5-11.0	TUBE			

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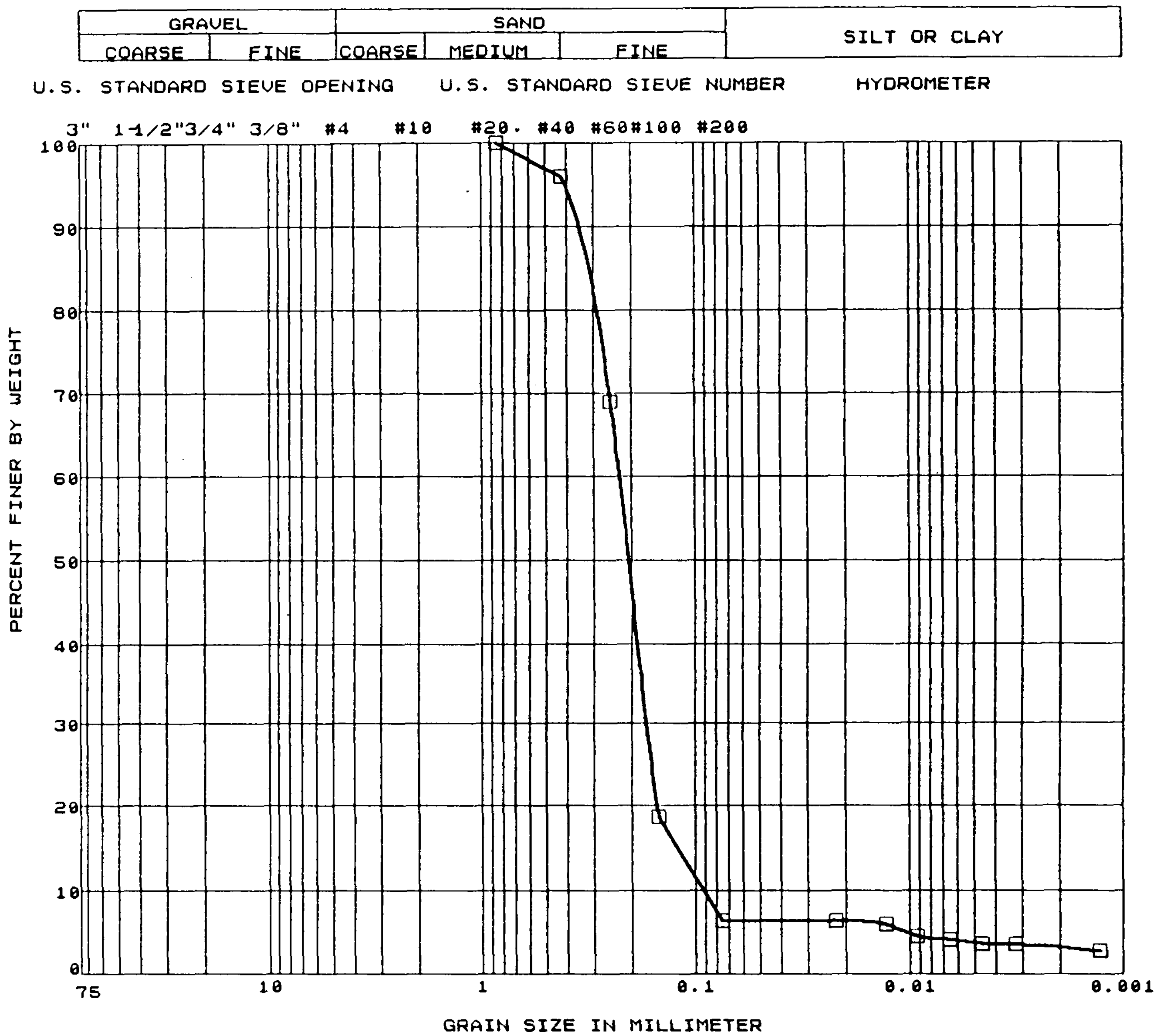
PROJECT NAME: NAS-Alameda

GRAIN SIZE DISTRIBUTION CURVE

9/91

FIGURE 9



SYMBOL	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE TYPE	SOIL TYPE	LIQUID LIMIT	PLASTI-CITY INDEX
□		M-016A	10.5-11	TUBE			

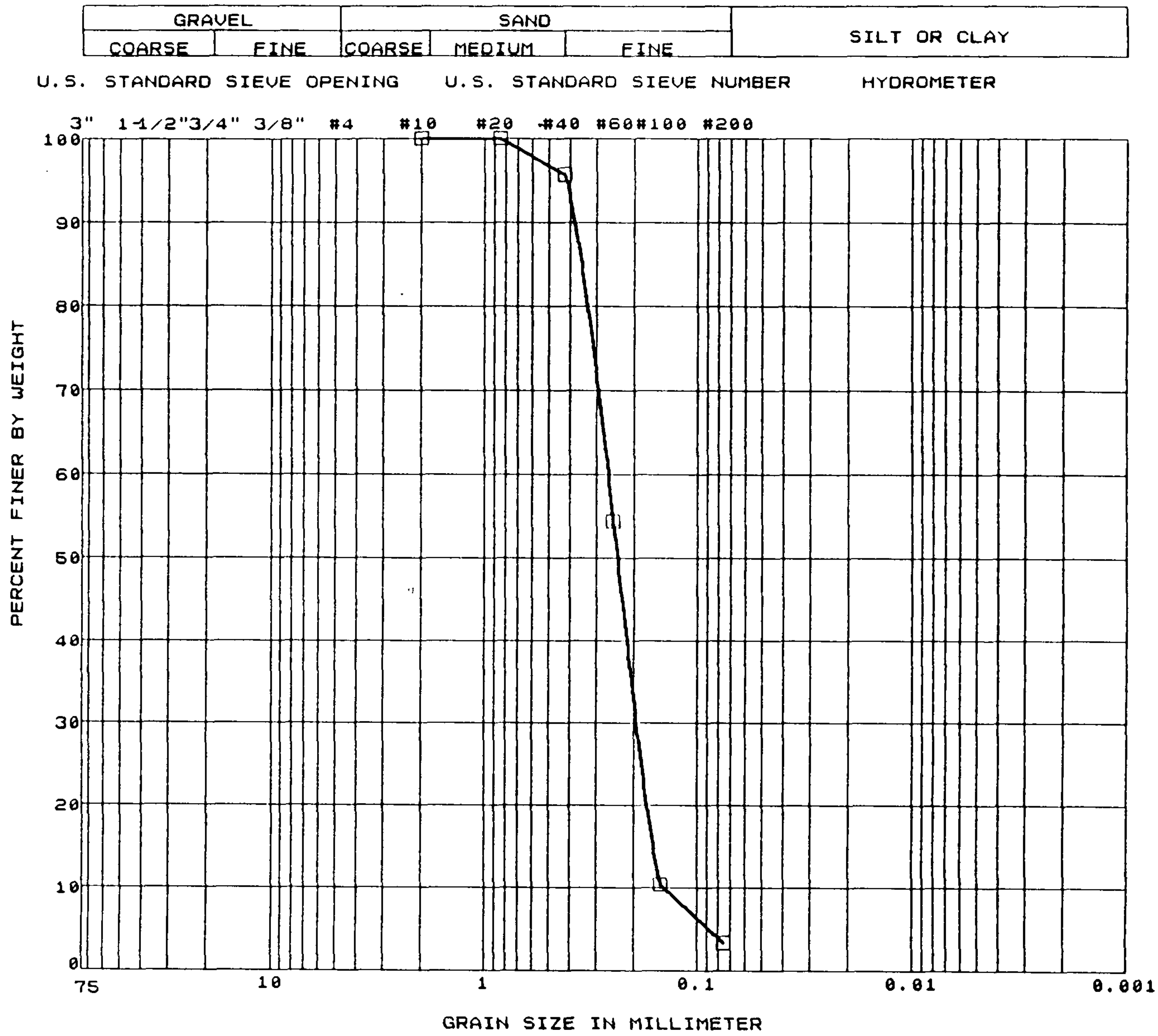
The Earth Technology Corporation

PROJECT NAME: NAS-Alameda

GRAIN SIZE DISTRIBUTION CURVE

9/91

FIGURE 8



SYMBOL	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE TYPE	SOIL TYPE	LIQUID LIMIT	PLASTI-CITY INDEX
□		M-017A	10.5-11	TUBE			

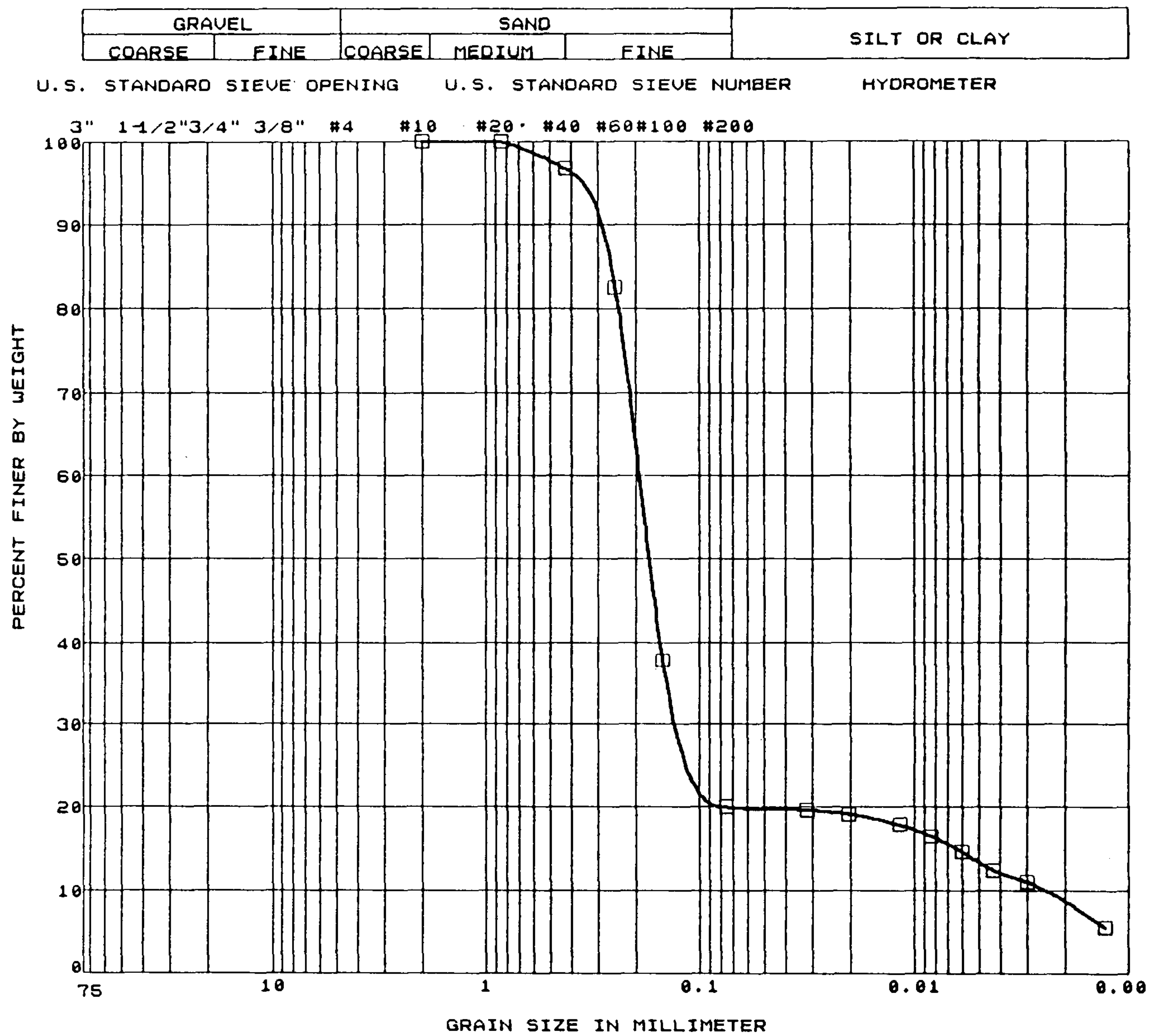
The Earth Technology Corporation

PROJECT NAME: NAS-Alameda

GRAIN SIZE DISTRIBUTION CURVE

9/91

FIGURE 42



SYMBOL	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE TYPE	SOIL TYPE	LIQUID LIMIT	PLASTICITY INDEX
□		M-018A	10.5-11	TUBE			

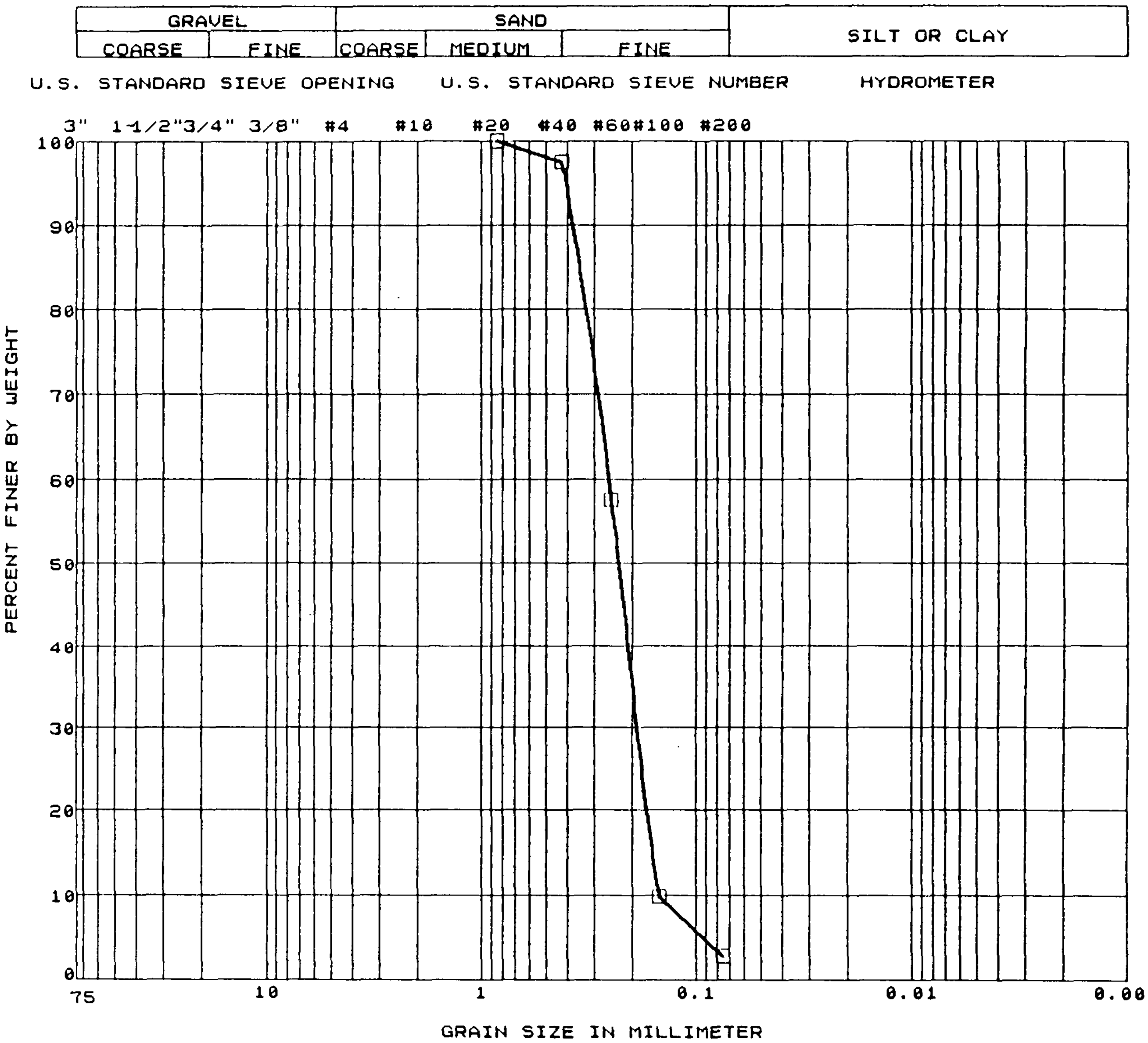
The Earth Technology Corporation

PROJECT NAME: NAS-Alameda

GRAIN SIZE DISTRIBUTION CURVE

9/91

FIGURE 7



SYMBOL	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE TYPE	SOIL TYPE	LIQUID LIMIT	PLASTI-CITY INDEX
□		M-019A	13.5-14	TUBE			

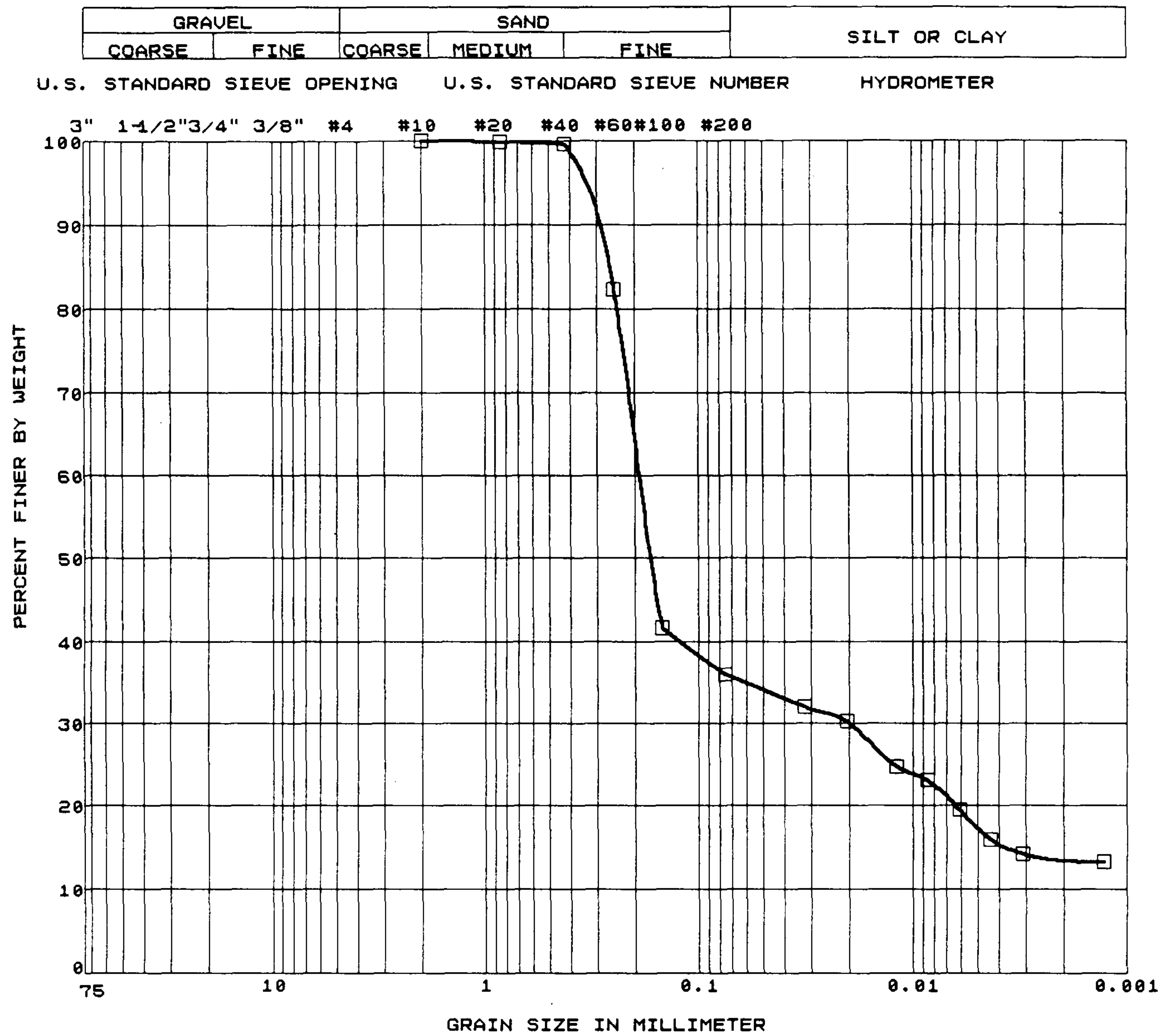
The Earth Technology Corporation

PROJECT NAME: NAS-Alameda

GRAIN SIZE DISTRIBUTION CURVE

9/91

FIGURE 43

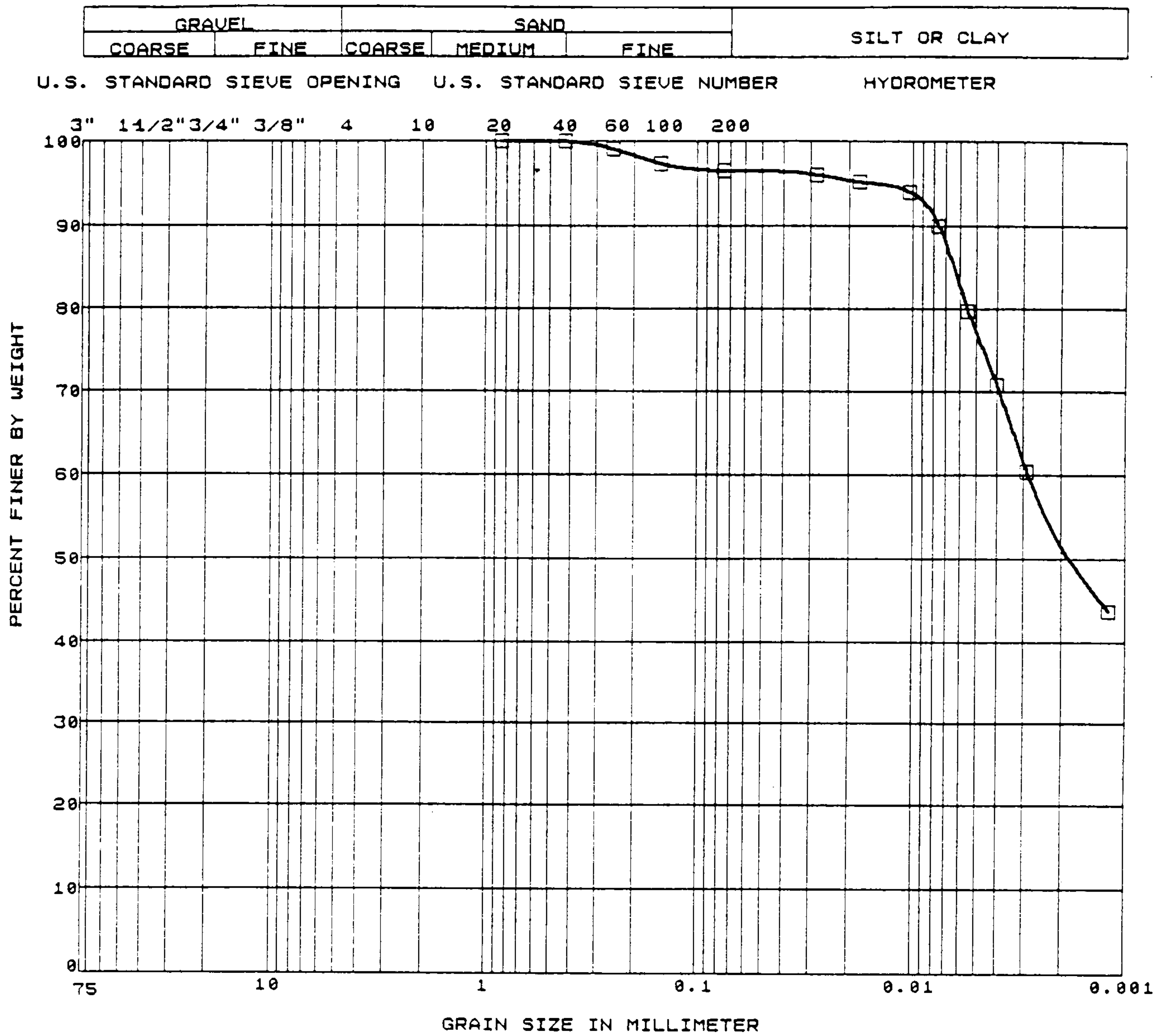


SYMBOL	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE TYPE	SOIL TYPE	LIQUID LIMIT	PLASTI-CITY INDEX
□		M-019E	43-43.5	TUBE	SC	40	20

The Earth Technology Corporation	PROJECT NAME: NAS-Alameda

GRAIN SIZE DISTRIBUTION CURVE

9/91 FIGURE 38



SYMBOL	BORING NO	SAMPLE NO	DEPTH (in)	SAMPLE TYPE	SOIL TYPE	LIQUID LIMIT	PLASTI-CITY INDEX
□		M-020B	89.5-90	TUBE	CH	68	40

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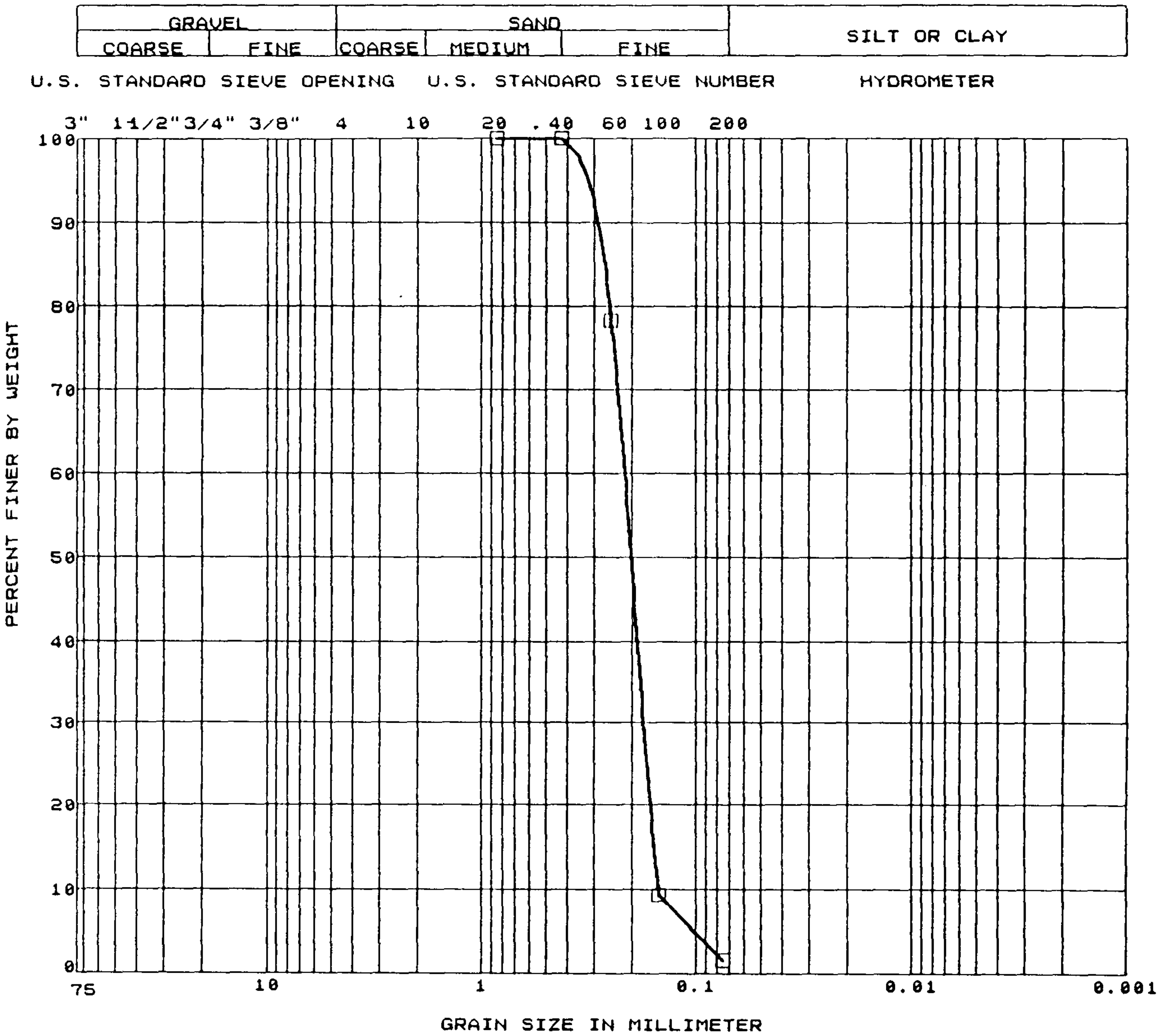
PROJECT NAME:
NAS-Alameda

Grain Size Distribution Curve

10/91

FIGURE 32



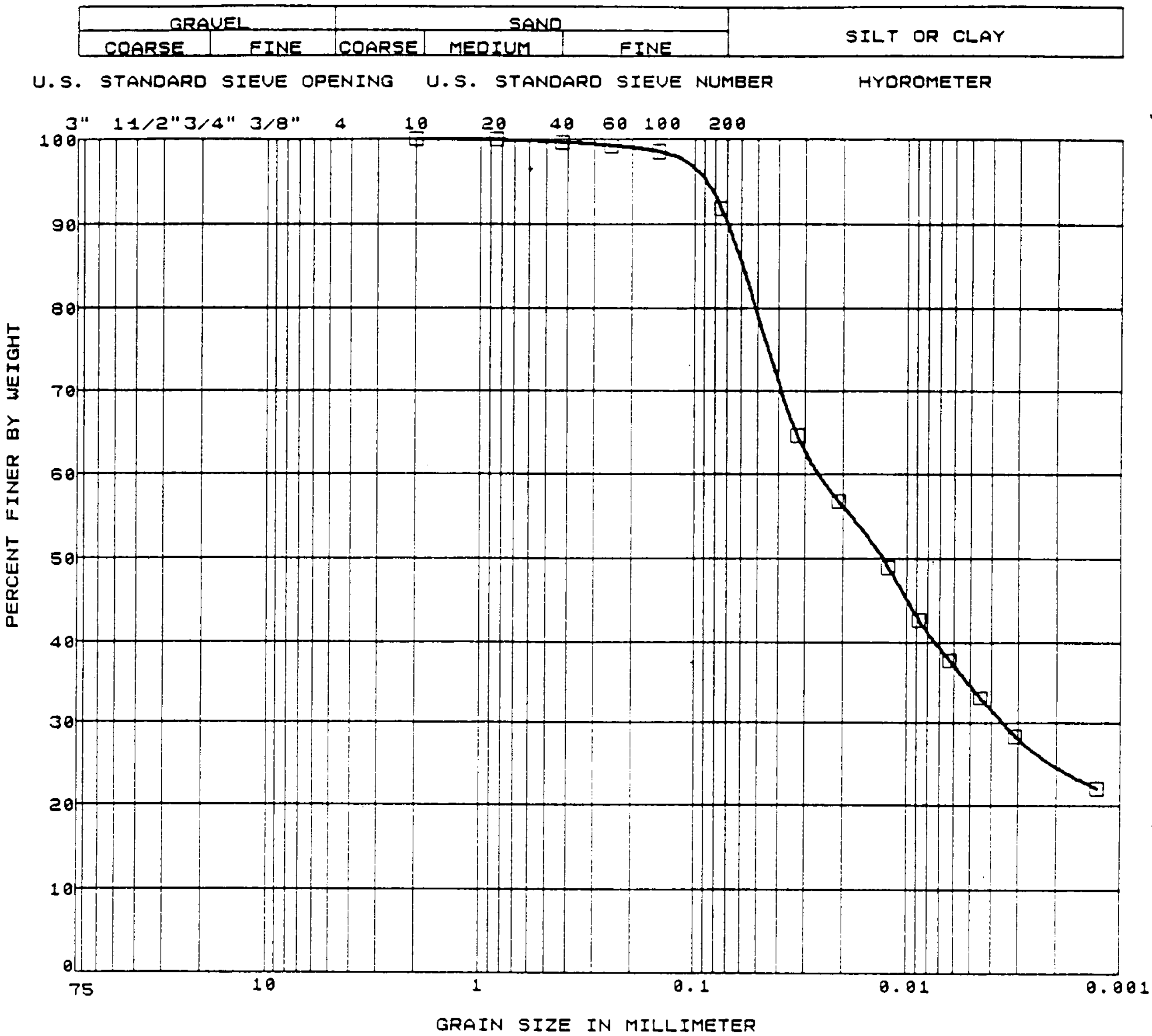
SYMBOL	BORING NO	SAMPLE NO	DEPTH (in)	SAMPLE TYPE	SOIL TYPE	LIQUID LIMIT	PLASTI-CITY INDEX
□		M-020E	30.5-31	TUBE			

