REQUEST FOR PROPOSALS

FOR THE COMPLETION OF THE PICACHO SOLID WASTE SITE CONSTRUCTION DOCUMENTS IN IMPERIAL COUNTY;

COUNTY PROJECT NO. 4547SW

Requested by:

John A. Gay, PE
Director of Public Works

Prepared By:

Jose Castaneda, MBA
Administrative Analyst III

Reviewed By:

David Dale, PE
Assistant Director

Deadline for Submissions: August 11, 2023 by 4:00 P.M

Imperial County
Department of Public Works
155 S. 11th Street
El Centro, CA 92243

PROPOSALS MUST BE SUBMITTED ON THE SPECIFIED DATE AND TIME. THE COUNTY WILL NOT CONSIDER PROPOSALS RECEIVED AFTER THE DUE DATE. AN AMENDMENT IS CONSIDERED A NEW PROPOSAL AND WILL NOT BE ACCEPTED AFTER THE SPECIFIED DATE AND TIME.

July 5, 2023

Table of Contents

EXHIBITS

A – Location Maps

B – Contact information for Regulatory/Permitting Agencies

C - Sample Proposal Evaluation Form

D – Sample Consultant Agreement and Insurance Requirements*
No changes shall be made to consultant agreement.

E – Final Closure Post Closure Maintenance Map

F – Regulatory Agency Approval of the Final Closure Post Closure Maintenance Map

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SPECIAL NOTICE

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Notification of Contractor Registration Requirements (where required)

Pursuant to the requirements of California Labor Code section 1771.1, all contractors and subcontractors that wish to engage in public work through a public works contract must be registered with the Department of Industrial Relations (DIR).

Beginning March 1, 2015, no contractor or subcontractor may be listed on a bid proposal for a public works project unless registered with DIR.

Beginning April 1, 2015, no contractor or subcontractor may be awarded a contract for public work on a public works project unless registered with the DIR, pursuant to Labor Code section 1725.5

All contractors, including subcontractors, listed in the proposal must be registered with the DIR at the time proposals are due, and must submit proof of registration with the proposal. Any proposals received listing unregistered contractors and/or subcontractors will be deemed non-responsive.

Application and renewal are completed online with a non-refundable fee of $300. Read the Public Works Reforms (SB 854) Fact Sheet for requirements. Instructions for completing the form and additional information can be found on the DIR website.

This Project is subject to compliance monitoring and enforcement by the Department of Industrial Relations (DIR).

SOURCES OF INFORMATION

INFORMATION	WEBSITE
Department of Industrial Relations (Public Works)	http://www.dir.ca.gov/Public-Works/PublicWorks.html
SB 854 Fact Sheet	http://www.dir.ca.gov/Public-Works/PublicWorksSB854.html
Senate Bill 854 Compliance	http://www.dir.ca.gov/Public-Works/SB854.html
Public Works Contractor (PWC) Registration	https://efiling.dir.ca.gov/PWCR/
Classifications and Minimum Labor Rates	http://www.dir.ca.gov/OPRL/Pwd/

Imperial County
Department of Public Works

Request for Proposals for Completion of the Picacho Solid Waste Site Construction Documents in Imperial County;
County Project No. 4547SW

July 5, 2023

I. PURPOSE AND BACKGROUND

The Imperial County Department of Public Works (ICDPW) is requesting proposals from qualified and experienced firms for the above mentioned locally funded project in Imperial County. One firm will be selected from this RFP.

The purpose of the Request for Proposals (RFP) is to provide the Department of Public Works with the required construction documents for the Picacho Solid Waste Site Final Closure Construction so that this County administered project can be advertised, awarded, and constructed in compliance with all applicable federal, state, and local regulations.

Qualified entities are invited to submit written proposals for consideration in accordance with this request. These services will be conducted under a contract with the County of Imperial, hereinafter referred to as "County" and the consultant entity, hereinafter referred to as "Consultant". The contract will be regulated according to the provisions of all federal, state and local laws and ordinances that are applicable. This includes compliance with prevailing wage rates and their payment in accordance with the Davis Bacon Wage Determinations.

Disadvantaged Business Enterprises (DBE), Minority Business Enterprise (MBE), Women Business Enterprise (WBE) and Veteran Owned Businesses (VOB) are encouraged to participate.

The Picacho Solid Waste Site (PSWS) is owned by the Quechan Tribe and is operated by the Imperial County Department of Public Works. The site last accepted waste on December 3, 2011 after reaching its maximum design site capacity.

The PSWS served the eastern portion of Imperial County and the Fort Yuma-Quechan Reservation. The site accepted waste from the surrounding unincorporated area of the County within a 30-mile radius of the township of Winterhaven and Bard. The approximate latitude of the site is 32 48’ 51” N and the approximate longitude is 114 37’13” W. The site is located within the Fort Yuma Indian Reservation occupied by the Quechan Indian Tribe.

The landfill is located in a rural area at the base of the Cargo Muchacho Mountains. The legal description of the site by the government survey method is: a portion of the Northeast quarter of Section 35, Township 15 South, Range 22 east, San Bernardino

Baseline and Meridian.

The PSWS was permitted to accepted mixed municipal refuse that is classified Class III non-hazardous solid waste and construction/demolition waste. No liquid or hazardous waste has knowingly been accepted at the site.

Bryan A. Stirrat and Associates prepared a Final Closure Post Closure Maintenance Plan (FCPCMP) which details the closure activities and requirements and is available for review at the ICDPW. The document has been circulated by the US Department of Environmental Protection (EPA) for site exemptions requested. The EPA approved the exemption on October 5, 2016: https://www.regulations.gov/document?D=EPA-R09-RCRA-2015-0445-0019 .

Closure of the PSWS will be performed in accordance with applicable regulatory federal standards. The components and systems required for closure of the PSWS form the Final Closure Plan and include the final grading plan, final cover design, surface water drainage and erosion control systems, landfill gas monitoring system, ground water monitoring system, and site security. Note that the landfill gas monitoring systems and ground water monitoring systems are in place and will need to be protected in place during construction.

At the time of construction, the Resident Engineer/Inspector and Quality Assurance Material Testing Firm consultant shall be obtained by County independently via a separate RFP process. Please note that the consultant selected for the current RFP will not be able to submit for the RE or Material Testing RFPs expected for the construction portion of the project.

II. PROJECT POSTING AND SCHEDULING

This RFP is being distributed over the internet and is posted at the County of Imperial Department of Public Works website at the following address: http://www.co.imperial.ca.us/publicwork/default.htm under “Projects out to Bid.” Consultants wishing to propose in response to this RFP must obtain this document from our website. Due to the fact that anyone can download the RFP and the County has no method for tracking the distribution, the County is not able to maintain a list of potential consultants and/or proposers and cannot provide individual notification of amendments or addendums to this RFP.

The County will therefore post any addendums to the RFP on the above mentioned website. All consultants shall refer to the website to verify all addendums that have been issued and that they have acknowledged all such addendums in their proposal.

Proposed Schedule of Events

Issue Request for Proposals	July 5, 2023

Requests for clarification must be submitted	July 31, 2023
Proposals Due	August 11, 2023
Consultant Selection	August 2023
County Awards Contract	September 2023
Notice to Proceed	October 2023

III. SCOPE OF WORK

The selected consultant will provide the necessary construction documents to the County Public Works Department in accordance with all provisions within this RFP. The construction documents will serve as the basis for advertisement of the construction project and request for bids.

1. Review available material for PSWS including approved FCPCMP. Become familiar with site issues for project completion.

2. Propose and forecast a schedule for project completion. Coordinate with ICDPW to include the construction portion and notification to the required regulatory agencies.

3. In October 2016, the Environmental Protection Agency (EPA) approved a final determination for the “Site-Specific Flexibility for Closure and Monitoring of Picacho Landfill” or Site-Specific Flexibility Request (SSFR) as submitted by the County of Imperial. . Any other required permit not yet secured will need to be secured by the consultant.

4. The Consultant must coordinate directly with the Quechan Tribe on all aspects of the project. The Quechan Tribe has its own government structure. The Consultant must have an accountable process to ensure meaningful and timely input from tribal officials and incorporate the input into the project until approved by the Tribe.

5. Coordinate directly with all regulatory agencies for all requirements, applications, submissions, permits, and clearances.

6. Prepare construction bid documents for project advertisement. Construction documents include plans and specification.

7. Plans and specification must be submitted to the County for plan checking at a 90% level. The consultant will also submit copies to the regulatory agencies providing oversight for the project.

8. Provide bid support during advertisement of the project. All questions submitted during

the bid phase for this project will be addressed by the consultant in written format. Answers will formatted by county and released as an addendum.

9. Bi-weekly updates of progress to ICDPW.

10. Consultant shall provide engineering support during bid process and during the construction of the final cover construction and coordinate as necessary during the construction with the contractor, county and the Resident Engineer/Inspector and QA/QC consultant to address any deficiencies or clarifications in consultant design as well as review any RFIs.

Throughout the course of the project, Consultant will maintain orderly project files. All tracings, plans, specifications and maps prepared or obtained under the terms of the agreement with County shall be delivered to and become property of the County; and basic survey notes and sketches, charts, computations and other data prepared or obtained under such agreement shall be made available upon request to the County without restriction or limitation on their use.

Deliverables:

Deliverables will include the following:

- One (1) draft of the Plans and Specifications (bid documents) for Imperial County review (including a copy in Portable Document Format).
- Two (2) final copies of the Plans and Specifications after approvals by all Regulatory Agencies (if required). Plans must be submitted on mylar media and sized appropriately for submission on 24x36.
- One (1) thumb drive copy (including tables, figures, CADD drawings, appendices, permits, acceptance letters) of the plans and specifications in PDF and executable formats.

At the conclusion of the project, Consultant shall submit to the County a project completion file which contains the required information, test results, forms, certifications, communications, and other information pertaining to the project. The report will be clearly labeled with the title:

Completion of the Picacho Solid Waste Site Construction Documents in Imperial County; County Project No. 4547SW

Document will serve as a record of the project. A copy of the record of the project is to be provided in Portable Document Format (PDF) on one (1) USB thumb drive. The required project file will need to be submitted before the final payment and retention will be released.

It is requested that responders submit a <u>lump sum fee based on the milestones described</u>

in this RFP (Section V.E.5) o perform the services set forth in the scope of work. Provide a clear breakdown of the costs by milestone including staff or by item, by hour. No subcontractors shall be utilized without prior authorization by County.

The County of Imperial Disadvantaged Business Enterprise (DBE) Program affirms the utilization and participation of qualified disadvantaged business firms in its contracting and procurement activities. The County encourages general and prime contractors to afford competitive subcontracting opportunities to disadvantaged firms, where possible, in their contracting and procurement activities with the County of Imperial.

IV. RESPONSIBILITIES OF THE COUNTY

1. This RFP is being conducted in accordance with the “One Step RFP” as per Chapter 10, “Consultant Selection”, of the Caltrans Local Assistance Procedures Manual. The County reserves the option of conducting an oral interview portion for the selection process. Participants will be notified in such occurrence.

2. The County will direct the development of the project, provide management oversight, and conduct administrative arrangements only.

3. The County will pay an agreed upon amount normally within 30 days after submittal of an invoice(s). County will retain 5% of each invoice until the completion of the project. At the completion of the project, the consultant should invoice the County for the retention. Imperial County Agreements are lump sum fixed fee.

4. The County will provide a template for the plans and boiler plate specifications for use on this contract.

5. The County will not provide dedicated workplace facilities, but upon request will provide a conference room for meetings with the Department staff and Consultant.

6. The County reserves the right to perform any portion of the scope of work by use of County personnel or other consultants should the County determine it would be in the best interest of the County to do so.

V. PROPOSAL CONTENT AND INFORMATION

Proposals should be typed, organized and concise yet comprehensive.

A. General Requirements

1. Provide a cover letter.

2. State the interpretation of the work to be performed. State a positive commitment to perform the scope of work in the required manner and time frame; include a basic summary and understanding of the project. Provide a statement that the offer is valid for at least a ninety (90) day period.

3. Provide the name(s) of the primary and/or alternate individuals authorized to respond to this RFP. Include titles, addresses, email if available and phone number. Also provide the name of Project Manager.

4. The Consultant is representing itself as a qualified professional. Therefore, it is acceptable to submit recommendations and comments for consideration on format, process, schedule, and additional content of projects. The County will consider comments and recommendations; however, is not required to select any of the recommendations or comments.

5. Expensive bindings, colored displays, promotional material, etc., are neither necessary nor desired. Emphasis should be concentrated on conformance to the RFP instructions, responsiveness to the RFP requirements, and on completeness and clarity of content.

6. If any subcontractors are utilized, the lead Consultant must submit a description of the firm, the portion of work to be done, and cost of each subcontractor. All subcontracts exceeding $25,000 in cost shall contain all required provisions of the prime contract.

B. Table of Contents

1. Include a table of contents with identification of material by section and page number.

C. Summary of Qualifications and Experience

2. State whether the firm is local, regional, national or international.

3. Identify the owner(s) of the firm and legal status (sole proprietor, corporation Etc.).
4. Give the location of the office from which work is anticipated to be done, the number of employees of the company and organization chart.

5. Identify the qualifications and résumés of all individuals who will be associated with this service. Include professional registrations and affiliations.

6. Summarize specific experience and qualification for similar and related projects. Describe the services previously performed such as studies, reports, etc. List at least 3 references with telephone numbers and email contact addresses.

D. Analysis of Effort/Methodology

1. Describe the approach for how the work will be performed to address Scope of Work. The proposal shall indicate any specific software, techniques or methodology to be utilized to keep costs within budget and schedule under control.

2. The proposal shall include a sample project timeline as a flow chart or Gantt chart with specific tasks and activities envisions, including staffing, sequence and timing.
3. The proposal shall include methods to support an expedited schedule if requested form the County.

4. Indicate what participation, data and products will be required from the County.

E. Cost and Fees

Please include the cost and fee proposal with the proposal being submitted. Proposals will be reviewed and ranked and the top ranking firm will be contacted to begin the negotiations process. The cost proposals shall take into account the following:

1. Develop costs and fees for the services requested. A not to exceed fee based on anticipated fully burdened hourly rates for the actual duration of the contract.

2. When preparing cost and fees consider the scope of work involving review of requests for information (RFIs), submittals, project documentation, finalizing forms, certifications and prepare a lump sum fixed fee breakdown based on anticipated staff and hours. Costs should be organized for full time hourly rates. Such hourly rates should be fully burdened or loaded, including full compensation for all overhead and profit. Billing rates shall include provision for normal office costs, including but not limited to office rental, utilities, insurance, cell phone or radio, equipment, normal supplies and materials, in-house reproduction services, and local travel costs. A fixed fee lump sum breakdown by phase of the construction based on billable hours is desirable for preconstruction and post construction.

3. Breakdown shall include all required services for this project. Provide a clear breakdown of the costs by phase including staff or by item, by hour. No subcontractors shall be utilized without prior authorization by the County.

4. A 5% retention rate will be in place for this contract. At the completion of the contract, the consultant is responsible for billing this Department for the retention.

5. Contract milestones for invoice payments will be observed. **<u>Monthly billings will not be accepted for this contract</u>**. Consulting firm may submit an invoice for the mile stone being met based on the approved payment schedule below. The consultant will be notified upon the successful completion of the mile stone and informed about the billing percentage up to the next mile stone. The milestones set for this project are as follows:

    - Up to 5% of the total contract price may be invoiced for the initial coordination, kick off meeting, and document review. **<u>5% cumulative mile stone.</u>**
    - Up to15% of the total contract price may be invoiced for 30% plans and specifications submission. **<u>25% cumulative mile stone.</u>**
    - Up to 15% of the total contract price may be invoiced for 60% plans and specifications submission. **<u>35% cumulative mile stone.</u>**
    - Up to 15% of the total contract price may be invoiced for 90% plans and specifications submission. **<u>50% cumulative mile stone.</u>**
    - Up to 15% of the total contract price may be invoiced for approval of plans and specs by regulatory agencies. **<u>65% cumulative mile stone.</u>**
    - Up to 20% of the total contract price may be invoiced for final plans and specifications submission. **<u>85% cumulative mile stone.</u>**
    - Up to 15% of the total contract price may be invoiced for engineering support during bid process and during the construction of the final cover construction and coordination as necessary during the construction with the contractor, county and the Resident Engineer/Inspector and CQA/CQC consultant to address any deficiencies or clarifications in consultant design as well as review any RFIs. **<u>100% cumulative mile stone.</u>**

    - **Optional – Proposing firms may include an alternate mile stone schedule with their interpretation of the scope of work and basis (per mile stone) for the need of a different schedule. However, the submittal is taken as a suggestion/consideration only and an alternative schedule submitted is subject to negotiation by County.**

    - Insurance requirements noted in sample contract and insurance exhibit are based on projected county estimate and may change when final cost and fees proposal is reviewed.

VI. EVALUATION OF PROPOSALS

Sample evaluation criteria for proposals are attached for your information.

The County will utilize a one-step selection process. Proposals will be reviewed by an evaluation committee. The evaluation committee's assessment and recommendations shall be forwarded to the Director of Public Works for review. The County may utilize a two-step selection process. In this event, proposals deemed responsive may be contacted for oral interviews, prior to final selection. The Director shall provide a report of the committee's evaluation and recommendations, along with his recommendation, for the selection of a firm to the Board of Supervisors for final review and approval to enter into negotiations for an agreement.

Please take note that the County reserves the right to select any consultant who is determined qualified and may not correlate to a number 1, number 2 or even number 3 ranked consultant. Additionally, the County reserves the right to reject any and all proposals submitted and/or request additional information for clarification.

Consultants are to submit one (1) original, three (3) copies, and one (1) electronic copy in Portable Document Format (PDF) on a USB Thumb Drive of the proposal to the appropriate submission place on the specified date and time. Proposal must be clearly titled:

REQUEST FOR PROPOSAL FOR COMPLETION OF THE PICACHO SOLID WASTE SITE CONSTRUCTION DOCUMENTS IN IMPERIAL COUNTY; COUNTY PROJECT NO. 4547SW

Proposals are to be delivered in a sealed envelope, no later than 4:00 P.M., August 11, 2023 addressed to the following:

John A. Gay, P.E
Director of Public Works
County of Imperial Department of Public Works
Attn: Jose Castaneda - Administrative Analyst III
155 S. 11th Street
El Centro, CA 92243

VII. CLOSING ITEMS

No pre-proposal conference has been scheduled for this RFP. Firms interested in viewing the site can coordinate a visit by contacting Jose Castaneda – Administrative Analyst III at josecastaneda@co.imperial.ca.us .

Clarification desired by a respondent relating to definition or interpretation shall be requested in writing with sufficient time to allow for a response and prior to the RFP due date. Requests for clarification must be submitted to Public Works no later 4:00 p.m. on July 31, 2023.Oral explanation or instructions shall not be considered binding on behalf of the County.

Any modifications to this solicitation will be issued by the County as a written addendum.

The County will not consider proposals received after the specified date and time. An amendment is considered a new proposal and will not be accepted after the specified date and time.

Any contract resulting from this RFP will be financed with funds available to the County from local or other grant funds.

This RFP does not commit the County of Imperial to award a contract or pay any costs associated with the preparation of a proposal. The County reserves the right to cancel, in part or in its entirety, this solicitation should this be in the best interest of the County.

Questions concerning this RFP are to be directed to Jose Castaneda, Administrative Analyst III, with the Imperial County Department of Public Works via electronic mail to josecastaneda@co.imperial.ca.us .

Exhibit A – Location Maps

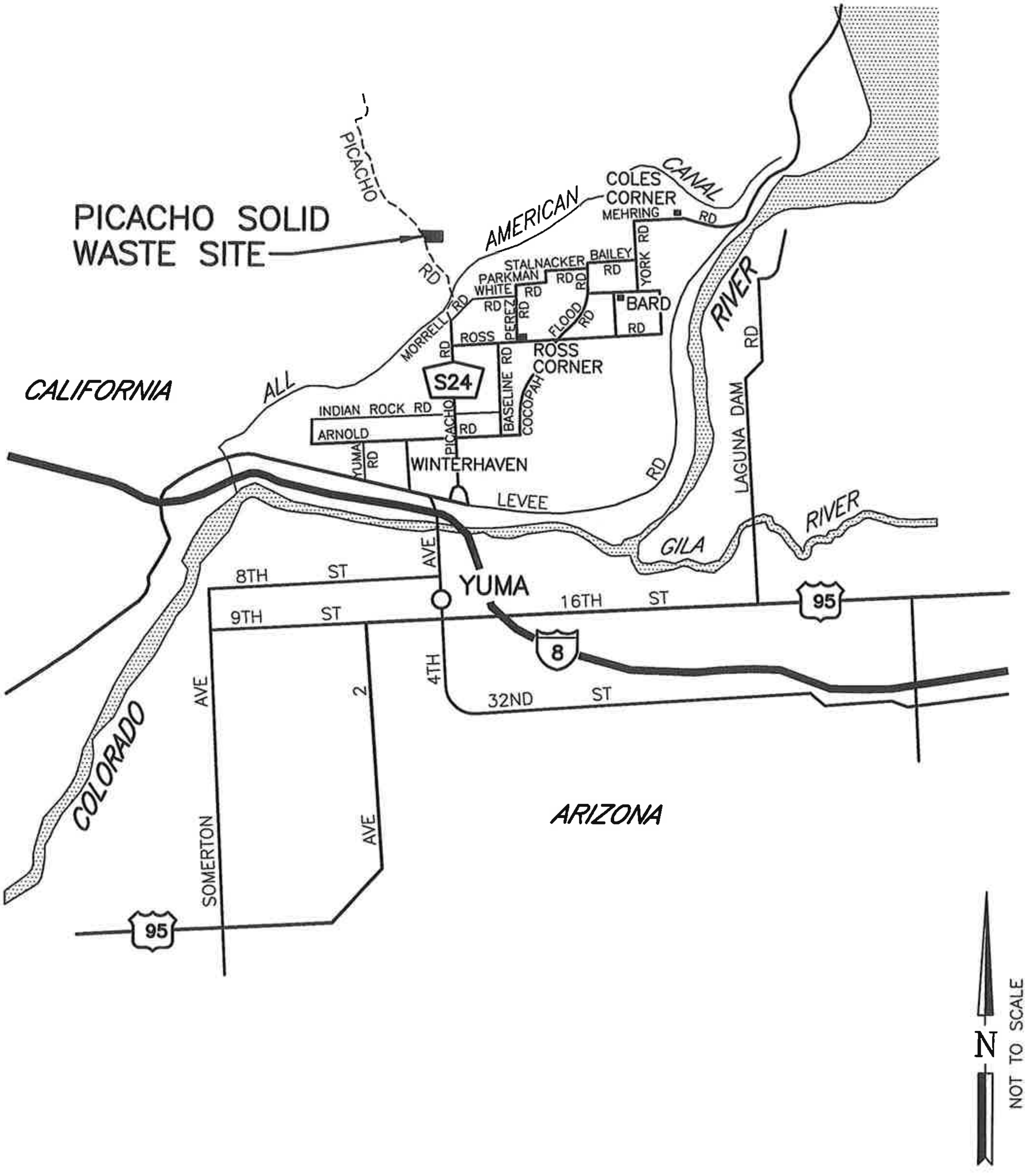


FIGURE 1

G:\DWG\IMPERIAL\ARCHIVED IMPERIAL CD\PICO\17087DB.DWG

BAS
(909) 860-7777
BRYAN A. STIRRAT & ASSOCIATES
CIVIL AND ENVIRONMENTAL ENGINEERS
1360 VALLEY VISTA DRIVE DIAMOND BAR, CA 91765

PICACHO CUT AND FILL SITE

LOCATION & VICINITY MAP

JOB NO.
9510-4A
DATE
6-8-95
DRAWN BY
D.L.L.
FILE NAME
17087DB

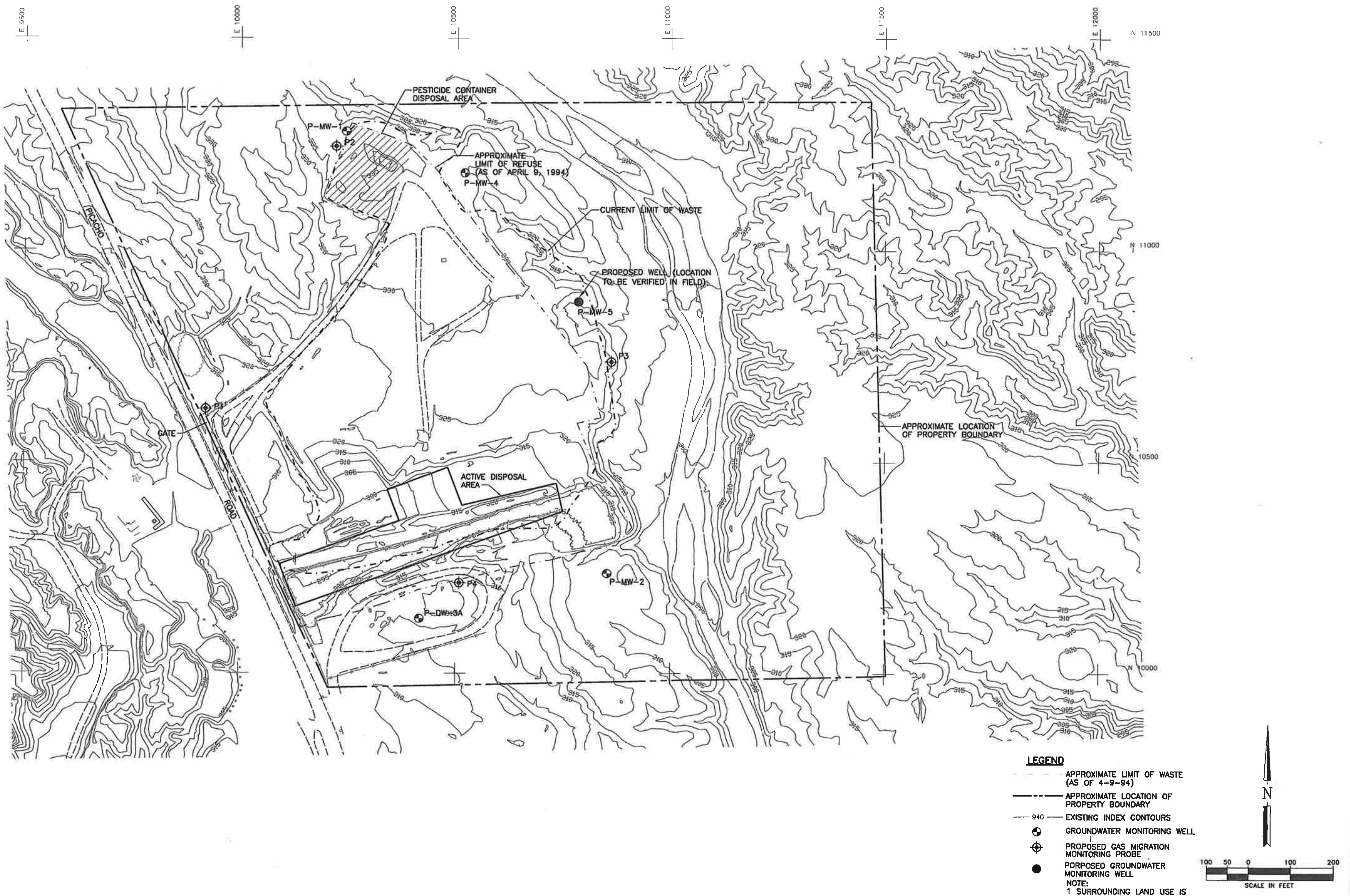


FIGURE 2

Revisions

Sym	Descrip	Date	Apd

COUNTY OF IMPERIAL
DEPARTMENT OF PUBLIC WORKS
155 SOUTH 11TH ST
EL CENTRO, CALIFORNIA, 92243-2853
Phone: (619) 339-4462

1907

BAS
BRYAN A. STIRRAT & ASSOCIATES
CIVIL AND ENVIRONMENTAL ENGINEERS
1360 VALLEY VISTA DRIVE
DIAMOND BAR, CA. 91765 (909) 860-7777

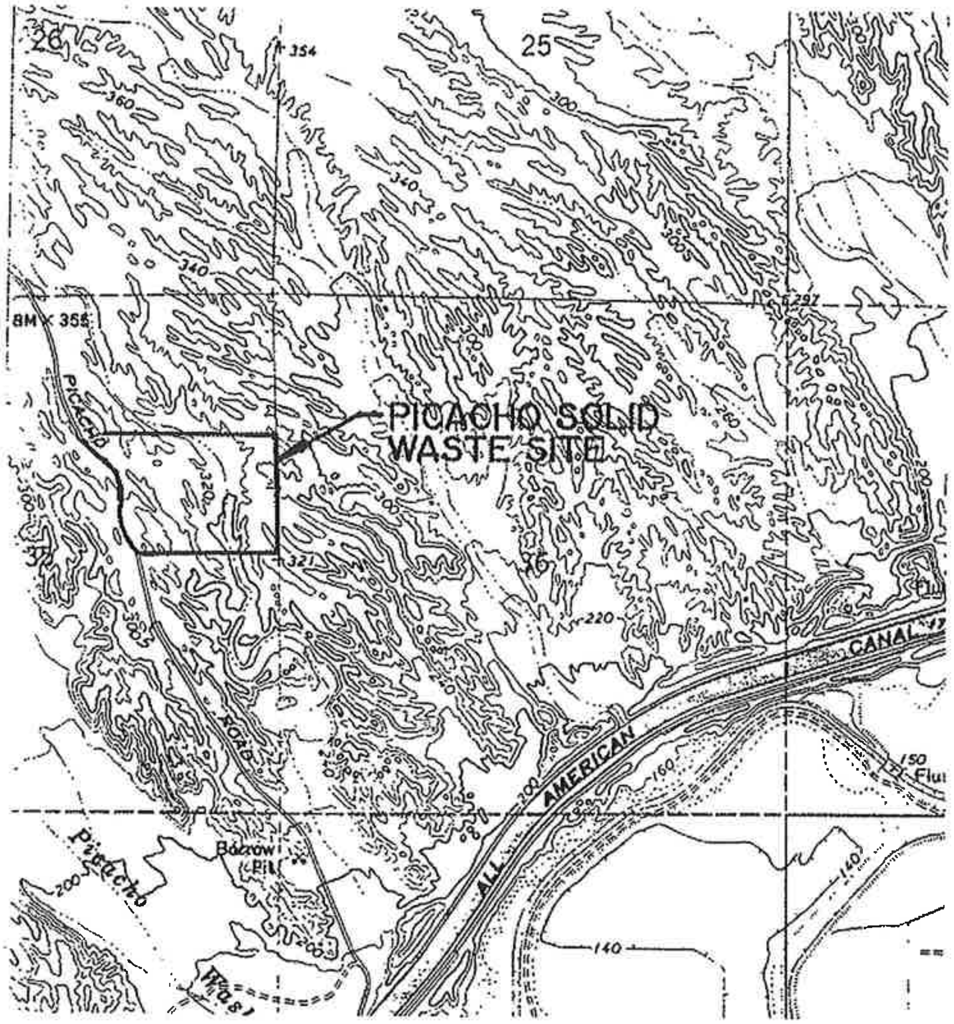
Design A.C.R. Drawn D.L.L. File 263240B
Chkd ___ Appd ___ Date 4-25-95

PICACHO CUT AND FILL SITE

SITE PLAN

Sheet 1 of 1
Rev

9510-004A-D-26-023-0B



N

SCALE: 1"=2,000'

TOPOGRAPHY: U.S.G.S. 7.5 MINUTE-BARD, CALIFORNIA - ARIZONA

FIGURE 3

BAS

(909) 860-7777

BRYAN A. STIRRAT & ASSOCIATES
CIVIL AND ENVIRONMENTAL ENGINEERS
1360 VALLEY VISTA DRIVE DIAMOND BAR, CA 91765

PICACHO CUT AND FILL SITE

PRE-LANDFILL TOPOGRAPHY

JOB NO.	9510-4A
DATE	6-8-95
DRAWN BY	D.L.L.
FILE NAME	173531DB

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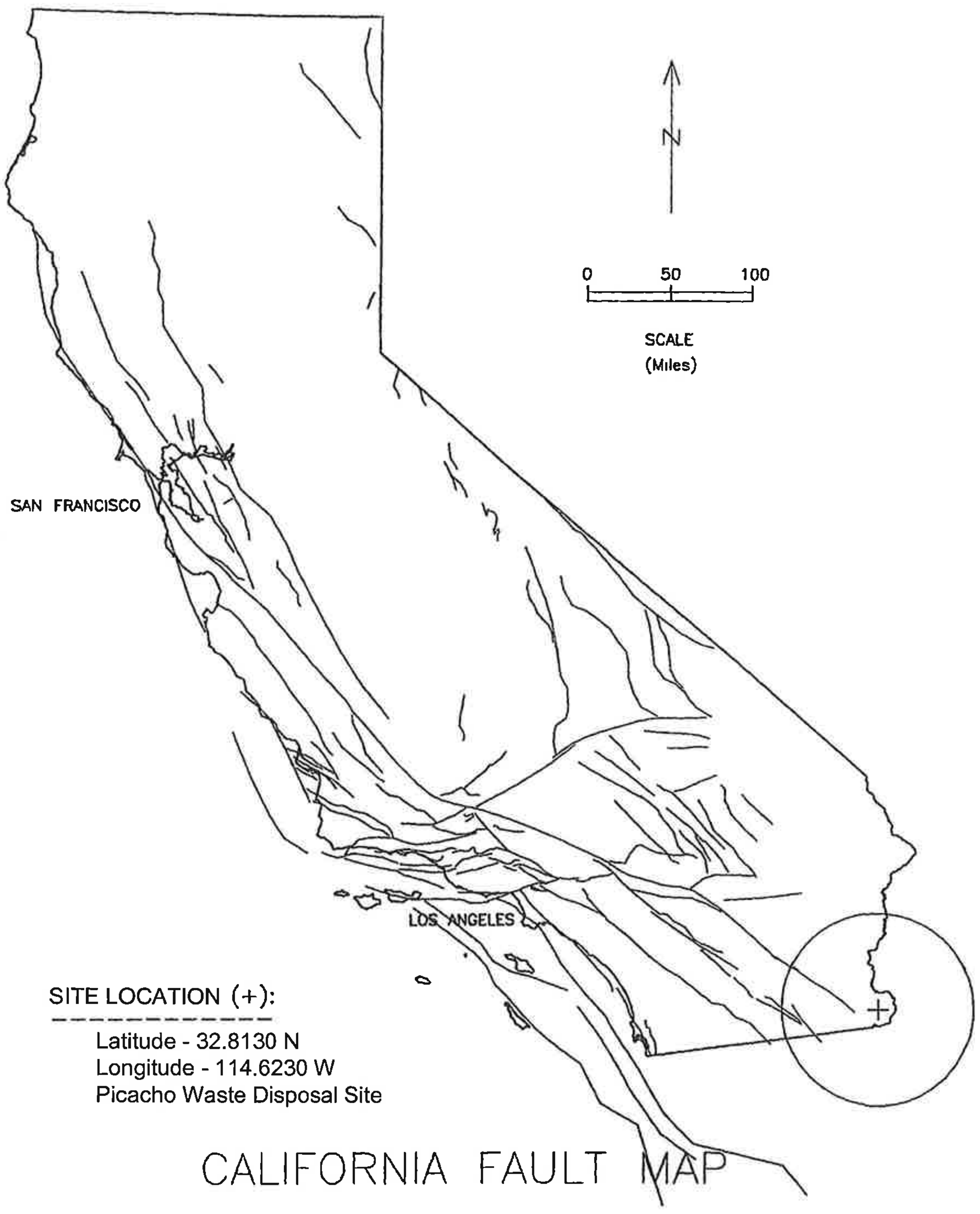

SITE LOCATION (+):

Latitude - 32.8130 N
Longitude - 114.6230 W
Picacho Waste Disposal Site

CALIFORNIA FAULT MAP

FIGURE 4

BAS

(909) 860-7777

BRYAN A. STIRRAT & ASSOCIATES
CIVIL AND ENVIRONMENTAL ENGINEERS
1360 VALLEY VISTA DRIVE DIAMOND BAR, CA 91765

PICACHO CUT AND FILL SITE

FAULT MAP

JOB NO.
9510-4A
DATE
6-8-95
DRAWN BY
D.L.L.
FILE NAME
173530DB

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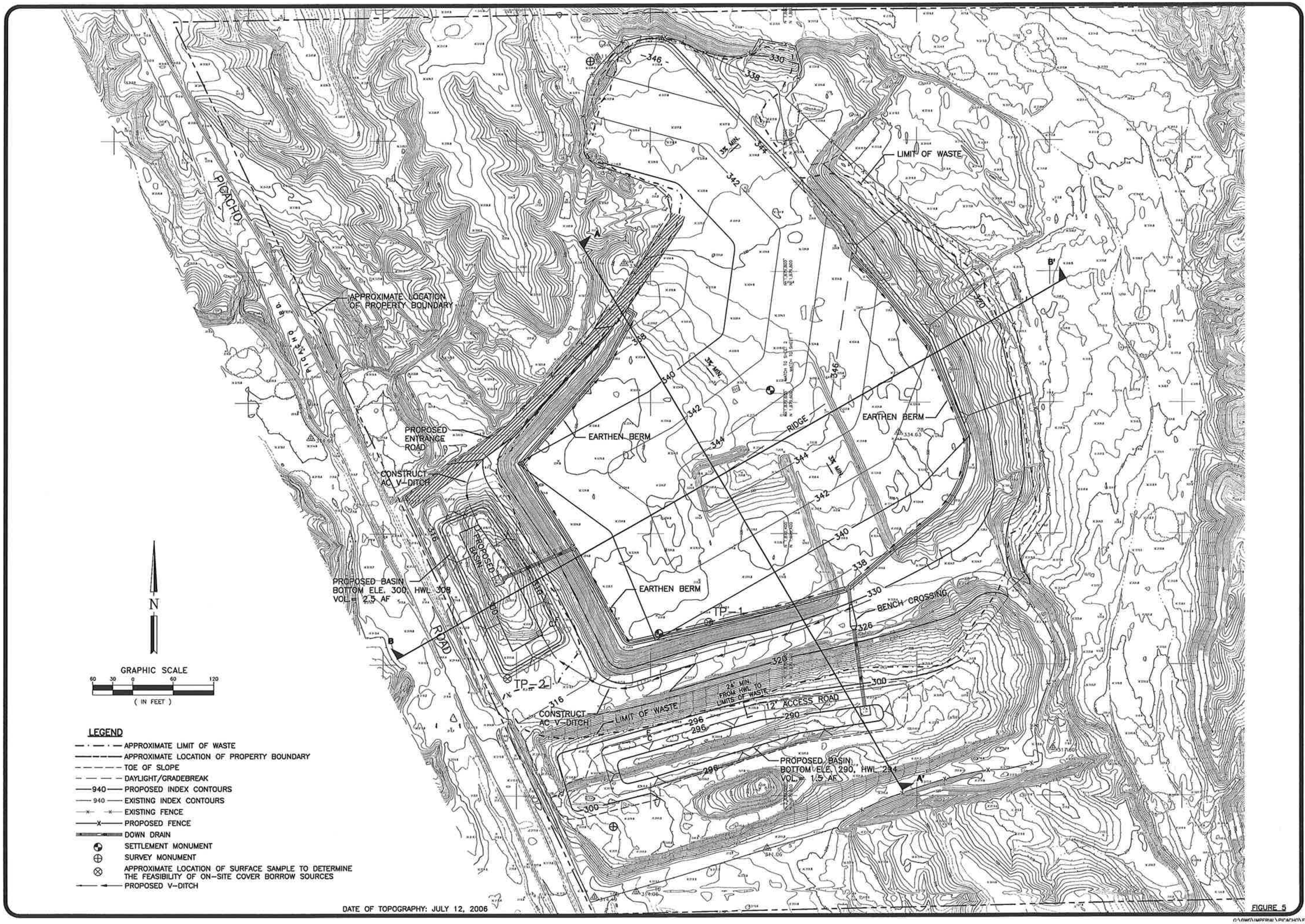

DATE OF TOPOGRAPHY: JULY 12, 2006

FIGURE 5

Sym	Descrip	Date	Apd
Revisions			

COUNTY OF IMPERIAL
DEPARTMENT OF PUBLIC WORKS
155 SOUTH 11TH ST
EL CENTRO, CALIFORNIA, 92243-2853
Phone: (619) 339-4462

BAS
BRYAN A. STIRRAT & ASSOCIATES
CIVIL AND ENVIRONMENTAL ENGINEERS
1360 VALLEY VISTA DRIVE
DIAMOND BAR, CA 91765 (909) 860-7777

Design --	Drawn --	Spvd
Chkd	Appd	Date 12-14-07

PICACHO CUT AND FILL SITE

FINAL GRADING AND DRAINAGE PLAN

Sheet 1 of 1

Rev

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Exhibit B – Contact Information for Regulatory/Permitting Agencies

Quechan Indian Tribe

PO Box 1899
Yuma, AZ 85366

Chase Choate, AICP, Environmental Director
c.choate@quechantribe.com
(760) 572-2969
https://www.quechantribe.com/

United States Environmental Protection Agency – Region 9

75 Hawthorne Street
San Francisco, CA 94105

Steve Wall, AICP, Zero Waste Section (LND-2-3)
wall.steve@epa.gov
(415) 972-3381
https://www.epa.gov/aboutepa/epa-region-9-pacific-southwest

Imperial County Planning and Building

801 Main Street
El Centro, CA 92243-2811

Jim Minnick, AICP, Planning & Development Services Director
jimminnick@co.imperial.ca.us
(442) 265-1736
http://www.icpds.com/?pid=553

Local Enforcement Agency – Imperial County Environmental Health Services

797 Main Street, Suite B
El Centro, CA 92243

Jeff Lamoure , Deputy Director for Environmental Health Services
jefflamoure@co.imperial.ca.us
(442) 265-1444
http://www.icphd.com/environmental-health/

Regional Water Quality Control Board - Colorado River Basin Region

73-720 Fred Waring Drive, Suite 100
Palm Desert, CA 92260

Jennie Snyder, Water Quality Control Engineer
JSnyder@waterboards.ca.gov
(760) 776-8936

http://www.waterboards.ca.gov/coloradoriver/

Imperial County Air Pollution Control District

150 S. 9th Street
El Centro, CA 92243

Matt Dessert, Air Pollution Control Officer
mattdessert@co.imperial.ca.us
(442) 265-1800
http://www.co.imperial.ca.us/AirPollution/

Exhibit C - Sample Proposal Evaluation Form

PROPOSAL EVALUATION FORM

IMPERIAL COUNTY DEPARTMENT OF PUBLIC WORKS REQUEST FOR PROPOSALS FOR COMPLETION OF THE PICACHO SOLID WASTE SITE CONSTRUCTION DOCUMENTS IN IMPERIAL COUNTY; COUNTY PROJECT NO. 4547SW

Prepared April 2017 by J. Castaneda

DATE:____________________

EVALUATOR:______________

RESPONDENT:_____________

RATING POINTS:

5 = excellent
4 = good
3 = above average
2 = average
1 = below average
0 = unsatisfactory

CRITERIA	**WEIGHT FACTOR**	**X**	**RATING**	**WEIGHTED RATING**
A. Technical Approach	0.35			
• Responsiveness & understanding of work to be done, (i.e. scope of work)	**(0.20)**			
• Specific experience with similar Plans and specs for solid waste sites	**(0.15)**			
B. Project Management	0.30			
• Capacity to perform the scope of work and the ability to conclude in a timely manner	**(0.20)**			
• Quality of staff based on recent experience	**(0.10)**			
C. References	**(0.05)**			
D. Familiarity and/or specific experience with state and federal project procedures adhering to solid waste site regulations	**(0.25)**			
E. Overall quality of proposal, including qualifications and thoroughness.	**(0.05)**			

Subtotal Score

F. Previous Experience and Performance working with County of Imperial Department of Public Works

_____
(0 to -5)

Total Score _____

Note: Positive previous experience and no previous experience will constitute a score of zero (0). Negative experience points will be deducted from the overall score.

Comments:

Exhibit D – Sample Consultant Agreement and Insurance Requirements

AGREEMENT FOR SERVICES

«Consultant_Business_Name»

THIS AGREEMENT FOR SERVICES ("Agreement"), made and entered into effective the ______ day of _____________, 2017, by and between the County of Imperial, a political subdivision of the State of California, by and through its Department of Public Works ("COUNTY") and **«Consultant_Business_Name»**, a «Consultant_Business_Type» licensed to do business within the state of California ("CONSULTANT") (individually, "Party;" collectively, "Parties") shall be as follows:

RECITALS

WHEREAS, COUNTY desires to retain a qualified individual, firm or business entity to provide «Contract_Services» for «Project_Name»; County Project No. «Project_Number» ("Project"); and

WHEREAS, CONSULTANT represents that it is qualified and experienced to perform the services; and

WHEREAS, COUNTY desires to engage CONSULTANT to provide services by reason of its qualifications and experience for performing such services, and CONSULTANT has offered to provide the required services for the Project on the terms and in the manner set forth herein.

NOW, THEREFORE, in consideration of their mutual covenants, COUNTY and CONSULTANT have and hereby agree to the following:

1. INCORPORATION OF RECITALS.

The Parties certify that, to the best of their knowledge, the above recitals are true and correct. The above recitals are hereby adopted and incorporated within this Agreement.

2. DEFINITIONS.

2.1. "Request for Proposal" or "RFP" shall mean that document that describes the Project and project requirements to prospective bidders entitled, "«Name_of_RFP»," dated «Date_of_RFP». The Request for Proposal is attached hereto as **Exhibit "A"** and incorporated herein by this reference.

2.2. "Proposal" shall mean CONSULTANT's document entitled, "«Name_of_Proposal»," dated «Date_of_Proposal» and submitted to COUNTY's Department of Public Works. The Proposal is attached hereto as **Exhibit "B"** and incorporated herein this by reference.

3. **CONTRACT COORDINATION**.

3.1. The Director of Public Works or his/her designee shall be the representative of COUNTY for all purposes under this Agreement. The Director of Public Works or his/her designee is hereby designated as the Contract Manager for COUNTY. He/she shall supervise the progress and execution of this Agreement.

3.2. CONSULTANT shall assign a single Contract Manager to have overall responsibility for the progress and execution of this Agreement. Should circumstances or conditions subsequent to the execution of this Agreement require a substitute Contract Manager for any reason, the Contract Manager designee shall be subject to the prior written acceptance and approval of COUNTY's Contract Manager.

4. **DESCRIPTION OF WORK**.

CONSULTANT shall provide all materials and labor to perform this Agreement consistent with the RFP and the Proposal, as set forth in **Exhibits "A" and "B."** In the event of a conflict amongst this Agreement, the RFP, and the Proposal, the RFP shall take precedence over the Proposal and this Agreement shall take precedence over both.

5. **WORK TO BE PERFORMED BY CONSULTANT**.

5.1. CONSULTANT shall comply with all terms, conditions and requirements of the Proposal and this Agreement.

5.2. CONSULTANT shall perform such other tasks as necessary and proper for the full performance of the obligations assumed by CONSULTANT hereunder; including but not limited to any additional work or change orders agreed upon pursuant to written authorization as described in Paragraph 6.3, and as contemplated under Sections 13, 14, and 28. Proposed additional work or change order requests, when applicable, will be attached and incorporated herein under **Exhibit "B"** (as "B-1," "B-2," etc.).

5.3. CONSULTANT shall:

5.3.1. Procure all permits and licenses, pay all charges and fees, and give all notices that may be necessary and incidental to the due and lawful prosecution of the services to be performed by CONSULTANT under this agreement;

5.3.2. Keep itself fully informed of all existing and proposed federal, state and local laws, ordinances, regulations, orders and decrees which may affect those engaged or employed under this Agreement;

5.3.3. At all times observe and comply with, and cause all of its employees to observe and comply with all of said laws, ordinances, regulations, orders and decrees mentioned above; and

5.3.4. Immediately report to COUNTY's Contract Manager in writing any discrepancy or inconsistency it discovers in said laws, ordinances, regulations, orders and decrees mentioned above in relation to any plans, drawings, specifications or provisions of this Agreement.

6. REPRESENTATIONS BY CONSULTANT.

6.1. CONSULTANT understands and agrees that COUNTY has limited knowledge in the multiple areas specified in the Proposal. CONSULTANT has represented itself to be an expert in these fields and understands that COUNTY is relying upon such representation.

6.2. CONSULTANT represents and warrants that it is a lawful entity possessing all required licenses and authorities to do business in the State of California and perform all aspects of this Agreement.

6.3. CONSULTANT shall not commence any work under this Agreement or provide any other services, or materials, in connection therewith until CONSULTANT has received written authorization from COUNTY's Contract manager to do so.

6.4. CONSULTANT represents and warrants that the people executing this Agreement on behalf of CONSULTANT have the authority of CONSULTANT to sign this Agreement and bind CONSULTANT to the performance of all duties and obligations assumed by CONSULTANT herein.

6.5. CONSULTANT represents and warrants that any employee, contractor and/or agent who will be performing any of the duties and obligations of CONSULTANT herein possess all required licenses and authorities, as well as the experience and training, to perform such tasks.

6.6. CONSULTANT represents and warrants that the allegations contained in the Proposal are true and correct.

6.7. CONSULTANT understands and agrees not to discuss this Agreement or work performed pursuant to this Agreement with anyone not a party to this Agreement without the prior permission of COUNTY. CONSULTANT further agrees to immediately advise COUNTY of any contacts or inquiries made by anyone not a party to this Agreement with respect to work performed pursuant to this Agreement.

6.8. Prior to accepting any work under this Agreement, CONSULTANT shall perform a due diligence review of its files and advise COUNTY of any conflict or potential conflict CONSULTANT may have with respect to the work requested.

6.9. CONSULTANT understands and agrees that in the course of performance of this Agreement CONSULTANT may be provided with information or data considered by the owner or the COUNTY to be confidential. COUNTY shall clearly identify such information and/or data as confidential. CONSULTANT shall take all necessary steps necessary to maintain such confidentiality including but not limited to restricting the dissemination of all material received to those required to have such data in order for CONSULTANT to perform under this Agreement.

6.10. CONSULTANT represents that the personnel dedicated to this project as identified in CONSULTANT's Proposal, will be the people to perform the tasks identified therein. CONSULTANT will not substitute other personnel or engage any contractors to work on any tasks identified herein without prior written notice to COUNTY.

6.11. CONSULTANT understands that COUNTY considers the representations made herein to be material and would not enter into this Agreement with CONSULTANT if such representations were not made.

7. **<u>TERM OF AGREEMENT</u>**.

This Agreement shall commence on the date first written above and shall remain in effect until the services provided as outlined in Section 4, ("DESCRIPTION OF WORK"), have been completed, unless otherwise terminated as provided for in this Agreement.

8. COMPENSATION.

8.1. The total compensation payable under this Agreement shall not exceed **«Cost_of_Original_Contract»**, unless otherwise previously agreed to in writing by COUNTY.

8.2. The fee for any additional services required by COUNTY will be computed either on a negotiated lump sum basis or upon actual hours and expenses incurred by CONSULTANT and based on CONSULTANT's current standard rates as set forth in the Proposal. Additional services or costs will not be paid without a prior written agreement between the Parties.

8.3. Except as provided under Paragraphs 8.1 and 8.2, COUNTY shall not be responsible to pay CONSULTANT any compensation, out of pocket expenses, fees, reimbursement of expenses or other remuneration.

9. PAYMENT.

9.1. CONSULTANT shall bill COUNTY on a time and material basis as set forth in **Exhibit "B."** COUNTY shall pay CONSULTANT for completed and approved services upon presentation of its itemized billing.

9.2. COUNTY shall have the right to retain five percent (5%) of the total of amount of each invoice, not to exceed five percent (5%) of the total compensation amount of the completed project. "Completion of the Project" is when the work to be performed has been completed in accordance with this Agreement, as determined by COUNTY, and all subcontractors, if any, have been paid in full by CONSULTANT. Upon completion of the Project CONSULTANT shall bill COUNTY the retention for payment by COUNTY.

10. METHOD OF PAYMENT.

CONSULTANT shall at any time prior to the fifteenth (15th) day of any month, submit to COUNTY a written claim for compensation for services performed. The claim shall be in a format approved by COUNTY. No payment shall be made by COUNTY prior to the claims being approved in writing by COUNTY's Contract Manager or his/her designee. CONSULTANT may expect to receive payment within a reasonable time thereafter and in any event in the normal course of business within thirty (30) days after the claim is submitted.

11. TIME FOR COMPLETION OF THE WORK.

The Parties agree that time is of the essence in the performance of this Agreement. Program scheduling shall be as described in Exhibits unless revisions are approved by both COUNTY's Contract Manager and CONSULTANT's Contract Manager. Time extensions may be allowed for delays caused by COUNTY, other governmental agencies or factors not directly brought about by the negligence or lack of due care on the part of CONSULTANT.

12. MAINTENANCE AND ACCESS OF BOOKS AND RECORDS.

12.1. CONSULTANT shall maintain books, records, documents, reports and other materials developed under this Agreement as follows:

12.2. CONSULTANT shall maintain all ledgers, books of accounts, invoices, vouchers, canceled checks, and other records relating to CONSULTANT's charges for services or expenditures and disbursements charged to COUNTY for a minimum period of three (3) years, or for any longer period required by law, from the date of final payment to CONSULTANT pursuant to this Agreement.

12.3. CONSULTANT shall maintain all reports, documents, and records, which demonstrate performance under this Agreement for a minimum period of five (5) years, or for any longer period required by law, from the date of termination or completion of this Agreement.

12.4. Any records or documents required to be maintained by CONSULTANT pursuant to this Agreement shall be made available to COUNTY for inspection or audit at any time during CONSULTANT's regular business hours provided that COUNTY provides CONSULTANT with seven (7) days advanced written or e-mail notice. Copies of such documents shall, at no cost to COUNTY, be provided to COUNTY for inspection at CONSULTANT's address indicated for receipt of notices under this Agreement.

13. SUSPENSION OF AGREEMENT.

COUNTY's Contract Manager shall have the authority to suspend this Agreement, in whole or in part, for such period as deemed necessary due to unfavorable conditions or to the failure on the part of CONSULTANT to perform any provision of this Agreement. CONSULTANT will be paid the compensation due and payable to the date of suspension.

14. TERMINATION.

COUNTY retains the right to terminate this Agreement for any reason by notifying CONSULTANT in writing twenty (20) days prior to termination and by paying the compensation due and payable to the date of termination; provided, however, if this Agreement is terminated for fault of CONSULTANT, COUNTY shall be obligated to compensate CONSULTANT only for that portion of CONSULTANT's services which are of benefit to COUNTY. Said compensation is to be arrived at by mutual agreement between COUNTY and CONSULTANT; should the parties fail to agree on said compensation, an independent arbitrator shall be appointed and the decision of the arbitrator shall be binding upon the parties.

15. INSPECTION.

CONSULTANT shall furnish COUNTY with every reasonable opportunity for COUNTY to ascertain that the services of CONSULTANT are being performed in accordance with the requirements and intentions of this Agreement. All work done and materials furnished, if any, shall be subject to COUNTY's Contract Manager's inspection and approval. The inspection of such work shall not relieve CONSULTANT of any of its obligations to fulfill its Agreement as prescribed.

16. OWNERSHIP OF MATERIALS.

All original drawings, videotapes, studies, sketches, computations, reports, information, data and other materials given to or prepared or assembled by or in the possession of CONSULTANT pursuant to this Agreement shall become the permanent property of COUNTY and shall be delivered to COUNTY upon demand, whether or not completed, and shall not be made available to any individual or organization without the prior written approval of COUNTY.

17. INTEREST OF CONSULTANT.

17.1. CONSULTANT covenants that it presently has no interest, and shall not acquire any interest, direct or indirect, financial or otherwise, which would conflict in any manner or degree with the performance of the services hereunder.

17.2. CONSULTANT covenants that, in the performance of this Agreement, no subcontractor or person having such an interest shall be employed.

17.3. CONSULTANT certifies that no one who has or will have any financial interest under this Agreement is an officer or employee of COUNTY.

18. INDEMNIFICATION.

18.1. CONSULTANT agrees to the fullest extent permitted by law to indemnify, defend, protect and hold COUNTY and its representatives, officers, directors, designees, employees, successors and assigns harmless from any and all claims, expenses, liabilities, losses, causes of actions, demands, losses, penalties, attorneys' fees and costs, in law or equity, of every kind and nature whatsoever arising out of or in connection with CONSULTANT's negligent acts and omissions or willful misconduct under this Agreement ("Claims"), whether or not arising from the passive negligence of COUNTY, but does not include Claims that are the result of the negligence or willful misconduct of COUNTY.

18.2. CONSULTANT agrees to defend with counsel acceptable to COUNTY, indemnify and hold COUNTY harmless from all Claims, including but not limited to:

18.2.1. Personal injury, including but not limited to bodily injury, emotional injury, sickness or disease or death to persons including but not limited to COUNTY's representatives, officers, directors, designees, employees, agents, successors and assigns, subcontractors and other third parties and/or damage to property of anyone (including loss of use thereof) arising out of CONSULTANT's negligent performance of, or willful misconduct surrounding, any of the terms contained in this Agreement, or anyone directly or indirectly employed by CONSULTANT or anyone for whose acts CONSULTANT may be liable;

18.2.2. Liability arising from injuries to CONSULTANT and/or any of CONSULTANT's employees or agents arising out of CONSULTANT's negligent performance of, or willful misconduct surrounding, any of the terms contained in this Agreement, or anyone directly or indirectly employed by CONSULTANT or anyone for whose acts CONSULTANT may be liable;

18.2.3. Penalties imposed upon account of the violation of any law, order, citation, rule, regulation, standard, ordinance or statute caused by the negligent action or inaction, or willful misconduct of CONSULTANT or anyone directly or indirectly employed by CONSULTANT or anyone for whose acts CONSULTANT may be liable, including but not limited to:

(a) Any loss of funding, penalties, fees, or other costs resulting from CONSULTANT's failure to adhere to Disadvantaged Business Enterprise requirements and/or goals, as determined by COUNTY or such other lawful entity in charge of monitoring Disadvantaged Business Enterprise compliance;

(a) Any loss of funding, penalties, fees, or other costs resulting from CONSULTANT's failure to adhere to prevailing wage requirements, as determined by COUNTY, the California Department of Industrial Relations, or such other lawful entity in charge of monitoring prevailing wage compliance;

18.2.4. Infringement of any patent rights which may be brought against COUNTY arising out of CONSULTANT's work;

18.2.5. Any violation or infraction by CONSULTANT of any law, order, citation, rule, regulation, standard, ordinance or statute in any way relating to the occupational health or safety of employees; and

18.2.6. Any breach by CONSULTANT of the terms, requirements or covenants of this Agreement.

18.3. These indemnification provisions shall extend to Claims occurring after this Agreement is terminated, as well as while it is in force.

19. INDEPENDENT CONTRACTOR.

In all situations and circumstances arising out of the terms and conditions of this Agreement, CONSULTANT is an independent contractor, and as an independent contractor, the following shall apply:

19.1. CONSULTANT is not an employee or agent of COUNTY and is only responsible for the requirements and results specified by this Agreement or any other agreement.

19.2. CONSULTANT shall be responsible to COUNTY only for the requirements and results specified by this Agreement and except as specifically provided in this Agreement, shall not be subject to COUNTY's control with respect to the physical actions or activities of CONSULTANT in fulfillment of the requirements of this Agreement.

19.3. CONSULTANT is not, and shall not be, entitled to receive from, or through, COUNTY, and COUNTY shall not provide, or be obligated to provide, CONSULTANT with Workers' Compensation coverage or any other type of employment or worker insurance or benefit coverage required or provided by any Federal, State or local law or regulation for, or normally afforded to, an employee of COUNTY.

19.4. CONSULTANT shall not be entitled to have COUNTY withhold or pay, and COUNTY shall not withhold or pay, on behalf of CONSULTANT, any tax or money relating to the Social Security Old Age Pension Program, Social Security Disability Program, or any other type of pension, annuity, or disability program required or provided by any federal, State or local law or regulation.

19.5. CONSULTANT shall not be entitled to participate in, nor receive any benefit from, or make any claim against any COUNTY fringe program, including, but not limited to, COUNTY's pension plan, medical and health care plan, dental plan, life insurance plan, or any other type of benefit program, plan, or coverage designated for, provided to, or offered to COUNTY's employees.

19.6. COUNTY shall not withhold or pay, on behalf of CONSULTANT, any Federal, State, or local tax, including, but not limited to, any personal income tax, owed by CONSULTANT.

19.7. CONSULTANT is, and at all times during the term of this Agreement, shall represent and conduct itself as an independent contractor, not as an employee of COUNTY.

19.8. CONSULTANT shall not have the authority, express or implied, to act on behalf of, bind or obligate COUNTY in any way without the written consent of COUNTY.

20. <u>INSURANCE</u>.

20.1. CONSULTANT hereby agrees at its own cost and expense to procure and maintain, during the entire term of this Agreement and any extended term therefore, insurance in a sum acceptable to COUNTY and adequate to cover potential liabilities arising in connection with the performance of this Agreement and in any event not less than the minimum limit set forth in the "Minimum Insurance Amounts" attachment to RFP (**Exhibit "A"**) which are incorporated as if set forth fully herein.

20.2. <u>Special Insurance Requirements</u>. All insurance required shall:

20.2.1. Be procured from California admitted insurers (licensed to do business in California) with a current rating by Best's Key Rating Guide, acceptable to COUNTY. A rating of at least A-VII shall be acceptable to COUNTY; lesser ratings must be approved in writing by COUNTY.

20.2.2. Be primary coverage as respects COUNTY and any insurance or self-insurance maintained by COUNTY shall be in excess of CONSULTANT's insurance coverage and shall not contribute to it.

20.2.3. Name The Imperial County Department of Public Works and the County of Imperial and their officers, employees, and volunteers as additional insured on all policies, except Workers' Compensation insurance and Errors & Omissions insurance, and provide that COUNTY may recover for any loss suffered by COUNTY due to CONSULTANT's negligence.

20.2.4. State that it is primary insurance and regards COUNTY as an additional insured and contains a cross-liability or severability of interest clause.

20.2.5. Not be canceled, non-renewed or reduced in scope of coverage until after thirty (30) days written notice has been given to COUNTY. CONSULTANT may not terminate such coverage until it provides COUNTY with proof that equal or better insurance has been secured and is in place. Cancellation or change without prior written consent of COUNTY shall, at the option of COUNTY, be grounds for termination of this Agreement.

20.2.6. If this Agreement remains in effect more than one (1) year from the date of its original execution, COUNTY may, at its sole discretion, require an increase to liability insurance to the level then customary in similar COUNTY Agreements by giving sixty (60) days notice to CONSULTANT.

20.3. Additional Insurance Requirements.

20.3.1. COUNTY is to be notified immediately of all insurance claims. COUNTY is also to be notified if any aggregate insurance limit is exceeded.

20.3.2. The comprehensive or commercial general liability shall contain a provision of endorsements stating that such insurance:

(a) Includes contractual liability;

(b) Does not contain any exclusions as to loss or damage to property caused by explosion or resulting from collapse of buildings or structures or damage to property underground, commonly referred to by insurers as the “XCU Hazards;”

(c) Does not contain a “pro rata” provision which looks to limit the insurer’s liability to the total proportion that its policy limits bear to the total coverage available to the insured;

(d) Does not contain an “excess only” clause which require the exhaustion of other insurance prior to providing coverage;

(e) Does not contain an “escape clause” which extinguishes the insurer’s liability if the loss is covered by other insurance;

(f) Includes COUNTY as an additional insured.

(g) States that it is primary insurance and regards COUNTY as an additional insured and contains a cross-liability or severability of interest clause.

20.4. Deposit of Insurance Policy. Promptly on issuance, reissuance, or renewal of any insurance policy required by this Agreement, CONSULTANT shall, if requested by COUNTY, provide COUNTY satisfactory evidence that insurance policy premiums have been paid together with a duplicate copy of the policy or a certificate evidencing the policy and executed by the insurance company issuing the policy or its authorized agent.

20.5. Certificates of Insurance. CONSULTANT agrees to provide COUNTY with the following insurance documents on or before the effective date of this Agreement:

20.5.1. Complete copies of certificates of insurance for all required coverages including additional insured endorsements shall be attached hereto as **Exhibit "C"** and incorporated herein.

20.5.2. The documents enumerated in this Paragraph shall be sent to the following:

County of Imperial
Risk Management Department
RE: County Project No. «Project_Number»
940 Main Street, Suite 101
El Centro, CA 92243

County of Imperial
Department of Public Works
RE: County Project No. «Project_Number»
155 South 11th Street
El Centro, CA 92243

20.6. Additional Insurance. Nothing in this, or any other provision of this Agreement, shall be construed to preclude CONSULTANT from obtaining and maintaining any additional insurance policies in addition to those required pursuant to this Agreement.

21. PREVAILING WAGE.

21.1. CONSULTANT acknowledges that any work that qualifies as a "public work" within the meaning of California Labor Code section 1720 shall cause CONSULTANT, and its sub-consultants, to comply with the provisions of California Labor Code sections 1775 et seq.

21.2. When applicable, copies of the prevailing rate of per diem wages shall be on file at COUNTY's Department of Public Works and available to CONSULTANT and any other interested party upon request. CONSULTANT shall post copies of the prevailing wage rate of per diem wages at the Project site.

21.3. CONSULTANT hereby acknowledges and stipulates to the following:

21.3.1. CONSULTANT has reviewed and agrees to comply with the provisions of Labor Code section 1776 regarding retention and inspection of payroll records and noncompliance penalties; and

21.3.2. CONSULTANT has reviewed and agrees to comply with the provisions of Labor Code section 1777.5 regarding employment of registered apprentices; and

21.3.3. CONSULTANT has reviewed and agrees to comply with the provisions of Labor Code section 1810 regarding the legal day's work; and

21.3.4. CONSULTANT has reviewed and agrees to comply with the provisions of Labor Code section 1813 regarding forfeiture for violations of the maximum hours per day and per week provisions contained in the same chapter.

21.3.5. CONSULTANT has reviewed and agrees to comply with any applicable provisions for those Projects subject to Department of Industrial Relations (DIR) Monitoring and Enforcement of prevailing wages. COUNTY hereby notifies CONSULTANT that CONSULTANT is responsible for complying with the requirements of Senate Bill 854 (SB854) regarding certified payroll record reporting. Further information concerning the requirements of SB854 is available on the DIR website located at: http://www.dir.ca.gov/Public-Works/PublicWorksEnforcement.html.

22. <u>WORKERS' COMPENSATION CERTIFICATION</u>.

22.1. Prior to the commencement of work, CONSULTANT shall sign and file with COUNTY the following certification: "I am aware of the provisions of California Labor Code §§3700 et seq. which require every employer to be insured against liability for workers' compensation or to undertake self-insurance in accordance with the provisions of that code, and I will comply with such provisions before commencing the performance of the work of this contract."

22.2. This certification is included in this Agreement and signature of the Agreement shall constitute signing and filing of the certificate.

22.3. CONSULTANT understands and agrees that any and all employees, regardless of hire date, shall be covered by Workers' Compensation pursuant to statutory requirements prior to beginning work on the Project.

22.4. If CONSULTANT has no employees, initial here: __________.

23. **ASSIGNMENT**.

Neither this Agreement nor any duties or obligations hereunder shall be assignable by CONSULTANT without the prior written consent of COUNTY. CONSULTANT may employ other specialists to perform services as required with prior approval by COUNTY.

24. **NON-DISCRIMINATION**.

24.1. During the performance of this Agreement, CONSULTANT and its subcontractors shall not unlawfully discriminate, harass or allow harassment against any employee or applicant for employment because of sex, race, color, ancestry, religious creed, national origin, physical disability (including HIV and AIDS), mental disability, medical condition (cancer), age (over forty (40)), marital status and denial of family care leave. CONSULTANT and its subcontractors shall insure that the evaluation and treatment of their employees and applicants for employment are free from such discrimination and harassment.

24.2. CONSULTANT and its subcontractors shall not discriminate on the basis of race, color, national origin, or sex in the performance of this Agreement. CONSULTANT shall carry out applicable requirements of 49 CFR 26 in the award and administration of DOT-assisted contracts. Failure by CONSULTANT to carry out these requirements is a material breach of this Agreement, which may result in the termination of this Agreement, or such other remedy as COUNTY deems appropriate.

24.3. CONSULTANT and its subcontractors shall comply with the provisions of the Fair Employment and Housing Act (Gov. Code §12990 (a-f) et seq.) and the applicable regulations promulgated thereunder (California Code of Regulations, Title 2, §7285 et seq.).

24.4. The applicable regulations of the Fair Employment and Housing Commission implementing Government Code §12990 (a-f), set forth in Chapter 5 of Division 4 of Title 2 of the California Code of Regulations, are incorporated into this Agreement by reference and made a part hereof as if set forth in full.

24.5. The applicable regulations of §504 of the Rehabilitation Act of 1973 (29 U.S.C. §794 (a)) are incorporated into this Agreement by reference and made a part hereof as if set forth in full.

24.6. CONSULTANT and its subconsultants shall give written notice of their obligations under this clause to labor organizations with which they have a collective bargaining or other agreement.

24.7. CONSULTANT shall include the nondiscrimination and compliance provisions of this clause in all subcontracts to perform work under this Agreement.

25. DISADVANTAGED BUSINESS ENTITY COMPLIANCE.

25.1. CONSULTANT represents and warrants that is has fully read the applicable Disadvantaged Business Enterprise ("DBE") requirements pertaining to this Project and has fully and accurately completed any and all required DBE forms.

25.2. CONSULTANT represents and warrants that it will comply with all applicable DBE requirements for this Project.

25.3. CONSULTANT shall comply with the applicable DBE provisions attached hereto as **Exhibit "D"** and incorporated by this reference as though fully set forth herein.

25.4. If any state or federal funds are withheld from COUNTY or not reimbursed to COUNTY due to CONSULTANT's failure to either comply with the DBE requirements set forth in the RFP and this Agreement, or to meet the mandatory DBE goals as determined by COUNTY, Caltrans, the Federal Highway Administration, and/or any other state or federal agency contributing funds to the Project, then CONSULTANT shall fully reimburse COUNTY the amount of funding lost. COUNTY reserves the right to deduct any such loss in funding from the amount of compensation due to CONSULTANT under this Agreement.

25.5. In addition to the above, CONSULTANT's failure to comply with DBE requirements/goals shall subject it to such sanctions as are permitted by law, which may include, but shall not be limited to the following:

25.5.1. Termination of this Agreement;

25.5.2. Withholding monthly progress payments;

25.5.3. Compensatory, special, incidental, liquidated and other damages; and/or

25.5.4. Designation of CONSULTANT as “nonresponsible,” and disqualification from bidding on future public works projects advertised by COUNTY.

26. NOTICES AND REPORTS.

26.1. Any notice and reports under this Agreement shall be in writing and may be given by personal delivery or by mailing by certified mail, addressed as follows:

COUNTY
Director of Public Works
RE: County Project No. «Project_Number»
«Project_Number»
155 South 11th Street
El Centro, CA 92243

CONSULTANT
«Consultant_Business_Name»
RE: County Project No.

«Consultant_Street_Address»
«Consultant_City_State»

County of Imperial
Clerk of the Board of Supervisors
RE: County Project No. «Project_Number»
940 W. Main Street, Suite 209
El Centro, CA 92243

26.2. Notice shall be deemed to have been delivered only upon receipt by the Party, seventy-two (72) hours after deposit in the United States mail or twenty-four (24) hours after deposit with an overnight carrier.

26.3. The addressees and addresses for purposes of this Section may be changed to any other addressee and address by giving written notice of such change. Unless and until written notice of change of addressee and/or address is delivered in the manner provided in this Section, the addressee and address set forth in this Agreement shall continue in effect for all purposes hereunder.

27. ENTIRE AGREEMENT.

This Agreement contains the entire Agreement between COUNTY and CONSULTANT relating to the transactions contemplated hereby and supersedes all prior or contemporaneous agreements, understandings, provisions, negotiations, representations, or statements, either written or oral.

28. MODIFICATION.

No modification, waiver, amendment, discharge, or change of this Agreement shall be valid unless the same is in writing and signed by both Parties.

29. CAPTIONS.

Captions in this Agreement are inserted for convenience of reference only and do not define, describe or limit the scope or the intent of this Agreement or any of the terms thereof.

30. PARTIAL INVALIDITY.

If any provision in this Agreement is held by a court of competent jurisdiction to be invalid, void, or unenforceable, the remaining provisions will nevertheless continue in full force without being impaired or invalidated in any way.

31. GENDER AND INTERPRETATION OF TERMS AND PROVISIONS.

31.1. As used in this Agreement and whenever required by the context thereof, each number, both singular and plural, shall include all numbers, and each gender shall include a gender.

31.2. CONSULTANT as used in this Agreement or in any other document referred to in or made a part of this Agreement shall likewise include the singular and the plural, a corporation, a partnership, individual, firm or person acting in any fiduciary capacity as executor, administrator, trustee or in any other representative capacity or any other entity.

31.3. All covenants herein contained on the part of CONSULTANT shall be joint and several if more than one person, firm or entity executes the Agreement.

32. WAIVER.

No waiver of any breach or of any of the covenants or conditions of this Agreement shall be construed to be a waiver of any other breach or to be a consent to any further or succeeding breach of the same or any other covenant or condition.

33. CHOICE OF LAW.

This Agreement shall be governed by the laws of the State of California. This Agreement is made and entered into in Imperial County, California. Any action brought by either party with respect to this agreement shall be brought in a court of competent jurisdiction within said County.

34. AUTHORITY.

34.1. Each individual executing this Agreement on behalf of CONSULTANT represents and warrants that:

34.1.1. He/She is duly authorized to execute and deliver this Agreement on behalf of CONSULTANT;

34.1.2. Such execution and delivery is in accordance with the terms of the Articles of Incorporation or Partnership, any by-laws or Resolutions of CONSULTANT and;

34.1.3. This Agreement is binding upon CONSULTANT accordance with its terms.

34.2. CONSULTANT shall deliver to COUNTY evidence acceptable to COUNTY of the foregoing within thirty (30) days of execution of this Agreement.

35. COUNTERPARTS.

This Agreement (as well as any amendments hereto) may be executed in any number of counterparts, each of which when executed shall be an original, and all of which together shall constitute one and the same Agreement. No counterparts shall be effective until all Parties have executed a counterpart hereof.

36. REVIEW OF AGREEMENT TERMS.

36.1. Each Party has had the opportunity to receive independent legal advice from its attorneys with respect to the advisability of making the representations, warranties, covenants and agreements provided for herein, and with respect to the advisability of executing this Agreement.

36.2. Each Party represents and warrants to and covenants with the other Party that:

36.2.1. This Agreement in its reduction to final written form is a result of extensive good faith negotiations between the Parties and/or their respective legal counsel;

and

36.2.2. The Parties and/or their legal counsel have carefully reviewed and examined this Agreement for execution by said Parties.

36.3. Any statute or rule of construction that ambiguities are to be resolved against the drafting party shall not be employed in the interpretation of this Agreement.

37. **NON-APPROPRIATION**.

37.1. All obligations of COUNTY are subject to appropriation of resources by various federal, State, and local agencies, including but not limited to the U.S. Department of Transportation ("DOT") and the California Department of Transportation ("Caltrans").

37.2. This Agreement is valid and enforceable only if sufficient funds are made available to COUNTY for the purposes of this Project. In addition, this Agreement is subject to any additional restrictions, limitations, conditions, or any statute enacted by Congress, State Legislature, or COUNTY, and any regulations prescribed therefrom, that may affect the provisions, terms, or funding of this Agreement.

37.3. If sufficient funds for the Project are not appropriated, this Agreement may be amended or terminated in order to reflect said reduction in funding.

IN WITNESS WHEREOF, the Parties have executed this Agreement on the day and year first above written.

County of Imperial	**«Consultant_Business_Name»**
By:__________________________________	By:__________________________________
Michael W. Kelley, Chairman Imperial County Board of Supervisors	«Consultant_Name_for_Signature»

ATTEST:

____
Blanca Acosta, Clerk of the Board,
County of Imperial, State of California

APPROVED AS TO FORM:

Katherine Turner,
County Counsel

By:____________________________
«CC_Attorney»,
«CC_Attorney_Title»

EXHIBIT "A" – "REQUEST FOR PROPOSAL"

EXHIBIT "B" – "PROPOSAL"

EXHIBIT "C" – "CERTIFICATES OF INSURANCE"

EXHIBIT “D” – “DISADVANTAGED BUSINESS ENTERPRISES (DBE) PARTICIPATION”

A. This contract is subject to 49 CFR, Part 26 entitled “Participation by Disadvantaged Business Enterprises in Department of Transportation Financial Assistance Programs.” Consultants who obtain DBE participation on this contract will assist Caltrans in meeting its federally mandated statewide overall DBE goal.

B. The goal for DBE participation for this contract is_________%. If applicable, participation by DBE consultant or subconsultants shall be in accordance with information contained in the form entitled, “Consultant Proposal DBE Commitment” (Exhibit 10-O1, of the LAPM), or in the form entitled, “Consultant Contract DBE Information” (Exhibit 10-O2, of the LAPM), attached hereto and incorporated as part of the Contract. If a DBE subconsultant is unable to perform, CONSULTANT must make a good faith effort to replace him/her with another DBE subconsultant, if the goal is not otherwise met.

C. DBEs and other small businesses, as defined in 49 CFR, Part 26 are encouraged to participate in the performance of contracts financed in whole or in part with federal funds. CONSULTANT or subconsultant shall not discriminate on the basis of race, color, national origin, or sex in the performance of this contract. CONSULTANT shall carry out applicable requirements of 49 CFR, Part 26 in the award and administration of US DOT-assisted agreements. Failure by CONSULTANT to carry out these requirements is a material breach of this contract, which may result in the termination of this contract or such other remedy as LOCAL AGENCY deems appropriate.

D. Any subcontract entered into as a result of this contract shall contain all of the provisions of this section.

E. A DBE firm may be terminated only with prior written approval from LOCAL AGENCY and only for the reasons specified in 49 CFR 26.53(f). Prior to requesting LOCAL AGENCY consent for the termination, CONSULTANT must meet the procedural requirements specified in 49 CFR 26.53(f).

F. A DBE performs a Commercially Useful Function (CUF) when it is responsible for execution of the work of the contract and is carrying out its responsibilities by actually performing, managing, and supervising the work involved. To perform a CUF, the DBE must also be responsible with respect to materials and supplies used on the contract, for negotiating price, determining quality and quantity, ordering the material, and installing (where applicable) and paying for the material itself. To determine whether a DBE is performing a CUF, evaluate the amount of work subcontracted, industry practices, whether the amount the firm is to be paid under the, contract is commensurate with the work it is actually performing, and other relevant factors.

G. A DBE does not perform a CUF if its role is limited to that of an extra participant in a transaction, contract, or project through which funds are passed in order to obtain the appearance of DBE participation. In determining whether a DBE is such an extra participant, examine similar transactions, particularly those in which DBEs do not participate.

H. If a DBE does not perform or exercise responsibility for at least thirty percent (30%) of the total cost of its contract with its own work force, or the DBE subcontracts a greater portion of the work of the contract than would be expected on the basis of normal industry practice for the type of work involved, it will be presumed that it is not performing a CUF.

I. CONSULTANT shall maintain records of materials purchased or supplied from all subcontracts entered into with certified DBEs. The records shall show the name and business address of each DBE or vendor and the total dollar amount actually paid each DBE or vendor, regardless of tier. The records shall show the date of payment and the total dollar figure paid to all firms. DBE prime consultants shall also show the date of work performed by their own forces along with the corresponding dollar value of the work.

J. If applicable, upon completion of the Contract, a summary of these records shall be prepared and submitted on the form entitled, “Final Report-Utilization of Disadvantaged Business Enterprise (DBE) and First-Tier Subcontractors” CEM-2402F (Exhibit 17-F, of the LAPM), certified correct by CONSULTANT or CONSULTANT’s authorized representative and shall be furnished to the Contract Administrator with the final invoice. Failure to provide the summary of DBE payments with the final invoice will result in twenty-five percent (25%) of the dollar value of the invoice being withheld from payment until the form is submitted. The amount will be returned to CONSULTANT when a satisfactory “Final Report-Utilization of Disadvantaged Business Enterprises (DBE) and First-Tier Subcontractors” form is submitted to the Contract Administrator.

K. If a DBE subconsultant is decertified during the life of the contract, the decertified subconsultant shall notify CONSULTANT in writing with the date of decertification. If a subconsultant becomes a certified DBE during the life of the Contract, the subconsultant shall notify CONSULTANT in writing with the date of certification. Any changes should be reported to LOCAL AGENCY’s Contract Administrator within 30 days.

MINIMUM INSURANCE AMOUNTS

Consultant contract (Agreement for Services) form and content is included.

Insurance Minimum Amounts *

Insurance	Minimum Limit *
Errors & Omissions/Professional Liability	$2 million per occurrence
Workers Compensation, Coverage A	Statutory
Employers Liability, Coverage B	$1 million
Commercial General Liability	
(Including Contractual Liability):	
Bodily Injury	$1 million per occurrence $2 million aggregate
Property Damage	$1 million per occurrence $2 million aggregate
Comprehensive Automobile Liability	
(Owned, hired & non-owned vehicles)	
Bodily Injury	$1 million per occurrence
Property Damage	$1 million per occurrence

An endorsement covering any explosion collapse and underground exposures, “XCU”, in the Commercial General Liability policy is also required.

*Minimums subject to additional review after Consultant is selected.

Exhibit E – Final Closure Post Closure Maintenance Plan

dichlormid (2,2-dichloro-*N,N*-di-2-propenylacetamide).

* * * * *

[FR Doc. 2016–24214 Filed 10–5–16; 8:45 am]

BILLING CODE 6560–50–P

ENVIRONMENTAL PROTECTION AGENCY

40 CFR Part 258

[EPA–R09–RCRA–2015–0445; FRL–9953–45–Region 9]

Final Determination To Approve Site-Specific Flexibility for Closure and Monitoring of the Picacho Landfill

AGENCY: Environmental Protection Agency (EPA).

ACTION: Final rule.

SUMMARY: The Environmental Protection Agency, Region IX, is making a final determination to approve two Site-Specific Flexibility Requests (SSFRs) from Imperial County (County or Imperial County) to close and monitor the Picacho Solid Waste Landfill (Picacho Landfill or Landfill). The Picacho Landfill is a commercial municipal solid waste landfill (MSWLF) operated by Imperial County from 1977 to the present on the Quechan Indian Tribe of the Fort Yuma Indian Reservation in California.

EPA is promulgating a site-specific rule proposed on April 7, 2016, that approves an alternative final cover and a modification to the prescribed list of groundwater detection-monitoring parameters for ongoing monitoring for the Picacho Landfill.

DATES: This final rule is effective on October 6, 2016.

ADDRESSES: EPA has established a docket for this action under Docket ID No. EPA–R09–RCRA–2015–0445. All documents in the docket are listed in the *http://www.regulations.gov* index. Publicly available docket materials are available electronically in *http://www.regulations.gov* and in hard copy at the EPA Library, located at the Environmental Protection Agency, Region IX, 75 Hawthorne Street, San Francisco, California. The EPA Library is open from 9:00 a.m. to 4:00 p.m., Monday through Thursday, excluding legal holidays, and is located in a secured building. To review docket materials at the EPA Library, it is recommended that the public make an appointment by calling (415) 947–4406 during normal business hours. Copying arrangements will be made through the EPA Library and billed directly to the recipient. Copying costs may be waived depending on the total number of pages copied.

FOR FURTHER INFORMATION CONTACT: Steve Wall, Land Division, Mail Code LND 2–3 U.S. Environmental Protection Agency, 75 Hawthorne Street, San Francisco, CA 94105–3901; telephone number: (415) 972–3381; fax number: (415) 947–3564; email address: *wall.steve@epa.gov.*

SUPPLEMENTARY INFORMATION:

I. What did EPA propose?

After completing a review of Imperial County's Picacho Landfill Final Closure/Post-Closure Maintenance Plan and the associated SSFRs, EPA proposed this rulemaking in the **Federal Register**. The proposed determination was published at 81 FR 20274, April 7, 2016. EPA proposed to approve an alternative final cover that varies from the final closure requirements of 40 CFR 258.60(a) but meets the criteria at 40 CFR 258.60(b), and alternative groundwater detection monitoring parameters for post-closure monitoring in accordance with 40 CFR 258.54(a).

II. Legal Authority for This Action

Under sections 1008, 2002, 4004, and 4010 of the Resource Conservation and Recovery Act of 1976 (RCRA) as amended by the Hazardous and Solid Waste Amendments of 1984 (HSWA), 42 U.S.C. 6901 *et seq.,* Congress required EPA to establish revised minimum federal criteria for MSWLFs, including landfill location restrictions, operating standards, design standards, and requirements for ground water monitoring, corrective action, closure and post-closure care, and financial assurance. Under RCRA section 4005, states are to develop permit programs for facilities that may receive household hazardous waste or waste from conditionally exempt small quantity generators of hazardous waste, and EPA is to determine whether the state's program is adequate to ensure that such facilities will comply with the revised federal criteria.

The MSWLF criteria are set forth in the Code of Federal Regulations at 40 CFR part 258. These regulations are prescriptive, self-implementing and apply directly to owners and operators of MSWLFs. Many of these criteria include a flexible performance standard as an alternative to the prescriptive, self-implementing regulation. The flexible standard is not self-implementing, and requires approval by the Director of an EPA-approved state MSWLF permitting program. However, EPA's approval of a state program generally does not extend to Indian Country because states generally do not have authority over Indian Country. For this reason, owners and operators of MSWLF units located in Indian Country cannot take advantage of the flexibilities available to those facilities that are within the jurisdiction of an EPA-approved state program. However, the EPA has the authority under sections 2002, 4004, and 4010 of RCRA to promulgate site-specific rules to enable such owners and operators to use the flexible standards. See *Yankton Sioux Tribe* v. *EPA,* 950 F. Supp. 1471 (D.S.D. 1996); *Backcountry Against Dumps* v. *EPA,* 100 F.3d 147 (D.C. Cir. 1996). EPA refers to such rules as ''Site-Specific Flexibility Determinations.'' EPA has developed guidance for owners and operators on preparing a request for such a site-specific rule, entitled ''Site-Specific Flexibility Requests for Municipal Solid Waste Landfills in Indian Country, Draft Guidance,'' EPA530–R–97–016 (August 1997) (Draft Guidance).

III. Background

The Picacho Landfill is located on Quechan tribal lands on the Fort Yuma Indian Reservation approximately four miles north-northeast of the community of Winterhaven, in Imperial County, California. The Picacho Landfill is a commercial MSWLF operated by Imperial County from 1977 to the present. The landfill site is approximately 12.5 acres.

In January 2006, the Tribe requested that EPA provide comments on the County's closure plan. Between 2006 and 2011, EPA worked with the Tribe, the Bureau of Indian Affairs (BIA) and the County to develop the closure plan. During this time, EPA also reviewed the SSFRs to determine whether they met technical and regulatory requirements. On October 27, 2010, Imperial County submitted its Picacho Final Closure/Post-Closure Maintenance Plan. EPA provided a final round of comments on February 10, 2011, which Imperial County incorporated as an addendum. On April 30, 2012, the Tribe approved the Picacho Landfill Final Closure/Post-Closure Maintenance Plan as amended, and, pursuant to EPA's Draft Guidance, the Tribe forwarded to EPA two SSFRs that had been submitted by Imperial County to close and monitor the Picacho Landfill. The requests sought EPA approval to use an alternative final cover meeting the performance requirements of 40 CFR 258.60(a), and to modify the prescribed list of groundwater detection-monitoring parameters provided in 40 CFR 258.54(a)(1) and (2) for ongoing monitoring.

IV. Basis for Final Determination

EPA is basing its final determination to approve the site-specific flexibility requests on the Tribe's approval, dated April 30, 2012, EPA's independent review of the Picacho Landfill Final Closure/Post-Closure Maintenance Plan as amended, and the associated SSFRs.

A. Alternative Final Cover SSFR: Alternative Final Cover System

The regulations require the installation of a final cover system specified in 40 CFR 258.60(a), which consists of an infiltration layer with a minimum of 18 inches of compacted clay with a permeability of 1×10^{-5} cm/sec, covered by an erosion layer with a minimum six inches of topsoil. Imperial County sought approval for an alternative final cover designed to satisfy the performance criteria specified in 40 CFR 258.60(b); Imperial County proposed to replace this with an alternative cover consisting of two and a half feet of native soil to control infiltration covered by six inches of a soil gravel mixture to control erosion.

EPA is basing its final determination on a number of factors, including: (1) Research showing that prescriptive, self-implementing requirements for final covers, comprised of low permeability compacted clay, do not perform well in the arid west. The clay dries out and cracks, which allows increased infiltration along the cracks; (2) Research showing that in arid environments thick soil covers comprised of native soil can perform as well or better than the prescriptive cover; and (3) Imperial County's analysis demonstrates, based on site-specific climatic conditions and soil properties, that the proposed alternative soil final cover will achieve equivalent reduction in infiltration as the prescriptive cover design and that the proposed erosion layer provides equivalent protection from wind and water erosion. This analysis is provided in Appendix D and Appendix D–1 of the Picacho Landfill Final Closure/Post-Closure Maintenance Plan dated October 27, 2010 and amended by EPA's comments dated February 20, 2011.

B. Groundwater Monitoring SSFR: Alternative Detection Monitoring Parameters

The regulations require post-closure monitoring of 15 heavy metals, listed in 40 CFR part 258, Appendix I. Imperial County proposed to replace these, with the exception of arsenic, with the alternative inorganic indicator parameters chloride, nitrate as nitrogen, sulfate, and total dissolved solids.

EPA's final determination is based on the fact that the County has performed over 15 years of semi-annual groundwater monitoring at the site, and during that time arsenic was the only heavy metal detected at a value that slightly exceeded the federal maximum contaminant level (MCL), a standard used for drinking water.

V. Summary of Public Comments Received and Response to Comments

EPA received one anonymous public comment during the public comment period stating support for EPA's Tentative Determination to Approve Site-Specific Flexibility for Closure and Monitoring of the Picacho Landfill, as proposed in the **Federal Register** on April 7, 2016.

VI. Additional Findings

In order to comply with the National Historic Preservation Act, 54 U.S.C. 100101 *et seq.,* Imperial County Department of Public Works will coordinate with the Tribe to arrange for a qualified Native American monitor to be present during any work. If buried or previously unidentified resources are located during project activities, all work within the vicinity of the find will cease, and the provisions of 36 CFR 800.13(b) will be implemented. If, during the course of the Landfill closure activities, previously undocumented archaeological material or human remains are encountered, all work shall cease in the immediate area and a qualified archaeologist shall be retained to evaluate the significance of the find and recommend further management actions.

Though no known threatened or endangered species or their habitat exist on the site, in order to ensure compliance with the Endangered Species Act, 16 U.S.C. 1536 *et seq.,* a preconstruction survey will be conducted prior to cover installation to ensure no threatened or endangered species are present. In particular, the survey will look for the presence of desert tortoises, which may occur in Imperial County. Should desert tortoises or other threatened or endangered species be encountered in the survey, or at any time during the closure of the Picacho Landfill, the County shall contact the U.S. Fish and Wildlife Service to develop avoidance measures to ensure that impacts to the species are minimized. Following closure and vegetation restoration activities, the project site may become suitable for threatened and endangered species. This would be a beneficial effect.

Under Executive Order 12866, ''Regulatory Planning and Review'' (58 FR 51735, October 4, 1993), this rule is not of general applicability and therefore is not a regulatory action subject to review by the Office of Management and Budget (OMB).

This rule does not impose an information collection burden under the provisions of the Paperwork Reduction Act of 1995 (44 U.S.C. 3501 *et seq.*) because it applies to a particular facility only.

Because this rule is of particular applicability relating to a particular facility, it is not subject to the regulatory flexibility provisions of the Regulatory Flexibility Act (5 U.S.C. 601 *et seq.*), or to sections 202, 204, and 205 of the Unfunded Mandates Reform Act of 1995 (UMRA) (Pub. L. 104–4). Because this rule will affect only a particular facility, it will not significantly or uniquely affect small governments, as specified in section 203 of UMRA.

Because this rule will affect only a particular facility, this proposed rule does not have federalism implications. It will not have substantial direct effects on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government, as specified in Executive Order 13132, ''Federalism,'' (64 FR 43255, August 10, 1999). Thus, Executive Order 13132 does not apply to this rule.

This rule also is not subject to Executive Order 13045, ''Protection of Children from Environmental Health Risks and Safety Risks'' (62 FR 19885, April 23, 1997), because it is not economically significant as defined in Executive Order 12866, and because the Agency does not have reason to believe the environmental health or safety risks posed by this action present a risk to children. The basis for this belief is EPA's analysis of the potential risks posed by Imperial County's alternative final cover and alternative groundwater detection-monitoring parameters proposals and the standards set forth in this rulemaking.

This rule is not subject to Executive Order 13211, ''Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use'' (66 FR 28355, May 22, 2001), because it is not a significant regulatory action under Executive Order 12866.

As required by section three of Executive Order 12988, ''Civil Justice Reform,'' (61 FR 4729, February 7, 1996), in issuing this rule, EPA has taken the necessary steps to eliminate drafting errors and ambiguity, minimize potential litigation, and provide a clear legal standard for affected conduct.

Executive Order 13175, entitled ''Consultation and Coordination with Indian Tribal Governments,'' (65 FR 67249, November 9, 2000), calls for EPA to develop an accountable process to ensure ''meaningful and timely input by tribal officials in the development of regulatory policies that have tribal implications.'' *See* also ''EPA Policy for the Administration of Environmental Programs on Indian Reservations,'' (November 8, 1984) and ''EPA Policy on Consultation and Coordination with Indian Tribes,'' (May 4, 2011). EPA consulted with the Quechan Tribe throughout Imperial County's development of its closure and monitoring plans for the Picacho Landfill.

List of Subjects in 40 CFR Part 258

Environmental protection, Final cover, Monitoring, Municipal landfills, Post-closure care groundwater, Reporting and recordkeeping requirements, Waste treatment and disposal, Water pollution control.

Dated: September 22, 2016.

Alexis Strauss,

Acting Regional Administrator, Region IX.

For the reasons stated in the preamble, 40 CFR part 258 is amended as follows:

PART 258—CRITERIA FOR MUNICIPAL SOLID WASTE LANDFILLS

■ 1. The authority citation for part 258 continues to read as follows:

Authority: 33 U.S.C. 1345(d) and (e); 42 U.S.C. 6902(a), 6907, 6912(a), 6944, 6945(c) and 6949a(c), 6981(a).

Subpart F—Closure and Post-Closure Care

■ 2. Section 258.62 is amended by removing ''[Reserved]'' at the end of the section and adding paragraph (b) to read as follows:

§ 258.62 Approval of site-specific flexibility requests in Indian country.

* * * * *

(b) *Picacho Municipal Solid Waste Landfill—alternative list of detection monitoring parameters and alternative final cover.* This paragraph (b) applies to the Picacho Landfill, a Municipal Solid Waste Landfill operated by Imperial County on the Quechan Indian Tribe of the Fort Yuma Indian Reservation in California.

(1) In accordance with § 258.54(a), the owner and operator may modify the list of heavy metal detection monitoring parameters specified in appendix I of this part, as required during Post-Closure Care by § 258.61(a)(3), by replacing monitoring of the inorganic constituents, with the exception of arsenic, with the inorganic indicator parameters chloride, nitrate as nitrogen, sulfate, and total dissolved solids.

(2) In accordance with § 258.60(b), the owner and operator may replace the prescriptive final cover set forth in § 258.60(a), with an alternative final cover as follows:

(i) The owner and operator may install an evapotranspiration cover system as an alternative final cover for the 12.5 acre site.

(ii) The alternative final cover system shall be constructed to achieve an equivalent reduction in infiltration as the infiltration layer specified in § 258.60(a)(1) and (2), and provide an equivalent protection from wind and water erosion as the erosion layer specified in § 258.60(a)(3).

(iii) The final cover system shall consist of a minimum three-foot-thick multi-layer cover system comprised, from bottom to top, of:

(A) A minimum 30-inch thick infiltration layer consisting of:

(*1*) Existing intermediate cover; and

(*2*) Additional cover soil which, prior to placement, shall be wetted to optimal moisture and thoroughly mixed to near uniform condition, and the material shall then be placed in lifts with an uncompacted thickness of six to eight inches, spread evenly and compacted to 90 percent of the maximum dry density, and shall:

(*i*) Exhibit a grain size distribution that excludes particles in excess of three inches in diameter;

(*ii*) Have a minimum fines content (percent by weight passing U.S. No. 200 Sieve) of seven percent for an individual test and eight percent for the average of ten consecutive tests;

(*iii*) Have a grain size distribution with a minimum of five percent smaller than five microns for an individual test and six percent for the average of ten consecutive tests; and

(*iv*) Exhibit a maximum saturated hydraulic conductivity on the order of 1.0E–03 cm/sec.; and

(*3*) A minimum six-inch surface erosion layer comprised of a rock/soil admixture. The surface erosion layer admixture and gradations for 3% slopes and 3:1 slopes are detailed below:

(*i*) 3% slopes: For the 3% slopes the surface admixture shall be composed of pea gravel (⅜-inch to ½-inch diameter) mixed with cover soil at the ratio of 25% rock to soil by volume with a minimum six-inch erosion layer.

(*ii*) For the 3:1 side slopes the surface admixture shall be composed of either: gravel/rock (¾-inch to one-inch diameter) mixed with additional cover soil as described in paragraph (b)(2)(iii)(A)(*2*) of this section at the ratio of 50% rock to soil by volume and result in a minimum six-inch erosion layer, or gravel/rock (¾-inch to two-inch diameter) mixed with additional cover soil as described in paragraph (b)(2)(iii)(A)(*2*) of this section at the ratio of 50% rock to soil by volume and result in a minimum 12-inch erosion layer.

(*iii*) The owner and operator shall place documentation demonstrating compliance with the provisions of this section in the operating record.

(*iv*) All other applicable provisions of this part remain in effect.

(B) [Reserved]

[FR Doc. 2016–23839 Filed 10–5–16; 8:45 am]

BILLING CODE 6560–50–P

FEDERAL COMMUNICATIONS COMMISSION

47 CFR Part 73

[MB Docket No. 02–376, RM–10617, RM–10690; DA 16–1062]

Radio Broadcasting Services; Sells, Willcox, and Davis-Monthan Air Force Base, Arizona

AGENCY: Federal Communications Commission.

ACTION: Final rule; dismissal of application for review.

SUMMARY: In this document, the Media Bureau (Bureau) dismisses as moot the Application for Review filed jointly by KZLZ, LLC (KZLZ) and Lakeshore Media, LLC, the current and former licensee, respectively, of Station KWCX–FM. While the AFR was pending, KZLZ filed a minor modification application to change the community of license of Station KWCX–FM from Willcox to Tanque Verde, Arizona. Once the requested facility modification to Station KWCX–FM was granted, the assignment at Willcox was deleted, and this in turn rendered moot any Section 307(b) comparison between Davis-Monthan AFB and the deleted Willcox assignment.

DATES: Effective October 6, 2016.

FOR FURTHER INFORMATION CONTACT: Adrienne Denysyk, Media Bureau, (202) 418–2700.

SUPPLEMENTARY INFORMATION: This is a synopsis of the Bureau's *Letter,* DA 16–1062, released September 21, 2016. The full text of this document is available for inspection and copying during normal business hours in the FCC Reference Information Center (Room CY–A257), 445 12th Street SW., Washington, DC 20554.

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Your Voice in Federal Decision-Making

Site-Specific Flexibility for Closure and Monitoring of Picacho Landfill: Final Determination to Approve

This Rule document was issued by the **Environmental Protection Agency** (EPA)

For related information, **Open Docket Folder**

Action

Final rule.

Summary

The Environmental Protection Agency, Region IX, is making a final determination to approve two Site-Specific Flexibility Requests (SSFRs) from Imperial County (County or Imperial County) to close and monitor the Picacho Solid Waste Landfill (Picacho Landfill or Landfill). The Picacho Landfill is a commercial municipal solid waste landfill (MSWLF) operated by Imperial County from 1977 to the present on the Quechan Indian Tribe of the Fort Yuma Indian Reservation in California.

EPA is promulgating a site-specific rule proposed on April 7, 2016, that approves an alternative final cover and a modification to the prescribed list of groundwater detection-monitoring parameters for ongoing monitoring for the Picacho Landfill.

Dates

This final rule is effective on October 6, 2016.

Addresses

EPA has established a docket for this action under Docket ID No. EPA-R09-RCRA-2015-0445. All documents in the docket are listed in the *http://www.regulations.gov* index. Publicly available docket materials are available electronically in *http://www.regulations.gov* and in hard copy at the EPA Library, located at the Environmental Protection Agency, Region IX, 75 Hawthorne Street, San Francisco, California. The EPA Library is open from 9:00 a.m. to 4:00 p.m., Monday through Thursday, excluding legal holidays, and is located in a secured building. To review docket materials at the EPA Library, it is recommended that the public make an appointment by calling (415) 947-4406 during normal business hours. Copying arrangements will be made through the EPA Library and billed directly to the recipient. Copying costs may be waived depending on the total number of pages copied.

For Further Information Contact

Steve Wall, Land Division, Mail Code LND 2-3 U.S. Environmental Protection Agency, 75 Hawthorne Street, San Francisco, CA 94105-3901;

Comment Period Closed

ID: EPA-R09-RCRA-2015-0445-0019

View original printed format: PDF

Document Information

Date Posted:
Oct 6, 2016

RIN:
Not Assigned

CFR:
40 CFR Part 258

Federal Register Number:
2016-23839

Show More Details

Comments

0
Comments Received *

Docket Information

This document is contained in
EPA-R09-RCRA-2015-0445

Related Dockets:
None

Related RINs:
None

Related Documents:
- Courtesy Notice Public Meeting Canceled
- Tentative Determination to Approve Site Specific Flexibility...

telephone number: (415) 972-3381; fax number: (415) 947-3564; email address: *wall.steve@epa.gov.*

Supplementary Information

I. What did EPA propose?

After completing a review of Imperial County's Picacho Landfill Final Closure/Post-Closure Maintenance Plan and the associated SSFRs, EPA proposed this rulemaking in the Federal Register. The proposed determination was published at 81 FR 20274, April 7, 2016. EPA proposed to approve an alternative final cover that varies from the final closure requirements of 40 CFR 258.60(a) but meets the criteria at 40 CFR 258.60(b), and alternative groundwater detection monitoring parameters for post-closure monitoring in accordance with 40 CFR 258.54(a).

II. Legal Authority for This Action

Under sections 1008, 2002, 4004, and 4010 of the Resource Conservation and Recovery Act of 1976 (RCRA) as amended by the Hazardous and Solid Waste Amendments of 1984 (HSWA), 42 U.S.C. 6901 *et seq.,* Congress required EPA to establish revised minimum federal criteria for MSWLFs, including landfill location restrictions, operating standards, design standards, and requirements for ground water monitoring, corrective action, closure and post-closure care, and financial assurance. Under RCRA section 4005, states are to develop permit programs for facilities that may receive household hazardous waste or waste from conditionally exempt small quantity generators of hazardous waste, and EPA is to determine whether the state's program is adequate to ensure that such facilities will comply with the revised federal criteria.

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III. Background

The Picacho Landfill is located on Quechan tribal lands on the Fort Yuma Indian Reservation approximately four miles north-northeast of the community of Winterhaven, in Imperial County, California. The Picacho Landfill is a commercial MSWLF operated by Imperial County from 1977 to the present. The landfill site is approximately 12.5 acres.

In January 2006, the Tribe requested that EPA provide comments on the County's closure plan. Between 2006 and 2011, EPA worked with the Tribe, the Bureau of Indian Affairs (BIA) and the County to develop the closure plan. During this time, EPA also reviewed the SSFRs to determine whether they met technical and regulatory requirements. On October 27, 2010, Imperial County submitted its Picacho Final Closure/Post-Closure Maintenance Plan. EPA provided a final round of comments on February 10, 2011, which Imperial County incorporated as an addendum. On April 30, 2012, the Tribe approved the Picacho Landfill Final Closure/Post-Closure Maintenance Plan as amended, and, pursuant to EPA's Draft Guidance, the Tribe forwarded to EPA two SSFRs that had been submitted by Imperial County to close and monitor the Picacho Landfill. The requests sought EPA approval to use an alternative final cover meeting the performance requirements of 40 CFR 258.60(a), and to modify the prescribed list of groundwater detection-monitoring parameters provided in 40 CFR 258.54(a)(1) and (2) for ongoing monitoring.

IV. Basis for Final Determination

EPA is basing its final determination to approve the site-specific flexibility requests on the Tribe's approval, dated April 30, 2012, EPA's independent review of the Picacho Landfill Final Closure/Post-Closure Maintenance Plan as amended, and the associated SSFRs.

A. Alternative Final Cover SSFR: Alternative Final Cover System

The regulations require the installation of a final cover system specified in 40 CFR 258.60(a), which consists of an infiltration layer with a minimum of 18 inches of compacted clay with a permeability of 1×10^{-5} cm/sec, covered by an erosion layer with a minimum six inches of topsoil. Imperial County sought approval for an alternative final cover designed to satisfy the performance criteria specified in 40 CFR 258.60(b); Imperial County proposed to replace this with an alternative cover consisting of two and a half feet of native soil to control infiltration covered by six inches of a soil gravel mixture to control erosion.

EPA is basing its final determination on a number of factors, including: (1) Research showing that prescriptive, self-implementing requirements for final covers, comprised of low permeability compacted clay, do not perform well in the arid west. The clay dries out and cracks, which allows increased infiltration along the cracks; (2) Research showing that in arid environments thick soil covers comprised of native soil can perform as well or better than the prescriptive cover; and (3) Imperial County's analysis demonstrates, based on site-specific climatic conditions and soil properties, that the proposed alternative soil final cover will achieve equivalent reduction in infiltration as the prescriptive cover design and that the proposed erosion layer provides equivalent protection from wind and water erosion. This analysis is provided in Appendix D and Appendix D-1 of the Picacho Landfill Final Closure/Post-Closure Maintenance Plan dated October 27, 2010 and amended by EPA's comments dated February 20, 2011.

B. Groundwater Monitoring SSFR: Alternative Detection Monitoring Parameters

The regulations require post-closure monitoring of 15 heavy metals, listed in 40 CFR part 258, Appendix I. Imperial County proposed to replace these, with the exception of arsenic, with the alternative inorganic indicator parameters chloride, nitrate as nitrogen, sulfate, and total dissolved solids.

EPA's final determination is based on the fact that the County has performed over 15 years of semi-annual groundwater monitoring at the site, and during that time arsenic was the only heavy metal detected at a value that slightly exceeded the federal maximum contaminant level (MCL), a standard used for drinking water.

V. Summary of Public Comments Received and Response to Comments

EPA received one anonymous public comment during the public comment period stating support for EPA's Tentative Determination to Approve Site-Specific Flexibility for Closure and Monitoring of the Picacho Landfill, as proposed in the Federal Register on April 7, 2016.

VI. Additional Findings

In order to comply with the National Historic Preservation Act, 54 U.S.C. 100101 *et seq.,* Imperial County Department of Public Works will coordinate with the Tribe to arrange for a qualified Native American monitor to be present during any work. If buried or previously unidentified resources are located during project activities, all work within the vicinity of the find will cease, and the provisions of 36 CFR 800.13(b) will be implemented. If, during the course of the Landfill closure activities, previously undocumented archaeological material or human remains are encountered, all work shall cease in the immediate area and a qualified archaeologist shall be retained to evaluate the significance of the find and recommend further management actions.

Though no known threatened or endangered species or their habitat exist on the site, in order to ensure compliance with the Endangered Species Act, 16 U.S.C. 1536 *et seq.,* a preconstruction survey will be conducted prior to cover installation to ensure no threatened or endangered species are present. In particular, the survey will look for the presence of desert tortoises, which may occur in Imperial County. Should desert tortoises or other threatened or endangered species be encountered in the survey, or at any time during the closure of the Picacho Landfill, the County shall contact the U.S. Fish and Wildlife Service to develop avoidance measures to ensure that impacts to the species are minimized. Following closure and vegetation restoration activities, the project site may become suitable for threatened and endangered species. This would be a beneficial effect.

Under Executive Order 12866, “Regulatory Planning and Review” (58 FR 51735, October 4, 1993), this rule is not of general applicability and therefore is not a regulatory action subject to review by the Office of Management and Budget (OMB).

This rule does not impose an information collection burden under the provisions of the Paperwork Reduction Act of 1995 (44 U.S.C. 3501 *et seq.*) because it applies to a particular facility only.

Because this rule is of particular applicability relating to a particular facility, it is not subject to the regulatory flexibility provisions of the Regulatory Flexibility Act (5 U.S.C. 601 *et seq.*), or to sections 202, 204, and 205 of the Unfunded Mandates Reform Act of 1995 (UMRA) (Pub. L. 104-4). Because this rule will affect only a particular facility, it will not significantly or uniquely affect small governments, as specified in section 203 of UMRA.

Because this rule will affect only a particular facility, this proposed rule does not have federalism implications. It will not have substantial direct effects on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government, as specified in Executive Order 13132, “Federalism,” (64 FR 43255, August 10, 1999). Thus, Executive Order 13132 does not apply to this rule.

This rule also is not subject to Executive Order 13045, “Protection of Children from Environmental Health Risks and Safety Risks” (62 FR 19885, April 23, 1997), because it is not economically significant as defined in Executive Order 12866, and because the Agency does not have reason to believe the environmental health or safety risks posed by this action present a risk to children. The basis for this belief is EPA's analysis of the potential risks posed by Imperial County's alternative final cover and alternative groundwater detection-monitoring parameters proposals and the standards set forth in this rulemaking.

This rule is not subject to Executive Order 13211, “Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use” (66 FR 28355, May 22, 2001), because it is not a significant regulatory action under Executive Order 12866.

As required by section three of Executive Order 12988, “Civil Justice Reform,” (61 FR 4729, February 7, 1996), in issuing this rule, EPA has taken the necessary steps to eliminate drafting errors and ambiguity, minimize potential litigation, and provide a clear legal standard for affected conduct.

Executive Order 13175, entitled “Consultation and Coordination with Indian Tribal Governments,” (65 FR 67249, November 9, 2000), calls for EPA to develop an accountable process to ensure “meaningful and timely input by tribal officials in the development of regulatory policies that have tribal implications.” *See* also “EPA Policy for the Administration of Environmental Programs on Indian Reservations,” (November 8, 1984) and “EPA Policy on Consultation and Coordination with Indian Tribes,” (May 4, 2011). EPA consulted with the Quechan Tribe throughout Imperial County's development of its closure and monitoring plans for the Picacho Landfill.

List of Subjects in 40 CFR Part 258

Environmental protection, Final cover, Monitoring, Municipal landfills, Post-closure care groundwater, Reporting and recordkeeping requirements, Waste treatment and disposal, Water pollution control.

Dated: September 22, 2016.
Alexis Strauss,
Acting Regional Administrator, Region IX.

For the reasons stated in the preamble, 40 CFR part 258 is amended as follows:

Part 258 Criteria for Municipal Solid Waste Landfills

Regulatory Text

1. The authority citation for part 258 continues to read as follows:

Authority:

33 U.S.C. 1345(d) and (e); 42 U.S.C. 6902(a), 6907, 6912(a), 6944, 6945(c) and 6949a(c), 6981(a).

Subpart F Closure and Post Closure Care

Regulatory Text

2. Section 258.62 is amended by removing “[Reserved]” at the end of the section and adding paragraph (b) to read as follows:

§ 258.62 Approval of site-specific flexibility requests in Indian country.

* * * * *

(b) *Picacho Municipal Solid Waste Landfill—alternative list of detection monitoring parameters and alternative final cover.* This paragraph (b) applies to the Picacho Landfill, a Municipal Solid Waste Landfill operated by Imperial County on the Quechan Indian Tribe of the Fort Yuma Indian Reservation in California.

(1) In accordance with § 258.54(a), the owner and operator may modify the list of heavy metal detection monitoring parameters specified in appendix I of this part, as required during Post-Closure Care by § 258.61(a)(3), by replacing monitoring of the inorganic constituents, with the exception of arsenic, with the inorganic indicator parameters chloride, nitrate as nitrogen, sulfate, and total dissolved solids.

(2) In accordance with § 258.60(b), the owner and operator may replace the prescriptive final cover set forth in § 258.60(a), with an alternative final cover as follows:

(i) The owner and operator may install an evapotranspiration cover system as an alternative final cover for the 12.5 acre site.

(ii) The alternative final cover system shall be constructed to achieve an equivalent reduction in infiltration as the infiltration layer specified in § 258.60(a)(1) and (2), and provide an equivalent protection from wind and water erosion as the erosion layer specified in § 258.60(a)(3).

(iii) The final cover system shall consist of a minimum three-foot-thick multi-layer cover system comprised, from bottom to top, of:

(A) A minimum 30-inch thick infiltration layer consisting of:

(*1*) Existing intermediate cover; and

(*2*) Additional cover soil which, prior to placement, shall be wetted to optimal moisture and thoroughly mixed to near uniform condition, and the material shall then be placed in lifts with an uncompacted thickness of six to eight inches, spread evenly and compacted to 90 percent of the maximum dry density, and shall:

(*i*) Exhibit a grain size distribution that excludes particles in excess of three inches in diameter;

(*ii*) Have a minimum fines content (percent by weight passing U.S. No. 200 Sieve) of seven percent for an individual test and eight percent for the average of ten consecutive tests;

(*iii*) Have a grain size distribution with a minimum of five percent smaller than five microns for an individual test and six percent for the average of ten consecutive tests; and

(*iv*) Exhibit a maximum saturated hydraulic conductivity on the order of 1.0E-03 cm/sec.; and

(*3*) A minimum six-inch surface erosion layer comprised of a rock/soil admixture. The surface erosion layer admixture and gradations for 3% slopes and 3:1 slopes are detailed below:

(*i*) 3% slopes: For the 3% slopes the surface admixture shall be composed of pea gravel (3/8-inch to 1/2-inch diameter) mixed with cover soil at the ratio of 25% rock to soil by volume with a minimum six-inch erosion layer.

(*ii*) For the 3:1 side slopes the surface admixture shall be composed of either: gravel/rock (3/4-inch to one-inch diameter) mixed with additional cover soil as described in paragraph (b)(2)(iii)(A)(*2*) of this section at the ratio of 50% rock to soil by volume and result in a minimum six-inch erosion layer, or gravel/rock (3/4-inch to two-inch diameter) mixed with additional cover soil as described in paragraph (b)(2)(iii)(A)(*2*) of this section at the ratio of 50% rock to soil by volume and result in a minimum 12-inch erosion layer.

(*iii*) The owner and operator shall place documentation demonstrating compliance with the provisions of this section in the operating record.

(*iv*) All other applicable provisions of this part remain in effect.

(B) [Reserved]

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BILLING CODE 6560-50-P

Final Closure/Post-Closure Maintenance Plan

PICACHO CUT AND FILL SITE
Imperial County, California

May 1999
Revised: October 2010

Prepared For:

COUNTY OF IMPERIAL
Department of Public Works
155 South 11th Street
El Centro, California 92243

Prepared By:

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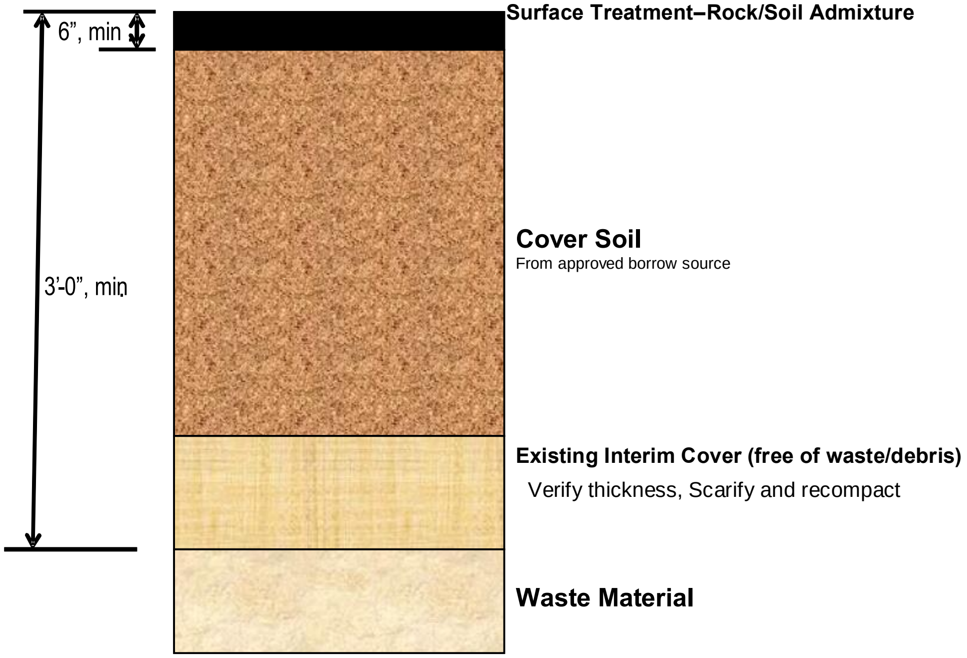
EPA Comments on Picacho Final Closure/Post-Closure Maintenance Plan dated 10/27/10
2/10/2011

The following comment reflect US EPA Region 9's comments on the revised Picacho Final Closure/Post-Closure Maintenance Plan dated 10/27/10. These comments can be incorporated into the Closure Plan or included as an addendum to the Closure Plan.

1. **Overall cover thickness of 3-ft vs. 4.5-ft proposed in the Closure Plan:** EPA recommends an overall cover thickness of 3.0-ft vs. the 4.5-ft cover thickness proposed in the Closure Plan for the following reasons:
    a. Modeling described in the Plan shows that a 3-ft cover would perform better than a 4.5-ft cover.
    b. Given the extreme arid nature of the site, a thinner cover (3-ft) is adequate to control infiltration versus the suggested 4.5-ft thick cover.
    c. As discussed below, our analysis shows that a 3.0-ft thick cover is stable on 3:1 side slopes while a 4.5-ft thick cover is not.

The suggested final cover profile is as follows:



2. **Side Slope Stability:** As discussed in the EPA analysis below, the steep 2.25:1 side slopes are not stable under static conditions, however, are stable with 3:1 side slopes and a 3.0-ft thick cover. Therefore, EPA recommends regrading the side slopes during final closure to a maximum 3:1 slope and using a cover thickness of 3-ft.

    EPA analysis shows that under static conditions the existing slopes are stable, using the input parameters utilized in the Plan. However, the input parameters used in the Plan were not all conservative. The Plan's write-up for the soils states that the borrow soil is "predominantly cohesionless", yet soil cohesion values were utilized in the Plan's stability analysis. Cohesion is a sensitive input parameter and has a significant impact on calculated factors of safety.

Evaluation of the cover side slope stability was performed for veneer stability. Values from the Closure Plan for soil weight, friction angle, slope, cover thickness, and cohesion were initially utilized. Values for cohesion, cover thickness, and slope were then varied based on more conservative possibilities. The following table shows calculated factor of safety results along with accompanying input parameters.

Cover Thickness	Slope	Friction Angle	Cohesion	Soil weight	Calculated Factor of Safety
4.5 ft	2.25:1	30	125 psf	118 pcf	1.9
4.5 ft	2.25:1	30	0	118 pcf	1.3
3 ft	2.25:1	30	125 psf	118 pcf	2.2
3 ft	2.25:1	30	0	118 pcf	1.3
3 ft	3:1	30	125 psf	118 pcf	2.9
3 ft	**3:1**	**30**	**0**	**118 pcf**	**1.7**

With a cover thickness of 3-ft and conservative cohesion value of zero, a factor of safety of 1.7 was estimated for static conditions. This is greater than the minimum factor of safety of 1.5. We therefore recommend that the side slopes be regraded during final closure to a maximum slope of 3:1 with a cover thickness of 3-ft.

3. **Erosion Layer Admixture and Gradations for 3% slopes and 3:1 slopes:** EPA calculated viable erosion layer mixtures and gradations for the slopes at the Picacho landfill.[1]

3% slopes: The calculations for the 3% slopes show that the surface admixture should be composed of pea gravel (3/8-in – 1/2-in diameter) mixed with cover soil at the ratio of 25% rock to soil by volume with a minimum 6-in erosion layer.

3:1 slopes: Calculations for the 3:1 slopes show that the surface admixture should be composed of gravel/rock (¾-in to 1-in diameter) mixed with cover soil at the ratio of 50% rock to soil by volume and result in a minimum 6-in erosion layer. Other rock size and percent content ratios can be used depending on the availability of gravel and its size in the area, however, increasing rock sizes results in an increased overall admixture erosion layer thickness. As an example using gravel/rock (¾-in to 2-in diameter) mixed with cover soil at the ratio of 50% rock to soil by volume and results in a minimum 12-in erosion layer. Viable erosion layer options are shown in the table below.

Viable Options Available to Design Erosion Layer Admixture Gradations for 3% slopes and 3:1 slopes

	Rock/Gravel Size (in Inches)	Percent rock to soil (by volume)	Minimum Erosion Layer Thickness
3% Slopes	3/8-in to 1/2-in	25% Rock	6 Inches
3:1 Slopes	3/4-in to 1-in	50% Rock	6 Inches
	3/4-in to 2-in	50% Rock	12 Inches

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[1] Based on the method described in Dwyer et al 2007.

A spreadsheet with the utilized parameters is available and can be used to evaluate different gravel size and quantities.

4. **Perimeter Berm Lining:** EPA continues to recommend lining the perimeter berms discussed in Section 3.7.1.3 of the Closure Plan in a way that will minimize soil lose and infiltration. BAS argues that the proposed rock mixed into the perimeter berm's cover soil will mitigate any erosion. We disagree. Soil/rock admixtures are appropriate to control sheet flow erosion, however, are not appropriate for concentrated flow such as conveying storm flow along berms or in channels. We recommend asphaltic lining for the perimeter berms.

Final Closure/Post-Closure Maintenance Plan

Picacho Cut and Fill Site

Imperial County, California
May 1999
Revised: October 2010

Final Closure/Post-Closure Maintenance Plan
Picacho Cut and Fill Site
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PICACHO CUT AND FILL SITE
ACRONYM LIST

27 CCR	California Code of Regulations, Title 27
AC	Asphaltic concrete
AMSL	Above Mean Sea Level
BAS	Bryan A. Stirrat & Associates, Inc.
CalRecycle	California Department of Resources Recycling and Recovery
CCR	California Code of Regulations
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
CIDPW	County of Imperial Department of Public Works
CIWMB	California Integrated Waste Management Board (Currently CalRecycle)
CM	Construction Manager
COC	Constituents of Concern
CQA	Construction Quality Assurance
CY	Cubic Yards
DMP	Detection Monitoring Program
EA	Enforcement Agency
EPA	Environmental Protection Agency
ERP	Emergency Response Plan
FCPCMP	Final Closure/Post-Closure Maintenance Plan
FID	Flame Ionization Detector
GLA	GeoLogic Associates
LCRS	Leachate Collection and Removal System
MCE	Maximum Credible Event
MPE	Maximum Probable Event
MSWLF	Municipal Solid Waste Landfill
OVA	Organic Vapor Analyzer
PCPCMP	Preliminary Closure/Post-Closure Maintenance Plan
RCRA	Resource Conservation and Recovery Act

PICACHO CUT AND FILL SITE
ACRONYM LIST (Continued)

RWQCB	Regional Water Quality Control Board
SSO	Site Safety Officer
SSFR	Site Specific Flexibility Request
Subtitle D	CFR 40 Parts 257 and 258
SWAT	Solid Waste Assessment Test
SWFP	Solid Waste Facilities Permit
SWPPP	Storm Water Pollution Prevention Plan
TOCs	Total Organic Compounds
RUSLE	Revised Universal Soil Loss Equation
VOCs	Volatile Organic Compounds
WDR	Waste Discharge Requirements

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SECTION 1.0

INTRODUCTION

1.0 INTRODUCTION

1.1 PURPOSE

This Final Closure and Post-Closure Maintenance Plan (FCPCMP) for the Picacho Cut and Fill Site (PCFS), SWIS No. 13-AA-0012, has been prepared for the County of Imperial Department of Public Works (CIDPW) by Bryan A. Stirrat & Associates, Inc. The PCFS FCPCMP has been prepared in accordance with the Code of Federal Regulations (CFR) Title 40, Part 258, Subpart F.

The PCFS is located on land occupied by the Quechan Indian Tribe. These Tribal lands are held in trust by the federal government and are not under the authority of the State of California. Therefore, the Quechan Tribal Council has the authority to regulate the Tribal environment. As a result, this FCPCMP for the PCFS will be subject to their review and input with final approval and by the United States Environmental Protection Agency (USEPA) Region 9 with the Quechan Tribal Council's concurrence. Since the PCFS is situated on Indian land, the governing Municipal Solid Waste (MSW) landfill regulations for the closure of the facility are found in the Federal Code of Regulations, Title 40, Part 258 (40 CFR 258). However, it should be noted that for certain aspects of the closure and post-closure requirements, not specifically outlined in the Code of Federal Regulations, California standards (i.e., Title 27 of the California Code of Regulations), which are more stringent than the Federal regulations, will be used as guidance.

Certain variations from the federal regulations (i.e., 40 CFR 258) must be approved by the EPA as described in a document entitled, "Site-Specific Flexibility Requests for Municipal Solid Waste Landfills in Indian Country - Draft Guidance" (EPA, August 1997). Included in the guidance document are the requirements and instructions for preparing a site-specific flexibility request (SSFR) for modifying the list of groundwater monitoring parameters from those specified in 40 CFR 258.54(a). GeoLogic Associates (GLA) has prepared a SSFR to modify the list of detection monitoring parameters provided in 40 CFR 258.54(a)(1) and (2). The groundwater SSFR was prepared based on information summarized in the semi-annual water quality monitoring reports prepared by GLA for the CIDPW, including the first semi-annual 2009 and the annual report dated April 2010, and the EPA (August 1997) SSFR guidance document. The groundwater SSFR (dated September 2010) is included as Appendix C-1 of the FCPCMP.

In addition, an SSFR has been prepared by GLA to demonstrate that the proposed alternative final cover system meets the requirements of 40 CFR 258.60(b). The final cover SSFR was prepared based on information summarized in the Preliminary Alternative Cover Evaluation and Design Report (see Appendix D) for the PSWS Final Closure prepared by GLA (May 1999) and the EPA (August 1997) SSFR guidance document. The alternative final cover SSFR (dated March 2008) is included as Appendix D-1 of the FCPCMP.

The sections titled Introduction (Section 1.0) and Existing Environmental Control and Monitoring Systems (Section 2.0) of this document present information which is common to both the Closure Plan (Section 3.0) and Post-Closure Maintenance Plan (Section 4.0). The Post-Closure Emergency Response Plan and Closure/Post-Closure Maintenance Cost Estimate are presented in Sections 5.0 and 6.0, respectively. Certification of Closure (Section 7.0), Recordkeeping (Section 8.0) and References (Section 9.0) comprise the remaining sections of this document.

1.2 SITE LOCATION

The PCFS is located in the southeastern portion of the Imperial Valley approximately four and one half miles north of Winterhaven and one and a half miles north of the All American Canal (Figure 1). The site is situated in a rural area at the base of the Cargo Muchacho Mountains. The legal description of the site by the government survey method is: a portion of the Northeast quarter of Section 35, Township 15 South, Range 22 East, San Bernardino Baseline and Meridian. The approximate latitude of the site is 32° 48′ 51″ N and the approximate longitude is 114° 37′ 13″ W. The site is located within the Fort Yuma Indian Reservation occupied by the Quechan Indian Tribe. As discussed in detail in Section 1.1, the Quechan Tribal Council has the authority to regulate the Tribal environment and this FCPCMP will be subject to their review and input with final approval made by the USEPA Region 9 with the Quechan Tribal Council's concurrence.

Access to the landfill is off Picacho Road as shown on Figure 1. Vehicles travel along Picacho Road, a two-lane, gravel roadway, and then turn into the landfill entrance located on the site's western boundary. This road provides access to the pesticide container disposal area located in the northern area of the site.

1.3 CLOSURE DATE

The disposal area footprint was delineated recently through trenchings and ground surveys and is approximately 12.5 acres as shown on Figure 5. The engineering design plans presented in this FCPCMP reflect this 12.5-acre footprint area.

The remaining site capacity is based on the difference between the existing topography and the final disposal area contours. Table 1 presents information regarding gross air space, final, intermediate and daily cover requirements and remaining refuse capacity. The remaining refuse capacity at the site as of January 2009 is estimated to be approximately 2,059 cy (based on a refuse to soil volume ratio of 5:1 and an in-place refuse density of 0.5 tons/cy). It should be noted that the current remaining site capacity included in this document reflects the maximum utilization of the 12.5-acre refuse area footprint.

With the total remaining refuse volume for the site at approximately 2,059 cy (see Appendix A) and an annual average inflow rate of 1,743 cubic yards per year, the landfill's service life is estimated to be approximately 1.2 years (see Table 1) from January 2009.

1.4 SURROUNDING LAND USE

Adjacent zoning and surrounding land use is compatible with the landfill operations. Land use within a one-mile radius of the site is located within the Fort Yuma Indian Reservation, which is designated as open space (S) for purposes of county zoning, and there are no structures located within 1,000 feet of the PCFS. However, this land is not subject to county zoning requirements or designations; the land is under the authority of the Quechan Tribal Council. There are currently no zoning ordinances within the Tribal land.

No known inconsistencies or incompatibilities exist with the surrounding land uses and no potential adverse land use impacts are foreseeable due to continued operation and eventual closure of the landfill.

1.5 POST-CLOSURE SITE USE

The currently proposed post-closure use of the PCFS will be non-irrigated open space. No known inconsistencies or incompatibilities exist with the surrounding land uses as there are no zoning ordinances set forth by the Quechan Tribal Council within or surrounding the PCFS area. Additionally, no potential adverse land use impacts are foreseeable due to continued operation and eventual closure of the landfill.

SECTION 2.0

EXISTING ENVIRONMENTAL CONTROL AND MONITORING SYSTEMS

2.0 EXISTING ENVIRONMENTAL CONTROL AND MONITORING SYSTEMS

2.1 LANDFILL GAS CONTROL/MONITORING SYSTEM

A landfill gas control or monitoring system does not currently exist at the PCFS. Previous landfill monitoring utilizing the bar probe method during the regulatory agency inspections have indicated no gas migration or surface emission problems. In addition, due to the sites remote location, landfill gas migration would not create a hazard or nuisance to the public. It should also be noted that the landfill's total refuse capacity of 645,333 cy is much less than the 2.5 million cubic meter threshold, which triggers the applicability of 40 CFR part 60, Subpart WWW. Therefore, no landfill gas collection and control system is required at the PCFS.

The CIDPW has implemented a Solid Waste Gas Sampling and Reporting Program, which includes quarterly surface monitoring at the perimeter of the landfill. The last eight quarters of methane gas detection monitoring results are included in Appendix H.

2.2 GROUNDWATER MONITORING SYSTEM

Initially, because California is an EPA-approved State regulating solid waste facilities within the State, the site was thought to fall under the jurisdiction of the California Regional Water Quality Control Board - Colorado River Basin Region, and site monitoring was performed in accordance with site-specific Waste Discharge Requirement No. 88-005, and the more recent blanket Waste Discharge Requirements No. 93-071, established for all active landfills within the Colorado River Basin Region and prepared to comply with federal regulations. As a result, the groundwater monitoring wells have been monitored by the County on a semi-annual basis beginning in November 1994 in accordance with these WDRs. Accordingly, the semiannual detection monitoring program complies with EPA regulation 40 CFR 258.54(a) to include the constituents listed in Appendix I, with the exception of the 15 heavy metals, which are included in the sampling program every 5 years.

The existing groundwater monitoring system at the PCFS consists of three monitoring wells (P-MW-1, 2, and 4) and one water level measuring station (P-DW-3A). Although the groundwater gradient is nearly flat, typically well P-MW-1 is located upgradient of the landfill, well P-MW-4 is located down-gradient of the landfill's pesticide disposal area, and wells P-MW-2 and P-DW-3A are located downgradient of the landfill. A proposed well (P-MW-5) is anticipated to be located cross-gradient of the landfill on the east side of the site. The locations of the existing wells and proposed well P-MW-5 are shown on Figure 2. All of the existing groundwater monitoring wells were installed by ENVIRON in August, 1994 and were constructed of two-inch diameter PVC casing with fifteen feet of screen. All of the existing wells are secured at the surface with a locking steel protective cover set in concrete and a padlock. Well construction logs are included in Appendix B.

Monitoring wells (P-MW-1, P-MW-2, P-MW-4) are sampled semi-annually in accordance with the Sampling and Analysis Plan (included in Appendix C) using dedicated bailers. The Sampling and Analysis Plan complies with 40 CFR 258.53. Protocols for proposed monitoring well P-MW-5 are anticipated to follow the same sampling and analysis plan as established for the existing monitoring wells.

As discussed in Section 1.1, GLA has prepared a SSFR to modify the list of detection monitoring parameters provided in 40 CFR 258.54(a)(1) and (2). This SSFR is included in Appendix C-1.

Groundwater samples are analyzed for the Appendix I list of volatile organic compounds (VOCs) provided in 40 CFR, Part 258, arsenic (since it is potentially associated with some pesticides) and the metal surrogates (chloride, nitrate as nitrogen, sulfate, and total dissolved solids). In addition, field parameters (pH, dissolved oxygen, electrical conductivity, turbidity, and temperature) are also measured during sampling. Every five years, the groundwater monitoring wells are analyzed for the full suite of constituents of concern (COCs) listed in Appendix II of 40 CFR, Part 258. COC sampling was last performed at the PCFS in August 2006, and is scheduled for sampling during the Winter/Spring 2011 monitoring event. In addition, following construction of proposed well P-MW-5, samples from this well will be analyzed for the entire 40 CFR 258 Appendix I list of parameters (including the metals) for at least two semiannual monitoring events.

During each semi-annual monitoring period, the surface monuments and well casings are inspected for security and damage. Any problems with the wells that are reported on the field data sheets are relayed to the CIDPW. If significant damage to a well is observed, then the CIDPW will initiate a maintenance program to address the problem.

2.3 LEACHATE COLLECTION AND REMOVAL SYSTEM/MONITORING

The PCFS is unlined and predates the requirements to install a leachate collection and removal system (LCRS). Therefore, LCRS monitoring is not performed at the site. To date, no leachate seeps have been observed at the landfill.

2.4 STORMWATER MONITORING

As authorized by the Clean Water Act, the National Pollutant Discharge Elimination System (NPDES) permit program controls water pollution by regulating point sources that discharge pollutants into waters of the United States. The CIDPW is currently working on submitting a Notice of Intent (NOI) under the Multi-Sector General Permit and developing a Stormwater Pollution Prevention Plan (SWPPP) and Stormwater Monitoring Plan (SWMP) for the PCFS.

SECTION 3.0

CLOSURE PLAN

3.0 CLOSURE PLAN

3.1 INTRODUCTION

Closure of the PCFS will be performed in accordance with applicable regulatory standards included in 40 CFR, Part 258, Subpart F. In some cases, the California standards, which are being adhered to, are more stringent than the Federal regulations.

The costs associated with closure of the PCFS are described in Section 7.0 of this document. The components and systems required for closure of the PCFS include: the final grading plan and final cover design, surface water drainage and erosion control systems, landfill gas monitoring system, groundwater monitoring system and site security. A description of these closure components as well as a schedule for construction of the PCFS closure improvements is presented in the following subsections.

3.2 FINAL GRADING

This section describes the final grading plan proposed for the PCFS. The most current topographic map (dated June 12, 2006) has been used as the base map for the final grading plan (Figure 5).

Upon cessation of refuse disposal operations, the deck area will be set at a gradient of three percent to facilitate drainage and accommodate for future differential settlement of the underlying waste. The proposed drainage control system provides for the handling of on-site surface flows as well as the diversion of potential run-on from surrounding areas. The drainage control system consists of drainage berms and concrete and asphaltic concrete (AC) V-channels. Due to the relatively shallow nature and age of the refuse prism at this site, settlement related drainage problems on the deck areas are not anticipated, as discussed in Section 3.4.1. The final cover described in Section 3.3.2 (see Figure 6) will then be placed over the refuse prism areas. Final slopes of the PCFS will be at maximum grades of 2.25:1 (horizontal to vertical) (Figure 5). The final grades have been designed to blend with the natural topography of the surrounding area.

3.3 FINAL COVER

The purpose of a final cover is to provide an effective barrier to infiltration of surface water and to encapsulate wastes, which reduces the potential for vectors, odors, and gas emissions. The cover also provides a base for vegetation, which has been documented to reduce drainage velocities, erosion and infiltration.

3.3.1 MINIMUM DESIGN STANDARDS

The minimum final cover standards for the PCFS are outlined in the closure and post-closure requirements for MSW landfills contained in 40 CFR, Part 258, Subpart F, Section 258.60. The Federal regulations require the following:

- A cover with a permeability less than or equal to the hydraulic conductivity of any bottom liner system or natural sub-soils present, or a permeability no greater than $1x10^{-5}$ cm/sec, whichever is less.
- A cover that minimizes infiltration through a closed landfill by the use of an infiltration layer that consists of a minimum 18 inches of earthen material.
- A cover which minimizes erosion of the final cover by the use of an erosion resistant layer that contains a minimum six inches of earthen material that is capable of sustaining native plant growth.

However, under 40 CFR 258.60 (b), an alternative final cover system design may be approved if it is demonstrated that the alternative final cover achieves equivalent reduction in infiltration to the prescriptive standard, and that the proposed erosion layer provides equivalent protection from wind and water erosion as the specified prescriptive standard.

In addition, the final cover should be designed for minimum maintenance requirements. Grading shall be designed to prevent ponding, provide for slopes of at least three percent (a lesser slope may be allowed if surface drainage is diverted) and minimize surface erosion by water and wind in areas of greater than ten percent slope and in surface drainage courses.

It should be noted that LEACHM modeling results presented in.a SSFR for the proposed alternative final cover, demonstrates that the proposed alternative final cover provides equivalent protection in infiltration to the prescriptive standard has been prepared. It is being concurrently submitted to the EPA for review and approval as discussed in Section 1.1.

3.3.2 FINAL COVER DESIGN

Several factors were taken into consideration in determining the cover design for the site to provide for adequate performance of the cover. These included the geometry of the existing landfill, climatic conditions, potential settlement, available cover materials, erosion protection, vegetative growth and end use at closure. It was determined that an alternative final cover design utilizing a monolithic engineered select soil cover is the most appropriate cover system for the PCFS based on these parameters.

An engineering analysis (see Appendix D-1) concluded that the site-specific climatological and soil conditions support the use of the proposed alternative final cover design utilizing a monolithic engineered soil. This design will meet or exceed the prescribed performance criteria and will be more economical for site closure than prescriptive standards.

Based on the analysis of the SSFR in Appendix D-1, an alternative final cover design utilizing a monolithic cover is proposed, consisting of the following:

- A four and a half foot thick monolithic cover layer composed of on-site or near-site soils , which includes a minimum one foot of which has been determined to be in-place (by the recent existing cover evaluation).
- An admixture of pit run rock (clasts greater than six inches will not be used) and soil will be placed in the upper six to eight inches of the final cover to provide protection against wind and water erosion.
- A minimum of two percent native plant community to be maintained to provide reasonable performance for the ET monolithic alternative cover system.

Because the analysis performed to date indicates that a four and a half foot thick final cover section composed of on-site or near-site soil material will meet or exceed the performance criteria of the prescribed standard, a traditional barrier layer is not proposed for the alternative final cover design. A typical cross-section of the proposed alternative final cover system is shown on Figure 6.

The alternative final cover configuration has been designed to:

- Ensure the containment of waste materials;

- Minimize the infiltration of water from rain and provide a vegetative cover of native shrubs and grasses;
- Prevent exposure of people and animals to waste;
- Limit landfill gas emissions;
- Minimize odor;
- Control fires; and
- Provide for an aesthetically pleasing appearance.

The soil characteristics of the site material were identified and evaluated for the PCFS (see Appendix D-1). This work included laboratory testing of two soil samples from the on-site borrow sources and infiltration modeling. Based on the findings of the evaluation, on-site materials meet the permeability equivalence requirements for final cover. Colorado River Basin Regional Water Quality Control Board (RWQCB), USEPA, and the Quechan Tribal Council approval of this design will be sought prior to implementation of this alternative final cover system.

3.3.3 FINAL COVER CONSTRUCTION

Clearing and Grubbing

Prior to final grading and placement of the cover, the deck and slope of the landfill will have all existing vegetative materials removed from the foundation surface without disturbing the underlying refuse. All materials generated by the clearing and grubbing operation shall be buried on the upper deck and covered with one foot of select soils from an on-site source.

Foundation Layer

Foundation layer material will be added in areas of the refuse prism which are covered with less than the two-foot minimum of interim cover material. It is assumed that the majority of the site has an existing one-foot thick interim cover in-place. The thickness of interim cover will be verified by pot-holing and additional foundation material placed to meet minimum thickness requirements and to achieve positive gradients for adequate surface water drainage. The entire thickness of the foundation layer will be required to meet 90 percent relative compaction according to ASTM D1557.

Monolithic Select Soil Layer

The proposed monolithic layer will be constructed with select soils obtained from an on-site or near-site source(s), and with the exception of the erosion control layer, the monolithic soil layer will exhibit a grain size distribution that excludes particles in excess of three inches and includes a minimum fines content of seven percent for an individual test and eight percent for the average of ten consecutive tests. Prior to placement, these materials will be wetted to optimum moisture and thoroughly mixed to obtain a near uniform condition. The material will then be placed in lifts with a maximum uncompacted thickness of six to eight inches. Each lift will be spread evenly and compacted to a minimum of 90 percent of maximum density.

Where quality control tests indicate that the moisture content, density, permeability or grain size distribution of any lift, or portion thereof, does not meet the specifications in Appendix 1 of Appendix D, that particular portion shall be retested, and if necessary reworked until the specified moisture, density, and permeability has been attained. Special attention will be given to unsaturated material characteristics to verify that they satisfy the requirements specified in Appendix 1 of Appendix D. No additional material will be placed over an area until the previously placed material has been tested and found to meet the design specifications. Testing of the materials will be done in accordance with the CQA Plan included in Appendix 1 of Appendix D.

Erosion Resistant Layer

A minimum plant coverage of two to five percent will provide reasonable performance for the proposed alternative cover. Vegetation for the proposed alternative cover will consist of native plant species.

An admixture of pit run rock (clasts smaller than six inches) and soil will be placed in the upper six to eight inches of the monolithic cover layer to provide additional protection of the final cover system against wind and water erosion. The pit run rock and soil will be obtained from local sources.

See the Alternative Final Cover SSFR (Appendix D-1) for a detailed analysis of the erosion resistant layer.

3.3.3.1 ACCESS ROAD

Access to the deck area of the PCFS will be provided by an access road. The access road will provide vehicular access to the deck in order to perform post-closure maintenance and monitoring of the final cover and drainage facilities.

3.4 LANDFILL SETTLEMENT

3.4.1 SETTLEMENT ANALYSIS

This section describes the method of settlement analysis used to evaluate the total potential settlement that may occur during the post-closure period. There are three principal modes of settlement for a typical municipal waste landfill. These can be described as: consolidation induced settlement resulting from the loss of fluids through drainage, dewatering by absorption, or release of leachate; shrinkage related settlement occurring as a result of overall volume loss due to microbial conversion of solids and liquids to carbon dioxide and methane gas; and compaction related settlement resulting from the reorientation of solids into a more dense configuration (Huitric, 1981). In addition to these "classic" settlement modes, dynamic settlement can occur during and shortly after earthquake events when soil and/or refuse particles consolidate as a result of ground shaking.

While it is theoretically possible to calculate the expected settlement from each of the phenomena described above, the data available for the PCFS and, in fact, virtually all landfills are insufficient to make a site-specific analysis. Therefore, the analysis for the PCFS is based on historical settlement.

Studies performed by Hagerty, Pavoni and Hur (1973) and the Los Angeles County Sanitation Districts (Huitric, 1981) for landfills in the Southern California area indicate that landfill settlements are typically between two and 40 percent of original refuse thickness. The following analysis assumed a 20 percent total settlement occurring logarithmically over an approximately 30-year period. Given the extremely dry climate at the landfill, these assumptions are considered conservative.

The first step in the analysis of settlement at this site involved an evaluation of the total anticipated depth of refuse at closure. Several points on the site were taken and a vertical refuse placement history estimated by taking the total depth of refuse disposed. For example the deepest point of waste is estimated at 50 feet. A relatively uniform refuse placement rate over the life of the site was then assumed.

The theoretical settlement, which has already occurred at a given node in the refuse prism, was subtracted from the total anticipated for that node to generate an estimate of the remaining settlement potential. For example, the deepest point of waste will experience approximately 10 feet of settlement (20% of 50 feet) over a 30 year period. Because the landfill has been in operation since 1977, the analysis assumes that 50% of the settlement will have already occurred at closure and approximately 5 feet of settlement during the post-closure period has been calculated at the deepest point of waste.

3.4.1.1 SETTLEMENT DUE TO UNDERLYING NATIVE MATERIAL SUBSIDENCE

The potential for settlement due to subsidence of the underlying natural geologic materials at the PCFS was also evaluated. However, given that the in-place density of the refuse at the site was estimated to be less than that of the natural soil excavated from the fill area, and considering that the depth of refuse at the site is shallow, settlement due to subsidence of the underlying natural geologic materials is not anticipated.

3.5 CLOSED LANDFILL STABILITY

In accordance with 40 CFR, Part 258, Subpart F, precautions should be taken to maintain the integrity and effectiveness of the final cover. Accordingly, landfill cover stability for the PCFS was analyzed.

The project plans prepared by BAS (12/2007) were analyzed by GeoLogic Associates for the proposed closure/post-closure plan. Consistent with the plan, the site is proposed to have a 4-1/2 foot thick soil final cover over the refuse mass (BAS, 2007) consistent with the Final Closure/Post-Closure Maintenance Plan (FCPCMP) for the Landfill. The results of these analyses are provided later in this section.

The soil materials at the site include municipal solid waste (MSW) fill below proposed compacted cover/fill materials. No liners or geotextiles are proposed for the cover in the closure plan.

Geotechnical parameters required for analysis include unit weight and shear strength parameters (angle of friction and cohesion). For the compacted cover soils, which are predominantly cohesionless in nature, the angle of friction and unit weight were based on average values obtained from laboratory testing of the borrow soils. Three samples (B-1, B-2, and B-3) were obtained from the borrow area south of the existing landfill (in the approximate location presented in Figure I.1 in Appendix I) and transported to our laboratory for geotechnical testing. The samples were tested for gradation analysis (ASTM D422), maximum density (ASTM D1557), and direct shear testing (ASTM D3080). The samples tested for direct shear were remolded in the laboratory to 90% of the soil maximum dry density near optimum moisture content. The results of the direct shear testing are presented in Appendix I and summarized below. Parameters for the refuse or municipal solid waste (MSW) are based on industry-wide typical values from previously published information (Singh and Murphy, 1990). A summary of the parameters used in the slope stability analyses is presented below.

Geotechnical Materials Strength Parameters

Material	Unit Weight (pcf)	Friction Angle (degrees)	Cohesion (psf)
Compacted Cover/Fill Soils	118	30	125
Refuse (MSW)	80	30	200

Conventional static and pseudo-static stability analyses for fill slopes were performed using the SLOPE/W (GeoStudio, 2007) computer program. Analytical methods used for analysis included the Morgenstern-Price method for circular failure modes. The program calculates the factor-of-safety for a user-specified geometry using a number of analytical methods for limit equilibrium.

The cover soils were modeled using a representative cross section constructed along the western end of the landfill in the area of the maximum slope height (25 feet) above the proposed adjacent basin. The cover sols were modeled with a thickness of 4-1/2 feet above the existing refuse with a slope inclination of 2.25:1 (horizontal to vertical).

Stability calculations were performed to evaluate the static and dynamic stability of the final (post-closure) configuration of the cover. Refuse prism configurations, past landfill history, and proposed closure plans were provided by BAS.

Based on the above material parameters, the cross section was analyzed for static slope stability. Groundwater is assumed to be below the base of the refuse and thus, is not significant in this analysis. The results of the static slope stability run is presented in Figure I.2 in Appendix I and is summarized in the following Table.

Static Slope Stability Analysis	
Description of Analysis	**Factor of Safety**
Static Slope Stability Analysis	2.1

The static cover stability for the maximum height cross section indicates a minimum factor of safety of 2.1(which is well above the minimum required static factor of safety of 1.5).

CCR Title 27 requires the cover slope stability under pseudo-static (dynamic) conditions demonstrate a factor of safety greater than 1.5 under the Maximum Probable Earthquake (MPE) for Class III facilities. Accordingly, a seismic hazard assessment was performed for the facility to determine the MPE event for the site. The site acceleration was calculated by performing a deterministic seismic hazard analysis using the Maximum Probable Earthquake (MPE) on the closest active to the site. This analysis was performed using the computer program EQFAULT (Blake, 2000a) presented in Appendix I. The results of this analysis indicate a site horizontal acceleration of 0.09g from the design earthquake on the Imperial Fault located approximately 40 miles from the site. In addition, historic earthquakes were searched using the computer program EQSEARCH (Blake, 2000b) to insure that there were no possible historic earthquakes greater than the deterministic deign earthquake. Review of the database indicates that the 1852 earthquake with a magnitude of 6.3 at a distance of 26.6 miles from the site has a calculated site acceleration of 0.11g. Accordingly, our design site acceleration is 0.11g for this analysis.

The pseudo-static stability of the cover is below the required stability of 1.5 Therefore, for the proposed closure project, seismic-induced permanent displacements due to the MPE were estimated using procedures described by Bray et. al., (1998) and Bray and Rathje (1998). The procedure is based on the methods described by Newmark (1965) for determining displacement of a rigid block resting on a sliding plane subjected to earthquake-type motions. The procedure is based on the premise that the sliding block will undergo displacement only during the periods when the maximum ground acceleration (k_{max}) exceeds the yield acceleration (k_y) for the sliding block, (i.e. displacements occur when k_y is greater than k_{max}). The representative cross section was analyzed to determine the yield acceleration (k_y) to achieve a pseudo-static factor of safety equal to 1.0. The results are presented in Figure L.3 in Appendix I and indicate a yield acceleration of 0.39g. Accordingly, since the calculated horizontal site acceleration due to the MPE event (0.11g) is significantly less than the yield acceleration (0.39g) to initiate any displacement, the calculated permanent seismic displacement due to the design earthquake event is negligible.

3.6 CONSTRUCTION QUALITY ASSURANCE

The construction of the final cover system shall be carried out in accordance with a CQA plan certified by an appropriately registered engineer or a certified engineering geologist. The CQA plan will provide evidence that suitable materials and standard construction practices are used to place the final cover system and to document that placement is consistent with the closure plan design specifications. Elements of the CQA Plan include: project description and definitions, qualifications and responsibilities, requirements for the final cover evaluation, inspection standards, testing frequencies, monitoring procedures, and documentation. The CQA plan is included in Appendix 1 of Appendix D. It should be noted that the CQA Plan addresses all of the general guidelines in the Interstate Technology and Regulatory Council (ITRC) 2003 guidance document. The CQA Plan has been developed to describe the methods and procedures to be used to install the final cover as specified in 40 CFR 258.60.

A final CQA Plan will be developed once the final cover design has been approved. The final CQA Plan will provide a detailed methodology for determining for determining existing cover soil thickness, processing these materials, integrating the final cover soils into the final cover, and the CQA testing required to demonstrate that appropriate material types and construction practices were used.

3.7 DRAINAGE AND EROSION CONTROL

3.7.1 DRAINAGE DESIGN

The primary functions of the PCFS drainage control system is to collect and convey stormwater in a controlled manner to minimize erosion of the final cover and inhibit infiltration of stormwater into the refuse prism in order to maintain the integrity and effectiveness of the final cover in accordance with 40 CFR 258. The final surface or deck area of the landfill will be sloped to prevent ponding and promote lateral runoff of stormwater, which falls directly on the landfill. The following sections describe the existing drainage control features and the proposed drainage design for closure of the PCFS.

3.7.1.1 SURFACE WATER HYDROLOGY

A hydrology study for proposed conditions at the site was conducted based on a designed 100-year/24-hour storm, which is more conservative than the Federal regulations for a 25-year/24-hour storm. The objective of the hydrology study was to calculate stormwater run-off for sizing and location information for the site's storm drain facilities at closure.

The Rational Method was used for the calculation of the peak discharge of a 24-hour, 100-year storm event. Estimated runoff values were calculated based on the National Oceanic and Atmospheric Administration Atlas Precipitation-Frequency Maps. A computer program developed by Advanced Engineering Software was used to compute the run-off. The hydrology study map for on-site flows and a summary of the peak discharge rates is shown on Figure 8. The Hydrology Study calculations are presented in Appendix E.

3.7.1.2 EXISTING DRAINAGE SYSTEM

There are no improved drainage facilities currently existing on the site. Surface water flows follow existing natural contours in several directions and finally discharge into a major natural drainage course, which flows in a southeasterly direction.

3.7.1.3 PROPOSED FINAL DRAINAGE CONTROL SYSTEM

The final drainage design is shown on Figure 5. Top deck earthen berms, which will contain an admixture of pit run rock and soil in the upper six to eight inches for erosion protection, shall be constructed to direct run-off away from the slope area. Collected run-off from the deck area will be directed into two discharge points located at the south and southwest portions of the landfill and into two proposed basins. This discharge point shall be protected with a concrete V-channel and energy dissipating structure to minimize erosion. All run-off from the site will be intercepted by an asphaltic concrete (AC) V-channel and directed to the proposed basin on the southwest side of the site. Infiltration rates for arid areas are extremely high and any stormwater, which falls directly into the pits, will be negligible and will evaporate or infiltrate into the ground rapidly. The sizing of the concrete and AC V-channels are presented in Appendix E.

3.7.2 SOIL LOSS ANALYSIS

The Revised Universal Soil Loss Equation (RUSLE) was used to evaluate potential soil losses within the watershed boundary of the PCFS site. The RUSLE, developed by the U.S. Department of Agriculture, considers soil and vegetation type as well as physical and climatic features of the landfill area.

The RUSLE is: $A = RKLSCP$

where
A = average annual soil loss, in tons/acre/year
R = rainfall and runoff erosivity index
K = soil erodibility factor, tons/acre
L = slope-length factor
S = slope-steepness factor
C = cover-management factor
P = practice factor

The soil loss analysis performed is based on a "closed landfill" condition. At closure, the potential soil loss is minimal since the landfill will have a compacted final cover with six to eight inches of a pit run rock and soil admixture, vegetation, and a storm drain system installed which all contribute to controlling soil erosion.

The following RUSLE constants were utilized:

$R = 27.0$	Located in a Type II area
$K = 0.06$	Based on 25-50 percent gravel
$0.4 \leq LS \leq 9.5$	Dependent upon length gradient
$C = 0.05$	Based on a monolithic cover with gravel admixture
$P = 1.0$	Practice factor

For the purpose of the soil loss analysis, the landfill was divided into regions based upon the average slopes of the final grades and surface drainage. The landfill soil loss analysis data is presented in Appendix F. The average soil loss for the PCFS is 0.23 tons/acre/year, which is within the two tons/acre/year recommended by the USEPA. Over the 30-year post-closure maintenance period, the average soil loss over the entire site would be 0.04 inches.

The top layer of the final cover will include a two and a half foot thick layer of on-site or near-site soil material that will comprise the monolithic vegetative cover layer. In addition, the top six to eight inches of this layer will include an admixture of pit run rock and soil. According to the Wind Erodibility Index from the USDA, the (I) value for WEZ equation is approximately zero (0) for soils not susceptible to wind erosion or saltation due to coarse fragments at the surface or wetness. Therefore, the annual soil loss due to wind erosion is small due to the coarse soil used. When combined with the soil loss to surface water runoff, the annual soil loss is still less than two tons/acre/year and is therefore adequate for average annual soil loss.

3.7.3 EROSION CONTROL

The landfill closure design has two primary erosion control features that will reduce the potential for soil erosion due to water and wind. These features include fill area grading and the monolithic vegetative cover, which will include a mixture of select soils and pit run rock. The decks will be graded for sheet flow runoff with a minimum slope of approximately three percent. Any large erosion gullies formed during storm events on the deck and slopes will be promptly filled, and track walked by a crawler tractor to recompact the soil.

In addition to pit run rocks, protection of the final cover soils will be provided through the placement of non-irrigated, native plant species cover serving as a short term and long term erosion control cover. Approximately two percent of vegetation needs to be sustained because that is the percentage of natural vegetation that is typical in the vicinity of this site. The final cover seed mixture is identified in Table 2. All final cover slope and deck areas will be seeded with this mixture. The plants were selected because of their adaptability to the landfill's general climatic area; reseeding potential; and required root depth of less than 30 inches. The long term vegetative maintenance needs are anticipated to be minimum since the plants are tolerant to disease, fire and insects. The plants are also compatible with the off-site native plant community and will provide a similar appearance to the surrounding native open space vegetation.

It is proposed that the final cover be seeded in December, prior to the "wet" season. Seeding will be accomplished by drill seeding. Prior to drill seeding soil preparation/fertilization is performed by spreading the appropriate amendments. The drill seeder is equipped with seed boxes calibrated for the specified seed types, soil discs and a metal or wood rake. As the discs till the soil to a one-quarter inch depth, the seed boxes drop the seed directly into the soil. The rake then passes over the loosened soil, which buries the seed. For best soil preparation and drill seeding results the soils should be moistened to a 2-inch depth.

3.8 LANDFILL GAS CONTROL/MIGRATION MONITORING SYSTEM

In order to ensure detection of potential gas migration throughout post-closure, a landfill gas migration monitoring system is proposed for the site. The proposed landfill gas migration monitoring probe plan (Appendix J) has incorporated elements from 27 CCR, Section 20925, which is more stringent than the Code of Federal Regulations. There are currently no structures located within 1,000 feet of the PCFS. Four proposed gas migration monitoring well locations, with varying depths, will be spaced no more than 1,000 feet apart.

Based on the depth of waste, it has been determined that monitoring wells will have one to three probe depths installed within each monitoring well. The wells will be constructed to provide a minimum seal of five feet of bentonite at the surface and between the monitored zones. In addition, each individual probe (i.e., shallow, intermediate, deep) will be clearly marked with the letters "S" for shallow probe or "I" for intermediate probe or "D" for deep probe to delineate depth. A typical subsurface monitoring well (probe) is shown on Figure 6.

The landfill gas migration monitoring wells will be installed by a licensed drilling contractor under the direction of a design engineer or engineering geologist. The wells shall be logged during installation by a geologist or geotechnical engineer. A final report will be prepared incorporating as-built surveyed probes locations, field logs, and daily reports.

As presented in Section 2.1 of this document, a landfill gas control system is not necessary for this site.

3.9 GROUNDWATER MONITORING SYSTEM

As previously discussed in Section 2.2, the existing groundwater monitoring system consists of one upgradient and three downgradient monitoring wells. Based on historical water elevation data, generally, well P-MW-1 is located upgradient of the landfill; well P-MW-4 is located downgradient of the landfill's pesticide disposal area; wells P-MW-2 and P-DW-3A are located downgradient of the landfill. With the exception of well P-DW-3A, which is used as a water level measuring station, these wells are currently being monitored and/or sampled on a semi-annual basis in accordance with the groundwater sampling and analysis plan included in Appendix C. A proposed groundwater monitoring well (P-MW-5) is anticipated to be located cross-gradient of the landfill. Protocols for sampling proposed monitoring well P-MW-5 are anticipated to follow the same sampling and analysis plan as the existing monitoring wells.

As discussed in Section 1.1, GLA has prepared a SSFR to modify the list of detection monitoring parameters provided in 40 CFR 258.54(a) (1) and (2). This SSFR is included in Appendix C-1.

3.10 LEACHATE COLLECTION AND REMOVAL SYSTEM

The PCFS is unlined and predates the requirements for installation of a liner and LCRS. Additionally, operators of existing MSWLF units are exempt from Subpart D (i.e., 258.40) of 40 CFR under certain conditions. Section 258.1(f)(1) allows for existing MSWLF units to be exempt from Subpart D, so long as the operator is able to demonstrate that the existing MSWLF unit accepts less than twenty (20) tons of MSW daily, based on an annual average, and there is no evidence of groundwater contamination from the MSWLF unit. CIDPW records indicated that the PCFS received an average of 13 tons per day in 2008 and routine groundwater monitoring to detect contaminants is performed according to the schedule in Appendix C. Therefore, the PCFS is exempt from the requirements of Subpart D for installation of a liner and a LCRS.

3.11 SITE SECURITY

In accordance with 27 CCR, Section 21135, signs will be posted at all points of access to the PCFS 60 days prior to the last receipt of waste at the site and for a period not less than 180 days after the facility has received the final shipment of waste. Signs will state the intended date of last receipt, the location of alternative solid waste management facilities, and a number to call in cases of emergency. A notice shall be placed in a local newspaper(s) 30 days prior to the last receipt of waste, which also includes the intended date of the last receipt of waste at the site and the location of alternative solid waste management facilities.

In addition, the operator is required to secure all points of access with a lock and gate and place signs at all access points prohibiting unauthorized entry. These measures are intended to reduce incidents of vandalism and illegal disposal of wastes during the post-closure maintenance period.

In accordance with 27 CCR, Section 21135, all points of access to the site will be restricted as of the date of the final shipment of waste. A sign similar to that presented in Figure 9 will be posted at the entrance to the PCFS.

Site security at the PCFS is currently provided by a locking gate and chain-link fence around three sides of the site (north, south and west sides). For the location of the existing perimeter fence and gate, see Figure 2. Additional fencing is proposed to be placed along the entire landfill perimeter in order to prevent unauthorized entry to the site at closure.

3.12 STRUCTURE REMOVAL/DECOMMISSIONING OF ENVIRONMENTAL CONTROL SYSTEMS

Site structures not deemed essential for closure construction or post-closure maintenance will be dismantled and removed. There are currently no permanent structures located at the PCFS and no structures will remain on-site during the post-closure maintenance period.

At this time there are no plans to decommission any of the environmental control systems at the site during the closure period. If deemed necessary, any groundwater monitoring wells that will not be utilized for monitoring purposes during the post-closure period, or that require replacement during ongoing operations, will be abandoned as approved by the appropriate agencies and in accordance with the Imperial County Building Inspection regulations and the Department of Water Resources Bulletin 74-90.

3.13 CLOSURE IMPLEMENTATION SCHEDULE

3.13.1 CLOSURE PROCESS

After approval of the Closure Plan, construction plans and specifications will be prepared by the operator and submitted to the Quechan Tribal Council with final regulatory approval made by the USEPA Region 9. It should be noted that EPA approval is required for any variance from the prescriptive standards as outlined in 40 CFR 258 through the SSFR process. The bidding package will be issued and a contractor selected.

A closure implementation schedule for the PCFS is presented in Table 3, which delineates the estimated time frame to complete each closure task described in this FCPCMP. This schedule may differ from the selected Contractor's schedule based on the Contractor's equipment and personnel resources.

Closure construction will begin with mobilization of equipment and materials. The type of equipment and required personnel expected to be utilized during closure construction includes the following:

- Types of Equipment
  - Dozers
  - Loaders
  - Compactors
  - Trucks
  - Soil Conditioning (Grizzlies) and Screening Equipment
- Personnel
  - Equipment Operators
  - Surveyors

- Mechanics

Once equipment is on-site, rough grading can begin. During the preparation of the site for final cover placement, additional final cover materials may be stockpiled. Necessary borrow material will continue to be transported and stockpiled on-site during construction of the final cover, as necessary. Prior to placement of final cover, the rough grading and final cover keyway installation will be performed which should take approximately one month.

Placement of the final cover materials will begin after rough grading and drainage improvements at the site are complete. It is anticipated that construction of the final cover will take approximately one month to complete. The access road/staging area construction will be completed in conjunction with the completion of the final cover. The gas migration monitoring system installation will also take place in conjunction with the completion of the final cover and should be completed within 15 days. Upon completion of the gas migration monitoring system and access road/staging area the landscaping improvements will be performed, which should take approximately one week. Upon completion of the tasks described above for closure, demobilization will begin.

3.13.2 CONSTRUCTION MANAGEMENT

A construction management team will be on-site during the entire period of construction. The team will be under the direction of a construction manager, who will be responsible for supervision of construction of the various features included in the closure plan. The construction manager will coordinate the activities of the on-site contractors and will provide liaison among the design engineers and the contractor(s). Other key staff will include a site engineer, who is a County staff representative, and construction inspector(s). A survey crew and a geotechnical CQA crew will be present, as required.

Survey Control

The survey control crew, under the direction of the contractor will be responsible for location of the closure plan improvements and for record drawing information. They will be responsible for establishing that the various components of the cover conform to grade and/or thickness requirements of the construction drawings and specifications.

CQA for Final Cover Placement

The construction specifications will include the CQA plan for cover placement. A geotechnical CQA crew, under the direction of a Geotechnical Engineer, will be on-site full time during the placement of the final cover to monitor compliance with cover design and installation methods included in the CQA plan. The CQA personnel will have day-to-day responsibility to oversee cover placement and to evaluate whether the cover is constructed according to specifications.

As described in Section 3.6, the CQA Plan is included in Appendix 1 of Appendix D. It should be noted that the CQA Plan addresses all of the general guidelines in the Interstate Technology and Regulatory Council (ITRC) 2003 guidance document. The CQA Plan has been developed to describe the methods and procedures to be used to install the final cover as specified in 40 CFR 258.60.

SECTION 4.0

POST-CLOSURE MAINTENANCE PLAN

4.0 POST-CLOSURE MAINTENANCE PLAN

4.1 INTRODUCTION

Post-closure maintenance of the closed PCFS will be performed in accordance with the applicable regulatory standards presented 40 CFR Section 258.61. Post-closure maintenance activities for the PCFS will consist of:

- Landfill Gas Migration Control System Monitoring and Maintenance
- Groundwater/Vadose Zone Monitoring and Maintenance
- Stormwater Monitoring
- Final Cover Inspection and Maintenance
- Settlement Monitoring
- Vegetative Cover Inspection and Maintenance
- Access Road Maintenance
- Drainage Control System Inspection and Maintenance
- Site Security Inspection and Maintenance

The following subsections will discuss compliance with 40 CFR 258, as applicable.

Post-closure care requirements will be conducted in accordance with 40 CFR 258.61. Post-closure care must be conducted for 30 years with the exception where the duration may be decreased in accordance with 40 CFR 258.61(b)(1) or increased in accordance with 40 CFR 258.61(b)(2) with approval by the USEPA and is deemed a sufficient duration to protect human health and the environment.

4.2 RESPONSIBLE PARTIES

The following is a listing of the responsible parties who will be involved in post-closure maintenance and monitoring activities at the PCFS. Questions pertaining to this Final Post-Closure Maintenance Plan should be directed to the CIDPW Project Engineer for the PCFS.

Landfill Owner

Quechan Indian Tribe Council
P.O. Box 1899
Yuma, Arizona 85366-1899
(602) 572-2102

Landfill Operator

County of Imperial
Department of Public Works
155 South 11th Street
El Centro, California 92243
William Brunet, Director of Public Works
Frank Fiorenza, Deputy Director of Public Works
(760) 482-4462

Prior to any transfer of ownership during the closure or post-closure maintenance period, responsible parties shall inform the new owner of current regulations, conditions, and agreements assigned to assure compliance. Additionally, the responsible parties will be responsible of notifying the LEA regarding title change within 30 days providing name, firm, mailing address, and telephone number of the new owner.

The CIDPW, as the landfill operator, will be responsible for post-closure personnel (maintenance and monitoring), the Site Engineer, and other post-closure contractors.

4.3 LANDFILL GAS MIGRATION MONITORING AND MAINTENANCE

The proposed landfill gas migration monitoring system program described in this section provides the methods and procedures required to detect migrating landfill gas. The proposed monitoring wells will be installed around the perimeter of the landfill as part of closure construction (see Appendix J).

4.3.1 LANDFILL GAS MIGRATION MONITORING PROCEDURES

Monitoring procedures for the gas migration monitoring system will include inspection of the subsurface monitoring wells for verification of proper operation. All probes will be monitored for methane to ensure that the concentration does not exceed 25 percent of the lower explosive limit (LEL) in facility structures (excluding gas control or recovery system components) or the LEL for methane at the facility property boundary. The monitoring events shall be conducted on a quarterly basis, at a minimum in accordance with 40 CFR 258.23(b)(2). This monitoring program has been determined based on the criteria specified in 40 CFR 258.23(b)(1).

4.3.2 LANDFILL GAS MIGRATION MONITORING REPORTING

The results of the gas migration monitoring program will be submitted to the USEPA, the Quechan Tribal Council within 90 days of sampling unless compliance levels are exceeded. The results will include the concentration of total hydrocarbons in each probe along with information involving personnel and general conditions in which the sample was obtained.

Should the compliance levels be exceeded, immediate necessary steps will be taken to ensure protection of human health and notification of the USEPA and Quechan Tribal Council will occur. Within seven days of detection of an exceedance, the methane gas levels and a description of corrective action will be placed in the operating record in accordance with 40 CFR 258.23(c). Within 60 days of detection, a remediation plan for the control of methane gas releases will be implemented. A copy of the remediation plan will be placed in the operating record and the USEPA and Quechan Tribal Council will be notified that the plan has been implemented. The plan will describe the nature and extent of the problem and proposed follow-up actions in accordance with 40 CFR 258.23(c)(3). It should be noted that the USEPA may develop an alternative schedule for demonstrating compliance with 40 CFR 258.23(c)(2) and (c)(3).

4.3.3 MAINTENANCE OF LANDFILL GAS MIGRATION MONITORING SYSTEM

The general maintenance requirements for the gas migration monitoring system are limited to replacing broken valves and fittings. As previously discussed, gas probes will be inspected at the time of monitoring for proper operation. Any deficiencies will be corrected immediately.

The following equipment will be utilized, as needed, for maintenance, repair or replacement of probes for the gas migration monitoring system:

- Various hand tools including hand saws, pipe cutters, electric drills, pipe taps, wrenches, hammers, hand or electric pump and/or shovels.
- Backhoe.

Equipment which may be needed to perform probe installations:

- Drill Rig.
- Front end loader.
- Dump truck.
- Drillers maintenance truck.
- Various hand tools needed to perform work including: shovels, generator, temporary support blocks.
- Safety equipment including: hard hat, goggles, gloves, steel toe rubber boots, overalls, safety belt and respirator.
- Additional equipment may also be needed due to certain environmental conditions, as required, in the site safety plan.

Materials

- PVC pipe
- Compression fittings
- Threaded pipe caps
- PVC labcock valves
- Teflon tape

4.4 GROUNDWATER, LEACHATE AND SURFACE WATER MONITORING

The purpose of the monitoring program discussed in this section is to detect any migration of contaminants to the groundwater from the closed waste disposal area. Initially, because California is a U.S. EPA-approved State regulating solid waste facilities within the State, the site was thought to fall under the jurisdiction of the California Regional Water Quality Control Board – Colorado River Basin Region, and site monitoring was performed in accordance with site-specific Waste Discharge Requirement No. 88-005, and the more recent blanket Waste Discharge Requirements No. 93-071, established for all active landfills within the Colorado River Basin Region and prepared to comply with federal regulations. As a result, the groundwater monitoring program for the site has been performed in accordance with the groundwater sampling and analysis plan (included in Appendix C) and these WDRs. However, the site is located on Tribal land, and therefore, it is subject to federal regulations. To fully comply with federal regulations, an SSFR was prepared requesting a modification to the list of detection monitoring parameters provided in 40 CFR Part 258.54(a)(1) and (2) (Appendix C-1).

There are no surface water bodies at or near the site. The Picacho wash, which passes along the eastern side of the property, rarely contains surface water, except for short periods of time immediately after a significant rain event.

As discussed in Section 2.2, the CIDPW is currently working on submitting a Notice of Intent (NOI) under the Multi-Sector General Permit and developing a Stormwater Pollution Prevention Plan (SWPPP) and Stormwater Monitoring Plan (SWMP) for the PCFS.

The PCFS site does not have nor is required to install a leachate collection and removal system, therefore, no leachate monitoring or maintenance procedures are discussed herein.

4.4.1 GROUNDWATER MONITORING PROCEDURES

CIDPW monitoring personnel (or its subcontractors) will conduct the groundwater monitoring program described in Appendix C during the entire post-closure period. It is expected that modifications to program frequency and protocols will take place, depending upon changing conditions, results of monitoring and advancing technology. This plan will be amended to include any changes in the monitoring program or modifications to the system including any proposed remediation systems.

The existing groundwater monitoring system at the PCFS consists of three monitoring wells (P-MW-1, 2, and 4) and one water level measuring station (P-DW-3A). One additional groundwater monitoring well (P-MW-5) is proposed as part of closure. All of the groundwater monitoring wells are being monitored in accordance with site specific WDR No. 88-005, and blanket WDR Order No. 93-071, which were established by the Colorado River Basin RWQCB for all active landfills within the Colorado River Basin Region. Because the site is located on Tribal land, federal regulations administered by the U.S. EPA govern the site program. Therefore, a SSFR has been prepared recommending a modified the list of detection monitoring parameters from those listed within 40 CFR 258.54(a) and generally consistent with the current monitoring program.

The current groundwater sampling and analysis program is included in Appendix C. All groundwater samples will be analyzed for routine monitoring parameters including chloride, nitrate as nitrogen, pH, sulfate, total dissolved solids, arsenic, and the 40 CFR 258 Appendix I list of volatile organic compounds (VOCs) as outlined in the groundwater sampling and analysis plan included in Appendix C on a semi-annual basis. The lowest possible analytical detection limits will be used so that the method detection limits are below currently established regulatory MCLs. In addition, the groundwater monitoring wells are analyzed for the full suite of COCs listed in Appendix II of 40 CFR, Part 258. COC sampling was last performed at the PCFS in August 2006. Following construction of well P-MW-5, samples from this well will be analyzed for the entire Appendix I list of monitoring parameters including the 15 metals as specified in 40 CFR 258, for two semiannual monitoring periods before routine sample analyses are performed at this well.

4.4.2 GROUNDWATER MONITORING EVALUATION AND REPORTING

After data are received from the laboratory, the data will be qualitatively evaluated prior to performing statistical analyses. The data will be evaluated by reviewing the quality control information that is included with the laboratory report. The quality control information provided by the laboratory will include measures of accuracy, precision, and sample contamination. The quality control information will be reviewed to determine that the quality control measures such as percent recovery and relative percent difference are within acceptable ranges, as determined by the laboratory. If these measures are outside the acceptable range, the laboratory will be asked to provide written documentation to explain the cause or potential cause for the failure to meet the quality control acceptance criteria. If the quality control acceptance criteria are not met, then the associated laboratory results are questionable and will not be included as part of the statistical analysis. Immediate resampling of the wells will not be performed unless the analysis for VOCs is deemed invalid. Otherwise, samples will be collected during the following scheduled semiannual sampling event.

The laboratory data, particularly inorganic parameters, will also be reviewed for outliers and anomalies. Outliers and anomalies are unusually or inconsistently large or small values that may be influenced by sampling, laboratory, shipping, or transcription errors. To date, sufficient historical databases for each well and analyte have been assembled so that data anomalies or outliers can be identified using statistical or comparative methods. If additional wells or analytes are added to the routine groundwater monitoring program, a minimum of eight measurements will be required before analysis of outliers or data anomalies can be conducted. To assist in detecting outliers, time-series charts of analyte concentrations will be produced for each constituent for each well. If a significant trend or an anomalously high result is observed, then field and laboratory procedures will be evaluated. If the source of an error cannot be determined and the laboratory results from the subsequent sampling event provide similar results, then the data will be considered reliable and be used for statistical analysis. If the laboratory results from the subsequent sampling event do not verify the previous data, even if the source of error cannot be determined, then the outlier or anomalous sample point will be removed from the database for the purpose of statistical evaluation.

Statistical Methodology

The recommended statistical method to be employed is by prediction interval, intra-well comparison, which compares the groundwater chemistry data collected from each individual well through time. This is considered appropriate because of the shallow site gradient, which results in some seasonal variability in the designation of upgradient and downgradient wells, the extensive databases for each well (at least 20 discrete sampling events), and generally similar upgradient and downgradient groundwater chemistries.

Under this method a correlation equation is calculated for each well and each analyte for which there are at least eight data points, based on the historical data, and a "normal" range of values is predicted for the following monitoring period. If the value of the last sampling period is inconsistent with the historical data trend, then contamination is suspected. This method is consistent with the statistical technique of prediction intervals recommended by the 40 CFR 258.53(g).

For organic compounds (VOCs, pesticides, etc.), alaboratory-specific Practical Quantitation Limit (PQL) will be used as its statistical concentration limit. Because the calculation of the laboratory-specific PQLs incorporates a measure of statistical uncertainty associated with the measurement process, any detected organic compound that is verified at a concentration above the PQL is statistically significant. Laboratory-specific PQLs will be periodically recalculated in accordance with 40 CFR, Part 136, or equivalent. If organic compounds are found and verified in samples from a well, statistical methods as described in the following section will be used.

Detection Verification Procedure

If one or more compounds are detected at concentrations in excess of the appropriate statistical limit as described above, then verification sampling will be performed. The schedule of verification sampling will be as follows:

- Organic Compounds: If one or more compounds is detected above the PQL, verification sampling will be immediately scheduled for collection from the well that produced the original significant detection.
- Inorganic Constituents: If one or more inorganic compounds is detected at above its respective statistical limit, then verification sampling will occur during the next regularly scheduled sampling event.

If the laboratory results of the verification samples confirm that the concentrations of the subject compounds are above their statistical limits, then the _US EPA - Region 9 will be notified and assessment monitoring in accordance with 40 CFR 258.55 will begin.

Trend Analyses

Analysis of groundwater quality data trends will be performed as an annual reporting requirement for the PCFS in support of the semiannual intrawell statistical analyses. Trend analyses will be performed by plotting the concentrations of a groundwater analyte over five years or the period of time that a well has been sampled whichever is less. Time-series charts will be prepared for each well or analyte and the historical data will also be compared with Federal maximum contaminant levels (MCLs), as appropriate. For the VOCs, and other organic compounds, charts will be prepared for each VOC that has been regularly detected at least 10 percent of the time in samples from at least one monitoring well. Significant increasing trends in laboratory measured analyte will be used as a way of assessing changes in the groundwater chemistry indicative of release from the landfill.

Assessment Monitoring

When one or more detection monitoring parameters is measured at a statistically significant concentration, in accordance with 40 CFR 258.55, assessment monitoring will begin. At the onset of an assessment monitoring program, groundwater samples will be collected and analyzed within 90 days for all of the parameters listed in Appendix II of 40 CFR, Part 258 and annually thereafter. The USEPA may specify an alternate frequency for the repeated sampling and analysis of the full assessment monitoring parameters. The USEPA may also specify an appropriate subset of wells to be sampled and analyzed during assessment monitoring.

After a minimum of four sample sets of the detected assessment monitoring parameters have been analyzed, background concentrations and groundwater protection standards will be established for the detected assessment monitoring parameters. If the concentrations of all assessment monitoring parameters are shown to be at or below background concentrations for two consecutive sampling events, the USEPA will be notified, and assessment monitoring will end, and detection monitoring will resume. If the concentrations of any of the assessment monitoring parameters are detected at statistically significant concentrations above the background concentrations but below the groundwater protection standards, then assessment monitoring will continue.

If the concentration of an assessment monitoring parameter is detected at a statistically significant concentration above both the background concentration and groundwater protection standard, then the USEPA will be notified within 14 days. The nature and extent of the contamination will be characterized with the installation of at least one additional monitoring well at the facility boundary in the direction of contaminant migration, in accordance with 40CFR 258.55(g)1(ii). Persons who own land or reside on land that directly overlies any part of the contamination plume will be notified. Also, an assessment of corrective measures will be initiated within 90 days of finding that an assessment monitoring parameter is above background concentration and the groundwater protection standard. Assessment monitoring will continue during the assessment of corrective action phase.

A demonstration that the source of contamination other than the landfill caused the contamination detected during the course of groundwater monitoring, or that the statistically significant increase resulted from an error in sampling, analysis, statistical evaluation, or natural variation in groundwater quality, may be submitted for review and approval by the USEPA. If a successful demonstration is made, then assessment monitoring may continue, though assessment of corrective action will not be pursued.

Semi-annual monitoring reports will be prepared in accordance with the site's groundwater monitoring program and WDRs. The reports will be submitted to the USEPA - Region 9 and the Tribal Council. Every five years, the results of the COC testing will be incorporated into the semi-annual monitoring report.

4.4.3 GROUNDWATER MONITORING SYSTEMS MAINTENANCE

The groundwater monitoring wells must be serviced and maintained to allow the wells to perform to the proper standards for which they were designed. Monitoring wells will be inspected at least semi-annually during sampling to determine if the well has been tampered with or damaged and to verify that the well cover is secure. If well damage is observed or if sampling equipment cannot be used to collect a sample, the condition will be noted and CIDPW will be informed of the nature and extent of corrective action. All necessary maintenance and/or repairs for wells will be documented using the sample Form C included in Appendix G.

In the event that a well may need to be replaced, a California licensed driller is recommended to be used to drill and construct any replacement well. The replacement well is recommended to be designed by a California registered geologist (RG) or professional engineer (PE) in accordance with "California Department of Water Resources" (DWR Bulletin 74-90). All drilling and well construction activities are recommended to be under the direct supervision of an RG or PE. Note that the California Department of Water Resources does not have authority over the PCFS, which is located on land governed by the Quechan Tribal Council.

If a groundwater monitoring well becomes unusable or unrepairable, it is recommended that the well be abandoned following RWQCB procedures in accordance with "California Well Standards: California Department of Water Resources" (DWR Bulletin 74-90).

Well repairs, which typically include well development, are considered CIDPW projects and as a result, they will go out to bid to qualified contractors. The bid preparation and selection process, mobilization, and well repair will typically require approximately three to six months to complete. It should be noted that the Site Engineer will be employed by either CIDPW or an outside contractor, who will report directly to the Director of the Department of Public Works.

4.5 FINAL COVER INSPECTION AND MAINTENANCE

Post-closure care of the final cover will be maintained and repaired, as needed, in accordance with 40 CFR 258.61(a)(1). The purpose of the completed final cover is to:

- Minimize storm water infiltration into and through the closed landfill,
- Minimize the venting of gas generated in the facility,
- Isolate the buried wastes from the surface,
- Promote drainage,
- Minimize erosion or abrasion of the cover, and
- Accommodate settlement and subsidence so that cover integrity is maintained.

The primary purpose of the final cover maintenance procedures is to maintain the integrity of the completed final cover over the long-term and provide maintenance, scheduling and documentation so that materials and maintenance practices are consistent with the final cover design specifications. Quarterly visual inspections of the final cover will include identification of any erosion and settlement problems and slope stability issues. The Site Engineer will be responsible for documenting the location and extent of any repairs. As indicated in Section 4.4.3, the Site Engineer will be employed by either CIDPW or an outside contractor, who will report directly to the Director of the Department of Public Works.

4.5.1 PERIODIC LEAK SEARCH/IDENTIFICATION OF PROBLEM AREAS

All employees with access to the site will be instructed to report any final cover surface cracking, ponding or unusual surface conditions to the Site Engineer, who will record the information in the site logbook at the time they are observed. Scheduled, formal inspections will be performed on a quarterly basis by grid walking the site to visually observe the following:

- Evidence of erosion
- Visible depressions
- Ponded water
- Odor
- Exposed refuse
- Cracks
- Settlement and subsidence
- Slope failure
- Leachate seeps

In addition to routine inspections, the site will be inspected following any major storm event, seismic event, or natural disaster. The drainage control facilities will also be inspected quarterly for improper operation and resultant effects on the surrounding final cover. A formal report of findings is to be presented to the Site Engineer.

4.5.2 MAINTENANCE PROCEDURES

The proposed final cover designed for the PCFS consists of a two-foot thick foundation layer composed of select soil materials, a minimum one foot of which has been determined to be in-place by the recent existing cover evaluation and a two and a half foot thick layer of on-site or near-site soil material that will comprise the monolithic vegetative cover layer (Figure 6).

All final cover repair and/or reconstruction activities shall be conducted in a manner directed to maintain the integrity of the as-built final cover system. Repair of fill materials should be performed in six to eight inch layers and procedures utilized during the original final cover construction. Any repair of the final cover will require removal of the pit run rock and soil surface. The rock surface should be scraped from the area requiring repair and stockpiled for placement upon completion of the repair. The following methods of repair are recommended for the following two modes of final cover distress:

- Settlement related sags and drainage interruptions, which interfere with the controlled flow and discharge of surface waters from the closed landfill surface.
- Surface erosion as a result of drainage channel "overflow" associated with intense rains.

Final cover repair activities will be conducted and documented as specified in the CQA Plan.

Sags, Ponds, Drainage Interruptions and Surface Erosion

Any minor repair of depressions in the final cover shall be completed in the landfill area on an annual basis immediately prior to the rainy season (October 15 to April 15). If significant sags or ponds are identified during other times of the year, the Site Engineer shall accurately locate the limits of the depressions both horizontally and vertically and required repairs shall be completed as soon as possible.

A channel capable of draining the lowest point of the sag will be constructed or additional soils will be placed such that the intended flow of surface water is unimpeded. The Site Engineer will be responsible for fill placement occurring only in the area of the sag; only that fill which is necessary to facilitate drainage is placed; and that sufficient record of the depths and limits of fill placement are kept. The depth and limit records should always be available so that the appropriate area can be re-excavated and permanently repaired during the annual maintenance period, if necessary, as discussed below.

The permanent repair of sags and ponds, when necessary, will be performed by excavating to the undisturbed soils and adding any select soil material necessary to maintain a positive gradient and rebuilding to at least two percent gradient, if possible. In areas of drainage interception and surface erosion, reconstruction will be consistent with the materials and practices utilized during closure construction. All records of cover repair will be kept in the record library. A certified engineering geologist will inspect and certify repairs to the final cover layer.