The Earth Technology Corporation	PROJECT NAME: NAS-Alameda

Grain Size Distribution Curve

9/91

FIGURE 44



SYMBOL	BORING NO	SAMPLE NO	DEPTH (in)	SAMPLE TYPE	SOIL TYPE	LIQUID LIMIT	PLASTI-CITY INDEX
□		M-020E	37	TUBE	CL	39	20

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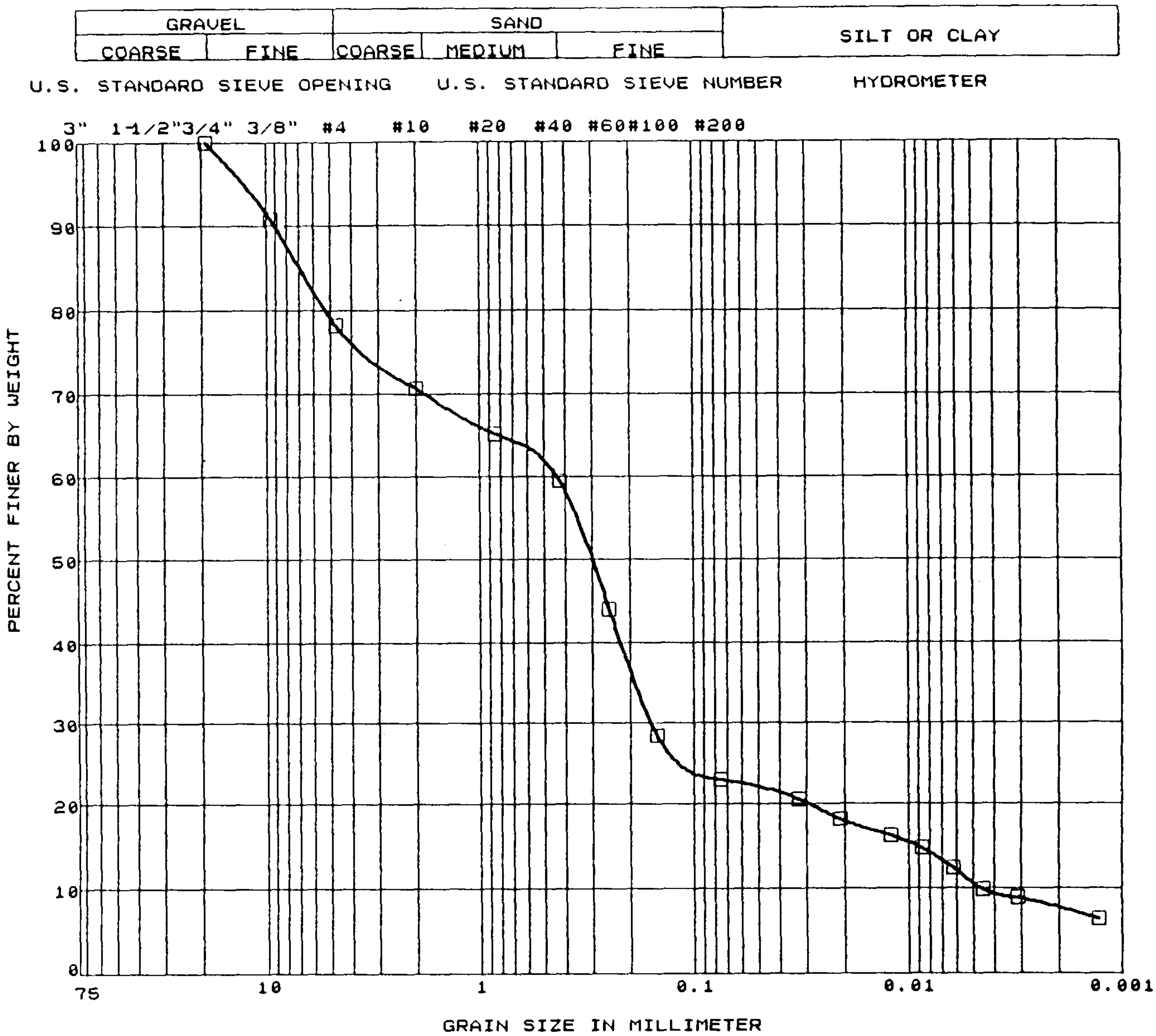
PROJECT NAME: NAS-Alameda

Grain Size Distribution Curve

10/91

FIGURE 33



SYMBOL	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE TYPE	SOIL TYPE	LIQUID LIMIT	PLASTICITY INDEX
□		M-021A	12-12.5	TUBE			

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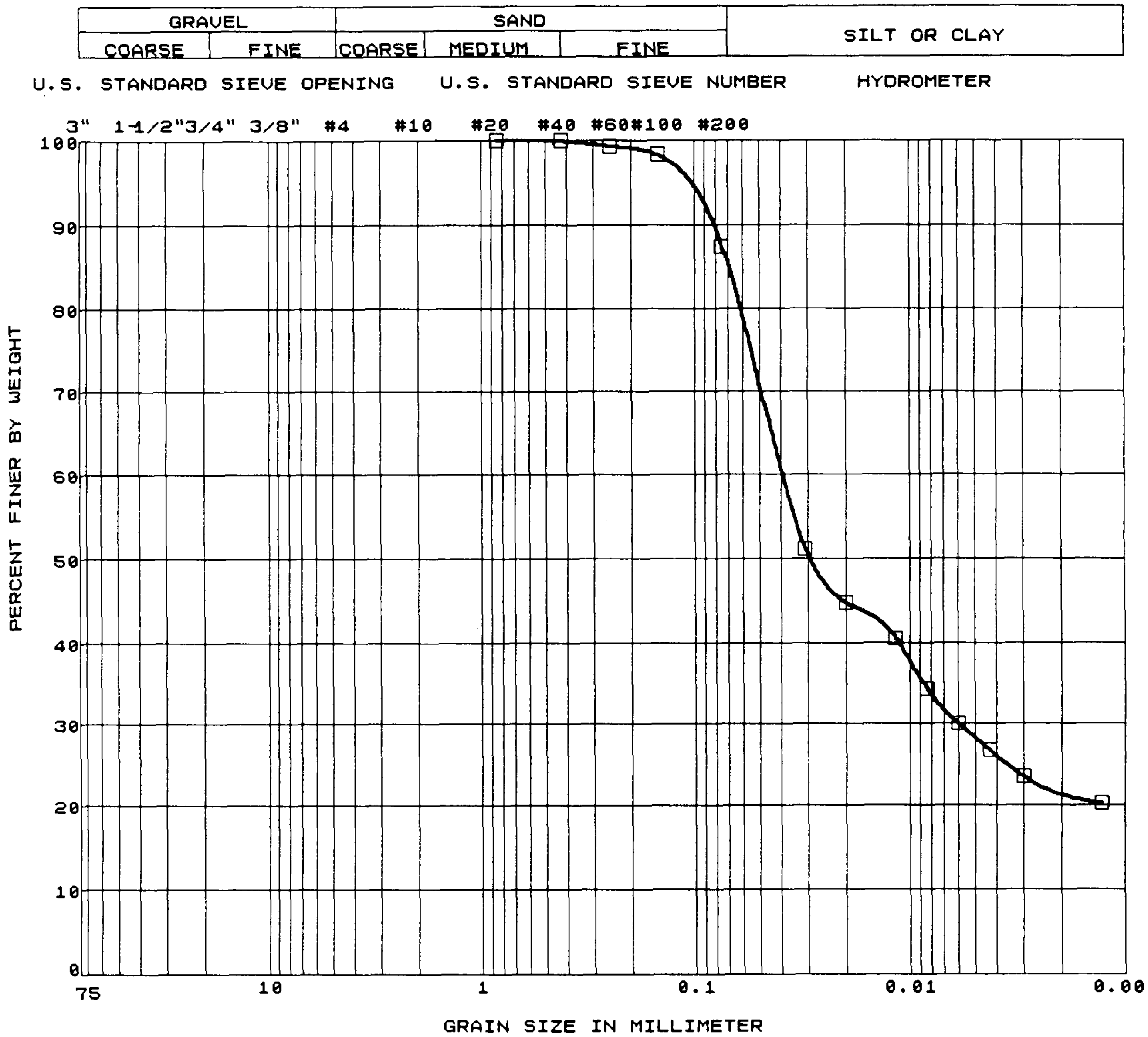
PROJECT NAME: NAS-Alameda

GRAIN SIZE DISTRIBUTION CURVE

9/91

FIGURE 46



SYMBOL	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE TYPE	SOIL TYPE	LIQUID LIMIT	PLASTI-CITY INDEX
□		M-021C	35.6-36	TUBE	ML	24	11

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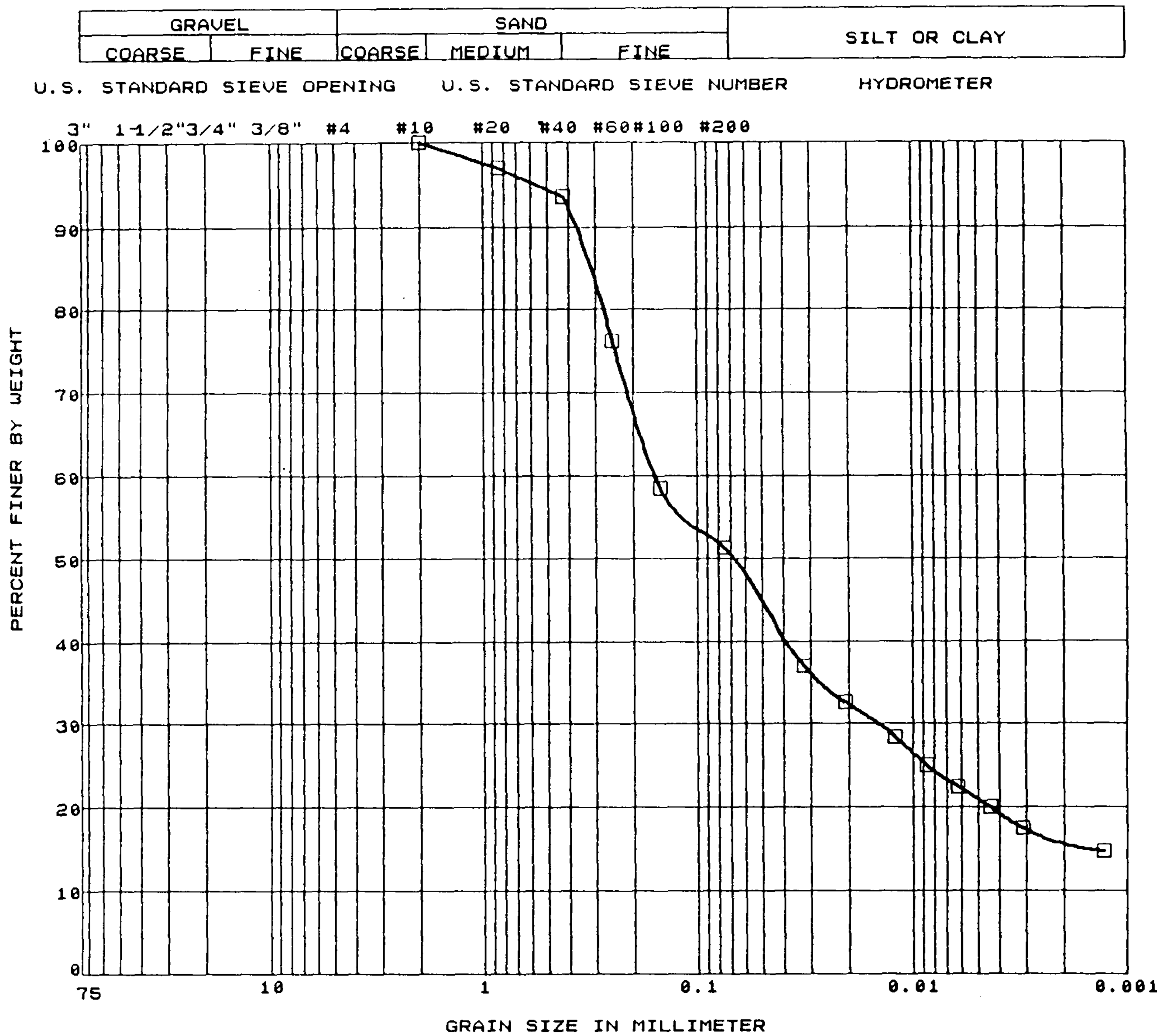
PROJECT NAME:
NAS-Alameda

GRAIN SIZE DISTRIBUTION CURVE

9/91

FIGURE 39



SYMBOL	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE TYPE	SOIL TYPE	LIQUID LIMIT	PLASTI-CITY INDEX
□		M-021E	36.5-37	TUBE			

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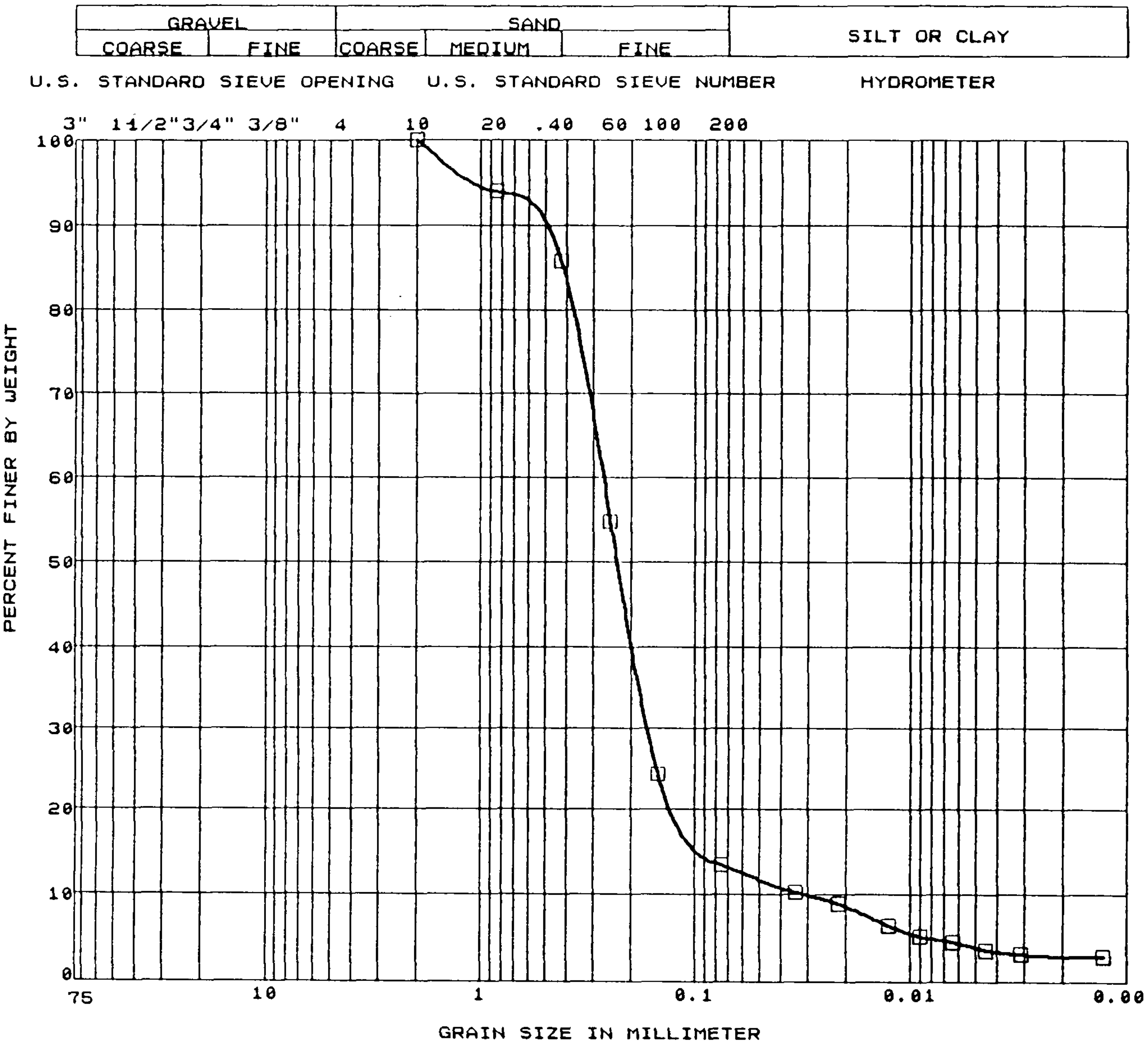
PROJECT NAME: NAS-Alameda

GRAIN SIZE DISTRIBUTION CURVE

9/91

FIGURE 46

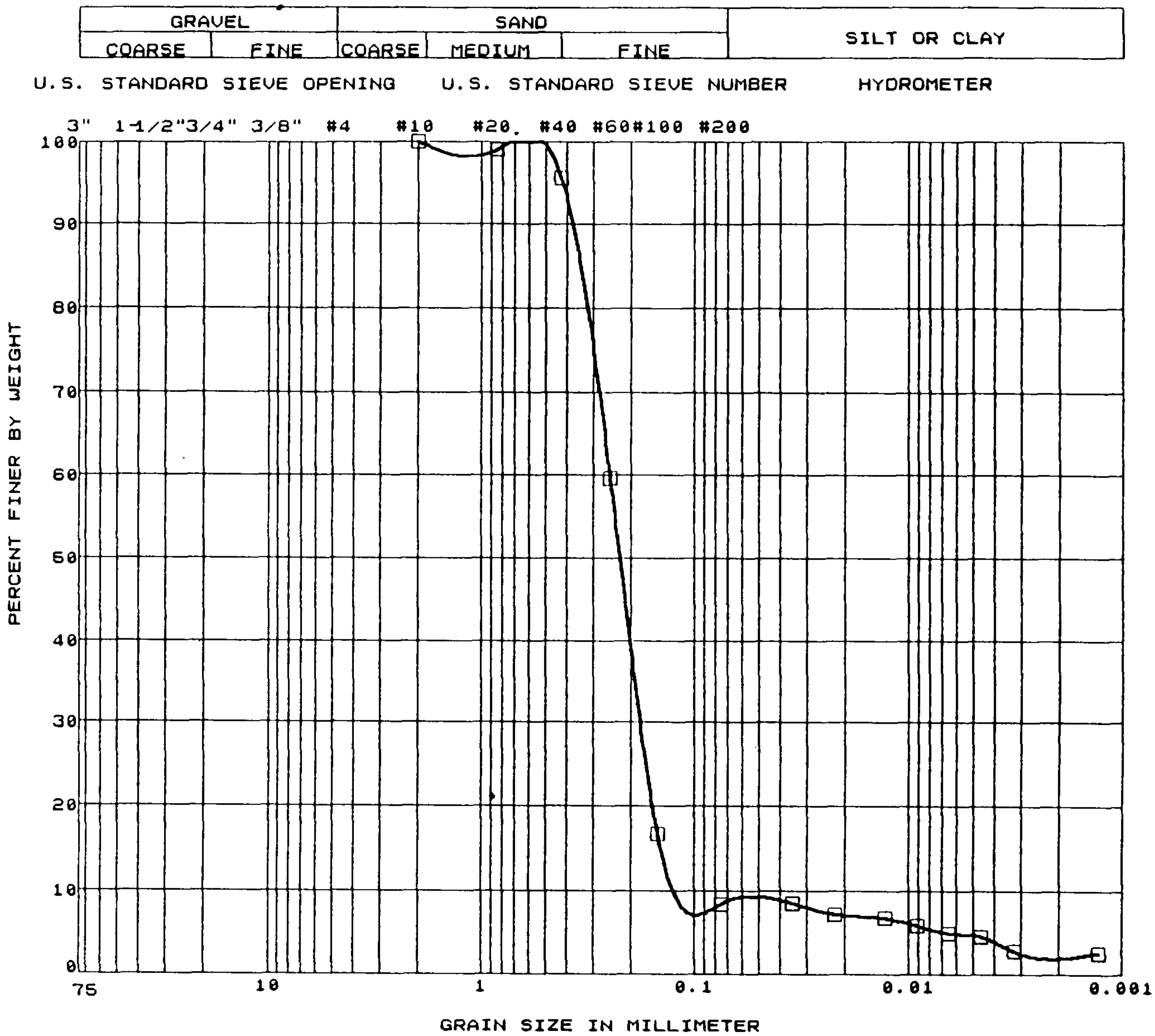


SYMBOL	BORING NO	SAMPLE NO	DEPTH (in)	SAMPLE TYPE	SOIL TYPE	LIQUID LIMIT	PLASTI-CITY INDEX
□		M-022A	10-10.5	TUBE			

The Earth Technology Corporation	PROJECT NAME: NAS-Alameda

Grain Size Distribution Curve

9/91 FIGURE 6



SYMBOL	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE TYPE	SOIL TYPE	LIQUID LIMIT	PLASTICITY INDEX
□		M-023A	11.0-11.5	TUBE			

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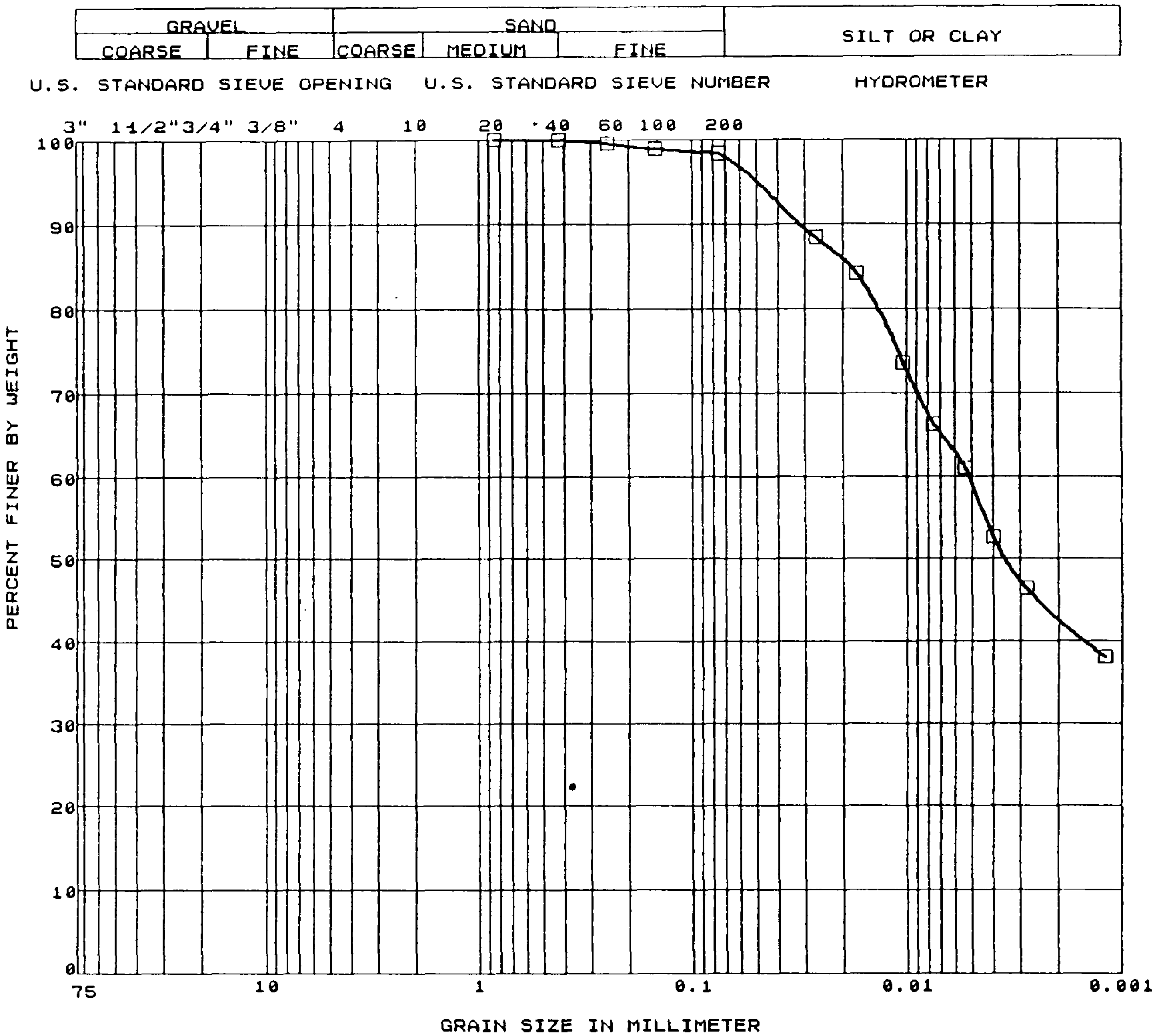
PROJECT NAME: NAS-Alameda

GRAIN SIZE DISTRIBUTION CURVE

9/91

FIGURE 11



SYMBOL	BORING NO	SAMPLE NO	DEPTH (in)	SAMPLE TYPE	SOIL TYPE	LIQUID LIMIT	PLASTI-CITY INDEX
□		M-023B	120-120.5	TUBE	CH	66	40

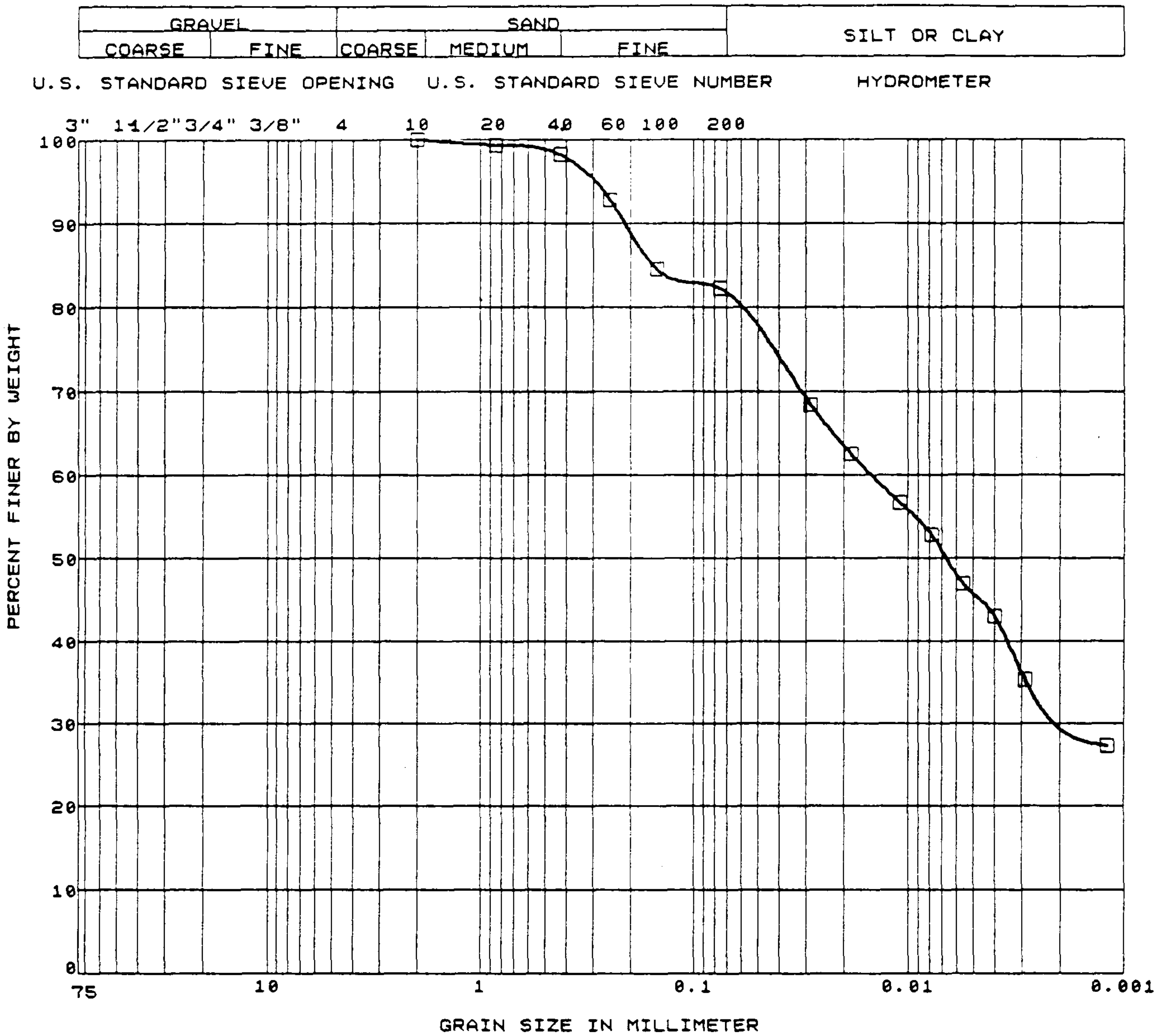
The Earth Technology Corporation

PROJECT NAME:
NAS-Alameda

Grain Size Distribution Curve

9/91

FIGURE 35



SYMBOL	BORING NO	SAMPLE NO	DEPTH (in)	SAMPLE TYPE	SOIL TYPE	LIQUID LIMIT	PLASTI-CITY INDEX
□		M-624E	15.5-16	TUBE	CL	33	17

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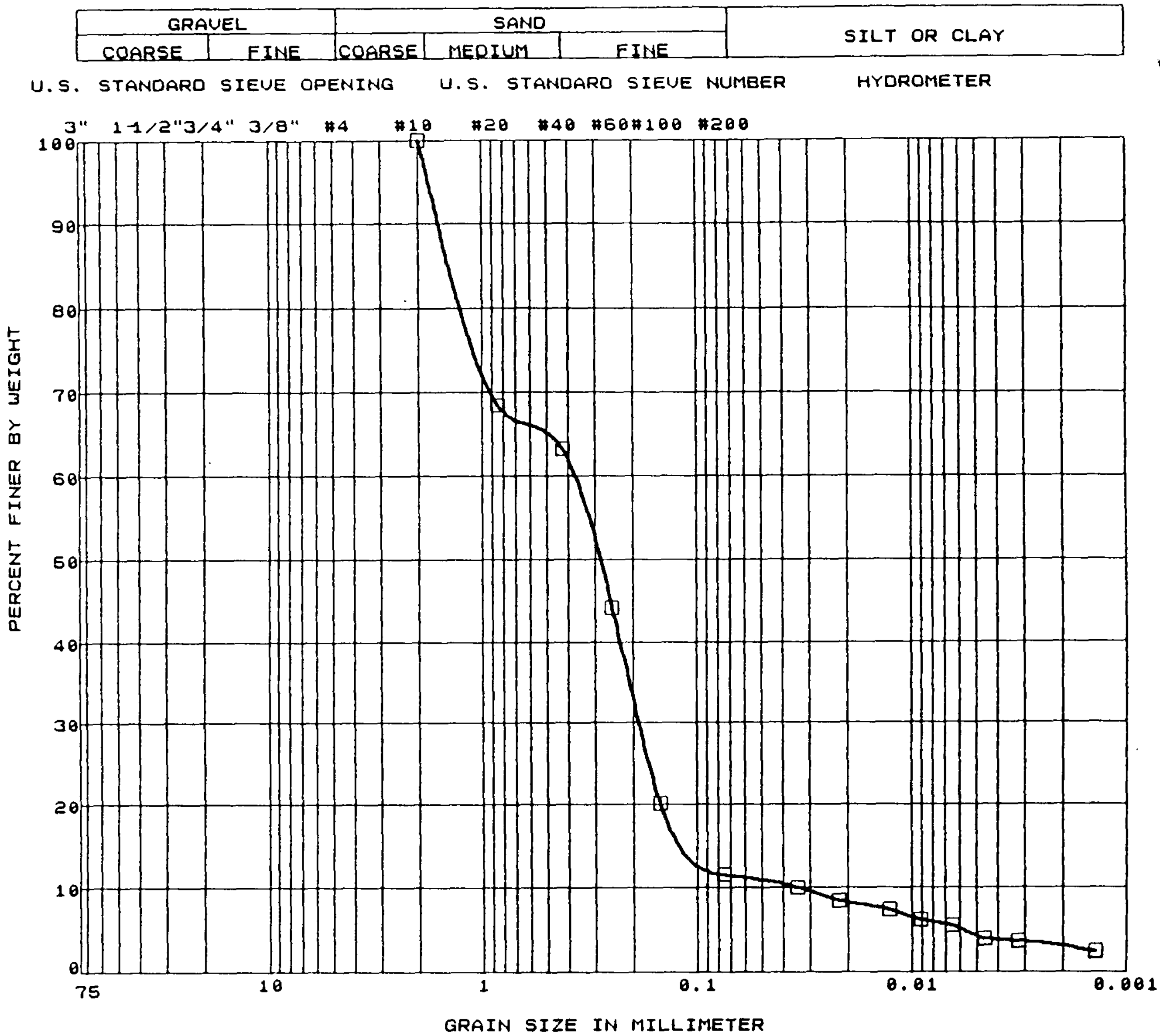
PROJECT NAME: NAS-Alameda

Grain Size Distribution Curve

9/91

FIGURE 34

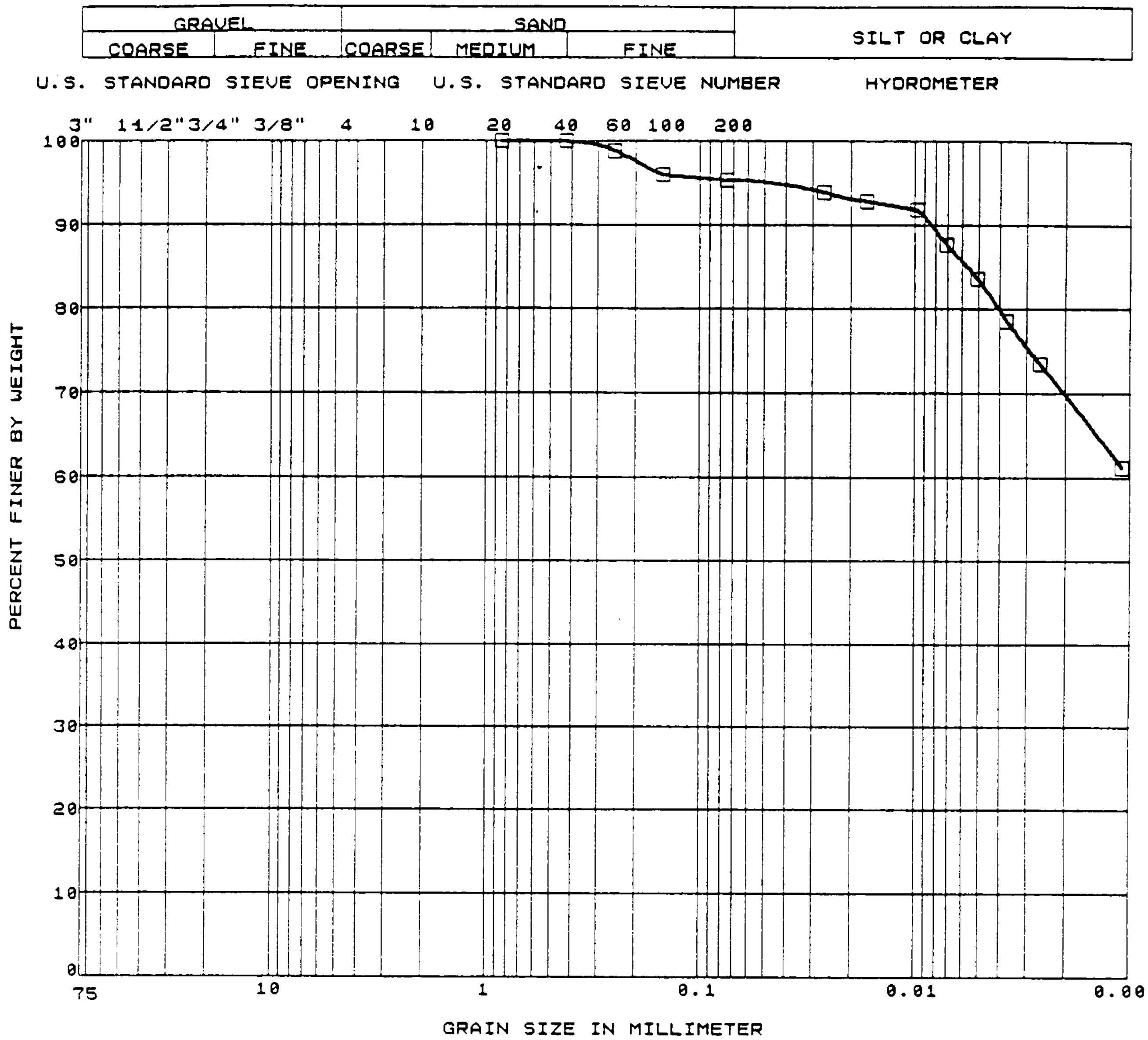


SYMBOL	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE TYPE	SOIL TYPE	LIQUID LIMIT	PLASTI-CITY INDEX
□		M-025A	10-10.5	TUBE			

The Earth Technology Corporation	PROJECT NAME: NAS-Alameda

GRAIN SIZE DISTRIBUTION CURVE

FIGURE 47



SYMBOL	BORING NO	SAMPLE NO	DEPTH (in)	SAMPLE TYPE	SOIL TYPE	LIQUID LIMIT	PLASTICITY INDEX
□		M-025C	83-83.5	TUBE	CH	53	36

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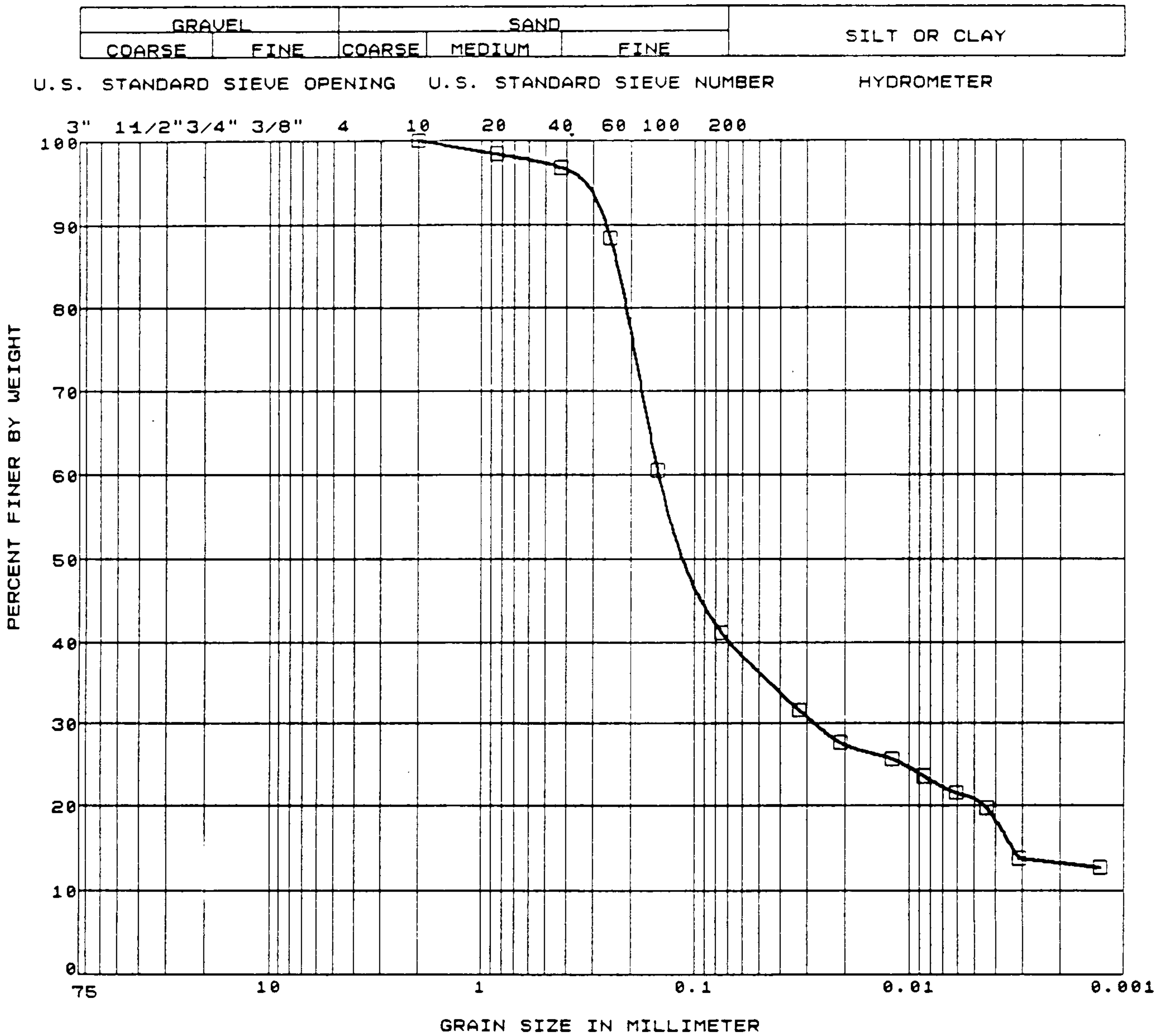
PROJECT NAME: NAS-Alameda

Grain Size Distribution Curve

10/91

FIGURE 30



SYMBOL	BORING NO	SAMPLE NO	DEPTH (in)	SAMPLE TYPE	SOIL TYPE	LIQUID LIMIT	PLASTICITY INDEX
□		M-025E	28.5-29	TUBE	CL	49	29

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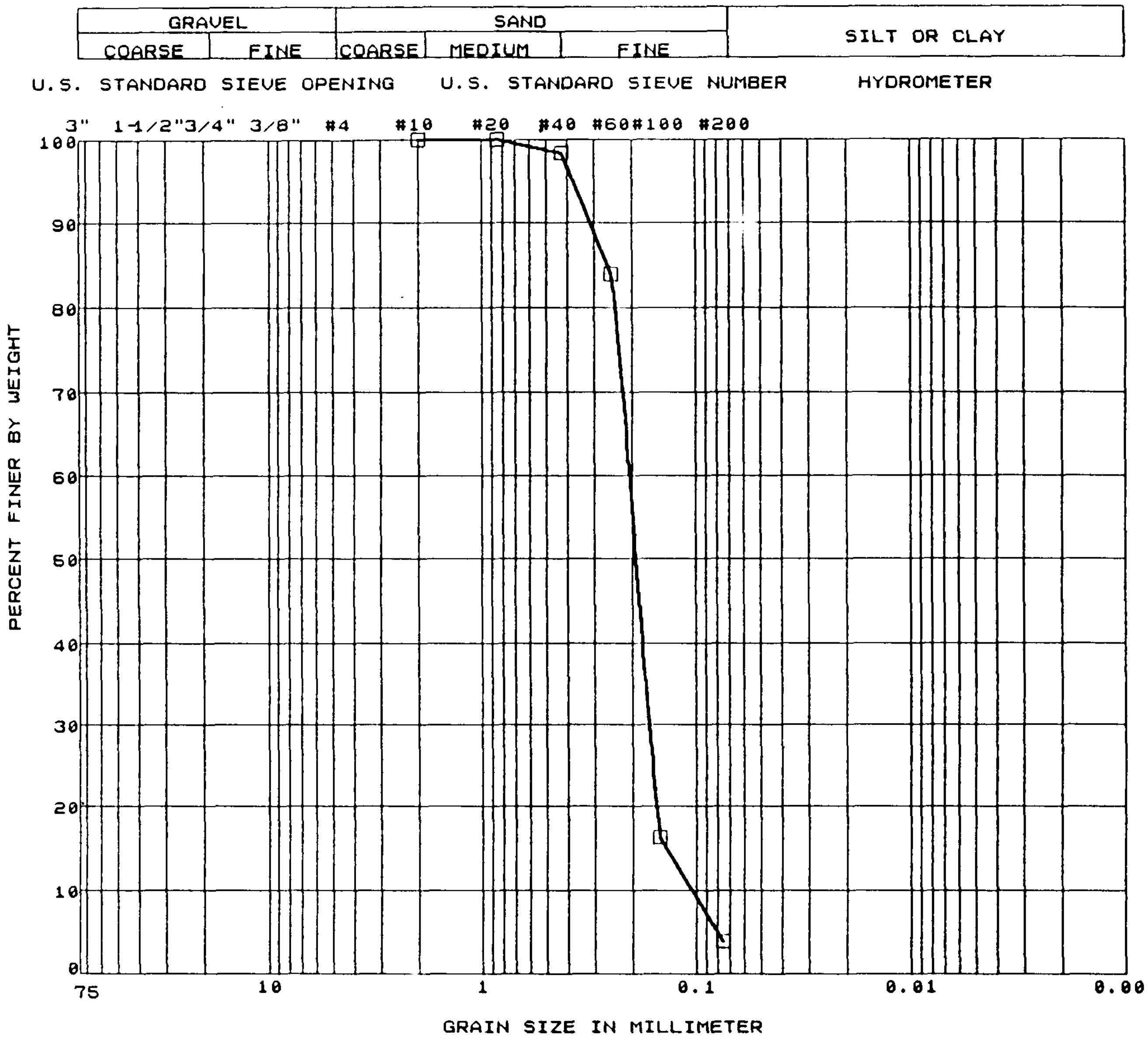
PROJECT NAME: NAS-Alameda

Grain Size Distribution Curve

9/91

FIGURE 31



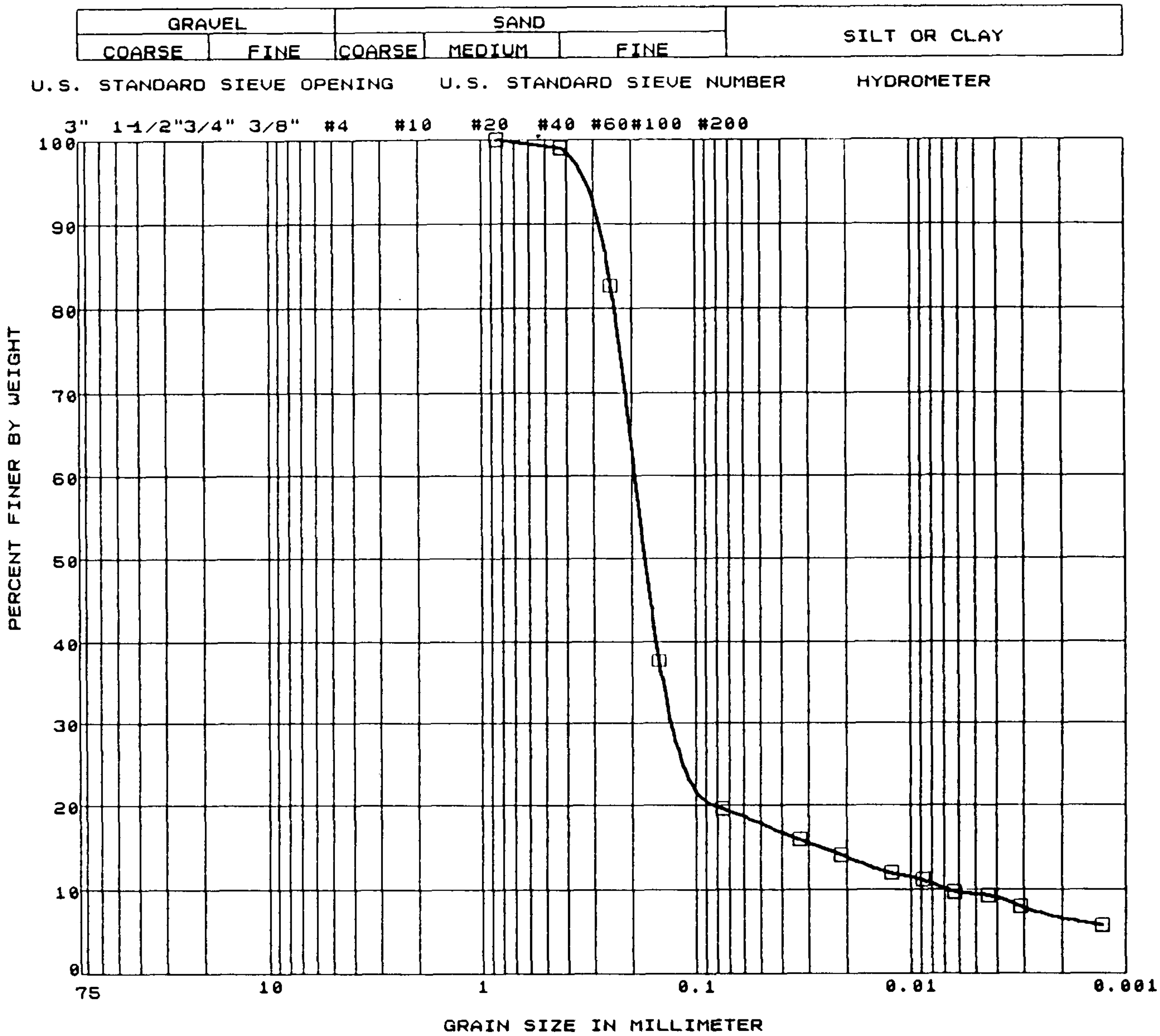
SYMBOL	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE TYPE	SOIL TYPE	LIQUID LIMIT	PLASTI-CITY INDEX
□		M-026A	11.5-12	TUBE			

The Earth Technology Corporation	PROJECT NAME: NAS-Alameda

GRAIN SIZE DISTRIBUTION CURVE

9/91

FIGURE 6



SYMBOL	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE TYPE	SOIL TYPE	LIQUID LIMIT	PLASTI-CITY INDEX
□		M-0278	57.5-58	TUBE			

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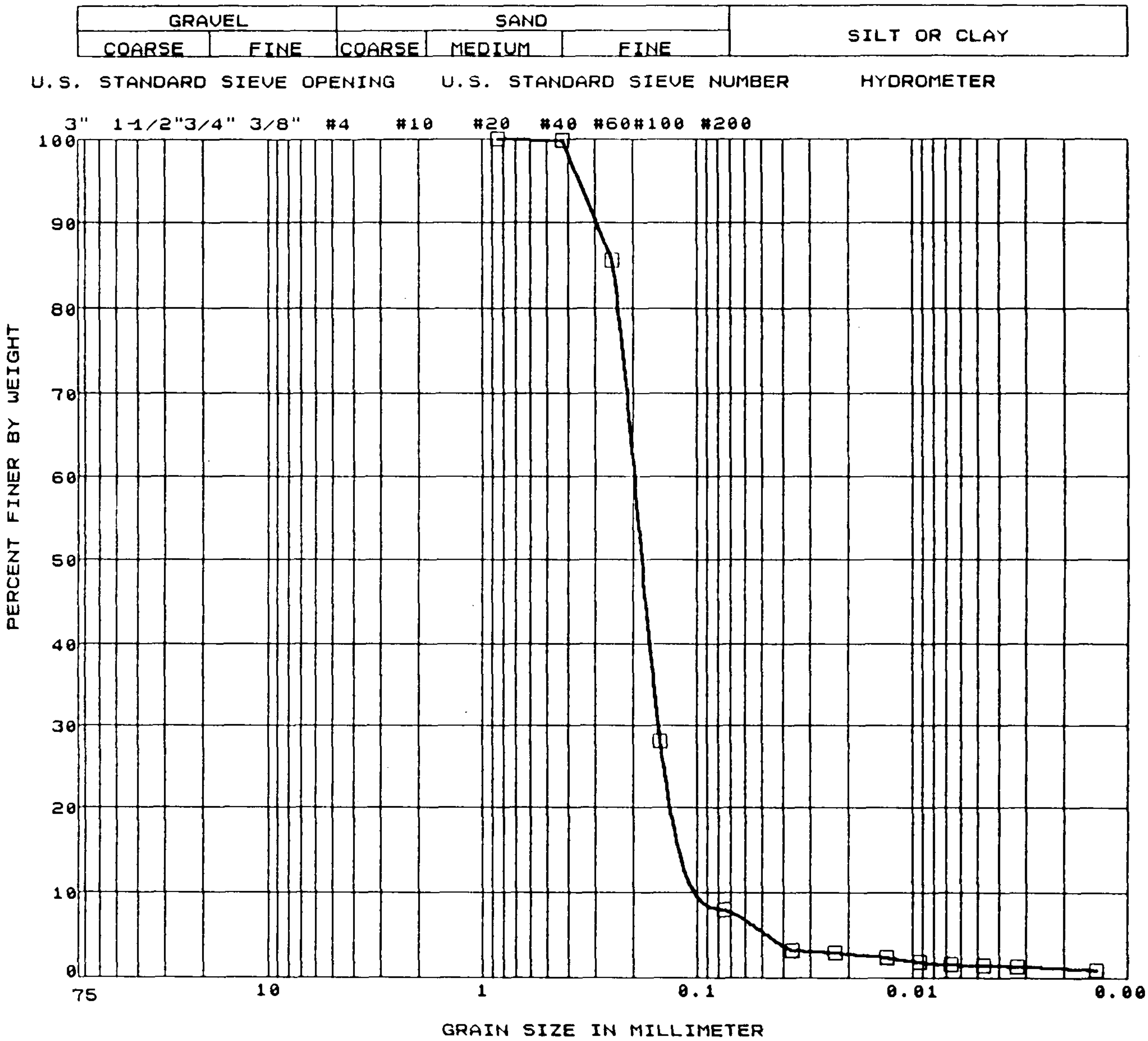
GRAIN SIZE DISTRIBUTION CURVE

9/91

FIGURE 3



SYMBOL	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE TYPE	SOIL TYPE	LIQUID LIMIT	PLASTI-CITY INDEX
□		M-027E	20.5-21	TUBE			

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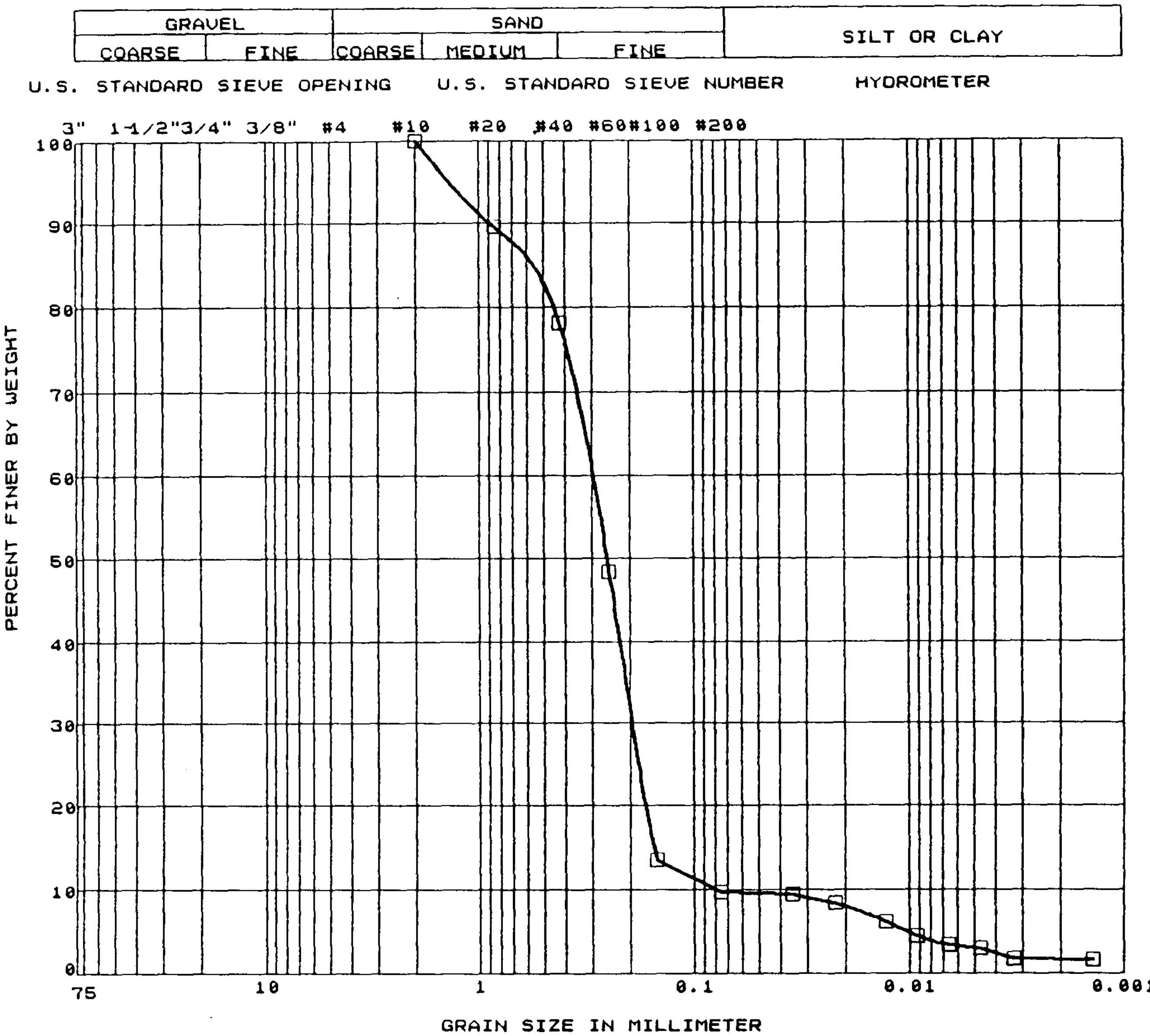
GRAIN SIZE DISTRIBUTION CURVE

9/91

FIGURE 48



SYMBOL	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE TYPE	SOIL TYPE	LIQUID LIMIT	PLASTI-CITY INDEX
□		M-028A	10.5-11	TUBE			

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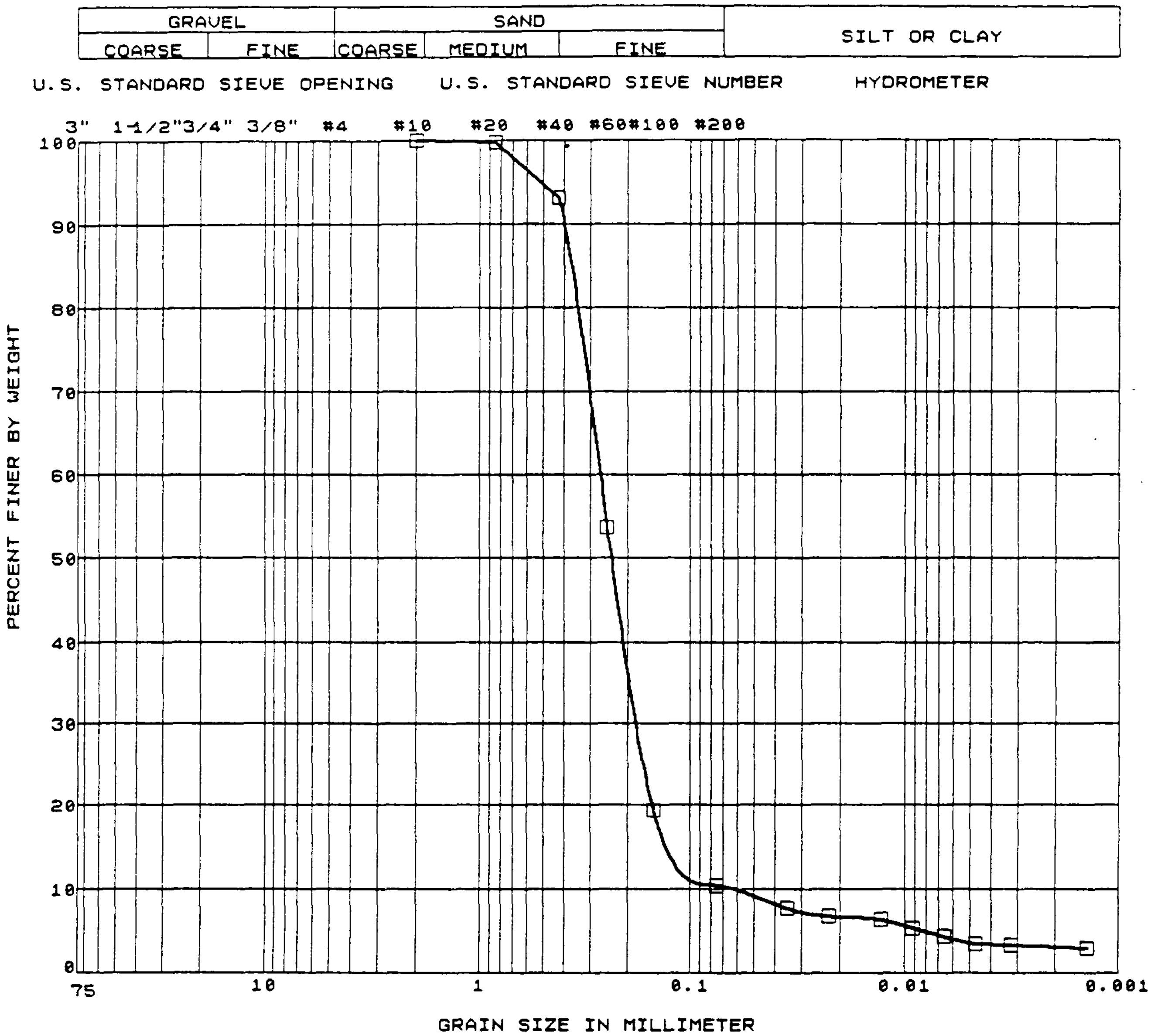
GRAIN SIZE DISTRIBUTION CURVE

9/91

FIGURE 4



SYMBOL	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE TYPE	SOIL TYPE	LIQUID LIMIT	PLASTICITY INDEX
□		M-029E	16-16.5	TUBE			

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GRAIN SIZE DISTRIBUTION CURVE

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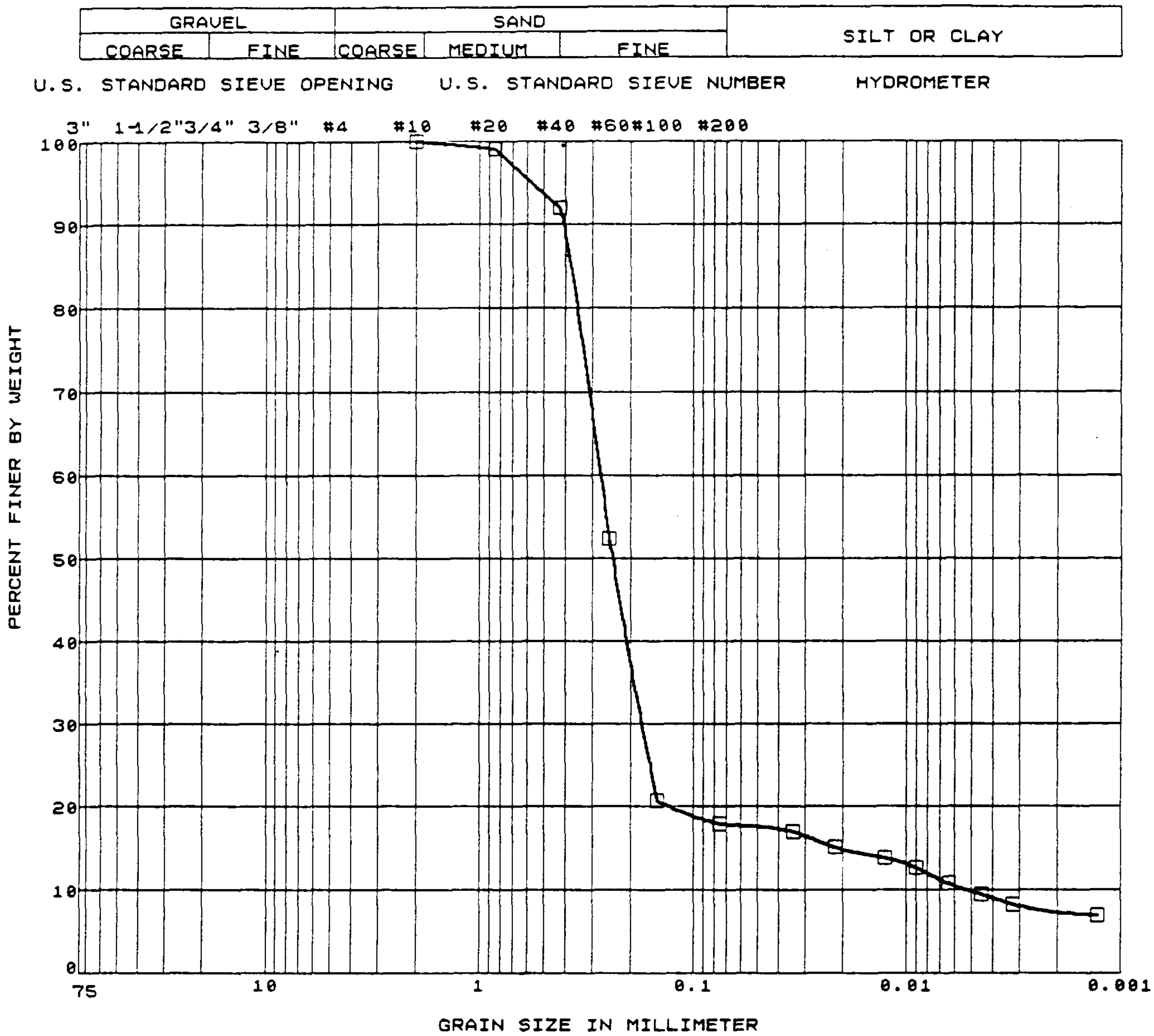
FIGURE 19