4.6 LANDFILL SETTLEMENT MONITORING

Settlement monitoring every five years is adequate at PCFS due to the following factors: 1) settlement is expected to be relatively slow based on the arid climate and the shallow depth of refuse and related low overburden pressure; and 2) the systems, which can be affected by differential settlement (i.e., final cover and drainage control), will be inspected on a much more frequent basis than every five years so potential issues will be identified without more frequent settlement monitoring. If the regulatory agency(ies) determine that the frequency should occur more often, then the initial monitoring will be conducted on a bi-annual basis with a reduction in frequency to every five years, if substantiated by the results of the first two monitoring events.

4.7 ACCESS ROAD MAINTENANCE

The site access road will be inspected during the final cover inspection on a quarterly basis for cracks and pot holes. If any large cracks or pot holes large enough to collect water are noted, the affected area will be repaired in accordance with the final cover repair procedures discussed in Section 4.5.2.

4.8 DRAINAGE SYSTEM INSPECTION AND MAINTENANCE

The following sections delineate the various maintenance activities to be performed on the landfill drainage facilities for the deck and slope areas. Figure 5 shows the location of the surface water drainage control facilities and Section 3.7 provides a description.

After the control system has been in service for several years, a more definitive inspection and maintenance schedule can be developed identifying those facilities that must be inspected annually, those facilities that must be inspected prior to and after a storm and those facilities that require maintenance before the rainy season.

4.8.1 DECK DRAINAGE CONTROL SYSTEM FEATURES MAINTENANCE

Inspection for proper deck surface drainage (i.e. diversion berms, grading, etc.) will be performed in conjunction with the final cover procedures described in Section 4.4.2. It is important that maintenance vehicles utilize access roads provided on the decks and benches whenever possible to reduce surface rutting which could interfere with the designed drainage patterns.

4.8.2 DOWNDRAINS, DRAINAGE CHANNELS, BASINS AND DITCHES

A visual inspection of each downdrain, open channel and basin will be conducted to identify any of the following deficiencies:

- Cracking
- Settlement
- Spalling
- Presence of silt and/or debris

The following corrective measures can be taken for deficiencies identified during the inspection.

- Cracking
  - Construction of expansion/control joints
  - Resurface
  - Replacement
- Settlement
  - Grout injection
  - Complete replacement with subgrade rework
- Spalling
  - Sandblast affected area and resurface
  - Sawcut and remove affected area, dowel into existing undamaged section and resurface
- Clogging by Silt/Debris
  - Vacuum pumps
  - Waterjet spray
  - Bucket line
  - Fire hose flushing

The downdrains, open channels and basins shall be inspected annually for debris build-up prior to the rainy season and after high intensity storm events.

4.8.3 OVERALL DRAINAGE MAINTENANCE SCHEDULE

The on-site drainage facilities must be free of debris and operational at all times.

In order to provide the desired protection against flooding and erosion damage routine inspections of the drainage control system will be conducted as shown on Table 4.

A written report will be prepared for all scheduled inspections and will be kept on file with the Site Engineer. In addition, all inspection forms will be placed in the record library as required by 40 CFR, 258.29. Form E included in Appendix G is a standard inspection form, which can be used for this purpose.

4.9 SITE SECURITY INSPECTION AND MAINTENANCE

Security fencing, access gates and signs will be inspected quarterly to ensure that the integrity of site security has been maintained. The gates will be inspected to ensure that the locks are intact. Any necessary repairs or replacements will be made during the quarterly inspection. On an annual basis, the fence will be inspected for corrosion and rust, and maybe repainted as necessary to maintain the aesthetic quality of the site.

4.10 EQUIPMENT, LABOR AND MATERIAL REQUIREMENTS

4.10.1 EQUIPMENT

The equipment schedule presented in Table 5 delineates the specific type of equipment, instruments and tools expected to be used for post-closure maintenance. Any required equipment not available for on-site use, when necessary, will be rented on an "as needed" basis.

4.10.2 LABOR

The work force necessary to monitor and maintain the PCFS during post-closure will be directed and coordinated by designated personnel. Staff will be assigned to each of the following activities:

- Final cover, landscape, drainage and general maintenance
- Environmental monitoring and reporting

The maintenance and monitoring personnel will be under the direction of a Site Engineer or geologist where appropriate.

The projected maintenance schedule for each of the post-closure activities is shown on Table 4. The primary purpose of this schedule is to identify the frequency of mandatory inspections for the various systems. The frequency of sampling and analysis for the groundwater, perimeter gas probes and settlement monuments will be in accordance with the monitoring schedule presented in Table 6.

Any additional personnel needed for surveying or drilling will be provided through outside contractors.

SECTION 5.0

POST-CLOSURE EMERGENCY RESPONSE PLAN

5.0 POST-CLOSURE EMERGENCY RESPONSE PLAN

5.1 PURPOSE AND SCOPE

This Emergency Response Plan (ERP) was prepared in accordance with 27 CCR, Section 21130 since 40 CFR, Part 258 does not require this plan, as part of the PCFS FCPCMP. The ERP identifies occurrences that may exceed the design of the site and endanger public health or the environment. The ERP also sets forth actions that will minimize the effects of these catastrophic events. The provisions of this ERP will be carried out immediately whenever an event occurs such as a fire, explosion, flood, earthquake, vandalism, surface drainage problems or release of any waste product which may threaten public health and/or the environment. The ERP will be kept in the operating record at the CIDPW Main Office.

5.2 SITE SAFETY OFFICER

The Site Engineer will have the responsibility of Site Safety Officer (SSO). The SSO will be trained to handle all emergency situations. The main responsibility of the SSO is to oversee the management of all emergency response procedures implemented at the landfill. The SSO is required to be thoroughly familiar with all aspects of the ERP as well as all post-closure maintenance activities, the location and characteristics of buried refuse, the location of facility records and the overall site layout. In addition, the SSO shall be given the authority to commit any of the available resources necessary to carry out the ERP.

5.3 EMERGENCY RESPONSE NOTIFICATION PROCEDURE

When any member of the site's maintenance personnel discover or witness an event, which constitutes an emergency situation, they shall determine the nature, source, and location of the emergency situation and immediately report the occurrence to the SSO. The SSO will notify all of the appropriate response agencies to provide assistance to site personnel. If an emergency event occurs when field personnel are not on-site, the general public will be able to use the telephone number posted on a sign to be located at the site entrance to notify the SSO. The emergency telephone number will be responded to 24 hours a day.

5.4 EMERGENCY RESPONSE PROCEDURES

General emergency response procedures for fire, explosions, earthquakes, floods, vandalism, release of waste products to air and soil, or surface drainage problems, are described below.

- Remove all non-essential employees from the vicinity of the incident.
- Remove non-essential equipment, if it can be done safely, from the vicinity of the incident.
- Determine and identify the nearest source of available equipment and supplies for responding to the incident.
- Determine the degree of risk to human health and safety for persons to be working in the vicinity of the emergency prior to sending in people to control the emergency.
- Determine the immediate risk to the environment. If the risk is imminent, it should be determined whether or not the emergency can be safely isolated to minimize damage to the environment.
- Determine the appropriate agencies to call given a particular type of emergency.
- When practicable, the SSO may utilize on-site personnel to control the incident.
- The Site Superintendent or his designee will be responsible for site personnel safety. Site personnel will communicate any damage and/or injury reports to the SSO and will coordinate all emergency actions directed by the SSO.
- Site personnel will be available for inspection of the landfill after an incident occurs. All crew members will be supplied with appropriate personal protective clothing, as required by the SSO, when conducting inspections of the site for possible design failure. All findings will be reported to the SSO for action.
- The SSO will immediately begin surveillance in those areas of the facility affected by the incident. In addition, monitoring will be conducted to prevent an incident from affecting other areas of the facility or adjacent properties.
- Shut down any control system, which have been damaged during an incident.
- The operator will maintain a small stockpile of final cover material for those events, which may require immediate cover placement to minimize waste releases, to repair severe cracks, or to fill in large erosion gullies.

The general types of equipment and materials that should be available for emergencies include a cellular phone, first aid kit, air supplies, fire extinguisher, final cover material, and sandbags. All action steps for the following emergency procedures should be done in as short a time period as possible to prevent adverse health and safety affects to the public.

5.5 FIRE AND/OR EXPLOSIONS

The following procedures will be followed during incidents of fire and/or explosions:

- Contact the County of Imperial Fire Department, even if on-site capabilities are deemed adequate to extinguish fires or control future explosions. On-site landfill personnel will be instructed to follow the Fire Department's directions and give their full cooperation.
- In the event of an off-site fire near the landfill, such as a brush fire, the operator will lend its personnel and equipment, if available, to the Fire Department to fight the fire.
- The fire will be extinguished and the effects of the fire or explosion will be mitigated.

The following are the general telephone numbers for emergency response agencies:

Imperial County Fire Department	(760) 355-1191
Imperial County Sheriff's Department	(760) 339-6302
Office of Emergency Services	(800) 852-7550
Imperial County Public Works Department	(760) 482-4462
Imperial County Division of Environmental Health	(760) 336-8530
Tribal Police, as needed	(760) 572-2933
Tribal Environmental Department, as needed	(760) 572-2969
Bureau of Indian Affairs (Regional Office), as needed	(602) 379-6600
Tribal Emergency Response	(760) 572-0213

5.6 FLOOD

If the site's existing stormwater diversion berms are inadequate in diverting flood waters away from the site, the following procedures will be followed:

- Additional berms may be constructed in areas prone to flooding.
- If additional berms are ineffective, the operator may cut a diversion channel to avoid inundation of the refuse cell.
- Sandbags may be used in conjunction with berms or diversion channels.

5.7 EARTHQUAKE

The following procedures will be performed following an earthquake incident:

- Employees driving in the field during an earthquake should stop their vehicle and get out, if it can be done in a safe manner.
- After the earthquake has subsided, site personnel shall report to the site entrance gate for a roll call. If medical care is required, the procedures in Section 5.10 shall be followed. An inspection of the site shall then be made and a report given to the SSO.
- Cracks observed in the final cover after an earthquake should be inspected with a combustible gas analyzer. The location of venting and the gas concentrations will be determined and reported to the SSO. Excavation and refill of the smaller surface cracks can be completed immediately. More extensive corrective actions will be authorized by the Site Engineer in accordance with the CQA Plan included in Appendix 1 of Appendix D.

5.8 SURFACE DRAINAGE PROBLEMS

In the event of a surface drainage problem, the following procedures shall be followed:

- The operator will investigate the problem and determine a necessary course of action.
- If a surface inlet is blocked with debris, all necessary labor forces and equipment will be implemented under the direction of the operator to remove the blockage.
- If a storm drain is damaged, a plan will be provided by the Site Engineer to repair the problem.
- After the drainage problem is corrected, an assessment of possible damage or erosion will be conducted and all necessary repairs will be made.

5.9 VANDALISM

The following procedures will be followed during incidents of vandalism:

- Repair (i.e., replace, repaint) any portion of the property which has been vandalized.
- Immediately repair any vandalism, which affects site security and/or environmental control/monitoring systems.
- A review of the adequacy of site security after each incident shall be performed and those measures will be revised, if needed.

5.10 UNDERGROUND FIRES

Underground landfill fires occur due to air intrusion into the refuse cell. Indicators of underground fires are as follows:

- Unusual depression-like settlement with tension cracks
- Smoke/steam
- Unusual odor

Should any of the above indicators be noted, the first course of action should be placement of soil to cover the depression and/or cracks. If this measure does not correct the problem, additional measures may be taken under the direction of the SSO.

5.11 EMERGENCY RESPONSE PLAN ORIENTATION

Contacts should be made with appropriate emergency response agency representatives and the following information should be conveyed:

- Familiarize them with the layout of the facility, the properties of the waste materials deposited, and the evacuation routes.
- Establish understandings between the responding Police/Sheriff and Fire Departments and designate which agency has primary emergency authority during an incident.
- Establish understandings between emergency response teams, emergency response contractors, and equipment suppliers for smooth coordination of emergency response actions.

5.12 EVACUATION PROCEDURES

During and/or after an incident, the SSO in consultation with other emergency personnel, such as the Fire Department, will assess the potential for injury to any persons located on adjacent properties. If the assessment concludes that an imminent threat to public health is possible, an evacuation of the nearby area will be initiated. Situations, which warrant partial or complete evacuation of site personnel and/or local residents, are as follows:

- Explosions resulting in airborne debris including particles and large fragments.
- Fires that cannot be readily contained or are spreading to other parts of the facility; or when fire could generate highly toxic fumes, or create a danger of igniting potentially explosive substances which may be stored on-site.

The SSO will immediately notify the responding Police/Sheriff Department and all other appropriate emergency response agencies. The SSO will check that the entrance gate is unlocked and locked as required.

5.13 MEDICAL CARE PROCEDURES

Should an emergency situation result in personal injury, immediate steps will be taken to determine the cause and extent of the injury and to render first aid. The SSO will be notified in all cases and the paramedics will be called when required. If further medical attention is necessary, the injured person will be transported to the nearest medical facility.

5.14 AMENDMENTS TO THE EMERGENCY RESPONSE PLAN

The ERP will be reviewed and can be amended, in accordance with the criteria listed in 27 CCR, Section 21130(c). The amendment criteria are as follows:

- A failure or release occurs for which the plan did not provide an appropriate response.
- The post-closure use and/or structures on the site change and these changes are not addressed in the existing plan.
- The LEA, the RWQCB or the CIWMB notifies the operator in writing that the current emergency response plan is inadequate under the provisions of this section. The notifying agency shall include within the written notice those items that must be considered for the plan to be in compliance with this

section. The operator shall submit an amended ERP to the Quechan Indian Tribe, LEA, the RWQCB and the CIWMB within 30 days of receipt of notification that the plan is inadequate.

Whenever the ERP is amended, a written copy will be submitted to the Quechan Tribal Council.

SECTION 6.0

CLOSURE/POST-CLOSURE MAINTENANCE COST ESTIMATE

6.0 CLOSURE/POST-CLOSURE MAINTENANCE COST ESTIMATE

6.1 INTRODUCTION

In order to establish the basis for the proper level of funding to close and provide post-closure maintenance for the PCFS in an environmentally sound manner, a cost estimate was prepared reflecting closure plan features and post-closure maintenance procedures presented in Section 4.0 of the this FCPCMP. This estimate was then combined with an estimate for construction management/quality assurance services to determine the total closure cost. This closure and post-closure cost estimate then serves as the basis to fund the closure account over the life of the landfill.

6.2 CLOSURE COST ESTIMATE

The plan features are grouped into categories for convenience in presenting the estimate. A brief description of the components included in each category is given below. The closure cost estimate, as shown in 2010 dollars, is shown on Table 7.

6.2.1 FINAL COVER

The PCFS disposal area at closure will be 12.5 acres. The planned final cover for the deck and slope areas consists of a two-foot thick foundation layer composed of select soil materials, a minimum one foot of which has been determined to be in-place by the recent existing cover evaluation, and a two and a half foot thick layer of select soil material that will comprise the monolithic vegetative cover layer with a soil/pit run rock admixture layer in the upper six to eight inches. The cost of constructing the final cover includes the use of on-site or near-site select soils, import of pit run rock material for the soil/pit run rock admixture, site preparation, and closure plan integration with the existing groundwater monitoring system. The final grading cost also includes access road/staging area construction.

6.2.2 FINAL COVER CONSTRUCTION QUALITY ASSURANCE

Costs for construction quality assurance include the final cover placement tests, inspections and reporting.

6.2.3 DRAINAGE CONTROL SYSTEM

Costs for drainage system improvements include the deck and V-channel drainage improvements for the landfill.

6.2.4 EROSION CONTROL

This category covers the cost of soil preparation and mixture of pit run rock materials into the top six inches of the monolithic vegetative layer as discussed in Section 3.3.

6.2.5 GAS MIGRATION MONITORING SYSTEM

This category includes costs for installation of four multiple-depth gas migration monitoring probes around the perimeter of the PCFS as discussed in Section 3.8.

6.2.6 GROUNDWATER MONITORING SYSTEM

No costs are associated with this category since no additional groundwater monitoring wells are planned to be installed at closure.

6.2.7 SITE SECURITY

This category includes costs for installation of additional perimeter fencing to secure the entire filled area of the site at closure. This category also includes signage as discussed in Section 3.11.

6.2.8 DEMOLITION

This category includes costs for dismantling and removal of the landfill scales and scalehouse.

6.2.9 CLOSURE CERTIFICATION REPORT

This category includes costs for preparation of a report certifying the final cover placement.

6.2.10 ENGINEERING DESIGN PLANS AND SPECIFICATIONS

This category includes costs for preparation of construction level engineering design plans and specifications for bid purposes. This cost estimate is assumed to be five percent of the total construction cost estimate.

6.2.11 CONSTRUCTION MANAGEMENT

The construction management cost for closure of the landfill is based on an estimated 3-month construction schedule.

6.3 POST-CLOSURE MAINTENANCE COST ESTIMATE

The post-closure maintenance cost estimate has been prepared utilizing information contained in Tables 3 through 5 and estimates of manpower, material and equipment to maintain the PCFS in compliance with current applicable regulations.

The total annual maintenance and monitoring cost estimate for post-closure is shown on Table 8. These costs are projected in 2010 dollars, assuming no change in the regulatory environment with respect to the PCFS. In the event that changes occur in the regulatory conditions pertaining to the PCFS, if necessary, revised post-closure cost estimates will be submitted to the USEPA, the Quechan Tribal Council, CIDPW, and LEA.

6.4 DEMONSTRATION OF FINANCIAL RESPONSIBILITY

In accordance with Subtitle D, Subpart G, the CIDPW must demonstrate financial responsibility for closure and post-closure costs. The CIDPW has established an enterprise fund for closure costs and a Pledge of Revenue has been established for post-closure maintenance costs to comply with financial assurance requirements of 40 CFR 258.71-72. Subsequent to their review of the FCPCMP for PCFS (dated May 1999; revised: June 2009), the United States Environmental Protection Agency – Region 9 approved the revised cost estimate included in the aforementioned FCPCMP and found that the CIDPW meets the Local Government Test for allowable mechanisms as outlined in 40 CFR 258.74(f).

A copy of the most up-to-date closure and post-closure cost estimate can be found in the operating record. The closure and post-closure cost estimates are adjusted for inflation annually as required by 40 CFR 258.71-72.

SECTION 7.0

RECORDKEEPING

7.0 RECORDKEEPING

7.1 OPERATING RECORD

A complete operating record will be maintained in accordance with Federal regulations 40 CFR 258 (Section 258.29 Recordkeeping Requirements and Section 258.60 Closure Criteria). Closure and post-closure activities will be documented in the operating record and will include, but will not be limited to, the following information:

- Any location restriction demonstration required by 40 CFR 258, Subpart B;
- Inspection records, training records, and notification procedures required by 40 CFR 258, Section 258.20;
- Gas monitoring results from monitoring and any remediation plans required by 40 CFR 258, Section 258.23;
- Any MSWLF unit design documentation for placement of leachate and gas condensate in a MSWLD unit as required under 40 CFR 258, Section 258.28(a)(2);
- Any demonstration, certification, finding, monitoring, testing or analytical data required by 40 CFR 258, Subpart E;
- Closure and post-closure care plans and any monitoring, testing, or analytical data required by 40 CFR 258, Sections 258.60 - 258.61;
- Any cost estimates and financial assurance documentation required by 40 CFR 258, Subpart G;
- Any information demonstrating compliance with small community exemption as required by 40 CFR 258, Section 258.1(f)(2); and
- Notice of intent to close the unit, notice of certification of closure, and deed notation as required by 40 CFR 258, Section 258.60.

It should be noted that the operating record will also contain that information compiled during active operations as required by applicable Federal regulations.

7.2 LOCATION AND INSPECTION OF OPERATING RECORDS

The operating records will be maintained at the CIDPW's Main Office. In accordance with 40 CFR 258, Section 258.29, the CIWMB has been notified of the alternative location (i.e., the Main Office) of the operating record for the

PCFS. These records are open for inspection during normal business hours by authorized representatives of those regulatory agencies having jurisdiction over the PCFS.

SECTION 8.0

REFERENCES

8.0 REFERENCES

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18. California Regional Water Quality Control Board - Colorado River Region, 1988, "Waste Discharge Requirements Order No. 88-5."

19. California Regional Water Quality Control Board - Colorado River Region, 1993, "Amended Waste Discharge Requirements Order No. 93-071."

20. California Integrated Waste Management Board, 1980, "Solid Waste Facilities Permit No. 13-AA-0012."

TABLES

TABLE 1
PICACHO SOLID WASTE SITE
SITE LIFE PROJECTION

• Landfill Site	50 acres
• Landfill Footprint	12.5 acres
• Landfill Footprint to Site Ratio	25%

Volumes	
• Remaining Capacity as of January 1, 2009	72,642 cy
• Final Cover – Soil foundation layer, one-foot thick min. in addition to intermediate cover – Final Cover	70,583 cy
• Remaining Net Capacity	2, 059 cy

Design Placement	
• Remaining Refuse and Daily Cover Soil Capacity	2,059 cy
• Refuse to Cover Ratio	5:1
• Refuse Placement Density	0.5 tons/cy

Disposal Rate	
• Estimated Annual Average	1,743 cy/yr
• Projected Remaining Service Life (1)	1.2 years

(1) Remaining service life projected using an average intake of waste from July 12, 2006 to December 31, 2008.

TABLE 2
PICHACO SOLID WASTE SITE
FINAL CLOSURE
VEGETATIVE COVER SEED MIX

Botanical Name	Common Name	Pounds per Acre
Agropyron spp.	"Luna" Pubescent Wheatgrass	9
Agropyron spp.	"Nordan" Desert Wheatgrass	24
Vulpia myuros	Zorro Fescue	8
Trifolium hirtum	"Hykon" Rose Clover Inoculated	15
Encelia farinosa	Brittle Bush	4

TABLE 3
PICACHO SOLID WASTE SITE
CLOSURE IMPLEMENTATION SCHEDULE

ACTIVITY DESCRIPTION	MONTHS		
	1	2	3
Closure Construction Start Date (1)	●		
Mobilization	▨		
Clearing, Grubbing and Demolition	▨		
Rough Grading	▨		
Drainage Improvements		▨	
Foundation Layer Filling and Grading		▨	
Final Cover Placement		▨	▨
Gas Monitoring System Installation			▨
Access Road/Security Fencing			▨
Landscaping			▨
Demobilization			▨

(1) This date is dependent upon approval of the final closure construction plans.

TABLE 4
PICACHO SOLID WASTE SITE
POST-CLOSURE MAINTENANCE SCHEDULE

MAINTENANCE ACTIVITY	FREQUENCY
FINAL COVER MAINTENANCE	
A. Inspection	3, 6
B. Repair	7
ACCESS ROAD/STAGING AREA	
A. Inspection	2, 6
B. Repair	1
DRAINAGE FACILITIES MAINTENANCE	
A. Silt Debris Build-up	6
B. Perimeter Drainage System	5
C. AC and Concrete Drainage Channels	5
GAS MIGRATION MONITORING SYSTEM MAINTENANCE	
A. Perimeter Probes	7
LANDSCAPE MAINTENANCE	
A. Weed Control	7
B. Reseeding	7
FINAL SURFACE MAINTENANCE	
A. Weed Control	7
SURVEY MONUMENTATION MAINTENANCE	
A. Disposal Area Monuments	4
PERIMETER FENCE MAINTENANCE	
A. Inspection	3
B. Maintenance and Repair	1
GROUNDWATER MONITORING WELL MAINTENANCE	
A. Well Maintenance	1
B. Well Replacement	7

LEGEND

1 = Annually
2 = Semi Annual
3 = Quarterly
4 = Every Five Years
5 = Annually During Summer Months
6 = After Each Heavy Rainfall
7 = As Required

TABLE 5
PICACHO SOLID WASTE SITE
POST-CLOSURE EQUIPMENT SCHEDULE

EQUIPMENT REQUIREMENTS	Small Dozer	Dump Truck	Motor Grader	Skip Loader	Backhoe w/ Bucket Loader	Compactor	Sheepsfoot Compactor	Tampers	Water Truck	Pickup Truck	Flatbed Truck	Boom Truck	Portable Generator	Air Compressor	Concrete Mixer	Sand Blasting Unit	Grouting Equipment
Final Cover Maintenance																	
Inspection										▨							
Repair	▨	▨	▨		▨	▨	▨	▨	▨	▨							▨
Access Road/Staging Area																	
Inspection										▨							
Repair				▨													
Drainage Facilities Maintenance																	
AC and Concrete Drainage Channels									▨	▨		▨	▨	▨	▨	▨	▨
Gas Migration Monitoring System Maintenance																	
Perimeter Probes										▨	▨		▨				
Final Surface Maintenance																	
Weed Control										▨							
Survey Monumentation Maintenance																	
Disposal Area Monuments										▨							
Perimeter Fence Maintenance																	
Maintenance and Repair										▨	▨	▨	▨				
Groundwater Monitoring Well Maintenance																	
Well Maintenance										▨	▨	▨	▨	▨			
Well Replacement										▨	▨		▨	▨	▨		
Groundwater Monitoring										▨							
Gas Migration Control System Monitoring										▨							

TABLE 6
PICACHO SOLID WASTE SITE
POST-CLOSURE MONITORING SCHEDULE

MONITORING ACTIVITY	FREQUENCY
GROUNDWATER MONITORING	
A. Groundwater	2
B. Constituents of Concern Monitoring	3
C. Groundwater Elevation/Flow Rate/Direction	2
GAS MIGRATION MONITORING SYSTEM MAINTENANCE	
A. Perimeter Probes	1
SETTLEMENT	
A. Settlement Monument Monitoring	3

LEGEND

1 = Quarterly
2 = Biannual
3 = Every Five Years

TABLE 7
PICACHO SOLID WASTE SITE (SWIS NO. 13-AA-0012)
CLOSURE COST ESTIMATE SUMMARY
(2010 DOLLARS)

Item	Description	Estimated Quantity	Unit Price	Estimated Cost ($)
1	**FINAL COVER**			
	Mobilization/Demobilization	- ls	$40,500	$40,500
	Clear and Grub	12.5 acres	$506	$6,325
	Slope Area			
	Preliminary Grading	64,207 sf	$0.07	$4,548
	Foundation Layer (2' thickness - 1' existing) (1)(2)	2,378 cy	$3.54	$8,423
	2.5' Monolithic Random Soil Cover (3)	5,945 cy	$3.54	$21,057
	Deck Area			
	Preliminary Grading	486,130 sf	$0.04	$19,679
	Foundation Layer (2' thickness - 1' existing) (1)(2)	18,005 cy	$2.53	$45,553
	2.5' Monolithic Random Soil Cover (3)	45,012 cy	$2.53	$113,880
	Survey Monument Installation	4 ea	$2,000	$8,000
	Surveying	- ls	-	$6,000
			Subtotal	**$273,965**
2	**FINAL COVER CONSTRUCTION QUALITY ASSURANCE**			
	Field Personnel/Monitoring/Reporting	1.5 mos	$9,988	$14,983
			Subtotal	**$14,983**
3	**DRAINAGE CONTROL SYSTEM**			
	V-Channel (AC)	560 lf	$30	$16,800
	V-Channel (concrete)	25 lf	$30	$750
	Grouted Rip-Rap	50 sf	$6	$300
			Subtotal	**$17,850**
4	**EROSION CONTROL**			
	Pit Run Rock (4)	6,720 cy	$25	$168,000
	Drill Seeding	12.5 acres	$1,000	$12,500
			Subtotal	**$12,500**
5	**GAS MIGRATION MONITORING SYSTEM**			
	Perimeter monitoring probe installation (5)	4 ea	$5,000	$20,000
			Subtotal	**$20,000**
6	**GROUNDWATER MONITORING SYSTEM (6)**			
			Subtotal	**$0**
7	**SITE SECURITY**			
	Fencing	3,940 lf	$14	$55,160
			Subtotal	**$55,160**
8	**DEMOLITION (7)**			
	Demolition-Scale House/Salvage Scales	- ls	$25,000	$25,000
			Subtotal	**$25,000**
9	**CONSTRUCTION MANAGEMENT**			
	Construction Management	3 mos	$28,600	$85,800
			Subtotal	**$85,800**
10	**ENGINEERING**			
	Design & Specifications	- ls	$20,200	$20,200
	Closure Certification	- ls	$4,000	$4,000
			Subtotal	**$24,200**
			Total Cost	$529,458

Assumuptions:
(1) Cost assumes that only one foot of random soil would need to be placed for the foundation layer because one foot of soil would already be in-place.
(2) Costs for preparation and compaction of the existing one foot of foundation is included in this item.
(3) Includes installation cost for admixture layer
(4) Includes purchasing and transportation cost
(5) Includes equipment, labor, material, and mobilization/demobilization
(6) No additional construction proposed for this system as part of closure construction.
(7) Demolish/Salvage Scalehouse/Scales

TABLE 8
PICACHO SOLID WASTE SITE
ANNUAL POST-CLOSURE MAINTENANCE AND MONITORING COST ESTIMATE SUMMARY
(2010 DOLLARS)

Item	Description	Quantity		Unit Price	Total
1	**FINAL COVER INSPECTION AND REPAIR**				
	Inspection				
	Labor	16	hr	$150	$2,400
	Cover Soils Repair				
	Equipment (includes operator)	16	hr	$314	$5,019
	Field Technician	16	hr	$95	$1,520
	Staff/Principal Geologist	8	hr	$122	$976
	Materials (cover stockpile maintained onsite)				$0
	Total Final Cover Inspection and Repair				**$9,915**
2	**ACCESS ROAD INSPECTION AND MAINTENANCE (1)**				
	Inspection - Labor	-		-	$0
	Repair - Labor & Material	-		-	$0
	Total Access Road Inspection and Maintenance				**$0**
3	**DRAINAGE INSPECTION, MAINTENANCE AND REPAIR (2)**				
	Inspection				
	Labor	16	hr	$150	$2,400
	Perimeter/Deck/Basin Drainage Facilities				
	Labor	24	hr	$60	$1,440
	Equipment (includes operator)	24	hr	$210	$5,040
	Materials	-		-	$800
	Total Drainage Inspection, Maintenance and Repair				**$9,680**
4	**SITE SECURITY**				
	Inspection				
	Labor	4	hr	$150	$600
	Maintenance/Repair	8	hr	$200	$1,600
	Total Site Security				**$2,200**
5	**FINAL SURFACE MAINTENANCE**				
	Reseeding				
	Labor and Material	0.25	ac	$1,010	$253
	Total Landscape Maintenance				**$253**
6	**GROUNDWATER MONITORING**				
	Biannual Monitoring Program				
	Field Technician	32	hr	$100	$3,200
	Equipment/Materials	-		-	$960
	Analysis				
	Indicator parameters	10	hr	$60	$600
	Volatile Organic Compounds	14	hr	$130	$1,820
	Biannual & Annual Monitoring Report Preparation				
	Site Engineer	40	hr	$150	$6,000
	Office Support	20	hr	$60	$1,200
	Constituents of Concern (COC) Monitoring Program				
	Labor	16	hr	$90	$288
	Analysis				
	Groundwater COC	-	ls	$6,330	$1,266
	Constituents of Concern Report Preparation				
	Site Engineer	20	hr	$150	$600
	Office Support	10	hr	$60	$120
	Total Groundwater Monitoring				**$16,054**
7	**GROUNDWATER MONITORING SYSTEM MAINTENANCE**				
	Well Repair (four wells in 30 years)				
	Geologist	40	hr	$180	-
	Driller	40	hr	$60	-
	Equipment/Materials	4	ea	$2,000	-
	Well Abandonment	4	ea	$3,400	-
	Total Groundwater Monitoring System Maintenance				**$1,040**
8	**GAS PROBE MONITORING AND MAINTENANCE**				
	Sampling gas in probes				
	Field Technician	16	hr	$100	$1,600
	Monitoring Equipment	-		-	$500
	Maintenance/Repair (1 probe every 30 years)	1	ea	$5,000	-
	Annual Repair - Replacement (in 30 years)	-	-	-	$167
	Total Gas Probe Monitoring and Maintenance (3)				**$2,267**
TOTAL ANNUAL POST-CLOSURE MONITORING & MAINTENANCE COSTS					**$41,409**
TOTAL 30-YEAR POST-CLOSURE MONITORING & MAINTENANCE COSTS					**$1,242,256**

(1) Access road maintenance is included in Final Cover Maintenance

(2) Includes cost for inspection of drainage channels, basins after high intensity storms (assume 2 events/year). Includes cost for silt/debris clearing and corrective measures mentioned in the Post-Closure Plan.

(3) Includes annual cost of sampling gas in probes (field technician and monitoring equipment) and Annual Repair-Replacement Cost.

FIGURES

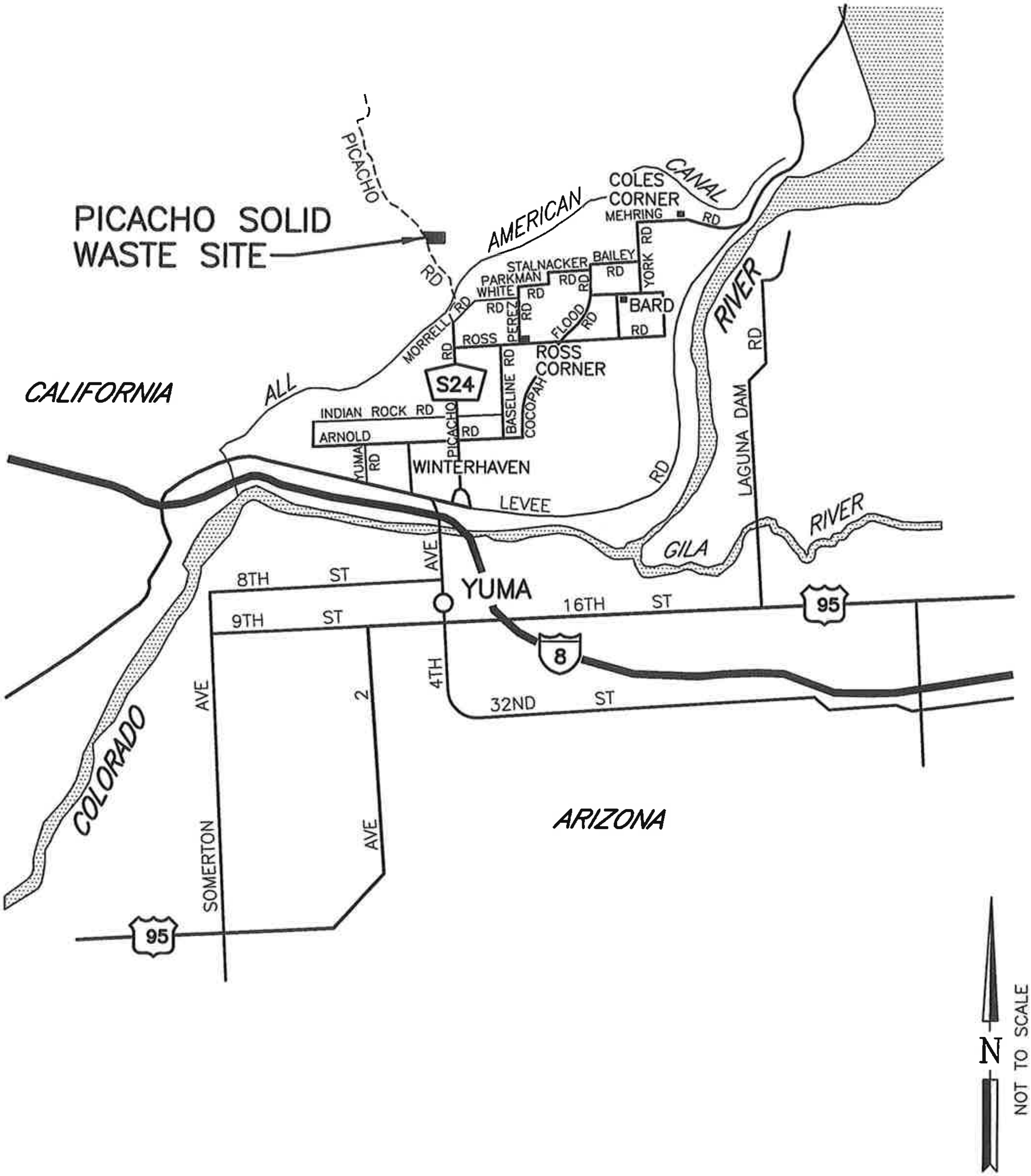

FIGURE 1

BAS (909) 860-7777

BRYAN A. STIRRAT & ASSOCIATES
CIVIL AND ENVIRONMENTAL ENGINEERS
1360 VALLEY VISTA DRIVE DIAMOND BAR, CA 91765

PICACHO CUT AND FILL SITE

LOCATION & VICINITY MAP

JOB NO.
9510-4A
DATE
6-8-95
DRAWN BY
D.L.L.
FILE NAME
17087DB

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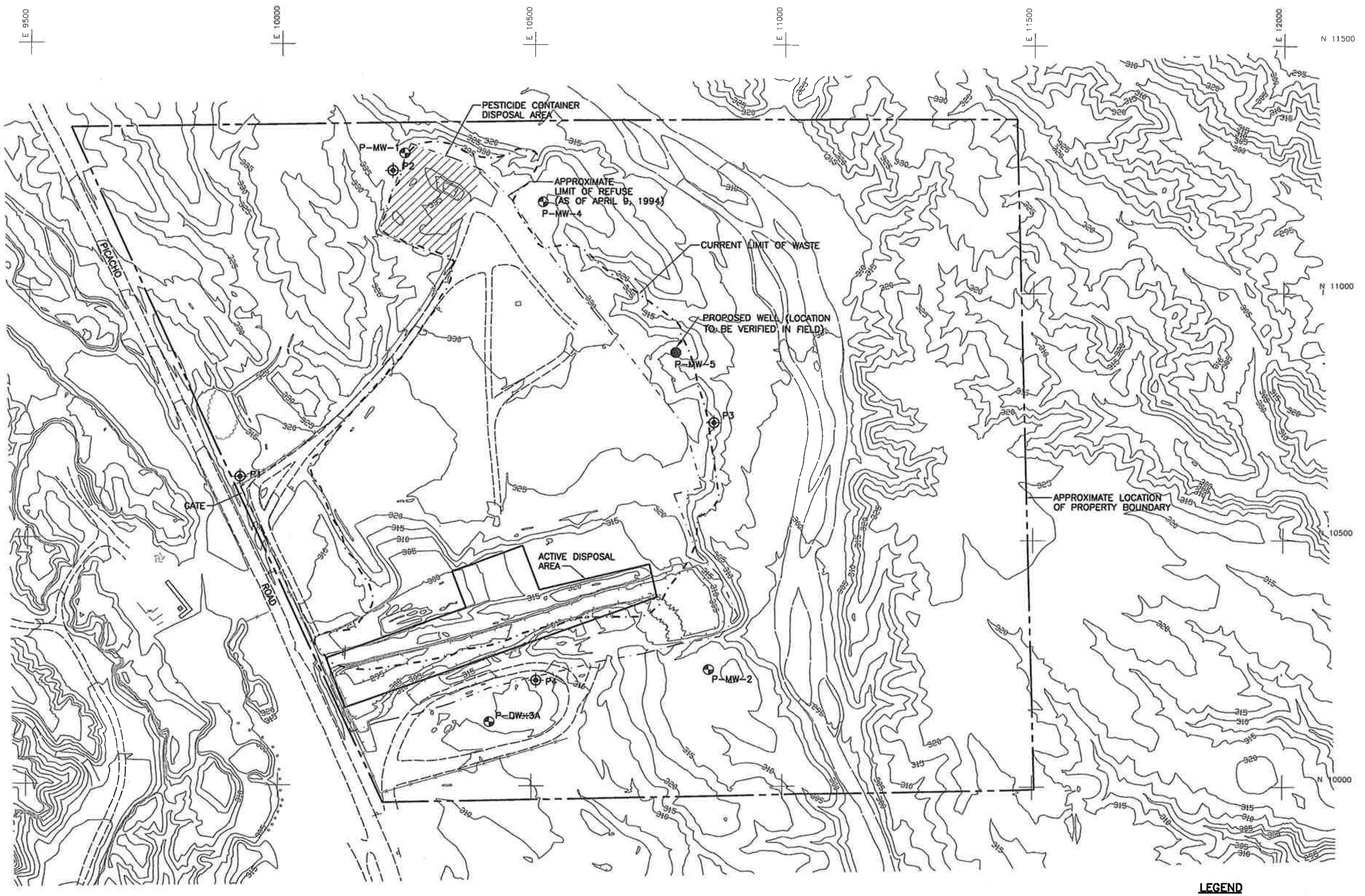

LEGEND

— — — —	APPROXIMATE LIMIT OF WASTE (AS OF 4-9-94)
——- - ——	APPROXIMATE LOCATION OF PROPERTY BOUNDARY
—— 940 ——	EXISTING INDEX CONTOURS
◒	GROUNDWATER MONITORING WELL
⊕	PROPOSED GAS MIGRATION MONITORING PROBE
●	PORPOSED GROUNDWATER MONITORING WELL

NOTE:
1 SURROUNDING LAND USE IS ZONED AS OPEN SPACE (S)

FIGURE 2

Sym	Descrip	Date	Apd

Revisions

COUNTY OF IMPERIAL
DEPARTMENT OF PUBLIC WORKS
155 SOUTH 11TH ST
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Phone: (619) 339-4462

BAS
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CIVIL AND ENVIRONMENTAL ENGINEERS
1360 VALLEY VISTA DRIVE
DIAMOND BAR, CA. 91765 (909) 860-7777

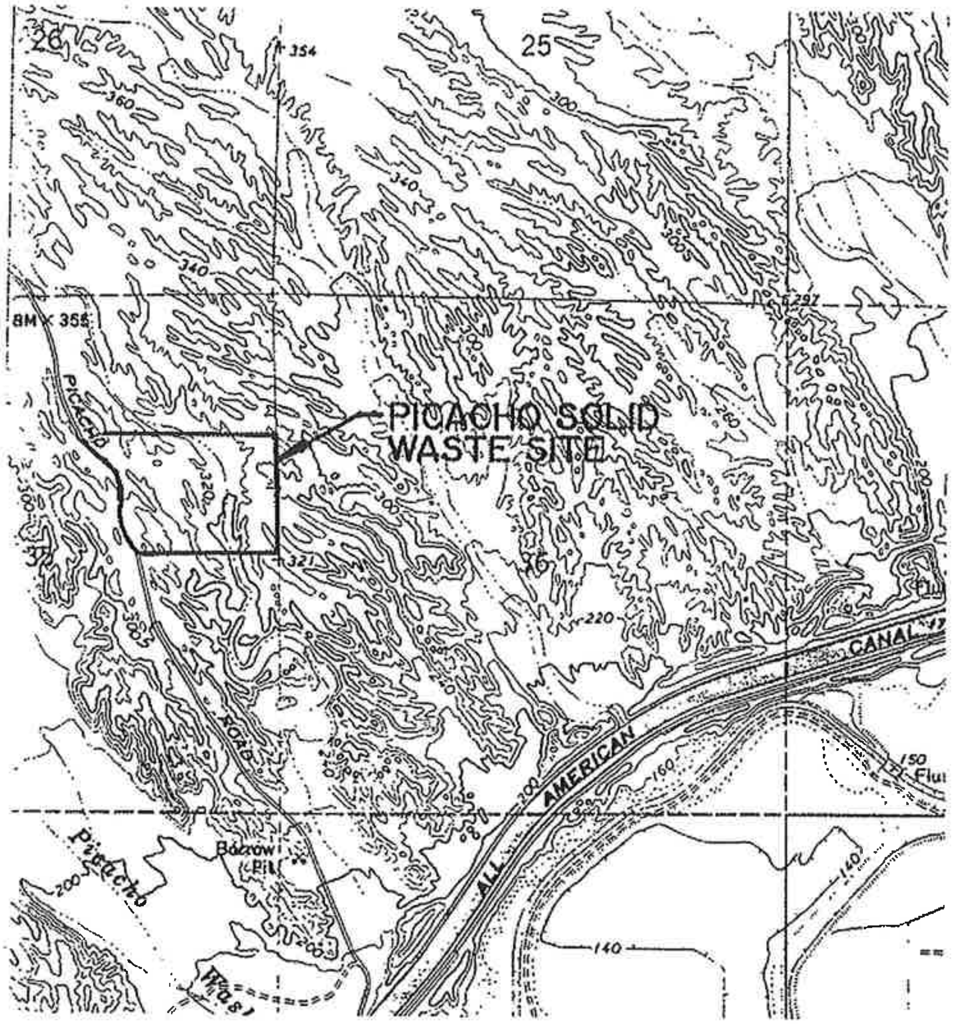
Design A.C.R.	Drawn D.L.L.	File 263240B
Chkd	Appd	Date 4-25-95

PICACHO CUT AND FILL SITE

SITE PLAN

Sheet 1 of 1
Rev

9510-004A-D-26-023-DB



N

SCALE: 1"=2,000'

TOPOGRAPHY: U.S.G.S. 7.5 MINUTE-BARD, CALIFORNIA - ARIZONA

FIGURE 3

BAS

(909) 860–7777

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1360 VALLEY VISTA DRIVE DIAMOND BAR, CA 91765

PICACHO CUT AND FILL SITE

PRE-LANDFILL TOPOGRAPHY

JOB NO.
9510–4A
DATE
6–8–95
DRAWN BY
D.L.L.
FILE NAME
173531DB

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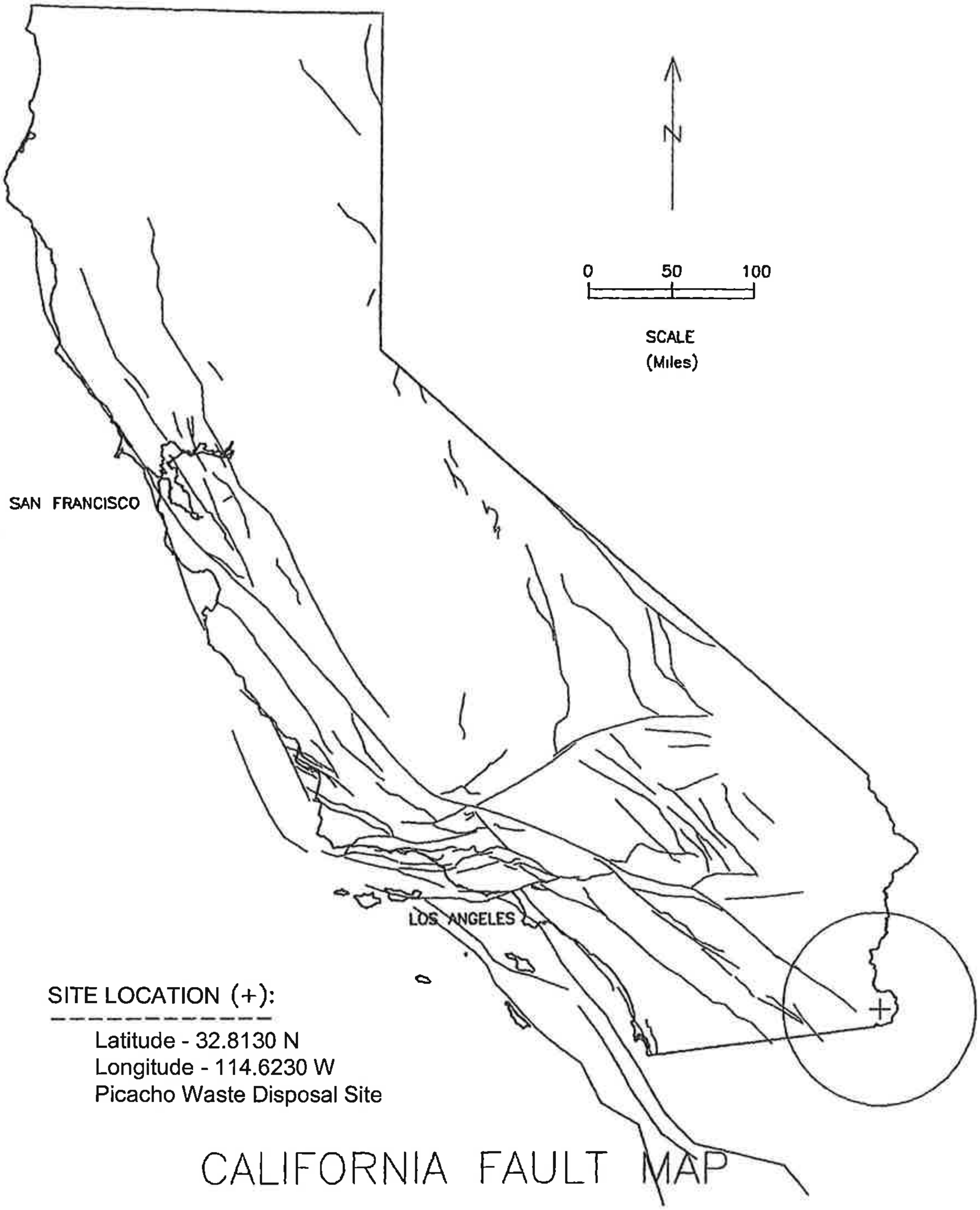

SITE LOCATION (+):

Latitude - 32.8130 N
Longitude - 114.6230 W
Picacho Waste Disposal Site

CALIFORNIA FAULT MAP

FIGURE 4

BRYAN A. STIRRAT & ASSOCIATES
CIVIL AND ENVIRONMENTAL ENGINEERS
1360 VALLEY VISTA DRIVE DIAMOND BAR, CA 91765
(909) 860-7777

PICACHO CUT AND FILL SITE

FAULT MAP

JOB NO.	9510-4A
DATE	6-8-95
DRAWN BY	D.L.L.
FILE NAME	173530DB

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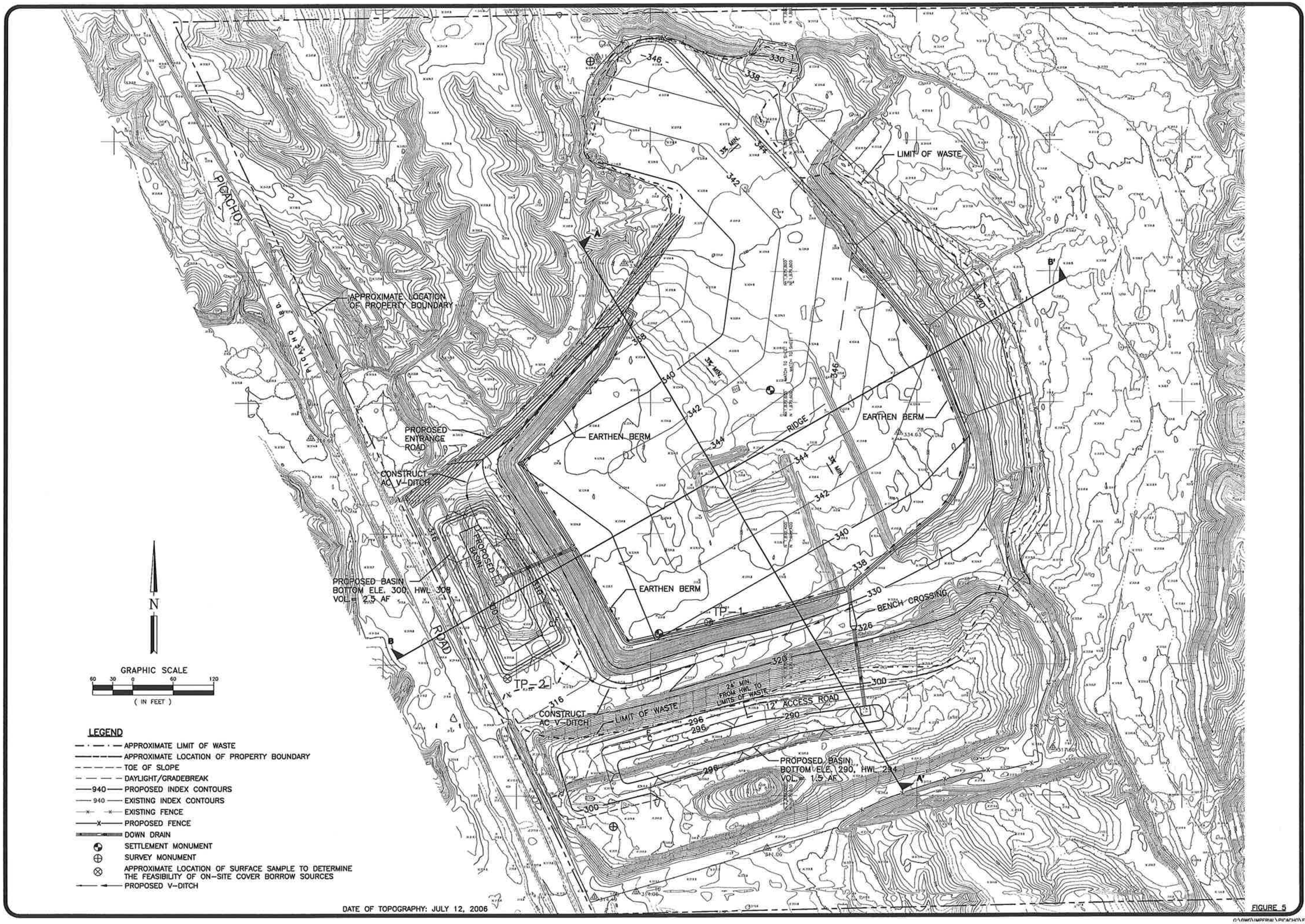

DATE OF TOPOGRAPHY: JULY 12, 2006

FIGURE 5

PICACHO CUT AND FILL SITE

FINAL GRADING AND
DRAINAGE PLAN

BAS
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Revisions			
Sym	Descrip	Date	Apd

Sheet 1 of 1
Rev

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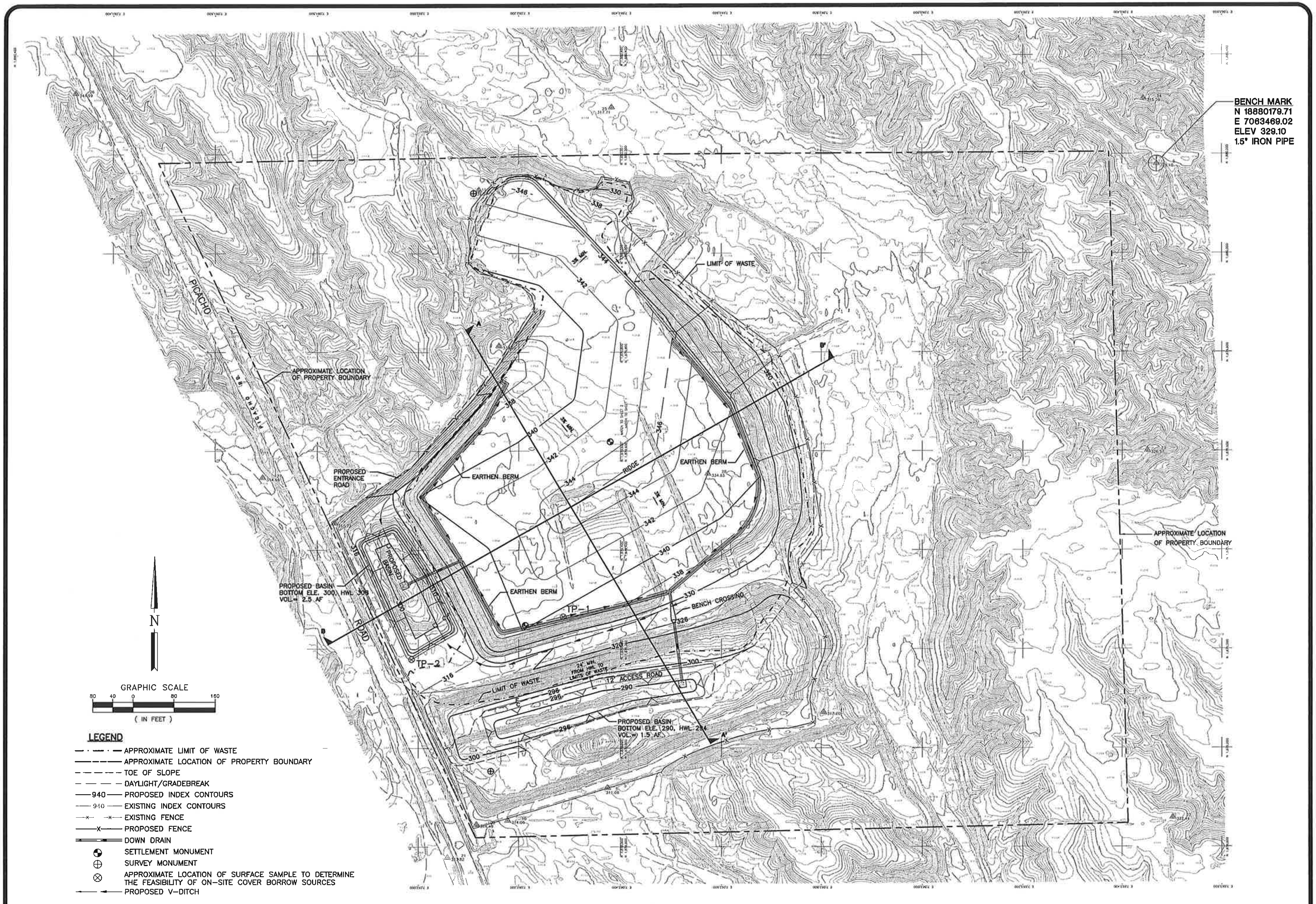

LEGEND

- — · — · — APPROXIMATE LIMIT OF WASTE
- ———— APPROXIMATE LOCATION OF PROPERTY BOUNDARY
- – – – – TOE OF SLOPE
- — — — DAYLIGHT/GRADEBREAK
- ——940—— PROPOSED INDEX CONTOURS
- ——940—— EXISTING INDEX CONTOURS
- —x— —x— EXISTING FENCE
- ——X—— PROPOSED FENCE
- ═══ DOWN DRAIN
- ◒ SETTLEMENT MONUMENT
- ⊕ SURVEY MONUMENT
- ⊗ APPROXIMATE LOCATION OF SURFACE SAMPLE TO DETERMINE THE FEASIBILITY OF ON-SITE COVER BORROW SOURCES
- —◄— PROPOSED V-DITCH

DATE OF TOPOGRAPHY: JULY 12, 2006

FIGURE 5A

Sym	Descrip	Date	Apd

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Design --	Drawn --	File 27138408
Chkd ___	Appd ___	Date 12-14-07

PICACHO CUT AND FILL SITE

FINAL GRADING AND DRAINAGE PLAN WITH BENCHMARK

Sheet 1 of 1
Rev

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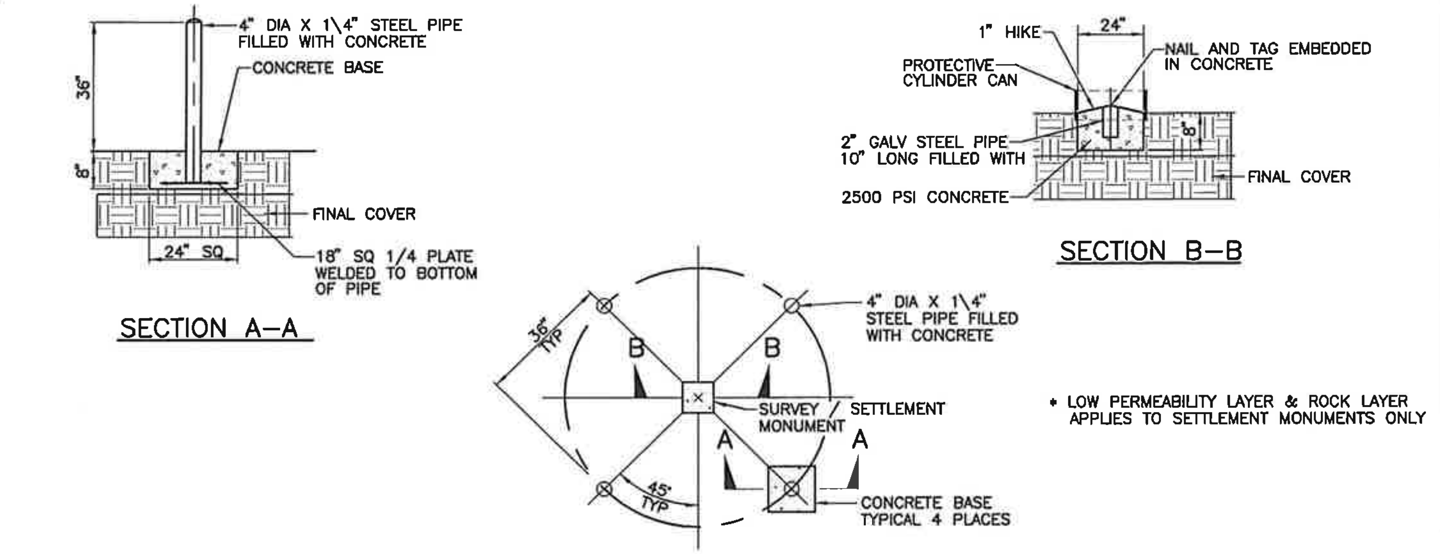
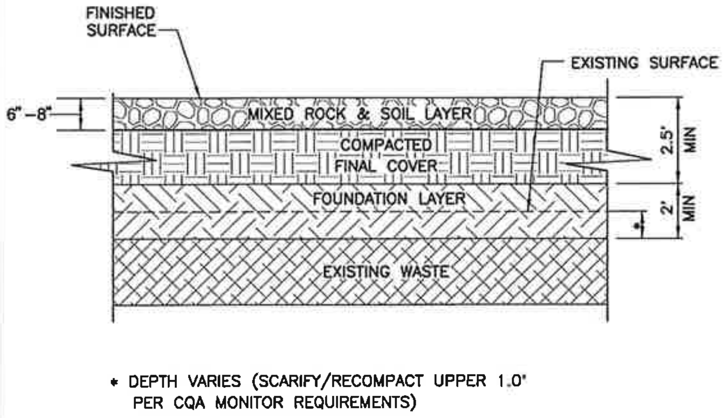


* LOW PERMEABILITY LAYER & ROCK LAYER APPLIES TO SETTLEMENT MONUMENTS ONLY

SURVEY / SETTLEMENT MONUMENT

NTS

1
—

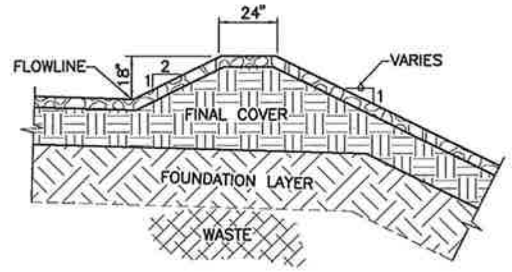


* DEPTH VARIES (SCARIFY/RECOMPACT UPPER 1.0' PER CQA MONITOR REQUIREMENTS)

ALTERNATIVE FINAL COVER TYPICAL SECTION

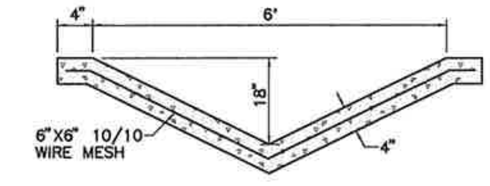
NTS

2
—

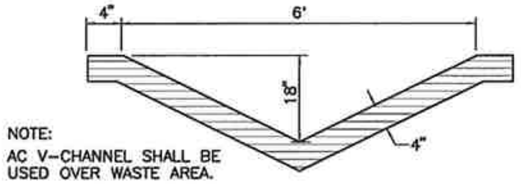


DECK DRAINAGE EARTHEN BERM

NTS



CONCRETE V-CHANNEL



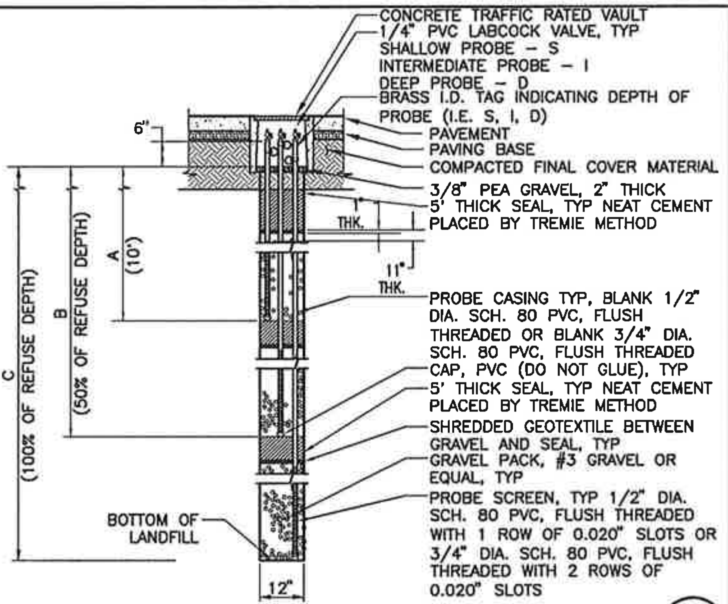
NOTE:
AC V-CHANNEL SHALL BE USED OVER WASTE AREA.

AC V-CHANNEL

V-CHANNEL

NTS

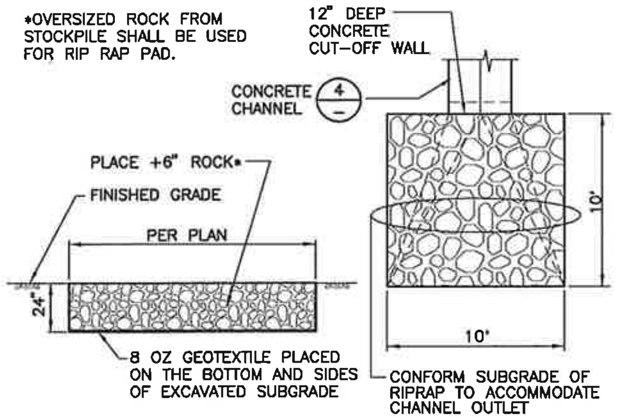
4
—



LANDFILL GAS MONITORING PROBE

NTS

5
—



RIP RAP PAD

NTS

6
—

FIGURE 6

Revisions

Sym	Descrip	Date	Apd

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Design__ Drawn__ Spvd__
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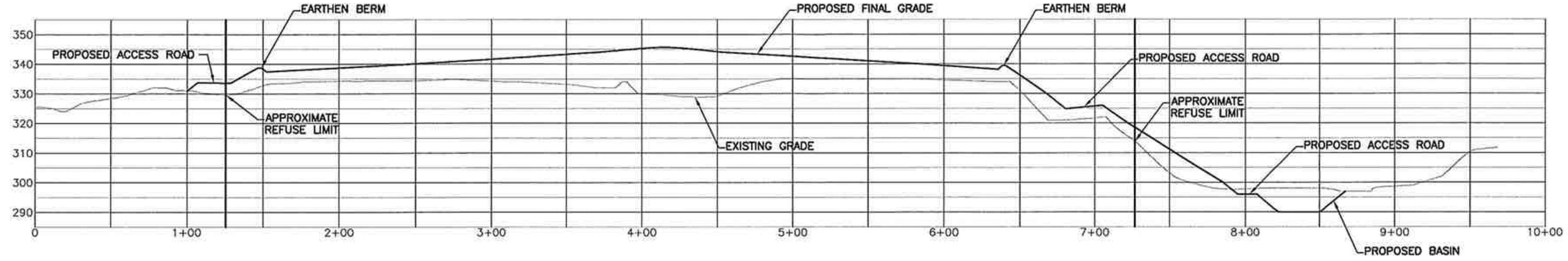
PICACHO CUT AND FILL SITE

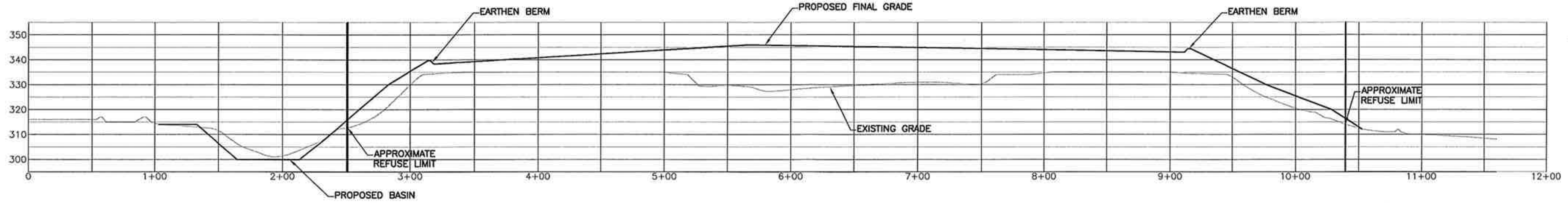
DETAIL SHEET

Sheet 1 of 1
Rev



SECTION A-A'

HORIZONTAL SCALE: 1"=40'
VERTICAL SCALE: 1"=20'



SECTION B-B'

HORIZONTAL SCALE: 1"=40'
VERTICAL SCALE: 1"=20'

FIGURE 7

DATE OF TOPOGRAPHY: JULY 12, 2006

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Revisions

Sym	Descrip	Date	Apd

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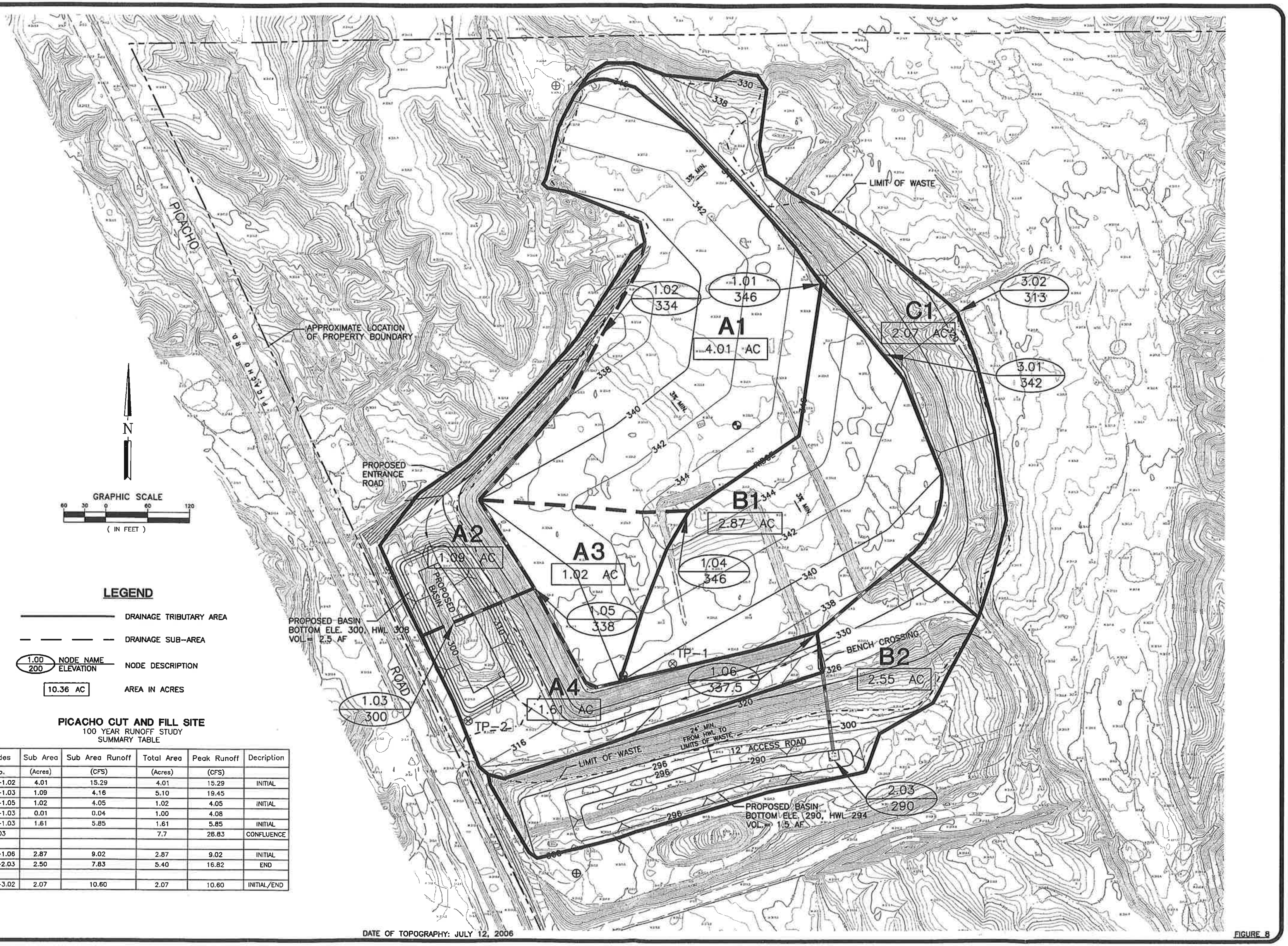
PICACHO CUT AND FILL SITE

CROSS SECTIONS

Sheet 1 of 1
Rev



LEGEND

▬▬▬	DRAINAGE TRIBUTARY AREA
— — —	DRAINAGE SUB-AREA
1.00 NODE NAME 200 ELEVATION	NODE DESCRIPTION
10.36 AC	AREA IN ACRES

PICACHO CUT AND FILL SITE

100 YEAR RUNOFF STUDY
SUMMARY TABLE

Nodes	Sub Area	Sub Area Runoff	Total Area	Peak Runoff	Decription
No.	(Acres)	(CFS)	(Acres)	(CFS)	
1.01–1.02	4.01	15.29	4.01	15.29	INITIAL
1.02–1.03	1.09	4.16	5.10	19.45	
1.04–1.05	1.02	4.05	1.02	4.05	INITIAL
1.05–1.03	0.01	0.04	1.00	4.08	
1.06–1.03	1.61	5.85	1.61	5.85	INITIAL
1.03			7.7	28.83	CONFLUENCE
1.01–1.06	2.87	9.02	2.87	9.02	INITIAL
1.06–2.03	2.50	7.83	5.40	16.82	END
3.01–3.02	2.07	10.60	2.07	10.60	INITIAL/END

FIGURE 8

Sym	Descrip	Revisions	Date	Apd

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DIAMOND BAR, CA 91765 (909) 860-7777

Design___ Drawn___ Spvd___
Chkd___ Appd___ Date 12-14-07

PICACHO CUT AND FILL SITE

100-YEAR DEVELOPED CONDITION
HYDROLOGY MAP

Sheet 1 of 1
Rev

PICACHO SOLID WASTE SITE

THIS FACILITY IS CLOSED

CLOSURE AND POST-CLOSURE MAINTENANCE PLANS
FOR THIS FACILITY MAY BE VIEWED
AT THE OFFICES OF THE COUNTY OF IMPERIAL
DEPARTMENT OF PUBLIC WORKS
LOCATED AT:

155 SOUTH 11TH STREET
EL CENTRO, CALIFORNIA 92243

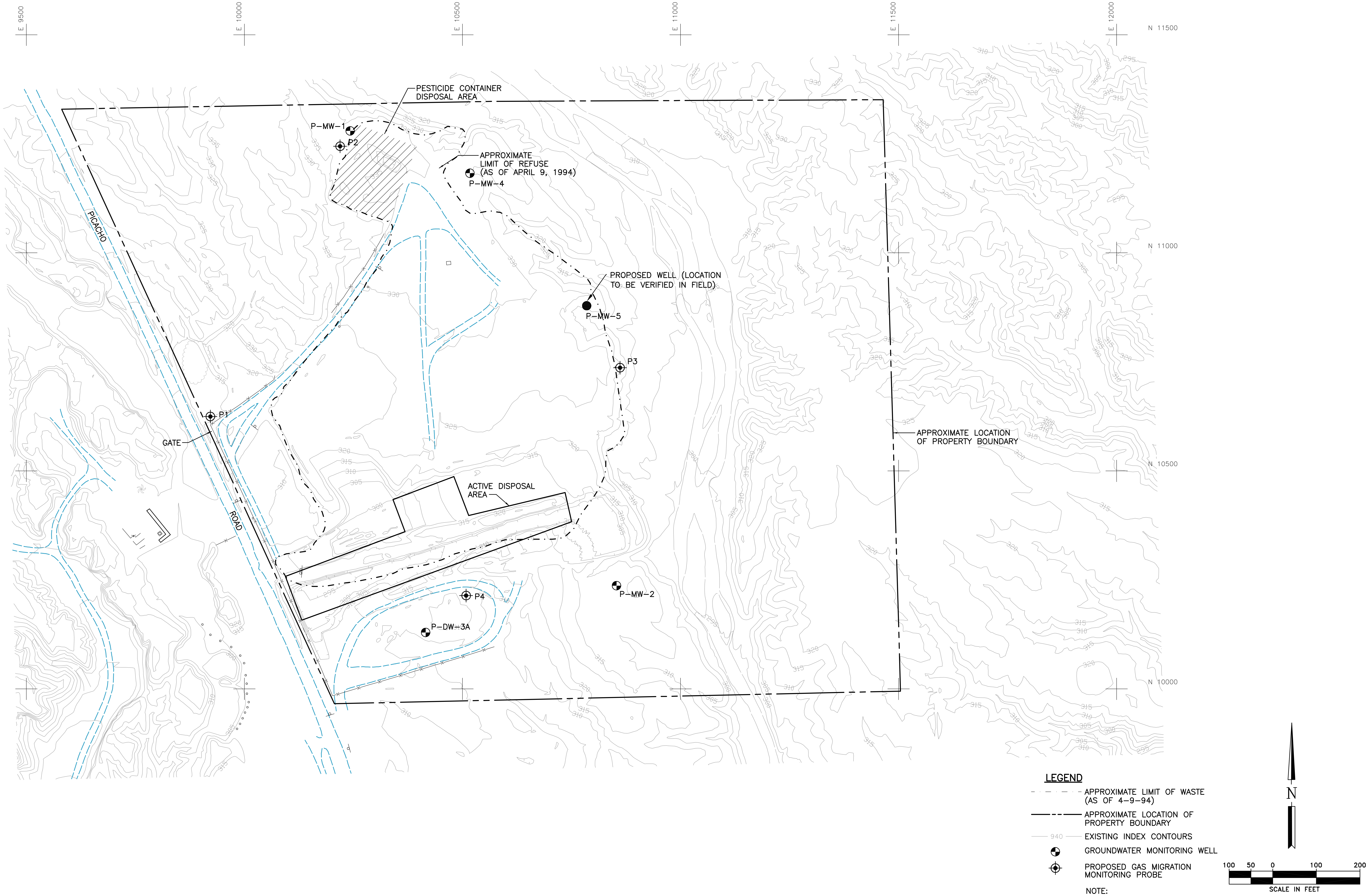
IN CASE OF EMERGENCY, A COUNTY OF IMPERIAL
DEPARTMENT OF PUBLIC WORKS
REPRESENTATIVE CAN BE REACHED AT:

(760) 339-4462

THANK YOU FOR YOUR COOPERATION

FIGURE 9

FULL-SIZE DRAWINGS



NOTE:
1 SURROUNDING LAND USE IS ZONED AS OPEN SPACE (S)

DRAWING 1

Revisions

Sym	Descrip	Date	Apd

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Design A.C.R. Drawn D.L.L. Spvd
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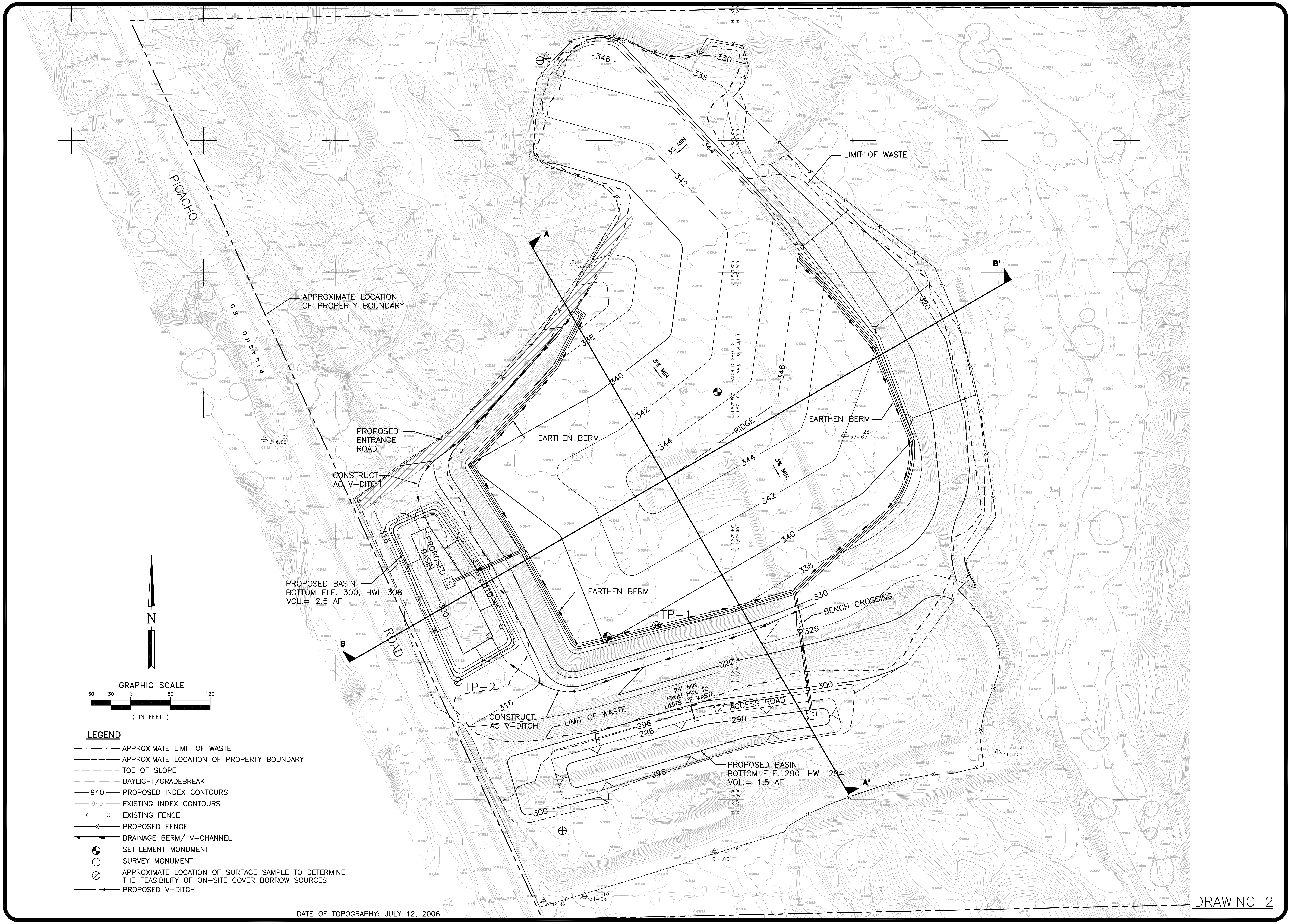
PICACHO CUT AND FILL SITE

SITE PLAN

Sheet 1 of 1
Rev

9510-004A-D-26-023-DB



LEGEND

— · — · —	APPROXIMATE LIMIT OF WASTE
——— — ———	APPROXIMATE LOCATION OF PROPERTY BOUNDARY
— — — — —	TOE OF SLOPE
— —— —— —	DAYLIGHT/GRADEBREAK
——940——	PROPOSED INDEX CONTOURS
——940——	EXISTING INDEX CONTOURS
—x— —x—	EXISTING FENCE
——x——	PROPOSED FENCE
═◄═◄═	DRAINAGE BERM/ V-CHANNEL
◕	SETTLEMENT MONUMENT
⊕	SURVEY MONUMENT
⊗	APPROXIMATE LOCATION OF SURFACE SAMPLE TO DETERMINE THE FEASIBILITY OF ON-SITE COVER BORROW SOURCES
◄— ◄—	PROPOSED V-DITCH

DATE OF TOPOGRAPHY: JULY 12, 2006

DRAWING 2

PICACHO CUT AND FILL SITE

FINAL GRADING AND DRAINAGE PLAN

BAS
BRYAN A. STIRRAT & ASSOCIATES
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Chkd____	Appd____	Date 12-14-07

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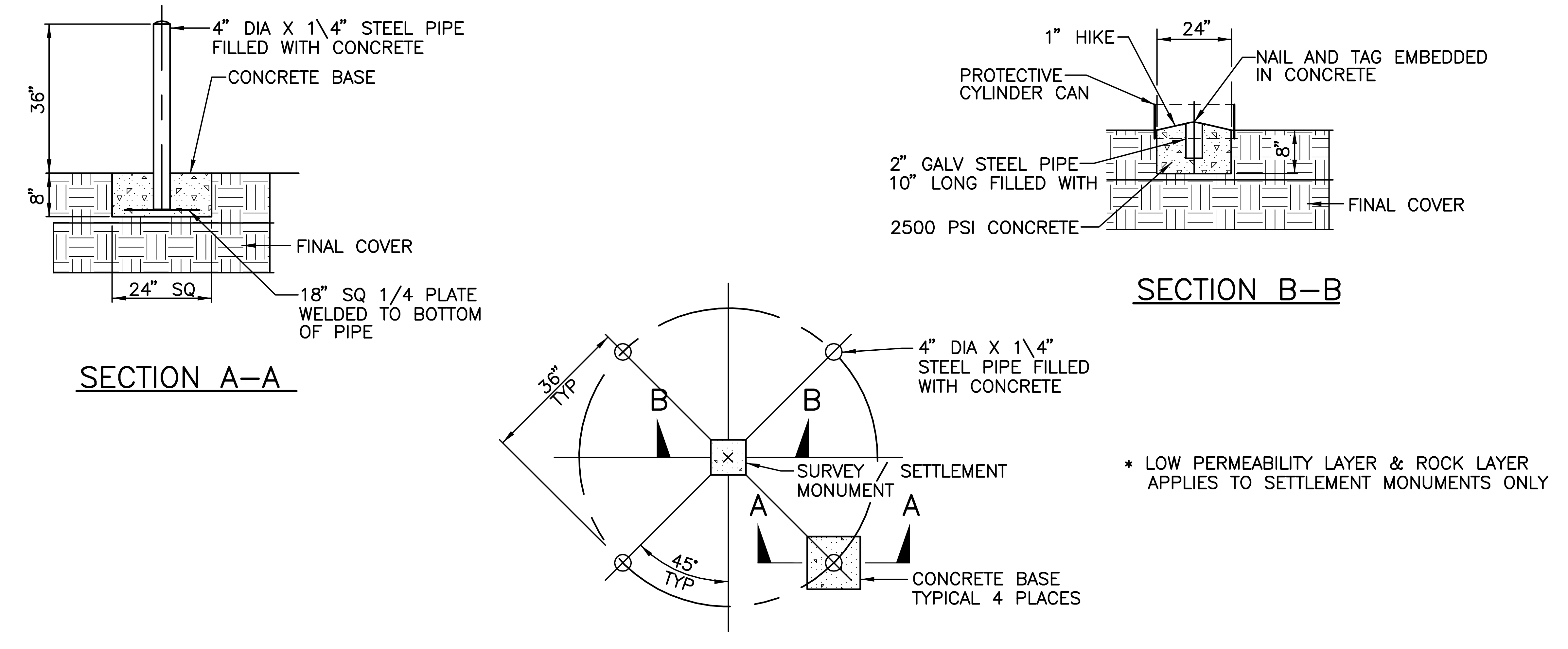
Revisions

Sym	Descrip	Date	Apd

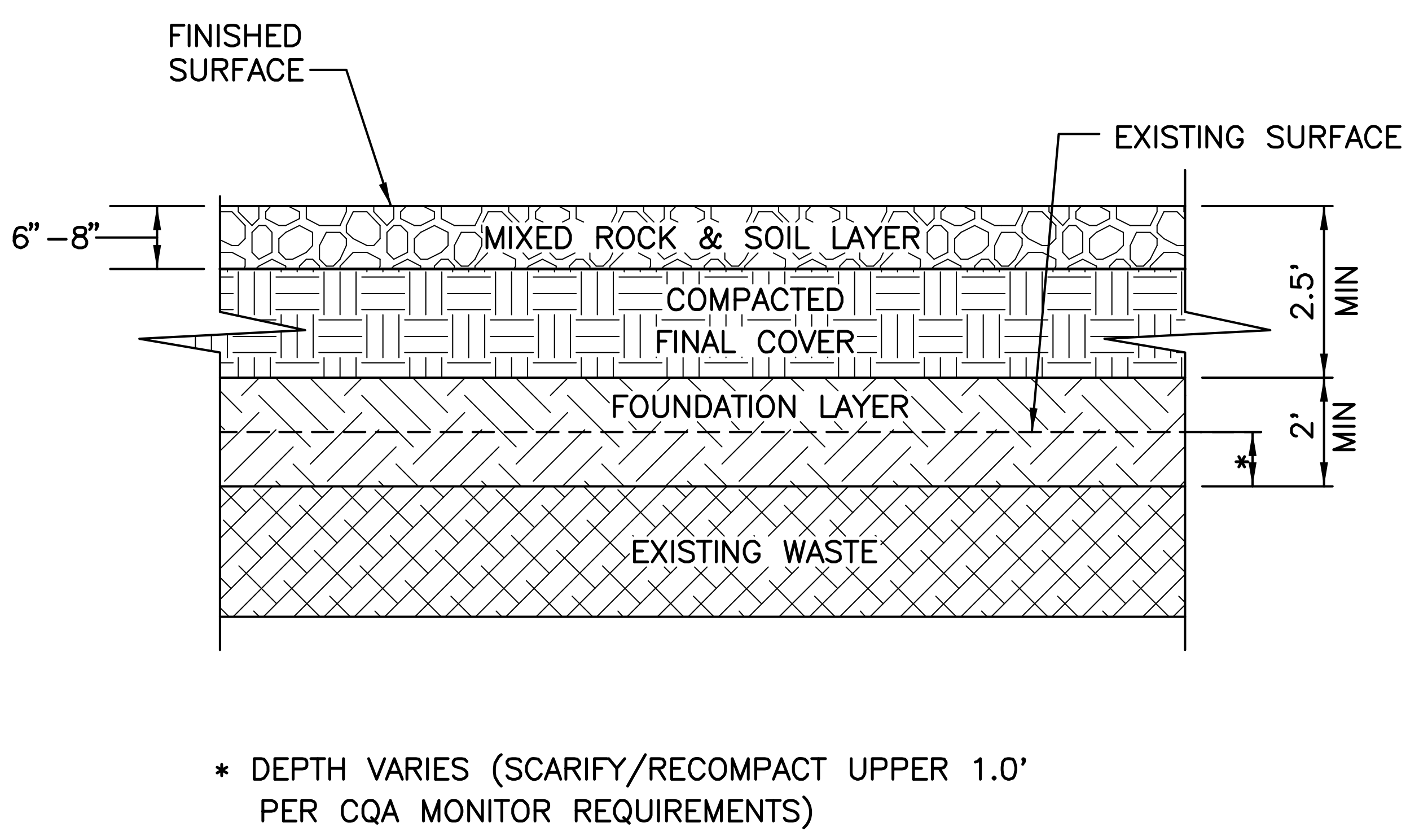
Sheet 1 of 1

Rev



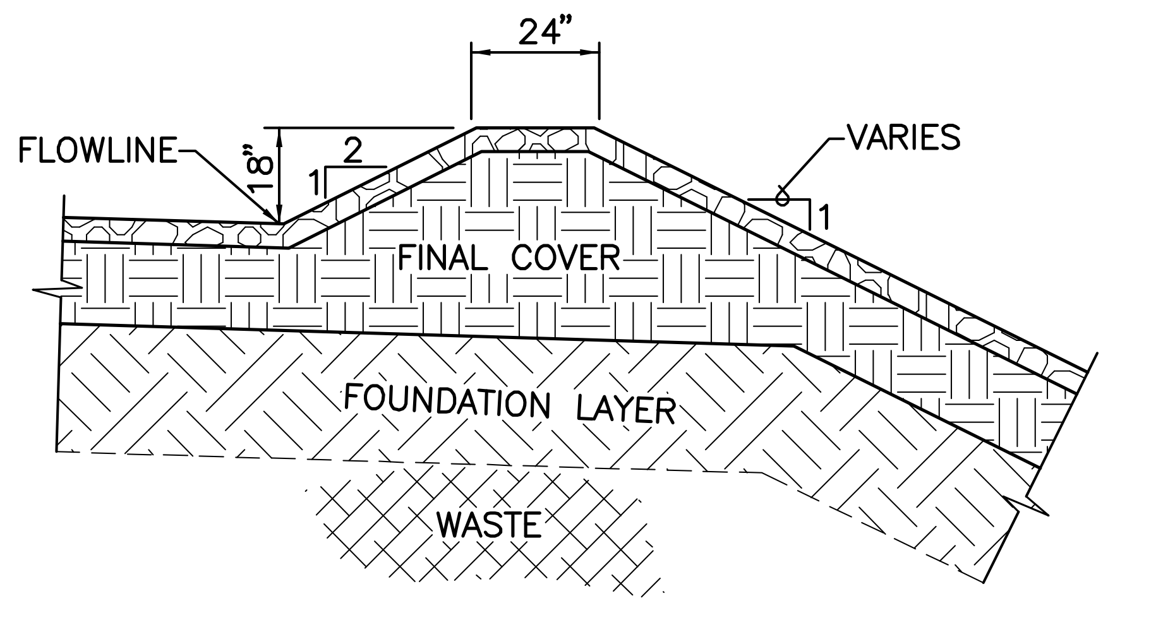
* LOW PERMEABILITY LAYER & ROCK LAYER APPLIES TO SETTLEMENT MONUMENTS ONLY

SURVEY / SETTLEMENT MONUMENT ①
NTS

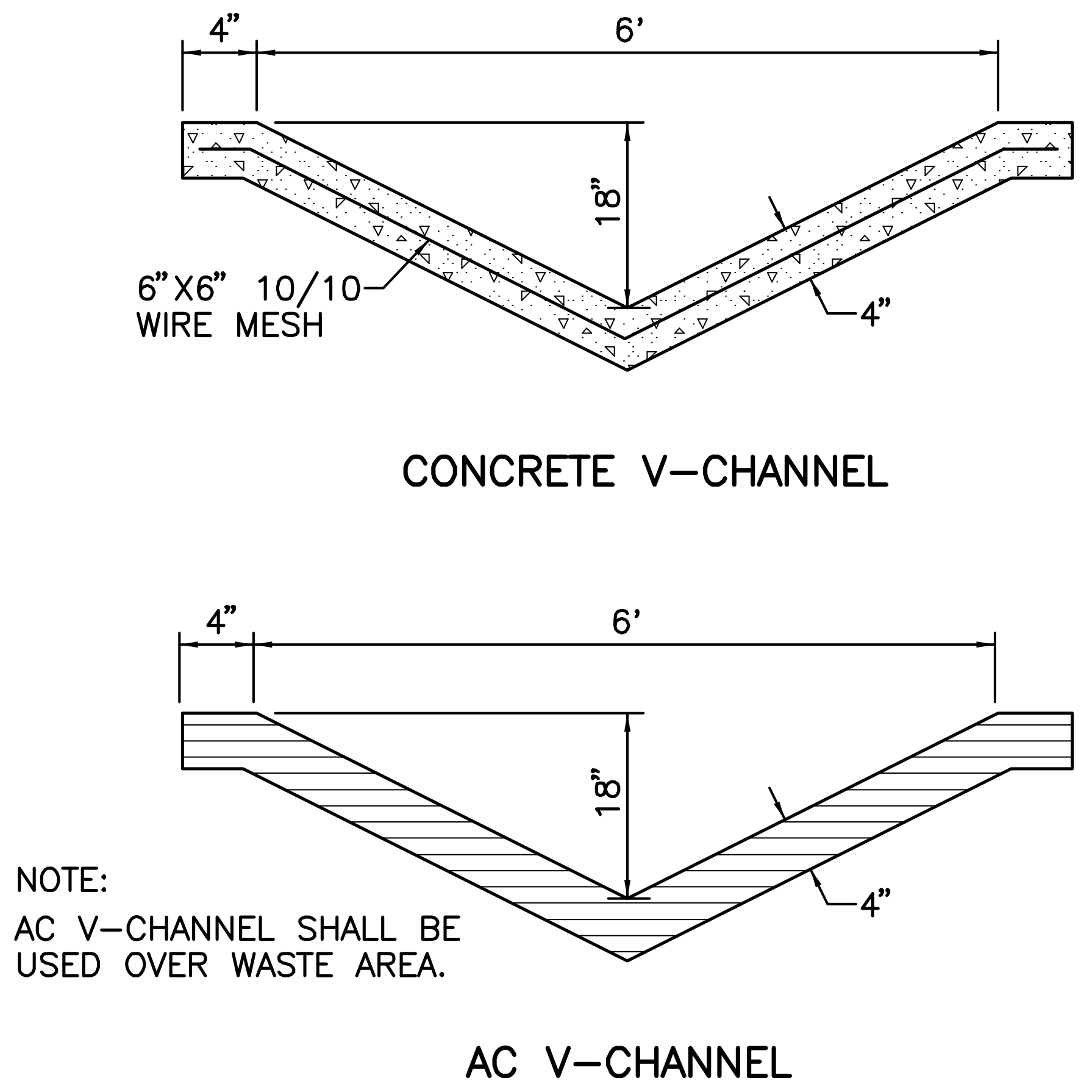


* DEPTH VARIES (SCARIFY/RECOMPACT UPPER 1.0' PER CQA MONITOR REQUIREMENTS)

ALTERNATIVE FINAL COVER TYPICAL SECTION ②
NTS

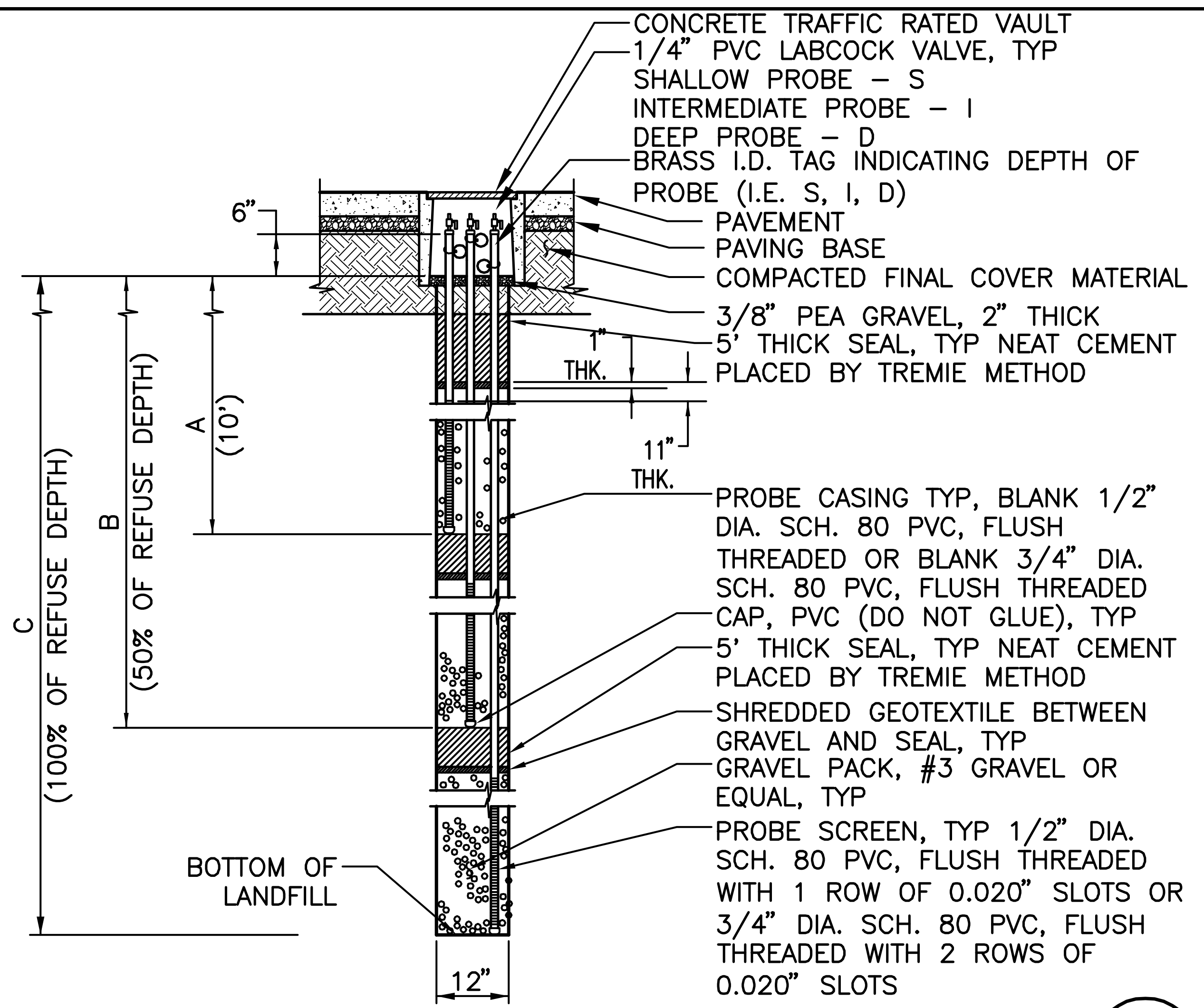


DECK DRAINAGE EARTHEN BERM ③
NTS



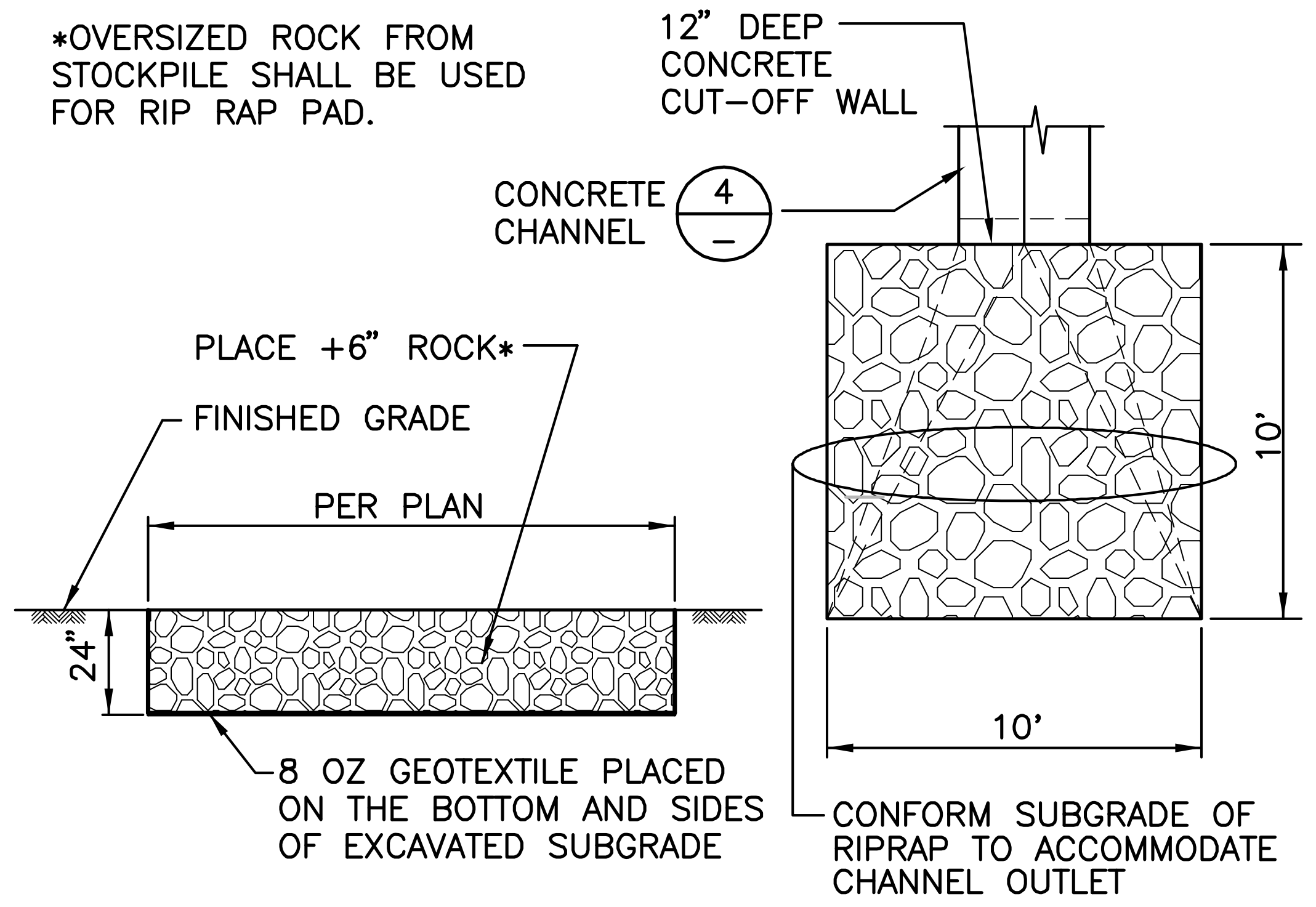
NOTE:
AC V–CHANNEL SHALL BE USED OVER WASTE AREA.

V-CHANNEL ④
NTS



LANDFILL GAS MONITORING PROBE ⑤
NTS

*OVERSIZED ROCK FROM STOCKPILE SHALL BE USED FOR RIP RAP PAD.



RIP RAP PAD ⑥
NTS

DRAWING 3

Revisions

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PICACHO CUT AND FILL SITE

DETAIL SHEET

Sheet 1 of 1
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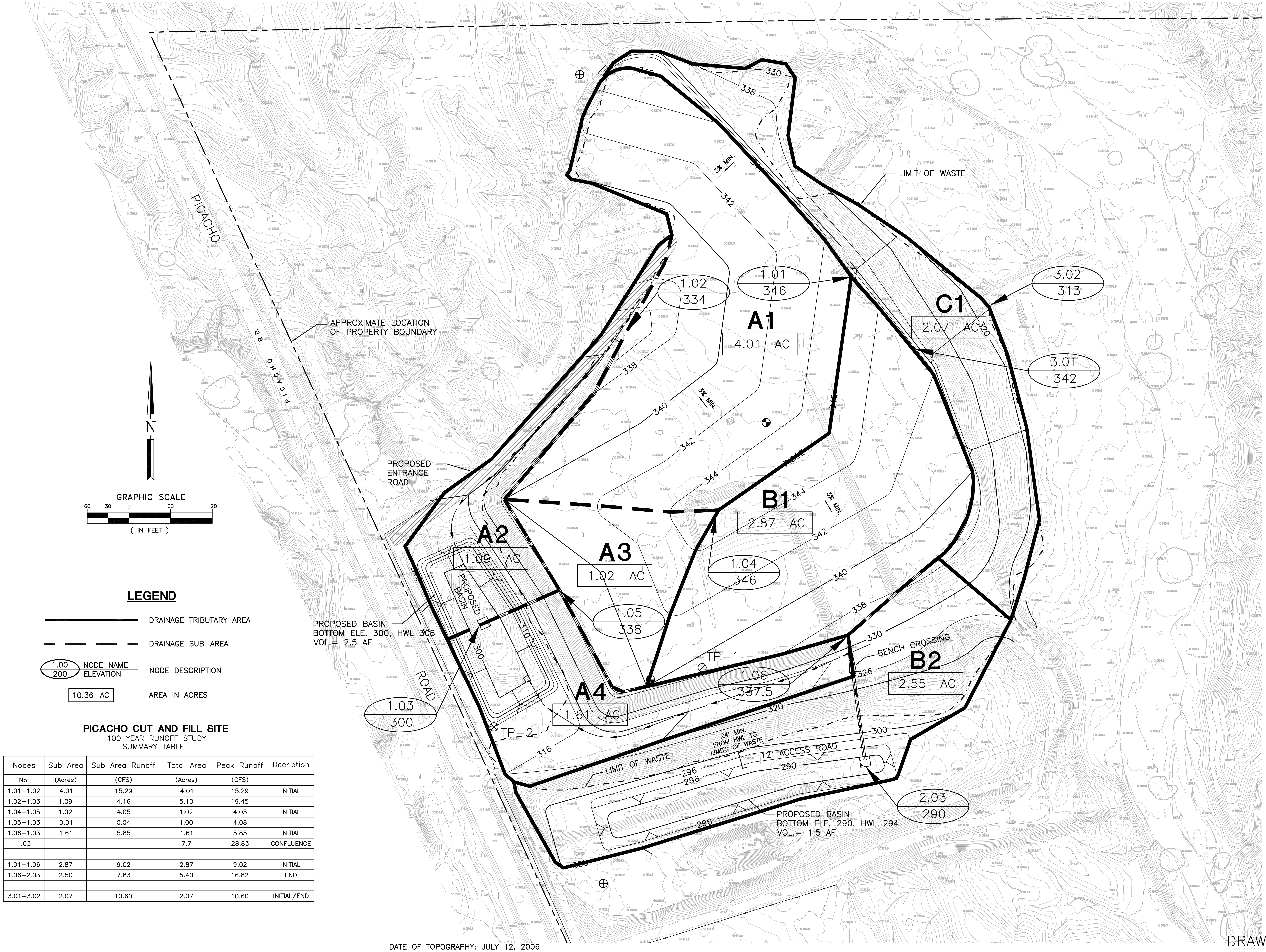

LEGEND

▬▬▬	DRAINAGE TRIBUTARY AREA
— — —	DRAINAGE SUB-AREA
1.00 NODE NAME 200 ELEVATION	NODE DESCRIPTION
10.36 AC	AREA IN ACRES

PICACHO CUT AND FILL SITE

100 YEAR RUNOFF STUDY
SUMMARY TABLE

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1.04–1.05	1.02	4.05	1.02	4.05	INITIAL
1.05–1.03	0.01	0.04	1.00	4.08	
1.06–1.03	1.61	5.85	1.61	5.85	INITIAL
1.03			7.7	28.83	CONFLUENCE
1.01–1.06	2.87	9.02	2.87	9.02	INITIAL
1.06–2.03	2.50	7.83	5.40	16.82	END
3.01–3.02	2.07	10.60	2.07	10.60	INITIAL/END

DRAWING 4

Sym	Descrip	Date	Apd

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DIAMOND BAR, CA. 91765 (909) 860-7777

Design __	Drawn __	Spvd ____
Chkd ____	Appd ____	Date 12-14-07

PICACHO CUT AND FILL SITE

100-YEAR DEVELOPED CONDITION HYDROLOGY MAP

Sheet 1 of 1

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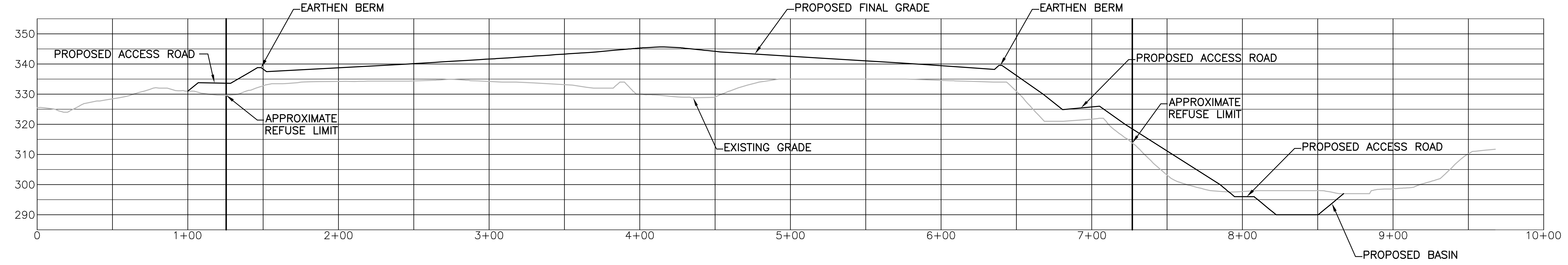
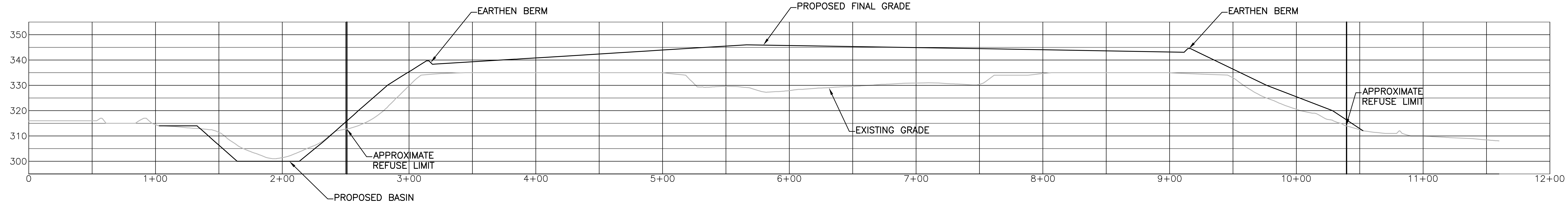


SECTION A-A'

HORIZONTAL SCALE: 1"=40'
VERTICAL SCALE: 1"=20'



DRAWING 5

SECTION B-B'

HORIZONTAL SCALE: 1"=40'
VERTICAL SCALE: 1"=20'

DATE OF TOPOGRAPHY: JULY 12, 2006

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Sym	Descrip	Date	Apd

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Chkd Appd Date 12-14-07

PICACHO CUT AND FILL SITE

CROSS SECTIONS

Sheet 1 of 1

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APPENDIX A

LANDFILL CAPACITY CALCULATION WORKSHEET

Picacho Cut and Fill Site
Capacity Calculation

1) Remaining Capacity
Proposed Final Grading Plan (using 2006 Topo)
Remaining Capacity as of 7/12/06 = 77,055 cubic yards (cy)
(Including Final Cover Quantities)

2) Refuse (Inflow Rate) received from July 12, 2006 through December 31, 2008
Information provided by County of Imperial Department of Public Works

Year	Tons Received
7/12/06 through 12/31/08	1,839
Total Tonnage	**1,839**

3) Conversion of tons received (Item 2) to cy
- Assume in-place density of 1,000 lbs per cy
- 2,000 lbs per ton

Calculation for conversion: 2,000 divided by 1000 = 2
1,839 tons x 2 (conversion rate for tons to cy) = 3,678 cy
3,678 cy were received from 3/24/06 through 8/31/07 (in-place)

4) Daily and Intermediate Cover Used (5:1 ratio)
5:1 ratio 1 div. by 5 = 0.2
3,678 x 0.2 = 736 cy

5) Total air space consumed (refuse and daily and intermediate cover in cubic yards) from 7/12/06 through 12/31/08
3,678 + 736 = 4,414 cy

6) Remaining Capacity as of January 1, 2009
77,055 - 4,414 = 72,642 cy

7) Remaining Net Capacity (Remaining Capacity less Final Cover Volume = Remaining Net Capacity)
See "Volumes" shown on Site Life Projection table.

Total Final Cover Volume (Foundation layer and Monolithic layer) = 70,583 cy

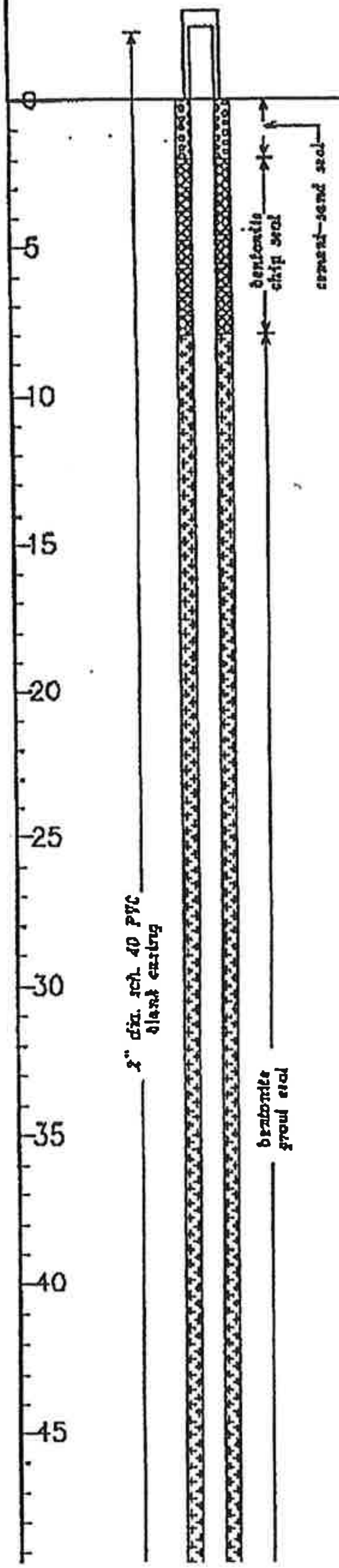
72,697 cy (rem capacity) - 70,583 cy (final cover volume) = 2,059 cy
as of 1/1/2009

APPENDIX B

WELL CONSTRUCTION LOGS

Top of Casing Elev. 339.82 ft. MSL datum
Coordinates
Drill Date: Start 8/22/94 Finish 8/24/94
Drill Method CME 75/Hollow-Stem Augers
8-inch OD
Driller West Hazmat/Dave Maracchi
Logged by S. Tamman
Reviewed by ~~R. Hartleb~~

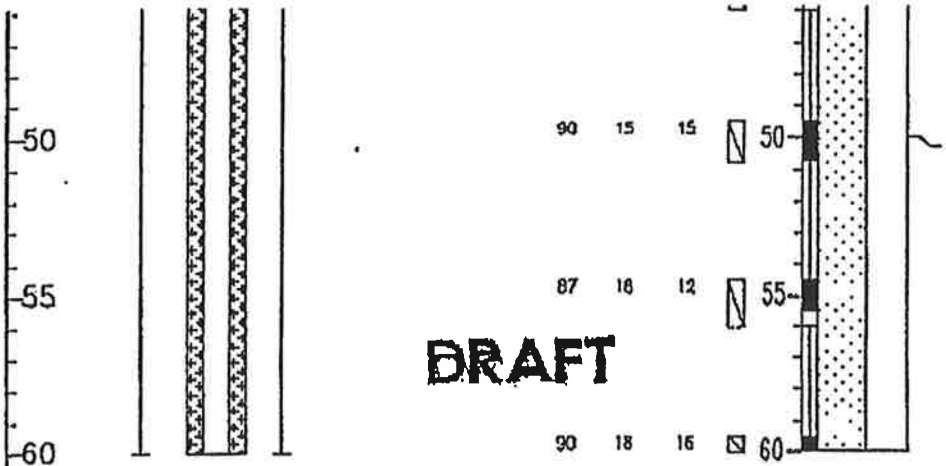
DRAFT



OVA (ppm) Sample	Blows/Ft.	Driven (in.)	Recovery (in.)	Drive Interval	Depth (ft)	Soil Type	
	grab	12	2	▨	0	SP	VERY PALE BROWN (10YR 8/4) GRAVELLY SILTY SAND, dry, loose
	92	18	12	▨	5		
	93	18	12	▨	10		
	116	18	9	▨	15		slight moisture noted, slightly damp to damp, color becomes very pale brown (10YR 7/4)
							grades with increasing fine-grained sand
	83	12	12	▨	20		predominantly fine-grained sand, color becomes very pale orange (10YR 8/2)
	88	12	12	▨	25		
	87	18	16	▨	30		predominantly fine to medium grained sand
	77	15	15	▨	35		some cemented (CaCO3?) lenses color becomes pale yellowish brown (10YR 6/2)
	99	18	14	▨	40		predominantly medium grained 1-inch thick cemented conglomerate lens
	94	18	14	▨	45		color becomes very pale orange (10YR 8/2); moist color becomes pale yellowish brown (10YR 6/2)

P-MW-1
D=~~217~~' 208.5'

Static g.w. level
203.17' Below
top casing



becomes slightly cohesive to loose; moist

2-inch thick clay lens at 50 ft.

sands predominantly fine with some medium grains; slightly cohesive to loose; with occasional thin silt and clay laminae

color becomes very pale orange (10YR 8/2), grades with sparse gravel clasts

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FIGURE
B-22

Top of Casing Elev. 339.82 ft. MLS datum
Coordinates
Drill Date: Start 8/22/94 Finish 8/24/94
Drill Method CME 75/Hollow-Stem Augers
8-Inch OD
Driller West Hazmat/Dave Maracchi
Logged by S. Tamman
Reviewed by R. Hartleb

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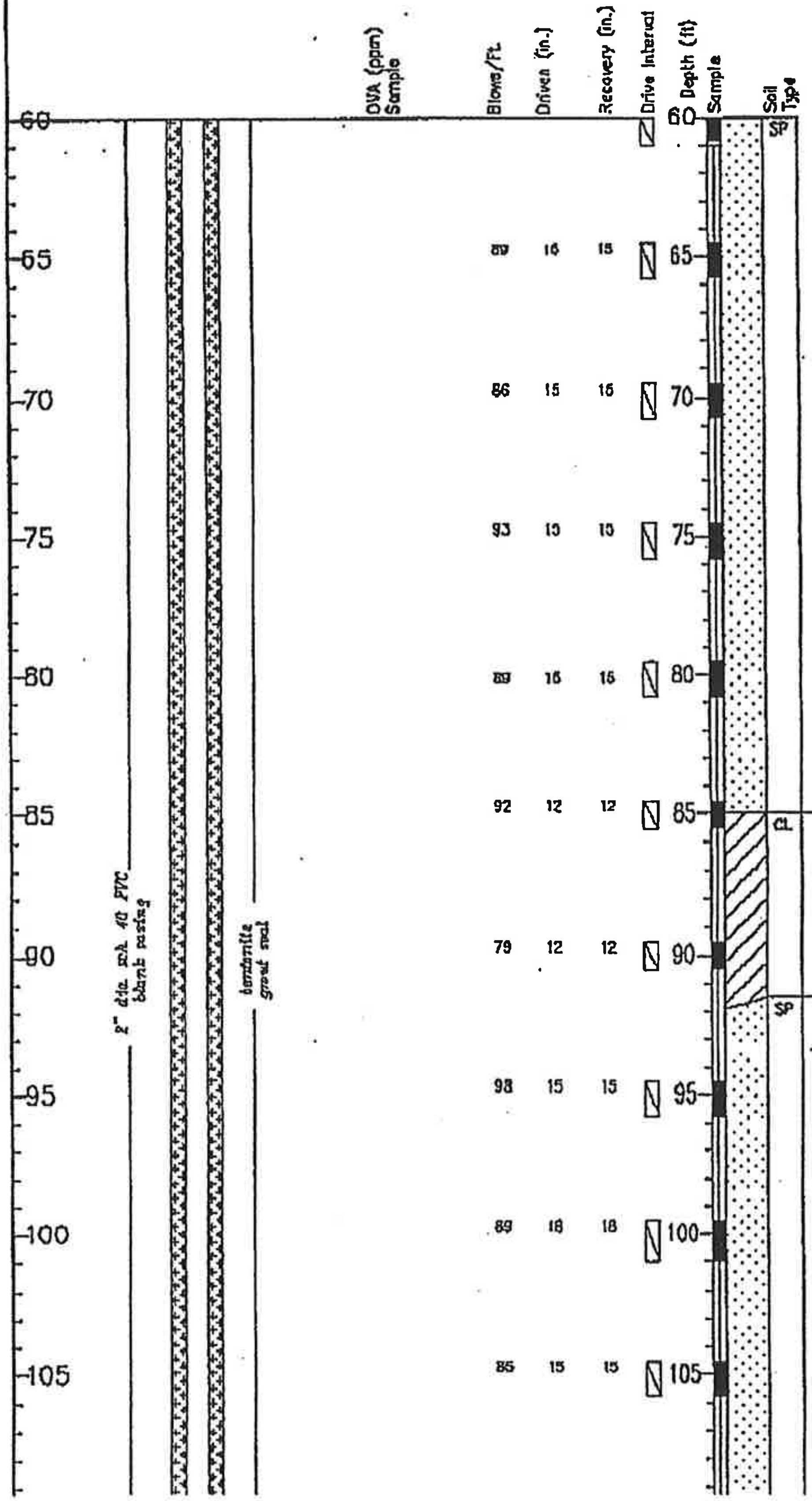
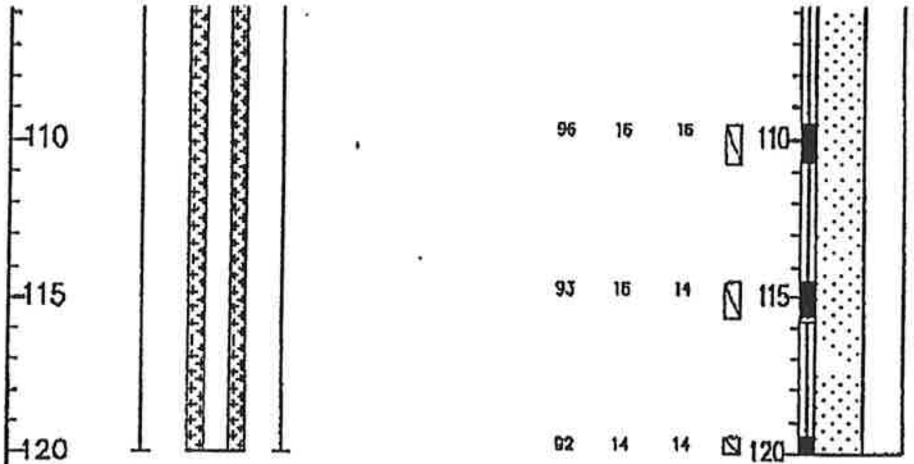


Depth (ft)	OVA (ppm) Sample	Blows/Ft.	Driven (in.)	Recovery (in.)	Soil Type	
60					SP	
65		89	16	15		grades with increasing fine-grained sand
70		86	15	16		grades with marked increase in silt content at 70.5: color becomes pale yellowish brown (10YR 6/2)
75		93	10	10		color becomes very pale orange (10YR 8/2)
80		89	16	16		slightly consolidated, moist fine to medium-grained sands display faint laminae; slightly cohesive to loose
						color becomes very pale brown (10YR 7/4)
85		92	12	12	CL	DARK BROWN (10YR 4/3) SILTY CLAY, massive, damp
90		79	12	12		grades to a highly weathered clayey silt. color becomes very pale orange (10YR 8/2) and chalky
					SP	VERY PALE ORANGE (10YR 8/2) FINE TO MEDIUM SAND, slightly cohesive to loose, damp
95		98	15	15		
100		89	18	18		
105		85	15	15		



grades to predominantly medium-grained sand; color becomes pale yellowish brown (10YR 6/2)

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FIGURE
B-22

Top of Casing Elev. 339.82 FT. MSL datum
Coordinates
Drill Date: Start 8/22/94 Finish 8/24/94
Drill Method CME 75/Hollow-Stem Augers
8-inch OD
Driller West Hazmat/Dave Marocchi
Logged by S. Tamman
Reviewed by R. Hartlieb

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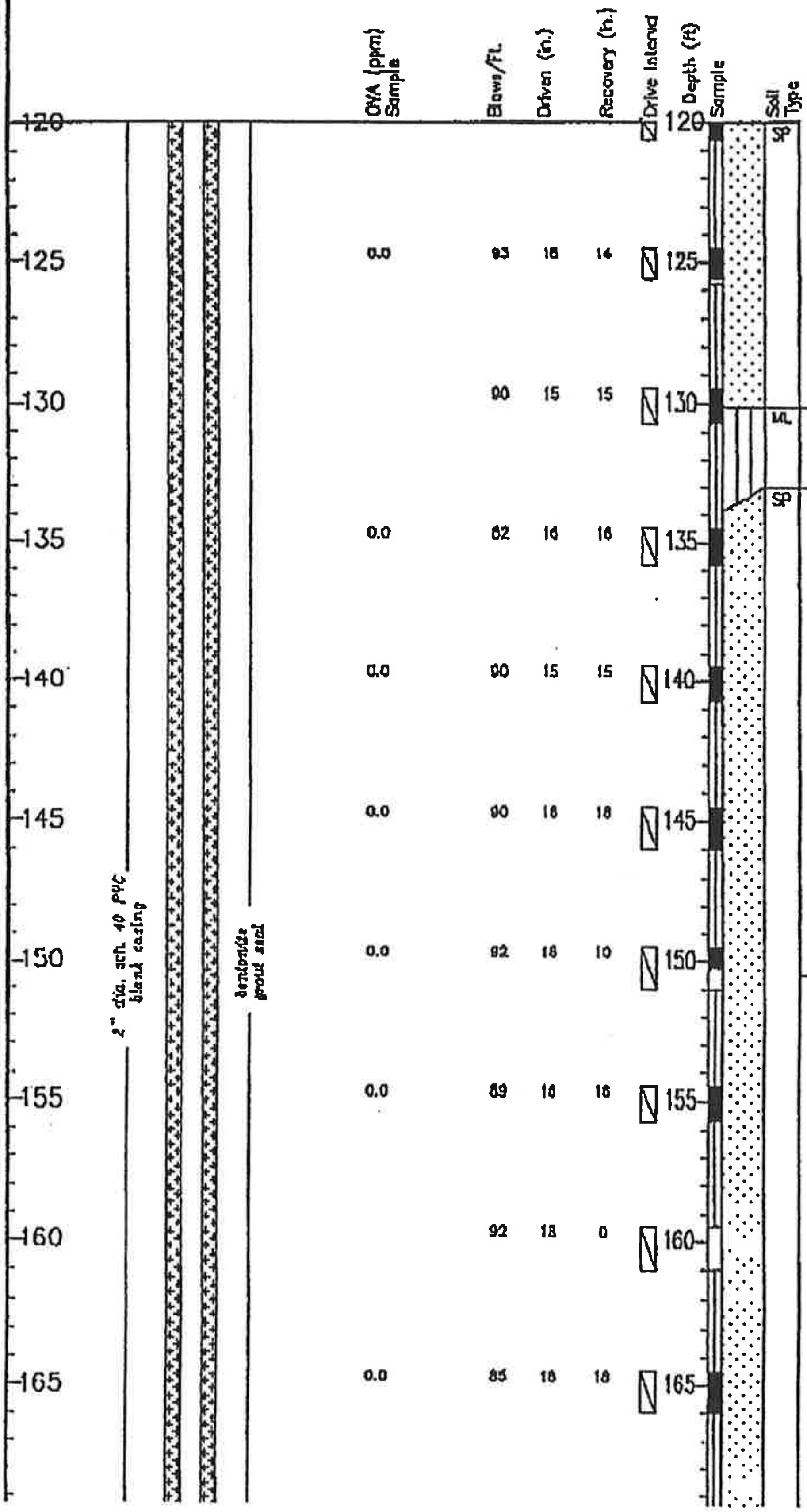
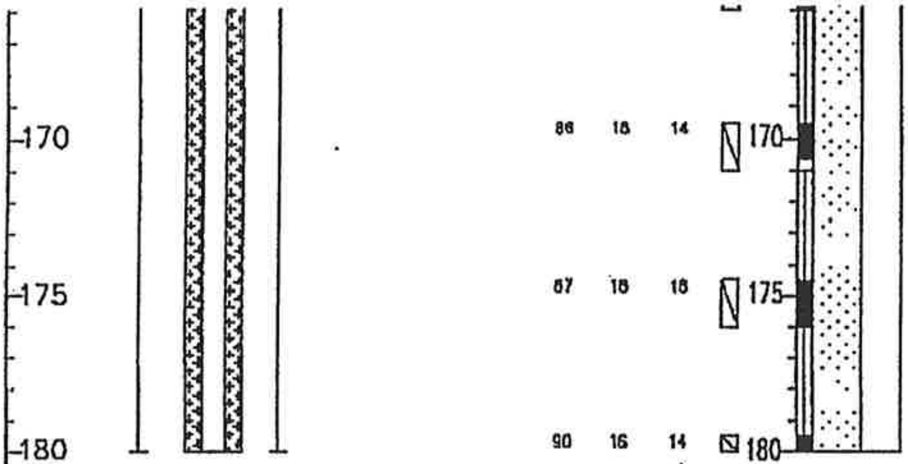


OVA (ppm) Sample	Blows/Ft.	Driven (in.)	Recovery (in.)	Depth (ft)	Soil Type	
				120	SP	
0.0	93	18	14	125		grades to predominantly fine-grained sand
	90	15	15	130	ML	GRAYISH BROWN (10YR 5/2) SANDY SILT. sand is fine to medium-grained. thinly bedded, cohesive, damp
					SP	PALE YELLOWISH BROWN (10YR 6/2) FINE TO MEDIUM SAND, slightly cohesive to loose, dry
0.0	82	16	16	135		
0.0	90	15	15	140		grades with increasing medium-grained sand; 3-inch cemented (CaCO3) fragment at 140 ft.
0.0	90	18	18	145		
0.0	92	18	10	150		damp at 150 ft; color becomes yellowish brown (10YR 5/4) grades with decreasing fine-grained sand
0.0	89	16	16	155		color becomes pale yellowish brown (10YR 6/2)
	92	18	0	160		no recovery – driller reports probable large cobble
0.0	85	18	18	165		slightly damp at 164.5 ft. grades with some coarse sand and subrounded gravel and subangular lithic fragments, maximum gravel ~ 1.5 inches

211'



subangular lithic fragments, maximum gravel ~ 1.5 inches

predominantly coarse-grained sand with approximately 10% subrounded to subangular gravel

predominantly coarse-grained sand with <5% gravel

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FIGURE
B-22

Top of Casing Elev. 339.87 ft. MSL datum
Coordinates
Drill Date: Start 8/22/94 Finish 8/24/94
Drill Method CME 75/Hollow-Stem Augers
8-inch OD
Driller West Hazmat/Dave Marocchi
Logged by S. Tamman
Reviewed by R. Hertlein

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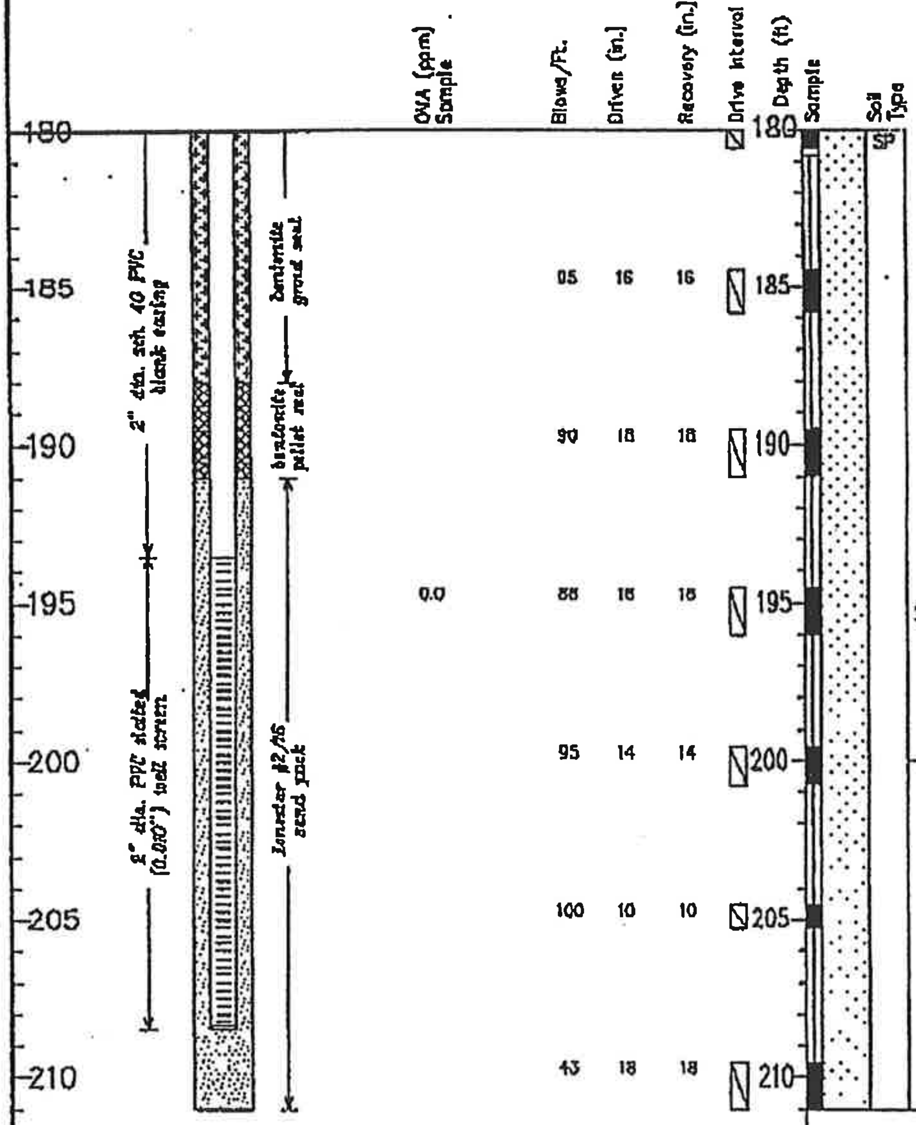

Depth (ft)	OVA (ppm) Sample	Blows/Ft.	Driven (in.)	Recovery (in.)	Soil Type	
180					SP	
185		05	16	16		1-inch thick lens of laminated sand and dark yellowish brown (10YR 4/4) silt
190		90	18	18		grades with approximately 5% gravel; damp
195	0.0	88	18	18		moist at 194.5 ft. ▼ 2.5-inch thick cemented conglomerate layer first encountered water, wet from 195.5-200 ft.
200		95	14	14		wet to saturated from 200-201 ft. saturated below 201 ft.
205		100	10	10		sample collected for geotechnical analysis at 205 ft.
210		43	18	18		sample collected for geotechnical analysis at 210 ft.

DRILLING NOTES:
1. Boring completed at a depth of 211 feet on 8/24/94.
2. Soil samples were collected by driving a California drive sampler (2 1/2-inch ID) advanced by a 140 lb. hammer falling 30-inches. Sampling resistance was recorded during drilling.
3. Boring log indicates subsurface conditions only at the location and time the boring was drilled.
4. Field estimates of percent gravel, sand and fines are shown in parentheses.

WELL

MONITORING NOTES:
1. 2-inch diameter PVC monitoring well installed to a depth of 208.5 feet on 8/24/94.
2. Screened interval from 193.5 to 208.5 feet; sandpack from 191 to 211 feet.
3. Static ground water level recorded at a depth of 203.17 feet below top of casing on 11/17/94.

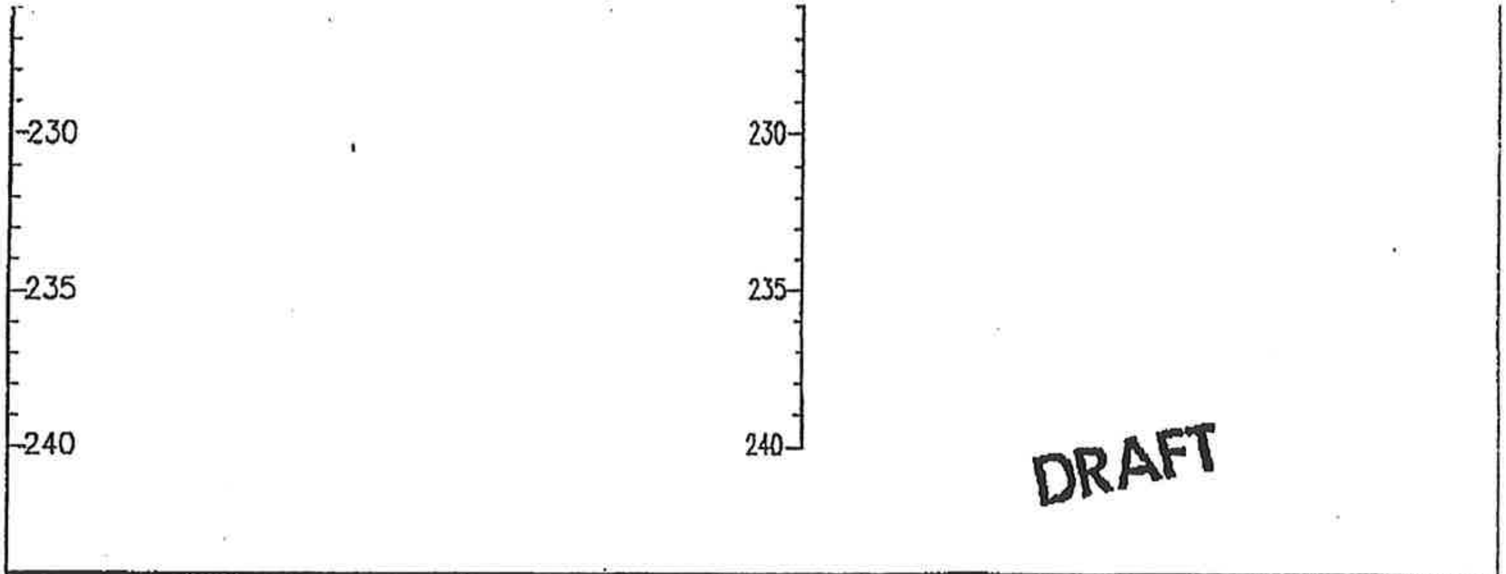

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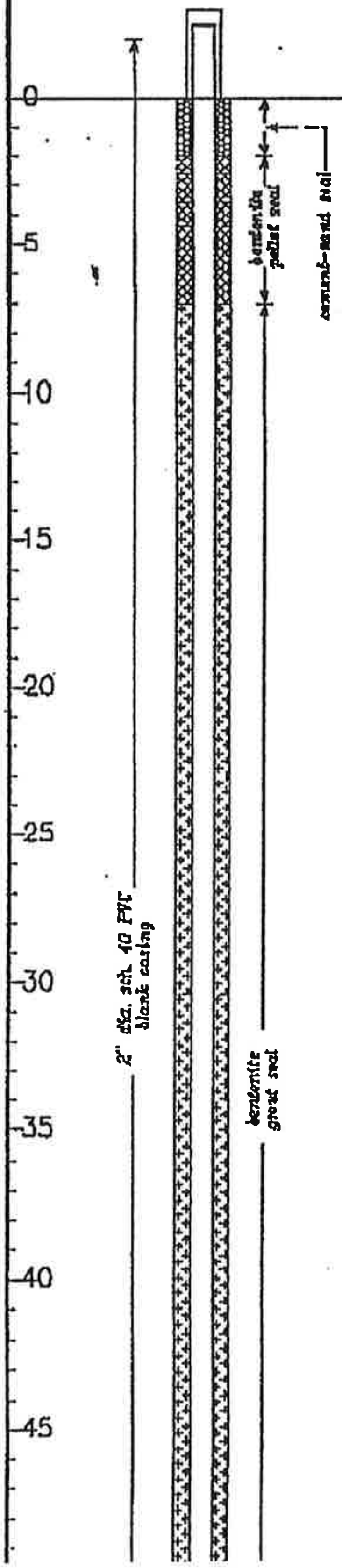
Figure

B-22

DRAFT

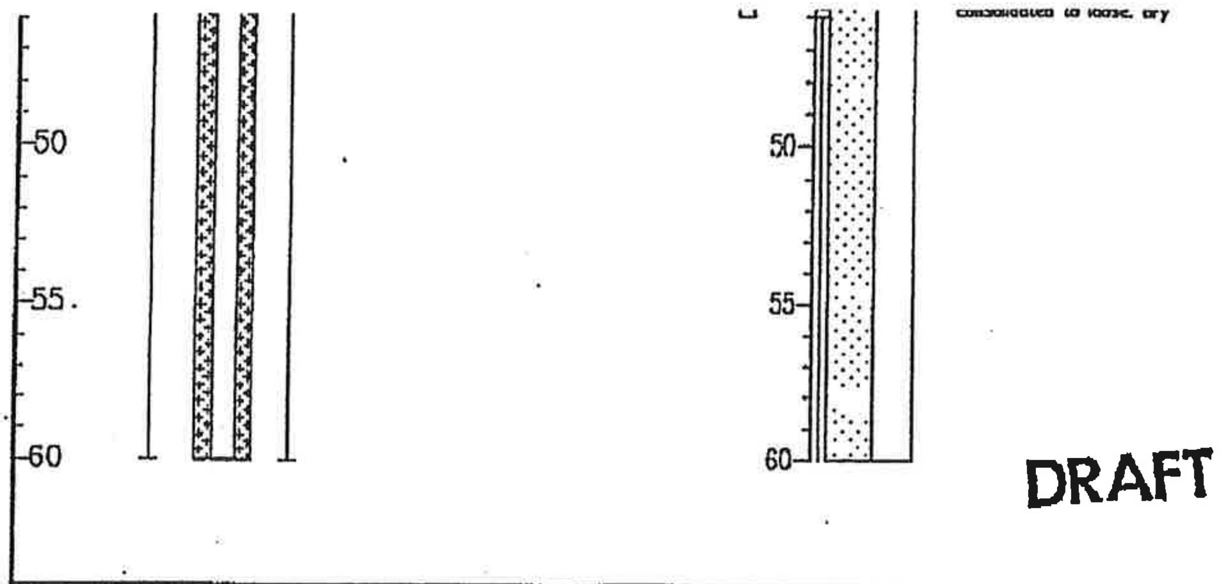
Top of Casing Elev. 316.43 ft. MSL datum
Coordinates
Drill Date: Start 8/26/94 Finish 8/29/94
Drill Method CME 75/Hollow-Stem Augers
8-inch OD
Driller West Hazmat/Dave Morocchi
Logged by S. Tamman
Reviewed by ~~R. Hartleb~~



OVA (ppm) Sample	Blows/Ft.	Driven (in.)	Recovery (in.)	Drive Interval	Depth (ft)	Soil Type	
	grab	12	12		0	SP	LIGHT BROWN (5YR 5/6) GRAVELLY FINE SAND, approximately 30% gravel (maximum size 0.5 inch), loose, dry
	50	6	3		5		
	50	6	0		10		No recovery – driller reports probable cobble, boulder
	60	6	0		15		No recovery due to rocky/cobbly soils
	90	18	0		20		No recovery
	100	3	3		25		medium to coarse sand with 40% gravel. color becomes light brownish gray (10YR 6/2) occasional lightly cemented (CaCO3) lenses
					30		
					35		
					40		
0.0	85	18	17		45		color is very pale orange (10YR 8/2): sands are fine to medium-grained with sparse gravel to 1-inch: slightly consolidated to loose. dry

1978' Depth=189

~~17~~ → Static GW level 179.3' Below Top (Casing)



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P-MW-2

FIGURE

B-23

Top of Casing Elev. 316.43 ft, MSL datum

Coordinates

Drill Date: Start 8/28/94 Finish 8/29/94

Drill Method CME 75/Hollow-Stem Augers
8-inch OD

Driller West Hazmat/Dave Marocchi

Logged by S. Tomman

Reviewed by R. Hartley

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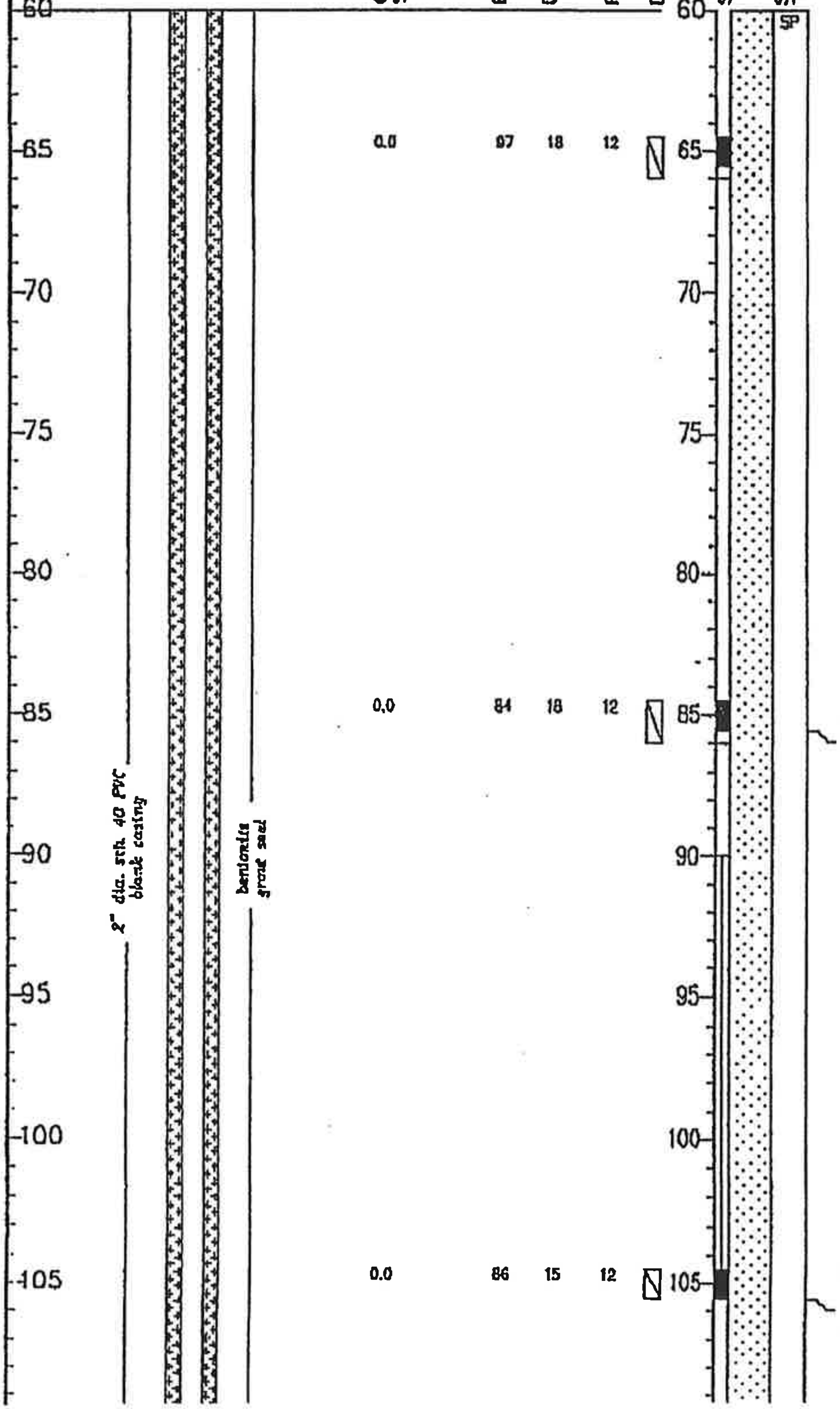


OVA (ppm) Sample	Blows/ft.	Driven (in.)	Recovery (in.)	Drive Interval	Depth (ft)	Sample	Soil Type
					60		SP
0.0	97	18	12	▨	65	■	
					70		
					75		
					80		
0.0	84	18	12	▨	85	■	
					90		
					95		
					100		
0.0	86	15	12	▨	105	■	

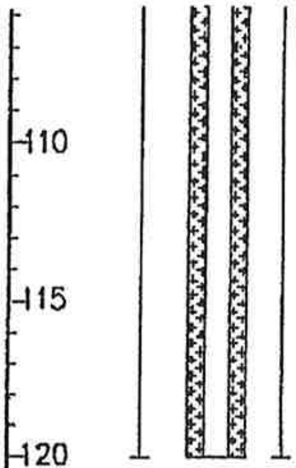
sand is fine to medium-grained, no gravel

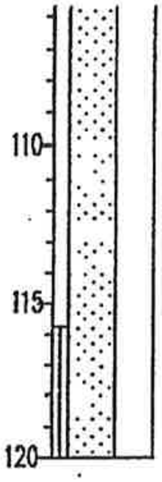
1-inch thick moderate brown (5YR 4/4) silty clay layer at 84.5 ft.

sand is medium to coarse-grained, damp, slightly cohesive to loose

2-inch thick moderate brown (5YR 5/4) silty clay lens at 104.5 ft.

sand is predominantly fine to medium-grained, damp, slightly cohesive to loose





sand is predominantly fine to medium-grained, damp, slightly cohesive to loose

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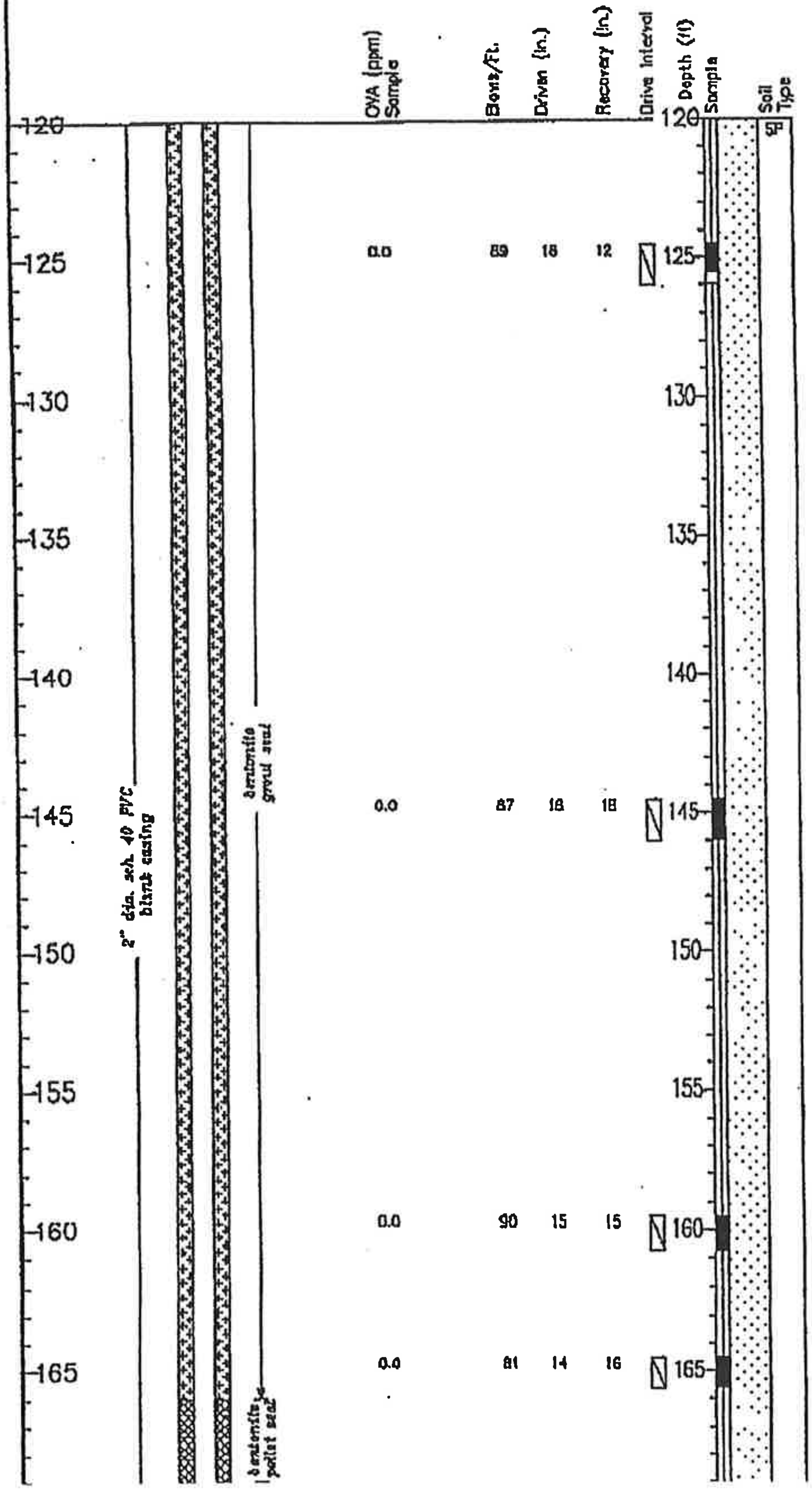
FIGURE
B-23

DRAFT

Top of Casing Elev. 316.43 ft, MSL datum
Coordinates
Drill Date: Start 8/26/94 Finish 8/29/94
Drill Method CME 75/Hollow-Stem Augers
8-inch OD
Driller West Hazmat/Dave Marocchi
Logged by S. Tamman
Reviewed by R. Tiorucb



Depth (ft)	OVA (ppm) Sample	Blows/Ft.	Driven (in.)	Recovery (in.)
125	0.0	89	18	12
145	0.0	87	18	18
160	0.0	90	15	15
165	0.0	81	14	16

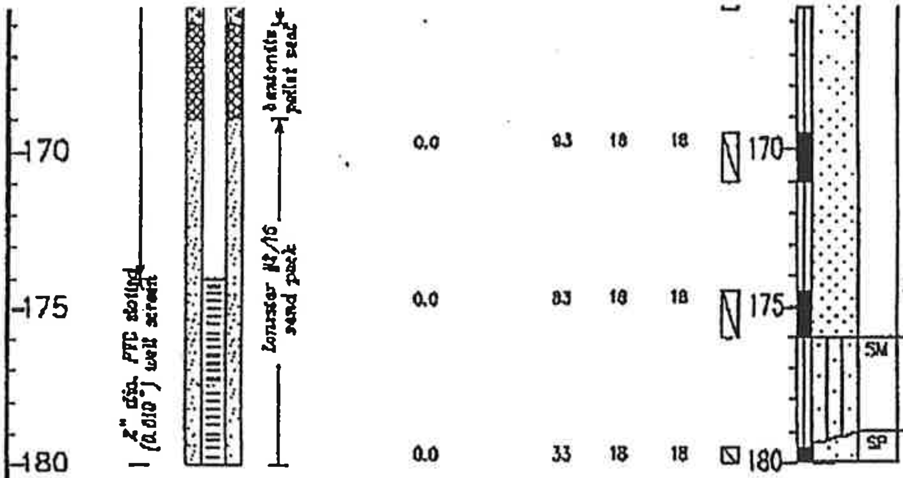
sparse gravel (to 0.5 inches)

60-[illegible]

Sparse gravel (to 1 inch)
1-inch thick moderate brown (5YR 4/4) silty clay lens at 146 ft.

1-inch thick lens of angular lithic fragments at 160 ft.
very damp to moist at 160.5 ft.

3-inch thick cemented (CaCO3) sand lens at 165.5 ft.



3-inch thick cemented (CaCO3) sand lens at

cemented (CaCO3) sand lens at 171 ft.

first encountered water at 174.5 ft. (saturated), fine to medium-grained sand

SM PALE YELLOWISH BROWN (10YR 6/2) SILTY SAND, some slightly cemented (CaCo3) fragments, saturated

SP FINE TO MEDIUM SAND, loose, saturated

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Imperial County, California

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P-MW-2

FIGURE
B-2

DRAFT

Top of Casing Elev. 316.43 ft. MSL datum

Coordinates

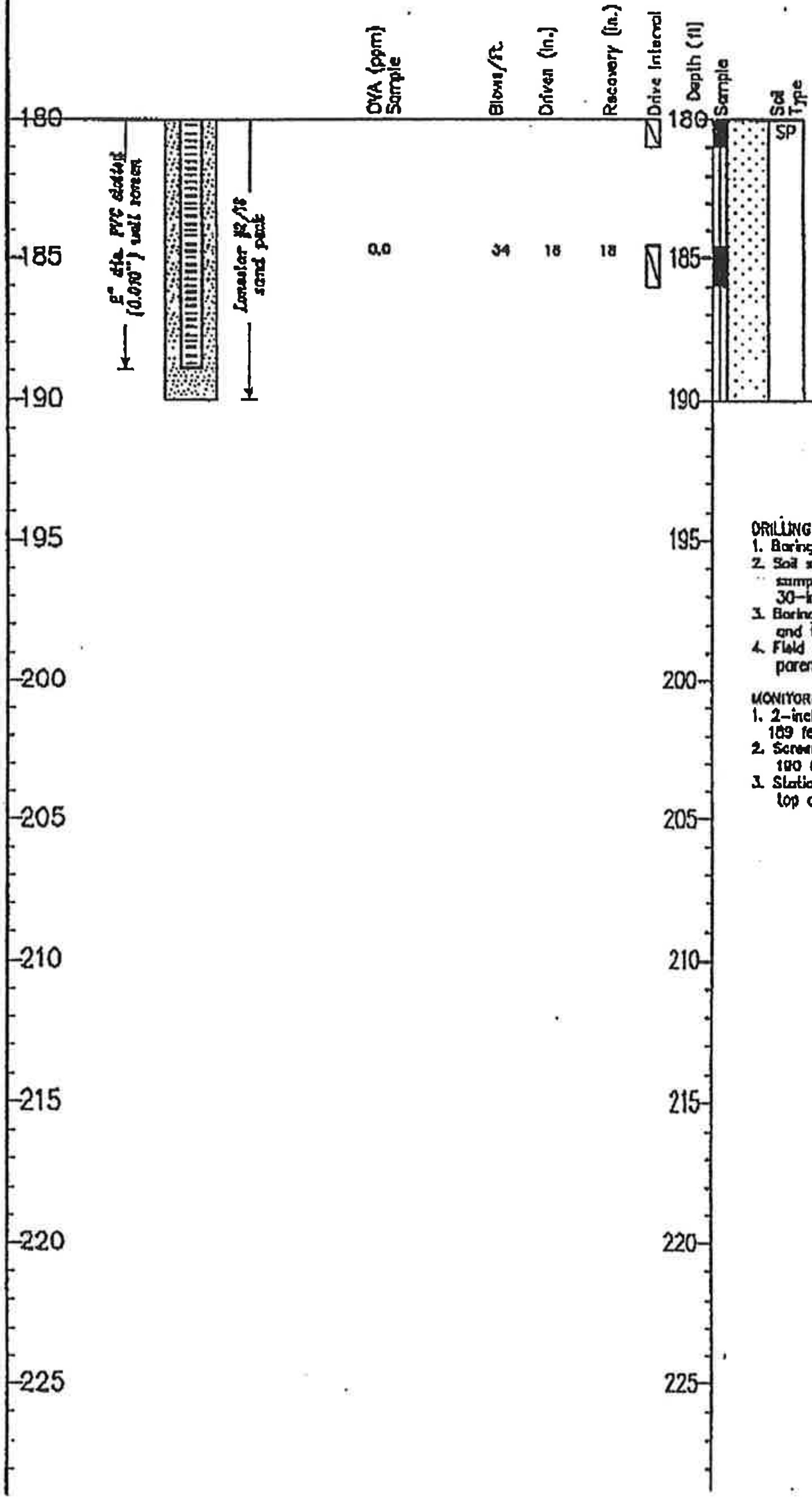
Drill Date: Start 8/26/94 Finish 8/29/94

Drill Method CME 75/Hollow-Stem Augers
8-inch OD

Driller West Hazmat/Dave Marocchi

Logged by S. Tamman

Reviewed by ~~R. [illegible]~~



sample collected for geotechnical analysis at 180.5 ft.

grades with sparse 1-inch angular to sub-angular gravel
sample collected for geotechnical analysis at 185.5 ft.

DRILLING NOTES:
1. Boring completed at a depth of 190 feet on 8/29/94.
2. Soil samples were collected by driving a California drive sampler (2 1/2-inch ID) advanced by a 140 lb. hammer falling 30-inches. Sampling resistance was recorded during drilling.
3. Boring log indicates subsurface conditions only at the location and time the boring was drilled.
4. Field estimates of percent gravel, sand and fines are shown in parentheses.

MONITORING WELL NOTES:
1. 2-inch diameter PVC monitoring well installed to a depth of 189 feet on 8/29/94.
2. Screened interval from 174 to 189 feet; sandpack from 169 to 190 feet.
3. Static ground water level recorded at a depth of 170.84 feet below top of casing on 11/17/94.

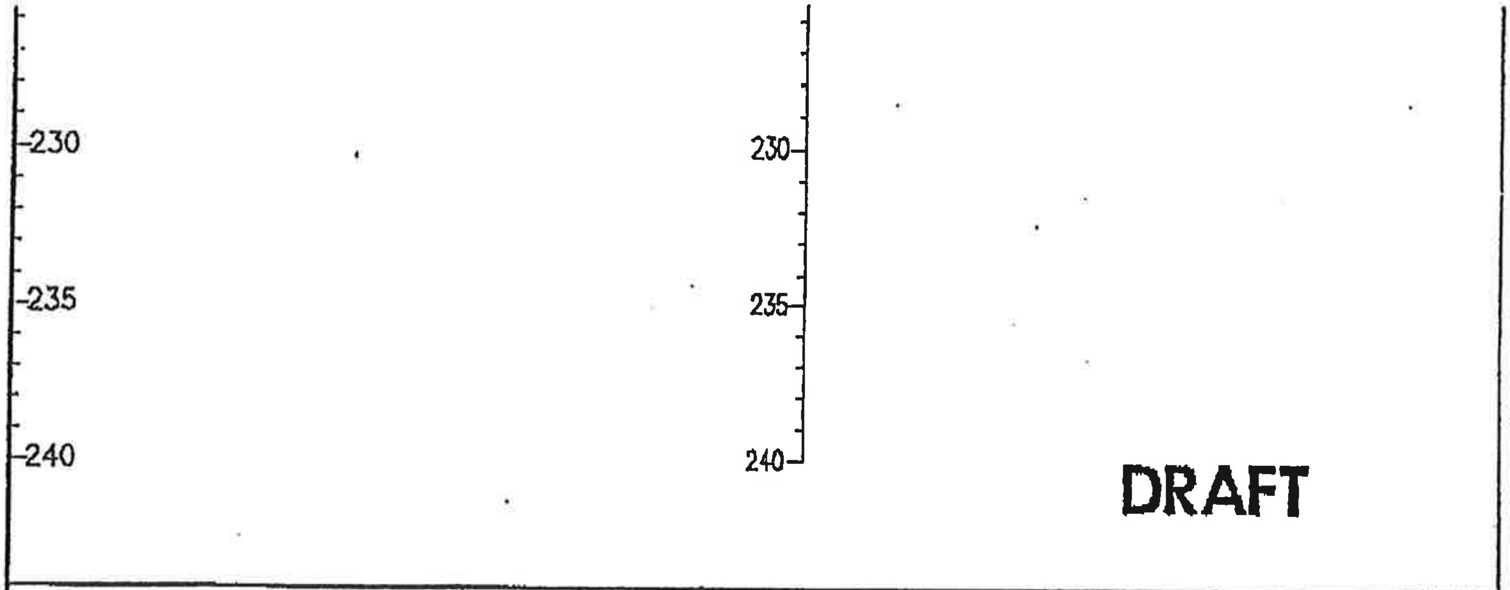


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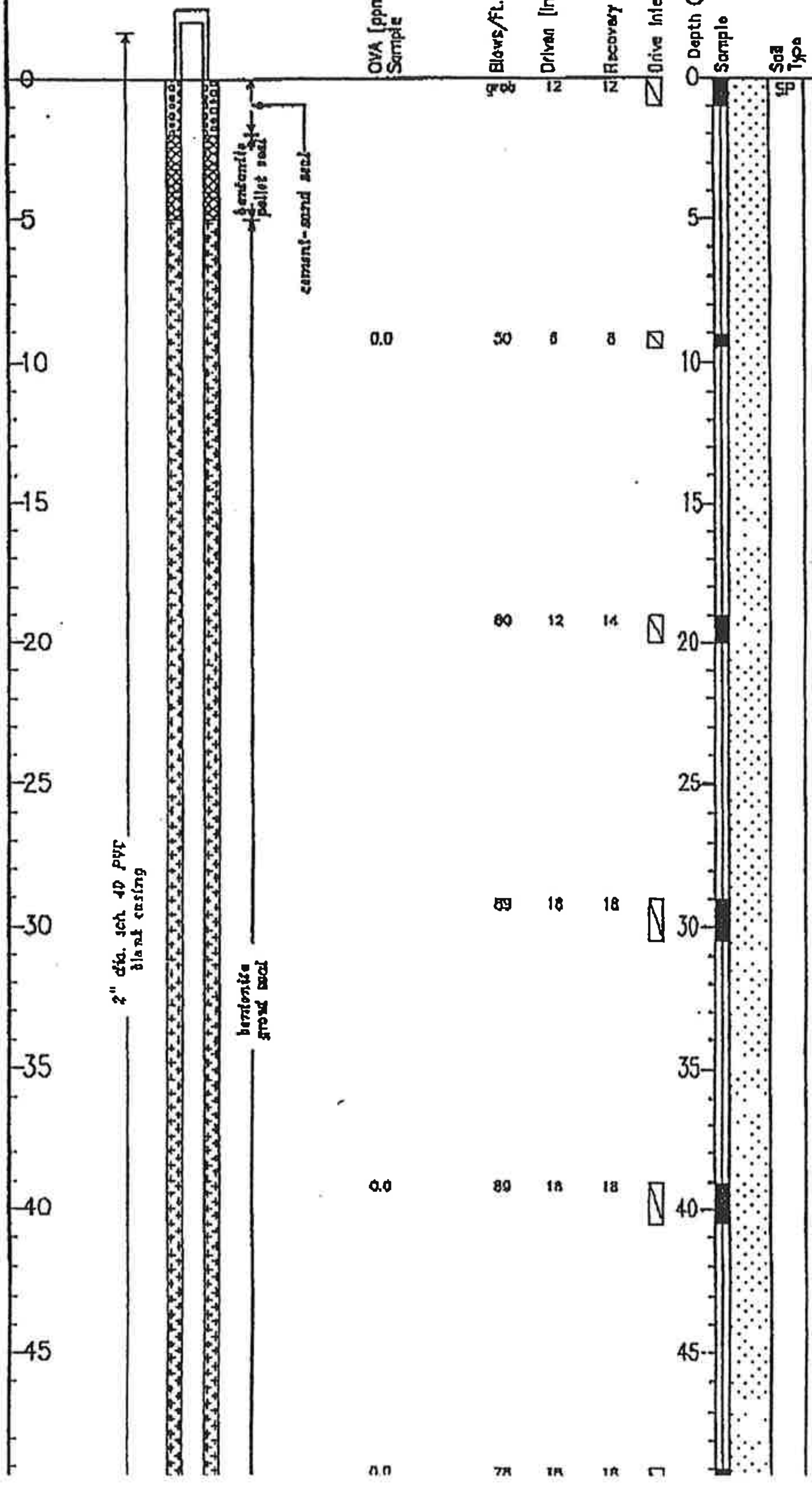
FIGURE
B-23

DRAFT

Top of Casing Elev. 318.13 ft. MSL datum
Coordinates
Drill Date: Start 8/24/94 Finish 8/30/94
Drill Method CME 75/Hollow-Stem Augers
8-inch OD
Driller West Hazmat/Dave Marocchi
Logged by S. Tamman
Reviewed by R. Hotchel



OVA (ppm) Sample	Blows/Ft.	Driven (in.)	Recovery (in.)
	grab	12	12
0.0	50	6	8
	60	12	14
	69	18	18
0.0	89	18	18
0.0	78	18	18

LIGHT BROWN (5YR 6/4) FINE TO MEDIUM SAND, with gravel (to 1 inch), loose, dry (15% gravel, 85% sand, 0% fines)

D= ~~195~~ 191'

sand is fine to coarse-grained with up to 40% gravel (to 2 inches), gravel is subangular to angular, color becomes moderate brown (6YR 4/4)

PMW3A

sand is predominantly fine to medium-grained, no gravel, loose to slightly cohesive, damp
color becomes very pale orange (10YR 8/2)

Static G.W. level
181.42' Below
Top of Casing

2-inch thick cemented (CaCO3) conglomerate lens at 30 ft.

sparse gravel (to 0.5 inch)

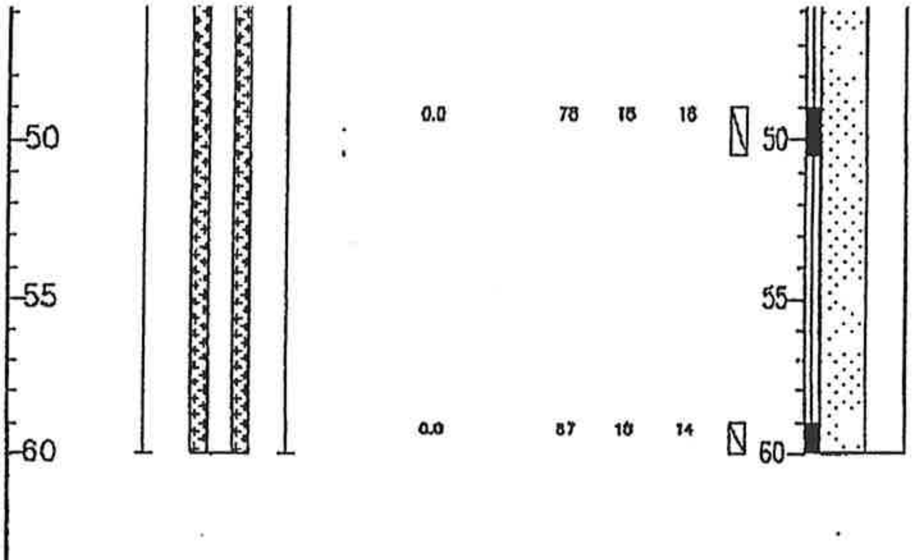


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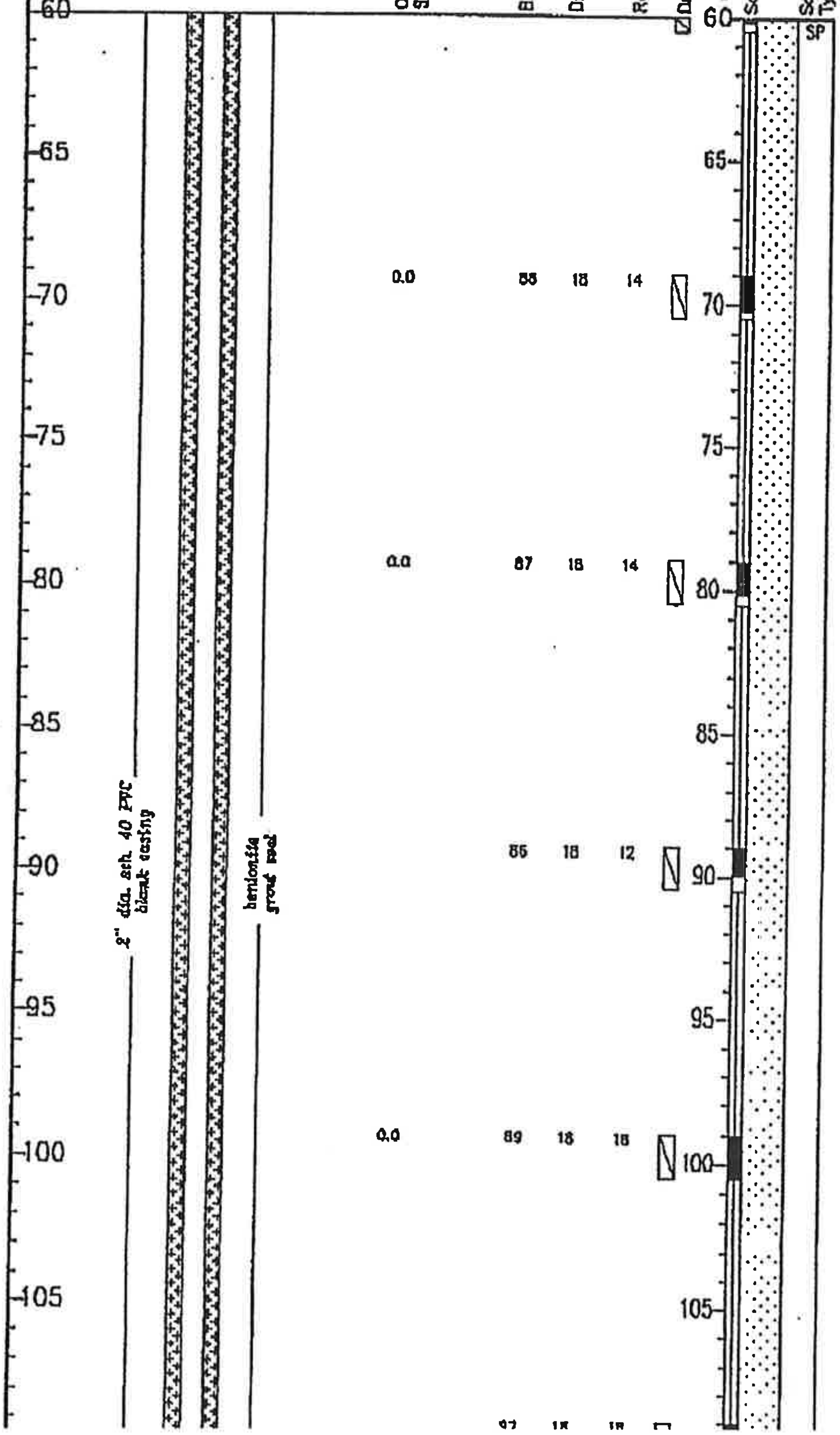
FIGURE

B-2

DRAFT

Top of Casing Elev. 318.13 ft. MSL datum
Coordinates
Drill Date: Start 8/24/94 Finish 8/30/94
Drill Method CME 75/Hollow-Stem Augers
8-inch OD
Driller West Hazmat/Dave Marocchi
Logged by S. Tamman
Reviewed by R. Hoffle



OVA (ppm) Sample	Blows/ft.	Driven (in.)	Recovery (in.)
0.0	55	18	14
0.0	87	18	14
	86	18	12
0.0	89	18	18
	[illegible]	[illegible]	[illegible]

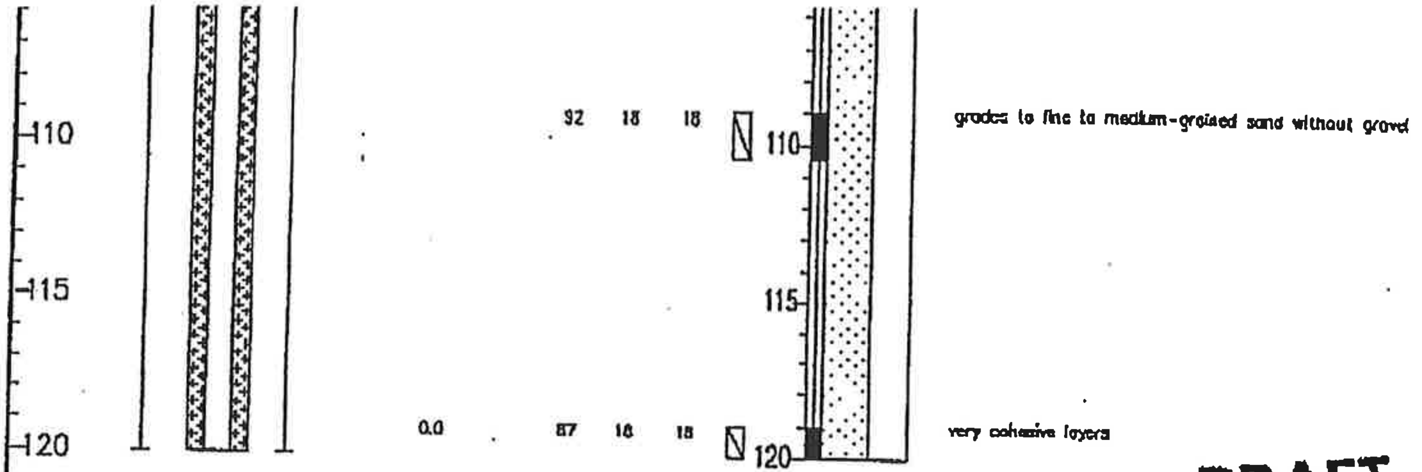
color becomes pale yellowish brown (10YR 6/2) occasional 1–2-inch lenses of highly cohesive sands with sparse gravel

occasional 0.5–3-inch lenses of slightly cemented (CaCO3) sands

occasional 1–3-inch lenses of slightly cemented (CaCO3) fine to medium-grained sands; sparse gravel to 0.5 inches.

1-inch thick moderate yellowish brown (10YR 5/4) clayey silt lens at 100 ft.

[illegible]



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P-MW-3A

FIGURE
B-24

Top of Casing Elev. 318.13 ft. MSL datum
Coordinates
Drill Date: Start 8/24/94 Finish 8/30/94
Drill Method CME 75/Hollow-Stem Augers
8-inch OD
Driller West Hazmat/Dave Morocchi
Logged by S. Tomman
Reviewed by R. Hartzb

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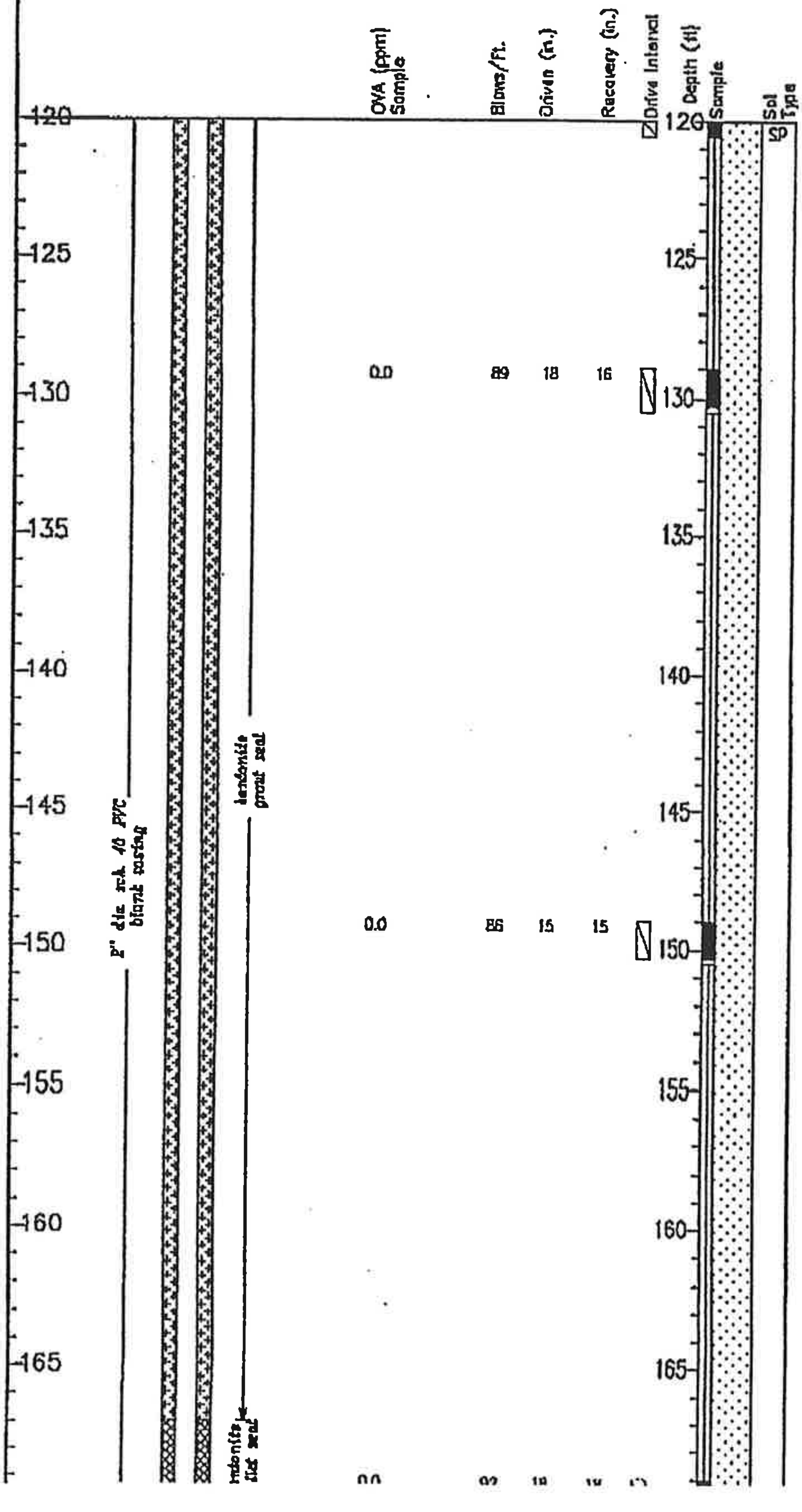
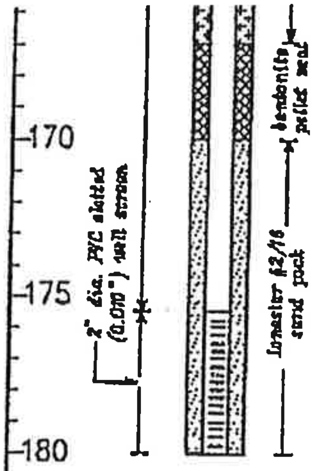
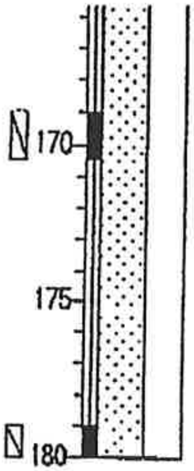


6-inch thick weakly cemented (CaCO3) fine to medium grained sand lens

predominantly medium-grained sand, loose to slightly cohesive,



0.0	92	18	18
0.0	88	18	12



predominantly medium-grained sand, loose to slightly cohesive, damp, occasional slightly cemented (CaCO3) lenses

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P-MW-3A

FIGURE
B-24

Top of Casing Elev. 318.13 ft. MSL datum
Coordinates
Drill Date: Start 8/24/94 Finish 8/30/94
Drill Method CME 75/Hollow-Stem Augers
8-inch OD
Driller West Hazmat/Dave Marcecni
Logged by S. Tamman
Reviewed by

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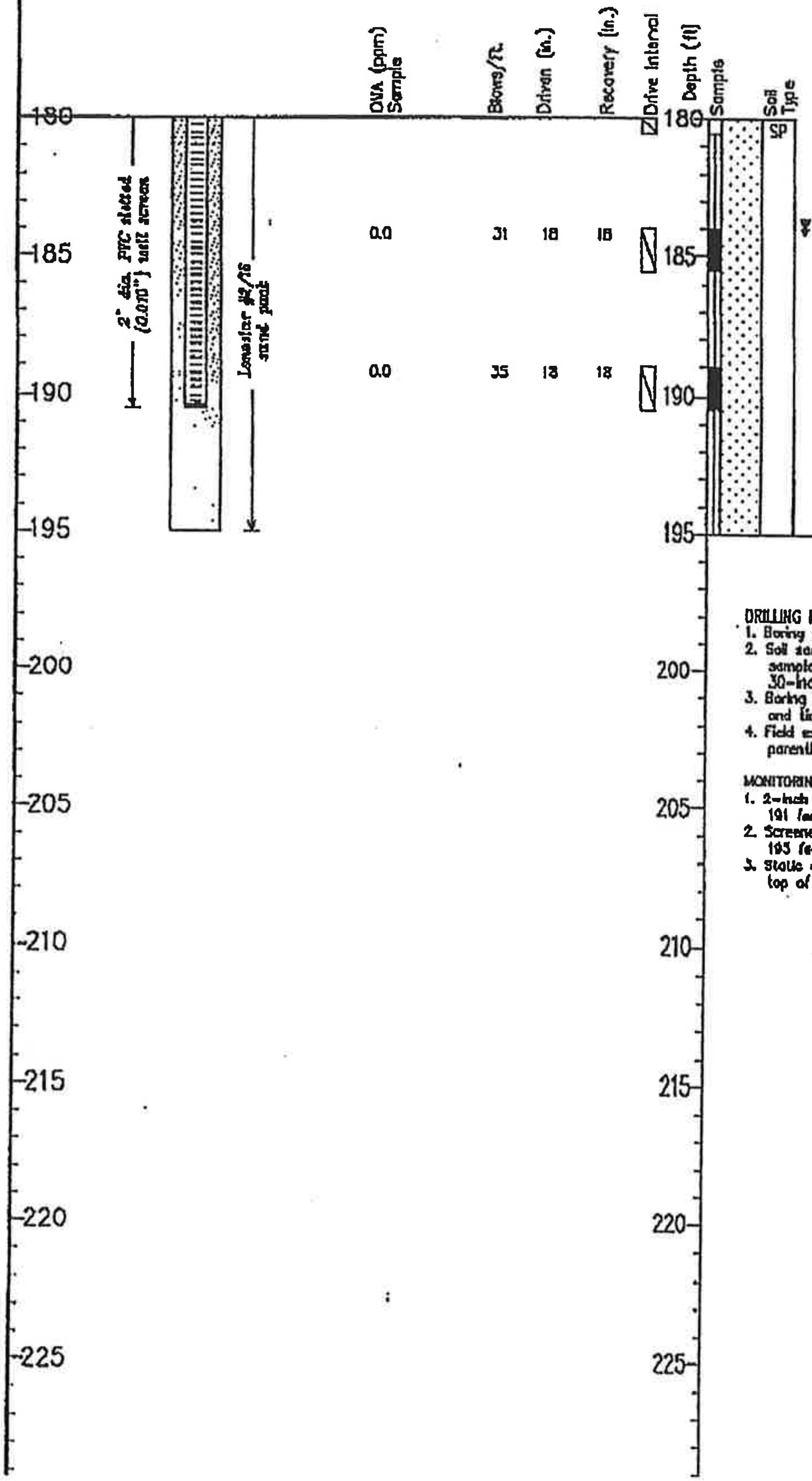


OVA (ppm) Sample	Blows/ft.	Driven (in.)	Recovery (in.)	Depth (ft)	Soil Type
0.0	31	18	18	185	SP
0.0	35	18	18	190	SP

first encountered water, saturated

sample collected for geotechnical analysis at 185 ft.