SYMBOL	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE TYPE	SOIL TYPE	LIQUID LIMIT	PLASTI-CITY INDEX
□		M-101A	10-10.5	TUBE			

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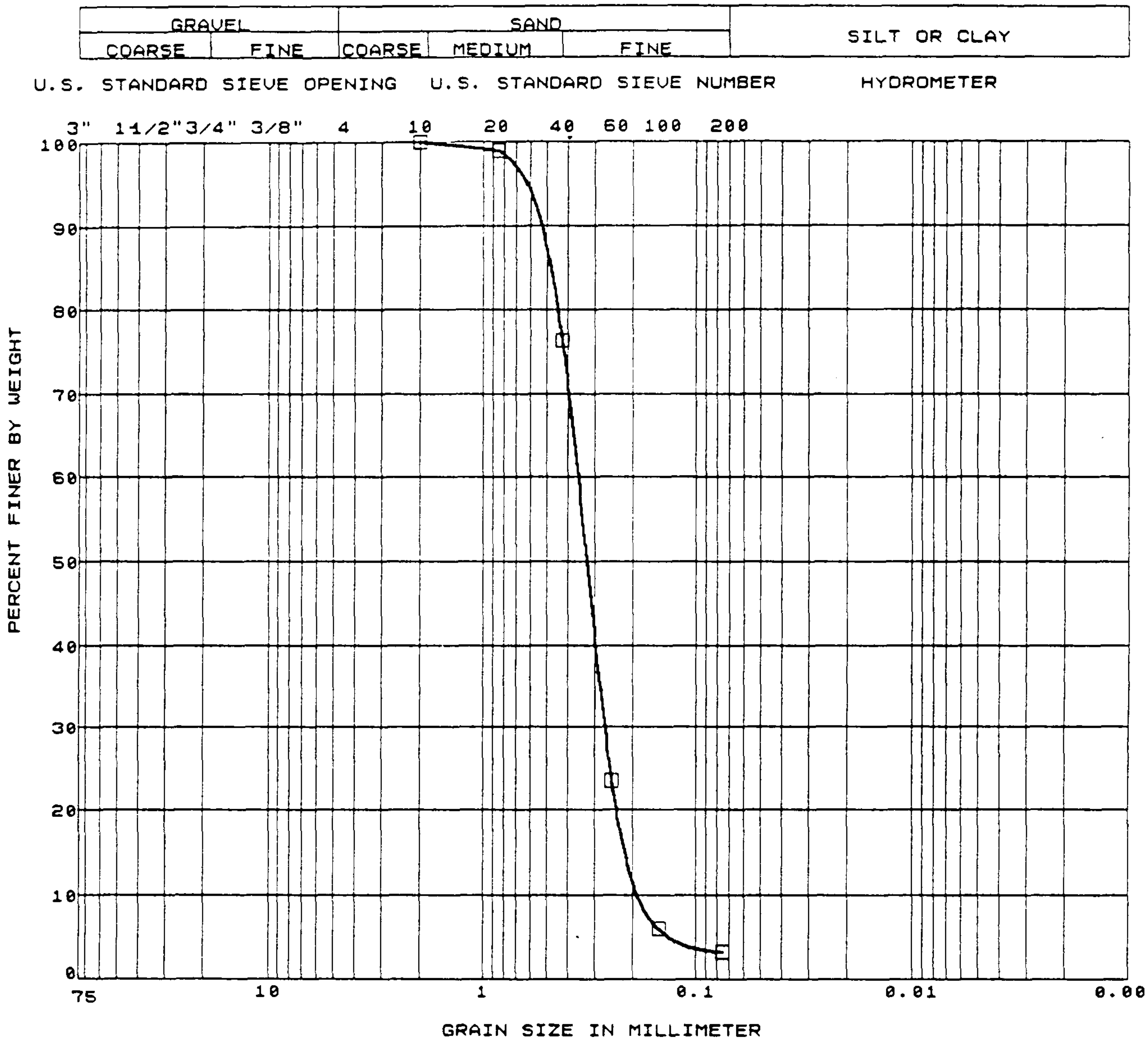
GRAIN SIZE DISTRIBUTION CURVE

9/91

FIGURE 20



SYMBOL	BORING NO	SAMPLE NO	DEPTH (in)	SAMPLE TYPE	SOIL TYPE	LIQUID LIMIT	PLASTI-CITY INDEX
□		M-102A	9-9.5	TUBE			

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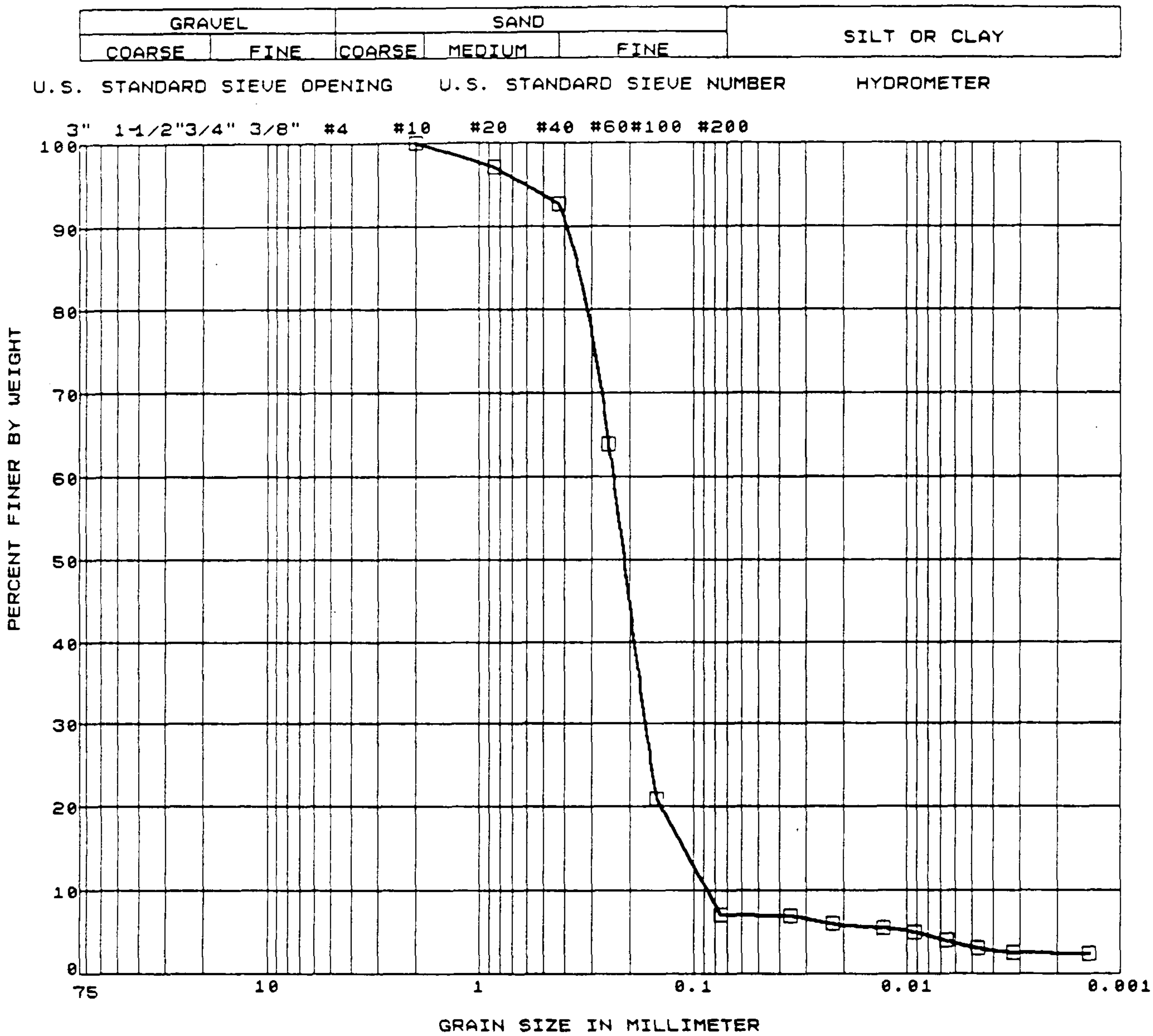
PROJECT NAME: NAS-Alameda

Grain Size Distribution Curve

9/91

FIGURE 27



SYMBOL	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE TYPE	SOIL TYPE	LIQUID LIMIT	PLASTICITY INDEX
□		M-104A	11-11.5	TUBE			

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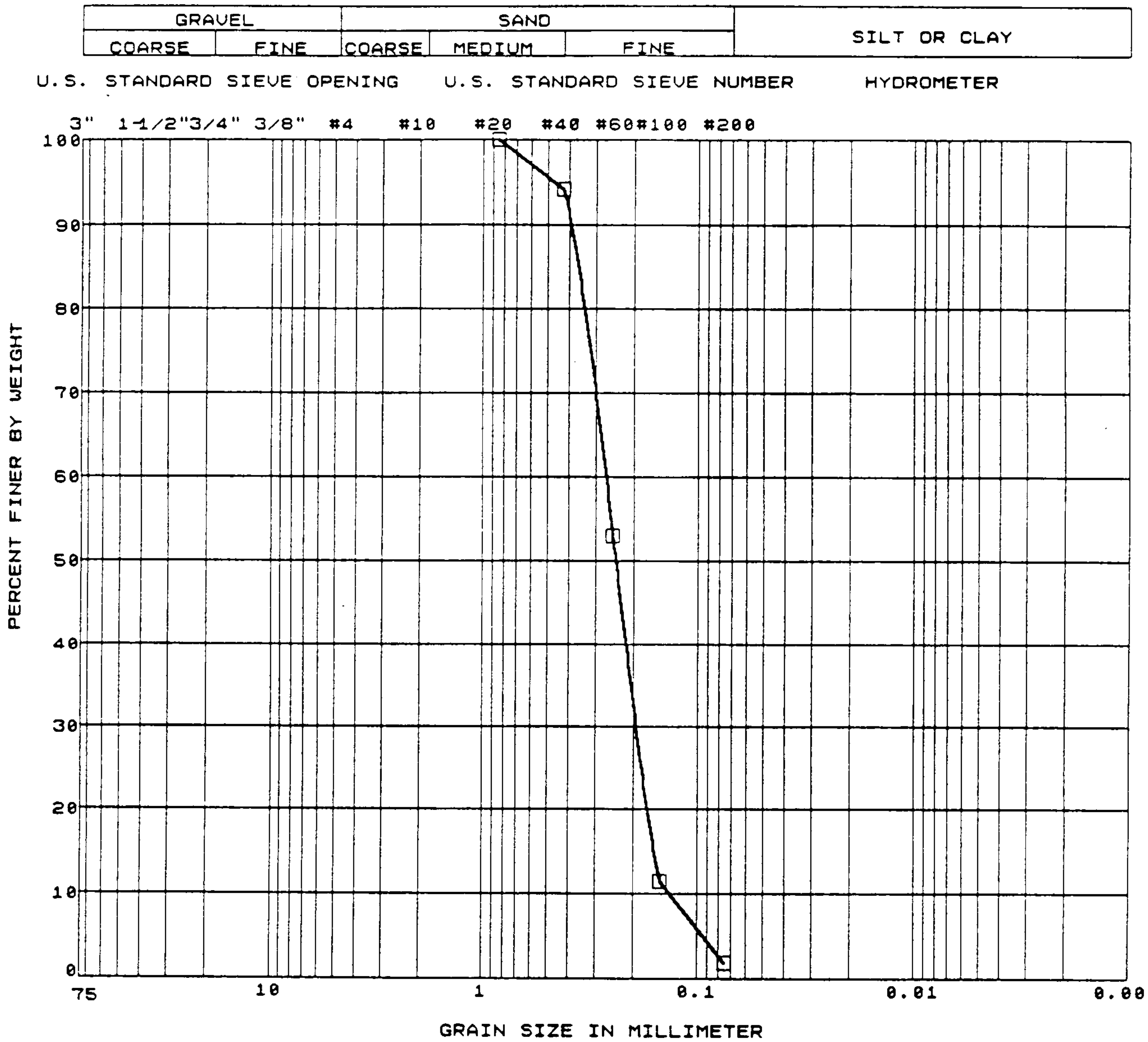
PROJECT NAME: NAS-Alameda

GRAIN SIZE DISTRIBUTION CURVE

9/91

FIGURE 21

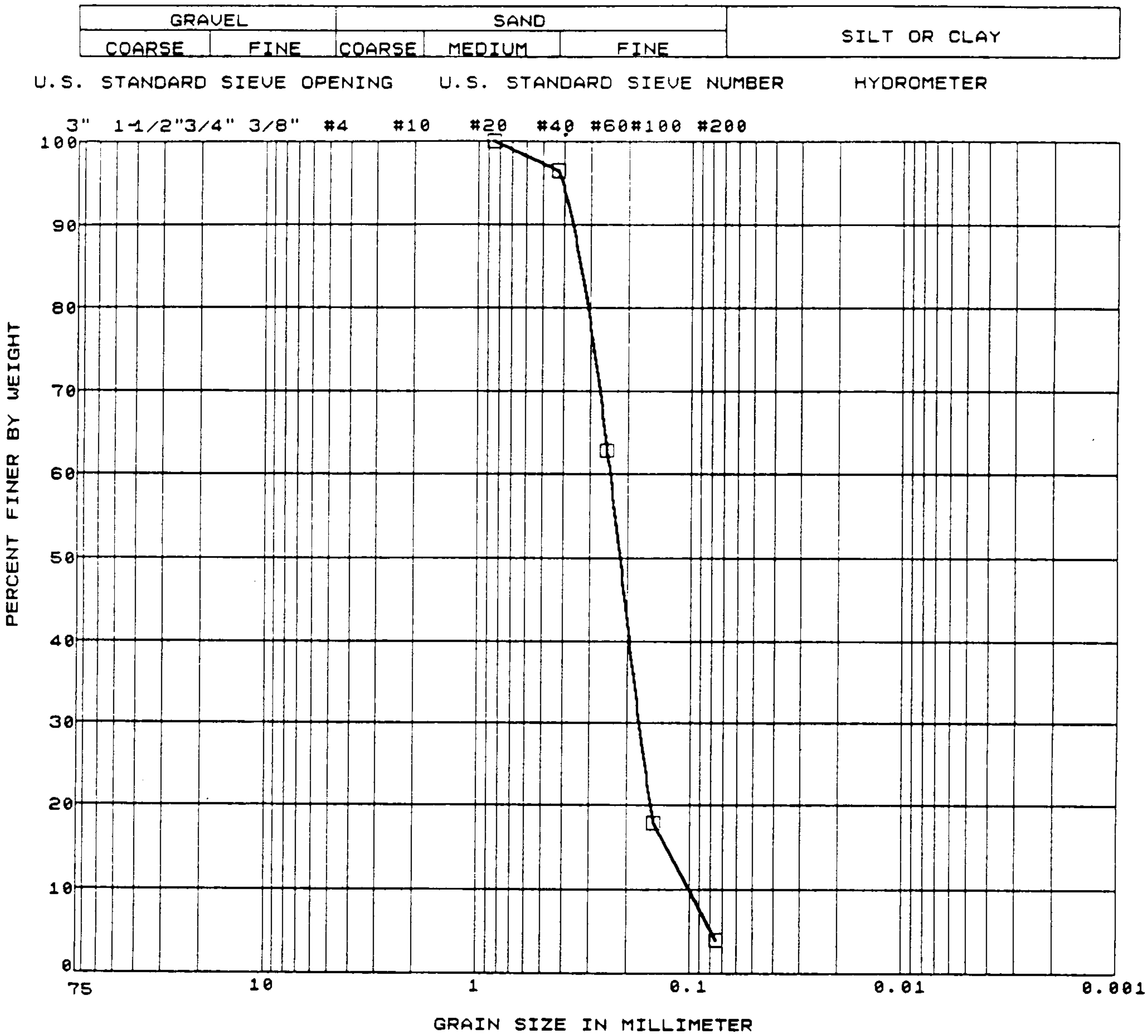


SYMBOL	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE TYPE	SOIL TYPE	LIQUID LIMIT	PLASTI-CITY INDEX
□		M-106A	10.5-11	TUBE			

The Earth Technology Corporation	PROJECT NAME: NAS-Alameda

GRAIN SIZE DISTRIBUTION CURVE

9/91 FIGURE 22



SYMBOL	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE TYPE	SOIL TYPE	LIQUID LIMIT	PLASTICITY INDEX
□		M-107A	11-11.5	TUBE			

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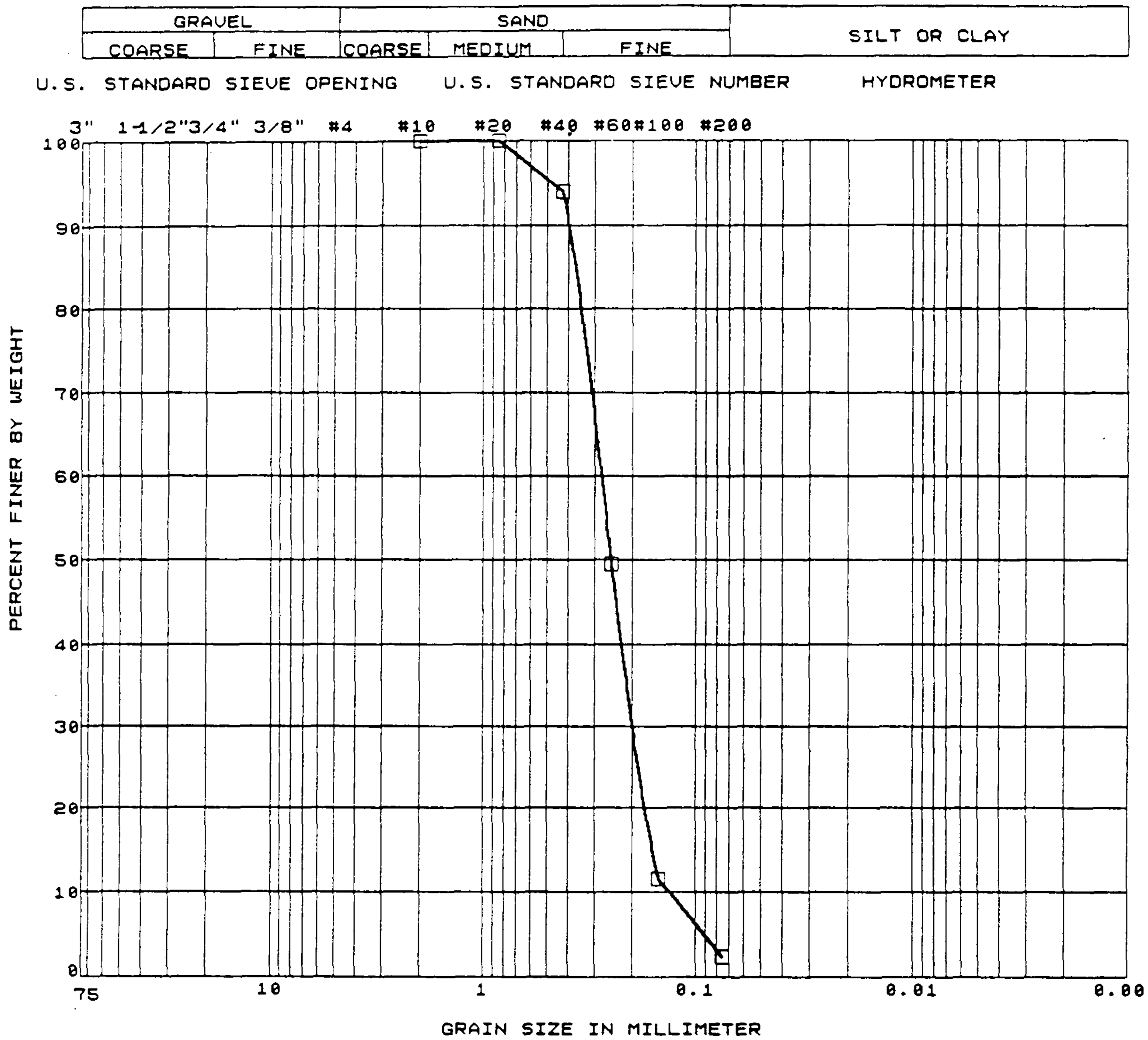
PROJECT NAME:
NAS-Alameda

GRAIN SIZE DISTRIBUTION CURVE

9/91

FIGURE 23



SYMBOL	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE TYPE	SOIL TYPE	LIQUID LIMIT	PLASTI-CITY INDEX
□		M-109A	10.5-11	TUBE			

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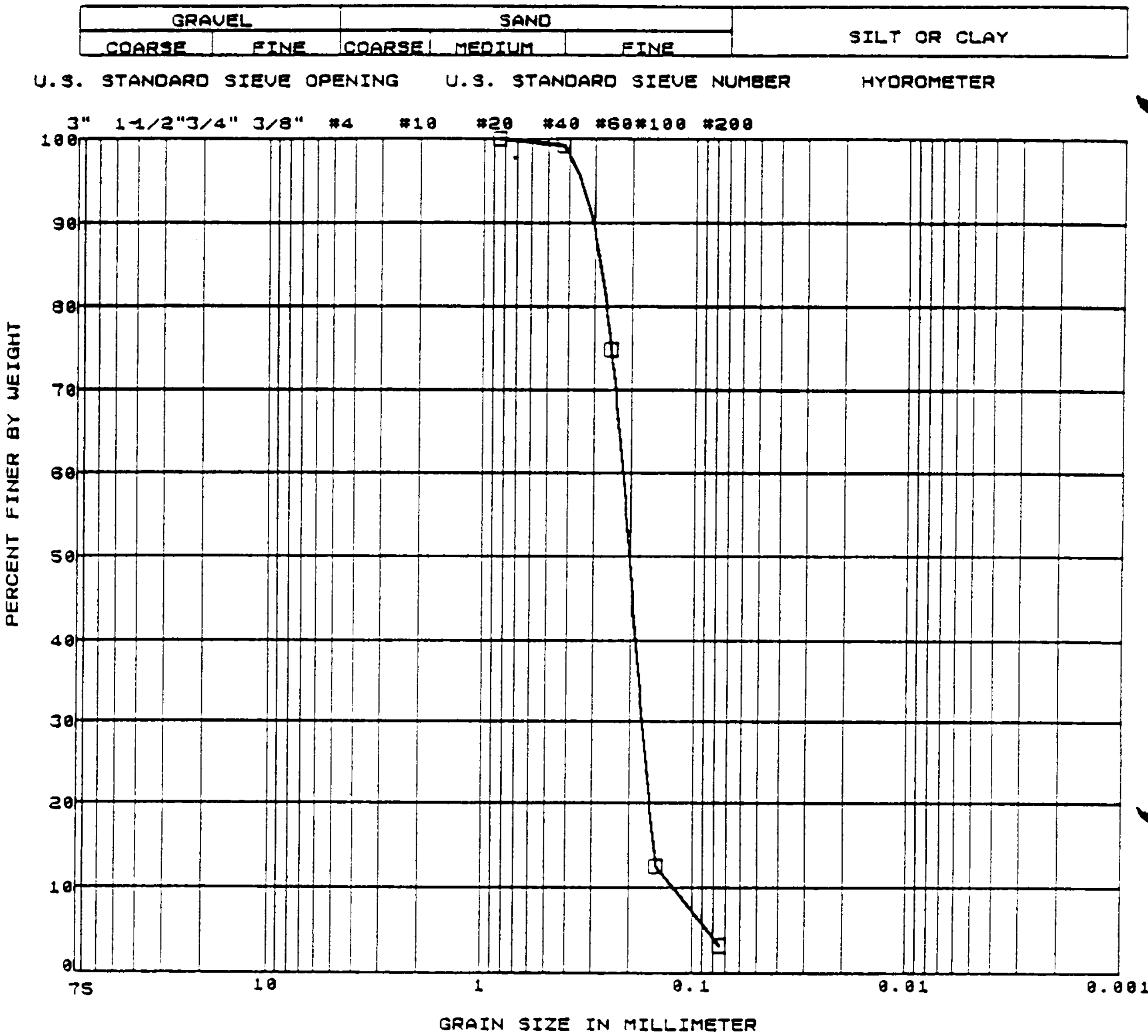
PROJECT NAME: NAS-Alameda

GRAIN SIZE DISTRIBUTION CURVE

9/91

FIGURE 26



SYMBOL	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE TYPE	SOIL TYPE	LIQUID LIMIT	PLASTI-CITY INDEX
□		M-110A	10.5-11	TUBE			

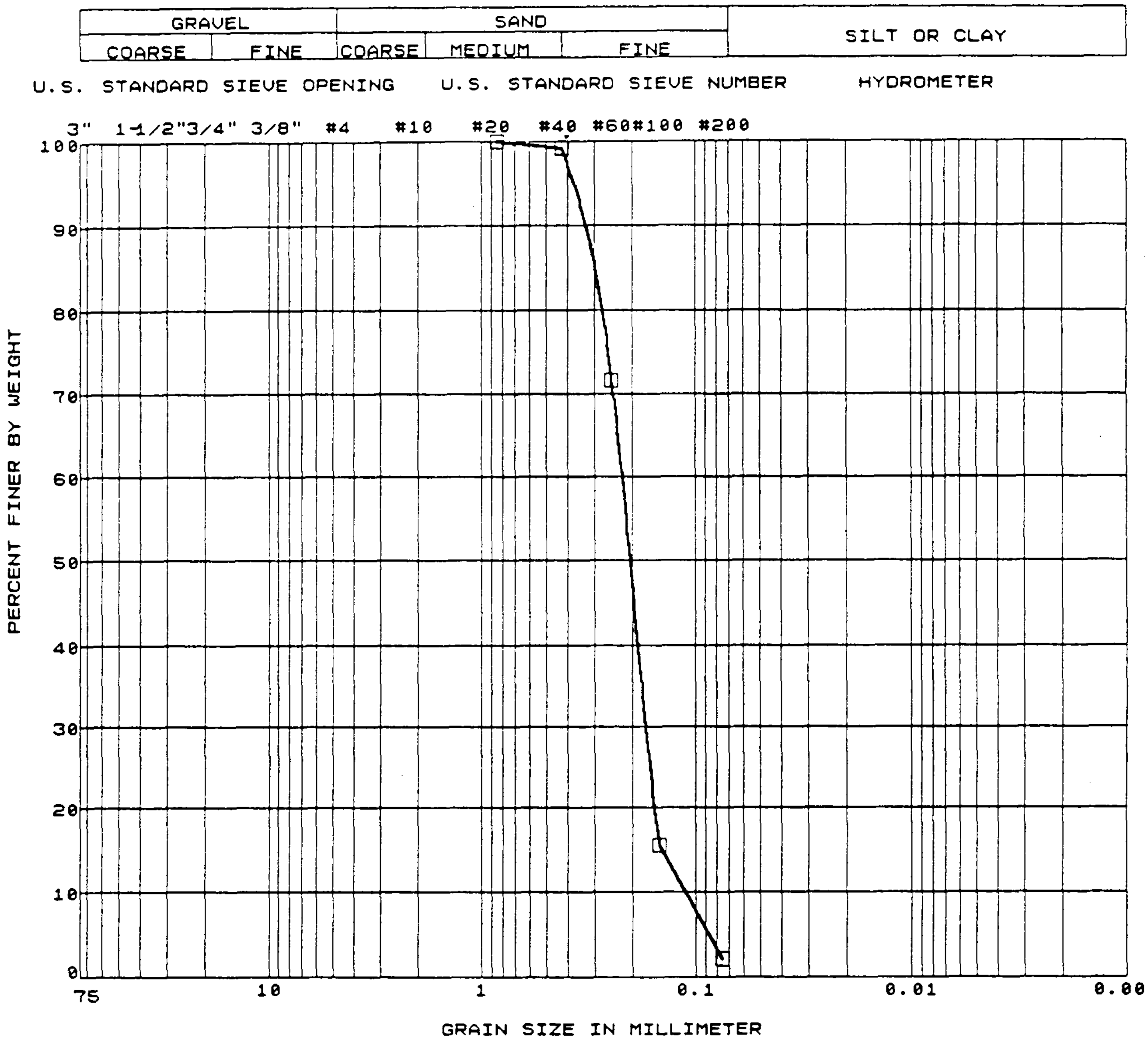
The Earth Technology Corporation

PROJECT NAME: NAS-Alameda

GRAIN SIZE DISTRIBUTION CURVE

9/91

FIGURE 24



SYMBOL	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE TYPE	SOIL TYPE	LIQUID LIMIT	PLASTI-CITY INDEX
□		M-111A	10.5-11	TUBE			

The Earth Technology Corporation

PROJECT NAME: NAS-Alameda

GRAIN SIZE DISTRIBUTION CURVE

9/91

FIGURE 25

TABLE 3

SUMMARY

. OF

CONSOLIDATION TEST RESULTS

(ASTM D2435)

PROJECT NAME: NAS-Alameda

TETC #: 91-220-7003

CLIENT PROJECT NO.: 2738.0215

CLIENT: J.M. MONTGOMERY

DATE: Sept. 25, 1991

SUMMARIZED BY: S. Sayawatana

Sample No.: M-022A

Dry Density (pcf): 104.93

Initial Moisture (%): 25.20

Initial Length (in.): 0.8000

Initial Dial Rdg (in): 0.3115

Depth (ft.): 10-10.5

Specific Gravity: 2.70 (Assumed)

Final Moisture (%): 23.95

Initial Void Ratio: 0.606

Wt. of Dry Soil (g.) 64.79

Dia.of sample (in.) 1.935

PRESSURE (p) (ksf)	FINAL READING (in)	THICKNESS (in)	VOID RATIO	STRAIN % OF SAMPLE THICKNESS	LOAD COMPLIANCE (%)	CORRECTED STRAIN (%)
0.25	0.3103	0.7988	0.605	0.150	0.06	0.09
H2O	0.3103	0.7988	0.605	0.150	0.06	0.09
0.50	0.3088	0.7973	0.602	0.337	0.12	0.22
1.00	0.3061	0.7946	0.596	0.675	0.22	0.45
2.00	0.3012	0.7897	0.587	1.287	0.38	0.91
4.00	0.2951	0.7836	0.574	2.050	0.57	1.48
8.00	0.2869	0.7754	0.558	3.075	0.88	2.19
16.00	0.2771	0.7656	0.538	4.300	1.24	3.06
4.00	0.2809	0.7694	0.546	3.825	0.96	2.86
1.00	0.2845	0.7730	0.553	3.375	0.85	2.53

TABLE 4

SUMMARY

. OF

CONSOLIDATION TEST RESULTS

(ASTM D2435)

PROJECT NAME:	NAS-Alameda	TETC #:	91-220-7003
CLIENT PROJECT NO.:	2738.0215	CLIENT:	J.M. MONTGOMERY
REPORTED DATE:	Sept. 25, 1991	SUMMARIZED BY:	S. Sayawatana

Sample No.:	M-024E	Depth (ft.) :	15.5-16
Dry Density (pcf):	48.42	Specific Gravity:	2.70 (Assumed)
Initial Moisture (%):	98.60	Final Moisture (%) :	57.89
Initial Length (in.):	0.8000	Initial Void Ratio :	2.481
Initial Dial Reading:	0.3416		

PRESSURE (p) (ksf)	FINAL READING (in)	THICKNESS (in)	VOID RATIO	STRAIN % OF SAMPLE THICKNESS	LOAD COMPLIANCE (%)	CORRECTED STRAIN (%)
0.25	0.3289	0.7873	1.741	1.587	0.08	1.51
H2O	0.3289	0.7873	1.741	1.587	0.08	1.51
0.50	0.3270	0.7854	1.734	1.825	0.20	1.62
1.00	0.3112	0.7696	1.679	3.800	0.35	3.45
2.00	0.2452	0.7036	1.449	12.050	0.54	11.51
4.00	0.1669	0.6253	1.177	21.837	0.72	21.12
8.00	0.1027	0.5611	0.953	29.862	1.00	28.86
16.00	0.0372	0.4956	0.725	38.050	1.54	36.51
4.00	0.0501	0.5085	0.770	36.437	1.27	35.17
1.00	0.0732	0.5316	0.851	33.550	1.07	32.48