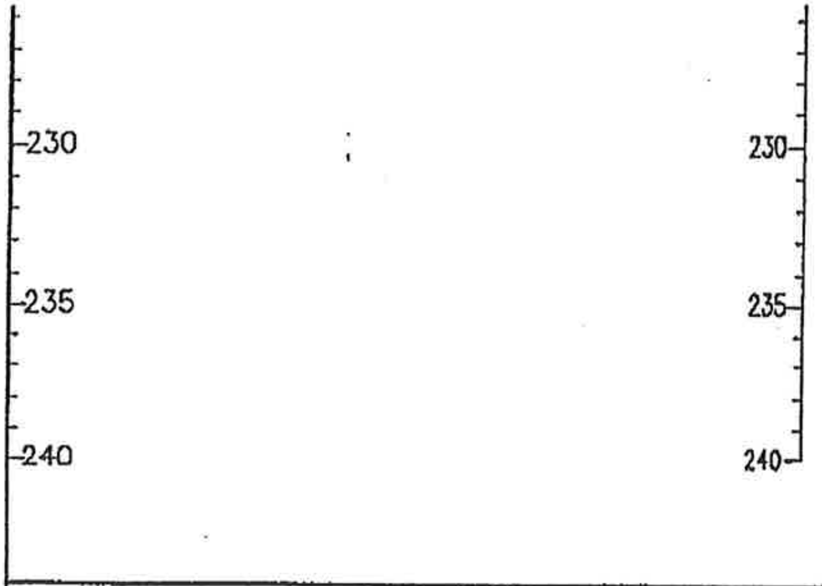
DRILLING NOTES:

1. Boring completed at a depth of 195 feet on 8/30/94.
2. Soil samples were collected by driving a California drive sampler (2 1/2-inch ID) advanced by a 140 lb. hammer falling 30-inches. Sampling resistance was recorded during drilling.
3. Boring log indicates subsurface conditions only at the location and time the boring was drilled.
4. Field estimates of percent gravel, sand and fines are shown in parentheses.

WELL

MONITORING NOTES:

1. 2-inch diameter PVC monitoring well installed to a depth of 191 feet on 8/30/94.
2. Screened interval from 175 to 190.5 feet; sandpack from 170 to 195 feet.
3. Static ground water level recorded at a depth of 181.42 feet below top of casing on 11/17/94.



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P-MW-3A

FIGURE
B-24

Top of Casing Elev. 334.96 ft. MSL datum
Coordinates
Drill Date: Start 9/2/94 Finish 9/6/94
Drill Method CME 75/Hollow-Stem Augers
8-Inch OD
Driller West Hazmat/Dave Marocchi
Logged by S. Tamman
Reviewed by R. Hartlieb

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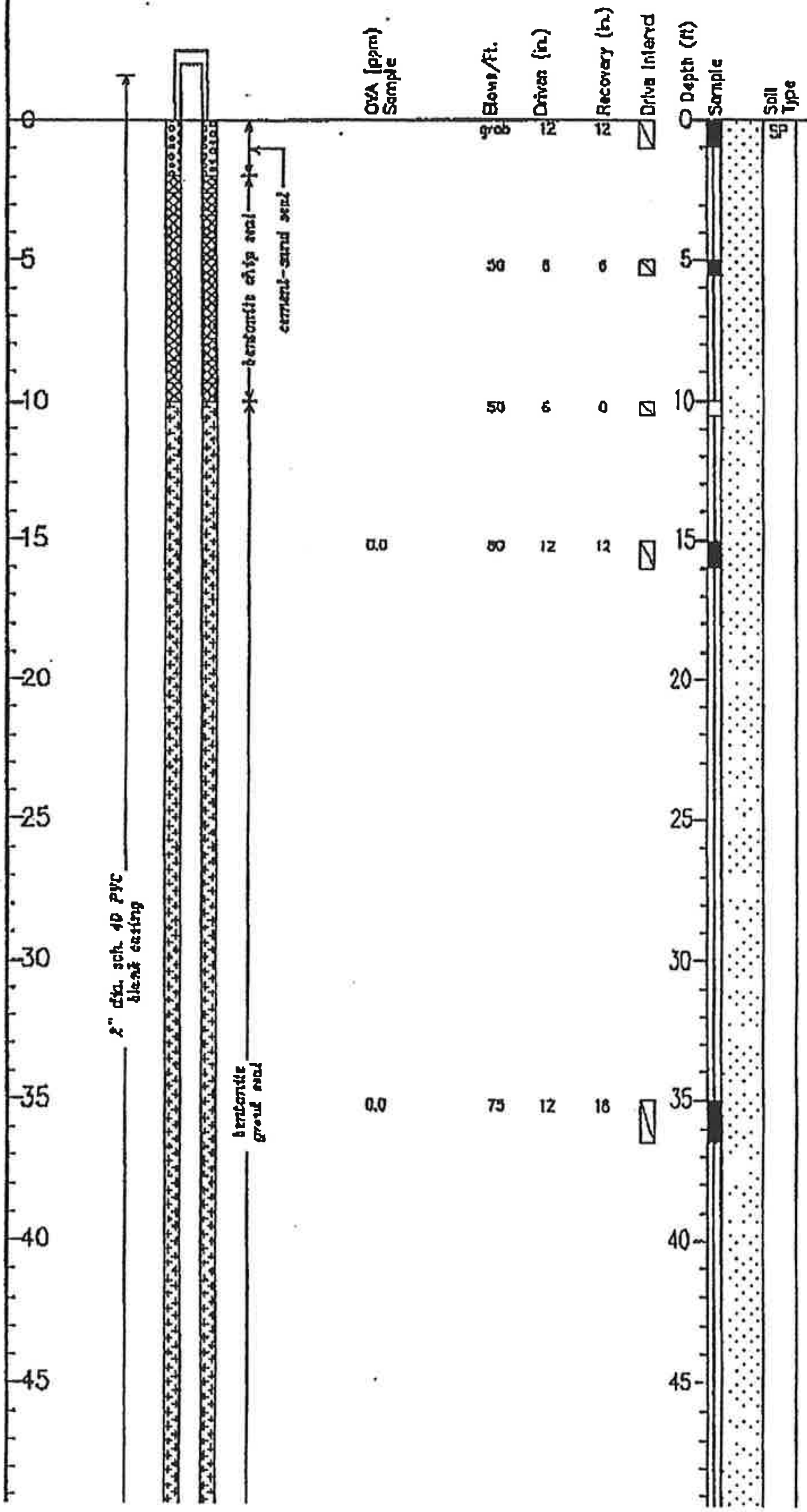
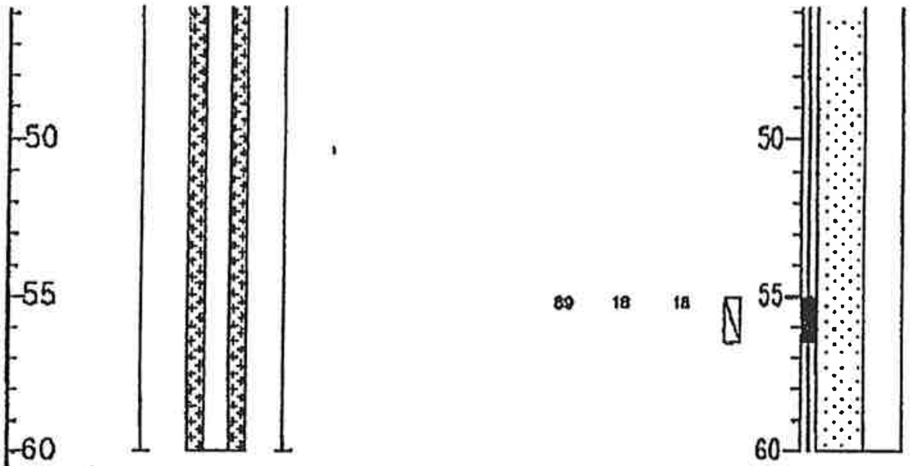


Depth (ft)	OVA (ppm) Sample	Blows/ft.	Driven (in.)	Recovery (in.)	Soil Type	
0		grab	12	12	SP	LIGHT BROWN (5YR 6/4) FINE SAND, with gravel (to 2 inches), gravel is subangular to subrounded, loose, dry, (10% gravel 90% sand)
5		50	6	6		grades with some coarse and medium-grained sand, 5% gravel (to 1 inch) some cemented sand lenses with associated FeO2 staining
10		50	6	0		No recovery
15	0.0	80	12	12		color becomes grayish orange (10YR 7/4) some cemented lenses of medium-grained sand
35	0.0	75	12	18		color becomes very pale orange (10YR 8/2). damp. sparse medium-grained cemented (CaCO3) sands, trace subrounded gravel (to 0.5 inches)

D=207'
P-DW-4
Static GW level
198.41' Below
Top casing



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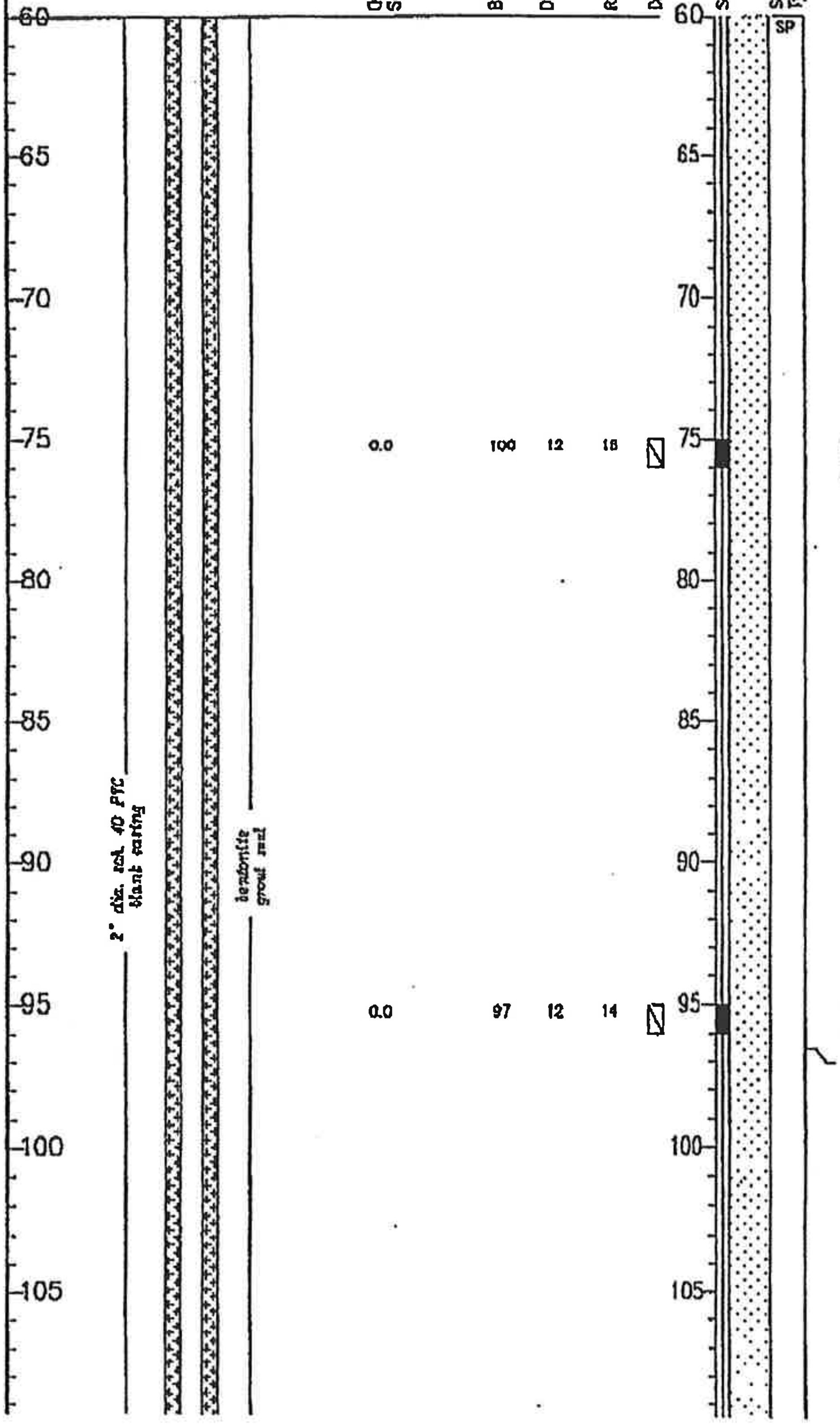
P-DW-4

FIGURE B-2

DRAFT

Top of Casing Elev. 334.86 ft. MSL datum
Coordinates
Drill Date: Start 9/2/94 Finish 9/6/94
Drill Method CME 75/Hollow-Stem Augers
8-inch OD
Driller West Hazmat/Dave Maracchi
Logged by S. Tamman
Reviewed by R. Horfleb

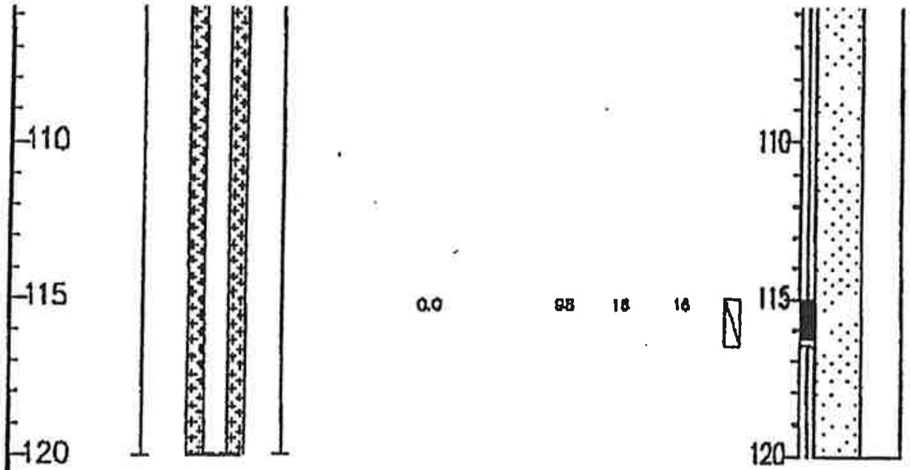


OVA (ppm) Sample	Blows/Ft.	Driven (in.)	Recovery (in.)	Drive Interval	Depth (ft)	Sample	Soil Type
					60		SP
0.0	100	12	18	☒	75	■	
0.0	97	12	14	☒	95	■	

alternating layers of dark yellowish brown (10YR 4/2) silty fine-grained sand and very pale orange (10YR 8/2) fine to medium-grained sand, loose to slightly cohesive, damp

color becomes pale yellowish brown (10YR 6/2); sand is medium to fine-grained with occasional cemented sand lenses, loose, damp

sands are interbedded with a crumbly moderate brown (5YR 4/4) silty clay. sparse subrounded gravel throughout (to 1.5 inches)



sand is predominantly medium-grained, slightly cohesive to loose, damp

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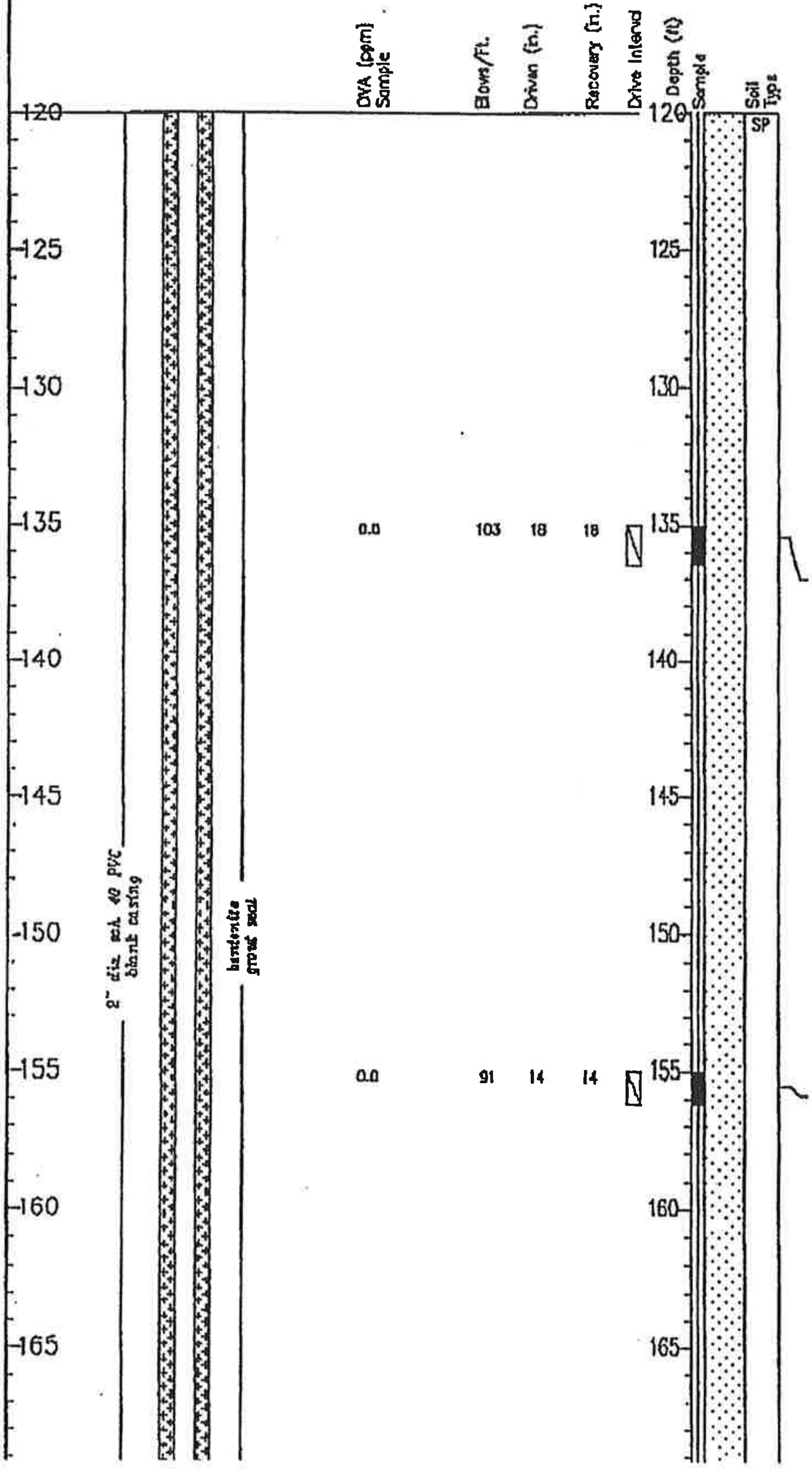
P-DW-4

FIGURE
B-25

Top of Casing Elev. 334.96 ft, MSL datum
Coordinates
Drill Date: Start 9/2/94 Finish 9/6/94
Drill Method OME 75/Hollow-Stem Augers
8-inch OD
Driller West Hazmat/Dave Marocchi
Logged by S. Tamman
Reviewed by R/Hatley

DRAFT



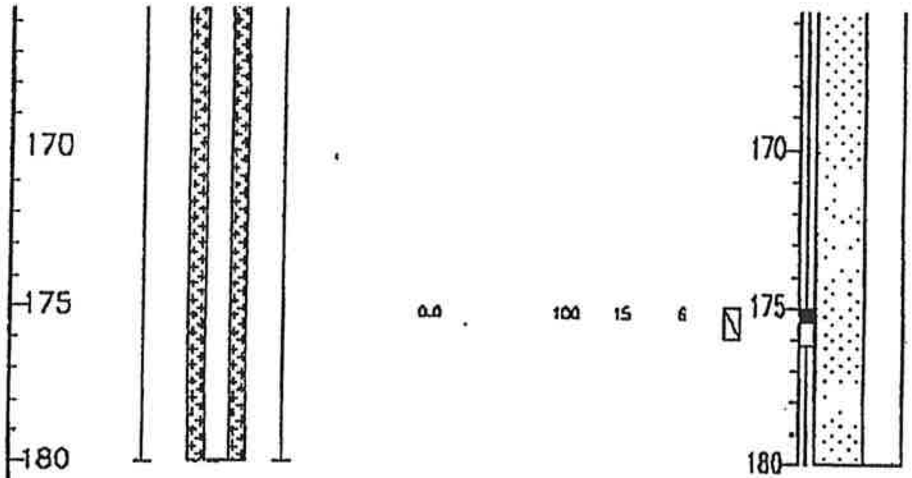
Depth (ft)	OVA (ppm) Sample	Blows/Ft.	Driven (in.)	Recovery (in.)
135	0.0	103	18	18
155	0.0	91	14	14

color becomes grayish orange (10YR 7/4) medium-grained sands alternate with sparse moderate brown (5YR 4/4) silty clay lenses

at 135.5 very pale orange (10YR 8/2) predominantly fine to medium-grained sand with no gravel, occasional cemented (CaCO3) lenses, damp, slightly cohesive to loose

3-inch thick weakly cemented sandstone layer at 155 ft.

pale yellowish brown (10YR 6/2) fine to medium-grained sand with occasional cemented CaCO3) zones



pale yellowish brown (10YR 6/2) subrounded lithic fragment (3 inches) at 175.5 ft.

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P--DW-4

FIGURE
B-2

Top of Casing Elev. 334.90 ft. MSL datum

Coordinates

Drill Date: Start 9/2/94 Finish 9/6/94

Drill Method CME 75/Hollow-Stem Augers

8-inch OD

Driller West Hazmat/Dave Marocchi

Logged by S. Tamman

Reviewed by R. Wartleb

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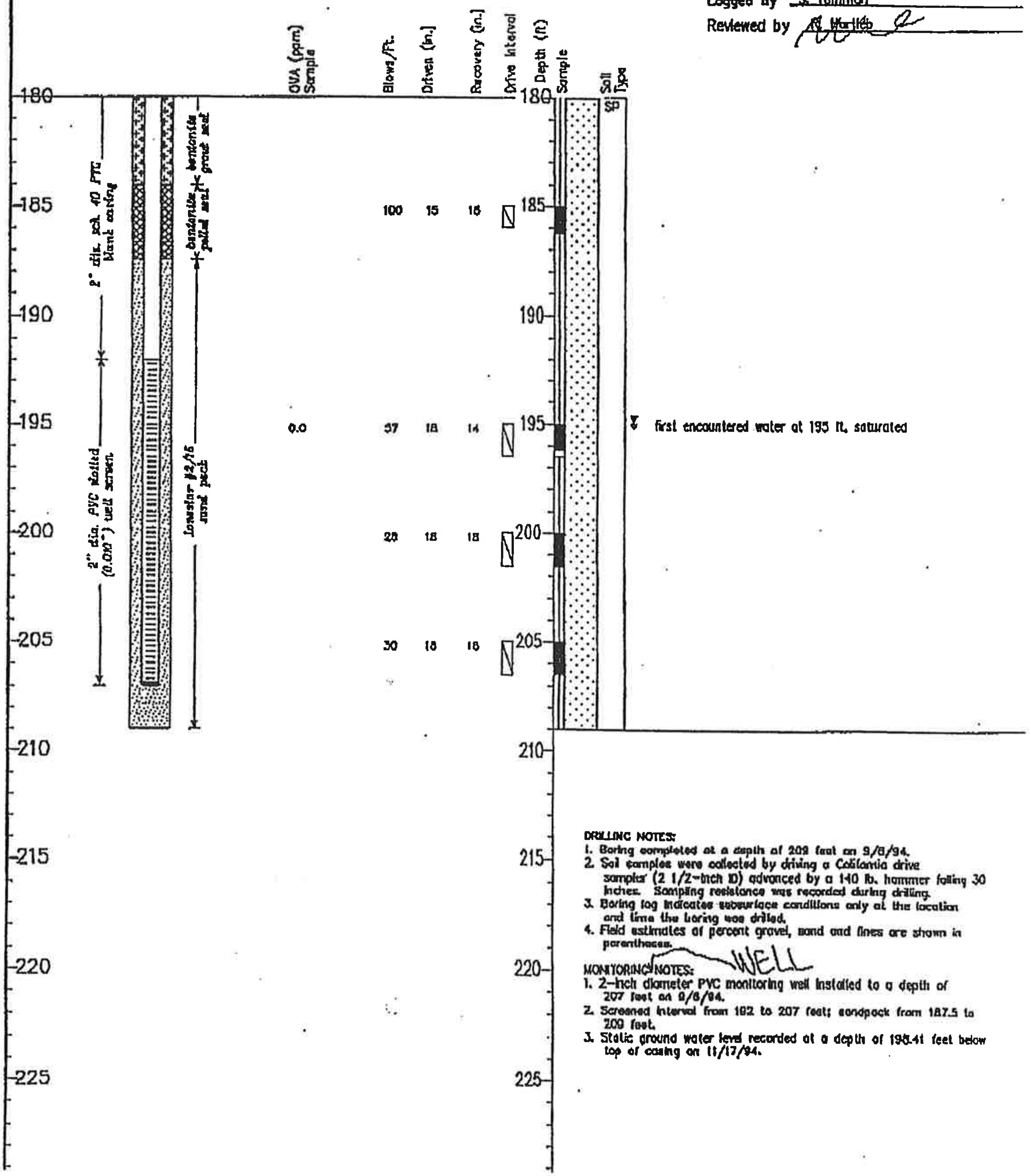
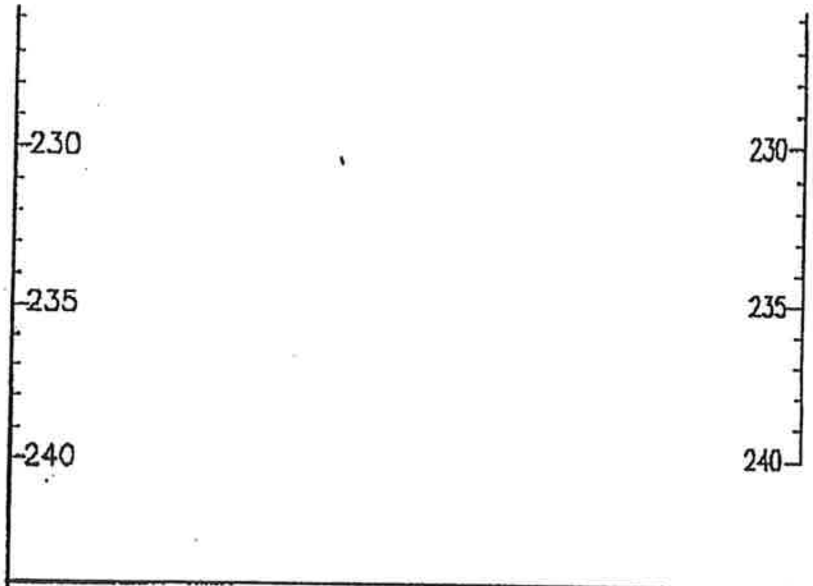


DRILLING NOTES:
1. Boring completed at a depth of 209 feet on 9/6/94.
2. Soil samples were collected by driving a California drive sampler (2 1/2-inch ID) advanced by a 140 lb. hammer falling 30 inches. Sampling resistance was recorded during drilling.
3. Boring log indicates subsurface conditions only at the location and time the boring was drilled.
4. Field estimates of percent gravel, sand and fines are shown in parentheses.

WELL

MONITORING NOTES:
1. 2-inch diameter PVC monitoring well installed to a depth of 207 feet on 9/6/94.
2. Screened interval from 192 to 207 feet; sandpack from 187.5 to 209 feet.
3. Static ground water level recorded at a depth of 198.41 feet below top of casing on 11/17/94.



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P-DW-4

FIGURE
B-2

APPENDIX C

SAMPLING AND ANALYSIS PLAN

SAMPLING AND ANALYSIS PLAN

Groundwater monitoring for the Picacho Cut and Fill Landfill is performed by Geo-Logic Associates. Since this facility is located on the Quechan Indian Reservation, it is regulated by the Federal government. Sampling and analyses are performed in general accordance with the sampling and analytical procedures included in existing U.S. EPA guidelines, as presented in *RCRA Ground Water Monitoring Technical Enforcement Guidance Document* (U.S. EPA, 1986). A brief summary of the protocols used for sample collection is presented below.

During each semiannual monitoring period, samples are collected from each accessible background and compliance well that contains water. Analysis of these samples is completed for the routine general chemistry monitoring parameters (chloride, nitrate as nitrogen, sulfate, total dissolved solids [TDS], and pH), arsenic and volatile organics as specified by the Site Specific Flexibility Request – Modified List of Detection Monitoring Parameters.

Table 1 presents the analytical methods and techniques used by the laboratory as well as the type of sample containers and preservatives to be utilized during each routine monitoring period.

The sampling protocols listed below will be generally followed during groundwater sampling operations.

- Upon arrival at the wellhead, each monitoring point will be inspected for evidence of tampering and/or vandalism, and the well identification information will be recorded.

- Prior to sounding each well, a weighted water level indicator (sounder) will be decontaminated using alconox soap solution followed by two rinses with de-ionized water. Each well includes a notch on the well casing to hang a dedicated bailer in the well. The wells will then be sounded at the notch, ideally by the same technician with the same water level sounder to an accuracy to 0.01 feet. The initial water level and, if possible, the total depth of the well will be recorded on a Well Data Sheet. Based on this information, and the known 2-inch PVC Schedule 40 casing diameter, a purge volume will be calculated using the following equation:

$$CV = (HW)(0.174)$$

Where:

CV = well casing volume (gallons)
HW = height of water column within the well (feet)
0.174 = conversion factor for a 2-inch diameter well

- The wells will be purged and sampled using dedicated bailers or new (factory sealed) disposable bailers. Up to three well casing volumes (under optimal conditions) of water will be purged and allowed to recover to 80 percent of original water elevation prior to sampling. Slow recharge wells (wells that do not recover to 80 percent of original water elevation within two hours) will be purged of a minimum of one well volume (purged dry) and allowed to recover sufficiently (for a period of about two hours) prior to sampling.

- To assess the presence of fresh water coming into the well, electrical conductivity, turbidity, pH, and temperature will be monitored after approximately every one to three gallons of purging (depending on the well and total estimated purge volume requirements).

- Sampling will be performed when the EC, pH, turbidity, and temperature have stabilized to within 10% between consecutive readings, and the total estimated purge volume has been reached.

- For sample collection (either with the dedicated bailer or new, factory-sealed, disposable bailer), a bottom-emptying device will be inserted into the bailer, and the sample will be transferred directly from the bailer to the container.

- Samples, including field blanks, will be collected in approved laboratory-prepared sample containers (Table 1). Each sample container will be filled completely and immediately capped, labeled, and placed in a cooler. Samples for VOC analysis will be filled by pouring the sample down the sides of the container to minimize aeration, and these sample vials will be capped immediately with no airspace.

- Collected samples, accompanied by a trip blank, will be placed immediately in an ice-filled cooler for transport to a state-certified testing laboratory. Samples will be kept chilled (at about 4°C) until delivery.

- A completed Chain-of-Custody form, detailing the sample numbers, date and time collected, analyses requested, and other project information will accompany each sample to the laboratory. The Chain-of-Custody forms will be signed and dated by all personnel retaining custody of the samples.

TABLE 1
PICACHO LANDFILL
ANALYTICAL METHODS

PARAMETER	TEST METHOD	TECHNIQUE	CONTAINER	PRESERVATIVE
Chloride	300.0	Ion Chromatography	Plastic	Cool, 4°C
pH	9040	Electrometric	Plastic	None
Nitrate as Nitrogen	353.2	Colorimetric	Plastic	Cool, 4°C
Sulfate	300.0	Ion Chromatography	Plastic	Cool, 4°C
Total Dissolved Solids	160.1	Gravimetric	Plastic	Cool, 4°C
Arsenic, Total	200.8	ICP/MS	Plastic	Nitric Acid, 4°C
Volatile Organics	8260	GC/MS	VOA- Glass	Cool, 4°C

Notes:
ICP = Inductively Coupled Plasma
MS = Mass Spectrophotometry
GC = Gas Chromatograph

APPENDIX C-1

SITE-SPECIFIC FLEXIBILITY REQUEST
MODIFIED LIST OF DETECTION MONITORING PARAMETERS

SITE-SPECIFIC FLEXIBILITY REQUEST MODIFIED LIST OF DETECTION MONITORING PARAMETERS

PICACHO SOLID WASTE SITE IMPERIAL COUNTY, CALIFORNIA

February 2008

Revised August 2010

PREPARED FOR:

Bryan A. Stirrat & Associates
1360 Valley Vista Drive
Diamond Bar, California 91765

PREPARED BY:

GeoLogic Associates
16885 W. Bernardo Drive
San Diego, California 92127

SITE-SPECIFIC FLEXIBILITY REQUEST
MODIFIED LIST OF DETECTION MONITORING PARAMETERS
PICACHO SOLID WASTE SITE
IMPERIAL COUNTY, CALIFORNIA

The Picacho Solid Waste Site (PSWS) is located on federally-administered Quechan Tribal lands in the County of Imperial (County), California. Although California is a U.S. Environmental Protection Agency (EPA) approved state, because the facility is located on Tribal lands, which are held in trust by the federal government, the site is subject to the code of federal regulations (CFR) 40 CFR Part 258 (40 CFR 258), which regulates solid waste facilities. Any variations from the federal regulations must be approved by the EPA through the site-specific flexibility process. This process was developed by the EPA and described in a document entitled, *Site Specific Flexibility Requests for Municipal Solid Waste Landfills in Indian Country - Draft Guidance* (EPA, August 1997). Included in this guidance document are the requirements and instructions for preparing a site-specific flexibility request (SSFR) for modifying the list of groundwater monitoring parameters from those specified in 40 CFR 258.54(a).

On behalf of Imperial County Department of Public Works (County), which operates the PSWS, GeoLogic Associates (GLA) has prepared this SSFR to modify the list of detection monitoring parameters provided in 40 CFR 258.54(a)(1) and (2). This SSFR was prepared based on information summarized in semiannual water quality monitoring reports prepared by GLA for the County, including the most recent first semiannual 2007 10 and annual report dated April 2010, and the EPA (August, 1997) SSFR guidance document.

1.0 BACKGROUND

The PSWS groundwater monitoring network includes four wells (P-MW-1, P-MW-2, P-DW-3A, and P-MW-4) constructed in August 1994 (Figure 1). Initially, because California is an EPA-approved State regulating solid waste facilities within the State, the site was thought to fall under the jurisdiction of the California Regional Water Quality Control Board – Colorado River Basin Region, and site monitoring was performed in accordance with site-specific Waste Discharge Requirement No. 88-005, and the more recent blanket Waste Discharge Requirements No. 93-071, established for all active landfills within the Colorado River Basin Region and prepared to comply with federal regulations. Under this program, the wells have been monitored by the County typically on a semiannual basis beginning in November 1994. Monitoring included well P-DW-3A until March 1999 when this well, which is located in the site borrow area, was converted to a water level measuring station and sampling and analysis of groundwater from this well ceased. The monitoring program has included analysis of volatile organic compounds (VOCs) and inorganic constituents including chloride, nitrate as nitrogen, pH, sulfate and total dissolved solids, as well as field measured electrical conductivity.

In contrast with 40 CFR 258, which requires sampling and analysis for its Appendix II list of constituents of concern (COCs) only if a release is identified, in accordance with California regulations, the current three-well monitoring network has been sampled every five years (in 1996, 2001, and 2006) for analysis of the Appendix I and Appendix II list of COCs. The current procedures provide historical water quality data for the full suite of COCs and are therefore more protective of water quality than the approach outlined in 40 CFR 258.

Accordingly, the semiannual detection monitoring program complies with EPA regulation 40 CFR 258.54(a) to include the constituents listed in Appendix I, with the exception of the 15 heavy metals, which are included in the sampling program every 5 years. In accordance with 40 CFR 258.54(a)(2) and the SSFR guidance document, an alternate list of inorganic indicator parameters may be established in lieu of the 15 heavy metals included in Appendix I. The following section provides a discussion of the site groundwater chemistry and a request to include inorganic indicator parameters in lieu of the 15 heavy metals in Appendix I. A change in the anthropogenic constituent list (VOCs) is not proposed.

2.0 SITE HYDROGEOLOGIC CONDITIONS

Currently, more than 15 years of semiannual groundwater monitoring data have been obtained from the detection monitoring wells at the PSWS, with several sampling rounds that include analysis of samples for the full suite of 40 CFR 258 Appendix II COCs. Groundwater occurs at a depth of 180 to 200 feet below the ground surface, with variations in groundwater elevations of less than 0.5 foot across the entire site, resulting in a very low groundwater gradient of less than 0.0004 ft/ft. Most recently, well P-MW-1 or P-MW-4 have been the most upgradient well, though the differences between these wells vary by less than two tenths of a foot (Table 1). Historically groundwater flows to the east to southeast, altered primarily by an occasional heavy influx of flow in the adjacent wash and associated infiltration.

General Chemistry. As presented in Tables 2 through 5, the general chemistry data indicate a relatively narrow range of values across the site (GLA, April 2010). Median chloride concentrations range from about 110 to 140 mg/L; nitrate as nitrogen median values range from 1.9 to 2.5 mg/L; median pH values exhibit slightly basic conditions ranging from 7.9 to 8.1; median sulfate concentrations range from 86 mg/L to 109 mg/L and median total dissolved solids (TDS) concentrations range from about 540 to 622 mg/L. . Only nitrate as nitrogen has a federal primary Maximum Contaminant Level (MCL) established for protection of drinking water quality, and the measured values at the PSWS are well below the MCL of 10 mg/L for this constituent. As a measure of the aesthetic water quality, federal secondary MCLs (SMCLs) are established as drinking water quality goals for public water systems for chloride, sulfate and TDS. Comparison of the median values measured in groundwater samples at the PSWS with the federal SMCLs indicates that only TDS concentrations slightly exceed the SMCL of 500 mg/L.

Heavy Metals. Based on the COC sampling rounds conducted at the PSWS, heavy metals are generally not detected in groundwater samples. Well P-MW-1 has been sampled six times for the 17 heavy metals listed in Appendices I and II. Of these, only arsenic and selenium have been measured three times in samples (Table 2). Other metals including barium, chromium, lead, mercury, tin, vanadium and zinc have been measured one or two times, but none above a federal MCL. Only arsenic values of 0.012 to 0.014 mg/L slightly exceed the federal MCL of 0.010 mg/L.

Well P-MW-2 has been sampled three times for the 17 COC metals, and only chromium was measured in samples from this well three times (Table 3). Barium, copper, thallium, vanadium and zinc were measured one or two times at quantifiable or estimated trace levels (between the laboratory method detection limit and practical quantitation limit), and no value exceeded a federal MCL.

Well P-DW-3A has only been sampled one time for COCs (in 1996), and only chromium, tin and vanadium were detected during the sampling round though all three metal concentrations were low (Table 4). The measured chromium concentration was well below its federal MCL.

Well P-MW-4, sampled three times for the COC metals, contained measurable chromium in all three sampling events (Table 5). The other detected heavy metals include barium, lead, tin, vanadium, and zinc, in one or two of the samples at quantifiable or estimated trace levels, and all were well below an established federal MCL.

Volatile Organic Compounds. Several VOCs have been detected in samples at the PSWS, but only chloroform in samples from well P-MW-1 has been measured with any regularity. Concentrations of chloroform measured in samples from well P-MW-1 have ranged from 0.46 µg/L to 1.4 µg/L, substantially below the federal MCL of 80 µg/L. Other detected VOCs include acetone, benzene, toluene, methylene chloride and chloromethane, which are common field or laboratory contaminants, and typically have been measured erratically in samples at estimated trace concentrations. A few VOCs such as dichlorodifluoromethane, trichlorofluoromethane, 4-methyl-2-pentanone (MIBK), 1,2,3-trichlorobenzene and naphthalene have been detected, also erratically, in samples and may be attributed to the landfill.

Other anthropogenic compounds. Every five years groundwater samples have been analyzed for the COCs listed in 40 CFR 258 Appendix II including organochlorine pesticides, chlorinated herbicides, semi-volatile organic compounds and polychlorinated biphenyls. To date, results of these sample analyses have not identified any of these compounds in groundwater samples at the PSWS. The next 5-year COC sampling event is scheduled to be conducted during the Winter/Spring 2011 sampling event.

3.0 ALTERNATIVE MONITORING PARAMETER LIST

The current alternative list of monitoring parameters complies with 40 CFR 258 with the exception that the inorganic indicator parameters (chloride, nitrate as nitrogen, pH[field measured], electrical conductivity [field measured], sulfate, and TDS) are proposed in lieu of the 15 heavy metals included in 40 CFR 258 Appendix I, with the exception of arsenic, which may be present associated with pesticides. We request replacement of these 15 heavy metals with the inorganic indicator parameters currently included in the site's detection monitoring program on the following grounds:

- ☐ In our experience regarding the chemical composition of municipal solid waste leachate, and landfill impacted groundwater in southern California particularly, heavy metals are generally poor indicators of a release since many occur naturally, and exhibit significant spatial variability across a site. In fact, of the heavy metals included in 40 CFR 258 Appendices I and II, as presented in Section 2.0 above, only a few typically have been found in quantifiable concentrations that could be differentiated from background water quality.

- ☐ Heavy metals are not typically very mobile unless subjected to highly acidic conditions, and under normal conditions such as expected at the PSWS, would tend to adsorb to soil particles before reaching the groundwater more than 150 feet below the bottom of the waste, making them poor early indicators of a release relative to VOCs and more mobile inorganic metal surrogates.

- ☐ As stated, review of the metals data indicates few quantifiable values. In contrast, the inorganic indicator parameters are commonly identified and the abundant historical data allow for robust conclusions based on statistical and deterministic analysis of that data. The extremely low concentrations and sporadic frequency of detection of the heavy metals precludes thorough analysis and determination of a release. Similarly, the pH values for leachate are often more acidic than identified in groundwater samples at the PSWS. When there are statistically significant changes in the proposed indicator parameters, indications of a release may be recognized.

Therefore, it is recommended that, with the exception of arsenic, the heavy metals be removed from the routine semiannual detection monitoring program. Arsenic was detected in groundwater samples from well P-MW-1 in 1994 and 1995 and may be associated with pesticides. Because this well is located in close proximity to the former pesticide container disposal pit, arsenic will be added to the list of monitoring parameters.The VOCs will continue to be included in the monitoring program, since they are anthropogenic and in the absence of other local sources are diagnostic of a landfill release to groundwater either by leachate or landfill gas migration.

In summary, to provide the earliest possible indication of release from the landfill, it is requested that the proposed water quality monitoring program includes analysis of groundwater samples for the inorganic indicator parameters (chloride, nitrate as nitrogen, pH, electrical conductivity, sulfate and TDS) in lieu of the 40 CFR 258 Appendix I heavy metals, with the exception of arsenic, which will be added to the list of monitoring parameters. In addition, at a minimum, the detection monitoring program will continue to include the 40 CFR 258 Appendix I VOCs. The proposed list of monitoring parameters provides good indicators of changing water chemistry potentially associated with the release of leachate, pesticides, or landfill gas to groundwater at the site.

It is also proposed that analysis continue to be conducted for the 40 CFR 258 Appendix II list of COCs every five years as required under California regulations as a further conservative approach to protection of water quality at the PSWS.

4.0 CLOSURE

This report has not been prepared for use by parties or projects other than those named or described herein. It may not contain sufficient information for other parties or purposes.

If you have any questions regarding this request for an alternative list of monitoring parameters, please give me a call.

Geo-Logic Associates

Sarah J Battelle

Sarah J. Battelle, PG, CHG
Project Manager

TABLE 1
SITE MONITORING WELL INFORMATION
PICACHO SOLID WASTE SITE

WELL INFORMATION	WELL NUMBER			
	P-MW-1	P-MW-2	P-DW-3A	P-MW-4
Elevation of well (ft MSL): Top of well casing	339.82	316.43	318.13	334.96
Total depth of well (ft): at installation	212.1	191.6	193.0	210.1
Depth of screened interval	193.5-208.5	174-189	175-190	192-207
Depth to water from top of well casing (ft):				
11/17/94	203.17	179.84	181.42	198.41
4/21/95	203.82	180.59	182.17	199.10
7/21/95	203.34	180.01	181.60	198.59
11/1/95	203.12	179.71	181.29	198.37
7/3/96	204.36	180.96	182.56	199.67
9/26/96	202.55	178.95	181.65	197.70
12/20/96	202.42	178.96	180.58	197.57
7/9/97	202.45	178.75	180.35	197.62
9/17/97	202.00	178.20	179.90	197.15
12/22/97	201.85	178.30	179.90	197.10
3/17/98	201.98	178.58	180.21	197.21
6/16/98	201.72	178.15	179.80	196.83
8/12/98	201.70	178.03	179.70	196.86
12/21/98	201.60	178.06	179.68	196.85
3/3/99	201.53	178.10	179.75	196.70
6/3/99	201.73	178.33	180.00	196.95
8/3/99	201.76	178.29	179.91	196.96
11/18/99	201.51	177.96	179.61	196.73
2/17/00	201.79	178.50	180.13	197.06
5/12/00	201.89	178.46	180.12	197.10
8/21/00	201.38	177.85	179.48	196.56
12/9/00	201.56	178.20	179.84	196.81
2/17/01	201.87	178.66	180.29	197.15
5/10/01	202.11	178.85	180.47	197.37
8/16/01	201.80	178.37	180.03	197.03
11/11/01	201.75	178.40	180.02	196.99
2/5/02	202.07	178.96	180.59	197.40
5/5/02	202.45	179.22	180.85	197.70
8/14/02	202.25	178.94	180.56	197.49
11/18/02	202.45	179.23	180.86	197.72
2/16/03	202.60	179.54	181.16	197.60
5/11/03	202.72	179.45	181.07	197.95
8/21/03	202.46	179.05	180.71	197.67
12/30/03	202.43	179.13	180.74	197.66
4/27/04	201.81	179.34	181.10	197.86
8/9/04	202.48	179.08	181.14	197.70
2/15/05	202.74	179.57	182.91	199.78
9/13/05	202.95	179.81	181.33	198.15
2/20/06	202.26	180.04	181.71	198.65
8/21/06	202.98	179.74	181.42	198.19
2/19/07	203.44	180.31	181.90	198.64
8/9/07	203.24	179.98	181.59	198.49
2/26/08	203.63	180.54	182.21	198.91
8/12/08	203.07	179.55	181.21	198.20
6/15/09	203.04	179.86	181.44	198.20
9/21/09	203.16	179.81	181.43	198.07
2/16/10	203.73	180.54	182.19	198.78
8/16/10	203.42	179.86	181.34	198.61

TABLE 1
SITE MONITORING WELL INFORMATION
PICACHO SOLID WASTE SITE

WELL INFORMATION	WELL NUMBER			
	P-MW-1	P-MW-2	P-DW-3A	P-MW-4
Elevation of water surface (ft MSL):				
11/17/94	136.65	136.59	136.71	136.55
4/21/95	136.00	135.84	135.96	135.86
7/21/95	136.48	136.42	136.53	136.37
11/1/95	136.70	136.72	136.84	136.59
7/3/96	135.46	135.47	135.57	135.29
9/26/96	137.27	137.48	136.48	137.26
12/20/96	137.40	137.47	137.55	137.39
7/9/97	137.37	137.68	137.78	137.34
9/17/97	137.82	138.23	138.23	137.81
12/22/97	137.97	138.13	138.23	137.86
3/17/98	137.84	137.85	137.92	137.75
6/16/98	138.10	138.28	138.33	138.13
8/12/98	138.12	138.40	138.43	138.10
12/21/98	138.22	138.37	138.45	138.11
3/3/99	138.29	138.33	138.38	138.26
6/3/99	138.09	138.10	138.13	138.01
8/3/99	138.06	138.14	138.22	138.00
11/18/99	138.31	138.47	138.52	138.23
2/17/00	138.03	137.93	138.00	137.90
5/12/00	137.93	137.97	138.01	137.86
8/21/00	138.44	138.58	138.65	138.40
12/9/00	138.26	138.23	138.29	138.15
2/17/01	137.95	137.77	137.84	137.81
5/10/01	137.71	137.58	137.66	137.59
8/16/01	138.02	138.06	138.10	137.93
11/11/01	138.07	138.03	138.11	137.97
2/5/02	137.75	137.47	137.54	137.56
5/5/02	137.37	137.21	137.28	137.26
8/14/02	137.57	137.49	137.57	137.47
11/18/02	137.37	137.20	137.27	137.24
2/16/03	137.22	136.89	136.97	137.36
5/11/03	137.10	136.98	137.06	137.01
8/21/03	137.36	137.38	137.42	137.29
12/30/03	137.39	137.30	137.39	137.30
4/27/04	138.01	137.09	137.03	137.10
8/9/04	137.34	137.35	136.99	137.26
2/15/05	137.08	136.86	135.22	135.18
9/13/05	136.87	136.62	136.80	136.81
2/20/06	137.56	136.39	136.42	136.31
8/21/06	136.84	136.69	136.71	136.77
2/19/07	136.38	136.12	136.23	136.32
8/9/07	136.58	136.45	136.54	136.47
2/26/08	136.19	135.89	135.92	136.05
8/12/08	136.75	136.88	136.92	136.76
6/15/09	136.78	136.57	136.69	136.76
9/13/09	136.66	136.62	136.70	136.89
2/16/10	136.09	135.89	135.94	136.18
8/16/10	136.40	136.57	136.79	136.35

TABLE 2
PICACHO SOLID WASTE SITE
HISTORICAL SUMMARY
MONITORING WELL P-MW-1

ANALYTE	UNIT	Nov 1994	Nov 1994	Jul 1995	Jul 1995	Nov 1995	Jul 1996	Jul 1996	Sept 1996	Sept 1996	Jul 1997
GENERAL CHEMISTRY											
Bicarbonate Alkalinity	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Carbonate Alkalinity	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chloride	mg/l	120	120	110	110	110	130	130	120	120	120
Cyanide	mg/l	0.02	NA	0.02	NA	0.02	0.03	NA	NA	NA	NA
Hydroxide Alkalinity	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nitrate as N	mg/l	1.7	1.9	2.1	2.4	2.4	2.11	2.11	2.39	2.52	2.13
pH	units	8.2	8.2	8.1	8.2	8.0	8.20	8.18	6.23	6.39	7.62
Perchlorate	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Specific Conductance	µmhos/cm	NA	NA	NA	NA	NA	1010	1007	NA	NA	NA
Sulfate	mg/l	130	130	120	110	110	124	121	117	115	73
Sulfide	mg/l	1	NA	1	NA	1	0.55	NA	NA	NA	NA
Total Dissolved Solids	mg/l	710	710	1200	1000	650	646	646	568	560	624
METALS											
Antimony	mg/l	NA	NA	NA	NA	NA	0.005	NA	NA	NA	NA
Arsenic	mg/l	0.014	NA	0.012	NA	0.014	0.005	NA	NA	NA	NA
Barium	mg/l	0.14	NA	0.02	NA	0.02	0.1	NA	NA	NA	NA
Beryllium	mg/l	0.02	NA	0.02	NA	0.02	0.001	NA	NA	NA	NA
Cadmium	mg/l	0.02	NA	0.02	NA	0.02	0.003	NA	NA	NA	NA
Chromium	mg/l	0.02	NA	0.02	NA	0.02	0.007	NA	NA	NA	NA
Cobalt	mg/l	0.05	NA	0.05	NA	0.05	0.003	NA	NA	NA	NA
Copper	mg/l	0.02	NA	0.02	NA	0.02	0.003	NA	NA	NA	NA
Lead	mg/l	0.003	NA	0.002	NA	0.002	0.005	NA	NA	NA	NA
Mercury	mg/l	0.0005	NA	0.0002	NA	0.0002	0.002	NA	NA	NA	NA
Nickel	mg/l	0.05	NA	0.05	NA	0.05	0.003	NA	NA	NA	NA
Selenium	mg/l	0.007	NA	0.008	NA	0.008	0.005	NA	NA	NA	NA
Silver	mg/l	0.02	NA	0.02	NA	0.02	0.001	NA	NA	NA	NA
Thallium	mg/l	0.2	NA	0.2	NA	0.2	0.005	NA	NA	NA	NA
Tin	mg/l	0.1	NA	0.1	NA	0.1	0.039	NA	NA	NA	NA
Vanadium	mg/l	0.05	NA	0.05	NA	0.05	0.003	NA	NA	NA	NA
Zinc	mg/l	0.07	NA	0.05	NA	0.05	0.01	NA	NA	NA	NA
VOLATILE ORGANICS/PURGEABLE ORGANICS											
1,2,3-Trichlorobenzene	µg/l	ND	NA	ND	NA	ND	ND	NA	ND	NA	ND
Acetone	µg/l	1	NA	3.0*	NA	8	1.2	NA	1.2	NA	1.2
Benzene	µg/l	ND	NA	ND	NA	ND	ND	NA	ND	NA	ND
Chloroform	µg/l	1	NA	1	NA	1.0	1.2	NA	0.9	NA	1.1
Chloromethane	µg/l	ND	NA	ND	NA	ND	ND	NA	ND	NA	ND
Dichlorodifluoromethane	µg/l	1	NA	1	NA	1	0.3	NA	0.3	NA	0.3
Methylene Chloride	µg/l	1	NA	1	NA	1	0.2	NA	0.2	NA	0.2
Naphthalene	µg/l	ND	NA	ND	NA	ND	ND	NA	ND	NA	ND
Toluene	µg/l	1	NA	1	NA	1	1.7	NA	0.3	NA	0.3
Trichlorofluoromethane	µg/l	1	NA	1	NA	1	0.2	NA	**0.3**	NA	0.2
SEMI-VOLATILE ORGANICS: None Detected											
HERBICIDES, PESTICIDES, & PCBs: None Detected											

NOTES:

NA Sample was not analyzed for this parameter during the specified sampling round.

▨ Indicates that the analyte was not detected above laboratory practical quantitation limit (PQL).
Value listed is MDL or estimated trace concentration (BOLDED).

ND Constituent not detected; MDL not provided.

* Analyte also found in blank(s).

TABLE 2
PICACHO SOLID WASTE SITE
HISTORICAL SUMMARY
MONITORING WELL P-MW-1 (CONT'D)

ANALYTE	UNIT	Jul 1997	Jul 1997	Jul 1997	Sept 1997	Sept 1997	Sept 1997	Sept 1997	Mar 1998	Jun** 1998	Jun** 1998
GENERAL CHEMISTRY											
Bicarbonate Alkalinity	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Carbonate Alkalinity	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chloride	mg/l	118	115	120	92	95	93	84	116	NA	NA
Cyanide	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Hydroxide Alkalinity	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nitrate as N	mg/l	2.19	2.0	1.9	1.0	0.96	1.01	1.15	2.6	NA	NA
pH	units	7.58	7.59	7.61	8.14	8.22	8.18	8.26	7.93	NA	NA
Perchlorate	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Specific Conductance	µmhos/cm	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sulfate	mg/l	73	73	73	60	63	58	48	114	NA	NA
Sulfide	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Dissolved Solids	mg/l	602	614	604	466	464	466	432	613	NA	NA
METALS											
Antimony	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Barium	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Beryllium	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cadmium	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chromium	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cobalt	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Copper	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lead	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mercury	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nickel	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Selenium	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Silver	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Thallium	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Tin	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vanadium	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Zinc	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
VOLATILE ORGANICS/PURGEABLE ORGANICS											
1,2,3-Trichlorobenzene	µg/l	NA	NA	NA	ND	NA	NA	NA	ND	ND	ND
Acetone	µg/l	NA	NA	NA	1.2	NA	NA	NA	5.75	5.75	5.75
Benzene	µg/l	NA	NA	NA	ND	NA	NA	NA	ND	ND	ND
Chloroform	µg/l	NA	NA	NA	0.6	NA	NA	NA	1.3*	1.2*	1.5*
Chloromethane	µg/l	NA	NA	NA	ND	NA	NA	NA	ND	ND	ND
Dichlorodifluoromethane	µg/l	NA	NA	NA	0.3	NA	NA	NA	0.09	0.09	0.09
Methylene Chloride	µg/l	NA	NA	NA	0.2	NA	NA	NA	0.08	**0.19***	0.08
Naphthalene	µg/l	NA	NA	NA	ND	NA	NA	NA	ND	ND	ND
Toluene	µg/l	NA	NA	NA	0.3	NA	NA	NA	0.07	0.07	0.07
Trichlorofluoromethane	µg/l	NA	NA	NA	0.2	NA	NA	NA	0.07	0.07	0.07
SEMI-VOLATILE ORGANICS: None Detected											
HERBICIDES, PESTICIDES, & PCBs: None Detected											

NOTES:

NA Sample was not analyzed for this parameter during the specified sampling round.

▨ Indicates that the analyte was not detected above laboratory practical quantitation limit (PQL).
Value listed is MDL or estimated trace concentration (BOLDED).

ND Constituent not detected; MDL not provided.

(a) Suspected laboratory/field contaminant.

* Analyte also found in blank(s).

** Retest.

TABLE 2
PICACHO SOLID WASTE SITE
HISTORICAL SUMMARY
MONITORING WELL P-MW-1 (CONT'D)

ANALYTE	UNIT	Aug 1998	Dec** 1998	Aug 1999	Aug 1999	Nov** 1999	Nov** 1999	Feb 2000	May** 2000	May** 2000	Aug 2000
GENERAL CHEMISTRY											
Bicarbonate Alkalinity	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Carbonate Alkalinity	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chloride	mg/l	119	NA	105	104	NA	NA	114	NA	NA	109
Cyanide	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Hydroxide Alkalinity	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nitrate as N	mg/l	2.7	NA	1.80	1.52	NA	NA	2.72	NA	NA	2.70
pH	units	8.38	NA	8.03	NA	8.06	NA	8.10	8.07	NA	8.04
Perchlorate	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Specific Conductance	µmhos/cm	NA	NA	1022	NA	1040	NA	1018	1054	NA	981
Sulfate	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sulfide	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Dissolved Solids	mg/l	620	NA	574	580	NA	NA	559	NA	NA	694
METALS											
Antimony	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Barium	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Beryllium	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cadmium	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chromium	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cobalt	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Copper	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lead	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mercury	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nickel	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Selenium	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Silver	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Thallium	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Tin	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vanadium	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Zinc	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
VOLATILE ORGANICS/PURGEABLE ORGANICS											
1,2,3-Trichlorobenzene	µg/l	ND	ND	ND	NA	ND	ND	ND	ND	ND	0.12
Acetone	µg/l	5.75	5.75	1.79	NA	1.79	1.79	1.79	1.79	**2.03(a)**	1.79
Benzene	µg/l	ND	ND	**0.0612**	NA	0.04	0.04	0.05	0.05	0.05	0.05
Chloroform	µg/l	1.4	**0.46**	**0.927**	NA	**0.956**	1.18	**0.826**	1.00	1.12	**0.915**
Chloromethane	µg/l	ND	ND	ND	NA	ND	ND	ND	0.14	**0.231(a)**	**0.210**
Dichlorodifluoromethane	µg/l	0.09	4.6	0.07	NA	0.07	0.07	0.09	0.09	0.09	0.09
Methylene Chloride	µg/l	**0.28***	2.0	0.03	NA	0.03	0.03	**0.101(a)**	0.06	0.06	0.06
Naphthalene	µg/l	ND	ND	ND	NA	ND	ND	ND	ND	ND	0.10
Toluene	µg/l	0.07	**0.21(a)**	0.07	NA	0.07	0.07	0.07	0.07	0.07	0.07
Trichlorofluoromethane	µg/l	0.07	**0.11**	0.04	NA	0.04	0.04	**0.113**	0.07	0.07	0.07
SEMI-VOLATILE ORGANICS: None Detected											
HERBICIDES, PESTICIDES, & PCBs: None Detected											

NOTES:

NA Sample was not analyzed for this parameter during the specified sampling round.

▨ Indicates that the analyte was not detected above laboratory practical quantitation limit (PQL).
Value listed is MDL or estimated trace concentration (BOLDED).
ND Constituent not detected; MDL not provided.
(a) Suspected laboratory/field contaminant.
** Retest.

TABLE 2
PICACHO SOLID WASTE SITE
HISTORICAL SUMMARY
MONITORING WELL P-MW-1 (CONT'D)

ANALYTE	UNIT	Aug 2000	Dec** 2000	Dec** 2000	Feb 2001	May** 2001	May** 2001	Aug 2001	Aug 2001	Nov** 2001	Nov** 2001
GENERAL CHEMISTRY											
Bicarbonate Alkalinity	mg/l	NA	NA	NA	178	NA	NA	NA	NA	NA	NA
Carbonate Alkalinity	mg/l	NA	NA	NA	20.0	NA	NA	NA	NA	NA	NA
Chloride	mg/l	110	NA	NA	127	NA	NA	110	110	NA	NA
Cyanide	mg/l	NA	NA	NA	0.0100	NA	NA	NA	NA	NA	NA
Hydroxide Alkalinity	mg/l	NA	NA	NA	20.0	NA	NA	NA	NA	NA	NA
Nitrate as N	mg/l	2.68	NA	NA	2.74	NA	NA	2.6	2.6	NA	NA
pH	units	NA	7.96	NA	8.15	8.26	NA	8.20	NA	8.13	NA
Perchlorate	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Specific Conductance	µmhos/cm	NA	1043	NA	992	1003	NA	1002	NA	955	NA
Sulfate	mg/l	NA	NA	NA	117	NA	NA	NA	NA	NA	NA
Sulfide	mg/l	NA	NA	NA	0.750	NA	NA	NA	NA	NA	NA
Total Dissolved Solids	mg/l	624	NA	NA	494	NA	NA	630	650	NA	NA
METALS											
Antimony	mg/l	NA	NA	NA	0.060	NA	NA	NA	NA	NA	NA
Arsenic	mg/l	NA	NA	NA	0.100	NA	NA	NA	NA	NA	NA
Barium	mg/l	NA	NA	NA	0.0137	NA	NA	NA	NA	NA	NA
Beryllium	mg/l	NA	NA	NA	0.001	NA	NA	NA	NA	NA	NA
Cadmium	mg/l	NA	NA	NA	0.010	NA	NA	NA	NA	NA	NA
Chromium	mg/l	NA	NA	NA	0.010	NA	NA	NA	NA	NA	NA
Cobalt	mg/l	NA	NA	NA	0.007	NA	NA	NA	NA	NA	NA
Copper	mg/l	NA	NA	NA	0.010	NA	NA	NA	NA	NA	NA
Lead	mg/l	NA	NA	NA	0.075	NA	NA	NA	NA	NA	NA
Mercury	mg/l	NA	NA	NA	0.0002	NA	NA	NA	NA	NA	NA
Nickel	mg/l	NA	NA	NA	0.030	NA	NA	NA	NA	NA	NA
Selenium	mg/l	NA	NA	NA	0.100	NA	NA	NA	NA	NA	NA
Silver	mg/l	NA	NA	NA	0.007	NA	NA	NA	NA	NA	NA
Thallium	mg/l	NA	NA	NA	0.100	NA	NA	NA	NA	NA	NA
Tin	mg/l	NA	NA	NA	0.250	NA	NA	NA	NA	NA	NA
Vanadium	mg/l	NA	NA	NA	0.0103	NA	NA	NA	NA	NA	NA
Zinc	mg/l	NA	NA	NA	0.020	NA	NA	NA	NA	NA	NA
VOLATILE ORGANICS/PURGEABLE ORGANICS											
1,2,3-Trichlorobenzene	µg/l	NA	0.12	0.12	**0.146**	0.12	0.12	0.080	NA	0.080	0.080
Acetone	µg/l	NA	1.79	1.79	1.79	1.79	1.79	1.8	NA	1.8	1.8
Benzene	µg/l	NA	0.05	0.05	0.05	0.05	0.05	0.050	NA	0.050	0.050
Chloroform	µg/l	NA	1.08	1.11	**0.660**	**0.701**	**0.838**	**0.88**	NA	**0.93**	**0.86**
Chloromethane	µg/l	NA	0.14	0.14	0.14	0.14	0.14	**0.18(a)**	NA	**0.23(a)**	0.14
Dichlorodifluoromethane	µg/l	NA	0.09	0.09	0.09	0.09	0.09	0.090	NA	0.090	0.090
Methylene Chloride	µg/l	NA	0.06	0.06	0.06	0.06	0.06	0.060	NA	0.060	0.060
Naphthalene	µg/l	NA	0.10	0.10	**0.140**	0.10	0.10	**0.14**	NA	0.10	0.10
Toluene	µg/l	NA	0.07	0.07	0.07	0.07	0.07	0.070	NA	0.070	0.070
Trichlorofluoromethane	µg/l	NA	0.07	0.07	0.07	0.07	0.07	0.070	NA	0.070	0.070
SEMI-VOLATILE ORGANICS: None Detected											
HERBICIDES, PESTICIDES, & PCBs: None Detected											

NOTES:

NA Sample was not analyzed for this parameter during the specified sampling round.

▨ Indicates that the analyte was not detected above laboratory practical quantitation limit (PQL).
Value listed is MDL or estimated trace concentration (BOLDED).

(a) Suspected laboratory/field contaminant.

** Retest.

TABLE 2
PICACHO SOLID WASTE SITE
HISTORICAL SUMMARY
MONITORING WELL P-MW-1 (CONT'D)

ANALYTE	UNIT	Feb 2002	May** 2002	May** 2002	Aug 2002	Nov** 2002	Nov** 2002	Feb 2003	May** 2003	May** 2003
GENERAL CHEMISTRY										
Bicarbonate Alkalinity	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA
Carbonate Alkalinity	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chloride	mg/l	99	NA	NA	130	NA	NA	130	NA	NA
Cyanide	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA
Hydroxide Alkalinity	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nitrate as N	mg/l	2.5	NA	NA	3.5	NA	NA	3.4	NA	NA
pH	units	8.15	NA	8.21	8.17	8.03	NA	8.38	8.11	NA
Perchlorate	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA
Specific Conductance	µmhos/cm	954	NA	950	965	998	NA	1002	982	NA
Sulfate	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sulfide	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Dissolved Solids	mg/l	640	NA	NA	710	NA	NA	620	NA	NA
METALS										
Antimony	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA
Barium	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA
Beryllium	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cadmium	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chromium	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cobalt	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA
Copper	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lead	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mercury	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nickel	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA
Selenium	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA
Silver	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA
Thallium	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA
Tin	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vanadium	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA
Zinc	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA
VOLATILE ORGANICS/PURGEABLE ORGANICS										
1,2,3-Trichlorobenzene	µg/l	0.50	0.50	0.50	0.50	0.50	0.50	0.067	0.096	0.096
Acetone	µg/l	5.0	5.0	5.0	5.0	5.0	5.0	1.4	2.0	2.0
Benzene	µg/l	0.30	0.30	0.30	0.30	0.30	0.30	0.080	0.15	0.15
Chloroform	µg/l	1.0	0.6	0.7	0.96	0.98	0.87	1.0	1.1	1.0
Chloromethane	µg/l	0.50	0.50	0.50	0.50	0.50	0.50	0.14	0.36	0.36
Dichlorodifluoromethane	µg/l	0.50	0.50	0.50	0.50	0.50	0.50	0.18	0.30	0.30
Methylene Chloride	µg/l	0.50	0.50	0.50	**0.18(a)**	0.50	0.50	0.16	0.14	0.14
Naphthalene	µg/l	0.50	0.50	0.50	0.50	0.50	0.50	0.078	0.049	0.049
Toluene	µg/l	0.30	0.30	0.30	0.30	0.30	0.30	0.11	0.13	0.13
Trichlorofluoromethane	µg/l	0.50	0.50	0.50	0.50	0.50	0.50	0.35	0.20	0.20
SEMI-VOLATILE ORGANICS: None Detected										
HERBICIDES, PESTICIDES, & PCBs: None Detected										

NOTES:

NA Sample was not analyzed for this parameter during the specified sampling round.

▨ Indicates that the analyte was not detected above laboratory practical quantitation limit (PQL).
Value listed is MDL or estimated trace concentration (BOLDED).

(a) Suspected laboratory/field contaminant.

** Retest.

TABLE 2
PICACHO SOLID WASTE SITE
HISTORICAL SUMMARY
MONITORING WELL P-MW-1 (CONT'D)

ANALYTE	UNIT	Aug 2003	Apr 2004	Aug 2004	Feb 2005	Sep 2005	Feb 2006	Aug 2006	Feb 2007	Aug 2007	Feb 2008
GENERAL CHEMISTRY											
Bicarbonate Alkalinity	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Carbonate Alkalinity	mg/l	NA	NA	NA	NA	NA	NA	8.00	NA	NA	NA
Chloride	mg/l	120	124	120	140	124	109	115	109	105	112
Cyanide	mg/l	NA	NA	NA	NA	NA	NA	0.01	NA	NA	NA
Hydroxide Alkalinity	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nitrate as N	mg/l	0.26	2.78	2.83	2.25	2.60	2.55	2.60	2.50	2.40	2.46
pH	units	8.16	8.0	8.2	8.3	8.2	7.7	8.6	7.3	7.6	7.6
Perchlorate	mg/l	NA	NA	NA	NA	NA	NA	0.0020	NA	NA	NA
Specific Conductance	µmhos/cm	1028	1000	1200	880	1200	1000	910	1000	1000	1200
Sulfate	mg/l	NA	115	102	103	105	108	116	92.0	104	107
Sulfide	mg/l	NA	NA	NA	NA	NA	NA	0.01	NA	NA	NA
Total Dissolved Solids	mg/l	590	760	616	670	630	628	640	630	720	600
METALS											
Antimony	mg/l	NA	NA	NA	NA	NA	NA	0.05	NA	NA	NA
Arsenic	mg/l	NA	NA	NA	NA	NA	NA	0.05	NA	NA	NA
Barium	mg/l	NA	NA	NA	NA	NA	NA	0.03	NA	NA	NA
Beryllium	mg/l	NA	NA	NA	NA	NA	NA	0.01	NA	NA	NA
Cadmium	mg/l	NA	NA	NA	NA	NA	NA	0.01	NA	NA	NA
Chromium	mg/l	NA	NA	NA	NA	NA	NA	**0.020**	NA	NA	NA
Cobalt	mg/l	NA	NA	NA	NA	NA	NA	0.01	NA	NA	NA
Copper	mg/l	NA	NA	NA	NA	NA	NA	0.01	NA	NA	NA
Lead	mg/l	NA	NA	NA	NA	NA	NA	0.05	NA	NA	NA
Mercury	mg/l	NA	NA	NA	NA	NA	NA	0.001	NA	NA	NA
Nickel	mg/l	NA	NA	NA	NA	NA	NA	0.01	NA	NA	NA
Selenium	mg/l	NA	NA	NA	NA	NA	NA	0.05	NA	NA	NA
Silver	mg/l	NA	NA	NA	NA	NA	NA	0.01	NA	NA	NA
Thallium	mg/l	NA	NA	NA	NA	NA	NA	0.05	NA	NA	NA
Tin	mg/l	NA	NA	NA	NA	NA	NA	0.30	NA	NA	NA
Vanadium	mg/l	NA	NA	NA	NA	NA	NA	0.03	NA	NA	NA
Zinc	mg/l	NA	NA	NA	NA	NA	NA	**0.029**	NA	NA	NA
VOLATILE ORGANICS/PURGEABLE ORGANICS											
1,2,3-Trichlorobenzene	µg/l	0.096	NA	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Acetone	µg/l	2.0	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75
Benzene	µg/l	0.15	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Chloroform	µg/l	1.1	**0.7**	**0.9**	**0.8**	**0.8**	**0.5**	0.07	0.07	**0.60**	0.07
Chloromethane	µg/l	0.36	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14
Dichlorodifluoromethane	µg/l	0.30	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09
Methylene Chloride	µg/l	0.14	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Naphthalene	µg/l	0.049	NA	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Toluene	µg/l	0.13	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07
Trichlorofluoromethane	µg/l	0.20	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07
SEMI-VOLATILE ORGANICS: None Detected											
HERBICIDES, PESTICIDES, & PCBs: None Detected											

NOTES:

NA Sample was not analyzed for this parameter during the specified sampling round.

▨ Indicates that the analyte was not detected above laboratory practical quantitation limit (PQL).
Value listed is MDL or estimated trace concentration (BOLDED).

TABLE 2
PICACHO SOLID WASTE SITE
HISTORICAL SUMMARY
MONITORING WELL P-MW-1 (CONT'D)

ANALYTE	UNIT	Aug 2008	Jun 2009	Sep 2009	Feb 2010	Aug 2010	MED.	AVG.	STD. DEV.	MIN.	MAX.
GENERAL CHEMISTRY											
Bicarbonate Alkalinity	mg/l	NA	NA	NA	NA	NA	NC	NC	NC	NC	NC
Carbonate Alkalinity	mg/l	NA	NA	NA	NA	NA	NC	NC	NC	NC	NC
Chloride	mg/l	101	130	120	120	120	116	115	11	84	140
Cyanide	mg/l	NA	NA	NA	NA	NA	NC	NC	NC	NC	NC
Hydroxide Alkalinity	mg/l	NA	NA	NA	NA	NA	NC	NC	NC	NC	NC
Nitrate as N	mg/l	2.50	2.7	2.6	2.7	2.5	2.5	2.27	0.63	0.26	3.5
pH	units	7.6	8.55	7.63	7.70	8.30	8.12	7.97	0.44	6.23	8.6
Perchlorate	mg/l	NA	NA	NA	NA	NA	NC	NC	NC	NC	NC
Specific Conductance	µmhos/cm	901	1020	971	739	1060	1000	1003	87	739	1200
Sulfate	mg/l	99.9	110	120	120	110	110	101	23	48	130
Sulfide	mg/l	NA	NA	NA	NA	NA	NC	NC	NC	NC	NC
Total Dissolved Solids	mg/l	600	620	570	640	640	624	634	124	432	1200
METALS											
Antimony	mg/l	NA	NA	NA	NA	NA	NC	NC	NC	NC	NC
Arsenic	mg/l	NA	NA	NA	NA	NA	0.014	0.013	0.001	0.012	0.014
Barium	mg/l	NA	NA	NA	NA	NA	NC	NC	NC	NC	NC
Beryllium	mg/l	NA	NA	NA	NA	NA	NC	NC	NC	NC	NC
Cadmium	mg/l	NA	NA	NA	NA	NA	NC	NC	NC	NC	NC
Chromium	mg/l	NA	NA	NA	NA	NA	NC	NC	NC	NC	NC
Cobalt	mg/l	NA	NA	NA	NA	NA	NC	NC	NC	NC	NC
Copper	mg/l	NA	NA	NA	NA	NA	NC	NC	NC	NC	NC
Lead	mg/l	NA	NA	NA	NA	NA	NC	NC	NC	NC	NC
Mercury	mg/l	NA	NA	NA	NA	NA	NC	NC	NC	NC	NC
Nickel	mg/l	NA	NA	NA	NA	NA	NC	NC	NC	NC	NC
Selenium	mg/l	NA	NA	NA	NA	NA	0.008	0.008	0.001	0.007	0.008
Silver	mg/l	NA	NA	NA	NA	NA	NC	NC	NC	NC	NC
Thallium	mg/l	NA	NA	NA	NA	NA	NC	NC	NC	NC	NC
Tin	mg/l	NA	NA	NA	NA	NA	NC	NC	NC	NC	NC
Vanadium	mg/l	NA	NA	NA	NA	NA	NC	NC	NC	NC	NC
Zinc	mg/l	NA	NA	NA	NA	NA	NC	NC	NC	NC	NC
VOLATILE ORGANICS/PURGEABLE ORGANICS											
1,2,3-Trichlorobenzene	µg/l	0.05	0.37	0.37	0.14	0.16	NC	NC	NC	NC	NC
Acetone	µg/l	1.75	7.4	7.4	4.6	4.6	NC	NC	NC	NC	NC
Benzene	µg/l	0.05	0.18	0.18	0.086	0.083	NC	NC	NC	NC	NC
Chloroform	µg/l	0.07	**0.48**	0.65*	0.61*	**0.48**	0.91	0.88	0.22	0.46	1.4
Chloromethane	µg/l	0.14	0.20	0.20	0.11	0.14	NC	NC	NC	NC	NC
Dichlorodifluoromethane	µg/l	0.09	0.22	0.21	0.11	0.099	NC	NC	NC	NC	NC
Methylene Chloride	µg/l	0.05	0.27	0.28	0.28	0.48	NC	NC	NC	NC	NC
Naphthalene	µg/l	0.05	0.30	0.30	0.36	0.36	NC	NC	NC	NC	NC
Toluene	µg/l	0.07	0.12	0.12	0.093	0.093	NC	NC	NC	NC	NC
Trichlorofluoromethane	µg/l	0.07	0.22	0.22	0.11	0.13	NC	NC	NC	NC	NC
SEMI-VOLATILE ORGANICS: None Detected											
HERBICIDES, PESTICIDES, & PCBs: None Detected											

NOTES:

NA Sample was not analyzed for this parameter during the specified sampling round.

▨ Indicates that the analyte was not detected above laboratory practical quantitation limit (PQL).
Value listed is MDL or estimated trace concentration (BOLDED).

NC No calculation performed. Requires a minimum of three data entries.

* Analyte also found in blank(s).

TABLE 3
PICACHO SOLID WASTE SITE
HISTORICAL SUMMARY
MONITORING WELL P-MW-2

ANALYTE	UNIT	Nov 1994	Nov 1994	Nov 1994	Nov 1994	Jul 1995	Jul 1995	Jul 1995	Jul 1995	Jul 1996	Jul 1996
GENERAL CHEMISTRY											
Bicarbonate Alkalinity	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Carbonate Alkalinity	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chloride	mg/l	140	140	140	140	130	130	130	130	145	150
Cyanide	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	0.03	NA
Hydroxide Alkalinity	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nitrate as N	mg/l	1.7	1.7	1.6	1.6	2.3	2.6	2.4	2.6	1.89	1.89
pH	units	8.1	8.2	8.0	8.2	8.0	8.0	8.0	8.0	8.08	8.05
Perchlorate	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Specific Conductance	µmhos/cm	NA	NA	NA	NA	NA	NA	NA	NA	935	923
Sulfate	mg/l	74	76	74	71	67	68	67	67	65.0	65.0
Sulfide	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	0.13	NA
Total Dissolved Solids	mg/l	630	620	600	610	600	570	600	590	514	552
METALS											
Antimony	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	0.005	NA
Arsenic	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	0.005	NA
Barium	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	0.1	NA
Beryllium	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	0.001	NA
Cadmium	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	0.003	NA
Chromium	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	0.003	NA
Cobalt	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	0.003	NA
Copper	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	0.003	NA
Lead	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	0.005	NA
Mercury	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	0.002	NA
Nickel	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	0.003	NA
Selenium	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	0.005	NA
Silver	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	0.001	NA
Thallium	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	0.011	NA
Tin	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	0.042	NA
Vanadium	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	0.003	NA
Zinc	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	0.01	NA
VOLATILE ORGANICS/PURGEABLE ORGANICS											
Chloroform	µg/l	1	NA	NA	NA	1	NA	NA	NA	0.2	NA
Chloromethane	µg/l	ND	NA	NA	NA	ND	NA	NA	NA	ND	NA
Methylene Chloride	µg/l	1	NA	NA	NA	1	NA	NA	NA	0.2	NA
Naphthalene	µg/l	ND	NA	NA	NA	ND	NA	NA	NA	ND	NA
Toluene	µg/l	1	NA	NA	NA	1	NA	NA	NA	**0.4(a)**	NA
SEMI-VOLATILE ORGANICS: None Detected											
HERBICIDES, PESTICIDES, & PCBs: None Detected											

NOTES:

NA Sample was not analyzed for this parameter during the specified sampling round.

▨ Indicates that the analyte was not detected above laboratory practical quantitation limit (PQL).
Value listed is MDL or estimated trace concentration (BOLDED).

ND Constituent not detected; MDL not provided.

(a) Suspected laboratory/field contaminant.

TABLE 3
PICACHO SOLID WASTE SITE
HISTORICAL SUMMARY
MONITORING WELL P-MW-2 (CONT'D)

ANALYTE	UNIT	Jul 1996	Jul 1996	Sept 1996	Sept 1996	Sept 1996	Sept 1996	Jul 1997	Jul 1997	Jul 1997	Jul 1997
GENERAL CHEMISTRY											
Bicarbonate Alkalinity	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Carbonate Alkalinity	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chloride	mg/l	148	147	140	140	140	140	138	138	140	140
Cyanide	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Hydroxide Alkalinity	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nitrate as N	mg/l	2.07	2.20	2.19	2.4	2.12	2.33	1.9	2.1	2.1	2.1
pH	units	8.06	8.08	7.7	7.73	7.7	7.75	7.48	7.44	7.43	7.47
Perchlorate	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Specific Conductance	µmhos/cm	947	923	NA	NA	NA	NA	NA	NA	NA	NA
Sulfate	mg/l	71.0	65.0	61.1	61.1	63.6	66.2	41.8	41.2	43.1	39.8
Sulfide	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Dissolved Solids	mg/l	560	564	520	514	520	506	540	540	556	538
METALS											
Antimony	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Barium	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Beryllium	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cadmium	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chromium	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cobalt	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Copper	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lead	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mercury	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nickel	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Selenium	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Silver	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Thallium	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Tin	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vanadium	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Zinc	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
VOLATILE ORGANICS/PURGEABLE ORGANICS											
Chloroform	µg/l	NA	NA	**0.4(a)**	NA	NA	NA	0.2	NA	NA	NA
Chloromethane	µg/l	NA	NA	ND	NA	NA	NA	ND	NA	NA	NA
Methylene Chloride	µg/l	NA	NA	0.2	NA	NA	NA	0.2	NA	NA	NA
Naphthalene	µg/l	NA	NA	ND	NA	NA	NA	ND	NA	NA	NA
Toluene	µg/l	NA	NA	0.3	NA	NA	NA	**0.34***	NA	NA	NA
SEMI-VOLATILE ORGANICS: None Detected											
HERBICIDES, PESTICIDES, & PCBs: None Detected											

NOTES:

NA Sample was not analyzed for this parameter during the specified sampling round.

▨ Indicates that the analyte was not detected above laboratory practical quantitation limit (PQL).
Value listed is MDL or estimated trace concentration (BOLDED).

ND Constituent not detected; MDL not provided.

(a) Suspected laboratory/field contaminant.

* Analyte also found in blank(s).

TABLE 3
PICACHO SOLID WASTE SITE
HISTORICAL SUMMARY
MONITORING WELL P-MW-2 (CONT'D)

ANALYTE	UNIT	Sept 1997	Sept 1997	Sept 1997	Sept 1997	Mar 1998	Aug 1998	Mar 1999	Aug 1999	Feb 2000
GENERAL CHEMISTRY										
Bicarbonate Alkalinity	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA
Carbonate Alkalinity	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chloride	mg/l	138	138	138	137	137	140	133	123	123
Cyanide	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA
Hydroxide Alkalinity	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nitrate as N	mg/l	1.03	1.04	1.19	1.13	2.5	2.7	1.79	2.22	2.72
pH	units	7.94	7.96	7.94	7.95	7.86	8.16	7.81	7.85	8.21
Perchlorate	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA
Specific Conductance	µmhos/cm	NA	NA	NA	NA	NA	NA	962	919	918
Sulfate	mg/l	43	41	41	43	60	NA	NA	NA	NA
Sulfide	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Dissolved Solids	mg/l	516	510	536	536	540	546	539	528	527
METALS										
Antimony	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA
Barium	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA
Beryllium	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cadmium	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chromium	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cobalt	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA
Copper	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lead	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mercury	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nickel	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA
Selenium	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA
Silver	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA
Thallium	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA
Tin	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vanadium	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA
Zinc	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA
VOLATILE ORGANICS/PURGEABLE ORGANICS										
Chloroform	µg/l	0.2	NA	NA	NA	0.06	0.06	0.17	0.06	0.06
Chloromethane	µg/l	ND	NA	NA	NA	ND	ND	**0.138(a)**	0.14	0.14
Methylene Chloride	µg/l	0.2	NA	NA	NA	0.08	**0.21***	0.35	0.03	0.03
Naphthalene	µg/l	ND	NA	NA	NA	ND	ND	ND	0.1	**0.247**
Toluene	µg/l	0.3	NA	NA	NA	0.07	0.07	0.05	0.07	0.07
SEMI-VOLATILE ORGANICS: None Detected										
HERBICIDES, PESTICIDES, & PCBs: None Detected										

NOTES:

NA Sample was not analyzed for this parameter during the specified sampling round.

▨ Indicates that the analyte was not detected above laboratory practical quantitation limit (PQL).
Value listed is MDL or estimated trace concentration (BOLDED).

ND Constituent not detected; MDL not provided.

(a) Suspected laboratory/field contaminant.

* Analyte also found in blank(s).

TABLE 3
PICACHO SOLID WASTE SITE
HISTORICAL SUMMARY
MONITORING WELL P-MW-2 (CONT'D)

ANALYTE	UNIT	Aug 2000	Feb 2001	Aug 2001	Feb 2002	Aug 2002	Aug 2002	Feb 2003	Feb 2003	Aug 2003
GENERAL CHEMISTRY										
Bicarbonate Alkalinity	mg/l	NA	156	NA	NA	NA	NA	NA	NA	NA
Carbonate Alkalinity	mg/l	NA	20.0	NA	NA	NA	NA	NA	NA	NA
Chloride	mg/l	123	149	130	140	140	140	140	160	160
Cyanide	mg/l	NA	0.0100	NA	NA	NA	NA	NA	NA	NA
Hydroxide Alkalinity	mg/l	NA	20.0	NA	NA	NA	NA	NA	NA	NA
Nitrate as N	mg/l	2.68	2.70	2.6	2.6	4.2	3.2	2.7	2.5	2.6
pH	units	7.86	7.98	8.04	7.94	8.01	NA	8.25	NA	7.98
Perchlorate	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA
Specific Conductance	µmhos/cm	914	912	902	884	874	NA	892	NA	918
Sulfate	mg/l	NA	100	NA	NA	NA	NA	NA	NA	NA
Sulfide	mg/l	NA	0.500	NA	NA	NA	NA	NA	NA	NA
Total Dissolved Solids	mg/l	524	568	600	560	660	530	600	540	510
METALS										
Antimony	mg/l	NA	0.060	NA	NA	NA	NA	NA	NA	NA
Arsenic	mg/l	NA	0.100	NA	NA	NA	NA	NA	NA	NA
Barium	mg/l	NA	0.0120	NA	NA	NA	NA	NA	NA	NA
Beryllium	mg/l	NA	0.001	NA	NA	NA	NA	NA	NA	NA
Cadmium	mg/l	NA	0.010	NA	NA	NA	NA	NA	NA	NA
Chromium	mg/l	NA	0.0269	NA	NA	NA	NA	NA	NA	NA
Cobalt	mg/l	NA	0.007	NA	NA	NA	NA	NA	NA	NA
Copper	mg/l	NA	0.010	NA	NA	NA	NA	NA	NA	NA
Lead	mg/l	NA	0.075	NA	NA	NA	NA	NA	NA	NA
Mercury	mg/l	NA	0.0002	NA	NA	NA	NA	NA	NA	NA
Nickel	mg/l	NA	0.030	NA	NA	NA	NA	NA	NA	NA
Selenium	mg/l	NA	0.100	NA	NA	NA	NA	NA	NA	NA
Silver	mg/l	NA	0.007	NA	NA	NA	NA	NA	NA	NA
Thallium	mg/l	NA	0.100	NA	NA	NA	NA	NA	NA	NA
Tin	mg/l	NA	0.250	NA	NA	NA	NA	NA	NA	NA
Vanadium	mg/l	NA	0.0114	NA	NA	NA	NA	NA	NA	NA
Zinc	mg/l	NA	0.020	NA	NA	NA	NA	NA	NA	NA
VOLATILE ORGANICS/PURGEABLE ORGANICS										
Chloroform	µg/l	0.07	0.07	0.07	0.50	0.50	NA	1.4	NA	0.19
Chloromethane	µg/l	**0.143**	0.14	0.14	0.50	0.50	NA	0.14	NA	0.36
Methylene Chloride	µg/l	0.06	0.06	0.06	0.50	0.50	NA	0.16	NA	0.14
Naphthalene	µg/l	0.10	0.10	0.10	0.50	0.50	NA	0.078	NA	0.049
Toluene	µg/l	0.07	0.07	0.07	0.30	0.30	NA	0.11	NA	0.13
SEMI-VOLATILE ORGANICS: None Detected										
HERBICIDES, PESTICIDES, & PCBs: None Detected										

NOTES:

NA Sample was not analyzed for this parameter during the specified sampling round.

▨ Indicates that the analyte was not detected above laboratory practical quantitation limit (PQL),
Value listed is MDL or estimated trace concentration (BOLDED).

TABLE 3
PICACHO SOLID WASTE SITE
HISTORICAL SUMMARY
MONITORING WELL P-MW-2 (CONT'D)

ANALYTE	UNIT	Aug 2003	Apr 2004	Aug 2004	Feb 2005	Sep 2005	Feb 2006	Aug 2006	Feb 2007	Aug 2007	Feb 2008
GENERAL CHEMISTRY											
Bicarbonate Alkalinity	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Carbonate Alkalinity	mg/l	NA	NA	NA	NA	NA	NA	8.00	NA	NA	NA
Chloride	mg/l	140	136	131	132	146	133	133	130	122	130
Cyanide	mg/l	NA	NA	NA	NA	NA	NA	0.01	NA	NA	NA
Hydroxide Alkalinity	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nitrate as N	mg/l	2.5	2.62	2.75	2.15	2.55	2.55	2.43	2.40	2.35	2.33
pH	units	NA	8.0	7.8	8.1	7.5	7.8	8.4	8.2	7.5	7.9
Perchlorate	mg/l	NA	NA	NA	NA	NA	NA	0.0020	NA	NA	NA
Specific Conductance	µmhos/cm	NA	1000	1100	820	990	1100	850	740	900	1000
Sulfate	mg/l	NA	64.5	61.0	62.0	59.3	61.0	63.0	52.3	56.6	57.7
Sulfide	mg/l	NA	NA	NA	NA	NA	NA	0.01	NA	NA	NA
Total Dissolved Solids	mg/l	530	665	584	590	590	600	600	608	630	604
METALS											
Antimony	mg/l	NA	NA	NA	NA	NA	NA	0.05	NA	NA	NA
Arsenic	mg/l	NA	NA	NA	NA	NA	NA	0.05	NA	NA	NA
Barium	mg/l	NA	NA	NA	NA	NA	NA	0.03	NA	NA	NA
Beryllium	mg/l	NA	NA	NA	NA	NA	NA	0.01	NA	NA	NA
Cadmium	mg/l	NA	NA	NA	NA	NA	NA	0.01	NA	NA	NA
Chromium	mg/l	NA	NA	NA	NA	NA	NA	**0.010**	NA	NA	NA
Cobalt	mg/l	NA	NA	NA	NA	NA	NA	0.01	NA	NA	NA
Copper	mg/l	NA	NA	NA	NA	NA	NA	**0.021**	NA	NA	NA
Lead	mg/l	NA	NA	NA	NA	NA	NA	0.05	NA	NA	NA
Mercury	mg/l	NA	NA	NA	NA	NA	NA	0.001	NA	NA	NA
Nickel	mg/l	NA	NA	NA	NA	NA	NA	0.01	NA	NA	NA
Selenium	mg/l	NA	NA	NA	NA	NA	NA	0.05	NA	NA	NA
Silver	mg/l	NA	NA	NA	NA	NA	NA	0.01	NA	NA	NA
Thallium	mg/l	NA	NA	NA	NA	NA	NA	0.05	NA	NA	NA
Tin	mg/l	NA	NA	NA	NA	NA	NA	0.30	NA	NA	NA
Vanadium	mg/l	NA	NA	NA	NA	NA	NA	0.03	NA	NA	NA
Zinc	mg/l	NA	NA	NA	NA	NA	NA	**0.028**	NA	NA	NA
VOLATILE ORGANICS/PURGEABLE ORGANICS											
Chloroform	µg/l	NA	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07
Chloromethane	µg/l	NA	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14
Methylene Chloride	µg/l	NA	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Naphthalene	µg/l	NA	NA	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Toluene	µg/l	NA	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07
SEMI-VOLATILE ORGANICS: None Detected											
HERBICIDES, PESTICIDES, & PCBs: None Detected											

NOTES:

NA Sample was not analyzed for this parameter during the specified sampling round.