TABLE 5

SUMMARY

· OF

CONSOLIDATION TEST RESULTS

(ASTM D2435)

PROJECT NAME: NAS-Alameda

TETC #: 91-220-7003

CLIENT PROJECT NO.: 2738.0215

CLIENT: J.M. MONTGOMERY

DATE: Sept. 25, 1991

SUMMARIZED BY: S. Sayawatana

Sample No.: M-002E

Dry Density (pcf): 63.80

Initial Moisture (%): 63.00

Initial Length (in.): 0.8000

Initial Dial Rdg (in): 0.2913

Depth (ft.) : 20.5-21

Specific Gravity: 2.70 (Assumed)

Final Moisture (%) : 31.60

Initial Void Ratio : 1.642

Wt. of Dry Soil (g.) 39.39

Dia.of sample (in.) 1.935

PRESSURE (p) (ksf)	FINAL READING (in)	THICKNESS (in)	VOID RATIO	STRAIN % OF SAMPLE THICKNESS	LOAD COMPLIANCE (%)	CORRECTED STRAIN (%)
0.25	0.2593	0.7680	1.538	4.000	0.02	3.98
H2O	0.2593	0.7680	1.538	4.000	0.02	3.98
0.50	0.2504	0.7591	1.508	5.112	0.06	5.05
1.00	0.2253	0.7340	1.426	8.250	0.10	8.15
2.00	0.1790	0.6877	1.273	14.037	0.19	13.85
4.00	0.1193	0.6280	1.075	21.500	0.35	21.15
8.00	0.0789	0.5876	0.942	26.550	0.55	26.00
16.00	0.0452	0.5539	0.830	30.762	0.78	29.98
4.00	0.0497	0.5584	0.845	30.200	0.53	29.67
1.00	0.0576	0.5663	0.871	29.213	0.40	28.81

TABLE 6

SUMMARY

OF

CONSOLIDATION TEST RESULTS

(ASTM D2435)

PROJECT NAME:	NAS-Alameda	TETC #:	91-220-7003
CLIENT PROJECT NO.:	2738.0215	CLIENT:	J.M. MONTGOMERY
DATE:	Sept. 25, 1991	SUMMARIZED BY:	S. Sayawatana

Sample No.:	M-025E	Depth (ft.) :	28.5-29
Dry Density (pcf):	82.45	Specific Gravity:	2.70 (Assumed)
Initial Moisture (%):	39.58	Final Moisture (%) :	29.29
Initial Length (in.):	0.8000	Initial Void Ratio :	1.044
Initial Dial Rdg (in):	0.3222	Wt. of Dry Soil (g.)	50.91
		Dia.of sample (in.)	1.935

PRESSURE (p) (ksf)	FINAL READING (in)	THICKNESS (in)	VOID RATIO	STRAIN % OF SAMPLE THICKNESS	LOAD COMPLIANCE (%)	CORRECTED STRAIN (%)
0.25	0.3095	0.7873	1.013	1.587	0.07	1.52
H2O	0.3095	0.7873	1.013	1.587	0.07	1.52
0.50	0.3093	0.7871	1.012	1.612	0.17	1.44
1.00	0.3037	0.7815	0.998	2.312	0.31	2.00
2.00	0.2813	0.7591	0.941	5.112	0.51	4.60
4.00	0.2561	0.7339	0.876	8.262	0.77	7.49
8.00	0.2300	0.7078	0.810	11.525	1.07	10.45
16.00	0.2010	0.6788	0.736	15.150	1.49	13.66
4.00	0.2051	0.6829	0.746	14.637	1.23	13.41
1.00	0.2113	0.6891	0.762	13.862	1.03	12.83

TABLE 7

SUMMARY

OF

CONSOLIDATION TEST RESULTS

(ASTM D2435)

PROJECT NAME: NAS-Alameda

TETC #: 91-220-7003

CLIENT PROJECT NO.: 2738.0215

CLIENT: J.M. MONTGOMERY

DATE: Oct. 10, 1991

SUMMARIZED BY: S. Sayawatana

Sample No.:	M-001E	Depth (ft.) :	28.50
Dry Density (pcf):	69.70	Specific Gravity:	2.70 (Assumed)
Initial Moisture (%):	53.50	Final Moisture (%) :	30.00
Initial Length (in.):	0.8000	Initial Void Ratio :	1.418
Initial Dial Rdg (in):	0.2803	Wt. of Dry Soil (g.)	43.04
		Dia.of sample (in.)	1.94

PRESSURE (p) (ksf)	FINAL READING (in)	THICKNESS (in)	VOID RATIO	STRAIN % OF SAMPLE THICKNESS	LOAD COMPLIANCE (%)	CORRECTED STRAIN (%)
0.10	0.2738	0.7935	1.400	0.812	0.00	0.81
0.25	0.2601	0.7798	1.358	2.525	0.02	2.50
0.50	0.2360	0.7557	1.285	5.538	0.06	5.48
H2O	0.2350	0.7547	1.282	5.663	0.06	5.60
1.00	0.2134	0.7331	1.217	8.362	0.10	8.26
2.00	0.1717	0.6914	1.091	13.575	0.19	13.39
4.00	0.1280	0.6477	0.959	19.037	0.35	18.69
8.00	0.0879	0.6076	0.838	24.050	0.58	23.47
16.00	0.0460	0.5657	0.711	29.287	0.87	28.42
4.00	0.0488	0.5685	0.719	28.938	0.57	28.37
1.00	0.0584	0.5781	0.748	27.737	0.37	27.37

TABLE 8

SUMMARY

OF

CONSOLIDATION TEST RESULTS

(ASTM D2435)

PROJECT NAME:	NAS-Alameda	TETC #:	91-220-7003
CLIENT PROJECT NO.:	2738.0215	CLIENT:	J.M. MONTGOMERY
DATE:	Oct. 10, 1991	SUMMARIZED BY:	S. Sayawatana

Sample No.:	M-019E	Depth (ft.) :	43-43.5	
Dry Density (pcf):	99.00	Specific Gravity:	2.70	(Assumed)
Initial Moisture (%):	28.40	Final Moisture (%) :	23.50	
Initial Length (in.):	0.8000	Initial Void Ratio :	0.703	
Initial Dial Rdg (in):	0.2575	Wt. of Dry Soil (g.)	61.14	
		Dia.of sample (in.)	1.9350	

PRESSURE (p) (ksf)	FINAL READING (in)	THICKNESS (in)	VOID RATIO	STRAIN % OF SAMPLE THICKNESS	LOAD COMPLIANCE (%)	CORRECTED STRAIN (%)
0.10	0.2558	0.7983	0.700	0.212	0.00	0.21
0.25	0.2506	0.7931	0.688	0.863	0.07	0.79
H2O	0.2466	0.7891	0.680	1.363	0.07	1.29
0.50	0.2403	0.7828	0.667	2.150	0.17	1.98
1.00	0.2333	0.7758	0.652	3.025	0.31	2.72
2.00	0.2267	0.7692	0.638	3.850	0.51	3.34
4.00	0.2162	0.7587	0.615	5.163	0.77	4.39
8.00	0.2063	0.7488	0.594	6.400	1.07	5.33
16.00	0.1949	0.7374	0.570	7.825	1.49	6.33
4.00	0.1990	0.7415	0.579	7.312	1.23	6.08
1.00	0.2033	0.7458	0.588	6.775	1.03	5.75

TABLE 9

SUMMARY

OF

CONSOLIDATION TEST RESULTS

(ASTM D2435)

PROJECT NAME:	NAS-Alameda	TETC #:	91-220-7003
CLIENT PROJECT NO.:	2738.0215	CLIENT:	J.M. MONTGOMERY
DATE:	Oct. 10, 1991	SUMMARIZED BY:	S. Sayawatana

Sample No.:	M-020E	Depth (ft.) :	37.0	
Dry Density (pcf):	81.80	Specific Gravity:	2.70	(Assumed)
Initial Moisture (%):	39.00	Final Moisture (%) :	31.50	
Initial Length (in.):	0.8000	Initial Void Ratio :	1.061	
Initial Dial Rdg (in):	0.2895	Wt. of Dry Soil (g.)	50.53	
		Dia.of sample (in.)	1.9350	

PRESSURE (p) (ksf)	FINAL READING (in)	THICKNESS (in)	VOID RATIO	STRAIN % OF SAMPLE THICKNESS	LOAD COMPLIANCE (%)	CORRECTED STRAIN (%)
0.10	0.2890	0.7995	1.059	0.062	0.00	0.06
0.25	0.2875	0.7980	1.056	0.250	0.06	0.19
0.50	0.2850	0.7955	1.049	0.562	0.12	0.44
H2O	0.2850	0.7955	1.049	0.562	0.12	0.44
1.00	0.2783	0.7888	1.032	1.400	0.22	1.18
2.00	0.2584	0.7689	0.981	3.887	0.38	3.51
4.00	0.2277	0.7382	0.902	7.725	0.57	7.15
8.00	0.1865	0.6970	0.795	12.875	0.88	11.99
16.00	0.1451	0.6556	0.689	18.050	1.24	16.81
4.00	0.1504	0.6609	0.702	17.388	0.96	16.43
1.00	0.1607	0.6712	0.729	16.100	0.85	15.25

TABLE 10

SUMMARY

OF

CONSOLIDATION TEST RESULTS

(ASTM D2435)

PROJECT NAME: NAS-Alameda

TETC #: 91-220-7003

CLIENT PROJECT NO.: 2738.0215

CLIENT: J.M. MONTGOMERY

DATE: Oct. 10, 1991

SUMMARIZED BY: S. Sayawatana

Sample No.:	M-021C	Depth (ft.) :	35.5-36
Dry Density (pcf):	82.70	Specific Gravity:	2.70 (Assumed)
Initial Moisture (%):	40.80	Final Moisture (%) :	30.40
Initial Length (in.):	0.8000	Initial Void Ratio :	1.038
Initial Dial Rdg (in):	0.2956	Wt. of Dry Soil (g.)	51.1
		Dia.of sample (in.)	1.9350

PRESSURE (p) (ksf)	FINAL READING (in)	THICKNESS (in)	VOID RATIO	STRAIN % OF SAMPLE THICKNESS	LOAD COMPLIANCE (%)	CORRECTED STRAIN (%)
0.10	0.2950	0.7994	1.036	0.075	0.00	0.07
0.25	0.2878	0.7922	1.018	0.975	0.02	0.95
0.50	0.2812	0.7856	1.001	1.800	0.05	1.75
H2O	0.2812	0.7856	1.001	1.800	0.05	1.75
1.00	0.2641	0.7685	0.958	3.937	0.10	3.84
2.00	0.2340	0.7384	0.881	7.700	0.16	7.54
4.00	0.2019	0.7063	0.799	11.713	0.26	11.45
8.00	0.1657	0.6701	0.707	16.238	0.38	15.86
16.00	0.1278	0.6322	0.610	20.975	0.50	20.47
4.00	0.1334	0.6378	0.625	20.275	0.31	19.97
1.00	0.1432	0.6476	0.650	19.050	0.16	18.89

CONSOLIDATION TEST RESULTS
(ASTM D2435)

PROJECT: NAS-Alameda SML / TETC NO. : 91-220-7003

CLIENT PROJECT NO.: 2738.0215 CLIENT : JAMES M. MONTGOMERY

DATE: Sept. 25, 1991 SUMMARIZED BY : S. Sayawatana

SAMPLE NO. : M-022A DEPTH : 10-10.5 ft.

INITIAL DRY DENSITY : 104.93 pcf. INITIAL MOISTURE CONTENT : 25.2 pct.

INITIAL VOID RATIO : 0.606

SPECIFIC GRAVITY : 2.71 (assumed)

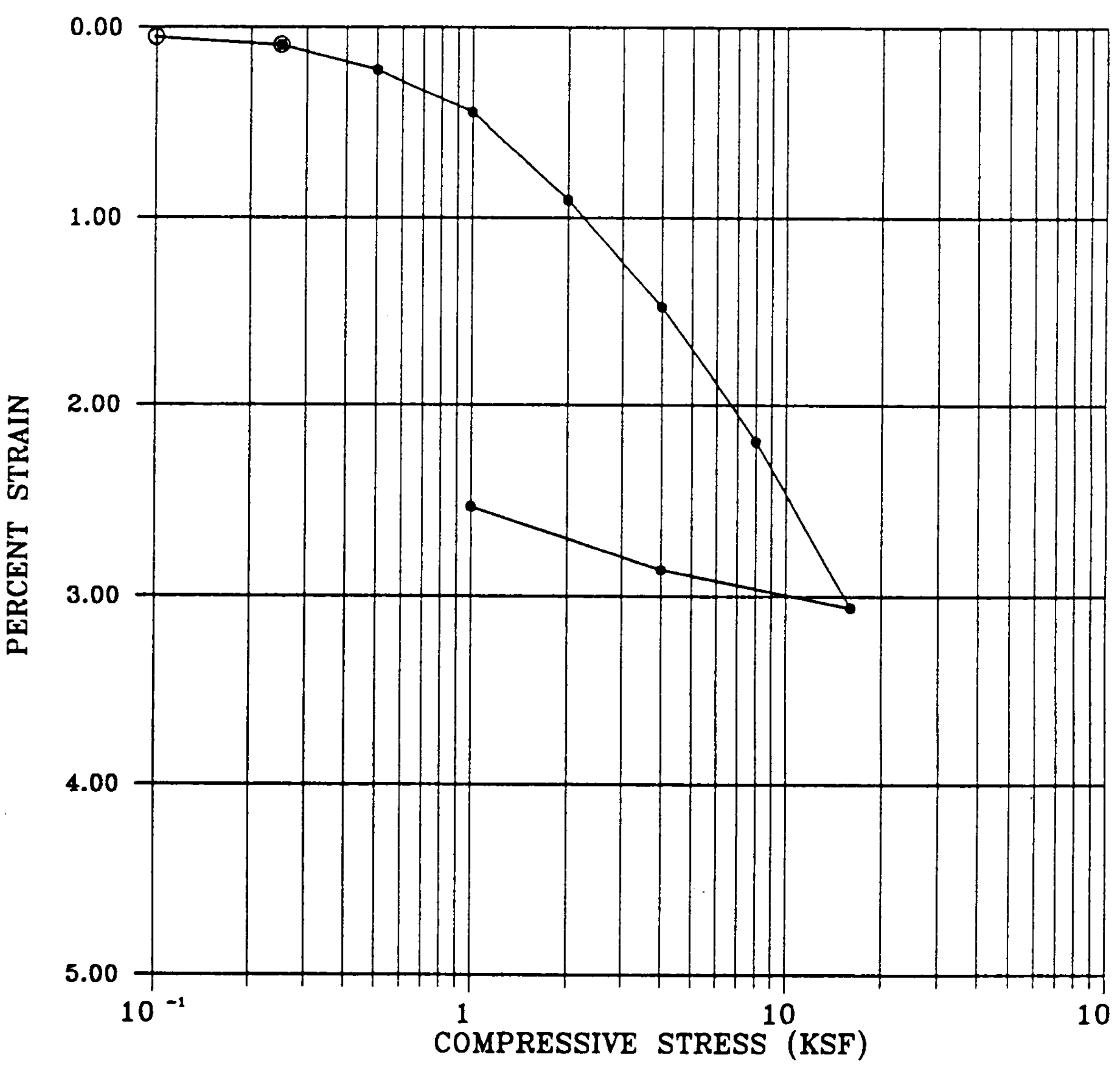


Figure 49

CONSOLIDATION TEST RESULTS
(ASTM D2435)

PROJECT: NAS-Alameda SML / TETC NO. : 91-220-7003

CLIENT PROJECT NO.: 2738.0215 . CLIENT : JAMES M. MONTGOMERY

DATE: Sept. 25, 1991 SUMMARIZED BY : S. Sayawatana

SAMPLE NO. : M-024E DEPTH : 15.5-16 ft.

INITIAL DRY DENSITY : 48.42 pcf. INITIAL MOISTURE CONTENT : 98.6 pct.

INITIAL VOID RATIO : 2.481

SPECIFIC GRAVITY : 2.70 (assumed)

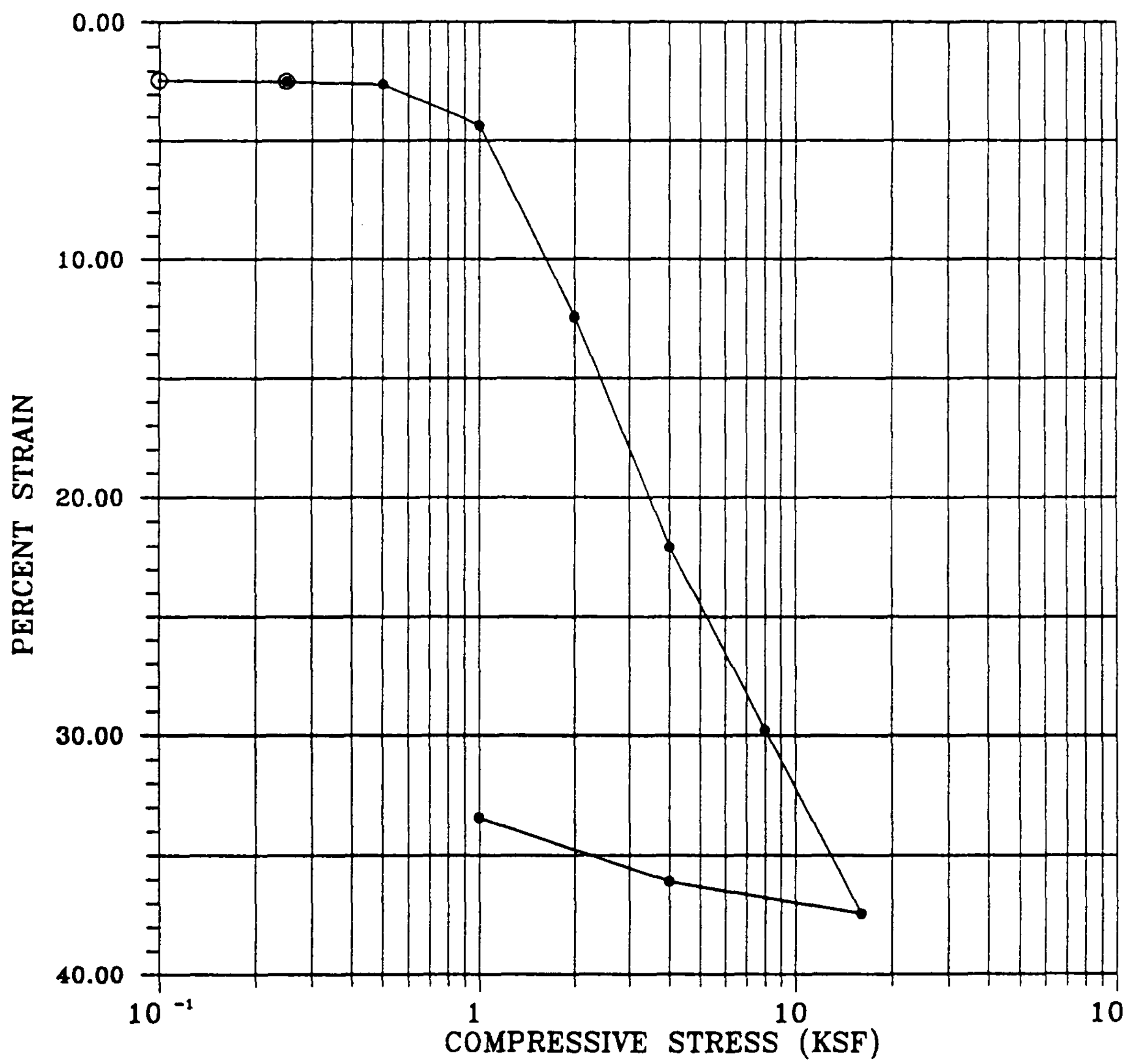


Figure 50

CONSOLIDATION TEST RESULTS
(ASTM D2435)

PROJECT:	NAS-Alameda	SML / TETC NO. :	91-220-7003
CLIENT PROJECT NO.:	2738.0215	CLIENT :	JAMES M. MONTGOMERY
DATE:	Sept. 25, 1991	SUMMARIZED BY :	S. Sayawatana

SAMPLE NO. : M-002E | DEPTH : 20.5-21 ft.

INITIAL DRY DENSITY : 63.82 pcf. | INITIAL MOISTURE CONTENT : 63.0 pct.

INITIAL VOID RATIO : 1.642

SPECIFIC GRAVITY : 2.70 (assumed)

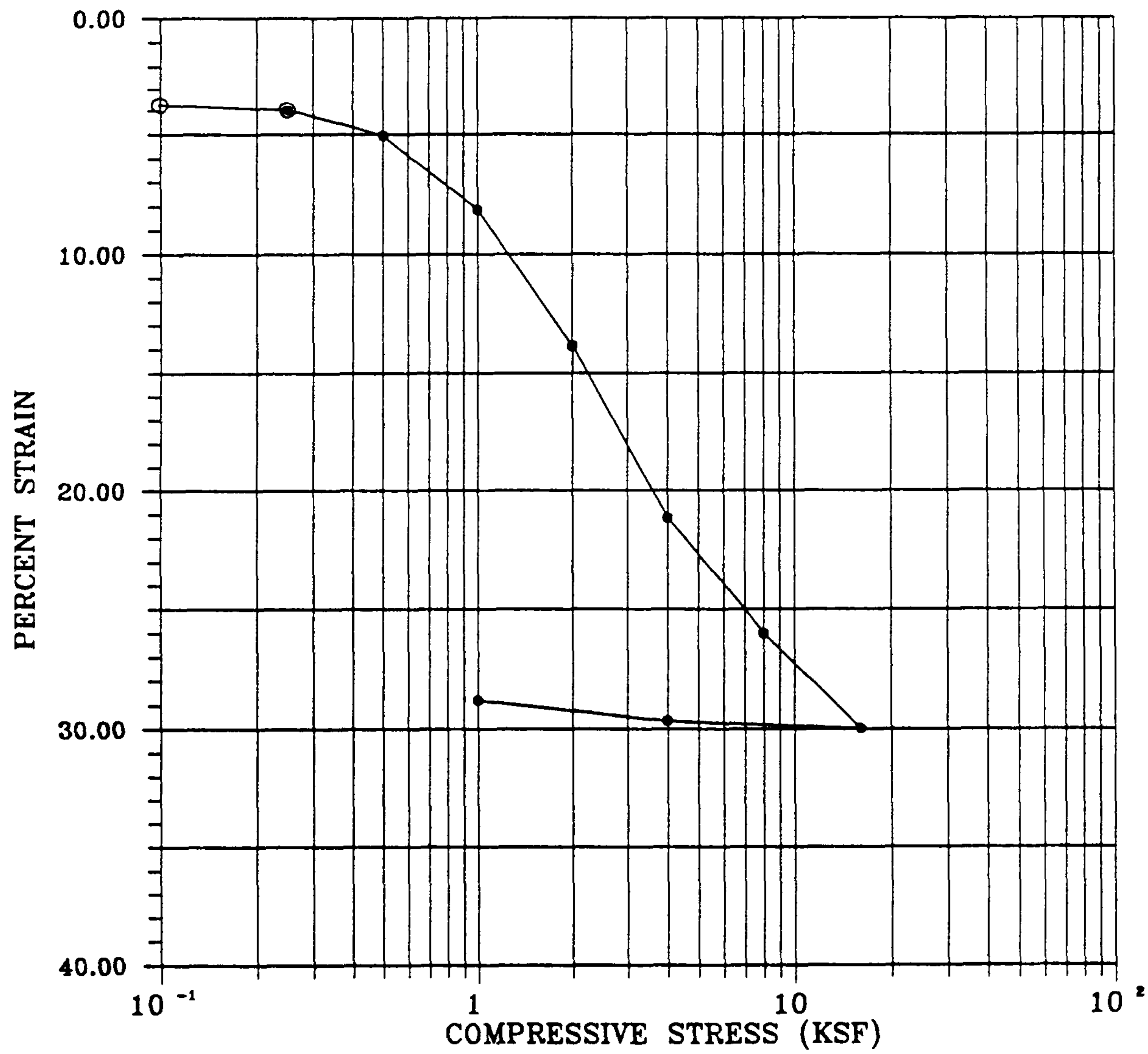


Figure 51

CONSOLIDATION TEST RESULTS
(ASTM D2435)

PROJECT: NAS-Alameda SML / TETC NO. : 91-220-7003

CLIENT PROJECT NO.: 2738.0215 CLIENT : JAMES M. MONTGOMERY

DATE: Sept. 25, 1991 SUMMARIZED BY : S. Sayawatana

SAMPLE NO. : M-025E DEPTH : 28.5-29 ft.

INITIAL DRY DENSITY : 82.45 pcf. INITIAL MOISTURE CONTENT : 39.58 pct.

INITIAL VOID RATIO : 1.044

SPECIFIC GRAVITY : 2.70 (assumed)