▨ Indicates that the analyte was not detected above laboratory practical quantitation limit (PQL).
Value listed is MDL or estimated trace concentration (BOLDED).

TABLE 3
PICACHO SOLID WASTE SITE
HISTORICAL SUMMARY
MONITORING WELL P-MW-2 (CONT'D)

ANALYTE	UNIT	Aug 2008	Jun 2009	Sep 2009	Feb 2010	Aug 2010	MED.	AVG.	STD. DEV.	MIN.	MAX.
GENERAL CHEMISTRY											
Bicarbonate Alkalinity	mg/l	NA	NA	NA	NA	NA	NC	NC	NC	NC	NC
Carbonate Alkalinity	mg/l	NA	NA	NA	NA	NA	NC	NC	NC	NC	NC
Chloride	mg/l	122	140	130	140	140	140	137	8	122	160
Cyanide	mg/l	NA	NA	NA	NA	NA	NC	NC	NC	NC	NC
Hydroxide Alkalinity	mg/l	NA	NA	NA	NA	NA	NC	NC	NC	NC	NC
Nitrate as N	mg/l	2.55	2.9	2.6	2.7	2.5	2.40	2.30	0.55	1.03	4.2
pH	units	7.3	8.00	8.00	7.59	7.49	7.97	7.9	0.25	7.3	8.4
Perchlorate	mg/l	NA	NA	NA	NA	NA	NC	NC	NC	NC	NC
Specific Conductance	µmhos/cm	980	929	1010	998	954	923	936	75	740	1100
Sulfate	mg/l	55.2	66	61	65	56	61.1	59.4	10.4	39.8	76
Sulfide	mg/l	NA	NA	NA	NA	NA	NC	NC	NC	NC	NC
Total Dissolved Solids	mg/l	560	530	530	590	580	560	564	40	506	665
METALS											
Antimony	mg/l	NA	NA	NA	NA	NA	NC	NC	NC	NC	NC
Arsenic	mg/l	NA	NA	NA	NA	NA	NC	NC	NC	NC	NC
Barium	mg/l	NA	NA	NA	NA	NA	NC	NC	NC	NC	NC
Beryllium	mg/l	NA	NA	NA	NA	NA	NC	NC	NC	NC	NC
Cadmium	mg/l	NA	NA	NA	NA	NA	NC	NC	NC	NC	NC
Chromium	mg/l	NA	NA	NA	NA	NA	0.010	0.013	0.012	0.003	0.0269
Cobalt	mg/l	NA	NA	NA	NA	NA	NC	NC	NC	NC	NC
Copper	mg/l	NA	NA	NA	NA	NA	NC	NC	NC	NC	NC
Lead	mg/l	NA	NA	NA	NA	NA	NC	NC	NC	NC	NC
Mercury	mg/l	NA	NA	NA	NA	NA	NC	NC	NC	NC	NC
Nickel	mg/l	NA	NA	NA	NA	NA	NC	NC	NC	NC	NC
Selenium	mg/l	NA	NA	NA	NA	NA	NC	NC	NC	NC	NC
Silver	mg/l	NA	NA	NA	NA	NA	NC	NC	NC	NC	NC
Thallium	mg/l	NA	NA	NA	NA	NA	NC	NC	NC	NC	NC
Tin	mg/l	NA	NA	NA	NA	NA	NC	NC	NC	NC	NC
Vanadium	mg/l	NA	NA	NA	NA	NA	NC	NC	NC	NC	NC
Zinc	mg/l	NA	NA	NA	NA	NA	NC	NC	NC	NC	NC
VOLATILE ORGANICS/PURGEABLE ORGANICS											
Chloroform	µg/l	0.07	0.23	0.23	0.072	0.12	NC	NC	NC	NC	NC
Chloromethane	µg/l	0.14	0.20	0.20	0.11	0.14	NC	NC	NC	NC	NC
Methylene Chloride	µg/l	0.05	0.27	0.28	0.28	0.48	NC	NC	NC	NC	NC
Naphthalene	µg/l	0.05	0.30	0.30	0.36	0.36	NC	NC	NC	NC	NC
Toluene	µg/l	0.07	0.12	0.12	0.093	0.093	NC	NC	NC	NC	NC
SEMI-VOLATILE ORGANICS: None Detected											
HERBICIDES, PESTICIDES, & PCBs: None Detected											

NOTES:

NA Sample was not analyzed for this parameter during the specified sampling round.

▨ Indicates that the analyte was not detected above laboratory practical quantitation limit (PQL).
Value listed is MDL or estimated trace concentration (BOLDED).

NC No calculation performed. Requires a minimum of three data entries.

TABLE 4
PICACHO SOLID WASTE SITE
HISTORICAL SUMMARY
MONITORING WELL P-DW-3A

ANALYTE	UNIT	Nov 1994	Nov 1994	Jul 1995	Jul 1995	Jul 1996	Jul 1996	Sept 1996	Sept 1996
GENERAL CHEMISTRY									
Chloride	mg/l	89	90	90	90	99.0	100	97.5	97.5
Cyanide	mg/l	NA	NA	NA	NA	0.03	NA	NA	NA
Nitrate as N	mg/l	1.7	1.7	2.3	2.2	1.89	1.81	2.12	1.97
pH	units	8.2	8.1	8.2	8.2	8.22	8.18	7.9	7.82
Specific Conductance	µmhos/cm	NA	NA	NA	NA	911	892	NA	NA
Sulfate	mg/l	100	100	98	98	97.0	97.0	91.9	90.9
Sulfide	mg/l	NA	NA	NA	NA	0.05	NA	NA	NA
Total Dissolved Solids	mg/l	670	700	570	680	524	518	440	448
METALS									
Antimony	mg/l	NA	NA	NA	NA	0.005	NA	NA	NA
Arsenic	mg/l	NA	NA	NA	NA	0.005	NA	NA	NA
Barium	mg/l	NA	NA	NA	NA	0.1	NA	NA	NA
Beryllium	mg/l	NA	NA	NA	NA	0.001	NA	NA	NA
Cadmium	mg/l	NA	NA	NA	NA	0.003	NA	NA	NA
Chromium	mg/l	NA	NA	NA	NA	0.006	NA	NA	NA
Cobalt	mg/l	NA	NA	NA	NA	0.003	NA	NA	NA
Copper	mg/l	NA	NA	NA	NA	0.003	NA	NA	NA
Lead	mg/l	NA	NA	NA	NA	0.005	NA	NA	NA
Mercury	mg/l	NA	NA	NA	NA	0.002	NA	NA	NA
Nickel	mg/l	NA	NA	NA	NA	0.003	NA	NA	NA
Selenium	mg/l	NA	NA	NA	NA	0.005	NA	NA	NA
Silver	mg/l	NA	NA	NA	NA	0.001	NA	NA	NA
Thallium	mg/l	NA	NA	NA	NA	0.005	NA	NA	NA
Tin	mg/l	NA	NA	NA	NA	0.045	NA	NA	NA
Vanadium	mg/l	NA	NA	NA	NA	0.003	NA	NA	NA
Zinc	mg/l	NA	NA	NA	NA	0.01	NA	NA	NA
VOLATILE ORGANICS/PURGEABLE ORGANICS									
4-Methyl-2-Pentanone	µg/l	NA	NA	NA	NA	ND	NA	ND	NA
Chloroform	µg/l	NA	NA	NA	NA	0.2	NA	**0.4(a)**	NA
Chloromethane	µg/l	NA	NA	NA	NA	ND	NA	ND	NA
Toluene	µg/l	NA	NA	NA	NA	**0.4(a)**	NA	0.3	NA
SEMI-VOLATILE ORGANICS: None Detected									
HERBICIDES, PESTICIDES AND PCBs: None Detected									

NOTES:

NA Sample was not analyzed for this parameter during the specified sampling round.

▨ Indicates that the analyte was not detected above laboratory practical quantitation limit (PQL).
Value listed is MDL or estimated trace concentration (BOLDED).

ND Constituent not detected; MDL not provided.

(a) Suspected laboratory/field contaminant.

TABLE 4
PICACHO SOLID WASTE SITE
HISTORICAL SUMMARY
MONITORING WELL P-DW-3A (CONT'D)

ANALYTE	UNIT	Jul 1997	Jul 1997	Jul 1997	Jul 1997	Sept 1997	Sept 1997	Sept 1997	Sept 1997
GENERAL CHEMISTRY									
Chloride	mg/l	93	95	95	98	98	96	98	96
Cyanide	mg/l	NA	NA	NA	NA	NA	NA	NA	NA
Nitrate as N	mg/l	1.96	1.85	1.83	1.72	1.65	1.46	1.76	1.99
pH	units	7.57	7.6	7.61	7.59	8.05	8.05	8.04	8.03
Specific Conductance	µmhos/cm	NA	NA	NA	NA	NA	NA	NA	NA
Sulfate	mg/l	69.5	67.5	66.2	62.9	58	62	66	60
Sulfide	mg/l	NA	NA	NA	NA	NA	NA	NA	NA
Total Dissolved Solids	mg/l	546	542	560	564	540	528	528	522
METALS									
Antimony	mg/l	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic	mg/l	NA	NA	NA	NA	NA	NA	NA	NA
Barium	mg/l	NA	NA	NA	NA	NA	NA	NA	NA
Beryllium	mg/l	NA	NA	NA	NA	NA	NA	NA	NA
Cadmium	mg/l	NA	NA	NA	NA	NA	NA	NA	NA
Chromium	mg/l	NA	NA	NA	NA	NA	NA	NA	NA
Cobalt	mg/l	NA	NA	NA	NA	NA	NA	NA	NA
Copper	mg/l	NA	NA	NA	NA	NA	NA	NA	NA
Lead	mg/l	NA	NA	NA	NA	NA	NA	NA	NA
Mercury	mg/l	NA	NA	NA	NA	NA	NA	NA	NA
Nickel	mg/l	NA	NA	NA	NA	NA	NA	NA	NA
Selenium	mg/l	NA	NA	NA	NA	NA	NA	NA	NA
Silver	mg/l	NA	NA	NA	NA	NA	NA	NA	NA
Thallium	mg/l	NA	NA	NA	NA	NA	NA	NA	NA
Tin	mg/l	NA	NA	NA	NA	NA	NA	NA	NA
Vanadium	mg/l	NA	NA	NA	NA	NA	NA	NA	NA
Zinc	mg/l	NA	NA	NA	NA	NA	NA	NA	NA
VOLATILE ORGANICS/PURGEABLE ORGANICS									
4-Methyl-2-Pentanone	µg/l	ND	NA	NA	NA	ND	NA	NA	NA
Chloroform	µg/l	0.2	NA	NA	NA	0.2	NA	NA	NA
Chloromethane	µg/l	ND	NA	NA	NA	ND	NA	NA	NA
Toluene	µg/l	0.3	NA	NA	NA	0.3	NA	NA	NA
SEMI-VOLATILE ORGANICS: None Detected									
HERBICIDES, PESTICIDES AND PCBs: None Detected									

NOTES:

NA Sample was not analyzed for this parameter during the specified sampling round.

▨ Indicates that the analyte was not detected above laboratory practical quantitation limit (PQL).
Value listed is MDL or estimated trace concentration (BOLDED).

ND Constituent not detected; MDL not provided.

TABLE 4
PICACHO SOLID WASTE SITE
HISTORICAL SUMMARY
MONITORING WELL P-DW-3A (CONT'D) - PIEZOMETER AFTER MARCH 1999

ANALYTE	UNIT	Mar 1998	Aug 1998	Mar 1999	MED.	AVG.	STD. DEV.	MIN.	MAX.
GENERAL CHEMISTRY									
Chloride	mg/l	91	97	90.4	96	95	4	89	100
Cyanide	mg/l	NA	NA	NA	NC	NC	NC	NC	NC
Nitrate as N	mg/l	2.2	2.3	1.55	1.87	1.91	0.2	1.5	2.3
pH	units	7.98	8.26	8.05	8.05	7.98	0.24	7.57	8.26
Specific Conductance	µmhos/cm	NA	NA	932	NC	NC	NC	NC	NC
Sulfate	mg/l	86	NA	NA	86	81	17	58	100
Sulfide	mg/l	NA	NA	NA	NC	NC	NC	NC	NC
Total Dissolved Solids	mg/l	533	533	530	536.5	553	69	440	700
METALS									
Antimony	mg/l	NA	NA	NA	NC	NC	NC	NC	NC
Arsenic	mg/l	NA	NA	NA	NC	NC	NC	NC	NC
Barium	mg/l	NA	NA	NA	NC	NC	NC	NC	NC
Beryllium	mg/l	NA	NA	NA	NC	NC	NC	NC	NC
Cadmium	mg/l	NA	NA	NA	NC	NC	NC	NC	NC
Chromium	mg/l	NA	NA	NA	NC	NC	NC	NC	NC
Cobalt	mg/l	NA	NA	NA	NC	NC	NC	NC	NC
Copper	mg/l	NA	NA	NA	NC	NC	NC	NC	NC
Lead	mg/l	NA	NA	NA	NC	NC	NC	NC	NC
Mercury	mg/l	NA	NA	NA	NC	NC	NC	NC	NC
Nickel	mg/l	NA	NA	NA	NC	NC	NC	NC	NC
Selenium	mg/l	NA	NA	NA	NC	NC	NC	NC	NC
Silver	mg/l	NA	NA	NA	NC	NC	NC	NC	NC
Thallium	mg/l	NA	NA	NA	NC	NC	NC	NC	NC
Tin	mg/l	NA	NA	NA	NC	NC	NC	NC	NC
Vanadium	mg/l	NA	NA	NA	NC	NC	NC	NC	NC
Zinc	mg/l	NA	NA	NA	NC	NC	NC	NC	NC
VOLATILE ORGANICS/PURGEABLE ORGANICS									
4-Methyl-2-Pentanone	µg/l	ND	ND	**0.413**	NC	NC	NC	NC	NC
Chloroform	µg/l	0.06	0.06	0.17	NC	NC	NC	NC	NC
Chloromethane	µg/l	ND	ND	**0.118(a)**	NC	NC	NC	NC	NC
Toluene	µg/l	0.07	0.07	0.05	NC	NC	NC	NC	NC
SEMI-VOLATILE ORGANICS: None Detected									
HERBICIDES, PESTICIDES AND PCBs: None Detected									

NOTES:

NA Sample was not analyzed for this parameter during the specified sampling round.

▨ Indicates that the analyte was not detected above laboratory practical quantitation limit (PQL).
Value listed is MDL or estimated trace concentration (BOLDED).

NC No calculation performed. Requires a minimum of three data entries.

ND Constituent not detected; MDL not provided.

(a) Suspected laboratory/field contaminant.

TABLE 5
PICACHO SOLID WASTE SITE
HISTORICAL SUMMARY
MONITORING WELL P-MW-4

ANALYTE	UNIT	Nov 1994	Nov 1994	Nov 1994	Nov 1994	Jul 1995	Jul 1995	Jul 1995	Jul 1995	Jul 1996	Jul 1996
GENERAL CHEMISTRY											
Bicarbonate Alkalinity	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Carbonate Alkalinity	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chloride	mg/l	110	110	110	110	130	120	120	130	123	123
Cyanide	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	0.03	NA
Hydroxide Alkalinity	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nitrate as N	mg/l	2.4	2.4	1.9	1.9	2.7	2.6	2.4	2.3	2.11	2.20
pH	units	8.1	8.1	8.1	8.1	8.1	8.0	8.0	8.0	8.00	8.01
Perchlorate	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Specific Conductance	µmhos/cm	NA	NA	NA	NA	NA	NA	NA	NA	947	947
Sulfate	mg/l	97	97	98	96	110	110	100	110	97.0	100
Sulfide	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	0.28	NA
Total Dissolved Solids	mg/l	650	630	620	630	650	660	630	680	566	610
METALS											
Antimony	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	0.005	NA
Arsenic	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	0.005	NA
Barium	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	0.1	NA
Beryllium	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	0.001	NA
Cadmium	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	0.003	NA
Chromium	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	0.005	NA
Cobalt	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	0.003	NA
Copper	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	0.003	NA
Lead	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	0.033	NA
Mercury	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	0.002	NA
Nickel	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	0.003	NA
Selenium	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	0.005	NA
Silver	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	0.001	NA
Thallium	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	0.005	NA
Tin	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	0.040	NA
Vanadium	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	0.003	NA
Zinc	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	0.01	NA
VOLATILE ORGANICS/PURGEABLE ORGANICS											
Acetone	µg/l	1	NA	NA	NA	3.8*	NA	NA	NA	1.2	NA
Chloroform	µg/l	ND	NA	NA	NA	ND	NA	NA	NA	ND	NA
Chloromethane	µg/l	ND	NA	NA	NA	ND	NA	NA	NA	ND	NA
Naphthalene	µg/l	ND	NA	NA	NA	ND	NA	NA	NA	ND	NA
Toluene	µg/l	1	NA	NA	NA	1	NA	NA	NA	**0.4(a)**	NA
Vinyl Chloride	µg/l	ND	NA	NA	NA	ND	NA	NA	NA	ND	NA
SEMI-VOLATILE ORGANICS: None Detected											
HERBICIDES, PESTICIDES, & PCBs: None Detected											

NOTES:

NA Sample was not analyzed for this parameter during the specified sampling round.

▨ Indicates that the analyte was not detected above laboratory practical quantitation limit (PQL).
Value listed is MDL or estimated trace concentration (BOLDED).

ND Constituent not detected; MDL not provided.
* Analyte also found in blank(s).
(a) Suspected laboratory/field contaminant.

TABLE 5
PICACHO SOLID WASTE SITE
HISTORICAL SUMMARY
MONITORING WELL P-MW-4 (CONT'D)

ANALYTE	UNIT	Jul 1996	Jul 1996	Sept 1996	Sept 1996	Sept 1996	Sept 1996	Jul 1997	Jul 1997	Jul 1997	Jul 1997
GENERAL CHEMISTRY											
Bicarbonate Alkalinity	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Carbonate Alkalinity	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chloride	mg/l	117	124	115	115	115	115	115	120	115	115
Cyanide	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Hydroxide Alkalinity	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nitrate as N	mg/l	2.11	2.03	2.37	2.41	2.33	2.55	2.1	2.1	2.1	1.76
pH	units	7.99	8.01	7.62	7.75	7.73	7.75	7.56	7.53	7.52	7.54
Perchlorate	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Specific Conductance	µmhos/cm	923	937	NA	NA	NA	NA	NA	NA	NA	NA
Sulfate	mg/l	100	97.0	96.9	94.4	96.9	94.4	79.4	69.5	72.2	68.9
Sulfide	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Dissolved Solids	mg/l	598	550	528	558	556	540	592	516	580	606
METALS											
Antimony	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Barium	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Beryllium	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cadmium	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chromium	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cobalt	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Copper	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lead	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mercury	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nickel	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Selenium	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Silver	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Thallium	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Tin	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vanadium	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Zinc	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
VOLATILE ORGANICS/PURGEABLE ORGANICS											
Acetone	µg/l	NA	NA	1.2	NA	NA	NA	1.2	NA	NA	NA
Chloroform	µg/l	NA	NA	ND	NA	NA	NA	ND	NA	NA	NA
Chloromethane	µg/l	NA	NA	ND	NA	NA	NA	ND	NA	NA	NA
Naphthalene	µg/l	NA	NA	ND	NA	NA	NA	ND	NA	NA	NA
Toluene	µg/l	NA	NA	0.3	NA	NA	NA	0.3	NA	NA	NA
Vinyl Chloride	µg/l	NA	NA	ND	NA	NA	NA	ND	NA	NA	NA
SEMI-VOLATILE ORGANICS: None Detected											
HERBICIDES, PESTICIDES, & PCBs: None Detected											

NOTES:

NA Sample was not analyzed for this parameter during the specified sampling round.

▨ Indicates that the analyte was not detected above laboratory practical quantitation limit (PQL).
Value listed is MDL or estimated trace concentration (BOLDED).

ND Constituent not detected; MDL not provided.

TABLE 5
PICACHO SOLID WASTE SITE
HISTORICAL SUMMARY
MONITORING WELL P-MW-4 (CONT'D)

ANALYTE	UNIT	Sept 1997	Sept 1997	Sept 1997	Sept 1997	Mar 1998	Aug 1998	Mar 1999	Mar 1999	Aug 1999	Feb 2000
GENERAL CHEMISTRY											
Bicarbonate Alkalinity	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Carbonate Alkalinity	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chloride	mg/l	110	110	110	110	111	116	111	103	100	99.3
Cyanide	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Hydroxide Alkalinity	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nitrate as N	mg/l	1.49	1.88	1.51	2.41	2.6	2.8	2.12	1.82	2.32	2.75
pH	units	7.85	7.87	7.85	7.87	7.79	8.10	7.76	NA	7.82	8.15
Perchlorate	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Specific Conductance	µmhos/cm	NA	NA	NA	NA	NA	NA	1023	NA	993	952
Sulfate	mg/l	75	69	66	65	88	NA	NA	NA	NA	NA
Sulfide	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Dissolved Solids	mg/l	564	547	550	570	567	576	573	572	554	566
METALS											
Antimony	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Barium	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Beryllium	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cadmium	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chromium	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cobalt	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Copper	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lead	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mercury	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nickel	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Selenium	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Silver	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Thallium	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Tin	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vanadium	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Zinc	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
VOLATILE ORGANICS/PURGEABLE ORGANICS											
Acetone	µg/l	1.2	NA	NA	NA	5.75	5.75	0.82	NA	1.79	1.79
Chloroform	µg/l	ND	NA	NA	NA	0.06	0.06	0.17	NA	0.07	0.07
Chloromethane	µg/l	ND	NA	NA	NA	ND	ND	0.1	NA	**0.419(a)**	0.14
Naphthalene	µg/l	ND	NA	NA	NA	ND	ND	0.32	NA	0.10	**0.189**
Toluene	µg/l	0.3	NA	NA	NA	0.07	0.07	0.05	NA	0.07	0.07
Vinyl Chloride	µg/l	ND	NA	NA	NA	ND	ND	ND	NA	0.06	0.06
SEMI-VOLATILE ORGANICS: None Detected											
HERBICIDES, PESTICIDES, & PCBs: None Detected											

NOTES:

NA Sample was not analyzed for this parameter during the specified sampling round.

▨ Indicates that the analyte was not detected above laboratory practical quantitation limit (PQL).
Value listed is MDL or estimated trace concentration (BOLDED).

ND Constituent not detected; MDL not provided.

(a) Suspected laboratory/field contaminant.

TABLE 5
PICACHO SOLID WASTE SITE
HISTORICAL SUMMARY
MONITORING WELL P-MW-4 (CONT'D)

ANALYTE	UNIT	Feb 2000	Aug 2000	Feb 2001	Feb 2001	Aug 2001	Feb 2002	Feb 2002	Aug 2002	Feb 2003	Aug 2003
GENERAL CHEMISTRY											
Bicarbonate Alkalinity	mg/l	NA	NA	210	NA	NA	NA	NA	NA	NA	NA
Carbonate Alkalinity	mg/l	NA	NA	20.0	NA	NA	NA	NA	NA	NA	NA
Chloride	mg/l	98.4	106	137	137	110	110	120	120	110	110
Cyanide	mg/l	NA	NA	0.0100	NA	NA	NA	NA	NA	NA	NA
Hydroxide Alkalinity	mg/l	NA	NA	20.0	NA	NA	NA	NA	NA	NA	NA
Nitrate as N	mg/l	2.81	2.79	2.89	2.86	2.6	3.0	3.1	3.7	2.6	0.25
pH	units	NA	7.76	7.87	NA	7.96	7.85	NA	7.96	8.12	7.95
Perchlorate	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Specific Conductance	µmhos/cm	NA	969	946	NA	926	880	NA	886	872	953
Sulfate	mg/l	NA	NA	104	NA	NA	NA	NA	NA	NA	NA
Sulfide	mg/l	NA	NA	0.500	NA	NA	NA	NA	NA	NA	NA
Total Dissolved Solids	mg/l	555	510	602	582	610	590	590	570	620	550
METALS											
Antimony	mg/l	NA	NA	0.060	NA	NA	NA	NA	NA	NA	NA
Arsenic	mg/l	NA	NA	0.100	NA	NA	NA	NA	NA	NA	NA
Barium	mg/l	NA	NA	0.0147	NA	NA	NA	NA	NA	NA	NA
Beryllium	mg/l	NA	NA	0.001	NA	NA	NA	NA	NA	NA	NA
Cadmium	mg/l	NA	NA	0.010	NA	NA	NA	NA	NA	NA	NA
Chromium	mg/l	NA	NA	0.0143	NA	NA	NA	NA	NA	NA	NA
Cobalt	mg/l	NA	NA	0.007	NA	NA	NA	NA	NA	NA	NA
Copper	mg/l	NA	NA	0.010	NA	NA	NA	NA	NA	NA	NA
Lead	mg/l	NA	NA	0.075	NA	NA	NA	NA	NA	NA	NA
Mercury	mg/l	NA	NA	0.0002	NA	NA	NA	NA	NA	NA	NA
Nickel	mg/l	NA	NA	0.030	NA	NA	NA	NA	NA	NA	NA
Selenium	mg/l	NA	NA	0.100	NA	NA	NA	NA	NA	NA	NA
Silver	mg/l	NA	NA	0.007	NA	NA	NA	NA	NA	NA	NA
Thallium	mg/l	NA	NA	0.100	NA	NA	NA	NA	NA	NA	NA
Tin	mg/l	NA	NA	0.250	NA	NA	NA	NA	NA	NA	NA
Vanadium	mg/l	NA	NA	0.0148	NA	NA	NA	NA	NA	NA	NA
Zinc	mg/l	NA	NA	0.020	NA	NA	NA	NA	NA	NA	NA
VOLATILE ORGANICS/PURGEABLE ORGANICS											
Acetone	µg/l	NA	1.79	1.79	1.79	**1.9(a)**	5.0	NA	5.0	1.4	2.0
Chloroform	µg/l	NA	0.07	0.07	**0.161**	0.07	0.50	NA	0.50	1.4	0.19
Chloromethane	µg/l	NA	0.14	0.14	0.14	**0.22(a)**	0.50	NA	0.50	0.14	0.36
Naphthalene	µg/l	NA	0.10	0.10	0.10	0.10	0.50	NA	0.50	0.078	0.049
Toluene	µg/l	NA	0.07	0.07	0.07	0.07	0.30	NA	0.30	0.11	0.13
Vinyl Chloride	µg/l	NA	0.06	0.06	**0.0702**	0.06	ND	NA	ND	ND	ND
SEMI-VOLATILE ORGANICS: None Detected											
HERBICIDES, PESTICIDES, & PCBs: None Detected											

NOTES:

NA Sample was not analyzed for this parameter during the specified sampling round.

▨ Indicates that the analyte was not detected above laboratory practical quantitation limit (PQL).
Value listed is MDL or estimated trace concentration (BOLDED).

ND Constituent not detected; MDL not provided.

(a) Suspected laboratory/field contaminant.

TABLE 5
PICACHO SOLID WASTE SITE
HISTORICAL SUMMARY
MONITORING WELL P-MW-4 (CONT'D)

ANALYTE	UNIT	Apr 2004	Aug 2004	Feb 2005	Sep 2005	Feb 2006	Aug 2006	Feb 2007	Aug 2007	Feb 2008	Aug 2008
GENERAL CHEMISTRY											
Bicarbonate Alkalinity	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Carbonate Alkalinity	mg/l	NA	NA	NA	NA	NA	8.00	NA	NA	NA	NA
Chloride	mg/l	111	110	112	116	101	106	102	98.5	101	103
Cyanide	mg/l	NA	NA	NA	NA	NA	0.01	NA	NA	NA	NA
Hydroxide Alkalinity	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nitrate as N	mg/l	2.60	3.15	2.40	2.75	2.65	2.60	2.60	2.50	2.45	2.80
pH	units	7.7	7.8	8.0	8.1	8.1	9.0	7.9	7.4	8.0	7.78
Perchlorate	mg/l	NA	NA	NA	NA	NA	0.0020	NA	NA	NA	NA
Specific Conductance	µmhos/cm	960	960	840	850	940	820	730	990	920	862
Sulfate	mg/l	93.5	83.0	85.0	82.9	83.0	87.2	71.4	79.5	78.9	80.9
Sulfide	mg/l	NA	NA	NA	NA	NA	0.01	NA	NA	NA	NA
Total Dissolved Solids	mg/l	785	612	600	600	592	592	620	640	608	564
METALS											
Antimony	mg/l	NA	NA	NA	NA	NA	0.05	NA	NA	NA	NA
Arsenic	mg/l	NA	NA	NA	NA	NA	0.05	NA	NA	NA	NA
Barium	mg/l	NA	NA	NA	NA	NA	0.03	NA	NA	NA	NA
Beryllium	mg/l	NA	NA	NA	NA	NA	0.01	NA	NA	NA	NA
Cadmium	mg/l	NA	NA	NA	NA	NA	0.01	NA	NA	NA	NA
Chromium	mg/l	NA	NA	NA	NA	NA	**0.012**	NA	NA	NA	NA
Cobalt	mg/l	NA	NA	NA	NA	NA	0.01	NA	NA	NA	NA
Copper	mg/l	NA	NA	NA	NA	NA	0.01	NA	NA	NA	NA
Lead	mg/l	NA	NA	NA	NA	NA	0.05	NA	NA	NA	NA
Mercury	mg/l	NA	NA	NA	NA	NA	0.001	NA	NA	NA	NA
Nickel	mg/l	NA	NA	NA	NA	NA	0.01	NA	NA	NA	NA
Selenium	mg/l	NA	NA	NA	NA	NA	0.05	NA	NA	NA	NA
Silver	mg/l	NA	NA	NA	NA	NA	0.01	NA	NA	NA	NA
Thallium	mg/l	NA	NA	NA	NA	NA	0.05	NA	NA	NA	NA
Tin	mg/l	NA	NA	NA	NA	NA	0.30	NA	NA	NA	NA
Vanadium	mg/l	NA	NA	NA	NA	NA	0.03	NA	NA	NA	NA
Zinc	mg/l	NA	NA	NA	NA	NA	**0.026**	NA	NA	NA	NA
VOLATILE ORGANICS/PURGEABLE ORGANICS											
Acetone	µg/l	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75
Chloroform	µg/l	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07
Chloromethane	µg/l	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14
Naphthalene	µg/l	NA	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Toluene	µg/l	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07
Vinyl Chloride	µg/l	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
SEMI-VOLATILE ORGANICS: None Detected											
HERBICIDES, PESTICIDES, & PCBs: None Detected											

NOTES:

NA Sample was not analyzed for this parameter during the specified sampling round.

▨ Indicates that the analyte was not detected above laboratory practical quantitation limit (PQL).
Value listed is MDL or estimated trace concentration (BOLDED).

TABLE 5
PICACHO SOLID WASTE SITE
HISTORICAL SUMMARY
MONITORING WELL P-MW-4 (CONT'D)

ANALYTE	UNIT	Jun 2009	Sep 2009	Feb 2010	Aug 2010	MED.	AVG.	STD. DEV.	MIN.	MAX.
GENERAL CHEMISTRY										
Bicarbonate Alkalinity	mg/l	NA	NA	NA	NA	NC	NC	NC	NC	NC
Carbonate Alkalinity	mg/l	NA	NA	NA	NA	NC	NC	NC	NC	NC
Chloride	mg/l	120	110	120	110	111	113.2	8.8	98.4	137
Cyanide	mg/l	NA	NA	NA	NA	NC	NC	NC	NC	NC
Hydroxide Alkalinity	mg/l	NA	NA	NA	NA	NC	NC	NC	NC	NC
Nitrate as N	mg/l	2.9	2.6	2.8	2.7	2.48	2.42	0.51	0.25	3.7
pH	units	8.2	7.92	7.93	8.00	7.94	7.92	0.24	7.4	9.0
Perchlorate	mg/l	NA	NA	NA	NA	NC	NC	NC	NC	NC
Specific Conductance	µmhos/cm	957	1050	987	1000	947	929	68	730	1050
Sulfate	mg/l	89	85	87	82	87.6	88	12.5	65	110
Sulfide	mg/l	NA	NA	NA	NA	NC	NC	NC	NC	NC
Total Dissolved Solids	mg/l	550	540	610	620	590	591	46	510	785
METALS										
Antimony	mg/l	NA	NA	NA	NA	NC	NC	NC	NC	NC
Arsenic	mg/l	NA	NA	NA	NA	NC	NC	NC	NC	NC
Barium	mg/l	NA	NA	NA	NA	NC	NC	NC	NC	NC
Beryllium	mg/l	NA	NA	NA	NA	NC	NC	NC	NC	NC
Cadmium	mg/l	NA	NA	NA	NA	NC	NC	NC	NC	NC
Chromium	mg/l	NA	NA	NA	NA	0.012	0.010	0.005	0.005	0.0143
Cobalt	mg/l	NA	NA	NA	NA	NC	NC	NC	NC	NC
Copper	mg/l	NA	NA	NA	NA	NC	NC	NC	NC	NC
Lead	mg/l	NA	NA	NA	NA	NC	NC	NC	NC	NC
Mercury	mg/l	NA	NA	NA	NA	NC	NC	NC	NC	NC
Nickel	mg/l	NA	NA	NA	NA	NC	NC	NC	NC	NC
Selenium	mg/l	NA	NA	NA	NA	NC	NC	NC	NC	NC
Silver	mg/l	NA	NA	NA	NA	NC	NC	NC	NC	NC
Thallium	mg/l	NA	NA	NA	NA	NC	NC	NC	NC	NC
Tin	mg/l	NA	NA	NA	NA	NC	NC	NC	NC	NC
Vanadium	mg/l	NA	NA	NA	NA	NC	NC	NC	NC	NC
Zinc	mg/l	NA	NA	NA	NA	NC	NC	NC	NC	NC
VOLATILE ORGANICS/PURGEABLE ORGANICS										
Acetone	µg/l	7.4	7.4	4.6	4.6	NC	NC	NC	NC	NC
Chloroform	µg/l	0.23	0.23	0.072	0.12	NC	NC	NC	NC	NC
Chloromethane	µg/l	0.20	0.20	0.11	0.14	NC	NC	NC	NC	NC
Naphthalene	µg/l	0.30	0.30	0.36	0.36	NC	NC	NC	NC	NC
Toluene	µg/l	0.12	0.12	0.093	0.093	NC	NC	NC	NC	NC
Vinyl Chloride	µg/l	0.16	0.16	0.14	0.12	NC	NC	NC	NC	NC
SEMI-VOLATILE ORGANICS: None Detected										
HERBICIDES, PESTICIDES, & PCBs: None Detected										

NOTES:

NA Sample was not analyzed for this parameter during the specified sampling round.

▨ Indicates that the analyte was not detected above laboratory practical quantitation limit (PQL).
Value listed is MDL or estimated trace concentration (BOLDED).

NC No calculation performed. Requires a minimum of three data entries.

APPENDIX D

PRELIMINARY EVALUATION FOR AN ALTERNATIVE FINAL COVER DESIGN

PRELIMINARY EVALUATION FOR AN ALTERNATIVE FINAL COVER DESIGN

PICACHO SOLID WASTE SITE
IMPERIAL COUNTY, CALIFORNIA

May 1999

PREPARED FOR:

Bryan A. Stirrat & Associates
1360 Valley Vista Drive
Diamond Bar, California 91765

PREPARED BY:

GeoLogic Associates
1360 Valley Vista Drive
Diamond Bar, California 91765

GeoLogic Associates

Geologists, Hydrogeologists and Engineers

May 6, 1999
Job No. 9878

Bryan A. Stirrat & Associates
1360 Valley Vista Drive
Diamond Bar, California 91765

Attention: Mr. John Boucher

PRELIMINARY ALTERNATIVE COVER EVALUATION AND DESIGN PICACHO SOLID WASTE SITE FINAL CLOSURE IMPERIAL COUNTY, CALIFORNIA

Introduction

This report is presented as a preliminary evaluation of the performance of an alternative final cover system for the Picacho Solid Waste Site in Imperial County, California. The analyses presented herein are submitted to provide a basis for agency evaluation of the alternative final cover design. The analyses included have been completed using local climatological data, soil data specific to the Picacho Solid Waste Site, and vegetative conditions typical of the natural environment adjacent to the site.

Regulatory Requirements

California Code of Regulations (CCR) Title 27 § 21090 (a) require that landfill final covers be constructed according to identified minimum standards. For Class III landfills, the minimum regulatory requirements include a two-foot thick foundation layer, a one-foot thick low-hydraulic conductivity layer, and a one-foot thick vegetative layer. As prescribed, the low-hydraulic conductivity layer is to consist of soils with a hydraulic conductivity of less than 1 x 10^{-6} cm/sec. Section 21090 (a) states:

> "The Regional Water Quality Control Board (RWQCB) can allow any alternative final cover design that it finds will continue to isolate the waste in the Unit from precipitation and irrigation waters at least as well as would a final cover built in accordance with applicable prescriptive standards under ¶(a)(1-3).

Purpose

The purpose of this report is to provide a basis for evaluating the feasibility of constructing an alternative final cover for closure of the Picacho Solid Waste Site. As such, this report presents an evaluation of whether the performance of the existing interim cover is consistent with the performance goals addressed by prescriptive standards and would yield equivalent protection against water quality impairment. The discussion presented is also intended to address whether a prescriptive cover constructed at this site is feasible as provided in CCR Title 27, §21090(a).

Scope of Work

Work completed for this study included:

- Determination of the relevant characteristics of soils derived from the Picacho Solid Waste Site;
- Obtaining local climatological data for the area of the Picacho Solid Waste Site;
- Selection of a computer program to simulate unsaturated flow through a soil profile;
- Computer modeling of an alternative cover system using the laboratory determined soil characteristics and historic local climate data;
- Comparison of expected long-term performance of the alternative final cover;
- Preparation of this report.

Model Description

After review of several infiltration models, the program LEACHM (Leaching Estimation and Chemistry Model) was selected for the alternative cover analyses summarized herein. LEACHM is a one-dimensional finite difference computer model developed at Cornell University. The model simulates water and solute transport in unsaturated or partially saturated soils to a depth of about two meters. Estimates of plant growth and absorption of water by plant roots are included in the model as are climatic factors such as precipitation and evaporation.

One of the advantages of LEACHM is its ability to perform unsaturated flow simulations using site and soil specific parameters. For each soil horizon identified in a given profile, LEACHM allows the user to stipulate laboratory determined matric potential/soil moisture content relationships, bulk density/porosity relationships, and saturated hydraulic conductivity values. These values are transformed in a curve fitting routine to produce the air entry value (a) and exponent (b) used in Campbell's retentivity equation. Unsaturated hydraulic conductivity is then estimated for a given soil moisture content using Campbell's conductivity relationship. After calculation of soil retentivity and unsaturated hydraulic conductivity, LEACHM simulates unsaturated flow through the modeled profile using Richards' equation.

Critical Input Parameters

The following sections describe the critical assumptions, variables, and input requirements incorporated into the LEACHM computer analysis. Variables specified in the model included the iteratively calculated transient soil water status factors, plant growth, plant maturity, plant harvest variables, soil matric potential and saturated hydraulic conductivity. Sample input and output files for the LEACHM program are provided in Appendix A.

Soil Profile - The first step in using the LEACHM model involves definition of the soil profile. This is accomplished by defining the total thickness of the profile and a nodal or profile segment thickness. The example input provided in Appendix A stipulates a total profile thickness of 1373 mm (4.5 feet), and a nodal frequency of 152.5 mm (6 inches), resulting in a total of 9 profile segments or nodes. The analysis assessed water flux at each node ten times a day throughout the modeling period.

Bottom Boundary Condition - One of the most critical parameters included in the analysis is definition of the bottom boundary condition of the final cover section. For the purposes of this study, this boundary condition was varied between a free draining condition (yielding one directional flow under an applied suction gradient at the bottom of the profile), a "lysimeter" condition (also yielding one directional flow but under conditions of zero suction at the boundary), and a constant potential condition (allowing for two directional flow and assuming a source of liquids exists within the landfill).

Soil Properties - For each node or interval in the defined profile, LEACHM requires input of specific soil properties including: remolded dry bulk density; initial matric potential and soil moisture content; Campbell's "a" and "b" coefficients; and saturated hydraulic conductivity. Porosity is then calculated as a function of the stipulated specific gravity of the soils and their remolded dry bulk density.

Precipitation - Another critical element in modeling cover performance using LEACHM involves identification of total daily precipitation and irrigation, as well as the time and rate of water application. For each rain or irrigation event, LEACHM calculates the maximum time period allowed for infiltration as the specified quantity of water to be applied divided by the application rate. Water which has not entered the soil profile at the end of the application period is assigned to an excess runoff term and included in the mass balance calculations. Infiltration into the profile is thus limited by the matric potential and unsaturated hydraulic conductivity of the soil at the time of water application. In other words, infiltration is limited by the ability of the soil to take water.

Since positive drainage should always be maintained on the landfill surface, no ponding of rain or irrigation waters was included in the analyses.

Evapotranspiration - LEACHM requires mean weekly pan evaporation data from which daily potential evapotranspiration (DPET) is calculated as one-seventh of the weekly total pan evaporation. Daily potential transpiration is calculated by multiplying the DPET by a crop cover fraction. Daily potential evaporation is then calculated as the difference between DPET and potential transpiration. Given a stipulated crop cover fraction of 1.0, LEACHM will calculate that all of the evapotranspiration that occurs is associated with transpiration. However, if a value of 0.0 is entered, all soil moisture losses will be calculated to result solely from evaporation.

For modeling purposes, LEACHM assumes that evapotranspiration starts at 0.3 days (7:12 a.m.) and ends 12 hours later at 0.8 day (7:12 p.m.). During this period, potential evapotranspiration is varied sinusoidally with actual evapotranspiration calculated as a function of the potential evapotranspiration, the profile's soil water status, and specified plant properties.

Vegetation - Rather than applying a coefficient to approximate the transpiration effects of plants, LEACHM uses the equation of Nimah and Hanks (1973) to simulate the uptake of water by plant roots. Variables included in the equation and requiring user specification include: plant wilting point (the soil matric potential below which plants are unable to extract water); root water potential (the root potential below which plants are unable to extract water from the soil); root resistance (the depth dependent resistance to upward flow of water within the roots); and the root distribution (expressed as a nodal percentage of all the roots).

Model Input

Cover Configuration

Modeling of the proposed alternative cover system at the Picacho Solid Waste Site was completed assuming a 2.0 foot foundation layer and 2.5 additional feet of alternative cover soils for a total modeled cover thickness of 4.5 feet. The model was set to report soil moisture and flux conditions at depths of 0, 1, 3, and 4.5 feet.

Bottom Boundary Conditions

In estimating the nature of flow through the bottom boundary of the final cover section at the Picacho Solid Waste Site, the following boundary conditions were utilized.

First, a free draining condition was used to calculate the "worst case" performance characteristics of the modeled final cover section. Worst case conditions are presumed under this scenario since moisture is drawn downward through the base of the profile under a suction head applied by the underlying soil/waste, but moisture is not allowed to be "pulled back" from the section if shallow drying conditions develop.

A slightly more realistic (but still conservative) condition is represented by definition of the lower boundary as a "lysimeter". In this scenario, moisture is again allowed to migrate in only one direction (vertically downward) though it passes into the waste prism only after the base of the section becomes saturated and local soil suction is essentially zero (a condition expected at this interface given the generally humid environment created by waste). Again though it should be recognized that this definition does not allow for moisture to be extracted upward from the waste if surface drying induces a negative suction gradient in the overlying cover.

Perhaps the most realistic characterization results are from the definition of a constant potential condition at the base of the final cover section. In this case, it is assumed that there is a source of moisture (e.g., saturated landfill gas) available within the landfill that would yield a constant moisture content within the waste and at the base of the cover section. This bottom definition allows for characterization of two directional moisture movement and for the extraction of moisture through the final cover if drying conditions predominate (i.e., downward migration is calculated when the final cover moisture content is high and allows for extraction of water from the landfill [i.e., drying of the waste] when the moisture in the final cover is low).

Cover Soil Characteristics

Prior to modeling, the soil characteristics of materials potentially available for use in the alternative cover design were identified at two locations (Figure 1). Testing included determination of dry density, optimum moisture content, grain size distribution, remolded saturated hydraulic conductivity and soil matric potential/soil moisture content relationships (Table 1). The material used for modeling purposes was Borrow Sample-2, which exhibits the coarsest grain size characteristics and fastest hydraulic conductivity. The grain size distribution and matric potential/moisture content relationships of the soils are presented in Appendix B.

Climatic Conditions

The modeling analyses of an alternative cover at the Picacho Solid Waste Site were performed utilizing daily precipitation and mean-weekly pan-evaporation data recorded at the nearest available weather station to the site. The analysis included precipitation and reference evapotranspiration values obtained from the Yuma Valley Station for the years 1989 through 1998.

The magnitude and duration of the rainfall events were estimated in a fashion believed to conservatively represent typical anticipated application. This included defining the time of day for water application to be 0.4 days (9:36 a.m.) and a water application rate of 100 mm/day.

Vegetation Conditions

The vegetation models evaluated for the long-term analysis included an annual shallow rooting grass and sparse native shrub species, which were estimated to provide a 2 percent coverage over the land. This coverage was selected based on review of the development of vegetation on the natural desert floor adjacent to the site, and is considered typical of the native vegetation in this area.

Modeling Results

As summarized above, the Picacho Solid Waste Site alternative cover was modeled as a 4.5 foot thick (1373 mm) alternative cover composed of compacted on-site soils combined with sparse native vegetation.

Figure 2

Figures 2a through 2c depict the modeled moisture content of the final cover soils in volumetric percent (theta) for four distinct depth intervals over a period of approximately ten years. Figure 2a represents the "worst case" result (definition of a free draining bottom boundary), 2c represents the more likely condition (a constant potential bottom boundary) and 2b represents a conservative but more intermediate condition (a "lysimeter" bottom boundary). Figure 2d depicts the rainfall history recorded over the same time period at the Yuma Valley Station.

As can be seen, in all cases the first layer (76 mm) mimics seasonal precipitation patterns throughout the modeling period, while the intermediate soil layer (533 mm) reflects only severe seasonal impacts. In all cases even the most severe seasons show little or no impact in the deepest soil layers (991 and 1296 mm).

Figure 3

Figures 2a through 2c depict the net flux through three layers of the modeled profile and represent three independently modeled bottom conditions. Figure 3d presents the net flux as a function of depth through each of the modeled profiles. As shown, "worst case" infiltration (Figure 2a) is calculated to be 0.02 inches/year (including the 1992/1993 year when the site is modeled to have received over 5.9 inches of precipitation).

Discussion

Prescriptive Design

As shown in Figure 2a through 2c, a substantial drying of final cover soils constructed at the Picacho Solid Waste Site is expected to substantial depth. This indicates that if a prescriptive final cover system were constructed at this site, the barrier layer would be subject to severe desiccation. This inference is supported by field investigations that indicate seasonal wetting and drying will result in a substantial degradation of the performance characteristics of a barrier soil in arid areas (Mechoir, S., 1997). In fact, the saturated hydraulic conductivity of clayey soils can decline by as much as two orders of magnitude if they are subject to severe desiccation cycles (Dr. Craig H. Benson, personal communication). In summary, the likelihood of severe desiccation is believed to represent conditions that make the prescriptive cover inappropriate in the environment typical of the Picacho Solid Waste Site.

In addition to the substantial loss of performance characteristics expected for a prescriptive cover barrier layer soil, it should be recognized that low hydraulic conductivity soils are not available on-site or in the immediate area and incorporating them into a final cover system at the site would be extremely expensive. In fact, it is estimated that construction of a prescriptive final cover system at the Picacho Solid Waste Site would cost about $671,000; a cost that does not include the substantial increase in post-closure costs that would be associated with thirty years of repairing desiccation related damage to the barrier layer of a prescriptive cover system.

Alternative Design

In contrast, the modeling completed to date and reported herein and the available literature, indicates that an alternative final cover system constructed using available on-site and near-site soils would be consistent with the performance goals addressed by the prescriptive standard and would afford equivalent or superior protection against water quality impairment. In addition, it is estimated that this system can be constructed at a cost of about $400,000 (substantially less than the prescriptive system) and that post-closure maintenance costs could be reduced by as much as 33%.

Recommendations

On the basis of the evaluations summarized herein and in recognition of the continuing evolution of the state of the art and the standards of practice in landfill closure design, it is recommended that the final closure of the Picacho Solid Waste Site be completed by using a 4.5 foot total thickness of monofill on-site or near-site soils equivalent to those identified in this investigation. This depth is considered sufficient to host the root systems of the proposed plant community and is of a sufficient thickness to maximize the moisture limiting characteristics of the final cover system.

Material Characteristics - On the basis of the soil conditions modeled it is recommended that the alternative final cover be constructed using on-site soils that exhibit a grain size distribution that generally exclude particles in excess of 3 inches and have a minimum fines content (percent by weight passing U.S. No. 200 Sieve) of 7 percent for an individual test and 8 percent for the average of 10 consecutive tests. In addition, it is recommended that the cover soils exhibit a maximum saturated hydraulic conductivity of 1.0E-03 cm/sec. To ensure that the quality of the materials used for the final cover system at the Picacho Solid Waste Site exhibit properties similar to those modeled in this report, it is recommended that the Construction Quality Assurance (CQA) procedures outlined in Appendix 1 be followed.

Erosion - An increased potential for erosion exists using the non-prescriptive granular soils proposed over the existing slopes (i.e. up to 3:1 horizontal:vertical). While some erosion can be accommodated by the over-thickened cover section without impacting the performance of the system, it is recommended that implementation of artificial erosion control mechanisms (i.e. silt fences) be implemented. It is also recommended that in order to mitigate the potential effects of erosion, inspection and maintenance in accordance with post-closure maintenance plan be implemented after significant rain events be implemented.

Plants - Sensitivity analyses performed for the Picacho Solid Waste Site indicate that a minimum plant coverage of 2 to 5 percent would provide reasonable performance for the proposed alternative cover. As a result, it is recommended that when final cover construction is completed, hydroseeding of native plant species be performed in the first Fall season after cover construction. In addition, it is recommended that reseeding occur each subsequent Fall season until a minimum of 2 percent plant coverage is established on the site.

Closure

This report is based on the project as described and the geotechnical data obtained in this study. Our firm should be notified of any pertinent change in the project plans or if conditions are found that differ from those described in this report, since this may require a revaluation. This report has not been prepared for use by parties or projects other than those named or described above. It may not contain sufficient information for other parties or other purposes.

This report has been prepared in accordance with generally accepted geotechnical practices and makes no other warranties, either express or implied, as to the professional advise or data included in it.

GeoLogic Associates

William B. Lopez
Project Geologist
WBL/GLL/lkl

Gary L. Lass, RG, EG, HG
President

Attachments: Appendix A - Leachm Input Data
Appendix B - Laboratory Test Results
Appendix 1 – Earthwork Quality Assurance Plan

Distribution: Three (3) to addressee

TABLES

Table 1
Picacho Solid Waste Site
Borrow Materials Evaluation Test Results

Sample No.	% Passing No. 200 Sieve	% Passing 5 Micron	Maximum Dry Density (lbs/ft)	Optimum Moisture	Permeability (cm/sec)	Campbell's "a" coefficient	Campbell's "b" coefficient
Borrow Sample-1	9	7	117.0	11.5	3.40E-04	-5.23E-02	10.025
Borrow Sample-2	7	5	126.0	7.0	1.40E-03	-2.84E-02	9.845
Average	8	6	121.5	9.25			

FIGURES

GRAPHIC SCALE

125 0 125 250

(IN FEET)

1 inch = 250 ft.

N

EXPLANATION:

◒ GROUNDWATER MONITORING WELL LOCATION

⊗ APPROXIMATE LOCATION OF SURFACE SAMPLE

— · — · — APPROXIMATE LOCATION OF LIMIT OF REFUSE

▬ ▬ ▬ ▬ APPROXIMATE LOCATION OF PROPERTY BOUNDARY

FIGURE 1

SURFACE SAMPLES LOCATION MAP

PICACHO SOLID WASTE SITE
IMPERIAL COUNTY, CALIFORNIA

GeoLogic Associates
Geologists, Hydrogeologists, and Engineers

DRAWN BY:	DATE:	JOB NO.
VL	MAY 1999	9878

Figure 2

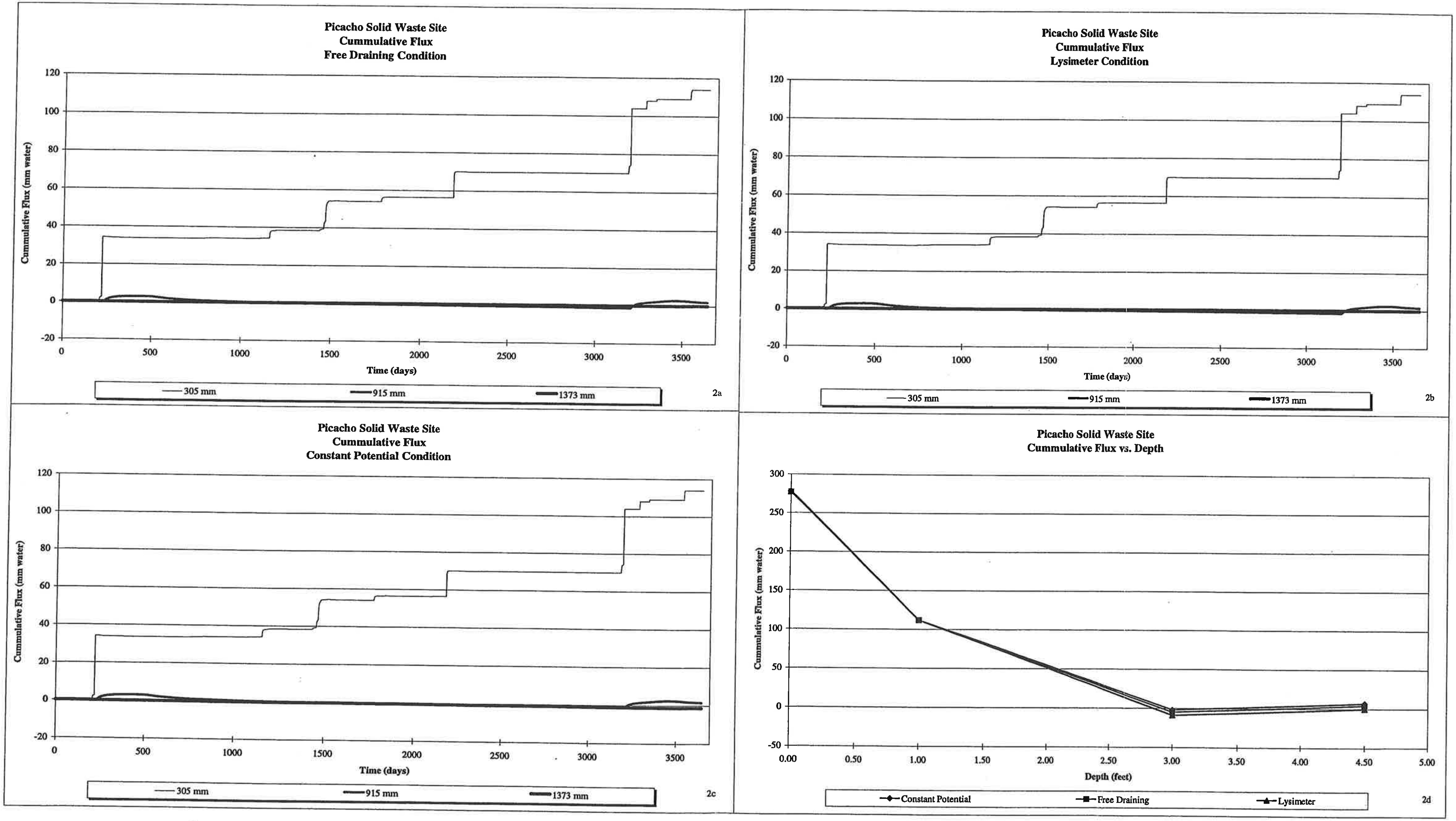
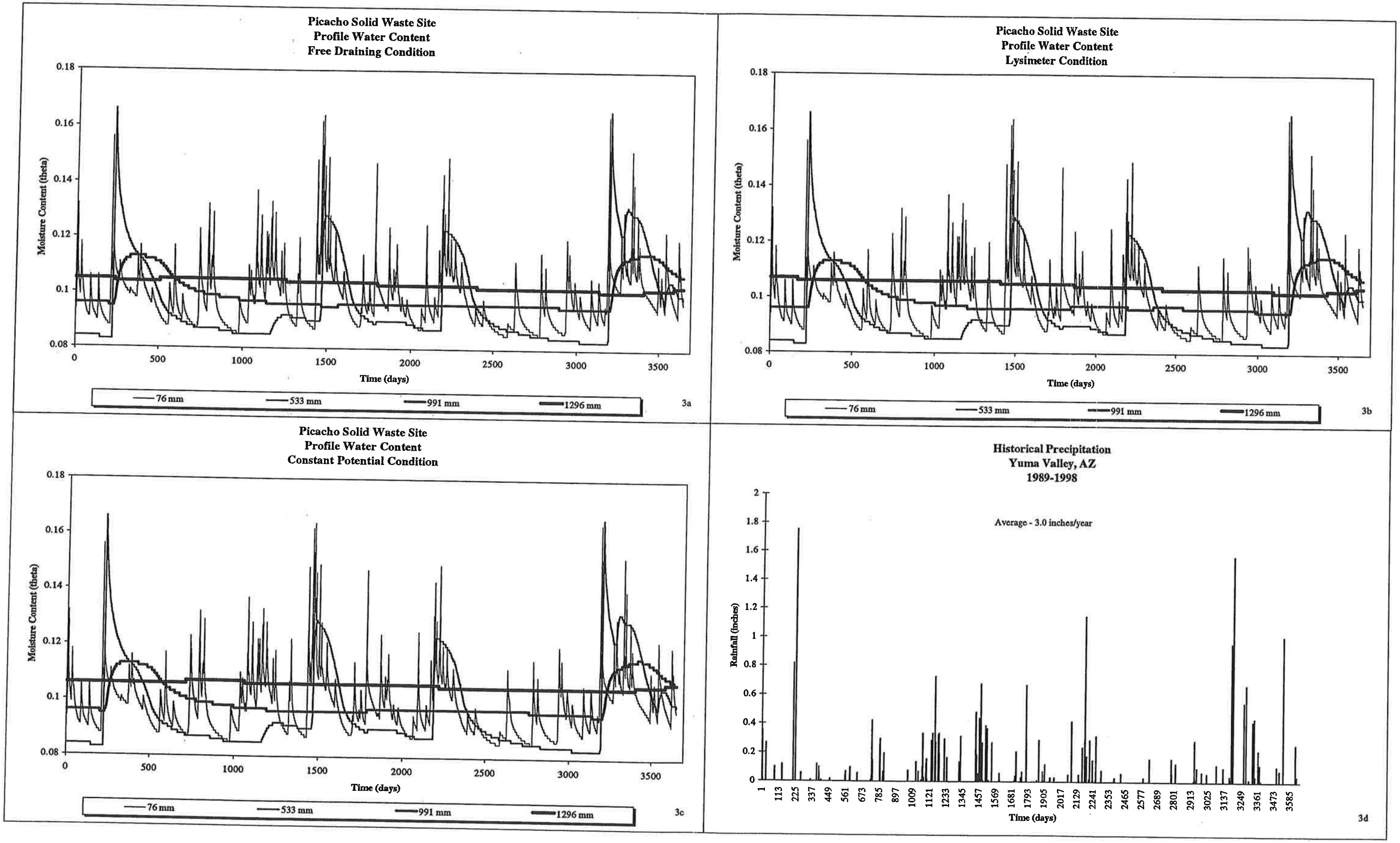

Picacho Solid Waste Site
Cummulative Flux
Free Draining Condition
Cummulative Flux (mm water)
120
100
80
60
40
20
0
-20
0
500
1000
1500
2000
2500
3000
3500
Time (days)
305 mm
915 mm
1373 mm
2a
Picacho Solid Waste Site
Cummulative Flux
Lysimeter Condition
Cummulative Flux (mm water)
Time (days)
305 mm
915 mm
1373 mm
2b
Picacho Solid Waste Site
Cummulative Flux
Constant Potential Condition
Cummulative Flux (mm water)
Time (days)
305 mm
915 mm
1373 mm
2c
Picacho Solid Waste Site
Cummulative Flux vs. Depth
Cummulative Flux (mm water)
300
250
200
150
100
50
0
-50
0.00
0.50
1.00
1.50
2.00
2.50
3.00
3.50
4.00
4.50
5.00
Depth (feet)
Constant Potential
Free Draining
Lysimeter
2d

Figure 3



Picacho Solid Waste Site
Profile Water Content
Free Draining Condition

Picacho Solid Waste Site
Profile Water Content
Lysimeter Condition

Picacho Solid Waste Site
Profile Water Content
Constant Potential Condition

Historical Precipitation
Yuma Valley, AZ
1989-1998

Average - 3.0 inches/year

APPENDIX A

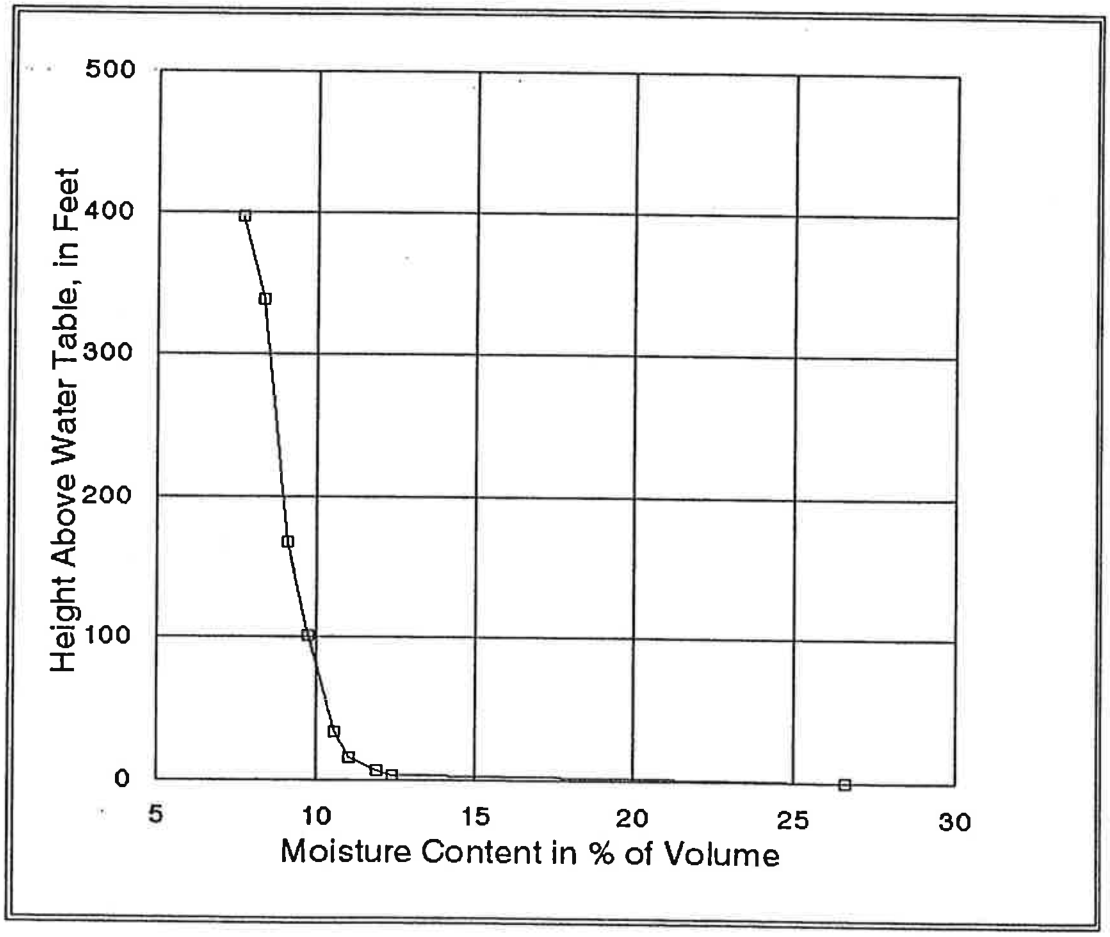
LEACHM INPUT DATA

TERATEST LABS, INC.

Capillary – Moisture Relationships for Soils
Fine – Textured Soils by Pressure – Membrane Apparatus
ASTM D 3152

Project Name: Picacho Landfill Soil Sample Testing
Project No.: 9878
Boring No.: N/A
Sample No.: Borrow Sample 2
Tested By: RA Date 11/04/98
Data Input By: lf Date 11/16/98
Checked By: LF Date 11/16/98
Depth (ft.): N/A
Visual Sample Description: Brown poorly graded sand with silt and gravel (SP – SM)g
Initial Natural Moisture Content %: 7.34
Initial Soil Wt. + Ring (gm.): 41.61
Initial Dry Unit Weight (pcf): 113.1
Diameter (in.): 1.900
Height (in.): 0.400
Specific Gravity (assumed): 2.70
Total Porosity: 0.329
Void Ratio: 0.490
Pore Volume (cc): 6.1

(1) Tension	(atm)	0.0	0.1	0.2	0.5	1.0	3.0	5.0	10.0	11.7
	(psi)	0.00	1.47	2.94	7.12	14.70	44.00	72.90	146.80	172.40
	(feet of water)	0.0	3.4	6.8	16.4	33.9	101.5	168.1	338.5	397.6
(2) Ring No.		17	17	17	17	17	17	17	17	17
(3) Wet Wt. of Soil + Ring (gm.)		44.21	41.56	41.47	41.31	41.22	41.07	40.95	40.80	40.68
(4) Dry Wt. of Soil + Ring (gm.)		39.25	39.25	39.25	39.25	39.25	39.25	39.25	39.25	39.25
(5) Wt. of Moisture	(gm.)	4.96	2.31	2.22	2.06	1.97	1.82	1.70	1.55	1.43
(6) Wt. of Ring	(gm.)	5.46	5.46	5.46	5.46	5.46	5.46	5.46	5.46	5.46
(7) Wt. of Dry Soil	(gm.)	33.79	33.79	33.79	33.79	33.79	33.79	33.79	33.79	33.79
(8) Moisture Content (Ww)	(%)	14.68	6.84	6.57	6.10	5.83	5.39	5.03	4.59	4.23
(9) Dry Unit Wt. of Soil	(pcf)	113.1	113.1	113.1	113.1	113.1	113.1	113.1	113.1	113.1
(10) Moisture Content by Volume (Wv) (%) (8)x(9)/62.43		26.60	12.39	11.91	11.05	10.56	9.76	9.12	8.31	7.67



TERATEST LABS, INC.

Capillary – Moisture Relationships for Soils
Fine – Textured Soils by Pressure – Membrane Apparatus
ASTM D 3152

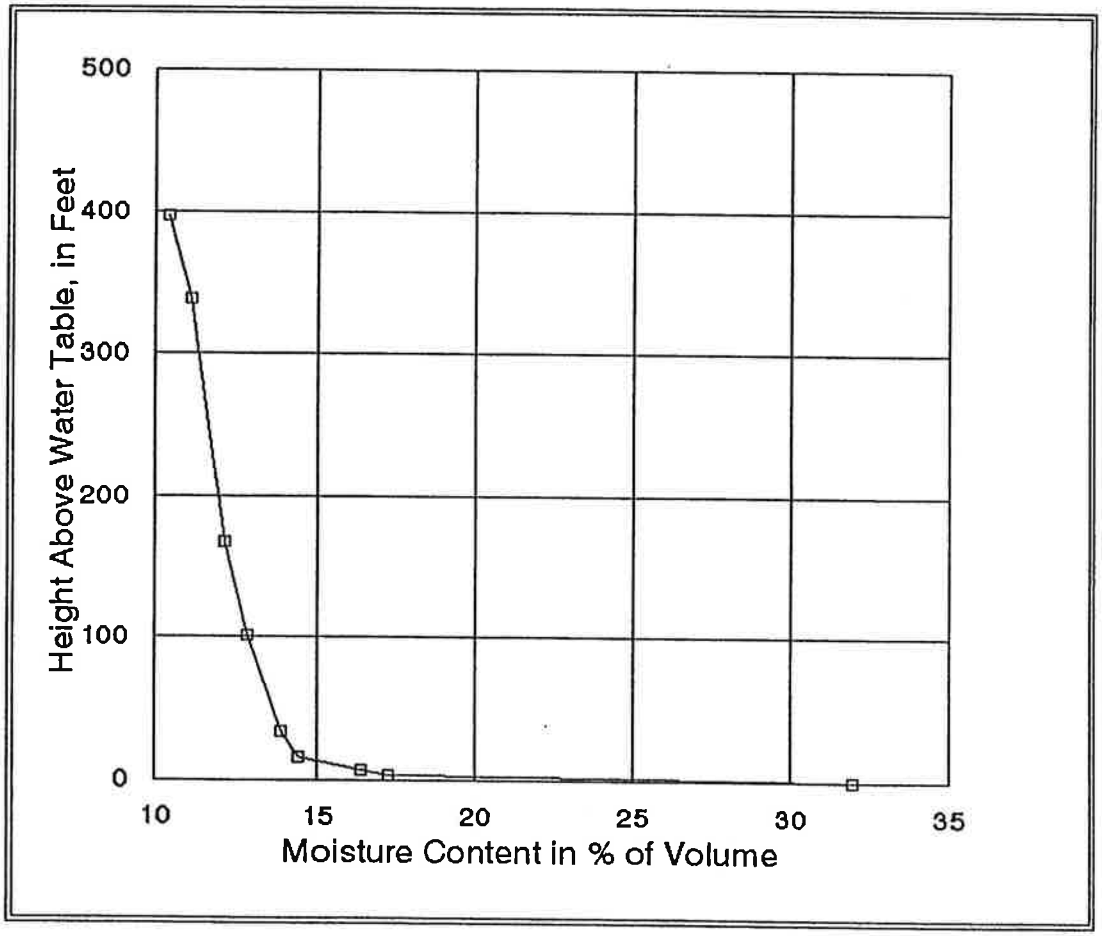
Project Name: Picacho Landfill Soil Sample Testing
Project No.: 9878
Boring No.: N/A
Sample No.: Borrow Sample 1

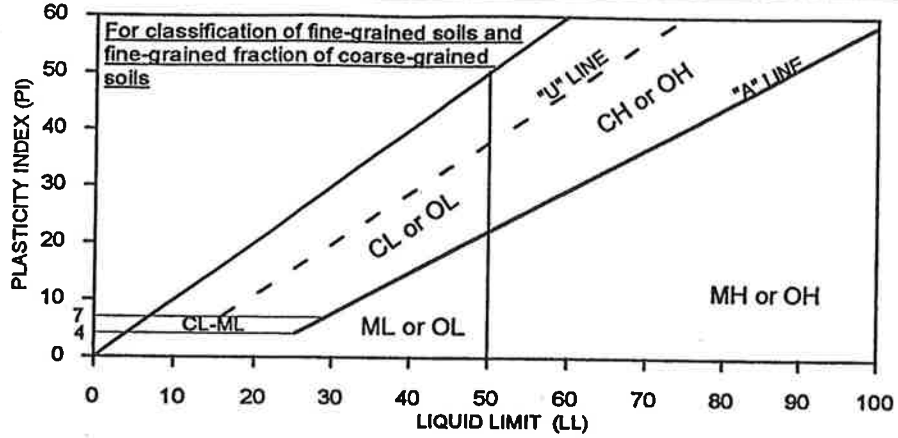
Tested By: RA Date 11/04/98
Data Input By: lf Date 11/16/98
Checked By: Date 11/16/98
Depth (ft.): N/A

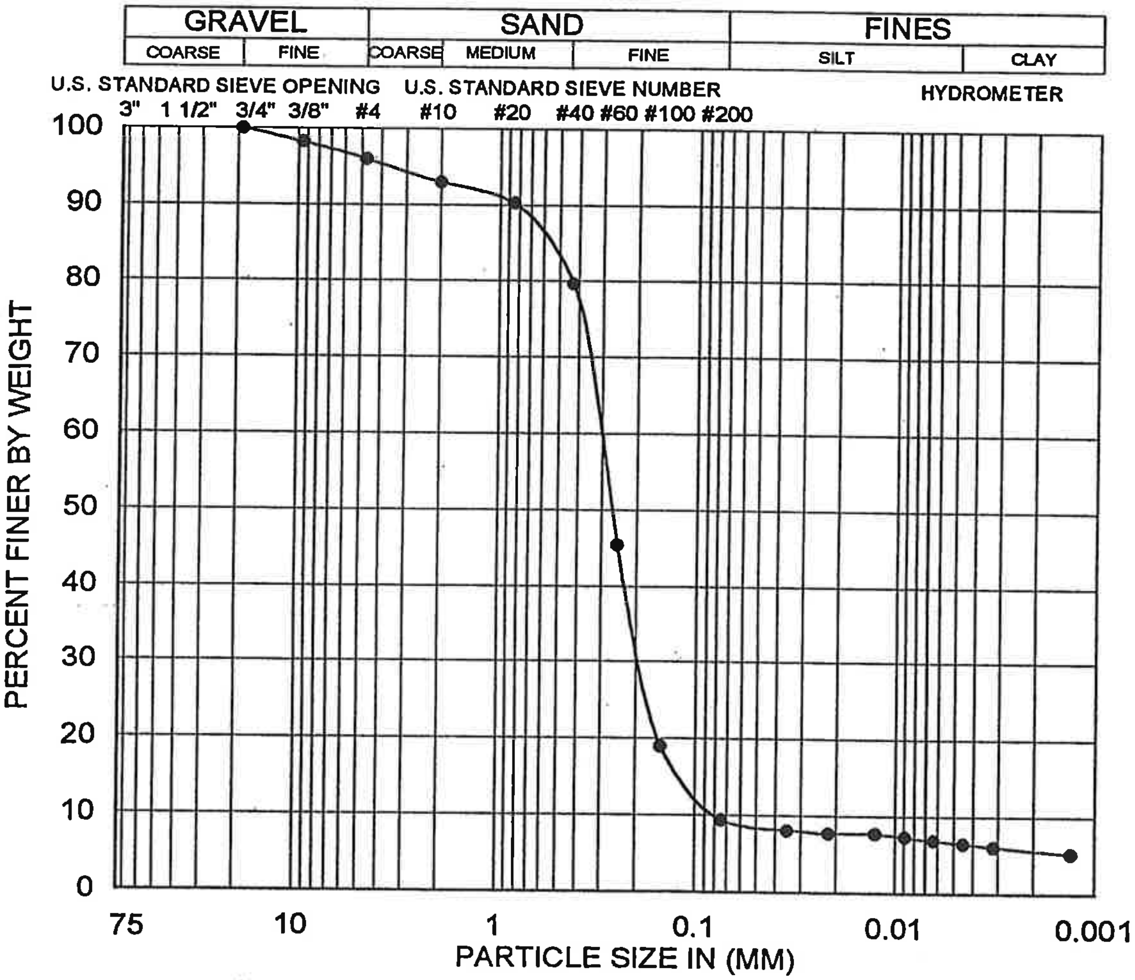
Visual Sample Description: Light brown poorly graded sand with silt (SP – SM)

Initial Natural Moisture Content %: 11.64
Initial Soil Wt. + Ring (gm.): 40.34
Initial Dry Unit Weight (pcf): 105.4
Diameter (in.): 1.900
Height (in.): 0.400
Specific Gravity (assumed): 2.70
Total Porosity: 0.375
Void Ratio: 0.600
Pore Volume (cc): 7.0

(1) Tension (atm)	0.0	0.1	0.2	0.5	1.0	3.0	5.0	10.0	11.7
(psi)	0.00	1.47	2.94	7.12	14.70	44.00	72.90	146.80	172.40
(feet of water)	0.0	3.4	6.8	16.4	33.9	101.5	168.1	338.5	397.6
(2) Ring No.	K2	K2	K2	K2	K2	K2	K2	K2	K2
(3) Wet Wt. of Soil + Ring (gm.)	42.83	40.08	39.92	39.56	39.46	39.26	39.13	38.94	38.81
(4) Dry Wt. of Soil + Ring (gm.)	36.86	36.86	36.86	36.86	36.86	36.86	36.86	36.86	36.86
(5) Wt. of Moisture (gm.)	5.97	3.22	3.06	2.70	2.60	2.40	2.27	2.08	1.95
(6) Wt. of Ring (gm.)	5.32	5.32	5.32	5.32	5.32	5.32	5.32	5.32	5.32
(7) Wt. of Dry Soil (gm.)	31.54	31.54	31.54	31.54	31.54	31.54	31.54	31.54	31.54
(8) Moisture Content (Ww) (%)	18.93	10.21	9.70	8.56	8.24	7.61	7.20	6.59	6.18
(9) Dry Unit Wt. of Soil (pcf)	105.4	105.4	105.4	105.4	105.4	105.4	105.4	105.4	105.4
(10) Moisture Content by Volume (Wv) (%) (8)x(9)/62.43	31.95	17.23	16.37	14.45	13.91	12.84	12.15	11.13	10.43







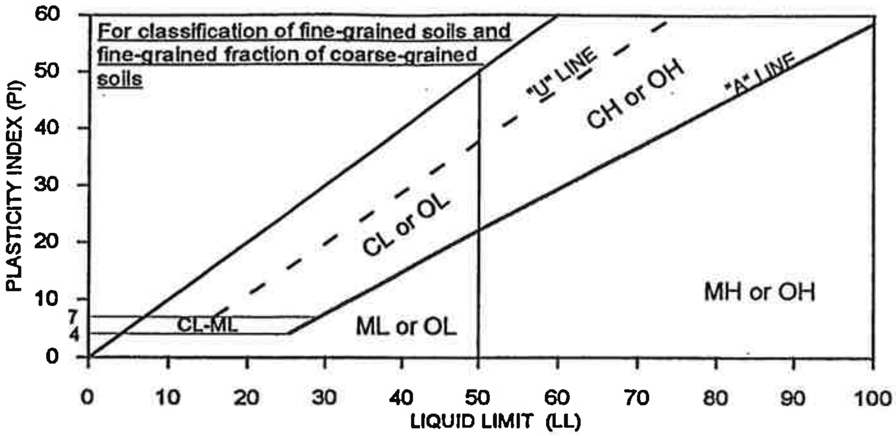
BORING NO.	SAMPLE NO.	DEPTH (ft.)	SOIL TYPE	GR:SA:FI (%)	LL,PL,PI
N/A	Borrow Sample 1	N/A	SP-SM	4:87:9	N/A

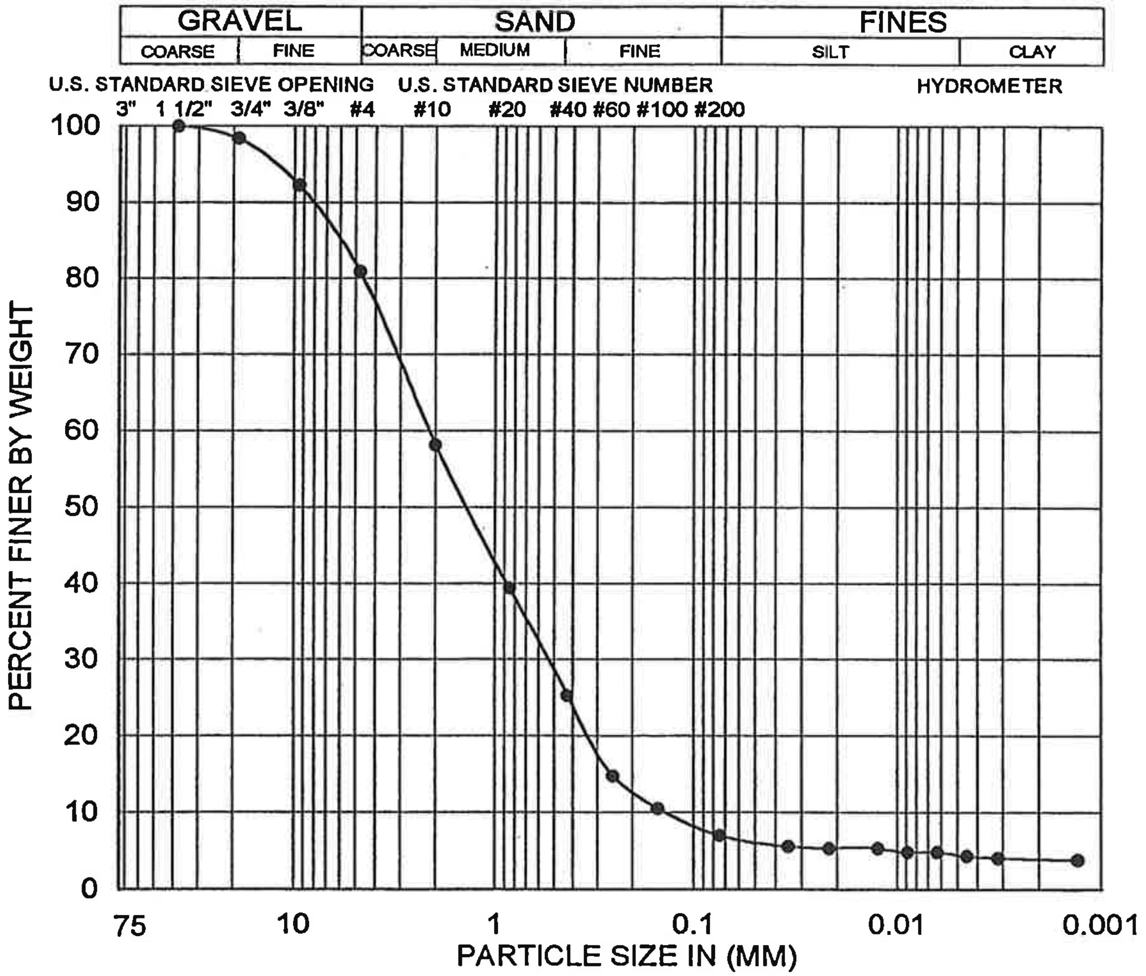
Sample Description:
Light brown poorly graded sand with silt (SP-SM)

TERATEST LABS, Inc.	Project No. 9878 Picacho Landfill Soil Sample Testing

ATTERBERG LIMITS, PARTICLE-SIZE CURVE
(ASTM D 4318, D 422)

11-98





BORING NO.	SAMPLE NO.	DEPTH (ft.)	SOIL TYPE	GR:SA:FI (%)	LL,PL,PI
N/A	Borrow Sample 2	N/A	(SP-SM)g	19:74:7	N/A

Sample Description:
Brown poorly graded sand with silt and gravel (SP-SM)g

TERATEST LABS, Inc.