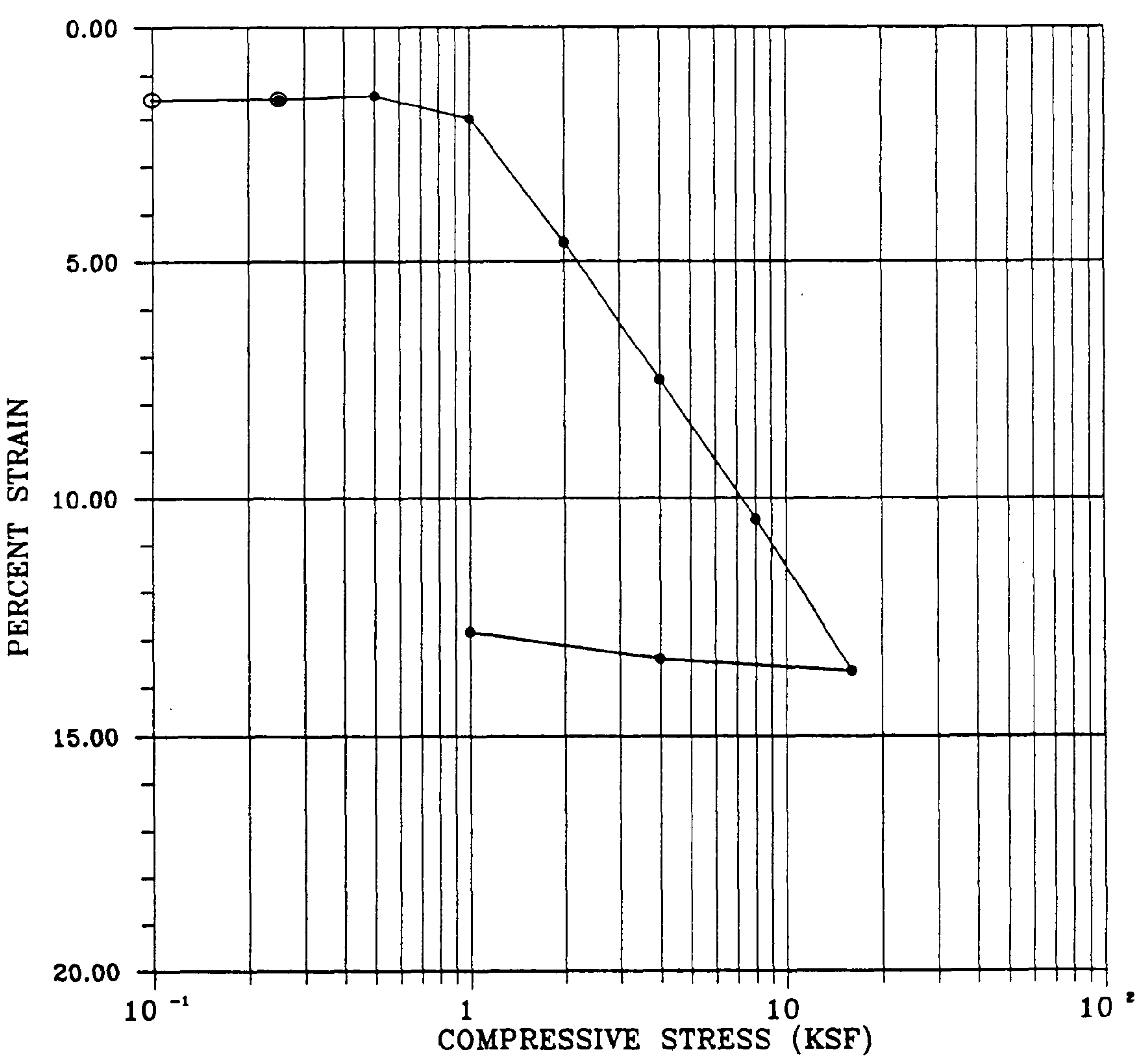


Figure 52

CONSOLIDATION TIME CURVE

SAMPLE NUMBER: M-022A DEPTH: 10.0-10.5

COMPRESSIVE STRESS 1.0 KSF

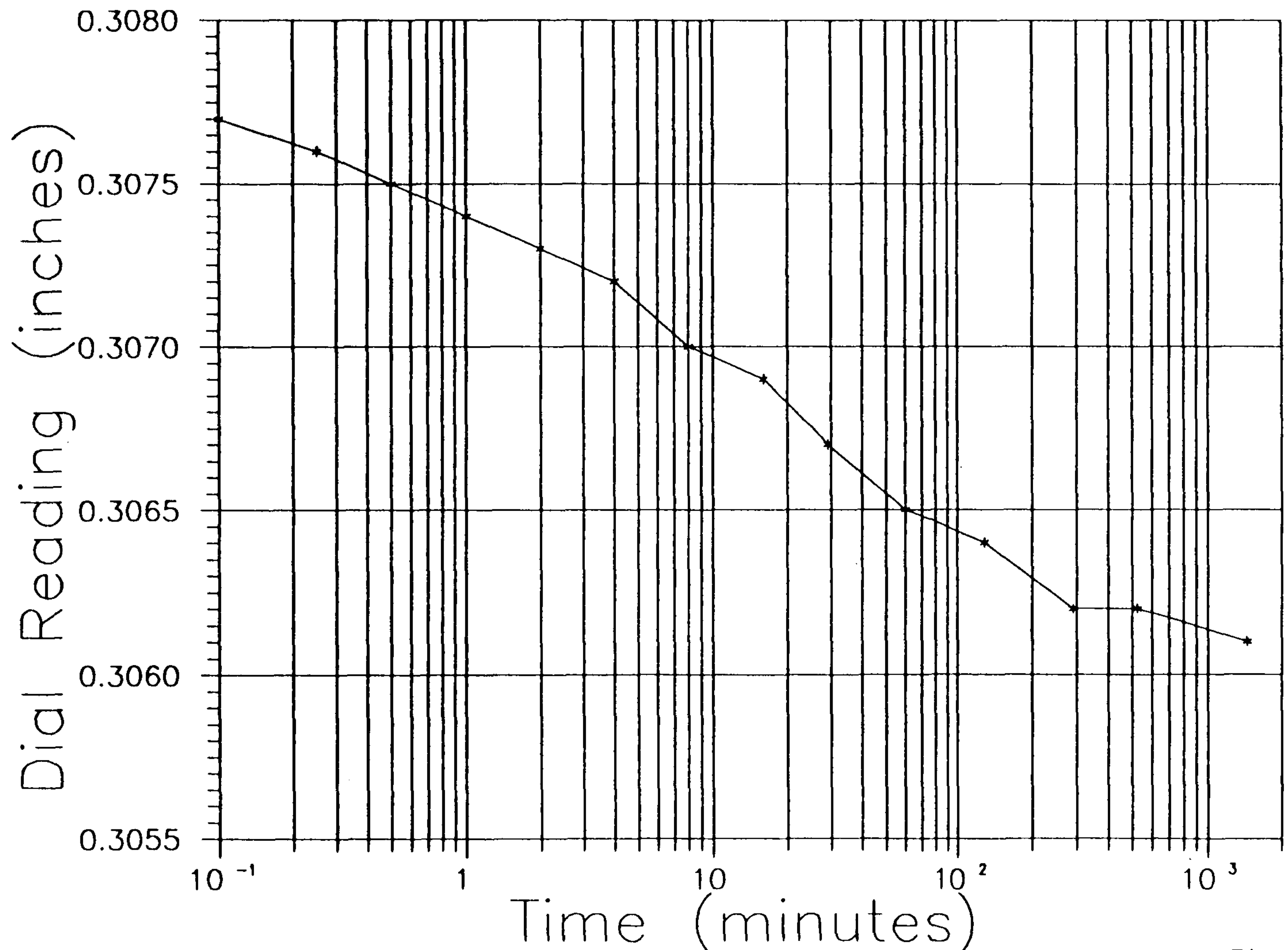


Figure 53

CONSOLIDATION TIME CURVE

SAMPLE NUMBER: M-024E   DEPTH: 15.5-16.0

COMPRESSIVE STRESS 1.0 KSF

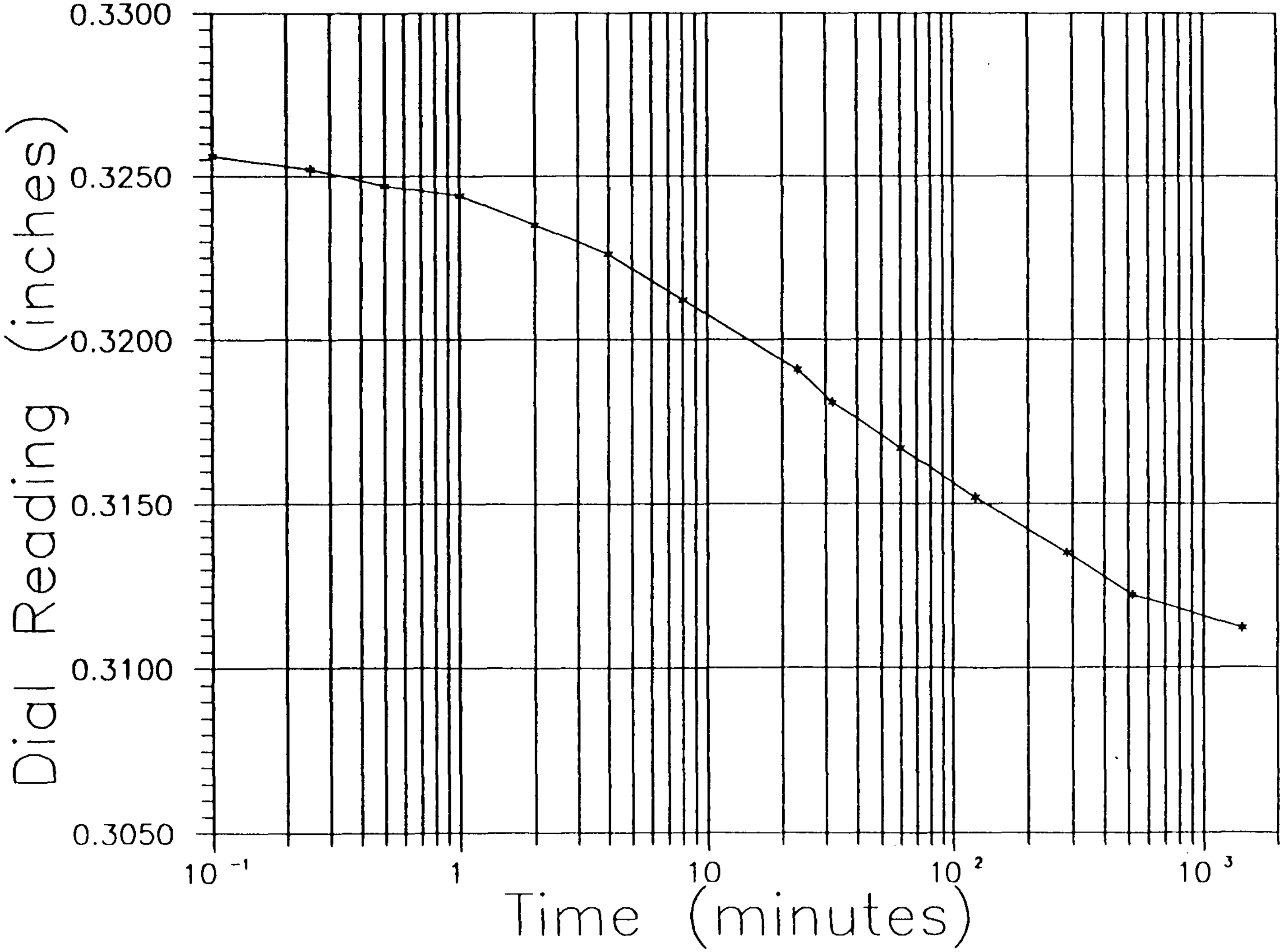


Figure 54

CONSOLIDATION TIME CURVE

SAMPLE NUMBER: M-002E   DEPTH: 20.5-21.0

COMPRESSIVE STRESS   1.0 KSF

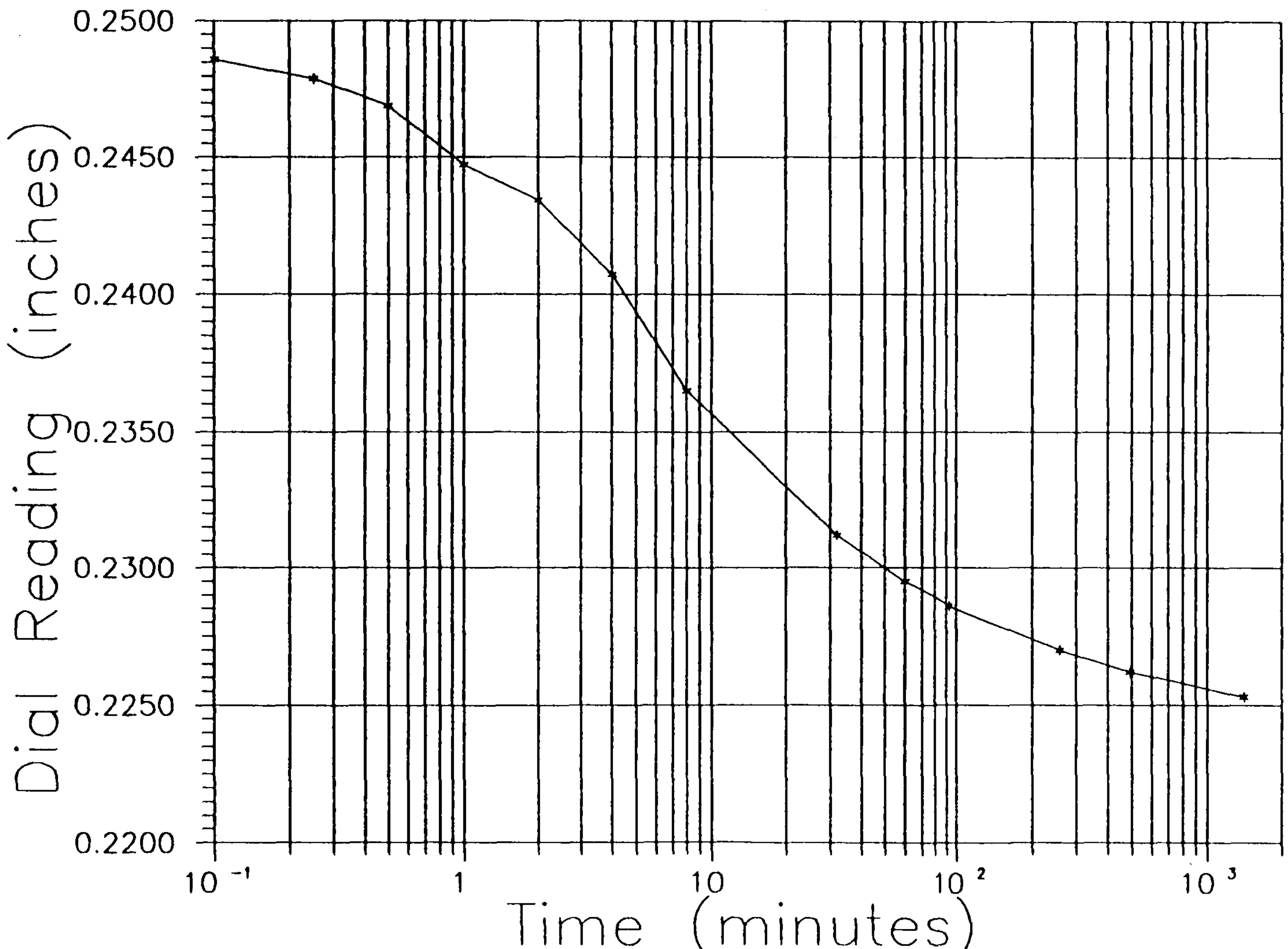


Figure 55

CONSOLIDATION TIME CURVE

SAMPLE NUMBER: M–025E DEPTH: 28.5–29.0

COMPRESSIVE STRESS 1.0 KSF

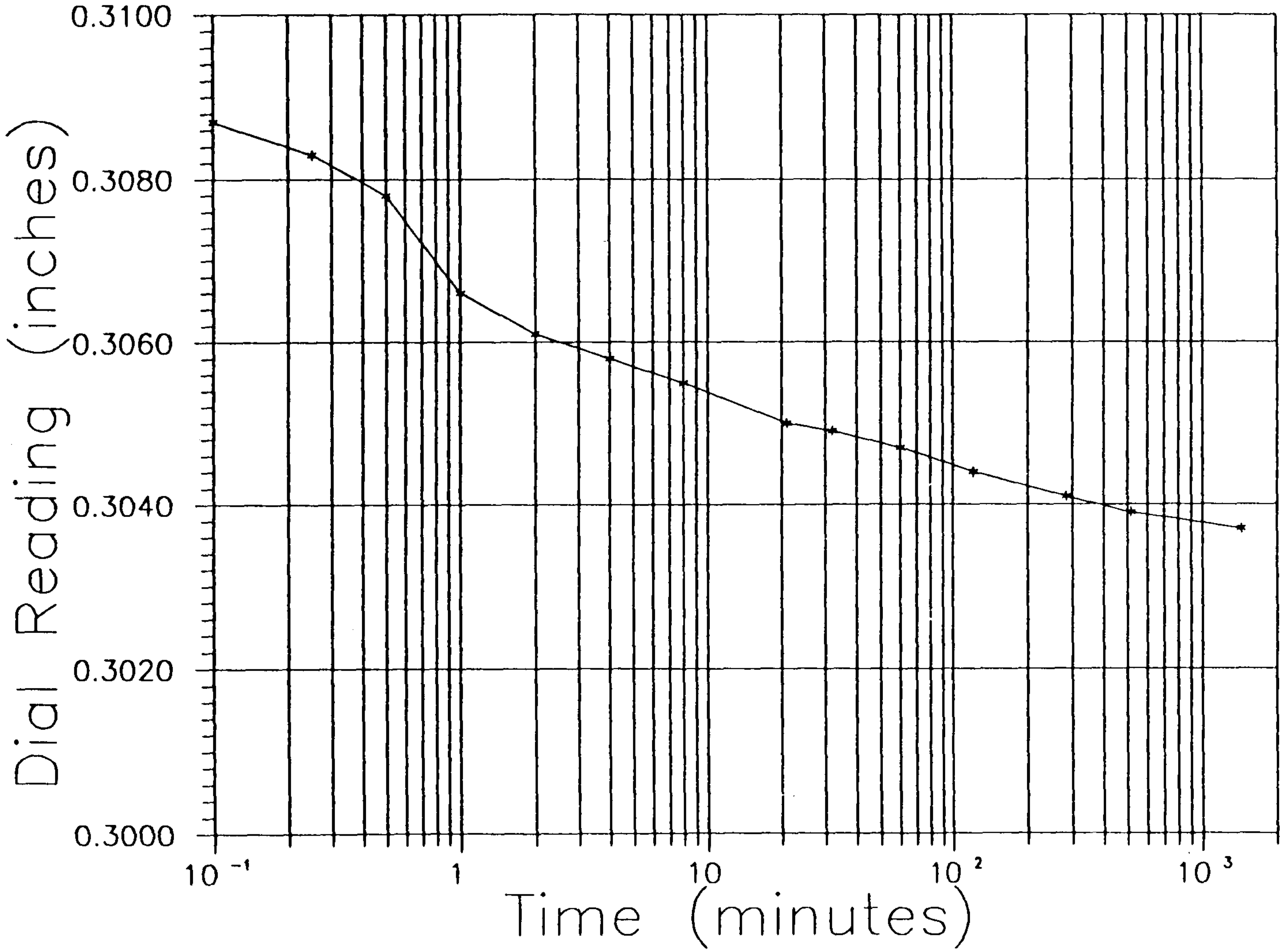


Figure 56

CONSOLIDATION TEST RESULTS
(ASTM D2435)

PROJECT: NAS–Alameda

SML / TETC NO. : 91–220–7003

CLIENT PROJECT NO.: 2738.0215

CLIENT : JAMES M. MONTGOMERY

DATE: Oct. 10, 1991

SUMMARIZED BY : S. Sayawatana

SAMPLE NO. : M–001E

DEPTH : 28.5 ft.

INITIAL DRY DENSITY : 69.7 pcf.

INITIAL MOISTURE CONTENT : 53.5 pct.

INITIAL VOID RATIO : 1.418

SPECIFIC GRAVITY : 2.70 (assumed)

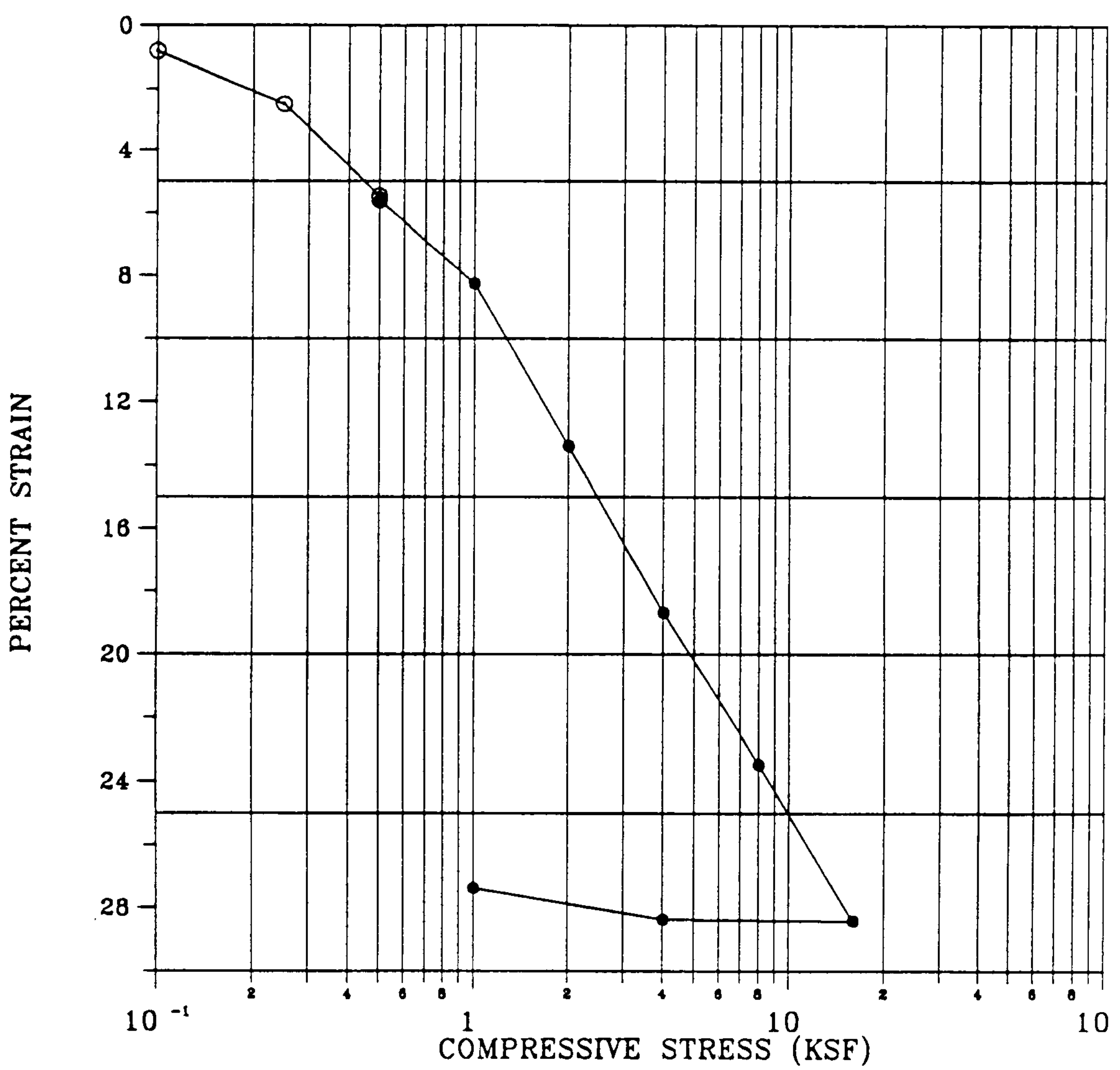


Figure 57

CONSOLIDATION TEST RESULTS
(ASTM D2435)

PROJECT: NAS-Alameda

SML / TETC NO. : 91-220-7003

CLIENT PROJECT NO.: 2738.0215

CLIENT : JAMES M. MONTGOMERY

DATE: Oct. 10, 1991

SUMMARIZED BY : S. Sayawatana

SAMPLE NO. : M-019E

DEPTH : 43-43.5 ft.

INITIAL DRY DENSITY : 99.0 pcf.

INITIAL MOISTURE CONTENT : 28.4 pct.

INITIAL VOID RATIO : 0.703

SPECIFIC GRAVITY : 2.70 (assumed)

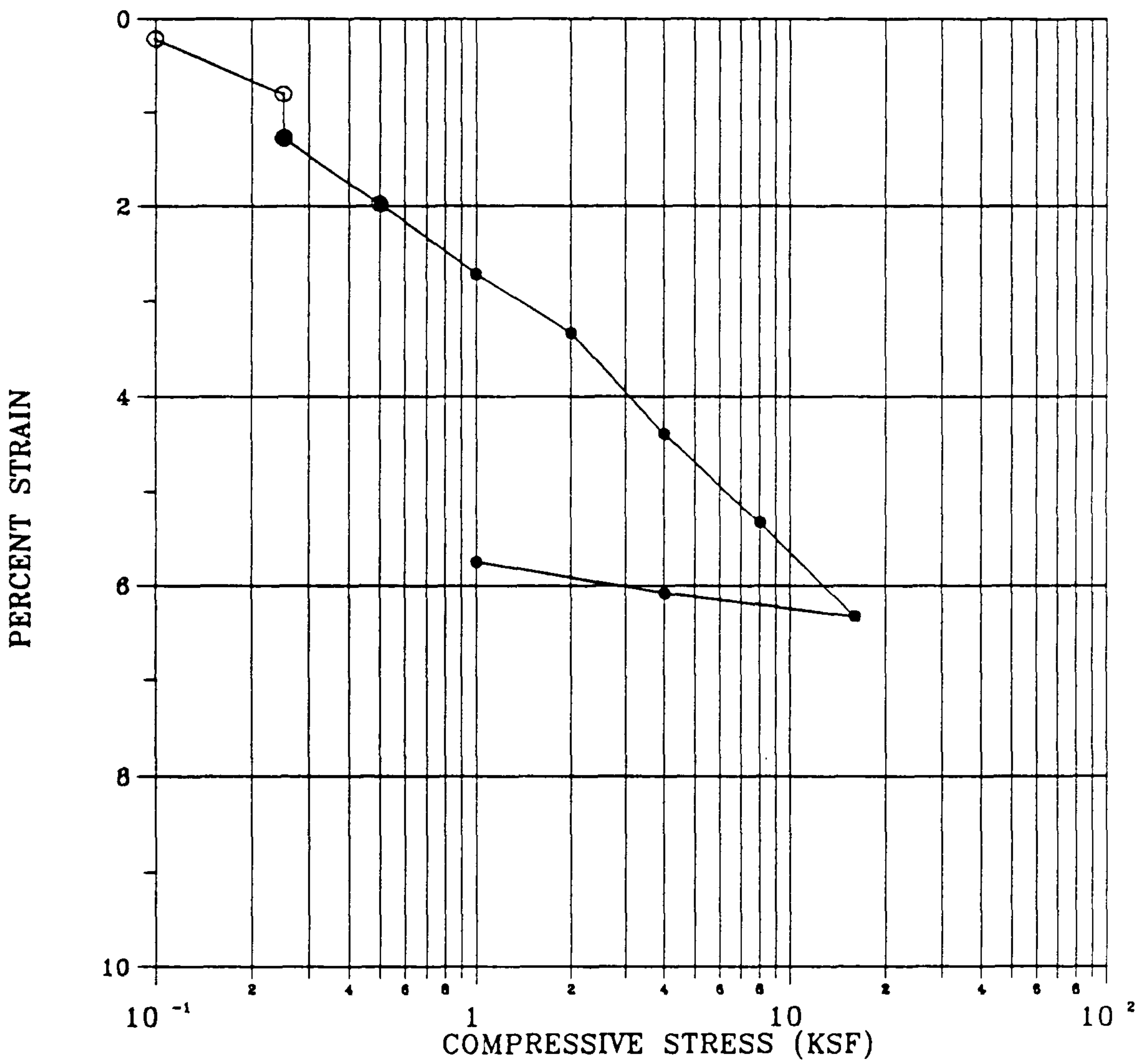


Figure 58

CONSOLIDATION TEST RESULTS
(ASTM D2435)

PROJECT: NAS-Alameda

SML / TETC NO. : 91-220-7003

CLIENT PROJECT NO.: 2738.0215

CLIENT : JAMES M. MONTGOMERY

DATE: Oct. 10, 1991

SUMMARIZED BY : S. Sayawatana

SAMPLE NO. : M-020E

DEPTH : 37 ft.

INITIAL DRY DENSITY : 81.8 pcf.

INITIAL MOISTURE CONTENT : 39.0 pct.

INITIAL VOID RATIO : 1.061

SPECIFIC GRAVITY : 2.70 (assumed)

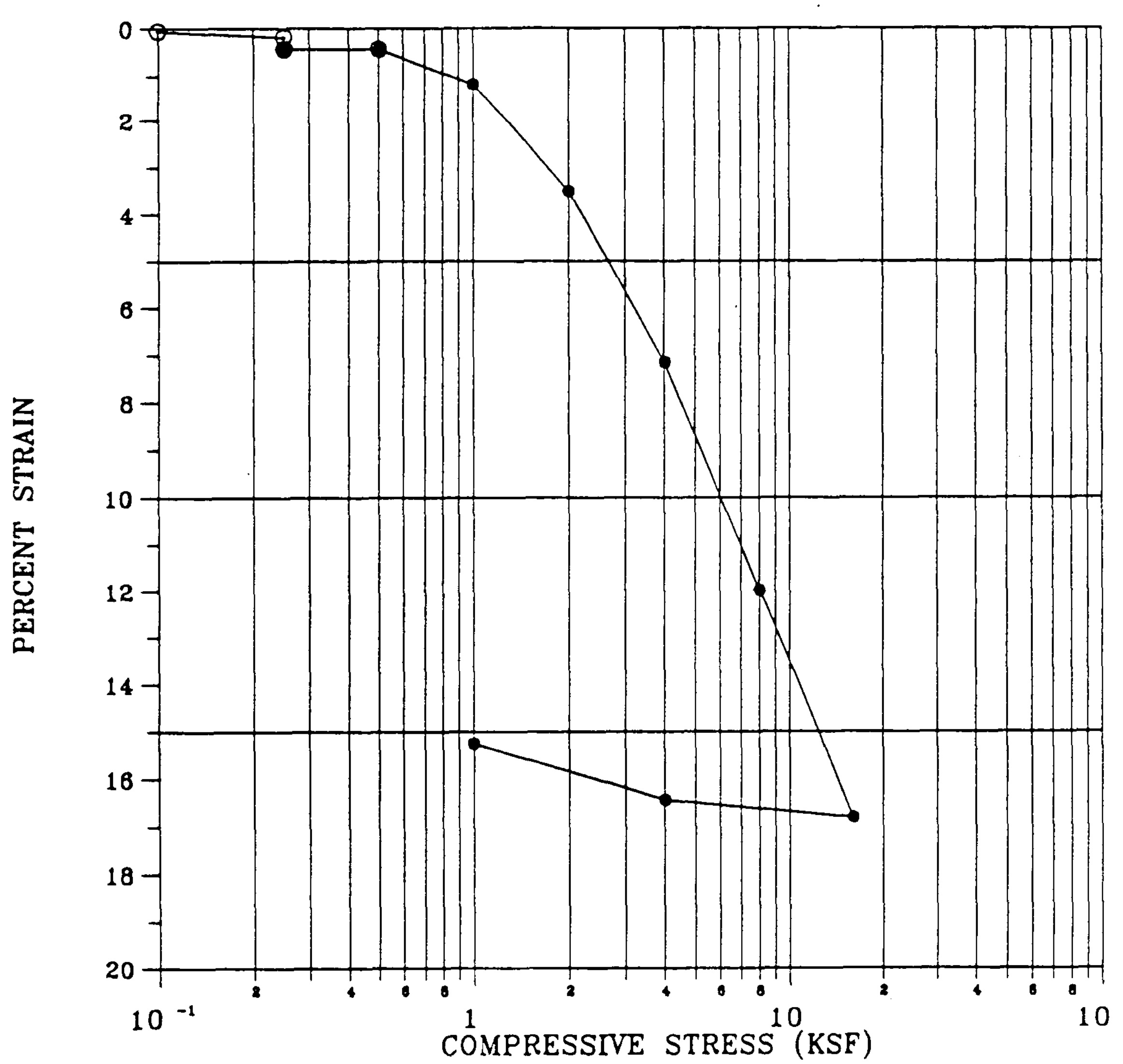


Figure 59

CONSOLIDATION TEST RESULTS
(ASTM D2435)

PROJECT: NAS-Alameda SML / TETC NO. : 91-220-7003

CLIENT PROJECT NO.: 2738.0215 CLIENT : JAMES M. MONTGOMERY

DATE: Oct. 10, 1991 SUMMARIZED BY : S. Sayawatana

SAMPLE NO. : M-021C DEPTH : 35.5-36 ft.

INITIAL DRY DENSITY : 82.7 pcf. INITIAL MOISTURE CONTENT : 40.8 pct.

INITIAL VOID RATIO : 1.038

SPECIFIC GRAVITY : 2.70 (assumed)

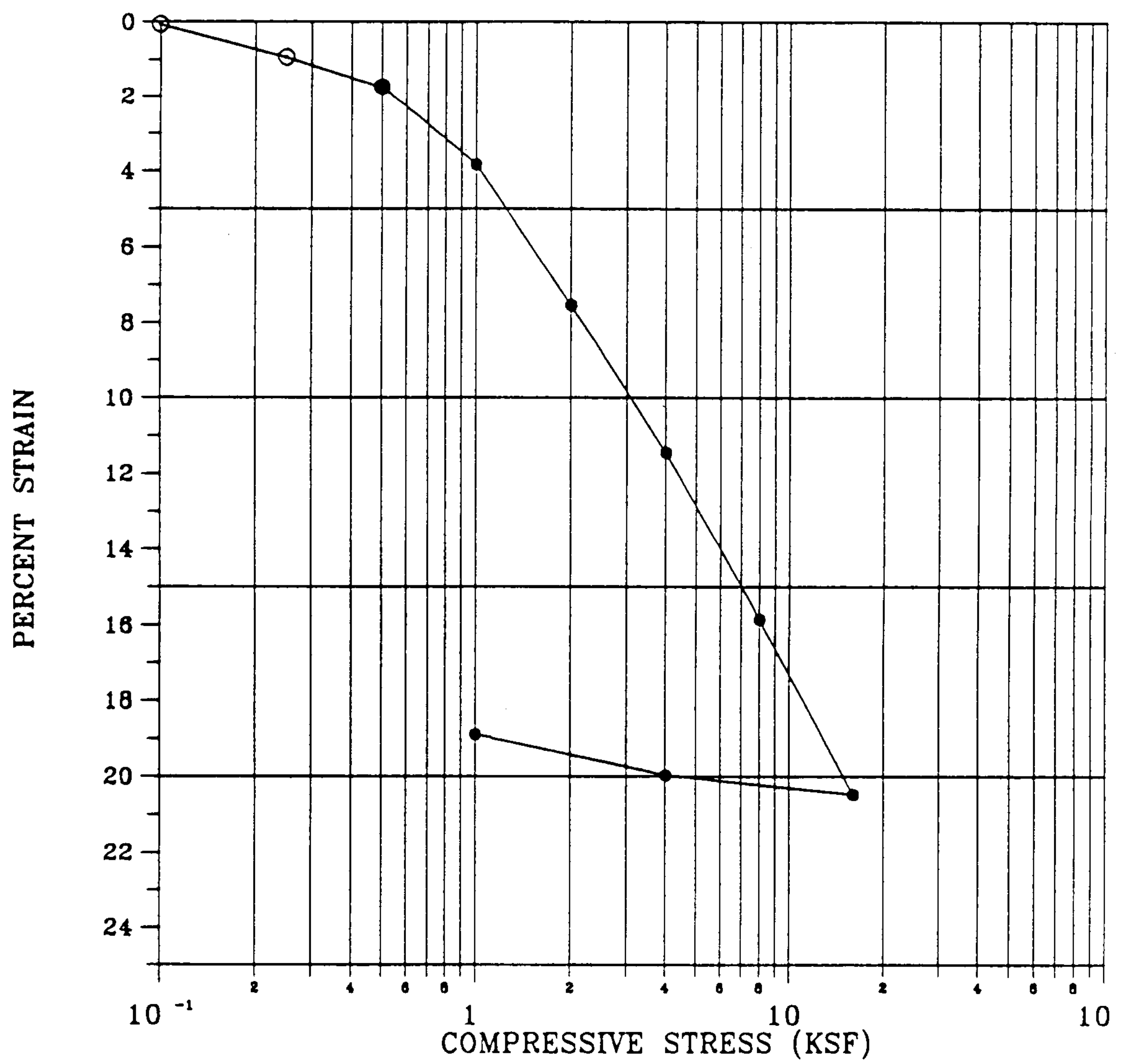


Figure 60

CONSOLIDATION TIME CURVE

SAMPLE NUMBER: M-001E DEPTH: 28.5

COMPRESSIVE STRESS 1.0 KSF

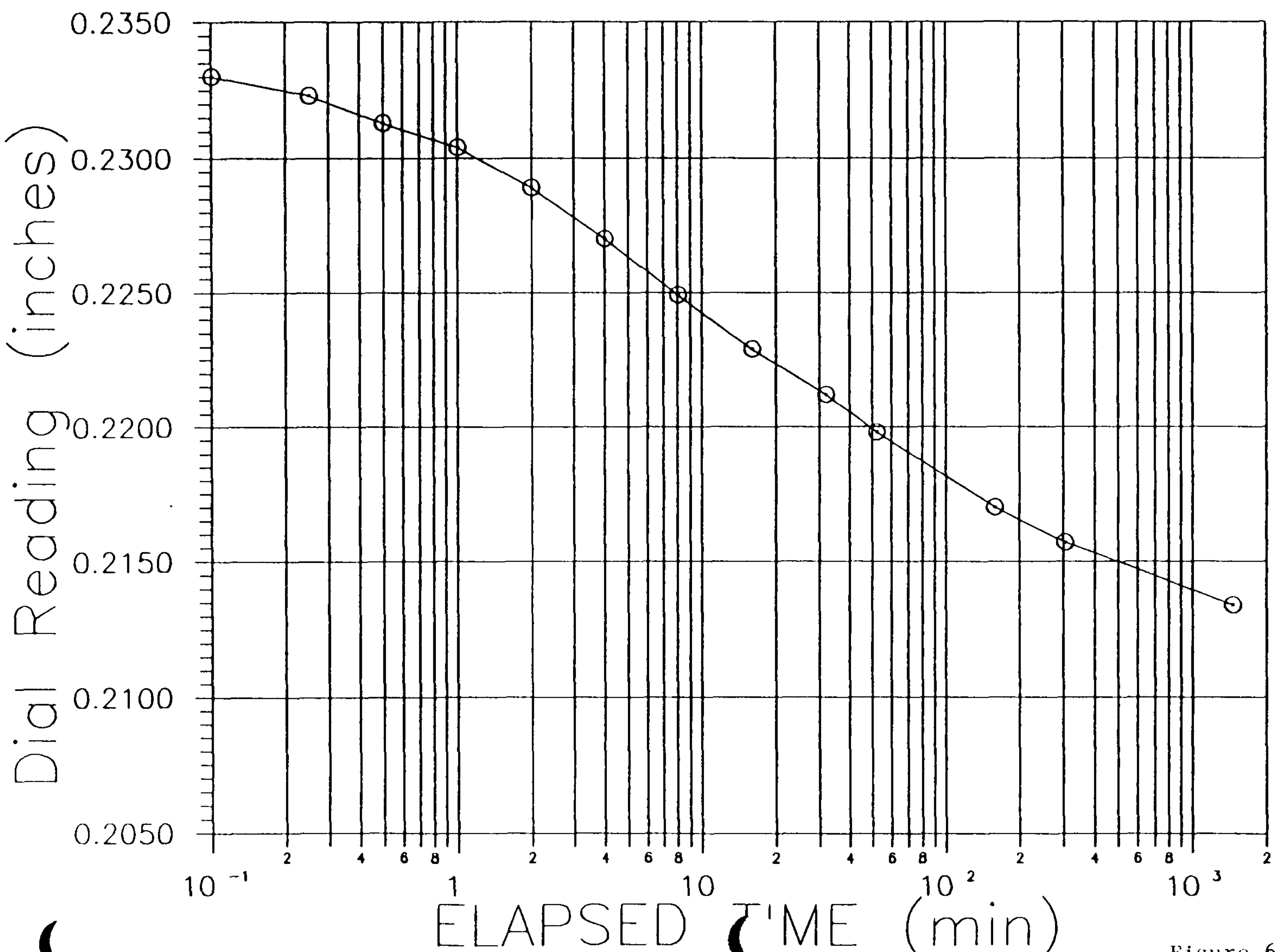


Figure 61

CONSOLIDATION TIME CURVE

SAMPLE NUMBER: M-019E DEPTH: 43-43.5

COMPRESSIVE STRESS 1.0 KSF

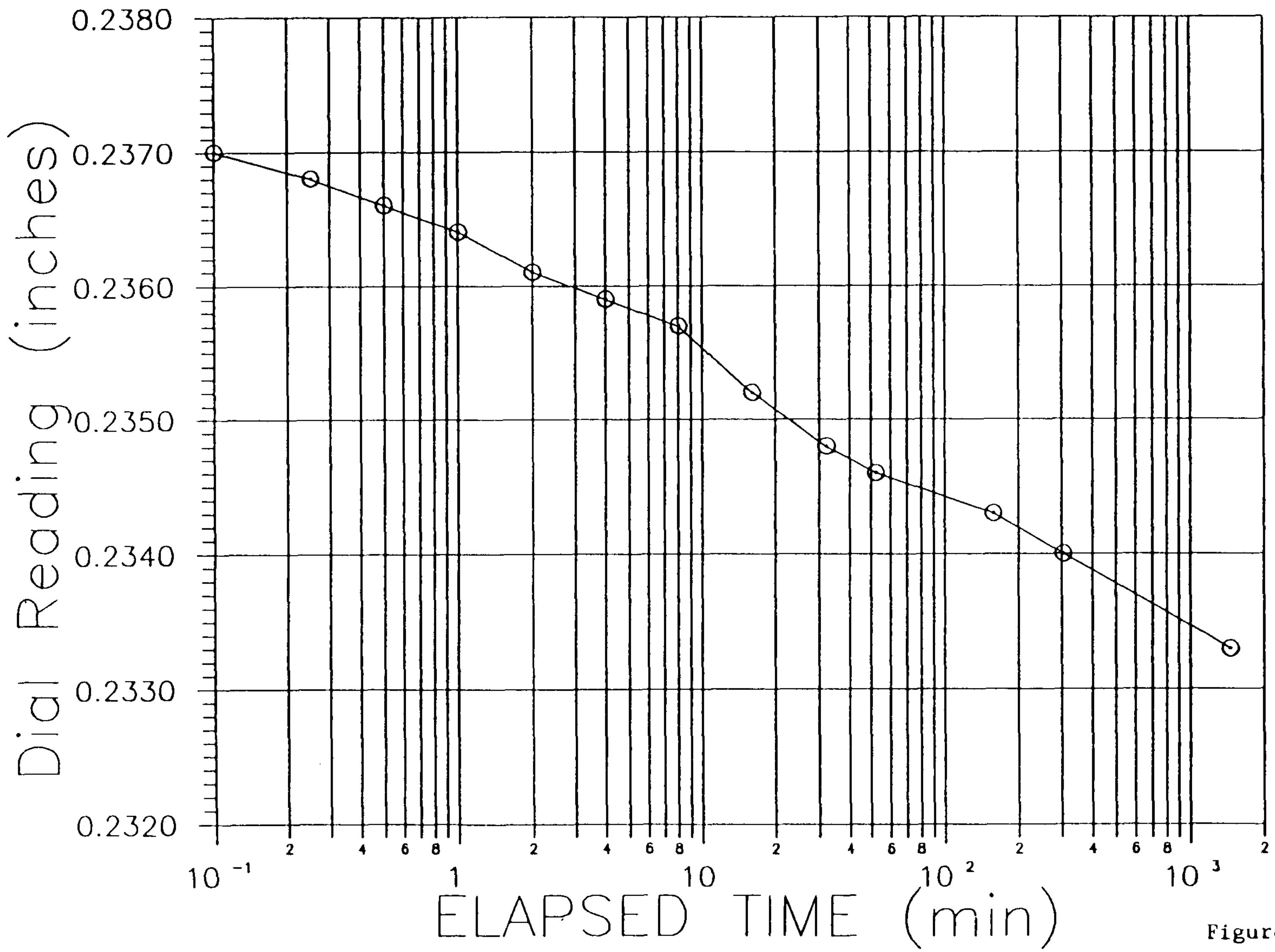


Figure 62

CONSOLIDATION TIME CURVE

SAMPLE NUMBER: M−020E DEPTH: 37

COMPRESSIVE STRESS 1.0 KSF

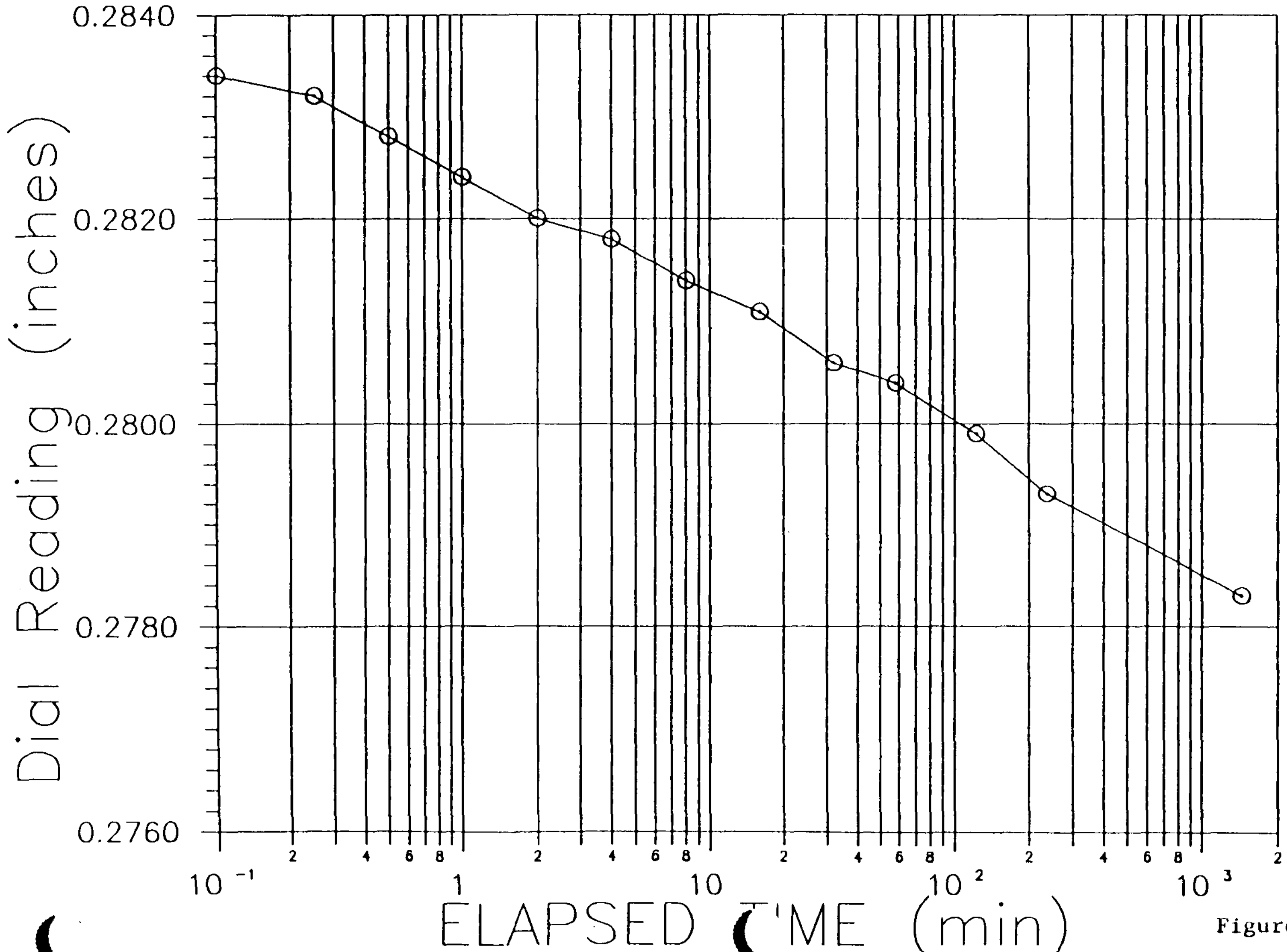


Figure 63

CONSOLIDATION TIME CURVE

SAMPLE NUMBER: M-021C DEPTH: 35.5-36

COMPRESSIVE STRESS 1.0 KSF

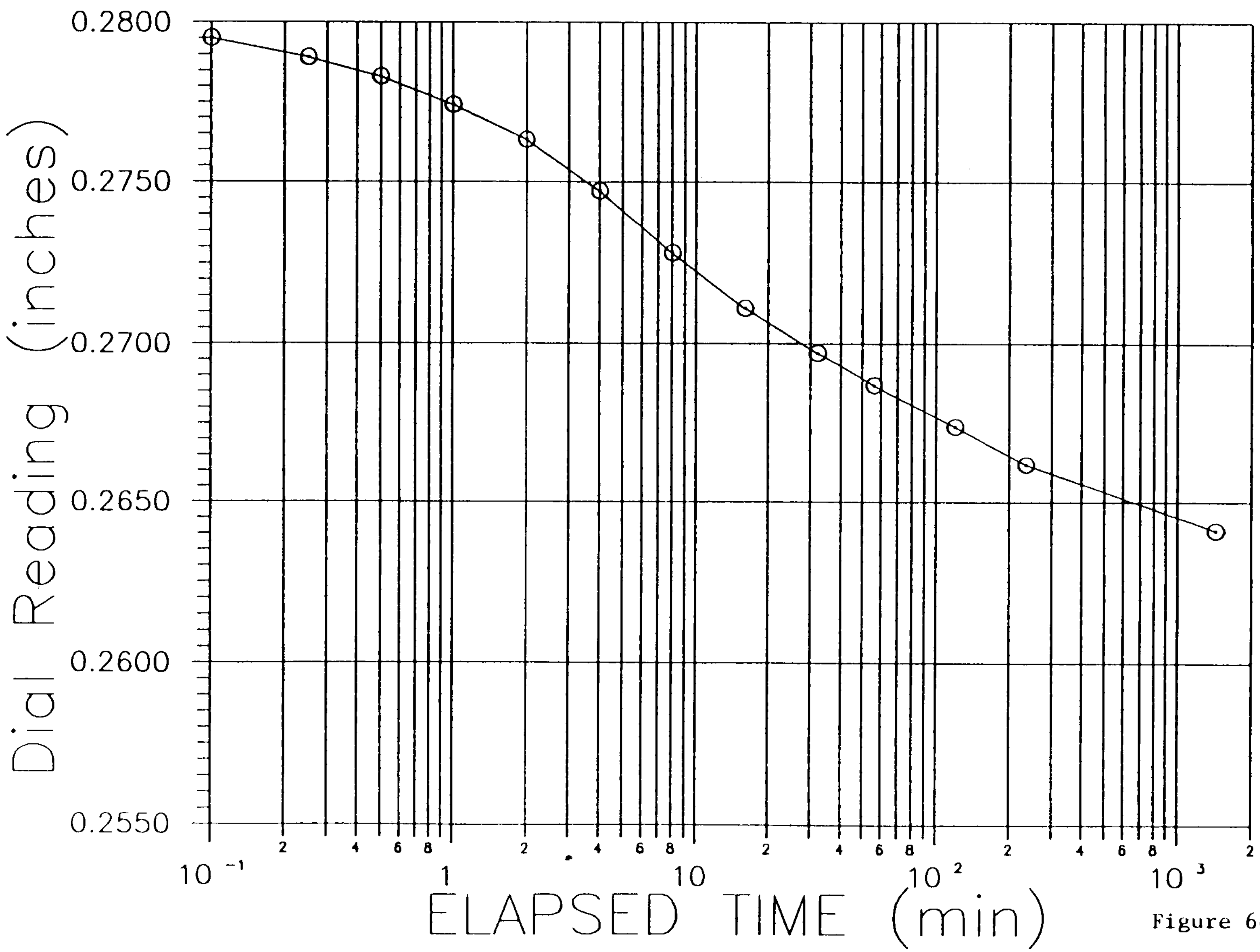
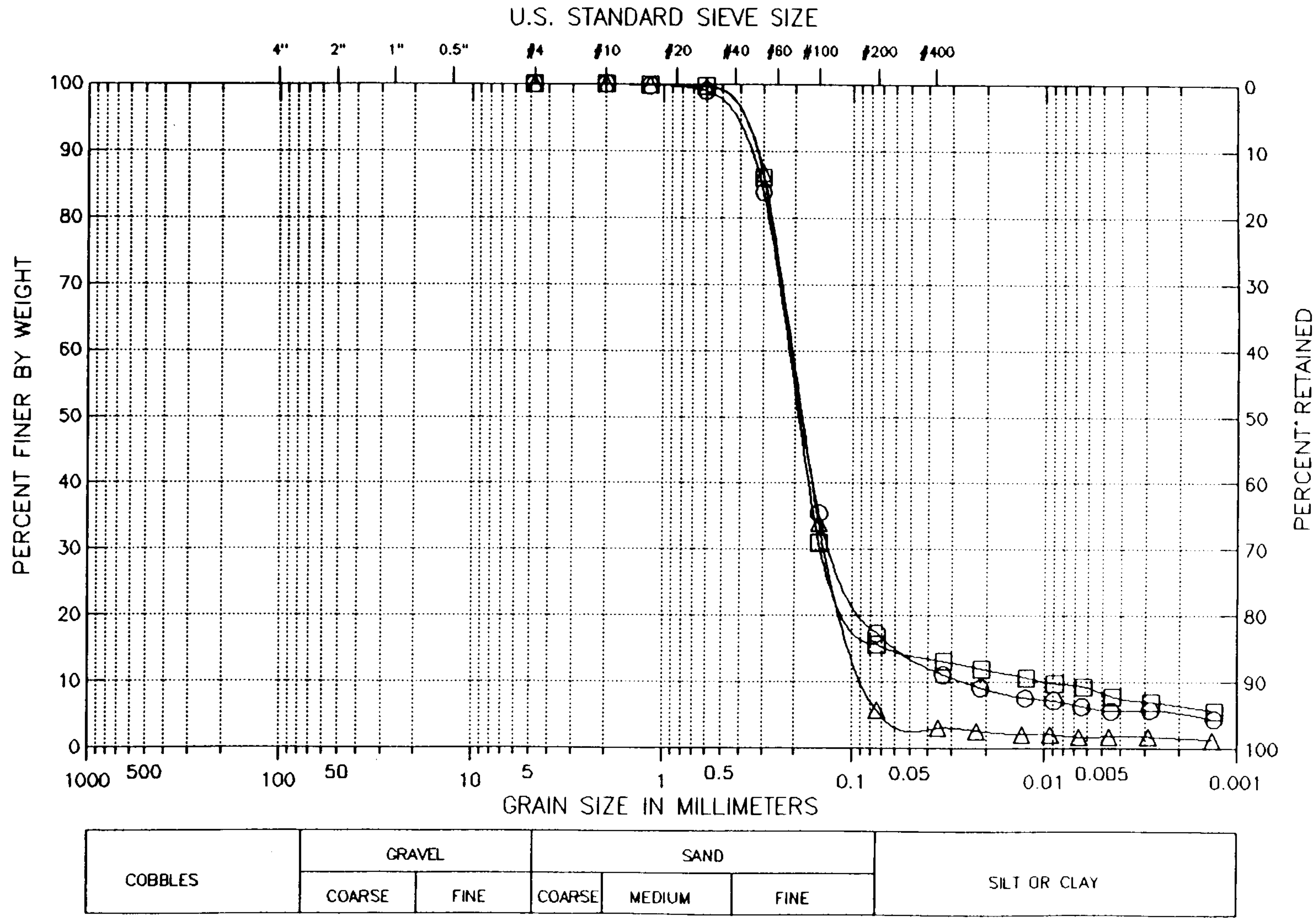


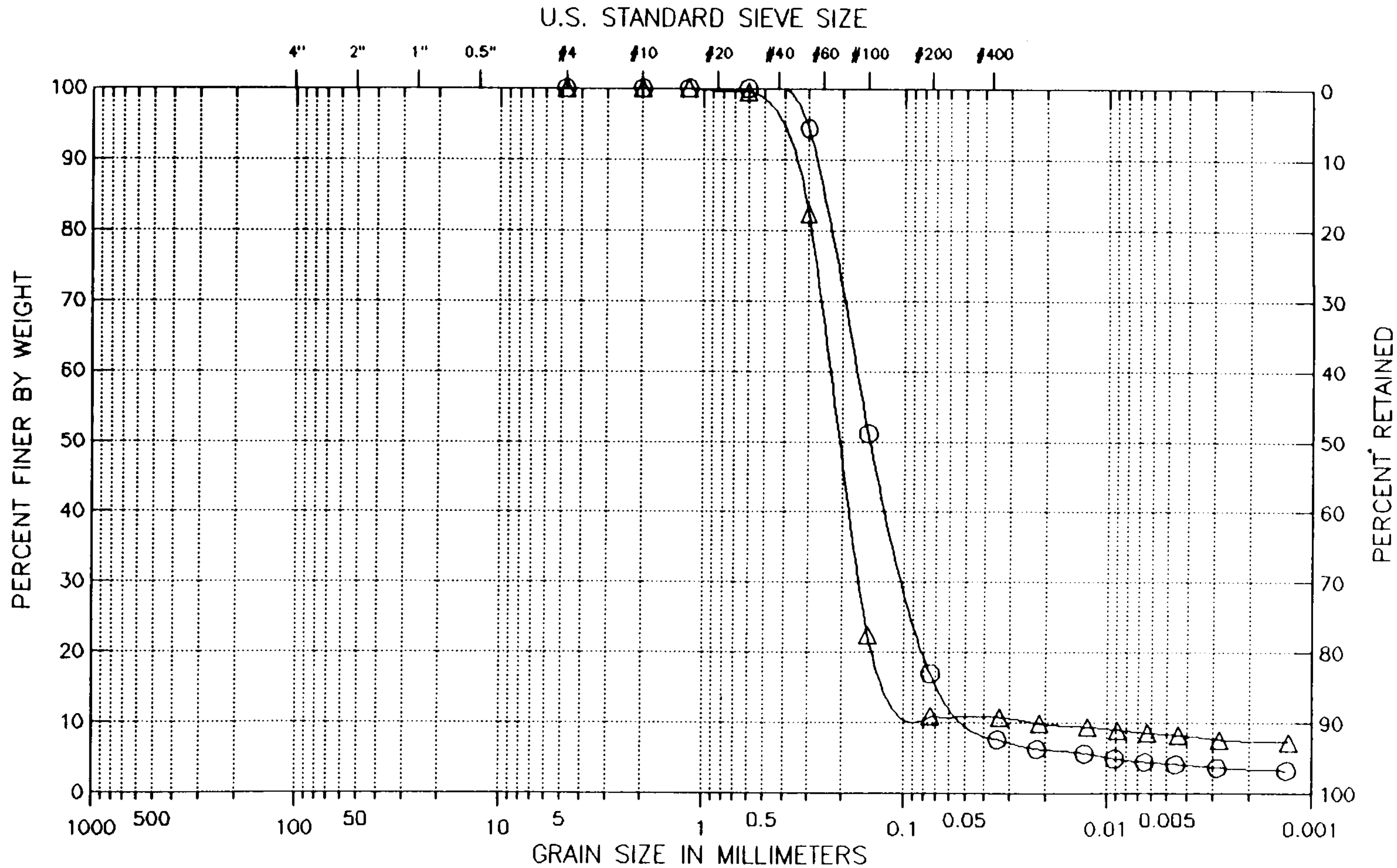
Figure 64

Project : JAMES M. MONTGOMERY
Project No.: 90C0137A
Location:
Date : Fri Mar 22 1991



Symbol	Boring No.	Sample No.	Depth	Filename	Classification / Description
○	M-10A	M-10A	4.0'	M10A	BROWN CLAYEY SILTY SAND
△	M-14A	M-14A	15.0'	M14A	YELLOW/TAN CLAYEY SILTY SAND
□	M-14B	M-14B	60.0'	M14B	YELLOW/TAN CLAYEY SILTY SAND

Project : JAMES M. MONTGOMERY
Project No.: 90C0137A
Location:
Date : Fri Mar 22 1991



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

Symbol	Boring No.	Sample No.	Depth	Filename	Classification / Description
-O-	M-103A	M-103A	15.0'	M103A	GRAY CLAYEY SILTY SAND
-Δ-	M-108B	M-108B	50.0'	M108B	YELLOW/TAN CLAYEY SILTY SAND

Figure 1

GEOTECHNICAL LABORATORY TEST DATA

Project : JAMES M. MONTGOMERY
Filename : M14A
Project No. : 90C0137A
Depth : 15.0'
Elevation :
Boring No. : M-14A
Test Date : 03/20/91
Tested by : N. JOHNSON
Sample No. : M-14A
Test Method : D422
Checked by : S. CAPPS
Location :
Soil Description : YELLOW/TAN CLAYEY SILTY SAND
Remarks :

HYDROMETER

Hydrometer ID : 1734
Weight of air-dried soil = 120 gm
Specific Gravity = 2.65

Hygroscopic Moisture Content :
Weight of Wet Soil = 120 gm
Weight of Dry Soil = 116.57 gm
Moisture Content = 0.0294244

Elapsed Time (min)	Reading	Temperature (deg. C)	Corrected Reading	Particle Size (mm)	Percent Finer (%)	Adjusted Particle Size
2.00	12.00	22.00	3.64	0.036	3	0.036
5.00	11.50	21.90	3.09	0.023	3	0.023
15.00	11.00	21.70	2.50	0.013	2	0.013
30.00	11.00	21.70	2.50	0.009	2	0.009
60.00	10.50	21.70	2.00	0.007	2	0.007
120.00	10.50	22.10	2.18	0.005	2	0.005
300.00	10.00	23.00	2.09	0.003	2	0.003
1440.00	9.80	22.30	1.57	0.001	1	0.001

GEOTECHNICAL LABORATORY TEST DATA

Project : JAMES M. MONTGOMERY
Filename : M14A
Project No. : 90C0137A
Depth : 15.0'
Elevation :
Boring No. : M-14A
Test Date : 03/20/91
Tested by : N. JOHNSON
Sample No. : M-14A
Test Method : D422
Checked by : S. CAPPS
Location :
Soil Description : YELLOW/TAN CLAYEY SILTY SAND
Remarks :

COARSE SIEVE SET

Sieve Mesh	Sieve Openings Inches	Millimeters	Weight Retained (gm)	Cumulative Weight Retained (gm)	Percent Finer (%)
#4	0.187	4.75	0.00	0.00	100
#10	0.079	2.00	0.00	0.00	100
#16	0.046	1.18	0.08	0.08	100
#30	0.024	0.60	0.35	0.43	100
#50	0.012	0.30	15.07	15.50	87
#100	0.006	0.15	61.31	76.81	34
#200	0.003	0.07	32.87	109.68	6

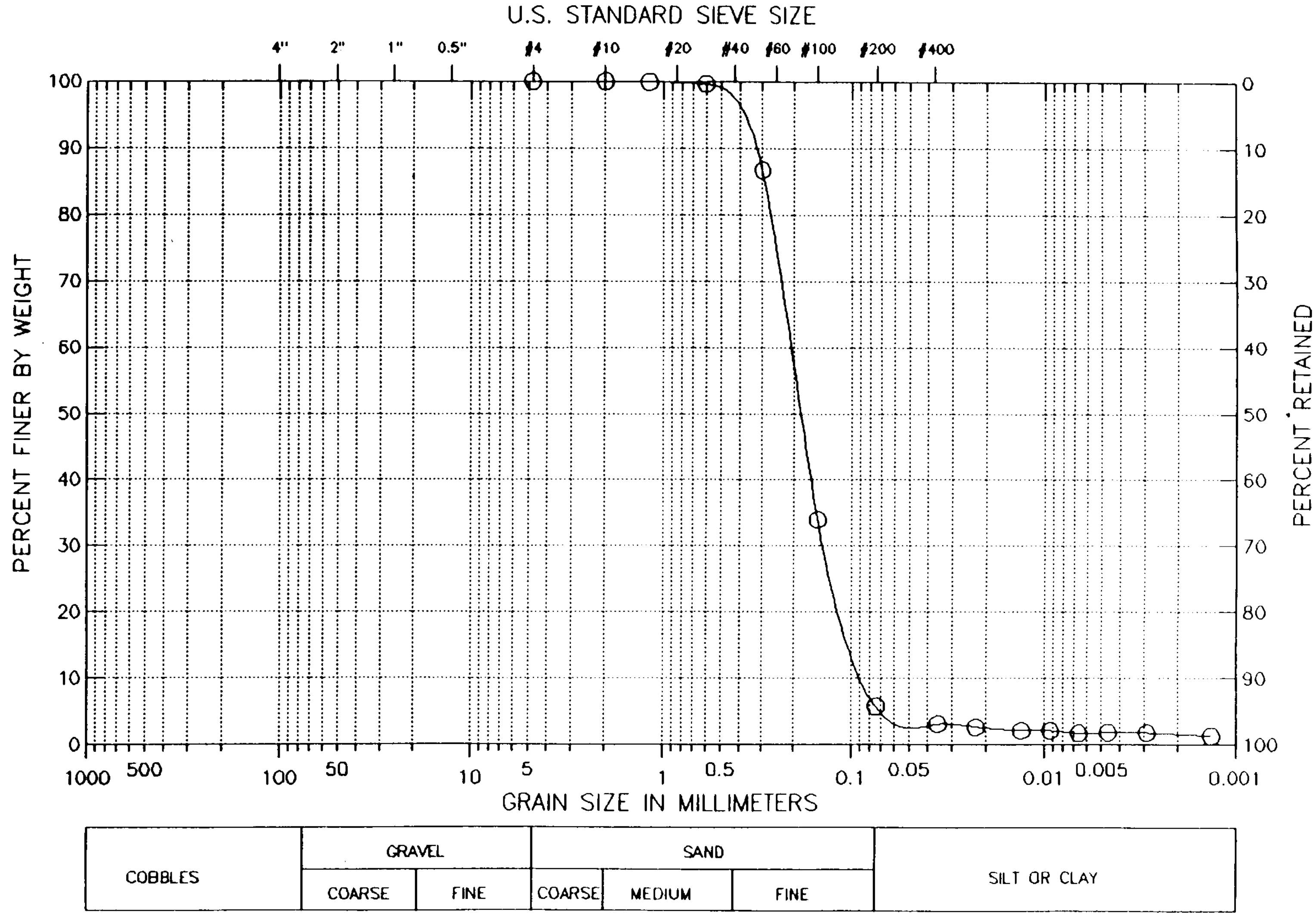
Total Weight of Sample = 116.57
Tare Weight = 0

D85 : 0.2934 mm
D60 : 0.2112 mm
D50 : 0.1852 mm
D30 : 0.1357 mm
D15 : 0.0933 mm
D10 : 0.0823 mm

Soil Classification

ASTM Group Symbol : N/A
ASTM Group Name : N/A
AASHTO Group Symbol : A-1-b(0)
AASHTO Group Name : Stone Fragments, Gravel and Sand

	Boring No. : M-14A Sample No.: M-14A Tested by : N. JOHNSON Filename : M14A	Project : JAMES M. MONTGOMERY Project No.: 90C0137A Location: Date : Fri Mar 22 1991



Classification :
()

Visual Description :
YELLOW/TAN CLAYEY SILTY SAND

Remarks :

GEOTECHNICAL LABORATORY TEST DATA

Project : JAMES M. MONTGOMERY
Filename : M14B
Project No. : 90C0137A
Depth : 60.0'
Elevation :
Boring No. : M-14B
Test Date : 03/20/91
Tested by : N. JOHNSON
Sample No. : M-14B
Test Method : D422
Checked by : S. CAPPS
Location :
Soil Description : YELLOW/TAN CLAYEY SILTY SAND
Remarks :

HYDROMETER

Hydrometer ID : 1734
Weight of air-dried soil = 120 gm
Specific Gravity = 2.65

Hygroscopic Moisture Content :
Weight of Wet Soil = 120 gm
Weight of Dry Soil = 118.24 gm
Moisture Content = 0.014885

Elapsed Time (min)	Reading	Temperature (deg. C)	Corrected Reading	Particle Size (mm)	Percent Finer (%)	Adjusted Particle Size
2.00	23.80	22.00	15.44	0.033	13	0.033
5.00	22.50	21.90	14.09	0.021	12	0.021
15.00	21.00	21.90	12.59	0.012	11	0.012
30.00	20.00	21.90	11.59	0.009	10	0.009
60.00	19.50	21.70	11.00	0.006	9	0.006
120.00	17.50	22.20	9.23	0.004	8	0.004
300.00	16.20	23.00	8.29	0.003	7	0.003
1440.00	15.00	22.20	6.73	0.001	6	0.001

GEOTECHNICAL LABORATORY TEST DATA

Project : JAMES M. MONTGOMERY		Filename : M14B
Project No. : 90C0137A	Depth : 60.0'	Elevation :
Boring No. : M-14B	Test Date : 03/20/91	Tested by : N. JOHNSON
Sample No. : M-14B	Test Method : D422	Checked by : S. CAPPS

Location :

Soil Description : YELLOW/TAN CLAYEY SILTY SAND

Remarks :

COARSE SIEVE SET

Sieve Mesh	Sieve Openings Inches	Millimeters	Weight Retained (gm)	Cumulative Weight Retained (gm)	Percent Finer (%)
#4	0.187	4.75	0.00	0.00	100
#10	0.079	2.00	0.00	0.00	100
#16	0.046	1.18	0.07	0.07	100
#30	0.024	0.60	0.35	0.42	100
#50	0.012	0.30	16.10	16.52	86
#100	0.006	0.15	64.88	81.40	31
#200	0.003	0.07	18.09	99.49	16