Project No. 9878
Picacho Landfill
Soil Sample Testing

ATTERBERG LIMITS, PARTICLE-SIZE CURVE
(ASTM D 4318, D 422)

11-98

APPENDIX B

LABORATORY TEST RESULTS

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picmin              SOIL-WATER-PLANT-INTERACTION SIMULATION
"SIMULATION PERIODS (Data must be present for each item, even if it not used)"
------------------
Date type (US:1 UK:2)                  1
Starting date                     010194   Ending (date or day no.)   3652
Read theta(1) or pot'l(2)              1
No. of water applications            185
Years or cycles                        1 No. of crops                       1
K-Th-h from PSD:yes(1)no(0)            0 Trace 1(on), 0(off)                0
----------------------------------------------------------------------------
PROFILE DETAILS
---------------
Profile depth     (mm)        .1373E+04 Bottom boundary condition          2
Segment thickness (mm)        .1525E+03 :1 or 5,water table depth  .0000E+00
----------------------------------------------------------------------------
FOR UNIFORM PROFILE: (Any non-zero value here will override those in the
table of hydrological characteristics below unless K-Th-h calc. from PSD).
Soil bulk density Mg/cu.m     .0000E+00 Air -entry value' kPa     -.0000E+00
Exponent in Campbell's eq     .0000E+00 Sat'd K values (mm/day)    .0000E+00
---------------------------------------------------------------------------
CROP DATA
---------
Plants present: 1 yes, 0 no            1  Wilting point (soil) kPa -.2500E+04
Max(actual tran/potl tran)    .1000E+01 Min.root water pot'l (kpa)-.3000E+04
Roots: Const(1);growing(2)             1 Max.root water pot'l (kPa) .0000E+00
If 1: root length (m)          .500E+03 Root flow resistance term  .1050E+01
---------------------------------------------------------------------------
NUMBER OF OUTPUT FILES                 2
  -- .OUT file --------                    ----- .SUM file ----------
                                         Summary print interval (d)       2
Node print frequency                   1 Three depth segments for the summary
Print options: 1, 2 or 3               2  file   (0's default to thirds of the
 1: Time intervals/print              1   profile)  (mm) :
 2: days/print                      1.0    Surface to [depth 1?]          305
 3: No. of prints (even)             14    Depth 1 to [depth 2?]          915
Tables printed: 1,2 or 3              3    Depth 2 to [depth 3?]         1373
***************************************************************************
***************************************************************************
          TIMES AT WHICH *.OUT FILE IS DESIRED (if print option = 3)
                   -------------------------------------
         Date or    Time of day       Date or    Time of day
         Day no.  (to nearest tenth)  Day no.  (to nearest tenth)
         -------- .---------------- .---------- .----------------
            90           .2             180          .2
           240           .2             365          .2
           730           .2            1095          .2
          1461           .2            1826          .2
          2191           .2            2557          .2
          2992           .2            3287          .2
          3652           .2            3652          .8
************************************************************************
************************************************************************
Soil      Particle size distribution       Match K(h) at:
Layer      Clay     Silt    Rho   Organic       K    Matric    Retentivity
 no.                                carbon            pot'l     regression
             %        %   kg/dm3     %         mm/d   kPa       model no.
-------------------------------------    ----------------------------
```

```
  1          06      02      2.02        1.0       1209.6     0.         0
  2          06      02      2.02        1.0       1209.6     0.         0
  3          06      02      2.02        1.0       1209.6     0.         0
  4          06      02      2.02        1.0       1209.6     0.         0
  5          06      02      2.02        1.0       1209.6     0.         0
  6          06      02      2.02        1.0       1209.6     0.         0
  7          06      02      2.02        1.0       1209.6     0.         0
  8          06      02      2.02        1.0       1209.6     0.         0
  9          06      02      2.02        1.0       1209.6     0.         0
 -----------------------------------------------------------------------------
-
Particle density kg/dm3:  Clay    Sand  Organic matter
                          2.65    2.65      1.10
**********************************************************************
**********************************************************************
 Soil |Starting values | Hydrological Characteristics|   Root
layer |--------------- | ----------------------------|  fraction
 no.  | Pot'l or Theta |   AEV     BCAM      KS      | (for const
      |  kPa           |   kPa               mm/d    | root distr)
----- |  ------ ------ |  -------  -----    -----    |   ------
 1       0.0   0.0950   -.284E-01  9.845   1209.6        0.500
 2       0.0   0.0890   -.284E-01  9.845   1209.6        0.200
 3       0.0   0.0850   -.284E-01  9.845   1209.6        0.120
 4       0.0   0.0840   -.284E-01  9.845   1209.6        0.080
 5       0.0   0.0900   -.284E-01  9.845   1209.6        0.050
 6       0.0   0.0810   -.284E-01  9.845   1209.6        0.050
 7       0.0   0.0960   -.284E-01  9.845   1209.6        0.000
 8       0.0   0.1030   -.284E-01  9.845   1209.6        0.000
 9       0.0   0.1050   -.284E-01  9.845   1209.6        0.000
*******************************************************************
                             CROP DATA
                             ---------
 Crop Planting Emergence  Maturity   Harvest  Rel.  Crop  Plants  Pan
  no                    Root  Plant           root  cover per    factor
     ...........Date or Day no ...........    depth frac  sq. m
---------------------------------------------------------------------
  1   010194  010294  010294 010294  3653    1.00   0.02  2.000   1.00
*********************************************************************
                      RAIN/IRRIGATION AND WATER COMPOSITION
                      ------------------------------------
                         START       AMOUNT      RATE
                      Date or  Time of  mm       mm/day
                      Day no.    Day
***********************************************************************
3       0.4    9.00   100
4       0.4    4.50   100
5       0.4    0.50   100
27      0.4    6.75   100
84      0.4    2.50   100
131     0.4    3.00   100
208     0.4    20.75  100
221     0.4    44.50  100
222     0.4    0.25   100
259     0.4    1.50   100
324     0.4    0.25   100
367     0.4    3.00   100
382     0.4    2.50   100
```

383	0.4	1.50	100
384	0.4	0.25	100
396	0.4	0.25	100
397	0.4	0.25	100
455	0.4	0.50	100
456	0.4	0.25	100
559	0.4	1.00	100
561	0.4	1.75	100
588	0.4	1.25	100
589	0.4	1.75	100
590	0.4	2.50	100
639	0.4	1.50	100
727	0.4	0.25	100
733	0.4	0.50	100
734	0.4	1.00	100
735	0.4	10.75	100
739	0.4	3.75	100
788	0.4	6.50	100
789	0.4	0.25	100
790	0.4	7.50	100
808	0.4	1.75	100
809	0.4	1.50	100
814	0.4	0.25	100
815	0.4	4.75	100
816	0.4	5.00	100
978	0.4	2.00	100
1030	0.4	3.50	100
1044	0.4	1.75	100
1063	0.4	0.25	100
1064	0.4	0.25	100
1072	0.4	2.50	100
1073	0.4	0.25	100
1074	0.4	8.50	100
1075	0.4	0.25	100
1076	0.4	0.25	100
1081	0.4	0.75	100
1098	0.4	3.25	100
1100	0.4	4.00	100
1101	0.4	0.50	100
1102	0.4	0.50	100
1103	0.4	0.25	100
1132	0.4	7.25	100
1133	0.4	1.00	100
1139	0.4	0.25	100
1141	0.4	8.50	100
1157	0.4	18.50	100
1162	0.4	7.00	100
1181	0.4	8.25	100
1182	0.4	4.50	100
1183	0.4	0.25	100
1185	0.4	8.50	100
1186	0.4	0.25	100
1187	0.4	5.00	100
1221	0.4	7.50	100
1238	0.4	4.25	100
1321	0.4	3.50	100
1330	0.4	8.00	100

1331	0.4	1.50	100
1433	0.4	8.00	100
1434	0.4	12.25	100
1437	0.4	4.75	100
1438	0.4	0.25	100
1448	0.4	1.52	100
1457	0.4	11.18	100
1458	0.4	8.13	100
1460	0.4	0.25	100
1467	0.4	5.08	100
1468	0.4	17.27	100
1469	0.4	1.78	100
1471	0.4	5.33	100
1473	0.4	3.56	100
1476	0.4	3.05	100
1477	0.4	6.86	100
1480	0.4	0.25	100
1482	0.4	0.25	100
1500	0.4	9.91	100
1511	0.4	9.40	100
1519	0.4	0.25	100
1520	0.4	0.25	100
1546	0.4	6.86	100
1596	0.4	1.52	100
1597	0.4	0.51	100
1698	0.4	0.25	100
1702	0.4	1.02	100
1709	0.4	5.33	100
1740	0.4	0.76	100
1750	0.4	1.78	100
1779	0.4	17.02	100
1780	0.4	6.86	100
1851	0.4	0.25	100
1864	0.4	7.37	100
1865	0.4	0.51	100
1891	0.4	0.25	100
1892	0.4	1.78	100
1904	0.4	1.27	100
1910	0.4	3.05	100
1942	0.4	0.25	100
1944	0.4	0.76	100
1970	0.4	0.76	100
1971	0.4	0.51	100
2064	0.4	1.27	100
2089	0.4	3.56	100
2090	0.4	10.67	100
2141	0.4	1.27	100
2142	0.4	0.25	100
2165	0.4	6.10	100
2166	0.4	0.25	100
2182	0.4	7.37	100
2185	0.4	29.21	100
2186	0.4	1.52	100
2187	0.4	0.25	100
2188	0.4	0.25	100
2194	0.4	1.27	100
2195	0.4	4.57	100

2196	0.4	1.02	100
2212	0.4	0.51	100
2216	0.4	7.37	100
2234	0.4	0.25	100
2236	0.4	3.81	100
2237	0.4	0.25	100
2256	0.4	0.51	100
2261	0.4	8.13	100
2297	0.4	0.76	100
2299	0.4	2.03	100
2387	0.4	0.25	100
2388	0.4	0.76	100
2436	0.4	1.52	100
2588	0.4	0.76	100
2630	0.4	4.06	100
2783	0.4	4.06	100
2784	0.4	1.52	100
2809	0.4	3.30	100
2928	0.4	0.25	100
2934	0.4	7.37	100
2935	0.4	0.76	100
2938	0.4	0.25	100
2948	0.4	2.54	100
2981	0.4	1.78	100
3015	0.4	1.52	100
3082	0.4	3.05	100
3128	0.4	2.54	100
3129	0.4	0.25	100
3169	0.4	1.02	100
3177	0.4	0.25	100
3182	0.4	24.38	100
3192	0.4	2.29	100
3193	0.4	39.88	100
3265	0.4	13.97	100
3266	0.4	0.25	100
3280	0.4	6.10	100
3281	0.4	17.02	100
3299	0.4	0.51	100
3300	0.4	0.51	100
3324	0.4	10.67	100
3327	0.4	0.25	100
3328	0.4	0.25	100
3329	0.4	0.51	100
3335	0.4	11.18	100
3336	0.4	0.25	100
3338	0.4	1.02	100
3341	0.4	1.02	100
3362	0.4	5.59	100
3363	0.4	1.52	100
3374	0.4	3.05	100
3378	0.4	0.25	100
3381	0.4	0.25	100
3492	0.4	2.79	100
3511	0.4	2.03	100
3537	0.4	25.65	100
3622	0.4	6.60	100
3629	0.4	0.25	100

```
3630    0.4     1.02    100
*************************************************************************
"      POTENTIAL ET (WEEKLY TOTALS, mm) AND DEPTH TO WATER TABLE (mm)"
-------------------------------------------------------------------------
-------------------------------------------------------------------------
      WEEK NO.    ET   WATER TABLE
      -----------------------------
1        11.7    0
2        23.3    0
3        26.5    0
4        17.6    0
5        21.4    0
6        21.9    0
7        26.5    0
8        30.4    0
9        33.6    0
10       37.6    0
11       42.9    0
12       43.4    0
13       43.0    0
14       56.7    0
15       47.6    0
16       49.1    0
17       53.1    0
18       50.9    0
19       55.0    0
20       53.5    0
21       72.4    0
22       59.8    0
23       62.2    0
24       63.6    0
25       63.6    0
26       74.0    0
27       65.6    0
28       65.6    0
29       65.5    0
30       65.5    0
31       59.4    0
32       59.1    0
33       41.0    0
34       57.2    0
35       58.2    0
36       53.2    0
37       56.3    0
38       44.6    0
39       53.1    0
40       46.6    0
41       39.6    0
42       39.6    0
43       37.0    0
44       29.4    0
45       38.2    0
46       27.8    0
47       25.5    0
48       20.0    0
49       31.6    0
50       25.9    0
```

51	20.2	0
52	14.6	0
53	20.6	0
54	20.8	0
55	18.6	0
56	14.5	0
57	28.4	0
58	21.9	0
59	21.1	0
60	23.4	0
61	30.3	0
62	30.6	0
63	31.4	0
64	35.2	0
65	38.9	0
66	34.6	0
67	38.4	0
68	50.4	0
69	43.2	0
70	54.9	0
71	56.0	0
72	59.0	0
73	61.5	0
74	65.1	0
75	60.0	0
76	60.3	0
77	65.6	0
78	66.0	0
79	70.9	0
80	65.2	0
81	65.2	0
82	46.9	0
83	62.7	0
84	66.4	0
85	62.9	0
86	59.7	0
87	50.5	0
88	57.7	0
89	54.4	0
90	46.1	0
91	49.6	0
92	47.9	0
93	45.2	0
94	37.3	0
95	48.7	0
96	35.5	0
97	34.9	0
98	34.1	0
99	36.0	0
100	24.5	0
101	25.4	0
102	27.9	0
103	31.6	0
104	12.4	0
105	15.9	0
106	20.6	0
107	14.0	0

108	12.9	0
109	26.2	0
110	20.2	0
111	28.6	0
112	25.8	0
113	26.9	0
114	33.7	0
115	22.3	0
116	35.1	0
117	29.1	0
118	28.2	0
119	36.9	0
120	51.1	0
121	53.1	0
122	52.3	0
123	53.2	0
124	59.2	0
125	58.9	0
126	62.3	0
127	63.3	0
128	60.5	0
129	61.9	0
130	61.4	0
131	72.9	0
132	65.3	0
133	59.8	0
134	59.8	0
135	63.3	0
136	64.6	0
137	61.7	0
138	55.4	0
139	53.4	0
140	60.4	0
141	54.1	0
142	52.0	0
143	44.4	0
144	49.4	0
145	39.7	0
146	42.5	0
147	42.3	0
148	36.6	0
149	36.9	0
150	33.0	0
151	33.8	0
152	21.8	0
153	24.4	0
154	35.4	0
155	20.6	0
156	17.4	0
157	15.2	0
158	12.5	0
159	14.5	0
160	11.9	0
161	30.2	0
162	24.9	0
163	28.8	0
164	32.3	0

165	12.9	0
166	20.5	0
167	35.2	0
168	30.5	0
169	21.9	0
170	37.5	0
171	36.4	0
172	26.4	0
173	33.0	0
174	45.9	0
175	54.0	0
176	52.1	0
177	53.8	0
178	52.2	0
179	63.6	0
180	57.9	0
181	60.4	0
182	64.5	0
183	71.6	0
184	68.3	0
185	77.8	0
186	59.6	0
187	59.6	0
188	61.2	0
189	64.1	0
190	60.6	0
191	52.3	0
192	54.7	0
193	55.3	0
194	45.3	0
195	54.9	0
196	51.7	0
197	47.9	0
198	42.2	0
199	51.0	0
200	45.8	0
201	44.0	0
202	31.3	0
203	22.3	0
204	36.6	0
205	28.8	0
206	30.7	0
207	21.8	0
208	29.9	0
209	6.9	0
210	17.7	0
211	18.9	0
212	15.8	0
213	8.4	0
214	8.8	0
215	10.3	0
216	27.9	0
217	23.0	0
218	20.9	0
219	15.7	0
220	24.0	0
221	27.1	0

222	41.2	0
223	44.6	0
224	41.3	0
225	35.7	0
226	49.9	0
227	51.1	0
228	55.3	0
229	54.1	0
230	60.8	0
231	59.2	0
232	53.5	0
233	63.1	0
234	65.9	0
235	60.2	0
236	68.8	0
237	72.0	0
238	66.1	0
239	68.0	0
240	68.0	0
241	63.1	0
242	60.5	0
243	64.8	0
244	63.0	0
245	65.4	0
246	62.0	0
247	53.1	0
248	44.5	0
249	53.9	0
250	54.7	0
251	49.5	0
252	49.6	0
253	44.0	0
254	37.6	0
255	33.6	0
256	40.1	0
257	36.3	0
258	28.1	0
259	14.1	0
260	26.4	0
261	26.4	0
262	19.0	0
263	20.0	0
264	23.8	0
265	23.1	0
266	23.6	0
267	26.0	0
268	24.9	0
269	21.8	0
270	28.2	0
271	20.7	0
272	34.1	0
273	33.2	0
274	36.3	0
275	32.8	0
276	41.2	0
277	31.9	0
278	42.8	0

279	48.8	0
280	49.2	0
281	49.1	0
282	48.6	0
283	54.4	0
284	50.8	0
285	58.3	0
286	49.0	0
287	60.1	0
288	63.9	0
289	69.2	0
290	63.9	0
291	66.0	0
292	73.0	0
293	73.0	0
294	72.6	0
295	51.9	0
296	64.4	0
297	66.0	0
298	58.3	0
299	63.2	0
300	56.9	0
301	62.5	0
302	55.8	0
303	61.2	0
304	41.3	0
305	42.3	0
306	44.5	0
307	47.1	0
308	33.2	0
309	28.1	0
310	30.4	0
311	19.6	0
312	22.1	0
313	19.2	0
314	27.7	0
315	14.3	0
316	17.8	0
317	17.5	0
318	6.6	0
319	12.1	0
320	13.3	0
321	18.1	0
322	14.4	0
323	33.1	0
324	29.0	0
325	23.5	0
326	34.0	0
327	27.4	0
328	34.0	0
329	40.3	0
330	40.4	0
331	48.1	0
332	53.6	0
333	52.4	0
334	41.7	0
335	59.0	0

336	60.6	0
337	55.2	0
338	57.2	0
339	58.9	0
340	63.2	0
341	65.0	0
342	66.3	0
343	64.7	0
344	70.5	0
345	70.8	0
346	70.8	0
347	49.7	0
348	70.4	0
349	68.2	0
350	68.0	0
351	64.3	0
352	54.5	0
353	55.3	0
354	57.1	0
355	56.1	0
356	56.0	0
357	48.0	0
358	52.8	0
359	50.9	0
360	44.3	0
361	37.5	0
362	37.3	0
363	22.9	0
364	22.8	0
365	25.0	0
366	23.1	0
367	25.3	0
368	18.5	0
369	18.6	0
370	17.7	0
371	20.5	0
372	26.1	0
373	29.4	0
374	22.9	0
375	20.9	0
376	15.4	0
377	25.6	0
378	23.0	0
379	25.3	0
380	27.1	0
381	38.5	0
382	34.4	0
383	44.8	0
384	45.1	0
385	51.5	0
386	52.8	0
387	54.8	0
388	59.3	0
389	60.4	0
390	62.3	0
391	68.0	0
392	63.2	0

393	60.8	0
394	69.5	0
395	68.1	0
396	68.5	0
397	66.2	0
398	60.1	0
399	60.1	0
400	57.7	0
401	64.4	0
402	60.7	0
403	66.9	0
404	61.9	0
405	61.9	0
406	62.9	0
407	57.0	0
408	50.5	0
409	52.4	0
410	45.0	0
411	48.1	0
412	50.1	0
413	42.3	0
414	38.0	0
415	41.2	0
416	29.9	0
417	36.0	0
418	24.9	0
419	21.6	0
420	31.4	0
421	22.3	0
422	23.4	0
423	24.9	0
424	16.9	0
425	20.6	0
426	12.4	0
427	26.9	0
428	17.4	0
429	32.0	0
430	26.8	0
431	35.3	0
432	43.3	0
433	30.5	0
434	47.7	0
435	43.0	0
436	45.8	0
437	42.7	0
438	34.5	0
439	50.4	0
440	51.1	0
441	57.5	0
442	51.3	0
443	58.6	0
444	56.4	0
445	58.3	0
446	61.3	0
447	57.4	0
448	62.9	0
449	63.7	0

450	70.1	0
451	68.2	0
452	68.2	0
453	64.8	0
454	63.1	0
455	54.3	0
456	66.4	0
457	58.9	0
458	60.2	0
459	56.1	0
460	56.7	0
461	45.4	0
462	52.4	0
463	47.6	0
464	35.7	0
465	42.0	0
466	41.9	0
467	50.7	0
468	34.7	0
469	33.2	0
470	34.3	0
471	19.8	0
472	23.5	0
473	19.8	0
474	14.2	0
475	25.9	0
476	21.8	0
477	15.6	0
478	18.6	0
479	12.7	0
480	18.4	0
481	23.1	0
482	19.2	0
483	20.5	0
484	19.3	0
485	25.1	0
486	35.3	0
487	42.6	0
488	30.2	0
489	45.3	0
490	32.7	0
491	44.9	0
492	48.7	0
493	55.4	0
494	58.3	0
495	58.8	0
496	56.9	0
497	50.3	0
498	60.6	0
499	65.7	0
500	62.3	0
501	65.7	0
502	74.2	0
503	71.9	0
504	66.2	0
505	66.2	0
506	71.1	0

507	62.4	0
508	66.8	0
509	63.8	0
510	53.4	0
511	59.5	0
512	60.3	0
513	60.7	0
514	49.0	0
515	56.0	0
516	52.3	0
517	47.3	0
518	50.0	0
519	38.0	0
520	42.0	0
521	30.2	0
522	30.7	0
523	24.2	0
524	24.8	0
525	25.0	0
526	15.5	0
527	21.3	0
528	20.1	0
529	18.6	0
530	17.1	0

```
picmid              SOIL-WATER-PLANT-INTERACTION SIMULATION
"SIMULATION PERIODS (Data must be present for each item, even if it not used)"
------------------
Date type (US:1 UK:2)                  1
Starting date                     010194   Ending (date or day no.)   3652
Read theta(1) or pot'l(2)              1
No. of water applications            185
Years or cycles                        1 No. of crops                      1
K-Th-h from PSD:yes(1)no(0)            0 Trace 1(on), 0(off)               0
--------------------------------------------------------------------------
PROFILE DETAILS
---------------
Profile depth      (mm)      .1373E+04 Bottom boundary condition         4
Segment thickness  (mm)      .1525E+03 :1 or 5,water table depth  .0000E+00
--------------------------------------------------------------------------
FOR UNIFORM PROFILE: (Any non-zero value here will override those in the
table of hydrological characteristics below unless K-Th-h calc. from PSD).
Soil bulk density Mg/cu.m    .0000E+00 Air -entry value' kPa    -.0000E+00
Exponent in Campbell's eq    .0000E+00 Sat'd K values (mm/day)   .0000E+00
--------------------------------------------------------------------------
CROP DATA
---------
Plants present: 1 yes, 0 no          1  Wilting point (soil) kPa -.2500E+04
Max(actual tran/potl tran)   .1000E+01 Min.root water pot'l (kpa)-.3000E+04
Roots: Const(1);growing(2)           1 Max.root water pot'l (kPa) .0000E+00
If 1: root length (m)         .500E+03 Root flow resistance term  .1050E+01
--------------------------------------------------------------------------
NUMBER OF OUTPUT FILES               2
  -- .OUT file --------                 ----- .SUM file ----------
                                       Summary print interval (d)       2
Node print frequency                 1 Three depth segments for the summary
Print options: 1, 2 or 3             2  file  (0's default to thirds of the
 1: Time intervals/print            1   profile)  (mm) :
 2: days/print                     1.0   Surface to [depth 1?]         305
 3: No. of prints (even)           14    Depth 1 to [depth 2?]         915
Tables printed: 1,2 or 3            3    Depth 2 to [depth 3?]        1373
**************************************************************************
**************************************************************************
          TIMES AT WHICH *.OUT FILE IS DESIRED (if print option = 3)
                ---------------------------------------
       Date or   Time of day      Date or    Time of day
       Day no.  (to nearest tenth) Day no.  (to nearest tenth)
       -------- ----------------- ---------- ----------------
          90          .2               180        .2
         240          .2               365        .2
         730          .2              1095        .2
        1461          .2              1826        .2
        2191          .2              2557        .2
        2992          .2              3287        .2
        3652          .2              3652        .8
***********************************************************************
***********************************************************************
Soil      Particle size distribution        Match K(h) at:
Layer      Clay     Silt    Rho    Organic       K      Matric    Retentivity
 no.                                carbon               pot'l     regression
            %        %    kg/dm3     %          mm/d    kPa       model no.
--------------------------------------       -----------------------------
```

```
  1         06      02     2.02       1.0       1209.6     0.         0
  2         06      02     2.02       1.0       1209.6     0.         0
  3         06      02     2.02       1.0       1209.6     0.         0
  4         06      02     2.02       1.0       1209.6     0.         0
  5         06      02     2.02       1.0       1209.6     0.         0
  6         06      02     2.02       1.0       1209.6     0.         0
  7         06      02     2.02       1.0       1209.6     0.         0
  8         06      02     2.02       1.0       1209.6     0.         0
  9         06      02     2.02       1.0       1209.6     0.         0
 -------------------------------------------------------------------------------
-
Particle density kg/dm3:  Clay     Sand   Organic matter
                          2.65     2.65       1.10
*************************************************************************
*************************************************************************
 Soil  |Starting values  | Hydrological Characteristics|   Root
layer  |---------------  | ----------------------------|  fraction
 no.   | Pot'l or Theta  |   AEV     BCAM      KS      | (for const
       |  kPa            |   kPa               mm/d    | root distr)
-----  |  ------ ------  | -------  -----     -----    |   ------
 1        0.0   0.0950   -.284E-01  9.845    1209.6          0.500
 2        0.0   0.0890   -.284E-01  9.845    1209.6          0.200
 3        0.0   0.0850   -.284E-01  9.845    1209.6          0.120
 4        0.0   0.0840   -.284E-01  9.845    1209.6          0.080
 5        0.0   0.0900   -.284E-01  9.845    1209.6          0.050
 6        0.0   0.0810   -.284E-01  9.845    1209.6          0.050
 7        0.0   0.0960   -.284E-01  9.845    1209.6          0.000
 8        0.0   0.1040   -.284E-01  9.845    1209.6          0.000
 9        0.0   0.1070   -.284E-01  9.845    1209.6          0.000
*********************************************************************
                          CROP DATA
                          ---------
 Crop Planting Emergence  Maturity   Harvest  Rel.  Crop   Plants  Pan
  no                    Root  Plant           root  cover  per     factor
    ...........Date or Day no ...........     depth frac   sq. m
------------------------------------------------------------------------
  1   010194  010294  010294 010294  3653     1.00  0.02   2.000   1.00
************************************************************************
                   RAIN/IRRIGATION AND WATER COMPOSITION
                   -------------------------------------
                     START      AMOUNT     RATE
                  Date or  Time of  mm     mm/day
                  Day no.    Day
***************************************************************************
3        0.4     9.00    100
4        0.4     4.50    100
5        0.4     0.50    100
27       0.4     6.75    100
84       0.4     2.50    100
131      0.4     3.00    100
208      0.4     20.75   100
221      0.4     44.50   100
222      0.4     0.25    100
259      0.4     1.50    100
324      0.4     0.25    100
367      0.4     3.00    100
382      0.4     2.50    100
```

383	0.4	1.50	100
384	0.4	0.25	100
396	0.4	0.25	100
397	0.4	0.25	100
455	0.4	0.50	100
456	0.4	0.25	100
559	0.4	1.00	100
561	0.4	1.75	100
588	0.4	1.25	100
589	0.4	1.75	100
590	0.4	2.50	100
639	0.4	1.50	100
727	0.4	0.25	100
733	0.4	0.50	100
734	0.4	1.00	100
735	0.4	10.75	100
739	0.4	3.75	100
788	0.4	6.50	100
789	0.4	0.25	100
790	0.4	7.50	100
808	0.4	1.75	100
809	0.4	1.50	100
814	0.4	0.25	100
815	0.4	4.75	100
816	0.4	5.00	100
978	0.4	2.00	100
1030	0.4	3.50	100
1044	0.4	1.75	100
1063	0.4	0.25	100
1064	0.4	0.25	100
1072	0.4	2.50	100
1073	0.4	0.25	100
1074	0.4	8.50	100
1075	0.4	0.25	100
1076	0.4	0.25	100
1081	0.4	0.75	100
1098	0.4	3.25	100
1100	0.4	4.00	100
1101	0.4	0.50	100
1102	0.4	0.50	100
1103	0.4	0.25	100
1132	0.4	7.25	100
1133	0.4	1.00	100
1139	0.4	0.25	100
1141	0.4	8.50	100
1157	0.4	18.50	100
1162	0.4	7.00	100
1181	0.4	8.25	100
1182	0.4	4.50	100
1183	0.4	0.25	100
1185	0.4	8.50	100
1186	0.4	0.25	100
1187	0.4	5.00	100
1221	0.4	7.50	100
1238	0.4	4.25	100
1321	0.4	3.50	100
1330	0.4	8.00	100

1331	0.4	1.50	100
1433	0.4	8.00	100
1434	0.4	12.25	100
1437	0.4	4.75	100
1438	0.4	0.25	100
1448	0.4	1.52	100
1457	0.4	11.18	100
1458	0.4	8.13	100
1460	0.4	0.25	100
1467	0.4	5.08	100
1468	0.4	17.27	100
1469	0.4	1.78	100
1471	0.4	5.33	100
1473	0.4	3.56	100
1476	0.4	3.05	100
1477	0.4	6.86	100
1480	0.4	0.25	100
1482	0.4	0.25	100
1500	0.4	9.91	100
1511	0.4	9.40	100
1519	0.4	0.25	100
1520	0.4	0.25	100
1546	0.4	6.86	100
1596	0.4	1.52	100
1597	0.4	0.51	100
1698	0.4	0.25	100
1702	0.4	1.02	100
1709	0.4	5.33	100
1740	0.4	0.76	100
1750	0.4	1.78	100
1779	0.4	17.02	100
1780	0.4	6.86	100
1851	0.4	0.25	100
1864	0.4	7.37	100
1865	0.4	0.51	100
1891	0.4	0.25	100
1892	0.4	1.78	100
1904	0.4	1.27	100
1910	0.4	3.05	100
1942	0.4	0.25	100
1944	0.4	0.76	100
1970	0.4	0.76	100
1971	0.4	0.51	100
2064	0.4	1.27	100
2089	0.4	3.56	100
2090	0.4	10.67	100
2141	0.4	1.27	100
2142	0.4	0.25	100
2165	0.4	6.10	100
2166	0.4	0.25	100
2182	0.4	7.37	100
2185	0.4	29.21	100
2186	0.4	1.52	100
2187	0.4	0.25	100
2188	0.4	0.25	100
2194	0.4	1.27	100
2195	0.4	4.57	100

2196	0.4	1.02	100
2212	0.4	0.51	100
2216	0.4	7.37	100
2234	0.4	0.25	100
2236	0.4	3.81	100
2237	0.4	0.25	100
2256	0.4	0.51	100
2261	0.4	8.13	100
2297	0.4	0.76	100
2299	0.4	2.03	100
2387	0.4	0.25	100
2388	0.4	0.76	100
2436	0.4	1.52	100
2588	0.4	0.76	100
2630	0.4	4.06	100
2783	0.4	4.06	100
2784	0.4	1.52	100
2809	0.4	3.30	100
2928	0.4	0.25	100
2934	0.4	7.37	100
2935	0.4	0.76	100
2938	0.4	0.25	100
2948	0.4	2.54	100
2981	0.4	1.78	100
3015	0.4	1.52	100
3082	0.4	3.05	100
3128	0.4	2.54	100
3129	0.4	0.25	100
3169	0.4	1.02	100
3177	0.4	0.25	100
3182	0.4	24.38	100
3192	0.4	2.29	100
3193	0.4	39.88	100
3265	0.4	13.97	100
3266	0.4	0.25	100
3280	0.4	6.10	100
3281	0.4	17.02	100
3299	0.4	0.51	100
3300	0.4	0.51	100
3324	0.4	10.67	100
3327	0.4	0.25	100
3328	0.4	0.25	100
3329	0.4	0.51	100
3335	0.4	11.18	100
3336	0.4	0.25	100
3338	0.4	1.02	100
3341	0.4	1.02	100
3362	0.4	5.59	100
3363	0.4	1.52	100
3374	0.4	3.05	100
3378	0.4	0.25	100
3381	0.4	0.25	100
3492	0.4	2.79	100
3511	0.4	2.03	100
3537	0.4	25.65	100
3622	0.4	6.60	100
3629	0.4	0.25	100

```
3630    0.4     1.02    100
*************************************************************************
"      POTENTIAL ET (WEEKLY TOTALS, mm) AND DEPTH TO WATER TABLE (mm)"
-------------------------------------------------------------------------
-------------------------------------------------------------------------
      WEEK NO.    ET   WATER TABLE
      -----------------------------
1         11.7    0
2         23.3    0
3         26.5    0
4         17.6    0
5         21.4    0
6         21.9    0
7         26.5    0
8         30.4    0
9         33.6    0
10        37.6    0
11        42.9    0
12        43.4    0
13        43.0    0
14        56.7    0
15        47.6    0
16        49.1    0
17        53.1    0
18        50.9    0
19        55.0    0
20        53.5    0
21        72.4    0
22        59.8    0
23        62.2    0
24        63.6    0
25        63.6    0
26        74.0    0
27        65.6    0
28        65.6    0
29        65.5    0
30        65.5    0
31        59.4    0
32        59.1    0
33        41.0    0
34        57.2    0
35        58.2    0
36        53.2    0
37        56.3    0
38        44.6    0
39        53.1    0
40        46.6    0
41        39.6    0
42        39.6    0
43        37.0    0
44        29.4    0
45        38.2    0
46        27.8    0
47        25.5    0
48        20.0    0
49        31.6    0
50        25.9    0
```

51	20.2	0
52	14.6	0
53	20.6	0
54	20.8	0
55	18.6	0
56	14.5	0
57	28.4	0
58	21.9	0
59	21.1	0
60	23.4	0
61	30.3	0
62	30.6	0
63	31.4	0
64	35.2	0
65	38.9	0
66	34.6	0
67	38.4	0
68	50.4	0
69	43.2	0
70	54.9	0
71	56.0	0
72	59.0	0
73	61.5	0
74	65.1	0
75	60.0	0
76	60.3	0
77	65.6	0
78	66.0	0
79	70.9	0
80	65.2	0
81	65.2	0
82	46.9	0
83	62.7	0
84	66.4	0
85	62.9	0
86	59.7	0
87	50.5	0
88	57.7	0
89	54.4	0
90	46.1	0
91	49.6	0
92	47.9	0
93	45.2	0
94	37.3	0
95	48.7	0
96	35.5	0
97	34.9	0
98	34.1	0
99	36.0	0
100	24.5	0
101	25.4	0
102	27.9	0
103	31.6	0
104	12.4	0
105	15.9	0
106	20.6	0
107	14.0	0

108	12.9	0
109	26.2	0
110	20.2	0
111	28.6	0
112	25.8	0
113	26.9	0
114	33.7	0
115	22.3	0
116	35.1	0
117	29.1	0
118	28.2	0
119	36.9	0
120	51.1	0
121	53.1	0
122	52.3	0
123	53.2	0
124	59.2	0
125	58.9	0
126	62.3	0
127	63.3	0
128	60.5	0
129	61.9	0
130	61.4	0
131	72.9	0
132	65.3	0
133	59.8	0
134	59.8	0
135	63.3	0
136	64.6	0
137	61.7	0
138	55.4	0
139	53.4	0
140	60.4	0
141	54.1	0
142	52.0	0
143	44.4	0
144	49.4	0
145	39.7	0
146	42.5	0
147	42.3	0
148	36.6	0
149	36.9	0
150	33.0	0
151	33.8	0
152	21.8	0
153	24.4	0
154	35.4	0
155	20.6	0
156	17.4	0
157	15.2	0
158	12.5	0
159	14.5	0
160	11.9	0
161	30.2	0
162	24.9	0
163	28.8	0
164	32.3	0

165	12.9	0
166	20.5	0
167	35.2	0
168	30.5	0
169	21.9	0
170	37.5	0
171	36.4	0
172	26.4	0
173	33.0	0
174	45.9	0
175	54.0	0
176	52.1	0
177	53.8	0
178	52.2	0
179	63.6	0
180	57.9	0
181	60.4	0
182	64.5	0
183	71.6	0
184	68.3	0
185	77.8	0
186	59.6	0
187	59.6	0
188	61.2	0
189	64.1	0
190	60.6	0
191	52.3	0
192	54.7	0
193	55.3	0
194	45.3	0
195	54.9	0
196	51.7	0
197	47.9	0
198	42.2	0
199	51.0	0
200	45.8	0
201	44.0	0
202	31.3	0
203	22.3	0
204	36.6	0
205	28.8	0
206	30.7	0
207	21.8	0
208	29.9	0
209	6.9	0
210	17.7	0
211	18.9	0
212	15.8	0
213	8.4	0
214	8.8	0
215	10.3	0
216	27.9	0
217	23.0	0
218	20.9	0
219	15.7	0
220	24.0	0
221	27.1	0

222	41.2	0
223	44.6	0
224	41.3	0
225	35.7	0
226	49.9	0
227	51.1	0
228	55.3	0
229	54.1	0
230	60.8	0
231	59.2	0
232	53.5	0
233	63.1	0
234	65.9	0
235	60.2	0
236	68.8	0
237	72.0	0
238	66.1	0
239	68.0	0
240	68.0	0
241	63.1	0
242	60.5	0
243	64.8	0
244	63.0	0
245	65.4	0
246	62.0	0
247	53.1	0
248	44.5	0
249	53.9	0
250	54.7	0
251	49.5	0
252	49.6	0
253	44.0	0
254	37.6	0
255	33.6	0
256	40.1	0
257	36.3	0
258	28.1	0
259	14.1	0
260	26.4	0
261	26.4	0
262	19.0	0
263	20.0	0
264	23.8	0
265	23.1	0
266	23.6	0
267	26.0	0
268	24.9	0
269	21.8	0
270	28.2	0
271	20.7	0
272	34.1	0
273	33.2	0
274	36.3	0
275	32.8	0
276	41.2	0
277	31.9	0
278	42.8	0

279	48.8	0
280	49.2	0
281	49.1	0
282	48.6	0
283	54.4	0
284	50.8	0
285	58.3	0
286	49.0	0
287	60.1	0
288	63.9	0
289	69.2	0
290	63.9	0
291	66.0	0
292	73.0	0
293	73.0	0
294	72.6	0
295	51.9	0
296	64.4	0
297	66.0	0
298	58.3	0
299	63.2	0
300	56.9	0
301	62.5	0
302	55.8	0
303	61.2	0
304	41.3	0
305	42.3	0
306	44.5	0
307	47.1	0
308	33.2	0
309	28.1	0
310	30.4	0
311	19.6	0
312	22.1	0
313	19.2	0
314	27.7	0
315	14.3	0
316	17.8	0
317	17.5	0
318	6.6	0
319	12.1	0
320	13.3	0
321	18.1	0
322	14.4	0
323	33.1	0
324	29.0	0
325	23.5	0
326	34.0	0
327	27.4	0
328	34.0	0
329	40.3	0
330	40.4	0
331	48.1	0
332	53.6	0
333	52.4	0
334	41.7	0
335	59.0	0

336	60.6	0
337	55.2	0
338	57.2	0
339	58.9	0
340	63.2	0
341	65.0	0
342	66.3	0
343	64.7	0
344	70.5	0
345	70.8	0
346	70.8	0
347	49.7	0
348	70.4	0
349	68.2	0
350	68.0	0
351	64.3	0
352	54.5	0
353	55.3	0
354	57.1	0
355	56.1	0
356	56.0	0
357	48.0	0
358	52.8	0
359	50.9	0
360	44.3	0
361	37.5	0
362	37.3	0
363	22.9	0
364	22.8	0
365	25.0	0
366	23.1	0
367	25.3	0
368	18.5	0
369	18.6	0
370	17.7	0
371	20.5	0
372	26.1	0
373	29.4	0
374	22.9	0
375	20.9	0
376	15.4	0
377	25.6	0
378	23.0	0
379	25.3	0
380	27.1	0
381	38.5	0
382	34.4	0
383	44.8	0
384	45.1	0
385	51.5	0
386	52.8	0
387	54.8	0
388	59.3	0
389	60.4	0
390	62.3	0
391	68.0	0
392	63.2	0

393	60.8	0
394	69.5	0
395	68.1	0
396	68.5	0
397	66.2	0
398	60.1	0
399	60.1	0
400	57.7	0
401	64.4	0
402	60.7	0
403	66.9	0
404	61.9	0
405	61.9	0
406	62.9	0
407	57.0	0
408	50.5	0
409	52.4	0
410	45.0	0
411	48.1	0
412	50.1	0
413	42.3	0
414	38.0	0
415	41.2	0
416	29.9	0
417	36.0	0
418	24.9	0
419	21.6	0
420	31.4	0
421	22.3	0
422	23.4	0
423	24.9	0
424	16.9	0
425	20.6	0
426	12.4	0
427	26.9	0
428	17.4	0
429	32.0	0
430	26.8	0
431	35.3	0
432	43.3	0
433	30.5	0
434	47.7	0
435	43.0	0
436	45.8	0
437	42.7	0
438	34.5	0
439	50.4	0
440	51.1	0
441	57.5	0
442	51.3	0
443	58.6	0
444	56.4	0
445	58.3	0
446	61.3	0
447	57.4	0
448	62.9	0
449	63.7	0

450	70.1	0
451	68.2	0
452	68.2	0
453	64.8	0
454	63.1	0
455	54.3	0
456	66.4	0
457	58.9	0
458	60.2	0
459	56.1	0
460	56.7	0
461	45.4	0
462	52.4	0
463	47.6	0
464	35.7	0
465	42.0	0
466	41.9	0
467	50.7	0
468	34.7	0
469	33.2	0
470	34.3	0
471	19.8	0
472	23.5	0
473	19.8	0
474	14.2	0
475	25.9	0
476	21.8	0
477	15.6	0
478	18.6	0
479	12.7	0
480	18.4	0
481	23.1	0
482	19.2	0
483	20.5	0
484	19.3	0
485	25.1	0
486	35.3	0
487	42.6	0
488	30.2	0
489	45.3	0
490	32.7	0
491	44.9	0
492	48.7	0
493	55.4	0
494	58.3	0
495	58.8	0
496	56.9	0
497	50.3	0
498	60.6	0
499	65.7	0
500	62.3	0
501	65.7	0
502	74.2	0
503	71.9	0
504	66.2	0
505	66.2	0
506	71.1	0

507	62.4	0
508	66.8	0
509	63.8	0
510	53.4	0
511	59.5	0
512	60.3	0
513	60.7	0
514	49.0	0
515	56.0	0
516	52.3	0
517	47.3	0
518	50.0	0
519	38.0	0
520	42.0	0
521	30.2	0
522	30.7	0
523	24.2	0
524	24.8	0
525	25.0	0
526	15.5	0
527	21.3	0
528	20.1	0
529	18.6	0
530	17.1	0

```
picmax              SOIL-WATER-PLANT-INTERACTION SIMULATION
"SIMULATION PERIODS (Data must be present for each item, even if it not used)"
------------------
Date type (US:1 UK:2)                  1
Starting date                     010194   Ending (date or day no.)   3652
Read theta(1) or pot'l(2)              1
No. of water applications            185
Years or cycles                        1 No. of crops                    1
K-Th-h from PSD:yes(1)no(0)            0 Trace 1(on), 0(off)             0
----------------------------------------------------------------------------
PROFILE DETAILS
---------------
Profile depth     (mm)      .1373E+04 Bottom boundary condition          2
Segment thickness (mm)      .1525E+03 :1 or 5,water table depth  .0000E+00
----------------------------------------------------------------------------
FOR UNIFORM PROFILE: (Any non-zero value here will override those in the
table of hydrological characteristics below unless K-Th-h calc. from PSD).
Soil bulk density Mg/cu.m   .0000E+00 Air -entry value' kPa     -.0000E+00
Exponent in Campbell's eq   .0000E+00 Sat'd K values (mm/day)    .0000E+00
---------------------------------------------------------------------------
CROP DATA
---------
Plants present: 1 yes, 0 no         1  Wilting point (soil) kPa -.2500E+04
Max(actual tran/potl tran)  .1000E+01 Min.root water pot'l (kpa)-.3000E+04
Roots: Const(1);growing(2)          1 Max.root water pot'l (kPa) .0000E+00
If 1: root length (m)        .500E+03 Root flow resistance term  .1050E+01
---------------------------------------------------------------------------
NUMBER OF OUTPUT FILES              2
  -- .OUT file --------                ----- .SUM file ----------
                                      Summary print interval (d)       2
Node print frequency                1 Three depth segments for the summary
Print options: 1, 2 or 3            2  file  (0's default to thirds of the
 1: Time intervals/print           1   profile)  (mm) :
 2: days/print                    1.0   Surface to [depth 1?]         305
 3: No. of prints (even)          14    Depth 1 to [depth 2?]         915
Tables printed: 1,2 or 3           3    Depth 2 to [depth 3?]        1373
***************************************************************************
***************************************************************************
         TIMES AT WHICH *.OUT FILE IS DESIRED (if print option = 3)
                     -------------------------------------
       Date or   Time of day       Date or    Time of day
       Day no.  (to nearest tenth) Day no.  (to nearest tenth)
       -------- .---------------.----------.----------------
           90        .2              180          .2
          240        .2              365          .2
          730        .2             1095          .2
         1461        .2             1826          .2
         2191        .2             2557          .2
         2992        .2             3287          .2
         3652        .2             3652          .8
**********************************************************************
**********************************************************************
Soil        Particle size distribution      Match K(h) at:
Layer       Clay     Silt    Rho    Organic       K     Matric    Retentivity
 no.                                 carbon              pot'l     regression
             %        %    kg/dm3      %        mm/d    kPa       model no.
-------------------------------------    ----------------------------
```

```
  1          06       02     2.02        1.0        1209.6     0.        0
  2          06       02     2.02        1.0        1209.6     0.        0
  3          06       02     2.02        1.0        1209.6     0.        0
  4          06       02     2.02        1.0        1209.6     0.        0
  5          06       02     2.02        1.0        1209.6     0.        0
  6          06       02     2.02        1.0        1209.6     0.        0
  7          06       02     2.02        1.0        1209.6     0.        0
  8          06       02     2.02        1.0        1209.6     0.        0
  9          06       02     2.02        1.0        1209.6     0.        0
 --------------------------------------------------------------------------------
-
Particle density kg/dm3:  Clay    Sand  Organic matter
                          2.65    2.65     1.10
*************************************************************************
*************************************************************************
 Soil  |Starting values | Hydrological Characteristics|   Root
layer  |--------------- | ----------------------------|  fraction
 no.   | Pot'l or Theta |   AEV     BCAM       KS     | (for const
       |  kPa           |   kPa                mm/d   | root distr)
-----  |  ------ ------ |  -------  -----     -----   |  ------
 1        0.0    0.0950  -.284E-01  9.845    1209.6       0.500
 2        0.0    0.0890  -.284E-01  9.845    1209.6       0.200
 3        0.0    0.0850  -.284E-01  9.845    1209.6       0.120
 4        0.0    0.0840  -.284E-01  9.845    1209.6       0.080
 5        0.0    0.0900  -.284E-01  9.845    1209.6       0.050
 6        0.0    0.0810  -.284E-01  9.845    1209.6       0.050
 7        0.0    0.0960  -.284E-01  9.845    1209.6       0.000
 8        0.0    0.1030  -.284E-01  9.845    1209.6       0.000
 9        0.0    0.1050  -.284E-01  9.845    1209.6       0.000
*********************************************************************
                              CROP DATA
                              ---------
 Crop Planting Emergence  Maturity   Harvest  Rel.   Crop  Plants  Pan
  no                    Root  Plant           root   cover per     factor
     ...........Date or Day no ...........    depth  frac  sq. m
------------------------------------------------------------------------
  1   010194  010294  010294 010294  3653     1.00   0.02  2.000   1.00
**********************************************************************
                       RAIN/IRRIGATION AND WATER COMPOSITION
                       -------------------------------------
                         START       AMOUNT      RATE
                       Date or  Time of  mm      mm/day
                       Day no.    Day
**************************************************************************
3       0.4     9.00    100
4       0.4     4.50    100
5       0.4     0.50    100
27      0.4     6.75    100
84      0.4     2.50    100
131     0.4     3.00    100
208     0.4     20.75   100
221     0.4     44.50   100
222     0.4     0.25    100
259     0.4     1.50    100
324     0.4     0.25    100
367     0.4     3.00    100
382     0.4     2.50    100
```

383	0.4	1.50	100
384	0.4	0.25	100
396	0.4	0.25	100
397	0.4	0.25	100
455	0.4	0.50	100
456	0.4	0.25	100
559	0.4	1.00	100
561	0.4	1.75	100
588	0.4	1.25	100
589	0.4	1.75	100
590	0.4	2.50	100
639	0.4	1.50	100
727	0.4	0.25	100
733	0.4	0.50	100
734	0.4	1.00	100
735	0.4	10.75	100
739	0.4	3.75	100
788	0.4	6.50	100
789	0.4	0.25	100
790	0.4	7.50	100
808	0.4	1.75	100
809	0.4	1.50	100
814	0.4	0.25	100
815	0.4	4.75	100
816	0.4	5.00	100
978	0.4	2.00	100
1030	0.4	3.50	100
1044	0.4	1.75	100
1063	0.4	0.25	100
1064	0.4	0.25	100
1072	0.4	2.50	100
1073	0.4	0.25	100
1074	0.4	8.50	100
1075	0.4	0.25	100
1076	0.4	0.25	100
1081	0.4	0.75	100
1098	0.4	3.25	100
1100	0.4	4.00	100
1101	0.4	0.50	100
1102	0.4	0.50	100
1103	0.4	0.25	100
1132	0.4	7.25	100
1133	0.4	1.00	100
1139	0.4	0.25	100
1141	0.4	8.50	100
1157	0.4	18.50	100
1162	0.4	7.00	100
1181	0.4	8.25	100
1182	0.4	4.50	100
1183	0.4	0.25	100
1185	0.4	8.50	100
1186	0.4	0.25	100
1187	0.4	5.00	100
1221	0.4	7.50	100
1238	0.4	4.25	100
1321	0.4	3.50	100
1330	0.4	8.00	100

1331	0.4	1.50	100
1433	0.4	8.00	100
1434	0.4	12.25	100
1437	0.4	4.75	100
1438	0.4	0.25	100
1448	0.4	1.52	100
1457	0.4	11.18	100
1458	0.4	8.13	100
1460	0.4	0.25	100
1467	0.4	5.08	100
1468	0.4	17.27	100
1469	0.4	1.78	100
1471	0.4	5.33	100
1473	0.4	3.56	100
1476	0.4	3.05	100
1477	0.4	6.86	100
1480	0.4	0.25	100
1482	0.4	0.25	100
1500	0.4	9.91	100
1511	0.4	9.40	100
1519	0.4	0.25	100
1520	0.4	0.25	100
1546	0.4	6.86	100
1596	0.4	1.52	100
1597	0.4	0.51	100
1698	0.4	0.25	100
1702	0.4	1.02	100
1709	0.4	5.33	100
1740	0.4	0.76	100
1750	0.4	1.78	100
1779	0.4	17.02	100
1780	0.4	6.86	100
1851	0.4	0.25	100
1864	0.4	7.37	100
1865	0.4	0.51	100
1891	0.4	0.25	100
1892	0.4	1.78	100
1904	0.4	1.27	100
1910	0.4	3.05	100
1942	0.4	0.25	100
1944	0.4	0.76	100
1970	0.4	0.76	100
1971	0.4	0.51	100
2064	0.4	1.27	100
2089	0.4	3.56	100
2090	0.4	10.67	100
2141	0.4	1.27	100
2142	0.4	0.25	100
2165	0.4	6.10	100
2166	0.4	0.25	100
2182	0.4	7.37	100
2185	0.4	29.21	100
2186	0.4	1.52	100
2187	0.4	0.25	100
2188	0.4	0.25	100
2194	0.4	1.27	100
2195	0.4	4.57	100

2196	0.4	1.02	100
2212	0.4	0.51	100
2216	0.4	7.37	100
2234	0.4	0.25	100
2236	0.4	3.81	100
2237	0.4	0.25	100
2256	0.4	0.51	100
2261	0.4	8.13	100
2297	0.4	0.76	100
2299	0.4	2.03	100
2387	0.4	0.25	100
2388	0.4	0.76	100
2436	0.4	1.52	100
2588	0.4	0.76	100
2630	0.4	4.06	100
2783	0.4	4.06	100
2784	0.4	1.52	100
2809	0.4	3.30	100
2928	0.4	0.25	100
2934	0.4	7.37	100
2935	0.4	0.76	100
2938	0.4	0.25	100
2948	0.4	2.54	100
2981	0.4	1.78	100
3015	0.4	1.52	100
3082	0.4	3.05	100
3128	0.4	2.54	100
3129	0.4	0.25	100
3169	0.4	1.02	100
3177	0.4	0.25	100
3182	0.4	24.38	100
3192	0.4	2.29	100
3193	0.4	39.88	100
3265	0.4	13.97	100
3266	0.4	0.25	100
3280	0.4	6.10	100
3281	0.4	17.02	100
3299	0.4	0.51	100
3300	0.4	0.51	100
3324	0.4	10.67	100
3327	0.4	0.25	100
3328	0.4	0.25	100
3329	0.4	0.51	100
3335	0.4	11.18	100
3336	0.4	0.25	100
3338	0.4	1.02	100
3341	0.4	1.02	100
3362	0.4	5.59	100
3363	0.4	1.52	100
3374	0.4	3.05	100
3378	0.4	0.25	100
3381	0.4	0.25	100
3492	0.4	2.79	100
3511	0.4	2.03	100
3537	0.4	25.65	100
3622	0.4	6.60	100
3629	0.4	0.25	100