Total Weight of Sample = 118.24

Tare Weight = 0

D85 : 0.2963 mm

D60 : 0.2162 mm

D50 : 0.1906 mm

D30 : 0.1433 mm

D15 : 0.0603 mm

D10 : 0.0095 mm

Soil Classification

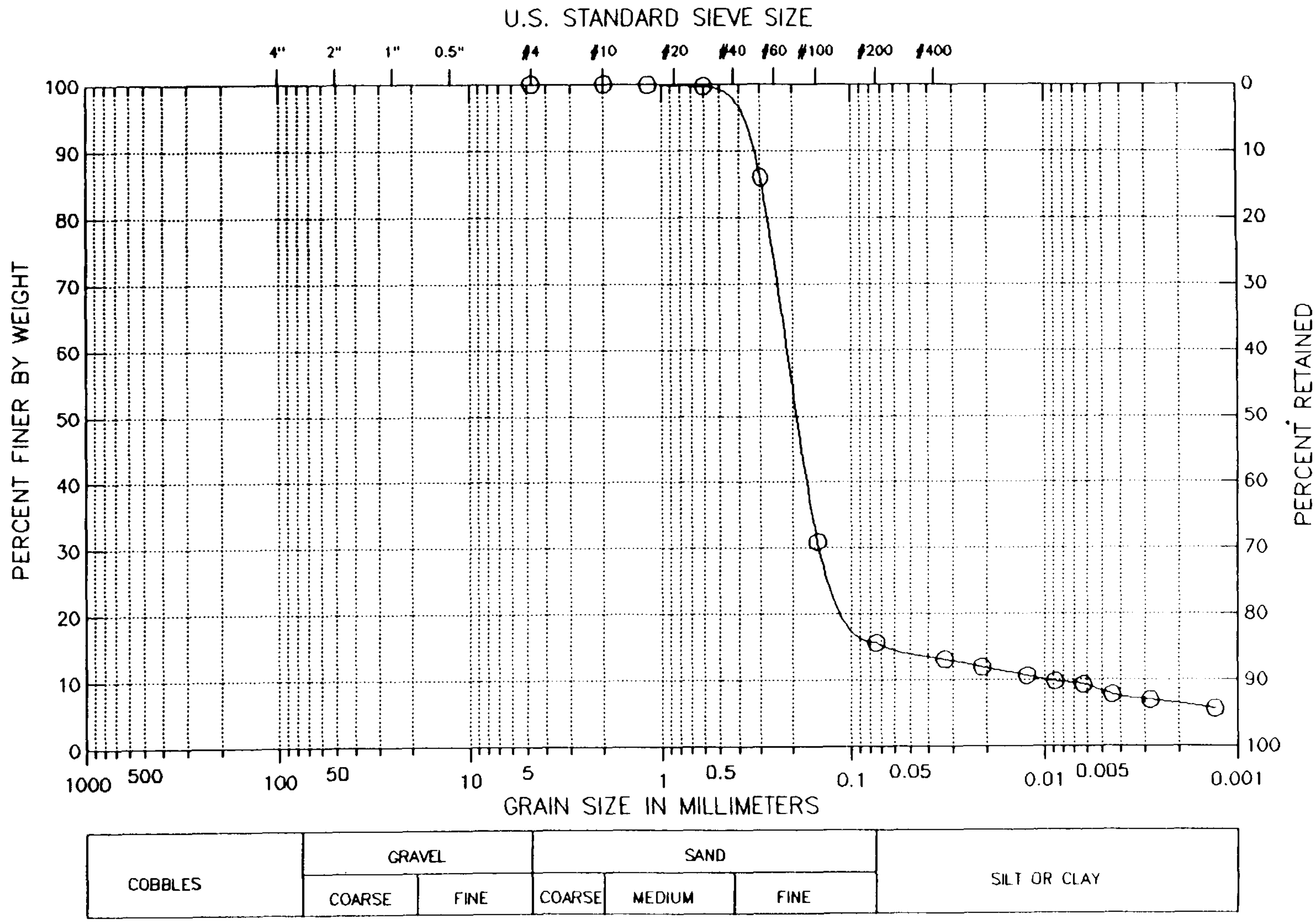
ASTM Group Symbol : N/A

ASTM Group Name : N/A

AASHTO Group Symbol : A-1-b(0)

AASHTO Group Name : Stone Fragments, Gravel and Sand

	Boring No. : M-14B Sample No.: M-14B Tested by : N. JOHNSON Filename : M14B	Project : JAMES M. MONTGOMERY Project No.: 90C0137A Location: Date : Fri Mar 22 1991



Classification :
()

Visual Description :
YELLOW/TAN CLAYEY SILTY SAND

Remarks :

Figure 1

GEOTECHNICAL LABORATORY TEST DATA

Project : JAMES M. MONTGOMERY
Filename : M108B
Project No. : 90C0137A
Depth : 50.0'
Elevation :
Boring No. : M-108B
Test Date : 03/20/91
Tested by : N. JOHNSON
Sample No. : M-108B
Test Method : D422
Checked by : S. CAPPS
Location :
Soil Description : YELLOW/TAN CLAYEY SILTY SAND
Remarks :

HYDROMETER

Hydrometer ID : 1734
Weight of air-dried soil = 120 gm
Specific Gravity = 2.65

Hygroscopic Moisture Content :
Weight of Wet Soil = 120 gm
Weight of Dry Soil = 117.81 gm
Moisture Content = 0.0185893

Elapsed Time (min)	Reading	Temperature (deg. C)	Corrected Reading	Particle Size (mm)	Percent Finer (%)	Adjusted Particle Size
2.00	21.00	22.10	12.68	0.034	11	0.034
5.00	20.00	22.00	11.64	0.021	10	0.021
15.00	19.50	21.90	11.09	0.012	9	0.012
30.00	19.00	21.90	10.59	0.009	9	0.009
60.00	18.50	21.90	10.09	0.006	9	0.006
120.00	18.00	22.20	9.73	0.004	8	0.004
300.00	17.00	22.80	9.00	0.003	8	0.003
1440.00	17.00	22.00	8.64	0.001	7	0.001

GEOTECHNICAL LABORATORY TEST DATA

Project : JAMES M. MONTGOMERY
Filename : M108B
Project No. : 90C0137A
Depth : 50.0'
Elevation :
Boring No. : M-108B
Test Date : 03/20/91
Tested by : N. JOHNSON
Sample No. : M-108B
Test Method : D422
Checked by : S. CAPPS
Location :
Soil Description : YELLOW/TAN CLAYEY SILTY SAND
Remarks :

COARSE SIEVE SET

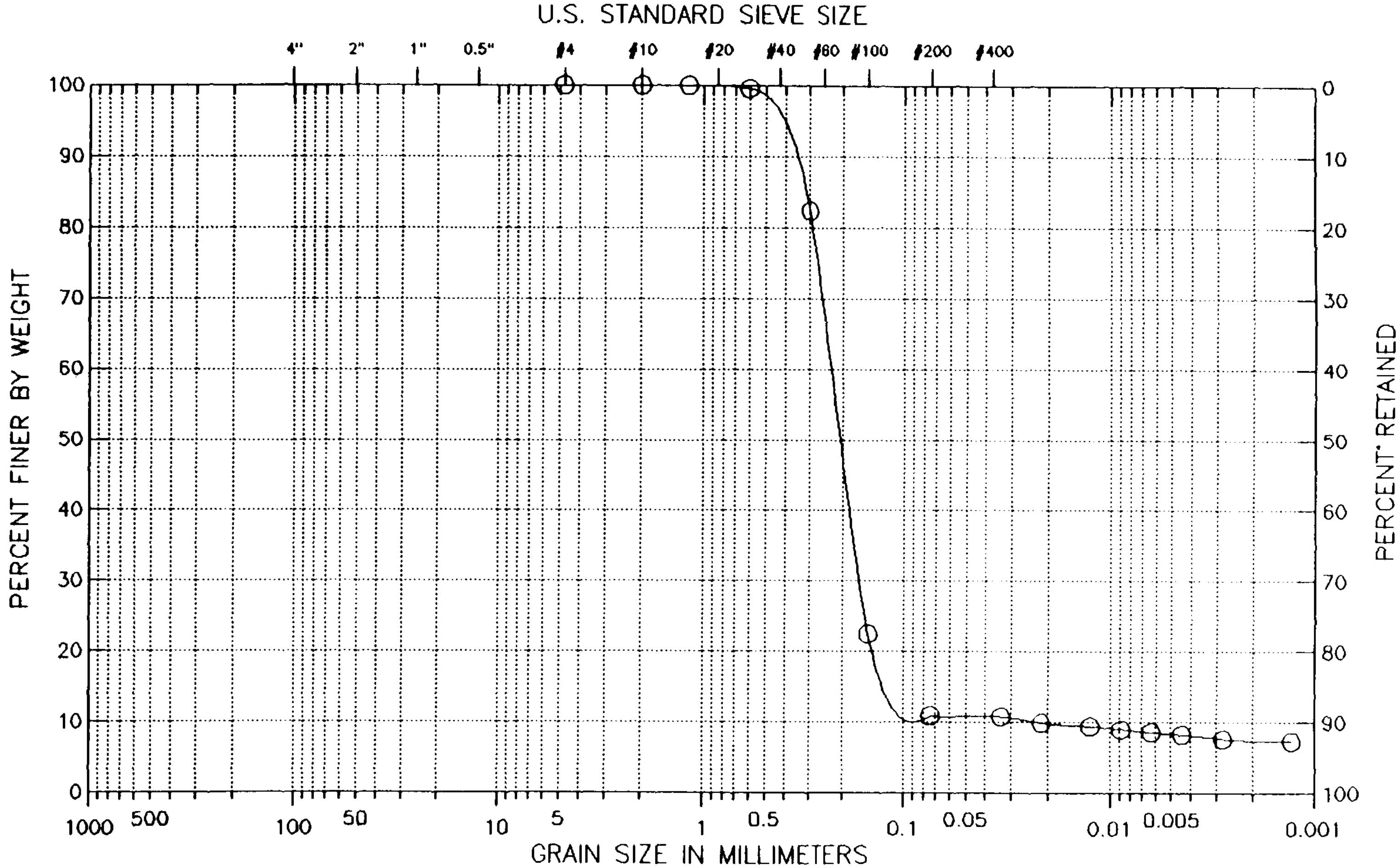
Sieve Mesh	Sieve Openings Inches	Millimeters	Weight Retained (gm)	Cumulative Weight Retained (gm)	Percent Finer (%)
#4	0.187	4.75	0.00	0.00	100
#10	0.079	2.00	0.00	0.00	100
#16	0.046	1.18	0.00	0.00	100
#30	0.024	0.60	0.52	0.52	100
#50	0.012	0.30	20.28	20.80	82
#100	0.006	0.15	70.30	91.10	23
#200	0.003	0.07	13.65	104.75	11

Total Weight of Sample = 117.81
Tare Weight = 0

D85 : 0.3343 mm
D60 : 0.2316 mm
D50 : 0.2063 mm
D30 : 0.1636 mm
D15 : 0.0949 mm
D10 : 0.0227 mm

Soil Classification
ASTM Group Symbol : N/A
ASTM Group Name : N/A
AASHTO Group Symbol : A-1-b(0)
AASHTO Group Name : Stone Fragments, Gravel and Sand

	Boring No. : M-108B Sample No.: M-108B Tested by : N. JOHNSON Filename : M108B	Project : JAMES M. MONTGOMERY Project No.: 90C0137A Location: Date : Fri Mar 22 1991



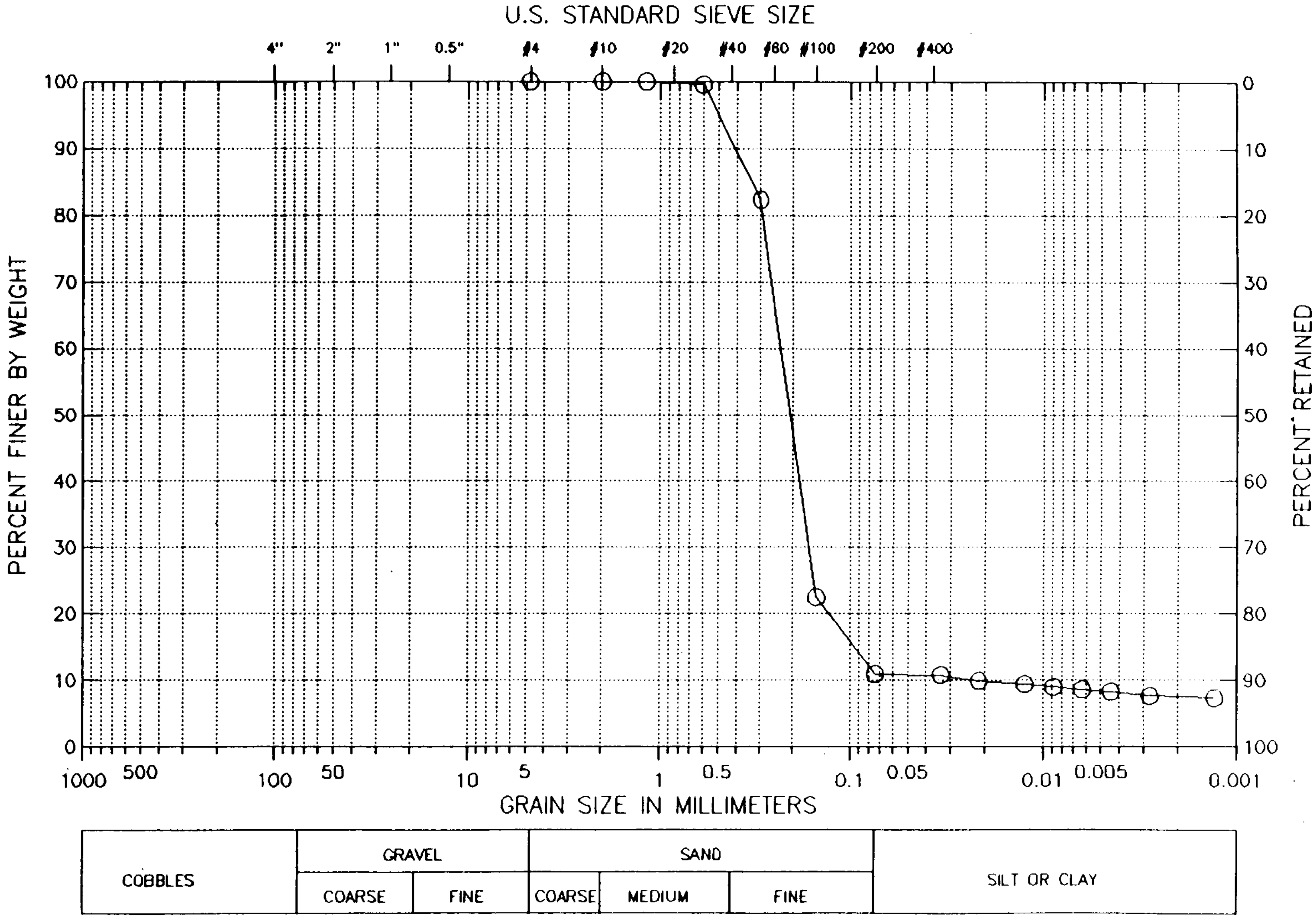
COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

Classification :
()

Remarks :

Visual Description :
YELLOW/TAN CLAYEY SILTY SAND

	Boring No. : M-108B Sample No.: M-108B Tested by : N. JOHNSON Filename : M108B	Project : JAMES M. MONTGOMERY Project No.: 90C0137A Location: Date : Fri Mar 22 1991



Classification :
()

Visual Description :
YELLOW/TAN CLAYEY SILTY SAND

Remarks :

Figure 1

GEOTECHNICAL LABORATORY TEST DATA

Project : JAMES M. MONTGOMERY
Filename : M10A
Project No. : 90C0137A
Depth : 4.0'
Elevation :
Boring No. : M-10A
Test Date : 03/20/91
Tested by : N. JOHNSON
Sample No. : M-10A
Test Method : D422
Checked by : S. CAPPS
Location :
Soil Description : BROWN CLAYEY SILTY SAND
Remarks :

HYDROMETER

Hydrometer ID : 1734
Weight of air-dried soil = 120 gm
Specific Gravity = 2.65

Hygroscopic Moisture Content :
Weight of Wet Soil = 120 gm
Weight of Dry Soil = 119.02 gm
Moisture Content = 0.00823391

Elapsed Time (min)	Reading	Temperature (deg. C)	Corrected Reading	Particle Size (mm)	Percent Finer (%)	Adjusted Particle Size
2.00	21.50	22.10	13.18	0.034	11	0.034
5.00	19.20	22.10	10.88	0.022	9	0.022
15.00	17.50	21.90	9.09	0.013	8	0.013
30.00	17.00	21.90	8.59	0.009	7	0.009
60.00	16.00	21.80	7.55	0.006	6	0.006
120.00	15.10	22.10	6.78	0.005	6	0.005
300.00	14.80	23.00	6.89	0.003	6	0.003
1440.00	13.50	22.20	5.23	0.001	4	0.001

GEOTECHNICAL LABORATORY TEST DATA

Project : JAMES M. MONTGOMERY
Filename : M10A
Project No. : 90C0137A
Depth : 4.0'
Elevation :
Boring No. : M-10A
Test Date : 03/20/91
Tested by : N. JOHNSON
Sample No. : M-10A
Test Method : D422
Checked by : S. CAPPS
Location :
Soil Description : BROWN CLAYEY SILTY SAND
Remarks :

COARSE SIEVE SET

Sieve Mesh	Sieve Openings Inches	Millimeters	Weight Retained (gm)	Cumulative Weight Retained (gm)	Percent Finer (%)
#4	0.187	4.75	0.00	0.00	100
#10	0.079	2.00	0.00	0.00	100
#16	0.046	1.18	0.27	0.27	100
#30	0.024	0.60	0.94	1.21	99
#50	0.012	0.30	18.04	19.25	84
#100	0.006	0.15	57.42	76.67	35
#200	0.003	0.07	21.53	98.20	17

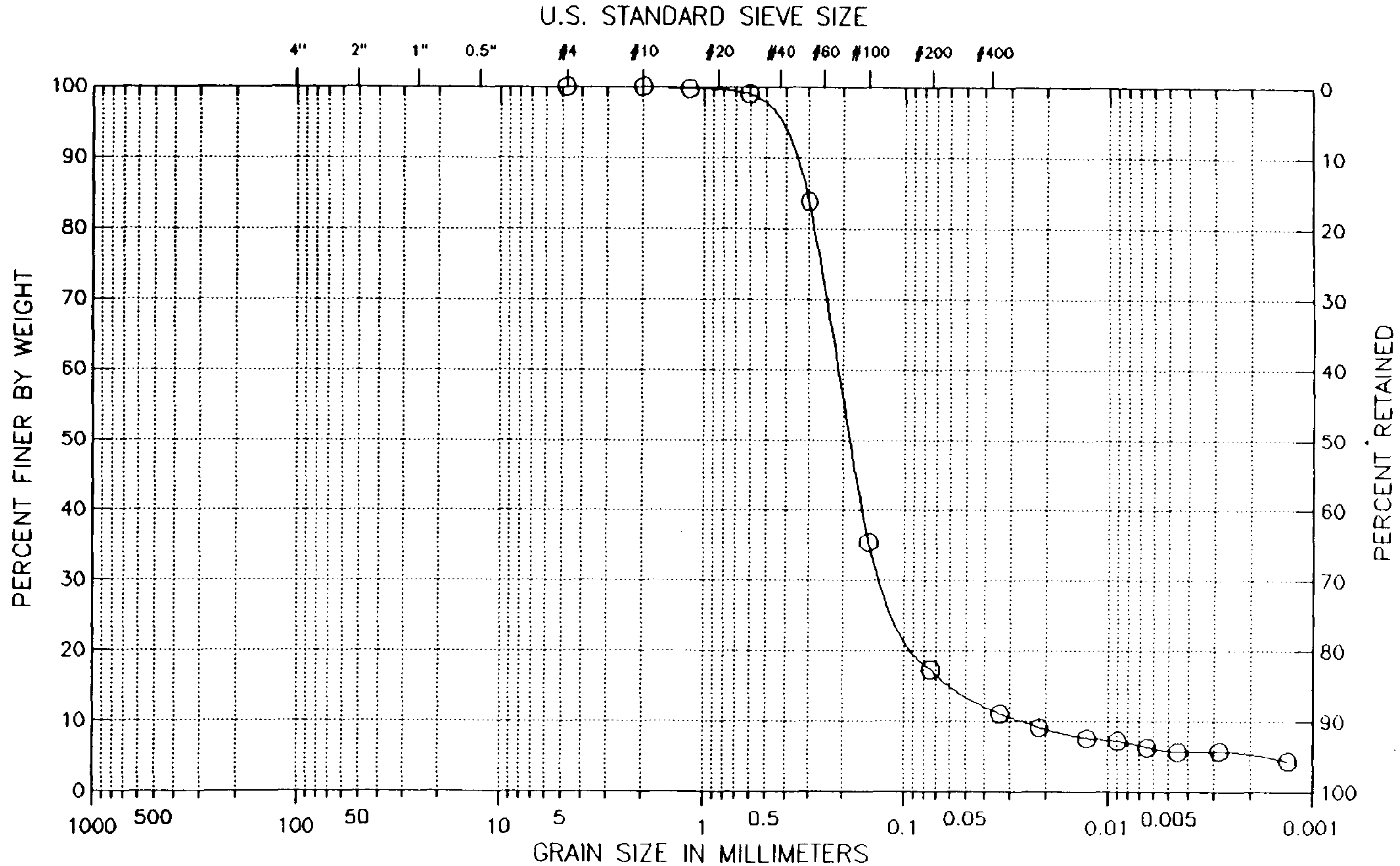
Total Weight of Sample = 119.02
Tare Weight = 0

D85 : 0.3169 mm
D60 : 0.2132 mm
D50 : 0.1847 mm
D30 : 0.1211 mm
D15 : 0.0549 mm
D10 : 0.0262 mm

Soil Classification

ASTM Group Symbol : N/A
ASTM Group Name : N/A
AASHTO Group Symbol : A-1-b(0)
AASHTO Group Name : Stone Fragments, Gravel and Sand

	Boring No. : M-10A Sample No.: M-10A Tested by : N. JOHNSON Filename : M10A	Project : JAMES M. MONTGOMERY Project No.: 90C0137A Location: Date : Fri Mar 22 1991



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

Classification :
()
Visual Description :
BROWN CLAYEY SILTY SAND

Remarks :

GEOTECHNICAL LABORATORY TEST DATA

Project : JAMES M. MONTGOMERY
Filename : M103A
Project No. : 90C0137A
Depth : 15.0'
Elevation :
Boring No. : M-103A
Test Date : 03/20/91
Tested by : N. JOHNSON
Sample No. : M-103A
Test Method : D422
Checked by : S. CAPPS
Location :
Soil Description : GRAY CLAYEY SILTY SAND
Remarks :

HYDROMETER

Hydrometer ID : 1734
Weight of air-dried soil = 120 gm
Specific Gravity = 2.65

Hygroscopic Moisture Content :
Weight of Wet Soil = 120 gm
Weight of Dry Soil = 113.9 gm
Moisture Content = 0.0535558

Elapsed Time (min)	Reading	Temperature (deg. C)	Corrected Reading	Particle Size (mm)	Percent Finer (%)	Adjusted Particle Size
2.00	17.00	22.10	8.68	0.035	8	0.035
5.00	15.50	22.10	7.18	0.022	6	0.022
15.00	14.90	21.90	6.49	0.013	6	0.013
30.00	14.00	21.90	5.59	0.009	5	0.009
60.00	13.50	21.90	5.09	0.006	4	0.006
120.00	13.00	22.20	4.73	0.005	4	0.005
300.00	12.10	23.00	4.19	0.003	4	0.003
1440.00	12.00	22.20	3.73	0.001	3	0.001

GEOTECHNICAL LABORATORY TEST DATA

Project : JAMES M. MONTGOMERY
Filename : M103A
Project No. : 90C0137A
Depth : 15.0'
Elevation :
Boring No. : M-103A
Test Date : 03/20/91
Tested by : N. JOHNSON
Sample No. : M-103A
Test Method : D422
Checked by : S. CAPPS
Location :
Soil Description : GRAY CLAYEY SILTY SAND
Remarks :

COARSE SIEVE SET

Sieve Mesh	Sieve Openings Inches	Millimeters	Weight Retained (gm)	Cumulative Weight Retained (gm)	Percent Finer (%)
#4	0.187	4.75	0.00	0.00	100
#10	0.079	2.00	0.00	0.00	100
#16	0.046	1.18	0.00	0.00	100
#30	0.024	0.60	0.03	0.03	100
#50	0.012	0.30	6.33	6.36	94
#100	0.006	0.15	48.78	55.14	51
#200	0.003	0.07	38.52	93.66	17

Total Weight of Sample = 113.9
Tare Weight = 0

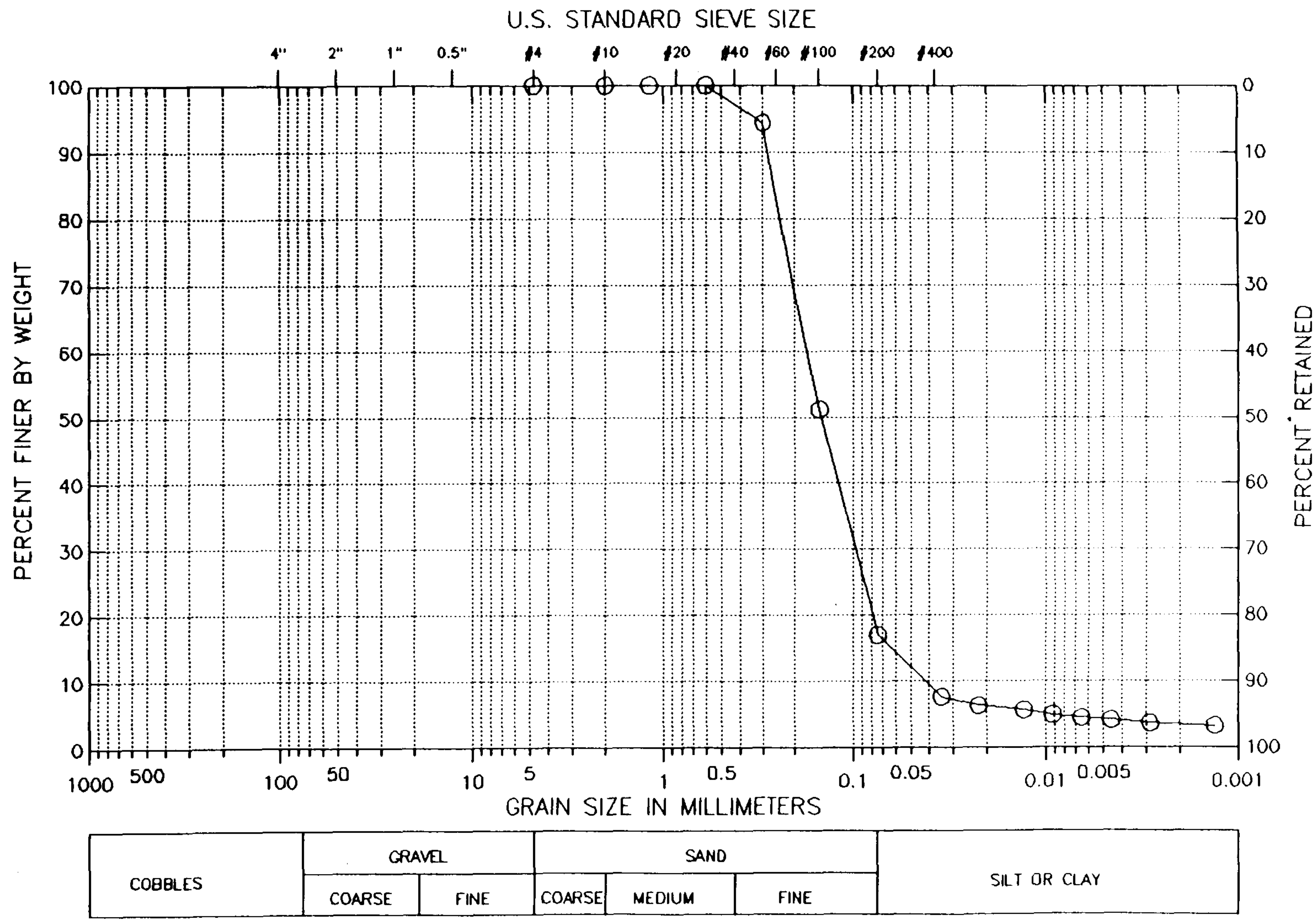
D85 : 0.2582 mm
D60 : 0.1729 mm
D50 : 0.1465 mm
D30 : 0.0968 mm
D15 : 0.0628 mm
D10 : 0.0419 mm

Soil Classification

ASTM Group Symbol : N/A
ASTM Group Name : N/A
AASHTO Group Symbol : A-1-b(0)
AASHTO Group Name : Stone Fragments, Gravel and Sand

Boring No. : M-103A
Sample No: M-103A
Tested by : N. JOHNSON
Filename : M103A

Project : JAMES M. MONTGOMERY
Project No.: 90C0137A
Location:
Date : Fri Mar 22 1991



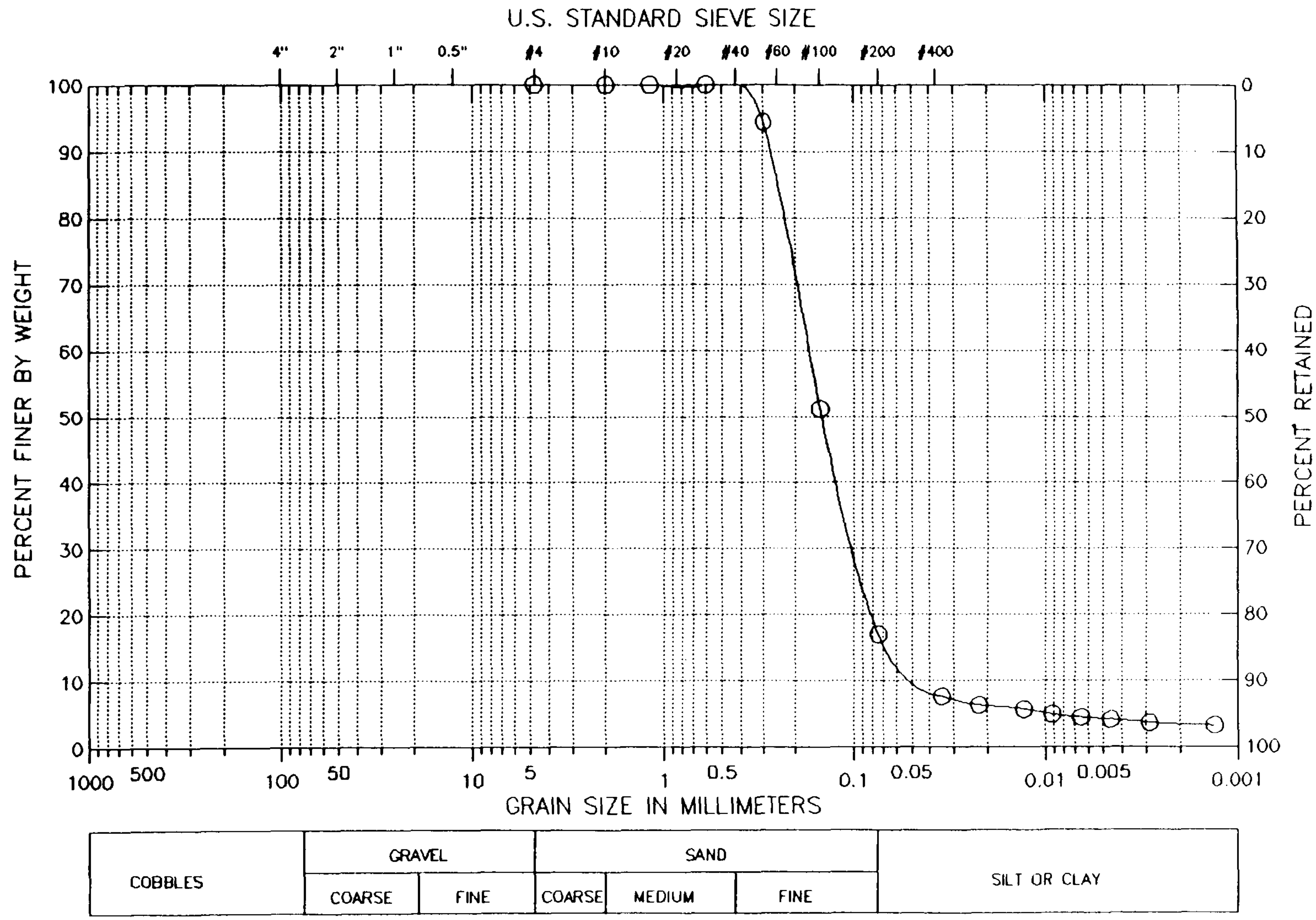
Classification :
()
Visual Description :
GRAY CLAYEY SILTY SAND

Remarks :

Figure 1

Continue

Boring No. : M-103A	Project : JAMES M. MONTGOMERY
Sample No.: M-103A	Project No.: 90C0137A
Tested by : N. JOHNSON	Location:
Filename : M103A	Date : Fri Mar 22 1991



Classification :
()
Visual Description :
GRAY CLAYEY SILTY SAND

Remarks :