```
3630     0.4      1.02     100
**************************************************************************
"      POTENTIAL ET (WEEKLY TOTALS, mm) AND DEPTH TO WATER TABLE (mm)"
--------------------------------------------------------------------------
--------------------------------------------------------------------------
       WEEK NO.    ET   WATER TABLE
       ----------------------------
1        11.7    0
2        23.3    0
3        26.5    0
4        17.6    0
5        21.4    0
6        21.9    0
7        26.5    0
8        30.4    0
9        33.6    0
10       37.6    0
11       42.9    0
12       43.4    0
13       43.0    0
14       56.7    0
15       47.6    0
16       49.1    0
17       53.1    0
18       50.9    0
19       55.0    0
20       53.5    0
21       72.4    0
22       59.8    0
23       62.2    0
24       63.6    0
25       63.6    0
26       74.0    0
27       65.6    0
28       65.6    0
29       65.5    0
30       65.5    0
31       59.4    0
32       59.1    0
33       41.0    0
34       57.2    0
35       58.2    0
36       53.2    0
37       56.3    0
38       44.6    0
39       53.1    0
40       46.6    0
41       39.6    0
42       39.6    0
43       37.0    0
44       29.4    0
45       38.2    0
46       27.8    0
47       25.5    0
48       20.0    0
49       31.6    0
50       25.9    0
```

51	20.2	0
52	14.6	0
53	20.6	0
54	20.8	0
55	18.6	0
56	14.5	0
57	28.4	0
58	21.9	0
59	21.1	0
60	23.4	0
61	30.3	0
62	30.6	0
63	31.4	0
64	35.2	0
65	38.9	0
66	34.6	0
67	38.4	0
68	50.4	0
69	43.2	0
70	54.9	0
71	56.0	0
72	59.0	0
73	61.5	0
74	65.1	0
75	60.0	0
76	60.3	0
77	65.6	0
78	66.0	0
79	70.9	0
80	65.2	0
81	65.2	0
82	46.9	0
83	62.7	0
84	66.4	0
85	62.9	0
86	59.7	0
87	50.5	0
88	57.7	0
89	54.4	0
90	46.1	0
91	49.6	0
92	47.9	0
93	45.2	0
94	37.3	0
95	48.7	0
96	35.5	0
97	34.9	0
98	34.1	0
99	36.0	0
100	24.5	0
101	25.4	0
102	27.9	0
103	31.6	0
104	12.4	0
105	15.9	0
106	20.6	0
107	14.0	0

108	12.9	0
109	26.2	0
110	20.2	0
111	28.6	0
112	25.8	0
113	26.9	0
114	33.7	0
115	22.3	0
116	35.1	0
117	29.1	0
118	28.2	0
119	36.9	0
120	51.1	0
121	53.1	0
122	52.3	0
123	53.2	0
124	59.2	0
125	58.9	0
126	62.3	0
127	63.3	0
128	60.5	0
129	61.9	0
130	61.4	0
131	72.9	0
132	65.3	0
133	59.8	0
134	59.8	0
135	63.3	0
136	64.6	0
137	61.7	0
138	55.4	0
139	53.4	0
140	60.4	0
141	54.1	0
142	52.0	0
143	44.4	0
144	49.4	0
145	39.7	0
146	42.5	0
147	42.3	0
148	36.6	0
149	36.9	0
150	33.0	0
151	33.8	0
152	21.8	0
153	24.4	0
154	35.4	0
155	20.6	0
156	17.4	0
157	15.2	0
158	12.5	0
159	14.5	0
160	11.9	0
161	30.2	0
162	24.9	0
163	28.8	0
164	32.3	0

165	12.9	0
166	20.5	0
167	35.2	0
168	30.5	0
169	21.9	0
170	37.5	0
171	36.4	0
172	26.4	0
173	33.0	0
174	45.9	0
175	54.0	0
176	52.1	0
177	53.8	0
178	52.2	0
179	63.6	0
180	57.9	0
181	60.4	0
182	64.5	0
183	71.6	0
184	68.3	0
185	77.8	0
186	59.6	0
187	59.6	0
188	61.2	0
189	64.1	0
190	60.6	0
191	52.3	0
192	54.7	0
193		

222	41.2	0
223	44.6	0
224	41.3	0
225	35.7	0
226	49.9	0
227	51.1	0
228	55.3	0
229	54.1	0
230	60.8	0
231	59.2	0
232	53.5	0
233	63.1	0
234	65.9	0
235	60.2	0
236	68.8	0
237	72.0	0
238	66.1	0
239	68.0	0
240	68.0	0
241	63.1	0
242	60.5	0
243	64.8	0
244	63.0	0
245	65.4	0
246	62.0	0
247	53.1	0
248	44.5	0
249	53.9	0
250	54.7	0
251	49.5	0
252	49.6	0
253	44.0	0
254	37.6	0
255	33.6	0
256	40.1	0
257	36.3	0
258	28.1	0
259	14.1	0
260	26.4	0
261	26.4	0
262	19.0	0
263	20.0	0
264	23.8	0
265	23.1	0
266	23.6	0
267	26.0	0
268	24.9	0
269	21.8	0
270	28.2	0
271	20.7	0
272	34.1	0
273	33.2	0
274	36.3	0
275	32.8	0
276	41.2	0
277	31.9	0
278	42.8	0

279	48.8	0
280	49.2	0
281	49.1	0
282	48.6	0
283	54.4	0
284	50.8	0
285	58.3	0
286	49.0	0
287	60.1	0
288	63.9	0
289	69.2	0
290	63.9	0
291	66.0	0
292	73.0	0
293	73.0	0
294	72.6	0
295	51.9	0
296	64.4	0
297	66.0	0
298	58.3	0
299	63.2	0
300	56.9	0
301	62.5	0
302	55.8	0
303	61.2	0
304	41.3	0
305	42.3	0
306	44.5	0
307	47.1	0
308	33.2	0
309	28.1	0
310	30.4	0
311	19.6	0
312	22.1	0
313	19.2	0
314	27.7	0
315	14.3	0
316	17.8	0
317	17.5	0
318	6.6	0
319	12.1	0
320	13.3	0
321	18.1	0
322	14.4	0
323	33.1	0
324	29.0	0
325	23.5	0
326	34.0	0
327	27.4	0
328	34.0	0
329	40.3	0
330	40.4	0
331	48.1	0
332	53.6	0
333	52.4	0
334	41.7	0
335	59.0	0

336	60.6	0
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342	66.3	0
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347	49.7	0
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349	68.2	0
350	68.0	0
351	64.3	0
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353	55.3	0
354	57.1	0
355	56.1	0
356	56.0	0
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358	52.8	0
359	50.9	0
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362	37.3	0
363	22.9	0
364	22.8	0
365	25.0	0
366	23.1	0
367	25.3	0
368	18.5	0
369	18.6	0
370	17.7	0
371	20.5	0
372	26.1	0
373	29.4	0
374	22.9	0
375	20.9	0
376	15.4	0
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379	25.3	0
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422	23.4	0
423	24.9	0
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425	20.6	0
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427	26.9	0
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430	26.8	0
431	35.3	0
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433	30.5	0
434	47.7	0
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437	42.7	0
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439	50.4	0
440	51.1	0
441	57.5	0
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443	58.6	0
444	56.4	0
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449	63.7	0

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472	23.5	0
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475	25.9	0
476	21.8	0
477	15.6	0
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479	12.7	0
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484	19.3	0
485	25.1	0
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497	50.3	0
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504	66.2	0
505	66.2	0
506	71.1	0

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510	53.4	0
511	59.5	0
512	60.3	0
513	60.7	0
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515	56.0	0
516	52.3	0
517	47.3	0
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519	38.0	0
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524	24.8	0
525	25.0	0
526	15.5	0
527	21.3	0
528	20.1	0
529	18.6	0
530	17.1	0

APPENDIX 1

EARTHWORK QUALITY ASSURANCE PLAN

EARTHWORK QUALITY ASSURANCE PLAN FOR CONSTRUCTION OF THE ALTERNATIVE FINAL COVER

PICACHO CUT AND FILL SITE
IMPERIAL COUNTY, CALIFORNIA

MAY 1999

REVISED OCTOBER 2010

PREPARED FOR:

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PREPARED BY:

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16885 W. Bernardo Drive
San Diego, California 92127

EARTHWORK QUALITY ASSURANCE PLAN FOR CONSTRUCTION OF THE ALTERNATIVE FINAL COVER

PICACHO CUT AND COVER SITE

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EARTHWORK QUALITY ASSURANCE PLAN
FOR CONSTRUCTION OF THE
ALTERNATIVE FINAL COVER

PICACHO CUT AND COVER SITE

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1.0 INTRODUCTION

A Quality Assurance (QA) program consists of selected testing and inspection of a final product completed in order to provide the Owner/Agencies an evaluation of whether the end product is of the specified quality of materials and workmanship. Since in earthwork construction, it is both inefficient and impractical to withhold QA testing until completion of a final cover system, an on-going QA program is typically conducted during construction to ascertain the quality of the end product. Because of possible conflicts of interest, the Contractor should not undertake the QA function directly. Rather, QA inspection and testing should be left under the objective authority of a single team of design and inspection professionals.

A Quality Control (QC) program consists of selected tests and inspections during production which can assist the Contractor in producing the quality product required. While the QC function is the sole responsibility of the Contractor, the Project Manager may, at his discretion, provide information regarding the on-going Geotechnical QA Monitoring for the Contractor's use in implementing his QC function. If provided, release of the QA data to the Contractor is for convenience only and should, in no way, relieve the Contractor from his QC function nor will it result in assumption by the QA Team of any part of the Contractor's sole responsibility for fulfilling the project requirements and his own QC functions.

The final cover system proposed for the Picacho Cut and Fill Site is an alternative design as allowed by current regulation and consists of compacted fill which will function as the containment system for closure of the waste management area. As proposed, the final cover system will consist of a monofill section of earth material which, includes from bottom to top: a 2 foot thick foundation layer and a 2.5 foot thick monofill layer; both of which are composed of similar on-site borrow soils. Each of these layers function as an integral part of the final cover system created during construction. As a result, it is important that each lift of the final cover meet design specifications prior to construction of successive or overlying lifts.

This document presents the QA plan and details the type and frequency of tests to be performed during construction of the earthwork portions of the final cover system for the Picacho Cut and Fill Site in Imperial County, California. This QA document details the quality assurance tests and procedures to be implemented during construction and will be used in conjunction with the Project Plans and Specifications.

1.1 PROJECT REQUIREMENTS

As currently proposed, the alternative final cover for the Picacho Cut and Fill Site will consist of a minimum 2 foot thick foundation layer consisting of in-place or additional random soils compacted to a minimum of 90 percent of the maximum dry density, overlain by a 2.5 foot thick monofill layer of select on-site borrow soils, moisture conditioned to about optimum moisture content, and compacted to a minimum of 90 percent of the maximum dry density.

All materials used to construct the final cover system must meet or exceed the criteria indicated in the Project Plans and Specifications. Any deviation from the Specifications must be pre-approved by the Geotechnical Consultant and/or Engineer.

1.2 FINAL COVER MATERIAL SPECIFICATIONS

Foundation layer soils shall consist of existing in place or selectively excavated soils which are free of potentially hazardous environmental pollutants; exhibit a maximum particle size of three inches and contain sufficient fine-grained constituents such that gravel size and larger fragments do not cluster during construction

Cover soils for the monofill layer shall consist of selectively excavated, transported, stockpiled, processed, and homogenized on-site soils from an approved on-site borrow source. These materials shall have a maximum particle size of 3 inches and a minimum fines content (percent by weight passing U.S. No. 200 sieve) of 7 percent for an individual test and 8 percent for the average of 10 consecutive tests. In addition, the soil shall have a minimum of 5 percent finer than 5 microns for an individual test and 6 percent finer for the average of 10 consecutive tests. Cover soils for the monofill layer shall have a maximum saturated hydraulic conductivity on the order of $1.0\text{x}10^{-3}$ cm/sec.

2.0 OWNER AND PROJECT TEAM

2.1 PROJECT TEAM

The Owner and Project Team for all Picacho Cut and Fill Site closure construction activities, as set forth herein, are as follows:

Landfill Owner

Quechan Indian Tribe
P.O. Box 1899
Yuma, Arizona 85366-1899
Contact: Mr. Mike Jackson, President
Phone: (760) 572-0213

Landfill Operator

Imperial County
Department of Public Works
155 South 11th Street
El Centro, California 92243
Contact: Mr. William Brunet, PE
Phone: (760) 339-4462

Landfill Engineer:

Bryan A. Stirrat & Associates
225 West Hospitality Lane, Suite 100
San Bernardino, California 92408
Contact: Mr. Caleb Moore
Phone: (909) 860-7777

Geotechnical Consultant:

Geo-Logic Associates
250 W. First Street, Suite 228
Claremont, California 91711
Contact: Mr. Gary Lass
Phone: (909) 626-2262

2.2 DEFINITIONS

"Construction Manager" - Person(s) or firm(s) authorized by the County to manage and oversee the administration of the Construction Contract.

"Contractor" - The firm responsible for earthworks construction and preparation of supporting surfaces. The Contractor is also responsible for any Sub-Contractors.

"County" - Imperial County, Department of Public Works.

"Geotechnical Consultant" - Geologist/geotechnical professional registered in the State of California and responsible for earthwork observation, inspection and testing.

"Geotechnical QA Manager" - The individual or company responsible for construction quality assurance (QA).

"Geotechnical QA Monitors" - The individuals working under the direction of the Geotechnical QA Manager. Such personnel include "Technicians", "Field Engineers" and "Field Geologists" representing the Engineer and Geotechnical Consultant. Geotechnical QA Monitors responsible for the earthwork, shall be experienced in landfill construction monitoring, soil construction and compaction testing during grading operations.

"Landfill Engineer" - The firm responsible for design and preparation of the Project Plans and Specifications. The Engineer or his representative is also responsible for observing, testing, and documenting activities related to quality assurance for all aspects of construction. All completed work is subject to approval by the Engineer.

"Owner" - The owner of the site, in this case, the Imperial County, Department of Public Works.

"Project Documents" - All Contractor submittals, Construction Drawings, Record Drawings, "As-Built" Plans, Construction Specifications, QA Plan, Health and Safety Plan and Project Schedule.

"Project Manager/Project Director" - The County's designated representative responsible for the project.

"Project Plans and Specifications" - All project related drawings and specifications including design modifications and Record Drawings.

"Work" - All tools, equipment, supervision, labor, and materials or supplies necessary to complete the project as specified herein and as shown on the Project Drawings.

3.0 QA ORGANIZATION

The QA Team will consist of design and field personnel with specific experience in the inspection and Geotechnical QA Monitoring of earthwork activities related to landfill final cover construction. The principal functions of the QA team are presented below:

3.1 PROJECT MANAGER/PROJECT DIRECTOR

The Project Manager/Project Director shall have overall authority for all QA activities.

3.2 CONSTRUCTION MANAGER

The Construction Manager will serve as the Project Manager's on-site representative. All QA functions will be under his direct authority. All coordination, reporting and issues related to non-compliance will be directed through the Construction Manager. In addition, he will participate with the Engineer and Geotechnical Consultant in all decisions related to design issues which arise during the course of construction.

3.3 LANDFILL ENGINEER

The Landfill Engineer will be responsible for reviewing all design issues which may arise during construction. The approval of the Landfill Engineer will be required prior to any design changes.

3.4 GEOTECHNICAL CONSULTANT

The Geotechnical Consultant will be responsible for reviewing all earth material or excavation issues which may arise during construction. Geotechnical consultant approval will be required for any earth material modifications or for any design modifications which may impact the performance of the earth materials.

3.5 GEOTECHNICAL QA MANAGER

The Geotechnical QA Manager will be a representative of the Geotechnical Consultant and shall be responsible for overall review, observation, sampling and testing activities for construction. Specific duties of the Geotechnical QA Manager will include:

- Review of all designs, Project Plans and Specifications.
- Implementation of the QA Plan including: assignment and management of all QA personnel; review of all field reports; and engineering review of all QA related issues.
- Review of all design changes.
- Familiarization of all Geotechnical QA Monitors with the site and the QA requirements for the project.
- Attendance at all QA related meetings, (i.e. preconstruction, progress and special meetings as required).
- Participation in the preparation of Record Drawings.
- Coordination of all field testing, sampling and laboratory testing.
- Review of all field and laboratory test results and preparation of recommendations for appropriate responses.
- Review of all Geotechnical QA Monitor's daily reports and logs.
- Notation of any on-site activities or conditions that could jeopardize the quality or function of the final cover system and reporting of these to the Construction Manager.
- Preparation of a monthly summary of QA activities.
- Designation of a Senior Geotechnical QA Monitor to act on his behalf at the site while operations are ongoing.
- Reporting of any unresolved deviations from the QA Plan to the Construction Manager.
- Preparation of the final "As-Built" report for all completed earthwork construction activities.

3.6 GEOTECHNICAL QA MONITORS

3.6.1 FIELD ENGINEER/FIELD GEOLOGIST

The Field Engineer/Field Geologist will be a representative of the Geotechnical Consultant and will be responsible for evaluation of whether earth materials conform to the requirements of the Project Plans and Specifications. Duties of the Field Engineer/Field Geologist will include the following:

- Subgrade inspection.
- Review of the adequacy of all clearing, grubbing, stripping and preparation of areas to receive fill.
- Monitoring and evaluation of all material processing, mixing, blending and moisture conditioning operations.
- Evaluation of the engineering characteristics of proposed on-site and import cover materials.
- Observation and evaluation of all cuts including keyway excavations that may be impacted by geologic conditions.

3.6.2 TECHNICIANS

Technicians will be representatives of the Geotechnical Consultant and will continuously observe all excavation and grading operations to provide a basis for concluding that construction is carried out in conformance with the Project Plans and Specifications. Duties will include:

- Observation of the subgrade surface preparation.
- Verification that cover soils are derived from appropriate sources.
- Visual evaluation of soil material properties for consistency with the Project Plans and Specifications.
- Identification of deleterious materials or other deficiencies in soil quality to minimize the possibility that these materials are incorporated into the final cover system.
- Monitoring of moisture conditioning, mixing, blending, and processing for uniformity of material and moisture content.
- Monitoring of activities for removal and/or disaggregation of all oversize material from the fill.
- Evaluation of the constructed cover material for conformance with the Project Plans and Specifications.
- Observation of uniformity of coverage of compaction equipment, especially at fill edges, turnaround areas and on slope faces.
- Monitoring of lift thickness.
- Observation of the active fill pad at the beginning of each grading day and establishment of requirements for wetting/drying and/or processing of the exposed surface prior to placement of additional fill.
- Undertaking field tests including but not limited to field hydraulic conductivity and field moisture/density content at the minimum frequencies noted herein or at any time that a deficiency is suspected.
- Recovery of samples for laboratory testing.
- Laboratory testing of the hydraulic conductivity, grain size and in-place moisture content and density of fill materials in accordance with the requirements of the Specifications and this QA Plan (including retests if necessary).
- Confirmation that the test results are in accordance with the Project Specifications (including retests of any previously failed area).

4.0 MEETINGS

In order to facilitate production of an acceptable final cover, close coordination between the Project Manager/Project Director, Construction Manager, Engineer, Geotechnical Consultant, Contractor (including appropriate Subcontractors) and Quality Assurance personnel is essential. To this end, the following meetings may be scheduled:

4.1 PRE-CONSTRUCTION MEETING

A Pre-Construction Meeting should be held at the site. At a minimum, the meeting shall be attended by the County of Imperial, Department of Public Works (or designated representative), the Construction Manager, the Engineer, the Geotechnical Consultant, the Contractor and the Geotechnical QA staff.

Specific items to be considered at this meeting may include:

- Any appropriate modifications to the QA requirements.
- Development of a format for site specific agenda.
- Review of the responsibilities of each party.
- Review of the lines of authority and communication.
- Review of work area security and safety protocol.
- Review of the procedures for project documentation and reporting, and distribution of documents and reports.
- Review of Contractor's proposed methods of construction (including equipment), with specific emphasis on methods of select grading, trucking, stockpiling, processing, moisture conditioning and compaction.
- Review of the procedures for field and laboratory QA testing.
- Establishment of procedures for correcting and documenting construction deficiencies.
- Conducting a site inspection to discuss work areas, excavations, stockpile areas, mixing tables, processing areas, lay-down areas, access roads, haul roads, and related items.
- Review of the project schedule.

The meeting shall be documented by the Construction Manager and minutes shall be distributed to all parties.

4.2 WEEKLY PROGRESS MEETINGS

Progress Meetings should be held weekly. At a minimum, these meetings shall be attended by the County of Imperial, Department of Public Works (or designated representative), the Construction Manager, the Geotechnical QA Manager and/or the Geotechnical QA Monitors, and the Contractor. The purpose of these meetings is typically to:

- Discuss any health and safety related issues.
- Review scheduled work activities.
- Discuss project related problems.
- Review Contractor performance.
- Discuss the Contractor's personnel and equipment assignments.
- Review the previous week's activities and accomplishments.

Weekly progress meetings shall be documented by the Construction Manager or his representative and minutes shall be distributed to all parties.

4.3 SPECIAL MEETINGS

Special meetings may be conducted as required to discuss problems or deficiencies. At a minimum, these meetings will be attended by the Construction Manager, the Geotechnical QA staff and the Contractor. If the correction of a problem requires a design modification, the Engineer and the Geotechnical Consultant will also be present. The purpose of these meetings is to:

- Define and discuss any problems or deficiencies in the project.
- Review possible corrective actions or solutions.
- Implement an action plan to resolve the problems or deficiencies.

Special meetings shall be documented by the Construction Manager or his representative and minutes shall be distributed to all parties.

5.0 GENERAL EARTHWORK REQUIREMENTS

The following earthwork requirements present the generally accepted standards and minimum requirements for earthwork grading operations to be used in construction of the project. These requirements shall be the project minimum requirements for earthwork except where specifically superseded in subsequent soils reports, or by prevailing guidance documents of the controlling agency.

5.1 GENERAL

A. The Contractor shall be solely responsible for the satisfactory completion of all earthwork in accordance with the Project Plans and Specifications.
B. Equipment used in the excavation, transport, stockpiling, processing, installation and/or compaction of all materials used in construction of the final cover will be standard of practice grading machinery of known specifications suitable for performing the required work in a timely and efficient manner.
C. All clearing, grubbing, stripping and site preparation for the project shall be accomplished to the satisfaction of the Geotechnical Engineer.
D. All materials incorporated as part of compacted fill must be inspected and placement must be observed by the Geotechnical Consultant or his designated representative. All material considered by the Geotechnical Consultant to be unsuitable for use in the construction of the final cover shall be removed.
E. Material deemed unlikely to meet the performance specifications and not disposed of during clearing and grubbing or demolition shall be removed from stockpiles, borrow and/or fill as directed by the Geotechnical Consultant and will be disposed of off-site.
F. The ground surface to receive fill shall be prepared to the satisfaction of the Geotechnical Consultant and the fill shall be placed, spread, mixed, moisture conditioned and compacted in accordance with the project specifications and as recommended by the Geotechnical Consultant.
G. The ground surface (i.e., existing interim cover soils) shall be scarified, disced or bladed until it is uniform and free from uneven features which may prevent uniform compaction. The scarified ground surface shall then be moisture conditioned to optimum moisture content, mixed as required, and compacted to a minimum of 90 percent of the maximum dry density as determined by ASTM D 1557. If the scarified zone is greater than 12 inches in depth, the excess shall be removed and placed in lifts of six to eight inches in thickness. Prior to fill placement, the ground surface to receive fill shall be inspected by the Geotechnical Engineer or his designated representative.

H. Irreducible rock or rock fragments in excess of three inches in maximum dimension shall be removed from the final cover section.

I. Suitable and sufficient processing and compaction equipment shall be on the job site to handle the amount of fill being stockpiled, processed, mixed and/or placed. If necessary, excavation equipment will be shut down temporarily in order to allow time for proper preparation and/or compaction of fills. Sufficient watering apparatus will be provided with due consideration to the type of fill material, curing characteristics, rate of placement, and time of year.

J. Fill material shall be placed in thin lifts with a maximum uncompacted thickness of six to eight inches. Each layer shall be spread evenly and thoroughly mixed to obtain a near uniform condition in each layer. In areas of excess lift thickness, regrading of the surface to the maximum lift thickness will be completed prior to construction of additional lifts.

K. The minimum compaction for the foundation layer and all fill materials placed is specified as 90 percent of the maximum dry density as determined by ASTM D 1557.

L. The Contractor shall selectively excavate soils from pre-approved on-site borrow sources as identified by the Geotechnical Consultant (or his representative) during the grading operations. Upon excavation, these materials will be screened, if necessary to exclude the oversize fraction, and transported to the landfill.

M. Cover soils shall be processed to obtain a uniform soil condition and shall be moisture conditioned (or dried) to no more than the optimum moisture content as determined by ASTM D 1557.

N. Neither material import nor cover production shall exceed the capability of the processing operation to meet the project specifications.

O. Representative samples of materials to be used for the final cover will be tested in the laboratory in order to determine the physical characteristics of the material. During processing and/or grading operations, no soils or soil types other than those previously analyzed may be used, unless the Geotechnical Consultant documents the suitability of these soils with appropriate additional testing paid for by the Contractor.

P. Where tests indicate the grain-size distribution, moisture content and/or density of any fill or portion thereof is below the project requirements, the particular layer or portion shall be reworked until the project requirements have been attained. No additional fill shall be placed over an area until the last fill has been tested and meets the requirements of this document to the satisfaction of the Geotechnical Consultant.

Q. Where tests indicate the saturated hydraulic conductivity of any fill or portion thereof is below the project requirements, the particular layer or portion shall be reworked and retested until the required saturated hydraulic conductivity has been attained. No additional fill shall be placed over an area until the last fill has been tested and meets the requirements of this document to the satisfaction of the Geotechnical Consultant.

R. Where work is interrupted by heavy rains, fill operations shall not be resumed until observations and field tests by the Geotechnical Consultant or his designated representative indicate the moisture content and density of the in-place fills and/or materials intended for placement are within the limits previously specified.

S. Drainage provisions shall be constructed in compliance with the recommendations of the Design Engineer and as shown on the Project Drawings.

T. As determined by the Geotechnical Consultant, fill over cut slopes shall be properly keyed through top soils, colluvium or creep material into rock or firm material. All transitions shall be stripped of all loose soils prior to placing fill.
U. If any unanticipated conditions of an adverse or potentially adverse nature are encountered during grading, the Geotechnical Consultant shall investigate, analyze and make recommendations to mitigate these conditions.
V. Unless otherwise specified by the Geotechnical Consultant, no permanent cut slopes shall be excavated higher or steeper than that allowed by the ordinances of controlling governmental agencies.
W. All excavated surfaces shall be graded to provide good drainage and prevent ponding of water. Surface water shall be controlled to avoid damage to adjoining properties or to finish work on the site.
X. All cut and/or fill slopes will be planted for erosion protection in accordance with the Project Plans and Specifications.

6.0 GEOTECHNICAL QA MONITORING FOR EARTH MATERIALS

6.1 GENERAL

Construction of the final cover system shall be performed in accordance with the Project Plans and Specifications and shall be continuously observed, and routinely sampled and tested by the Geotechnical QA Monitors for the physical parameters described in this section.

The testing frequencies presented herein are a minimum. Additional tests will be conducted by the Geotechnical QA Monitor for retests and at any time that in the opinion of the Geotechnical QA Monitor, additional testing is required and/or a deficiency is suspected. Retests of previously failed areas will be performed at the discretion of the Geotechnical QA Monitor when, in his opinion, sufficient reworking of the area has been performed by the Contractor to warrant a retest.

6.2 FINAL COVER TESTING

Field and laboratory testing for compaction, moisture content, engineering properties and saturated hydraulic conductivity properties during construction will be completed according to the following minimum schedule:

FILL TESTING
TYPE AND FREQUENCY

TEST DESCRIPTION	TEST DESIGNATION	MINIMUM TEST FREQUENCY
Moisture-Density Relationship	ASTM D 1557	The greater of: one per 5,000 CY or 1 per material
In-Place Density and Moisture Content (Nuclear or Drive Ring)	ASTM D 2922, D3017 or D 2937	One per 250 CY or a minimum of 4 tests per day
In-Place Density and Moisture Content (Sand-Cone)	ASTM D 1556	One per 2,500 CY and a minimum of 10% of required density tests

FILL TESTING
TYPE AND FREQUENCY (CONT'D)

TEST DESCRIPTION	TEST DESIGNATION	MINIMUM TEST FREQUENCY
Particle Size Analysis	ASTM D 422	Daily or one per 5,000 CY minimum
Atterberg Limits	ASTM D 4318	Daily or one per 5,000 CY minimum
Laboratory Saturated Hydraulic Conductivity	ASTM D 5084 or USBR Modified E-15	One per 10,000 CY
Field Saturated Hydraulic Conductivity		One per 5,000 CY
Visual Inspection	ASTM D 2488	Daily

6.3 ACCEPTANCE CRITERIA

6.3.1 GENERAL

Where test results indicate that the lift thickness, maximum particle size and/or in-place density/moisture content, or hydraulic conductivity of any portion of the final cover system is below the project requirements, that particular portion shall be re-worked or replaced until the required condition has been attained and the resulting product meets or exceeds the Project Specifications. No additional fill shall be placed over an area until the existing fill has been tested horizontally and vertically and determined by the Geotechnical QA Monitor to meet or exceed the project Earthwork Specifications. The area to be reworked will be verified by survey if in the opinion of the Geotechnical QA Monitor conditions warrant this detail.

6.3.2 MOISTURE CONTENT AND DENSITY

If, in the opinion of the Geotechnical Consultant, fill materials which have been placed and/or are ready to be placed, do not visually have a uniform and homogeneous material characteristic and moisture content throughout, these materials will be removed, without testing, and will be reprocessed and/or reworked until, in the opinion of the Geotechnical Consultant or his designated representative, they are likely to meet the Project Specifications.

Upon placement, if test results indicate a relative dry density of less than 90 percent of the maximum dry density as determined by ASTM D 1557 or a moisture content outside of the specified limits, the area will be considered inadequate and will be reworked. Any reworked areas will be retested by the Geotechnical QA Monitor to assure the reworked area meets the density and moisture content requirements.

Within the lower one foot of the final cover foundation layer, a relative density of slightly less than 90 percent of the ASTM D 1557 maximum dry density may be approved if, in the opinion of the Geotechnical Consultant, the yielding nature of the underlying refuse prism, creates a situation where the minimum required density cannot be achieved. In no event will the minimum density requirement of the remainder of the cover system be modified.

6.3.3 LIFT THICKNESS AND PROCESSING

If at any time the Geotechnical QA Monitor observes an uncompacted lift thickness in excess of six- to eight-inches or observes placement of over-sized materials or materials without the required processing, and moisture conditioning, the Contractor shall immediately cease placing additional fills in that area. For an over thick lift, the Contractor shall immediately blade the surface to reduce the lift thickness to the requirements of the Project Specifications. If over-size or inadequately mixed materials are placed, the Contractor shall immediately remove these materials and/or reprocess them prior to placement of additional fill.

6.3.4 GRAIN-SIZE DISTRIBUTION

If at any time the grain-size tistribution tests (ASTM D 422) indicate that the final cover soils contain particles in excess of 3 inches and/or have a minimum fines content (defined by No. 200 sieve) less than 7 percent for an individual test and 8 percent for the average of 10 consecutive tests, these materials shall be rejected for use in the final cover system. In addition, the soil shall have a minimum of 5 percent finer than 5 microns for any individual test and 6 percent for the average of 10 consecutive tests.

6.3.5 PERMEABILITY

If at any time laboratory (ASTM D 5084 or USBR Modified E-13) saturated hydraulic conductivity tests indicate that the final cover soils have an in-place saturated hydraulic conductivity greater than 1.0E-03 cm/sec, this area will be considered inadequate and will be reworked. Any reworked areas will be retested by the QA monitor to assure the reworked area meets the saturated hydraulic conductivity requirements.

7.0 DOCUMENTATION

To provide evidence of satisfactory work performance, all stages of final cover construction shall be documented. The information shall be recorded on a standardized form or in a bound field logbook.

7.1 DAILY RECORD KEEPING

The purpose of daily record keeping is to document construction activities, including results of continuous visual observations; laboratory/field test data; sampling; review of test results; repairs; problems; solutions and general field activity. The daily record keeping will include a daily field inspection report and a daily test summary report, as discussed below.

7.1.1 DAILY FIELD INSPECTION REPORT

The Geotechnical QA Monitor(s) shall keep a daily field inspection report of project activities. At a minimum, this report shall include the following:

- Date and project identification.
- Field activity and work locations.
- Summaries of field communications.
- Summary of equipment and personnel used.
- Work activity monitored, general location on-site and any related test results.
- Record of material sampling and testing activities.
- Any variance from specified methods and standards.
- Estimated quantities of material placed and compacted.
- Unusual events.
- Actions regarding acceptance/rejection of work.
- Weather conditions.
- Signature of person preparing the report.

7.1.2 DAILY TEST SUMMARY REPORT

A daily test summary report of the field and laboratory tests conducted for the QA of the final cover will be prepared under the direction of the Geotechnical QA Manager for the sole benefit of the owner. The daily test summary report will include:

- Locations and results of all field and laboratory tests with pass/fail comment.
- Results of all re-tests for failed tests with remarks showing the corrective action taken before the re-tests. If re-test(s) also show a rejection, final corrective action shall be noted.

Both the daily field inspection report and the daily test summary report shall be reviewed by the Geotechnical QA Manager and shall be submitted only to the Construction Manager. One complete set of both daily reports shall be kept on site by the QA personnel at all times. The contractor will be notified of the "pass/fail" nature of the QA results but may not be provided with numerical data.

7.2 MONTHLY PROGRESS REPORT

A Monthly Progress Report shall be prepared by the Geotechnical QA Manager and submitted to the Construction Manager. This monthly progress report shall summarize the work activities, deficiencies, and corrective actions implemented. It shall also summarize the QA test results.

7.3 PHOTO DOCUMENTATION

A photographic record will be prepared as necessary by the Construction Manager as part of the construction control activities. Photographs shall be in color and shall include photographs of construction activities, problem areas, corrective actions, and final constructed features. Photographs shall be identified with the site designation, the date taken, the location, and a description of the activity covered by the photograph.

7.4 AS-BUILT DOCUMENTATION

As the work is completed, final Record Drawings and a report shall be prepared under the direction of the Engineer and Construction Manager utilizing the record prepared during construction. These drawings and the report shall be retained as a permanent record of the final cover construction. The report shall include a laboratory test results summary and discuss typical construction conditions and procedures. The Record Drawings and report will be submitted to the Owner. The Contractor shall submit all "As-Built" information to the Owner as required by the Special Provisions.

APPENDIX D-1

SITE-SPECIFIC FLEXIBILITY REQUEST
ALTERNATIVE FINAL COVER

SITE-SPECIFIC FLEXIBILITY REQUEST
ALTERNATIVE FINAL COVER

PICACHO SOLID WASTE SITE
IMPERIAL COUNTY, CALIFORNIA

March 2008

PREPARED FOR:

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SITE-SPECIFIC FLEXIBILITY REQUEST
ALTERNATIVE FINAL COVER
PICACHO SOLID WASTE SITE
IMPERIAL COUNTY, CALIFORNIA

TABLE OF CONTENTS

1.0 INTRODUCTION

The Picacho Solid Waste Site (PSWS) is located on federally-administered Quechan Tribal lands in the County of Imperial (County), California. Although California is a U.S. Environmental Protection Agency (US EPA) approved state, because the facility is located on Tribal lands, which are held in trust by the federal government, the site is subject to the code of federal regulations (CFR) 40 CFR Part 258 (40 CFR 258), which regulates solid waste facilities. Any variations from the federal regulations must be approved by the US EPA through the site-specific flexibility process. On behalf of Imperial County Department of Public Works (County), which operates the PSWS, GeoLogic Associates (GLA) has prepared this Site Specific Flexibility Request (SSFR) to demonstrate that the proposed alternative final cover system meets the requirements of federal regulation 40 CFR 258.60(b). This SSFR was prepared based on information summarized in the Preliminary Alternative Cover Evaluation and Design Report for the PSWS Final Closure prepared by GLA (GLA, 1999), and the USEPA (August, 1997) SSFR guidance document.

1.1 REGULATORY REQUIREMENTS

Federal regulations require that landfill final covers be constructed according to identified minimum standards. For all municipal solid waste landfill (MSWLF) units, the minimum regulatory requirements include construction of at least 18 inches of earthen material that has a permeability no greater than 1 x 10^{-5} cm/sec, overlain by a minimum of a 6 inch erosion layer consisting of earthen material that is capable of sustaining native plant growth. However, under 40 CFR 258.60 (b), an alternative final cover system design may be approved if it is demonstrated that the alternative final cover achieves equivalent reduction in infiltration to the prescriptive standard, and that the proposed erosion layer provides equivalent protection from wind and water erosion as the specified prescriptive standard.

1.2 SCOPE OF WORK

The purpose of this SSFR and analysis presented herein are submitted to provide a basis for the Tribe and USEPA to evaluate and approve a proposal to implement final closure of the PSWS using an alternative to the federal prescriptive final cover design in accordance with 40 CFR 258.60 (b). As such, this document presents an evaluation of whether the performance of the proposed alternative final cover design is consistent with the performance goals addressed by prescriptive standards and would yield equivalent protection. The evaluation is based on results of the prior evaluation and design report prepared for the PSWS by GLA (1999). Work completed for this study included:

1. Determination of the relevant characteristics of cover borrow materials used at the PSWS;
2. Obtaining local climatological data for the Picacho area;
3. Selection of a computer program to simulate unsaturated flow through the soil profile;
4. Computer modeling of the proposed alternative final cover system using the laboratory determined soil characteristics and local, historical climate data;
5. Completion of a sensitivity analysis for the variables input into the LEACHM model;
6. Discussion of expected long-term performance of the alternative final cover; and
7. Preparation of this SSFR.

2.0 ALTERNATIVE FINAL COVER

In 1998, the US EPA initiated its Alternative Cover Assessment Program (ACAP) to evaluate innovative and alternative landfill final cover designs that offer equivalent or superior long-term environmental protection when compared with the US EPA's prescriptive landfill final cover design, as outlined in 40 CFR 258. To date, the ACAP has evaluated the performance of evapotranspiration (ET) monolithic soil cover systems and demonstration fills at sites around the United States to evaluate performance in a variety of climatic zones using a variety of soil types. GLA has also conducted numerous alternative final cover demonstration projects for comparison with prescriptive final cover system performance. Based on the results of these studies by the US EPA ACAP and GLA, ET monolithic soil covers have been successfully permitted and constructed at numerous landfills across the United States, including landfills sited in arid environments, such as the PSWS. As a result, the consideration for use of an ET monolithic soil cover at the PSWS does not set a regulatory precedent, but should be viewed as a continuation of the development of the ET monolithic soil cover systems for use in landfill applications.

The primary advantage of an ET monolithic soil cover when compared to the prescriptive final cover design is that ET monolithic soil covers do not rely on the extended competency of an infiltration or low-permeability layer to maintain performance integrity. Studies by the US EPA's ACAP have found that desiccation of the prescriptive low permeability layer will begin in as little as three weeks after the last application of moisture (Albright, et al, 2002). Since the historical climatic data for the area surrounding the PSWS indicate that it is not uncommon for this area to experience well over three weeks without significant rainfall, desiccation of a conventional prescriptive final cover would be anticipated. In addition, ET monolithic soil cover typically provides a thicker section of earthen material promoting the growth of vegetation that aids in moisture uptake and removal by transpiration, thereby minimizing the quantity of water that passes through the refuse prism. The above-ground plant structure also minimizes erosion by diffusing wind and rainfall energy and runoff channeling, and by binding the cover materials with the root system. As a result, a plant community similar to that present in the surrounding area not only enhances evapotranspiration but also the long-term stability of the cover materials.

2.1 BORROW MATERIALS EVALUATION

The PSWS is located approximately 4.5 miles north of Winterhaven in the Imperial Valley. The site is underlain by Holocene Older Alluvial fan and terrace deposits consisting of coarse-grained sands and gravels with variable silt and clay. Currently, borrow operations for daily cover occur in a borrow pit on the south side of the site. Initially, a borrow materials evaluation was performed to assess the soil properties of the on-site borrow soil for an alternative cover system at the PSWS. The following sections describe the borrow materials evaluation.

Soil Sampling and Analysis

The primary purpose of the geotechnical testing was to determine whether or not the local borrow soils from the adjacent borrow area would be suitable for use as an ET alternative final cover. For this study, two samples determined to be representative of existing and future cover soil conditions were collected. Samples were collected at the surface using hand tools, placed in five-gallon buckets, and shipped to a geotechnical laboratory for analyses of grain size distribution, moisture-density relationships, permeability (or saturated hydraulic conductivity), and soil matric potential/moisture content relationships. The test results are provided in Table 1, and the complete laboratory test data are presented in Appendix A.

Table 1
Borrow Material Evaluation Test Results

TEST	BORROW SAMPLE-1	BORROW SAMPLE-2	AVERAGE
% Passing No. 200 Sieve	9	7	8
% Passing 5 Micron	7	5	6
Maximum Density (pcf)	117.0	126.0	121.5
Optimum Moisture Content (%)	11.5	7.0	9.25
Permeability (cm/sec)	3.4E-04 cm/s	1.4E-03	8.7E-04
Capillary Moisture Relationship			
Campbell's "A" Coefficient	-5.44E-03	-2.79E-03	-4.12E-03
Campbell's "B" Exponent	10.197	9.440	9.8185

As shown on Table 1, the properties of the two soil samples are relatively similar poorly graded sands, though Borrow Sample-1 collected from the east side of the borrow pit contains a slightly higher percentage of fine-grained soil. Since Borrow Sample-2 exhibited a faster hydraulic conductivity, it was selected as a more conservative representation of the proposed cover soils that could be used for final cover construction.

2.2 ALTERNATIVE FINAL COVER MODELING

2.2.1 Model Description

Over the last several years, GLA has reviewed several infiltration models to simulate unsaturated fluid flow through soil profiles. Based on the unsaturated fluid flow modeled results with site-specific moisture monitoring, GLA has selected the computer program LEACHM (Leaching Estimation and Chemistry Model, Hutson and Wagenet, 1992) for alternative cover analyses since it provides defensible, appropriate, and accurate estimations of unsaturated fluid transport. LEACHM is a one-dimensional finite difference computer model developed at Cornell University. The model simulates water and solute transport in unsaturated or partially saturated soils to a depth of about two meters (6.56 feet). Estimates of plant growth and absorption of water by plant roots are included in the model as are climatic factors such as precipitation and evaporation.

One of the advantages of LEACHM is its ability to perform unsaturated flow simulations using site and soil specific parameters. For each soil horizon identified in a given profile, LEACHM allows the user to stipulate laboratory determined matric potential/soil moisture content relationships, bulk density/porosity relationships, and saturated hydraulic conductivity values. These values are transformed in a curve fitting routine to produce the air entry value (a) and exponent (b) used in Campbell's retentivity equation.

$$h = a(\theta/\theta_s)^{-b}$$

Where:

h = pressure potential (kPa).
θ = volume fractional water content (%).
θ_s = volumetric water content at saturation (%).
a = air entry constant, determined by curve matching.
b = dimensionless constant, determined by curve matching.

Unsaturated hydraulic conductivity is then estimated for a given soil moisture content using Campbell's conductivity relationship.

After calculation of soil retentivity and unsaturated hydraulic conductivity, LEACHM simulates unsaturated flow through the modeled profile using Richards' equation:

$$\delta/\delta x(K_x(\Psi)\delta\psi/\delta x)+ \delta/\delta y(K_y(\Psi)\delta\psi/\delta y)+ \delta/\delta z[K_z(\Psi)(1+\delta\psi/\delta z)]=C(\psi)\delta\psi/\delta t$$

This partial differential equation is used to describe soil-water movement in three-dimensions in the unsaturated zone; however, in LEACHM, the equation is simplified to approximate the one-dimensional (vertical) movement of water through the modeled soil cover:

$$\delta/\delta z[K_z(\Psi)(1+\delta\psi/\delta z)]=C(\psi)\delta\psi/\delta t$$

In this formula, the pressure head (ψ) is derived from the characteristic curves generated from the matric potential tests (i.e., pressure head values [$K(\psi)$] plotted for varying moisture contents [$\theta(\psi)$]) completed on representative samples. The specific moisture capacity, [$C(\psi)$] is a function of the pressure head since an increase of $\delta\psi$ must be accompanied by a decrease of $\delta\theta$ in the moisture stored in the unsaturated soil. The transmission and storage properties of an unsaturated soil are fully specified by the characteristic curve $K(\psi)$ and either $\theta(\psi)$ or $C(\psi)$.

The LEACHM modeling program has been used to design monolithic alternative final cover systems at many landfill sites in California. The monolithic final cover systems constructed at several of these sites are fitted with soil-moisture monitoring devices, and moisture infiltration data are collected routinely to evaluate the effectiveness of these systems. The results of these field demonstration projects further support the applicability of the LEACHM analyses.

2.2.2 Model Input Parameters

The following sections describe the critical assumptions, variables, and input requirements incorporated into the LEACHM computer analysis. Variables specified in the model include the iteratively calculated transient soil water status factors, plant growth, plant maturity, plant harvest variables (for seasonal plant communities), soil matric potential and saturated hydraulic conductivity. Sample input and output files for the LEACHM program are provided in Appendix B.

Final Cover Configuration

The first step in developing the PSWS alternative final cover model is defining the soil profile. For the LEACHM model, the soil profile is defined by the total thickness of the profile and a nodal or profile segment thickness.

Modeling of the proposed ET alternative final cover system was completed assuming a 2.0 foot foundation layer and 2.5 foot additional feet of alternative cover soils for a total profile thickness of 1373 mm (4.5 feet). The model was set up to report soil moisture and flux conditions at depths of 0, 1, 3 and 4.5 feet.

Bottom Boundary Condition

One of the most essential parameters included in the analysis of unsaturated fluid flow is definition of the bottom boundary condition of the final cover section. For the purposes of this study, three conditions were evaluated. The most conservative condition was a free draining condition whereby moisture is drawn downward through the base of the soil profile under a suction head applied by the underlying soil/waste, but moisture does not "pull back" from the section if shallow drying conditions develop. A "lysimeter" condition was also evaluated. Under this scenario, moisture again migrates only in one direction (vertically downward) but only passes into the waste after the base of the soil section becomes saturated and the local soil suction is essentially zero. Finally, a constant potential condition was evaluated. Under the constant potential it is assumed that a source of liquids exists within the landfill that would yield a constant moisture content within the waste and at the base of the cover. This bottom boundary condition allows for more effective characterization of two directional moisture movement and allows for the extraction of moisture through the final cover if drying conditions predominate (i.e., downward migration is calculated when the final cover moisture content is high and allows for extraction of water from the landfill when the moisture in the final cover is low).

Based on more recent large-scale demonstration project data, it is clear that the most realistic characterization of the bottom boundary condition is represented by the constant potential condition (GLA, 1999, GLA 2001, Lass et. al., 2000, Lass et. al., 2001). As a result, in estimating the nature of flow through the bottom boundary of the final cover section at the PSWS, although all three flow conditions are presented, the constant potential boundary condition is expected to be the most representative of actual unsaturated fluid flow.

Alternative Cover Soil Properties

For each node or interval in the defined profile, LEACHM requires input of specific soil properties including: remolded dry bulk density; initial matric potential and soil moisture content; Campbell's "a" and "b" coefficients (Campbell, G.S., 1974); and saturated hydraulic conductivity. Porosity is then calculated as a function of the stipulated specific gravity of the soils and their remolded dry bulk density.

Prior to initiation of modeling, samples from the existing PSWS daily cover borrow area were collected and analyzed as described in Section 2.1 of this report. Testing included determination of dry density, optimum moisture content, grain size distribution, remolded saturated hydraulic conductivity and soil matrix potential/soil moisture content relationships (Table 1). The material used for modeling purposes was Borrow Sample-2 which exhibits a conservative estimate of the borrow material characteristics.

Campbell's "a" and "b" coefficients were calculated using the LEACHM RETFIT program and are based on soil grain size distribution, bulk density, matric potentials, and hydraulic conductivity. The test results and calculated Campbell's "a" and "b" coefficients are presented in Table 1. The grain size distribution and matrix potential/moisture content relationships of the soils are also presented in Appendix B.

Climatic Conditions

The modeling analyses of an alternative cover at the PSWS were performed utilizing daily precipitation and weekly pan evaporation data recorded at the nearest available weather station to the site. The analysis included precipitation and pan evaporation values obtained from the Yuma Valley Station, located approximately 9 miles southwest of the landfill, for the years 1989 to 1998. During the modeling period the PSWS site was modeled to receive an average of 2.98 inches of rain per year with an average annual pan evaporation of 90.5 inches.

Precipitation. A critical element in modeling cover performance using LEACHM involves identification of total daily precipitation, as well as the time and rate of water application. The magnitude and duration of the rainfall events were estimated in a fashion believed to conservatively represent typical anticipated application. This included defining the time of day for water application to be 0.4 days (9:36 a.m.) and a water application rate of 100 mm/day (3.9 inches).

For each rain event, LEACHM calculates the maximum time period allowed for infiltration as the specified quantity of water to be applied divided by the application rate. Water that has not entered the soil profile at the end of the application period is assigned to an excess runoff term and included in the mass balance calculations. Infiltration into the profile is thus limited by the matric potential of the soil and the unsaturated hydraulic conductivity of the soil at the time of water application. In other words, infiltration is limited by the ability of the soil to take water.

Evapotranspiration - LEACHM requires mean weekly pan evaporation data from which daily potential evapotranspiration (DPET) is calculated as one-seventh of the weekly total pan evaporation. Daily potential transpiration is calculated by multiplying the DPET by a crop cover fraction. Daily potential evaporation is then calculated as the difference between DPET and potential transpiration. Given a stipulated crop cover fraction of 1.0, LEACHM will calculate that all of the evapotranspiration that occurs is associated with transpiration. However, if a value of 0.0 is entered, all soil moisture losses will be calculated to result solely from evaporation.

Vegetation - The vegetation models evaluated for the long term analysis herein included an annual shallow rooting grass and sparse native shrub species, which were estimated to provide a 2 percent coverage over the land. This coverage was selected based on review of the development of vegetation on the natural desert floor adjacent to the site, and is considered typical of the native vegetation in this area.

Rather than applying a coefficient to approximate the transpiration effects of plants, LEACHM uses the equation of Nimah and Hanks (1973) to simulate the uptake of water by plant roots. Variables included in the equation and requiring user specification include: plant wilting point (the soil matric potential below which plants are unable to extract water); root water potential (the root potential below which plants are unable to extract water from the soil); root resistance (the depth dependent resistance to upward flow of water within the roots); and the root distribution (expressed as a nodal percentage of all the roots).

2.2.3 Sensitivity Analysis and Selection of Variables

The following discussion addresses the selection of variables used in the LEACHM model and the sensitivity of the modeled results with respect to these variables. Table 2 lists all of the variables included in the sensitivity analysis along with their stipulated values and corresponding cumulative flux.

Saturated Hydraulic Conductivity

Saturated hydraulic conductivity is the rate at which water flows through soil. As presented in Table 2, the modeled profile showed only a relatively minor change in the calculated net flux (0.0012 inches per year versus 0.0033 inches per year) using the range of saturated hydraulic conductivities identified in borrow samples at the site. In analyzing the sensitivity of other variables and in the long-term modeling of the landfills alternative cover performance, a hydraulic conductivity of 1.4E-03 cm/sec (1209.6 mm/day) was used.

Application Rate

This term describes the rate at which rainfall occurs, or irrigation is applied, to the final cover system. As a caution, this term can also limit the amount of water that can be absorbed by the final cover soils. Any water that falls on the landfill in excess of the water application rate is assumed to be removed as runoff. As shown on Table 2, calculated net flux through several modeled profiles showed only a slight sensitivity to this variable when using application rates between 30.5 mm/day (1.2 inches/day) and 1524 mm/day (6 inches/day). Therefore, a reasonably conservative value of 100 mm/day (3.9 inches/day) was selected for the typical case and analysis of the sensitivity of other variables.

Maximum Actual Transpiration/Evaporation

Sensitivity analyses for this parameter included stipulation of maximum actual transpiration/evaporation values slightly greater than 1.0 and these analyses resulted in minor changes to the calculated net flux through the modeled soil profile (Table 2). This suggests that with the soils available in this environment, maximum actual transpiration/evaporation is not a critical parameter and a value of 1.0 was selected for evaluation of the sensitivity of other variables as well as for the typical case analysis completed as part of this study.

Minimum Root Potential

The minimum root potential is the minimum force at which plant roots can remove water from a soil and should be within the range of the wilting point (estimated around –2500 Kpa) and the hygroscopic water of a soil (estimated around –3100 Kpa; Brady and Weil, 1996). The maximum root potential is associated with the force required by plants to access capillary water (estimated to be around 0 to –30 Kilopascals (Kpa)).

Calculated net flux through several modeled profiles showed a slight variation when comparing minimum root potential values between -500 and -4500 Kpa (Table 2). Again, though not considered a particularly critical parameter, a conservative value of

-3000 Kpa (relatively low for arid region plant types) was selected for subsequent analyses of the water extraction capabilities of the average grass and shrub vegetative cover.

Wilting Point

Analysis using wilting point values between -500 and -4500 Kpa suggest almost no sensitivity to this parameter (Table 2). A reasonably conservative value of -2500 Kpa was selected for subsequent analysis.

Crop Cover Fraction

The crop cover fraction variable describes the percentage of the final cover system that will be covered with vegetation. Selection of crop cover fraction coefficients ranging from 1 to 5 percent resulted in minor changes to the calculated net flux (Table 2). However, calculated net flux for no plants (e.g. 0 percent coverage) is significantly higher indicating that even a very small percentage of plants (e.g. 1 to 5 percent) can still be effective at extracting water out of the soil. Crop cover fraction is therefore considered to be critical. Since undisturbed areas of the native desert floor currently support a vegetative cover of about 2 percent, this value was selected for subsequent long term analyses.

Root Distribution

The root distribution variable describes the percentage of the total root mass present at various discrete depth intervals within the final cover soils. Since roots are the mechanism used by plants to extract water from the soil, the quantity of root mass is used by LEACHM to estimate the effectiveness of water extraction from the final cover soils at various depths. As shown on Table 2, calculated net flux varied only slightly when completing analysis using moderate to deep rooting plant communities. However, calculated net flux through shallow root distributions (e.g. 100 percent of the roots in the upper one foot [PICSENS19 and PICSENS20]) is somewhat higher, and it is concluded that this is a more sensitive parameter.

In order to conservatively consider the effects of this parameter, subsequent analyses incorporated relatively shallow rooting grasses with deeper rooting shrubs. As modeled, roots were limited to the upper 36 inches (915 mm) of the profile, with 70 percent of the roots assigned to the upper one foot (305 mm) interval, followed by 20 percent in the one- to two-foot (305 - 610 mm) intervals, and 10 percent in the two- to three-foot (610 - 915 mm) zone.

3.0 MODELING RESULTS

As summarized above, the PSWS alternative cover was modeled as a 4.5 foot thick (1373 mm) alternative cover composed of compacted on-site soils combined with sparse (2 percent) native vegetation. Input variables were generally conservative given the range of values identified for the soil and vegetative conditions typical of the PSWS. The results of the modeling performed for this study are therefore considered conservative. The following sections describe the model results and presented on Figures 2 and 3.

Figures 2a through 2c depict the modeled moisture content of the final cover soils in volumetric percent (theta) for four distinct depth intervals over a period of approximately ten years. Figure 2a represents the "worst case" result (definition of a free draining bottom boundary), 2c represents the more likely condition (a constant potential bottom boundary) and 2b represents a conservative but more intermediate condition (a "lysimeter" bottom boundary). Figure 2d depicts the rainfall history recorded over the same time period at the Yuma Valley Station.

As can be seen, in all cases the first layer (76 mm) mimics seasonal precipitation patterns throughout the modeling period, while the intermediate soil layer (533 mm) reflects only severe seasonal impacts. In all cases even the most severe seasons show little or no impact in the deepest soil layers (991 and 1296 mm). Of note, the deepest soil layers (991 and 1296 mm) both reflect a net loss of moisture from the cover over the modeling period.

Figures 3a through 3c depict the cumulative flux through three layers of the modeled profile and represent three independently modeled bottom conditions. Figure 3d presents the cumulative flux as a function of depth through each of the modeled profiles. As shown, "worst case" infiltration (Figure 3a) is calculated to be 0.001 inches/year (including the 1992/1993 year when the site is modeled to have received over 5.9 inches of precipitation).

4.0 DISCUSSION

4.1 PRESCRIPTIVE DESIGN

As shown in Figure 2a through 2c, a substantial drying of final cover soils constructed at the PSWS is expected to substantial depth. This indicates that if a prescriptive final cover system were constructed at this site, the barrier layer would be subject to severe desiccation. As indicated by on-going research being completed by the University of Wisconsin, this seasonal wetting and drying will result in a substantial degradation of the performance characteristics of the barrier soil. In fact, field investigations indicate that the hydraulic properties of a prescriptive final cover system can degrade by orders of magnitude with regard to saturated hydraulic conductivity within a period of a few years (Dr. Craig Benson, personal communication). Recent investigations undertaken at a site located in Georgia by the US EPA's ACAP study team have found that even at high humidity sites, desiccation cracks were observed throughout the low hydraulic conductivity infiltration layer of the prescriptive final cover section in a matter of only a few years (Albright, et al, 2005). In summary, the likelihood of severe desiccation is believed to represent conditions that make the prescriptive cover inappropriate in the environment typical of the PSWS site.

In addition to the substantial loss of performance characteristics expected for a prescriptive cover barrier layer soil, it should also be recognized that low permeability soils are not available on-site or in the immediate area of the PSWS. As a result incorporating them into a final cover system would be expensive. The initial capital cost would then be exacerbated by the considerable increase in post-closure costs that would be associated with the minimum of 30 years of maintenance of a prescriptive cover system in this environment.

4.2 ALTERNATIVE FINAL COVER DESIGN

In contrast to the prescriptive cover sytem, the modeling completed to date and reported herein indicates that an alternative final cover system constructed using available on-site and near-site soils, with a minimum 2 percent native plant community, would be consistent with the performance goal addressed by the prescriptive standard and would afford equivalent or superior protection against water quality impairment.

5.0 CONCLUSIONS AND RECOMMENDATIONS

On the basis of the evaluations summarized herein and in recognition of the continuing evolution of the state of the art and the standards of practice in landfill closure design, it is recommended that the final closure of the PSWS be completed by using a 4.5 foot total thickness of monolithic on-site or near-site soils. This depth is considered sufficient to host the root systems of the proposed plant community and is of a sufficient thickness to maximize the moisture limiting characteristics of the final cover system and provide protection from wind and water erosion.

Material Characteristics - On the basis of the soil conditions modeled it is recommended that the alternative final cover be constructed using on-site soils that exhibit a grain size distribution that generally exclude particles in excess of 3 inches and a minimum fines content (percent by weight passing U.S. No. 200 Sieve) of 7 percent for an individual test and 8 percent for the average of 10 consecutive tests. In addition, the soil shall have a minimum of 5 percent finer than 5 microns for an individual test and 6 percent finer for the average of 10 consecutive tests. Finally, it is recommended that the cover soils exhibit a maximum saturated hydraulic conductivity on the order of 1.0E-03 cm/sec.

Erosion - An increased potential for erosion exists using the non prescriptive granular soils proposed over the steep existing slopes (i.e. greater than 3:1 horizontal:vertical). While some exaggerated erosion can be accommodated by the over-thickened cover section without impacting the systems performance, it is recommended that implementation of short-term artificial erosion control mechanisms such as silt fences, (in areas of high erosion) be implemented until the establishment of vegetation is achieved.

It is also recommended that an admixture of pit run rock and soil is placed in the upper 6-8 inches of the final cover to provide "rock armoring" as a means of protection against wind and water erosion. Pit run rock will be inspected for clasts greater than six inches. Rocks greater than six inches will be removed from the final cover.

In addition, to further minimize the potential for water erosion, it is recommended that the admixture of pit run rock and soil be placed along the edge of the decks to minimize flow down the slopes and promote positive drainage off of the decks. Erosion monuments should be placed throughout the cover sections at locations of exaggerated erosion so that the residual cover thickness can be verified at all times. Finally it is recommended that surface inspection (and monitoring of erosion monuments) be completed at least bi-annually, particularly after significant rain events, until erosion equilibrium has been reached.

Plants - Sensitivity analyses performed for the PSWS indicate that a minimum plant coverage of 2 to 5 percent could provide reasonable performance for the proposed alternative cover. As a result, it is recommended that when final cover construction is completed, hydroseeding, or the broadcasting of seeds of native plant species be performed in the first Fall season after cover construction. In addition, it is recommended that reseeding occur each subsequent Fall season until a minimum of 2 percent plant coverage is established on the site.

Based on the above modeling, construction of the proposed alternative final cover system in accordance with the recommendations presented herein is expected to provide at least equivalent performance to the prescriptive standard as defined by federal regulation 40 CFR 258. In addition, the proposed erosion layer included in the alternative final cover system will provide equivalent protection from wind and water erosion as the specified prescriptive standard. Therefore, it is requested that Tribe and USEPA grant the County be given approval for an ET monolithic alternative final cover system.

6.0 CLOSURE

This report is based on the project as described and the geotechnical data obtained in this study. Our firm should be notified of any pertinent change in the project plans or if conditions are found that differ from those described in this report, since this may require a re-evaluation. This report has not been prepared for use by parties or projects other than those named or described above. It may not contain sufficient information for other parties or other purposes.

This report has been prepared in accordance with generally accepted geotechnical practices and makes no other warranties, either express or implied, as to the professional advise or data included in it.

GeoLogic Associates

Will B.

William B. Lopez, PG, CHg
Project Geologist

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TABLES

Table 2
Picacho Landfill
LEACHM Model Sensitivity Analysis

	Saturated Permeability (mm/day)		Application Rate (mm/day)				
	PICMAX1	PICMAX2	PICSENS1	PICSENS2	PICMAX1	PICSENS3	PICSENS4
Saturated Permeability (mm/day)	1209.6	293.8	1209.6	1209.6	1209.6	1209.6	1209.6
Application Rate (mm/day)	100	100	30.5	60	100	1219.2	1524
Maximum Actual Transpiration/Evaporation (Kpa)	1	1	1	1	1	1	1
Minimum Root Potential (Kpa)	-3000	-3000	-3000	-3000	-3000	-3000	-3000
Wilting Point (Kpa)	-2500	-2500	-2500	-2500	-2500	-2500	-2500
Crop Cover Fraction (%)	2	2	2	2	2	2	2
Root Distribution	50/20/12/8/5/5	50/20/12/8/5/5	50/20/12/8/5/5	50/20/12/8/5/5	50/20/12/8/5/5	50/20/12/8/5/5	50/20/12/8/5/5
Cum. Flux mm (Total)	1.97	15.1	1.91	1.98	1.97	1.9	1.88
Cum. Flux mm (years 4-10)	0.19	0.5	0.18	0.19	0.19	0.18	0.18
Total Flux (inches/Year)	0.0012	0.0033	0.0012	0.0012	0.0012	0.0012	0.0012

	Maximum Actual Transpiration/Evaporation (Kpa)			Minimum Root Potential (Kpa)			
	PICMAX1	PICSENS7	PICSENS8	PICSENS9	PICSENS10	PICMAX1	PICSENS11
Saturated Permeability (mm/day)	1209.6	1209.6	1209.6	1209.6	1209.6	1209.6	1209.6
Application Rate (mm/day)	100	100	100	100	100	100	100
Maximum Actual Transpiration/Evaporation (Kpa)	1	3	5	1	1	1	1
Minimum Root Potential (Kpa)	-3000	-3000	-3000	-500	-1500	-3000	-4500
Wilting Point (Kpa)	-2500	-2500	-2500	-2500	-2500	-2500	-2500
Crop Cover Fraction (%)	2	2	2	2	2	2	2
Root Distribution	50/20/12/8/5/5	50/20/12/8/5/5	50/20/12/8/5/5	50/20/12/8/5/5	50/20/12/8/5/5	50/20/12/8/5/5	50/20/12/8/5/5
Cum. Flux mm (Total)	1.97	1.37	1.27	2.29	2.05	1.97	1.93
Cum. Flux mm (years 4-10)	0.19	0.14	0.13	0.35	0.24	0.19	0.17
Total Flux (inches/Year)	0.0012	0.0009	0.0009	0.0023	0.0016	0.0012	0.0011

	Wilting Point (Kpa)					Crop Cover Fraction (%)			
	PICSENS12	PICSENS13	PICMAX1	PICSENS14	PICSENS15	PICSENS16	PICSENS17	PICMAX1	PICSENS18
Saturated Permeability (mm/day)	1209.6	1209.6	1209.6	1209.6	1209.6	1209.6	1209.6	1209.6	1209.6
Application Rate (mm/day)	100	100	100	100	100	100	100	100	100
Maximum Actual Transpiration/Evaporation (Kpa)	1	1	1	1	1	1	1	1	1
Minimum Root Potential (Kpa)	-3000	-3000	-3000	-3000	-3000	-3000	-3000	-3000	-3000
Wilting Point (Kpa)	-500	-1500	-2500	-3500	-4500	-2500	-2500	-2500	-2500
Crop Cover Fraction (%)	2	2	2	2	2	0	1	2	5
Root Distribution	50/20/12/8/5/5	50/20/12/8/5/5	50/20/12/8/5/5	50/20/12/8/5/5	50/20/12/8/5/5	50/20/12/8/5/5	50/20/12/8/5/5	50/20/12/8/5/5	50/20/12/8/5/5
Cum. Flux mm (Total)	1.99	1.97	1.97	1.97	1.97	23.4	3.29	1.97	1.42
Cum. Flux mm (years 4-10)	0.2	0.19	0.19	0.19	0.19	11.2	0.4	0.19	0.14
Total Flux (inches/Year)	0.0013	0.0012	0.0012	0.0012	0.0012	0.0735	0.0026	0.0012	0.0009

	Root Distribution				
	PICMAX1	PICSENS19	PICSENS20	PICSENS21	PICSENS22
Saturated Permeability (mm/day)	1209.6	1209.6	1209.6	1209.6	1209.6
Application Rate (mm/day)	100	100	100	100	100
Maximum Actual Transpiration/Evaporation (Kpa)	1	1	1	1	1
Minimum Root Potential (Kpa)	-3000	-3000	-3000	-3000	-3000
Wilting Point (Kpa)	-2500	-2500	-2500	-2500	-2500
Crop Cover Fraction (%)	2	2	2	2	2
Root Distribution	50/20/12/8/5/5	99/01	75/25	20/20/20/20/20	10/10/30/30/20
Cum. Flux mm (Total)	1.97	10.2	6.87	2.53	2.48
Cum. Flux mm (years 4-10)	0.19	3.9	2.26	0.36	0.34
Total Flux (inches/Year)	0.0012	0.0256	0.0148	0.0024	0.0022

▨ - Indicates Variable changed

FIGURES

GRAPHIC SCALE

125	0	125	250

(IN FEET)

1 inch = 250 ft.

N

EXPLANATION:

⊕ GROUNDWATER MONITORING WELL LOCATION

⊗ APPROXIMATE LOCATION OF SURFACE SAMPLE

— · — · — APPROXIMATE LOCATION OF LIMIT OF REFUSE

— — — — APPROXIMATE LOCATION OF PROPERTY BOUNDARY

FIGURE 1

SURFACE SAMPLES LOCATION MAP

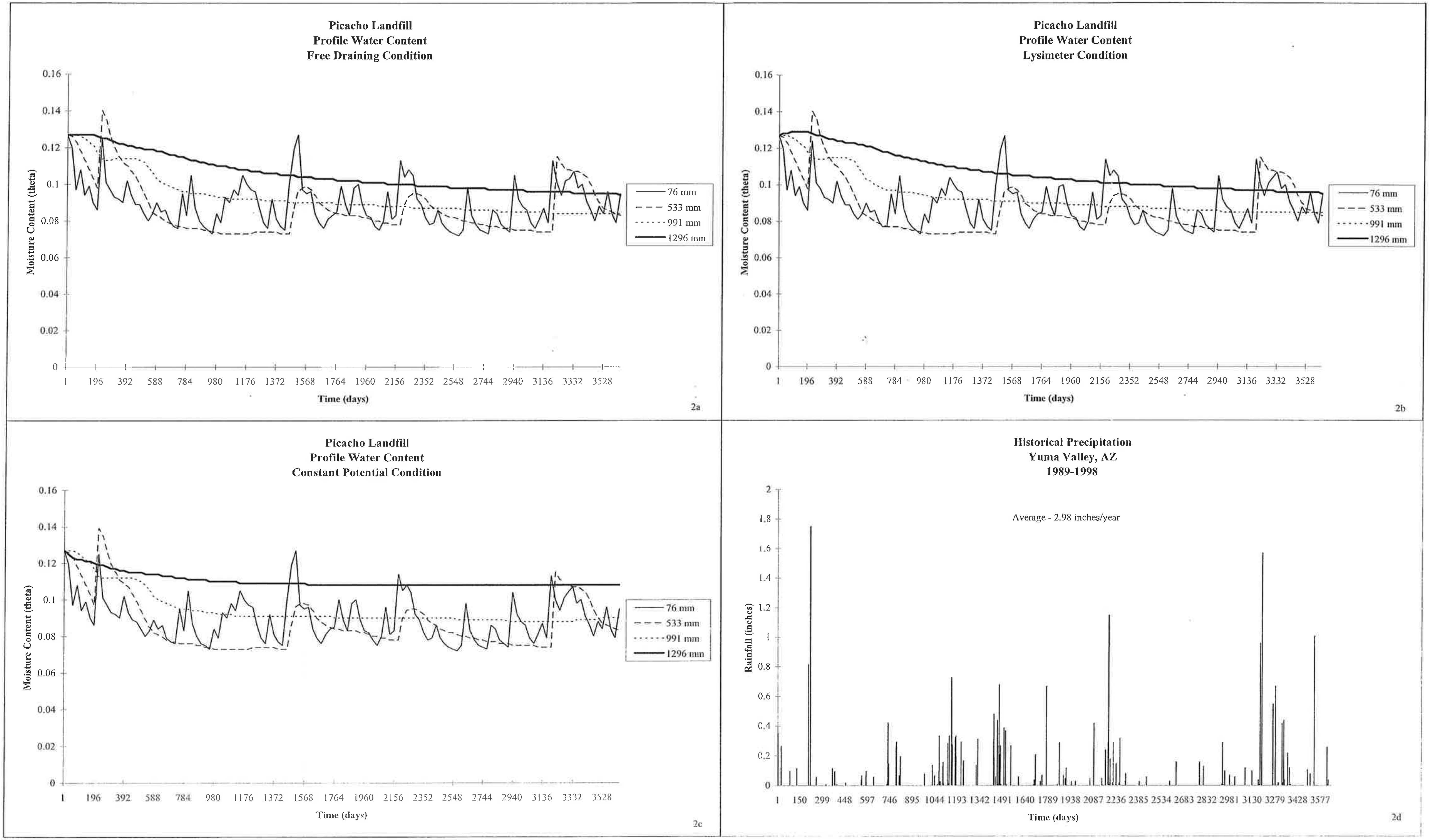
PICACHO SOLID WASTE SITE
IMPERIAL COUNTY, CALIFORNIA

GeoLogic Associates

Geologists, Hydrogeologists, and Engineers

DRAWN BY:	DATE:	JOB NO.
VL	MAY 1999	9878

Figure 2



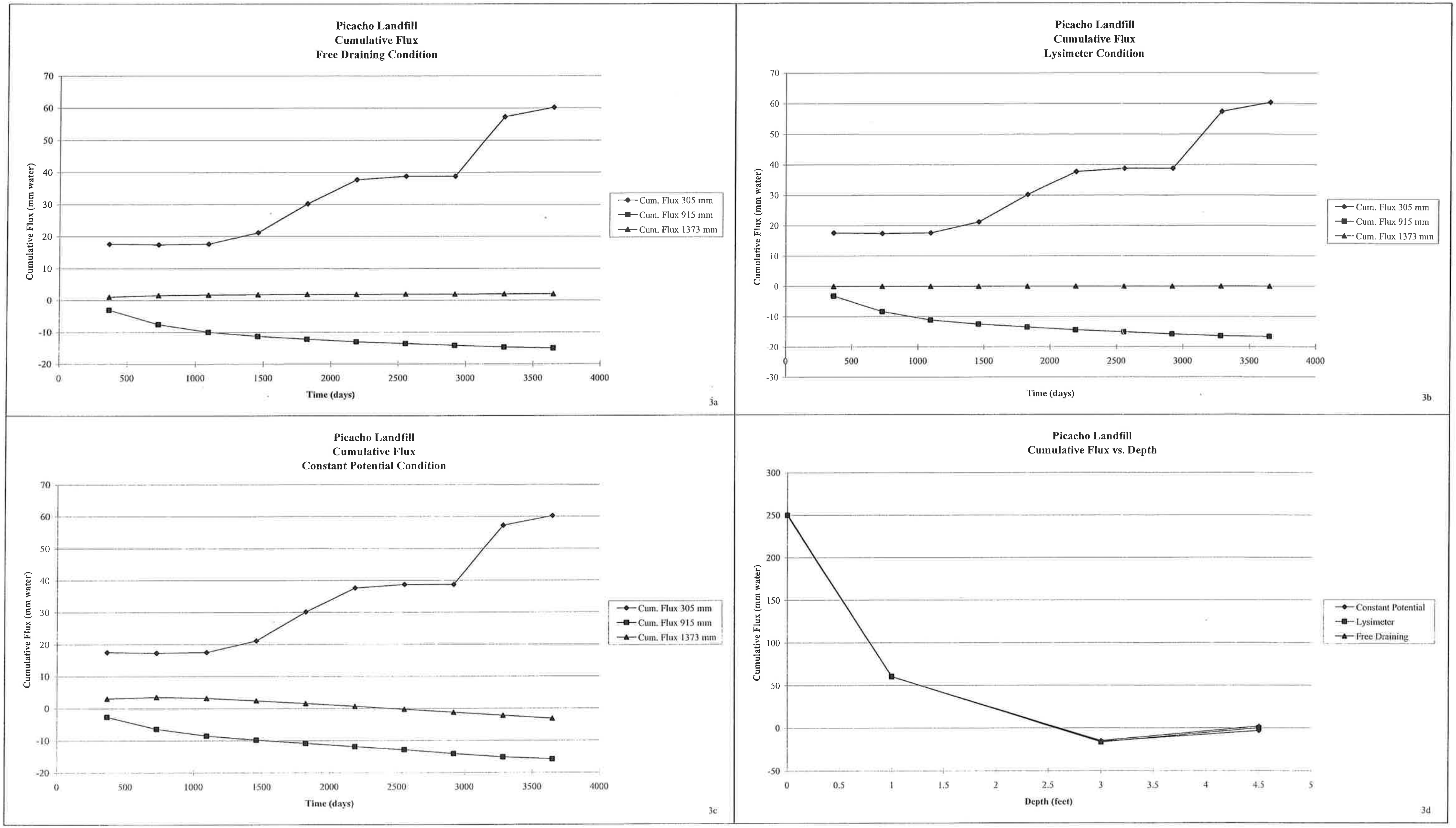
Picacho Landfill
Profile Water Content
Free Draining Condition

Picacho Landfill
Profile Water Content
Lysimeter Condition

Picacho Landfill
Profile Water Content
Constant Potential Condition

Historical Precipitation
Yuma Valley, AZ
1989-1998

Figure 3


Picacho Landfill
Cumulative Flux
Free Draining Condition
Cumulative Flux (mm water)
70
60
50
40
30
20
10
0
-10
-20
0
500
1000
1500
2000
2500
3000
3500
4000
Time (days)
Cum. Flux 305 mm
Cum. Flux 915 mm
Cum. Flux 1373 mm
3a
Picacho Landfill
Cumulative Flux
Lysimeter Condition
Cumulative Flux (mm water)
70
60
50
40
30
20
10
0
-10
-20
-30
0
500
1000
1500
2000
2500
3000
3500
4000
Time (days)
Cum. Flux 305 mm
Cum. Flux 915 mm
Cum. Flux 1373 mm
3b
Picacho Landfill
Cumulative Flux
Constant Potential Condition
Cumulative Flux (mm water)
70
60
50
40
30
20
10
0
-10
-20
0
500
1000
1500
2000
2500
3000
3500
4000
Time (days)
Cum. Flux 305 mm
Cum. Flux 915 mm
Cum. Flux 1373 mm
3c
Picacho Landfill
Cumulative Flux vs. Depth
Cumulative Flux (mm water)
300
250
200
150
100
50
0
-50
0
0.5
1
1.5
2
2.5
3
3.5
4
4.5
5
Depth (feet)
Constant Potential
Lysimeter
Free Draining
3d

APPENDIX A

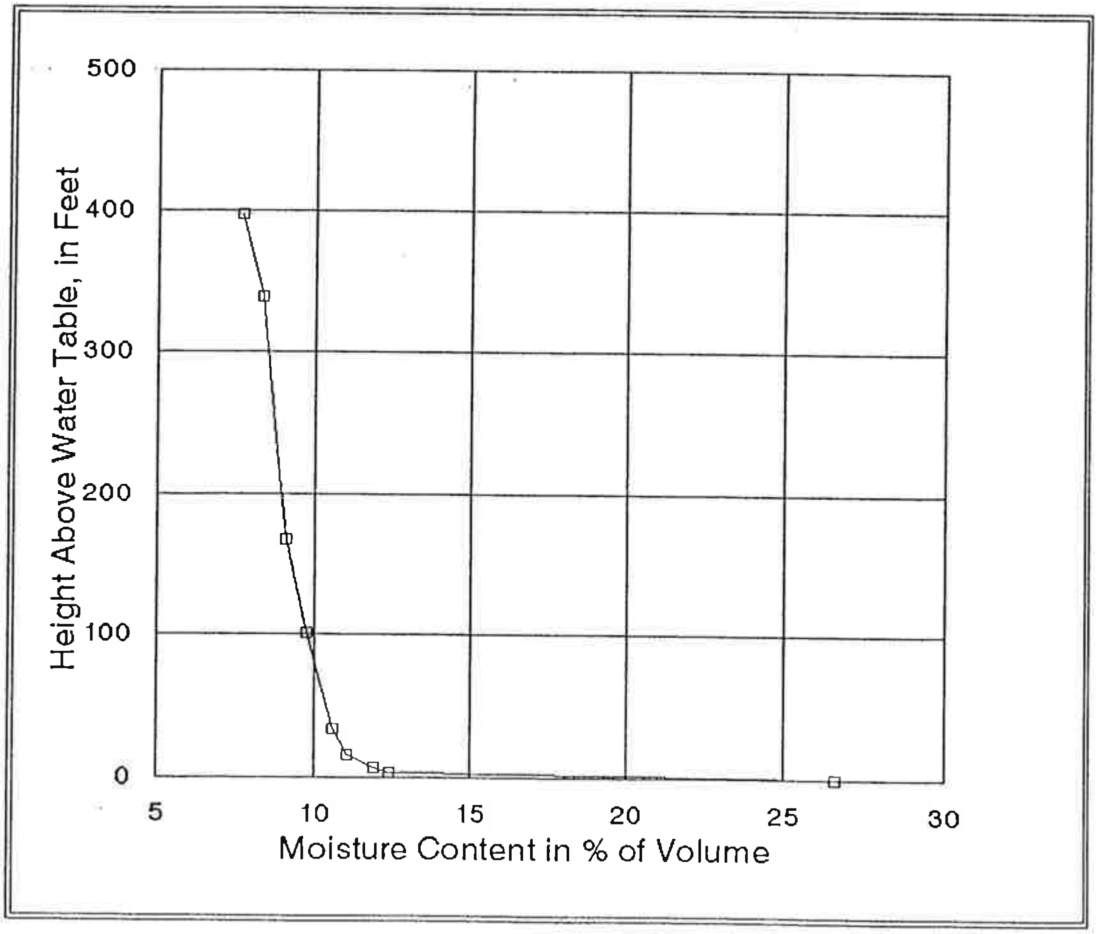
LABORATORY TESTING AND RESULTS

TERATEST LABS, INC.

Capillary–MoistureRelationshipsfor Soils
Fine–Textured Soils by Pressure–Membrane Apparatus
ASTM D 3152

Project Name: Picacho Landfill Soil Sample Testing
Project No.: 9878
Boring No.: N/A
Sample No.: Borrow Sample 2
Tested By: RA Date 11/04/98
Data Input By: lf Date 11/16/98
Checked By: LF Date 11/16/98
Depth (ft.): N/A
Visual Sample Description: Brown poorly graded sand with silt and gravel (SP–SM)g
Initial Natural Moisture Content %: 7.34 Initial Soil Wt. + Ring (gm.): 41.61 Initial Dry Unit Weight (pcf): 113.1
Diameter (in.): 1.900 Height (in.): 0.400 Specific Gravity (assumed): 2.70
Total Porosity: 0.329 Void Ratio: 0.490 Pore Volume (cc): 6.1

(1) Tension (atm)	0.0	0.1	0.2	0.5	1.0	3.0	5.0	10.0	11.7
(psi)	0.00	1.47	2.94	7.12	14.70	44.00	72.90	146.80	172.40
(feet of water)	0.0	3.4	6.8	16.4	33.9	101.5	168.1	338.5	397.6
(2) Ring No.	17	17	17	17	17	17	17	17	17
(3) Wet Wt. of Soil + Ring (gm.)	44.21	41.56	41.47	41.31	41.22	41.07	40.95	40.80	40.68
(4) Dry Wt. of Soil + Ring (gm.)	39.25	39.25	39.25	39.25	39.25	39.25	39.25	39.25	39.25
(5) Wt. of Moisture (gm.)	4.96	2.31	2.22	2.06	1.97	1.82	1.70	1.55	1.43
(6) Wt. of Ring (gm.)	5.46	5.46	5.46	5.46	5.46	5.46	5.46	5.46	5.46
(7) Wt. of Dry Soil (gm.)	33.79	33.79	33.79	33.79	33.79	33.79	33.79	33.79	33.79
(8) Moisture Content (Ww) (%)	14.68	6.84	6.57	6.10	5.83	5.39	5.03	4.59	4.23
(9) Dry Unit Wt. of Soil (pcf)	113.1	113.1	113.1	113.1	113.1	113.1	113.1	113.1	113.1
(10) Moisture Content by Volume (Wv) (%) (8)x(9)/62.43	26.60	12.39	11.91	11.05	10.56	9.76	9.12	8.31	7.67



TERATEST LABS, INC.

Capillary – Moisture Relationships for Soils

Fine – Textured Soils by Pressure – Membrane Apparatus

ASTM D 3152

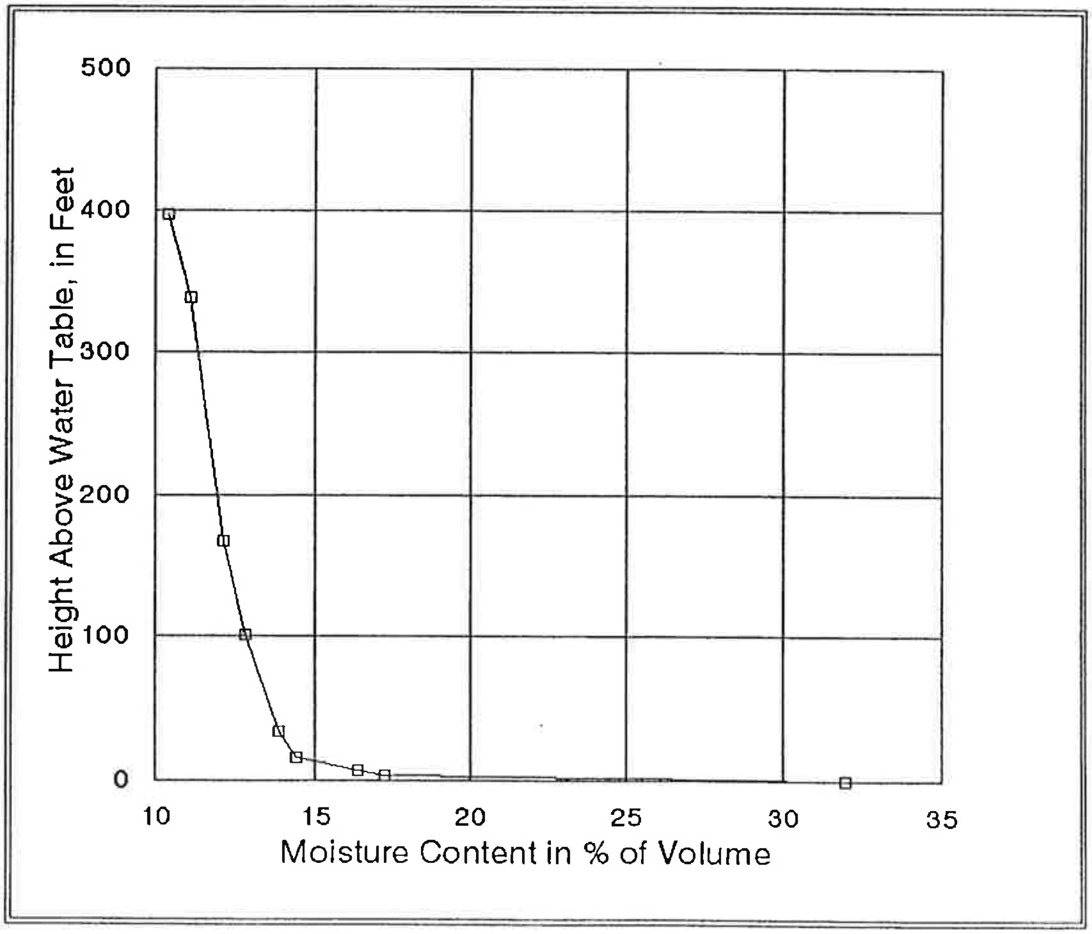
Project Name: Picacho Landfill Soil Sample Testing
Project No. : 9878
Boring No.: N/A
Sample No. : Borrow Sample 1

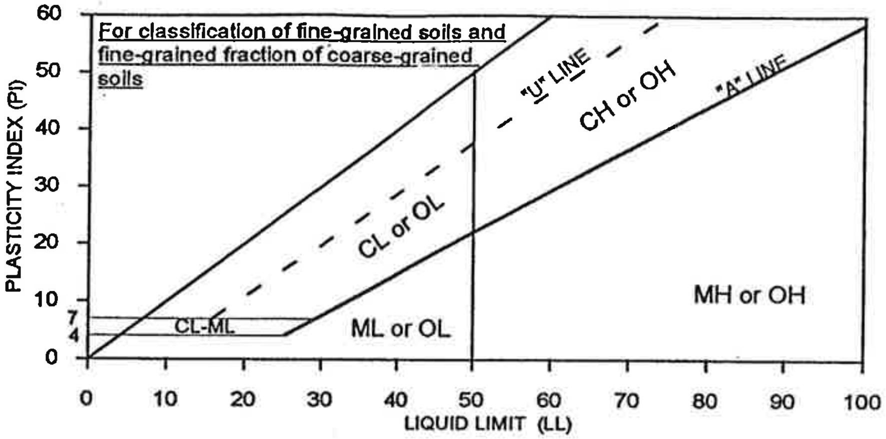
Tested By: RA Date 11/04/98
Data Input By: lf Date 11/16/98
Checked By: Date 11/16/98
Depth (ft.) : N/A

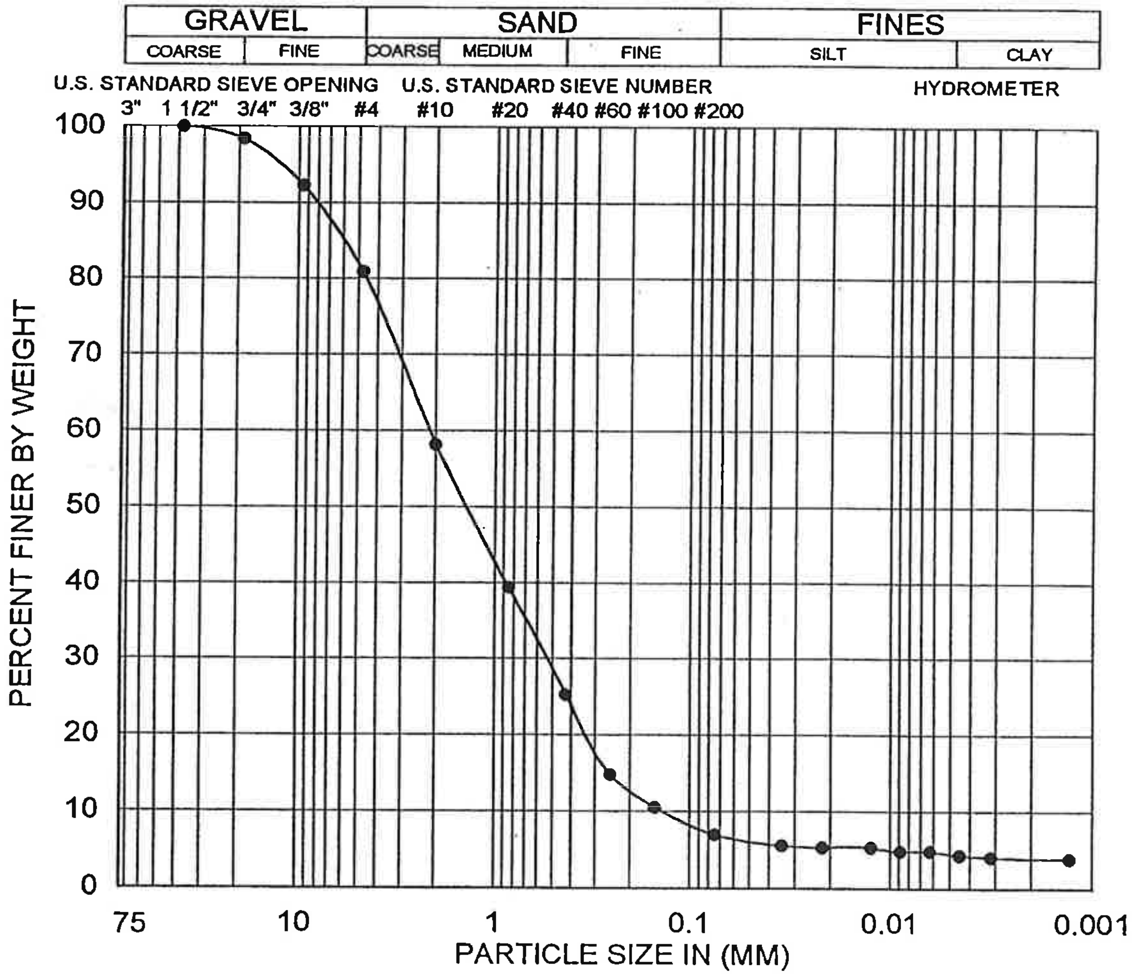
Visual Sample Description: Light brown poorly graded sand with silt (SP – SM)

Initial Natural Moisture Content % : 11.64 Initial Soil Wt. + Ring (gm.) : 40.34 Initial Dry Unit Weight (pcf) : 105.4
Diameter (in.): 1.900 Height (in.) : 0.400 Specific Gravity (assumed) : 2.70
Total Porosity : 0.375 Void Ratio : 0.600 Pore Volume (cc) : 7.0

(1) Tension (atm)	0.0	0.1	0.2	0.5	1.0	3.0	5.0	10.0	11.7
(psi)	0.00	1.47	2.94	7.12	14.70	44.00	72.90	146.80	172.40
(feet of water)	0.0	3.4	6.8	16.4	33.9	101.5	168.1	338.5	397.6
(2) Ring No.	K2	K2	K2	K2	K2	K2	K2	K2	K2
(3) Wet Wt. of Soil + Ring (gm.)	42.83	40.08	39.92	39.56	39.46	39.26	39.13	38.94	38.81
(4) Dry Wt. of Soil + Ring (gm.)	36.86	36.86	36.86	36.86	36.86	36.86	36.86	36.86	36.86
(5) Wt. of Moisture (gm.)	5.97	3.22	3.06	2.70	2.60	2.40	2.27	2.08	1.95
(6) Wt. of Ring (gm.)	5.32	5.32	5.32	5.32	5.32	5.32	5.32	5.32	5.32
(7) Wt. of Dry Soil (gm.)	31.54	31.54	31.54	31.54	31.54	31.54	31.54	31.54	31.54
(8) Moisture Content (Ww) (%)	18.93	10.21	9.70	8.56	8.24	7.61	7.20	6.59	6.18
(9) Dry Unit Wt. of Soil (pcf)	105.4	105.4	105.4	105.4	105.4	105.4	105.4	105.4	105.4
(10) Moisture Content by Volume (Wv) (%) (8)x(9)/62.43	31.95	17.23	16.37	14.45	13.91	12.84	12.15	11.13	10.43







BORING NO.	SAMPLE NO.	DEPTH (ft.)	SOIL TYPE	GR:SA:FI (%)	LL,PL,PI
N/A	Borrow Sample 2	N/A	(SP-SM)g	19:74:7	N/A

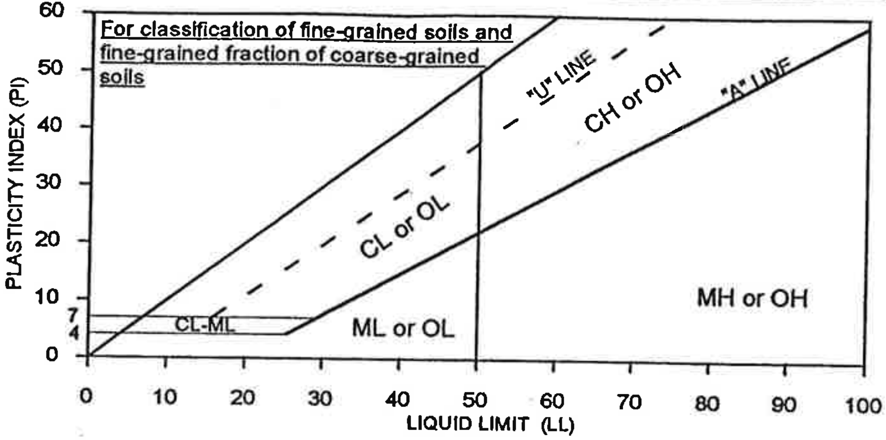
Sample Description:
Brown poorly graded sand with silt and gravel (SP-SM)g

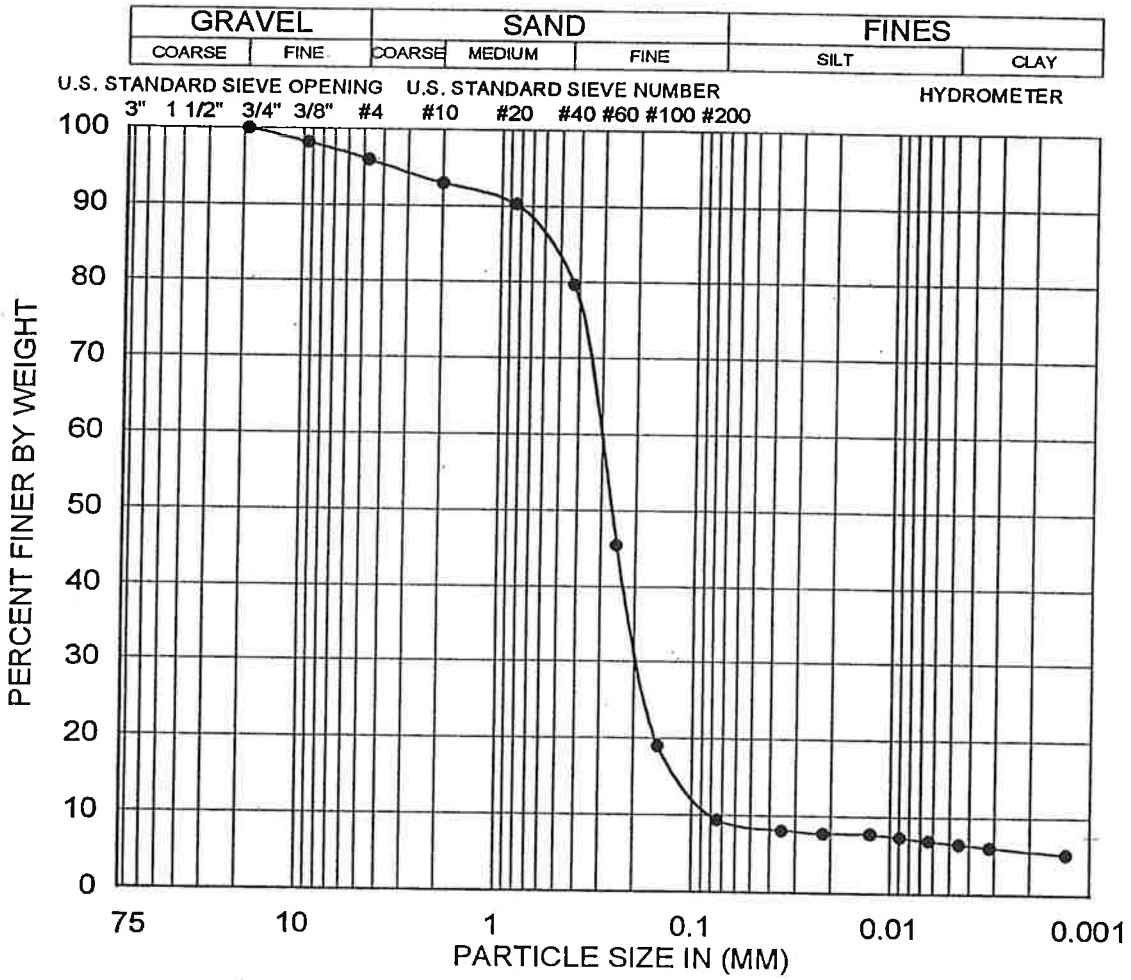
TERATEST LABS, Inc.	Project No. 9878 Picacho Landfill Soil Sample Testing

ATTERBERG LIMITS, PARTICLE-SIZE CURVE

(ASTM D 4318, D 422)

11-98





BORING NO.	SAMPLE NO.	DEPTH (ft.)	SOIL TYPE	GR:SA:FI (%)	LL,PL,PI
N/A	Borrow Sample 1	N/A	SP-SM	4:87:9	N/A

Sample Description:
Light brown poorly graded sand with silt (SP-SM)

TERATEST LABS, Inc.

Project No. 9878
Picacho Landfill
Soil Sample Testing

ATTERBERG LIMITS, PARTICLE-SIZE CURVE
(ASTM D 4318, D 422)

11-98

APPENDIX B

LEACHM ANALYSIS SAMPLE INPUT/OUTPUT

```
picmin             SOIL-WATER-PLANT-INTERACTION SIMULATION
"SIMULATION PERIODS (Data must be present for each item, even if it not used)"
------------------
Date type (US:1 UK:2)                 1
Starting date                    010194   Ending (date or day no.)   3652
Read theta(1) or pot'l(2)             1
No. of water applications           185
Years or cycles                       1 No. of crops                     1
K-Th-h from PSD:yes(1)no(0)           0 Trace 1(on), 0(off)              0
----------------------------------------------------------------------------
PROFILE DETAILS
---------------
Profile depth     (mm)       .1373E+04 Bottom boundary condition        2
Segment thickness (mm)       .1525E+03 :1 or 5,water table depth  .0000E+00
----------------------------------------------------------------------------
FOR UNIFORM PROFILE: (Any non-zero value here will override those in the
table of hydrological characteristics below unless K-Th-h calc. from PSD).
Soil bulk density Mg/cu.m    .0000E+00 Air -entry value' kPa     -.0000E+00
Exponent in Campbell's eq    .0000E+00 Sat'd K values (mm/day)    .0000E+00
---------------------------------------------------------------------------
CROP DATA
---------
Plants present: 1 yes, 0 no           1  Wilting point (soil) kPa -.2500E+04
Max(actual tran/potl tran)   .1000E+01 Min.root water pot'l (kpa)-.3000E+04
Roots: Const(1);growing(2)            1 Max.root water pot'l (kPa) .0000E+00
If 1: root length (m)         .500E+03 Root flow resistance term  .1050E+01
---------------------------------------------------------------------------
NUMBER OF OUTPUT FILES                2
  -- .OUT file --------                  ----- .SUM file ----------
                                       Summary print interval (d)       2
Node print frequency                  1 Three depth segments for the summary
Print options: 1, 2 or 3              2  file  (0's default to thirds of the
 1: Time intervals/print             1   profile)  (mm) :
 2: days/print                       1.0   Surface to [depth 1?]         305
 3: No. of prints (even)             14    Depth 1 to [depth 2?]         915
Tables printed: 1,2 or 3             3     Depth 2 to [depth 3?]        1373
***************************************************************************
***************************************************************************
          TIMES AT WHICH *.OUT FILE IS DESIRED (if print option = 3)
                ---------------------------------------
        Date or   Time of day        Date or   Time of day
        Day no.  (to nearest tenth) Day no.  (to nearest tenth)
        -------- .----------------.----------.----------------
           90          .2              180          .2
          240          .2              365          .2
          730          .2             1095          .2
         1461          .2             1826          .2
         2191          .2             2557          .2
         2992          .2             3287          .2
         3652          .2             3652          .8
************************************************************************
************************************************************************
Soil       Particle size distribution        Match K(h) at:
Layer        Clay     Silt    Rho    Organic      K     Matric    Retentivity
 no.                                  carbon             pot'l     regression
               %        %   kg/dm3      %        mm/d    kPa       model no.
---------------------------------------         -----------------------------
```

```
   1          06      02     2.02       1.0      1209.6    0.         0
   2          06      02     2.02       1.0      1209.6    0.         0
   3          06      02     2.02       1.0      1209.6    0.         0
   4          06      02     2.02       1.0      1209.6    0.         0
   5          06      02     2.02       1.0      1209.6    0.         0
   6          06      02     2.02       1.0      1209.6    0.         0
   7          06      02     2.02       1.0      1209.6    0.         0
   8          06      02     2.02       1.0      1209.6    0.         0
   9          06      02     2.02       1.0      1209.6    0.         0
  ---------------------------------------------------------------------------
-
Particle density kg/dm3:  Clay     Sand  Organic matter
                          2.65     2.65      1.10
**********************************************************************
**********************************************************************
 Soil |Starting values  | Hydrological Characteristics|   Root
layer |---------------- | ----------------------------|  fraction
 no.  | Pot'l or Theta  |    AEV      BCAM      KS    |  (for const
      |  kPa            |    kPa                mm/d  |  root distr)
----- |  ------ ------  |  -------   -----     -----  |   ------
 1       0.0   0.0950   -.284E-01  9.845    1209.6        0.500
 2       0.0   0.0890   -.284E-01  9.845    1209.6        0.200
 3       0.0   0.0850   -.284E-01  9.845    1209.6        0.120
 4       0.0   0.0840   -.284E-01  9.845    1209.6        0.080
 5       0.0   0.0900   -.284E-01  9.845    1209.6        0.050
 6       0.0   0.0810   -.284E-01  9.845    1209.6        0.050
 7       0.0   0.0960   -.284E-01  9.845    1209.6        0.000
 8       0.0   0.1030   -.284E-01  9.845    1209.6        0.000
 9       0.0   0.1050   -.284E-01  9.845    1209.6        0.000
******************************************************************
                          CROP DATA
                          ---------
 Crop Planting Emergence  Maturity   Harvest  Rel.  Crop  Plants  Pan
  no                     Root  Plant          root  cover per    factor
     ...........Date or Day no ...........    depth frac  sq. m
---------------------------------------------------------------------
  1   010194  010294  010294 010294  3653     1.00   0.02  2.000   1.00
*********************************************************************
                   RAIN/IRRIGATION AND WATER COMPOSITION
                   -------------------------------------
                     START       AMOUNT      RATE
                  Date or  Time of  mm       mm/day
                  Day no.     Day
**********************************************************************
3        0.4      9.00     100
4        0.4      4.50     100
5        0.4      0.50     100
27       0.4      6.75     100
84       0.4      2.50     100
131      0.4      3.00     100
208      0.4      20.75    100
221      0.4      44.50    100
222      0.4      0.25     100
259      0.4      1.50     100
324      0.4      0.25     100
367      0.4      3.00     100
382      0.4      2.50     100
```

383	0.4	1.50	100
384	0.4	0.25	100
396	0.4	0.25	100
397	0.4	0.25	100
455	0.4	0.50	100
456	0.4	0.25	100
559	0.4	1.00	100
561	0.4	1.75	100
588	0.4	1.25	100
589	0.4	1.75	100
590	0.4	2.50	100
639	0.4	1.50	100
727	0.4	0.25	100
733	0.4	0.50	100
734	0.4	1.00	100
735	0.4	10.75	100
739	0.4	3.75	100
788	0.4	6.50	100
789	0.4	0.25	100
790	0.4	7.50	100
808	0.4	1.75	100
809	0.4	1.50	100
814	0.4	0.25	100
815	0.4	4.75	100
816	0.4	5.00	100
978	0.4	2.00	100
1030	0.4	3.50	100
1044	0.4	1.75	100
1063	0.4	0.25	100
1064	0.4	0.25	100
1072	0.4	2.50	100
1073	0.4	0.25	100
1074	0.4	8.50	100
1075	0.4	0.25	100
1076	0.4	0.25	100
1081	0.4	0.75	100
1098	0.4	3.25	100
1100	0.4	4.00	100
1101	0.4	0.50	100
1102	0.4	0.50	100
1103	0.4	0.25	100
1132	0.4	7.25	100
1133	0.4	1.00	100
1139	0.4	0.25	100
1141	0.4	8.50	100
1157	0.4	18.50	100
1162	0.4	7.00	100
1181	0.4	8.25	100
1182	0.4	4.50	100
1183	0.4	0.25	100
1185	0.4	8.50	100
1186	0.4	0.25	100
1187	0.4	5.00	100
1221	0.4	7.50	100
1238	0.4	4.25	100
1321	0.4	3.50	100
1330	0.4	8.00	100

1331	0.4	1.50	100
1433	0.4	8.00	100
1434	0.4	12.25	100
1437	0.4	4.75	100
1438	0.4	0.25	100
1448	0.4	1.52	100
1457	0.4	11.18	100
1458	0.4	8.13	100
1460	0.4	0.25	100
1467	0.4	5.08	100
1468	0.4	17.27	100
1469	0.4	1.78	100
1471	0.4	5.33	100
1473	0.4	3.56	100
1476	0.4	3.05	100
1477	0.4	6.86	100
1480	0.4	0.25	100
1482	0.4	0.25	100
1500	0.4	9.91	100
1511	0.4	9.40	100
1519	0.4	0.25	100
1520	0.4	0.25	100
1546	0.4	6.86	100
1596	0.4	1.52	100
1597	0.4	0.51	100
1698	0.4	0.25	100
1702	0.4	1.02	100
1709	0.4	5.33	100
1740	0.4	0.76	100
1750	0.4	1.78	100
1779	0.4	17.02	100
1780	0.4	6.86	100
1851	0.4	0.25	100
1864	0.4	7.37	100
1865	0.4	0.51	100
1891	0.4	0.25	100
1892	0.4	1.78	100
1904	0.4	1.27	100
1910	0.4	3.05	100
1942	0.4	0.25	100
1944	0.4	0.76	100
1970	0.4	0.76	100
1971	0.4	0.51	100
2064	0.4	1.27	100
2089	0.4	3.56	100
2090	0.4	10.67	100
2141	0.4	1.27	100
2142	0.4	0.25	100
2165	0.4	6.10	100
2166	0.4	0.25	100
2182	0.4	7.37	100
2185	0.4	29.21	100
2186	0.4	1.52	100
2187	0.4	0.25	100
2188	0.4	0.25	100
2194	0.4	1.27	100
2195	0.4	4.57	100

2196	0.4	1.02	100
2212	0.4	0.51	100
2216	0.4	7.37	100
2234	0.4	0.25	100
2236	0.4	3.81	100
2237	0.4	0.25	100
2256	0.4	0.51	100
2261	0.4	8.13	100
2297	0.4	0.76	100
2299	0.4	2.03	100
2387	0.4	0.25	100
2388	0.4	0.76	100
2436	0.4	1.52	100
2588	0.4	0.76	100
2630	0.4	4.06	100
2783	0.4	4.06	100
2784	0.4	1.52	100
2809	0.4	3.30	100
2928	0.4	0.25	100
2934	0.4	7.37	100
2935	0.4	0.76	100
2938	0.4	0.25	100
2948	0.4	2.54	100
2981	0.4	1.78	100
3015	0.4	1.52	100
3082	0.4	3.05	100
3128	0.4	2.54	100
3129	0.4	0.25	100
3169	0.4	1.02	100
3177	0.4	0.25	100
3182	0.4	24.38	100
3192	0.4	2.29	100
3193	0.4	39.88	100
3265	0.4	13.97	100
3266	0.4	0.25	100
3280	0.4	6.10	100
3281	0.4	17.02	100
3299	0.4	0.51	100
3300	0.4	0.51	100
3324	0.4	10.67	100
3327	0.4	0.25	100
3328	0.4	0.25	100
3329	0.4	0.51	100
3335	0.4	11.18	100
3336	0.4	0.25	100
3338	0.4	1.02	100
3341	0.4	1.02	100
3362	0.4	5.59	100
3363	0.4	1.52	100
3374	0.4	3.05	100
3378	0.4	0.25	100
3381	0.4	0.25	100
3492	0.4	2.79	100
3511	0.4	2.03	100
3537	0.4	25.65	100
3622	0.4	6.60	100
3629	0.4	0.25	100

```
3630    0.4    1.02    100
****************************************************************************
"     POTENTIAL ET (WEEKLY TOTALS, mm) AND DEPTH TO WATER TABLE (mm)"
----------------------------------------------------------------------------
----------------------------------------------------------------------------
      WEEK NO.    ET   WATER TABLE
      ------------------------------
1         11.7     0
2         23.3     0
3         26.5     0
4         17.6     0
5         21.4     0
6         21.9     0
7         26.5     0
8         30.4     0
9         33.6     0
10        37.6     0
11        42.9     0
12        43.4     0
13        43.0     0
14        56.7     0
15        47.6     0
16        49.1     0
17        53.1     0
18        50.9     0
19        55.0     0
20        53.5     0
21        72.4     0
22        59.8     0
23        62.2     0
24        63.6     0
25        63.6     0
26        74.0     0
27        65.6     0
28        65.6     0
29        65.5     0
30        65.5     0
31        59.4     0
32        59.1     0
33        41.0     0
34        57.2     0
35        58.2     0
36        53.2     0
37        56.3     0
38        44.6     0
39        53.1     0
40        46.6     0
41        39.6     0
42        39.6     0
43        37.0     0
44        29.4     0
45        38.2     0
46        27.8     0
47        25.5     0
48        20.0     0
49        31.6     0
50        25.9     0
```

51	20.2	0
52	14.6	0
53	20.6	0
54	20.8	0
55	18.6	0
56	14.5	0
57	28.4	0
58	21.9	0
59	21.1	0
60	23.4	0
61	30.3	0
62	30.6	0
63	31.4	0
64	35.2	0
65	38.9	0
66	34.6	0
67	38.4	0
68	50.4	0
69	43.2	0
70	54.9	0
71	56.0	0
72	59.0	0
73	61.5	0
74	65.1	0
75	60.0	0
76	60.3	0
77	65.6	0
78	66.0	0
79	70.9	0
80	65.2	0
81	65.2	0
82	46.9	0
83	62.7	0
84	66.4	0
85	62.9	0
86	59.7	0
87	50.5	0
88	57.7	0
89	54.4	0
90	46.1	0
91	49.6	0
92	47.9	0
93	45.2	0
94	37.3	0
95	48.7	0
96	35.5	0
97	34.9	0
98	34.1	0
99	36.0	0
100	24.5	0
101	25.4	0
102	27.9	0
103	31.6	0
104	12.4	0
105	15.9	0
106	20.6	0
107	14.0	0

108	12.9	0
109	26.2	0
110	20.2	0
111	28.6	0
112	25.8	0
113	26.9	0
114	33.7	0
115	22.3	0
116	35.1	0
117	29.1	0
118	28.2	0
119	36.9	0
120	51.1	0
121	53.1	0
122	52.3	0
123	53.2	0
124	59.2	0
125	58.9	0
126	62.3	0
127	63.3	0
128	60.5	0
129	61.9	0
130	61.4	0
131	72.9	0
132	65.3	0
133	59.8	0
134	59.8	0
135	63.3	0
136	64.6	0
137	61.7	0
138	55.4	0
139	53.4	0
140	60.4	0
141	54.1	0
142	52.0	0
143	44.4	0
144	49.4	0
145	39.7	0
146	42.5	0
147	42.3	0
148	36.6	0
149	36.9	0
150	33.0	0
151	33.8	0
152	21.8	0
153	24.4	0
154	35.4	0
155	20.6	0
156	17.4	0
157	15.2	0
158	12.5	0
159	14.5	0
160	11.9	0
161	30.2	0
162	24.9	0
163	28.8	0
164	32.3	0

165	12.9	0
166	20.5	0
167	35.2	0
168	30.5	0
169	21.9	0
170	37.5	0
171	36.4	0
172	26.4	0
173	33.0	0
174	45.9	0
175	54.0	0
176	52.1	0
177	53.8	0
178	52.2	0
179	63.6	0
180	57.9	0
181	60.4	0
182	64.5	0
183	71.6	0
184	68.3	0
185	77.8	0
186	59.6	0
187	59.6	0
188	61.2	0
189	64.1	0
190	60.6	0
191	52.3	0
192	54.7	0
193	55.3	0
194	45.3	0
195	54.9	0
196	51.7	0
197	47.9	0
198	42.2	0
199	51.0	0
200	45.8	0
201	44.0	0
202	31.3	0
203	22.3	0
204	36.6	0
205	28.8	0
206	30.7	0
207	21.8	0
208	29.9	0
209	6.9	0
210	17.7	0
211	18.9	0
212	15.8	0
213	8.4	0
214	8.8	0
215	10.3	0
216	27.9	0
217	23.0	0
218	20.9	0
219	15.7	0
220	24.0	0
221	27.1	0

222	41.2	0
223	44.6	0
224	41.3	0
225	35.7	0
226	49.9	0
227	51.1	0
228	55.3	0
229	54.1	0
230	60.8	0
231	59.2	0
232	53.5	0
233	63.1	0
234	65.9	0
235	60.2	0
236	68.8	0
237	72.0	0
238	66.1	0
239	68.0	0
240	68.0	0
241	63.1	0
242	60.5	0
243	64.8	0
244	63.0	0
245	65.4	0
246	62.0	0
247	53.1	0
248	44.5	0
249	53.9	0
250	54.7	0
251	49.5	0
252	49.6	0
253	44.0	0
254	37.6	0
255	33.6	0
256	40.1	0
257	36.3	0
258	28.1	0
259	14.1	0
260	26.4	0
261	26.4	0
262	19.0	0
263	20.0	0
264	23.8	0
265	23.1	0
266	23.6	0
267	26.0	0
268	24.9	0
269	21.8	0
270	28.2	0
271	20.7	0
272	34.1	0
273	33.2	0
274	36.3	0
275	32.8	0
276	41.2	0
277	31.9	0
278	42.8	0

279	48.8	0
280	49.2	0
281	49.1	0
282	48.6	0
283	54.4	0
284	50.8	0
285	58.3	0
286	49.0	0
287	60.1	0
288	63.9	0
289	69.2	0
290	63.9	0
291	66.0	0
292	73.0	0
293	73.0	0
294	72.6	0
295	51.9	0
296	64.4	0
297	66.0	0
298	58.3	0
299	63.2	0
300	56.9	0
301	62.5	0
302	55.8	0
303	61.2	0
304	41.3	0
305	42.3	0
306	44.5	0
307	47.1	0
308	33.2	0
309	28.1	0
310	30.4	0
311	19.6	0
312	22.1	0
313	19.2	0
314	27.7	0
315	14.3	0
316	17.8	0
317	17.5	0
318	6.6	0
319	12.1	0
320	13.3	0
321	18.1	0
322	14.4	0
323	33.1	0
324	29.0	0
325	23.5	0
326	34.0	0
327	27.4	0
328	34.0	0
329	40.3	0
330	40.4	0
331	48.1	0
332	53.6	0
333	52.4	0
334	41.7	0
335	59.0	0

336	60.6	0
337	55.2	0
338	57.2	0
339	58.9	0
340	63.2	0
341	65.0	0
342	66.3	0
343	64.7	0
344	70.5	0
345	70.8	0
346	70.8	0
347	49.7	0
348	70.4	0
349	68.2	0
350	68.0	0
351	64.3	0
352	54.5	0
353	55.3	0
354	57.1	0
355	56.1	0
356	56.0	0
357	48.0	0
358	52.8	0
359	50.9	0
360	44.3	0
361	37.5	0
362	37.3	0
363	22.9	0
364	22.8	0
365	25.0	0
366	23.1	0
367	25.3	0
368	18.5	0
369	18.6	0
370	17.7	0
371	20.5	0
372	26.1	0
373	29.4	0
374	22.9	0
375	20.9	0
376	15.4	0
377	25.6	0
378	23.0	0
379	25.3	0
380	27.1	0
381	38.5	0
382	34.4	0
383	44.8	0
384	45.1	0
385	51.5	0
386	52.8	0
387	54.8	0
388	59.3	0
389	60.4	0
390	62.3	0
391	68.0	0
392	63.2	0

393	60.8	0
394	69.5	0
395	68.1	0
396	68.5	0
397	66.2	0
398	60.1	0
399	60.1	0
400	57.7	0
401	64.4	0
402	60.7	0
403	66.9	0
404	61.9	0
405	61.9	0
406	62.9	0
407	57.0	0
408	50.5	0
409	52.4	0
410	45.0	0
411	48.1	0
412	50.1	0
413	42.3	0
414	38.0	0
415	41.2	0
416	29.9	0
417	36.0	0
418	24.9	0
419	21.6	0
420	31.4	0
421	22.3	0
422	23.4	0
423	24.9	0
424	16.9	0
425	20.6	0
426	12.4	0
427	26.9	0
428	17.4	0
429	32.0	0
430	26.8	0
431	35.3	0
432	43.3	0
433	30.5	0
434	47.7	0
435	43.0	0
436	45.8	0
437	42.7	0
438	34.5	0
439	50.4	0
440	51.1	0
441	57.5	0
442	51.3	0
443	58.6	0
444	56.4	0
445	58.3	0
446	61.3	0
447	57.4	0
448	62.9	0
449	63.7	0

450	70.1	0
451	68.2	0
452	68.2	0
453	64.8	0
454	63.1	0
455	54.3	0
456	66.4	0
457	58.9	0
458	60.2	0
459	56.1	0
460	56.7	0
461	45.4	0
462	52.4	0
463	47.6	0
464	35.7	0
465	42.0	0
466	41.9	0
467	50.7	0
468	34.7	0
469	33.2	0
470	34.3	0
471	19.8	0
472	23.5	0
473	19.8	0
474	14.2	0
475	25.9	0
476	21.8	0
477	15.6	0
478	18.6	0
479	12.7	0
480	18.4	0
481	23.1	0
482	19.2	0
483	20.5	0
484	19.3	0
485	25.1	0
486	35.3	0
487	42.6	0
488	30.2	0
489	45.3	0
490	32.7	0
491	44.9	0
492	48.7	0
493	55.4	0
494	58.3	0
495	58.8	0
496	56.9	0
497	50.3	0
498	60.6	0
499	65.7	0
500	62.3	0
501	65.7	0
502	74.2	0
503	71.9	0
504	66.2	0
505	66.2	0
506	71.1	0

507	62.4	0
508	66.8	0
509	63.8	0
510	53.4	0
511	59.5	0
512	60.3	0
513	60.7	0
514	49.0	0
515	56.0	0
516	52.3	0
517	47.3	0
518	50.0	0
519	38.0	0
520	42.0	0
521	30.2	0
522	30.7	0
523	24.2	0
524	24.8	0
525	25.0	0
526	15.5	0
527	21.3	0
528	20.1	0
529	18.6	0
530	17.1	0

```
picmid             SOIL-WATER-PLANT-INTERACTION SIMULATION
"SIMULATION PERIODS (Data must be present for each item, even if it not used)"
------------------
Date type (US:1 UK:2)               1
Starting date                  010194   Ending (date or day no.)   3652
Read theta(1) or pot'l(2)           1
No. of water applications         185
Years or cycles                     1 No. of crops                      1
K-Th-h from PSD:yes(1)no(0)         0 Trace 1(on), 0(off)               0
-----------------------------------------------------------------------------
PROFILE DETAILS
---------------
Profile depth      (mm)      .1373E+04 Bottom boundary condition         4
Segment thickness (mm)       .1525E+03 :1 or 5,water table depth  .0000E+00
-----------------------------------------------------------------------------
FOR UNIFORM PROFILE: (Any non-zero value here will override those in the
table of hydrological characteristics below unless K-Th-h calc. from PSD).
Soil bulk density Mg/cu.m    .0000E+00 Air -entry value' kPa     -.0000E+00
Exponent in Campbell's eq    .0000E+00 Sat'd K values (mm/day)    .0000E+00
-----------------------------------------------------------------------------
CROP DATA
---------
Plants present: 1 yes, 0 no         1  Wilting point (soil) kPa -.2500E+04
Max(actual tran/potl tran)   .1000E+01 Min.root water pot'l (kpa)-.3000E+04
Roots: Const(1);growing(2)          1 Max.root water pot'l (kPa) .0000E+00
If 1: root length (m)         .500E+03 Root flow resistance term  .1050E+01
-----------------------------------------------------------------------------
NUMBER OF OUTPUT FILES              2
  -- .OUT file --------                 ----- .SUM file ----------
                                       Summary print interval (d)       2
Node print frequency                1 Three depth segments for the summary
Print options: 1, 2 or 3            2  file  (0's default to thirds of the
 1: Time intervals/print           1   profile)  (mm) :
 2: days/print                   1.0    Surface to [depth 1?]        305
 3: No. of prints (even)          14    Depth 1 to [depth 2?]        915
Tables printed: 1,2 or 3           3    Depth 2 to [depth 3?]       1373
*****************************************************************************
*****************************************************************************
          TIMES AT WHICH *.OUT FILE IS DESIRED (if print option = 3)
                ----------------------------------------
        Date or    Time of day      Date or    Time of day
        Day no.  (to nearest tenth) Day no.  (to nearest tenth)
        -------- .----------------.----------.----------------
            90          .2              180         .2
           240          .2              365         .2
           730          .2             1095         .2
          1461          .2             1826         .2
          2191          .2             2557         .2
          2992          .2             3287         .2
          3652          .2             3652         .8
**************************************************************************
**************************************************************************
Soil        Particle size distribution       Match K(h) at:
Layer        Clay     Silt    Rho    Organic      K     Matric     Retentivity
 no.                                  carbon             pot'l      regression
               %        %    kg/dm3     %        mm/d    kPa        model no.
----------------------------------------     ------------------------------
```

```
   1          06      02     2.02       1.0       1209.6     0.         0
   2          06      02     2.02       1.0       1209.6     0.         0
   3          06      02     2.02       1.0       1209.6     0.         0
   4          06      02     2.02       1.0       1209.6     0.         0
   5          06      02     2.02       1.0       1209.6     0.         0
   6          06      02     2.02       1.0       1209.6     0.         0
   7          06      02     2.02       1.0       1209.6     0.         0
   8          06      02     2.02       1.0       1209.6     0.         0
   9          06      02     2.02       1.0       1209.6     0.         0
 ------------------------------------------------------------------------------
-
Particle density kg/dm3:  Clay    Sand  Organic matter
                          2.65    2.65      1.10
************************************************************************
************************************************************************
 Soil  |Starting values  | Hydrological Characteristics|   Root
layer  |---------------  | ----------------------------|  fraction
 no.   | Pot'l or Theta  |   AEV     BCAM      KS      | (for const
       |  kPa            |   kPa               mm/d    | root distr)
-----  |  ------  ------ |  -------  -----    -----    |   ------
 1        0.0   0.0950    -.284E-01  9.845    1209.6        0.500
 2        0.0   0.0890    -.284E-01  9.845    1209.6        0.200
 3        0.0   0.0850    -.284E-01  9.845    1209.6        0.120
 4        0.0   0.0840    -.284E-01  9.845    1209.6        0.080
 5        0.0   0.0900    -.284E-01  9.845    1209.6        0.050
 6        0.0   0.0810    -.284E-01  9.845    1209.6        0.050
 7        0.0   0.0960    -.284E-01  9.845    1209.6        0.000
 8        0.0   0.1040    -.284E-01  9.845    1209.6        0.000
 9        0.0   0.1070    -.284E-01  9.845    1209.6        0.000
********************************************************************
                          CROP DATA
                          ---------
 Crop Planting Emergence  Maturity    Harvest  Rel.  Crop  Plants  Pan
  no                    Root  Plant            root  cover per     factor
     ...........Date or Day no ...........     depth frac  sq. m
----------------------------------------------------------------------
  1   010194  010294  010294 010294  3653     1.00   0.02  2.000   1.00
**********************************************************************
                   RAIN/IRRIGATION AND WATER COMPOSITION
                   -------------------------------------
                     START      AMOUNT     RATE
                   Date or  Time of  mm    mm/day
                   Day no.    Day
*************************************************************************
3        0.4      9.00     100
4        0.4      4.50     100
5        0.4      0.50     100
27       0.4      6.75     100
84       0.4      2.50     100
131      0.4      3.00     100
208      0.4      20.75    100
221      0.4      44.50    100
222      0.4      0.25     100
259      0.4      1.50     100
324      0.4      0.25     100
367      0.4      3.00     100
382      0.4      2.50     100
```

383	0.4	1.50	100
384	0.4	0.25	100
396	0.4	0.25	100
397	0.4	0.25	100
455	0.4	0.50	100
456	0.4	0.25	100
559	0.4	1.00	100
561	0.4	1.75	100
588	0.4	1.25	100
589	0.4	1.75	100
590	0.4	2.50	100
639	0.4	1.50	100
727	0.4	0.25	100
733	0.4	0.50	100
734	0.4	1.00	100
735	0.4	10.75	100
739	0.4	3.75	100
788	0.4	6.50	100
789	0.4	0.25	100
790	0.4	7.50	100
808	0.4	1.75	100
809	0.4	1.50	100
814	0.4	0.25	100
815	0.4	4.75	100
816	0.4	5.00	100
978	0.4	2.00	100
1030	0.4	3.50	100
1044	0.4	1.75	100
1063	0.4	0.25	100
1064	0.4	0.25	100
1072	0.4	2.50	100
1073	0.4	0.25	100
1074	0.4	8.50	100
1075	0.4	0.25	100
1076	0.4	0.25	100
1081	0.4	0.75	100
1098	0.4	3.25	100
1100	0.4	4.00	100
1101	0.4	0.50	100
1102	0.4	0.50	100
1103	0.4	0.25	100
1132	0.4	7.25	100
1133	0.4	1.00	100
1139	0.4	0.25	100
1141	0.4	8.50	100
1157	0.4	18.50	100
1162	0.4	7.00	100
1181	0.4	8.25	100
1182	0.4	4.50	100
1183	0.4	0.25	100
1185	0.4	8.50	100
1186	0.4	0.25	100
1187	0.4	5.00	100
1221	0.4	7.50	100
1238	0.4	4.25	100
1321	0.4	3.50	100
1330	0.4	8.00	100

1331	0.4	1.50	100
1433	0.4	8.00	100
1434	0.4	12.25	100
1437	0.4	4.75	100
1438	0.4	0.25	100
1448	0.4	1.52	100
1457	0.4	11.18	100
1458	0.4	8.13	100
1460	0.4	0.25	100
1467	0.4	5.08	100
1468	0.4	17.27	100
1469	0.4	1.78	100
1471	0.4	5.33	100
1473	0.4	3.56	100
1476	0.4	3.05	100
1477	0.4	6.86	100
1480	0.4	0.25	100
1482	0.4	0.25	100
1500	0.4	9.91	100
1511	0.4	9.40	100
1519	0.4	0.25	100
1520	0.4	0.25	100
1546	0.4	6.86	100
1596	0.4	1.52	100
1597	0.4	0.51	100
1698	0.4	0.25	100
1702	0.4	1.02	100
1709	0.4	5.33	100
1740	0.4	0.76	100
1750	0.4	1.78	100
1779	0.4	17.02	100
1780	0.4	6.86	100
1851	0.4	0.25	100
1864	0.4	7.37	100
1865	0.4	0.51	100
1891	0.4	0.25	100
1892	0.4	1.78	100
1904	0.4	1.27	100
1910	0.4	3.05	100
1942	0.4	0.25	100
1944	0.4	0.76	100
1970	0.4	0.76	100
1971	0.4	0.51	100
2064	0.4	1.27	100
2089	0.4	3.56	100
2090	0.4	10.67	100
2141	0.4	1.27	100
2142	0.4	0.25	100
2165	0.4	6.10	100
2166	0.4	0.25	100
2182	0.4	7.37	100
2185	0.4	29.21	100
2186	0.4	1.52	100
2187	0.4	0.25	100
2188	0.4	0.25	100
2194	0.4	1.27	100
2195	0.4	4.57	100

2196	0.4	1.02	100
2212	0.4	0.51	100
2216	0.4	7.37	100
2234	0.4	0.25	100
2236	0.4	3.81	100
2237	0.4	0.25	100
2256	0.4	0.51	100
2261	0.4	8.13	100
2297	0.4	0.76	100
2299	0.4	2.03	100
2387	0.4	0.25	100
2388	0.4	0.76	100
2436	0.4	1.52	100
2588	0.4	0.76	100
2630	0.4	4.06	100
2783	0.4	4.06	100
2784	0.4	1.52	100
2809	0.4	3.30	100
2928	0.4	0.25	100
2934	0.4	7.37	100
2935	0.4	0.76	100
2938	0.4	0.25	100
2948	0.4	2.54	100
2981	0.4	1.78	100
3015	0.4	1.52	100
3082	0.4	3.05	100
3128	0.4	2.54	100
3129	0.4	0.25	100
3169	0.4	1.02	100
3177	0.4	0.25	100
3182	0.4	24.38	100
3192	0.4	2.29	100
3193	0.4	39.88	100
3265	0.4	13.97	100
3266	0.4	0.25	100
3280	0.4	6.10	100
3281	0.4	17.02	100
3299	0.4	0.51	100
3300	0.4	0.51	100
3324	0.4	10.67	100
3327	0.4	0.25	100
3328	0.4	0.25	100
3329	0.4	0.51	100
3335	0.4	11.18	100
3336	0.4	0.25	100
3338	0.4	1.02	100
3341	0.4	1.02	100
3362	0.4	5.59	100
3363	0.4	1.52	100
3374	0.4	3.05	100
3378	0.4	0.25	100
3381	0.4	0.25	100
3492	0.4	2.79	100
3511	0.4	2.03	100
3537	0.4	25.65	100
3622	0.4	6.60	100
3629	0.4	0.25	100

```
3630    0.4     1.02    100
*************************************************************************
"      POTENTIAL ET (WEEKLY TOTALS, mm) AND DEPTH TO WATER TABLE (mm)"
-------------------------------------------------------------------------
-------------------------------------------------------------------------
      WEEK NO.    ET   WATER TABLE
      -----------------------------
1         11.7    0
2         23.3    0
3         26.5    0
4         17.6    0
5         21.4    0
6         21.9    0
7         26.5    0
8         30.4    0
9         33.6    0
10        37.6    0
11        42.9    0
12        43.4    0
13        43.0    0
14        56.7    0
15        47.6    0
16        49.1    0
17        53.1    0
18        50.9    0
19        55.0    0
20        53.5    0
21        72.4    0
22        59.8    0
23        62.2    0
24        63.6    0
25        63.6    0
26        74.0    0
27        65.6    0
28        65.6    0
29        65.5    0
30        65.5    0
31        59.4    0
32        59.1    0
33        41.0    0
34        57.2    0
35        58.2    0
36        53.2    0
37        56.3    0
38        44.6    0
39        53.1    0
40        46.6    0
41        39.6    0
42        39.6    0
43        37.0    0
44        29.4    0
45        38.2    0
46        27.8    0
47        25.5    0
48        20.0    0
49        31.6    0
50        25.9    0
```

51	20.2	0
52	14.6	0
53	20.6	0
54	20.8	0
55	18.6	0
56	14.5	0
57	28.4	0
58	21.9	0
59	21.1	0
60	23.4	0
61	30.3	0
62	30.6	0
63	31.4	0
64	35.2	0
65	38.9	0
66	34.6	0
67	38.4	0
68	50.4	0
69	43.2	0
70	54.9	0
71	56.0	0
72	59.0	0
73	61.5	0
74	65.1	0
75	60.0	0
76	60.3	0
77	65.6	0
78	66.0	0
79	70.9	0
80	65.2	0
81	65.2	0
82	46.9	0
83	62.7	0
84	66.4	0
85	62.9	0
86	59.7	0
87	50.5	0
88	57.7	0
89	54.4	0
90	46.1	0
91	49.6	0
92	47.9	0
93	45.2	0
94	37.3	0
95	48.7	0
96	35.5	0
97	34.9	0
98	34.1	0
99	36.0	0
100	24.5	0
101	25.4	0
102	27.9	0
103	31.6	0
104	12.4	0
105	15.9	0
106	20.6	0
107	14.0	0

108	12.9	0
109	26.2	0
110	20.2	0
111	28.6	0
112	25.8	0
113	26.9	0
114	33.7	0
115	22.3	0
116	35.1	0
117	29.1	0
118	28.2	0
119	36.9	0
120	51.1	0
121	53.1	0
122	52.3	0
123	53.2	0
124	59.2	0
125	58.9	0
126	62.3	0
127	63.3	0
128	60.5	0
129	61.9	0
130	61.4	0
131	72.9	0
132	65.3	0
133	59.8	0
134	59.8	0
135	63.3	0
136	64.6	0
137	61.7	0
138	55.4	0
139	53.4	0
140	60.4	0
141	54.1	0
142	52.0	0
143	44.4	0
144	49.4	0
145	39.7	0
146	42.5	0
147	42.3	0
148	36.6	0
149	36.9	0
150	33.0	0
151	33.8	0
152	21.8	0
153	24.4	0
154	35.4	0
155	20.6	0
156	17.4	0
157	15.2	0
158	12.5	0
159	14.5	0
160	11.9	0
161	30.2	0
162	24.9	0
163	28.8	0
164	32.3	0

165	12.9	0
166	20.5	0
167	35.2	0
168	30.5	0
169	21.9	0
170	37.5	0
171	36.4	0
172	26.4	0
173	33.0	0
174	45.9	0
175	54.0	0
176	52.1	0
177	53.8	0
178	52.2	0
179	63.6	0
180	57.9	0
181	60.4	0
182	64.5	0
183	71.6	0
184	68.3	0
185	77.8	0
186	59.6	0
187	59.6	0
188	61.2	0
189	64.1	0
190	60.6	0
191	52.3	0
192	54.7	0
193	55.3	0
194	45.3	0
195	54.9	0
196	51.7	0
197	47.9	0
198	42.2	0
199	51.0	0
200	45.8	0
201	44.0	0
202	31.3	0
203	22.3	0
204	36.6	0
205	28.8	0
206	30.7	0
207	21.8	0
208	29.9	0
209	6.9	0
210	17.7	0
211	18.9	0
212	15.8	0
213	8.4	0
214	8.8	0
215	10.3	0
216	27.9	0
217	23.0	0
218	20.9	0
219	15.7	0
220	24.0	0
221	27.1	0

222	41.2	0
223	44.6	0
224	41.3	0
225	35.7	0
226	49.9	0
227	51.1	0
228	55.3	0
229	54.1	0
230	60.8	0
231	59.2	0
232	53.5	0
233	63.1	0
234	65.9	0
235	60.2	0
236	68.8	0
237	72.0	0
238	66.1	0
239	68.0	0
240	68.0	0
241	63.1	0
242	60.5	0
243	64.8	0
244	63.0	0
245	65.4	0
246	62.0	0
247	53.1	0
248	44.5	0
249	53.9	0
250	54.7	0
251	49.5	0
252	49.6	0
253	44.0	0
254	37.6	0
255	33.6	0
256	40.1	0
257	36.3	0
258	28.1	0
259	14.1	0
260	26.4	0
261	26.4	0
262	19.0	0
263	20.0	0
264	23.8	0
265	23.1	0
266	23.6	0
267	26.0	0
268	24.9	0
269	21.8	0
270	28.2	0
271	20.7	0
272	34.1	0
273	33.2	0
274	36.3	0
275	32.8	0
276	41.2	0
277	31.9	0
278	42.8	0

279	48.8	0
280	49.2	0
281	49.1	0
282	48.6	0
283	54.4	0
284	50.8	0
285	58.3	0
286	49.0	0
287	60.1	0
288	63.9	0
289	69.2	0
290	63.9	0
291	66.0	0
292	73.0	0
293	73.0	0
294	72.6	0
295	51.9	0
296	64.4	0
297	66.0	0
298	58.3	0
299	63.2	0
300	56.9	0
301	62.5	0
302	55.8	0
303	61.2	0
304	41.3	0
305	42.3	0
306	44.5	0
307	47.1	0
308	33.2	0
309	28.1	0
310	30.4	0
311	19.6	0
312	22.1	0
313	19.2	0
314	27.7	0
315	14.3	0
316	17.8	0
317	17.5	0
318	6.6	0
319	12.1	0
320	13.3	0
321	18.1	0
322	14.4	0
323	33.1	0
324	29.0	0
325	23.5	0
326	34.0	0
327	27.4	0
328	34.0	0
329	40.3	0
330	40.4	0
331	48.1	0
332	53.6	0
333	52.4	0
334	41.7	0
335	59.0	0

336	60.6	0
337	55.2	0
338	57.2	0
339	58.9	0
340	63.2	0
341	65.0	0
342	66.3	0
343	64.7	0
344	70.5	0
345	70.8	0
346	70.8	0
347	49.7	0
348	70.4	0
349	68.2	0
350	68.0	0
351	64.3	0
352	54.5	0
353	55.3	0
354	57.1	0
355	56.1	0
356	56.0	0
357	48.0	0
358	52.8	0
359	50.9	0
360	44.3	0
361	37.5	0
362	37.3	0
363	22.9	0
364	22.8	0
365	25.0	0
366	23.1	0
367	25.3	0
368	18.5	0
369	18.6	0
370	17.7	0
371	20.5	0
372	26.1	0
373	29.4	0
374	22.9	0
375	20.9	0
376	15.4	0
377	25.6	0
378	23.0	0
379	25.3	0
380	27.1	0
381	38.5	0
382	34.4	0
383	44.8	0
384	45.1	0
385	51.5	0
386	52.8	0
387	54.8	0
388	59.3	0
389	60.4	0
390	62.3	0
391	68.0	0
392	63.2	0

393	60.8	0
394	69.5	0
395	68.1	0
396	68.5	0
397	66.2	0
398	60.1	0
399	60.1	0
400	57.7	0
401	64.4	0
402	60.7	0
403	66.9	0
404	61.9	0
405	61.9	0
406	62.9	0
407	57.0	0
408	50.5	0
409	52.4	0
410	45.0	0
411	48.1	0
412	50.1	0
413	42.3	0
414	38.0	0
415	41.2	0
416	29.9	0
417	36.0	0
418	24.9	0
419	21.6	0
420	31.4	0
421	22.3	0
422	23.4	0
423	24.9	0
424	16.9	0
425	20.6	0
426	12.4	0
427	26.9	0
428	17.4	0
429	32.0	0
430	26.8	0
431	35.3	0
432	43.3	0
433	30.5	0
434	47.7	0
435	43.0	0
436	45.8	0
437	42.7	0
438	34.5	0
439	50.4	0
440	51.1	0
441	57.5	0
442	51.3	0
443	58.6	0
444	56.4	0
445	58.3	0
446	61.3	0
447	57.4	0
448	62.9	0
449	63.7	0

450	70.1	0
451	68.2	0
452	68.2	0
453	64.8	0
454	63.1	0
455	54.3	0
456	66.4	0
457	58.9	0
458	60.2	0
459	56.1	0
460	56.7	0
461	45.4	0
462	52.4	0
463	47.6	0
464	35.7	0
465	42.0	0
466	41.9	0
467	50.7	0
468	34.7	0
469	33.2	0
470	34.3	0
471	19.8	0
472	23.5	0
473	19.8	0
474	14.2	0
475	25.9	0
476	21.8	0
477	15.6	0
478	18.6	0
479	12.7	0
480	18.4	0
481	23.1	0
482	19.2	0
483	20.5	0
484	19.3	0
485	25.1	0
486	35.3	0
487	42.6	0
488	30.2	0
489	45.3	0
490	32.7	0
491	44.9	0
492	48.7	0
493	55.4	0
494	58.3	0
495	58.8	0
496	56.9	0
497	50.3	0
498	60.6	0
499	65.7	0
500	62.3	0
501	65.7	0
502	74.2	0
503	71.9	0
504	66.2	0
505	66.2	0
506	71.1	0

507	62.4	0
508	66.8	0
509	63.8	0
510	53.4	0
511	59.5	0
512	60.3	0
513	60.7	0
514	49.0	0
515	56.0	0
516	52.3	0
517	47.3	0
518	50.0	0
519	38.0	0
520	42.0	0
521	30.2	0
522	30.7	0
523	24.2	0
524	24.8	0
525	25.0	0
526	15.5	0
527	21.3	0
528	20.1	0
529	18.6	0
530	17.1	0

```
picmax              SOIL-WATER-PLANT-INTERACTION SIMULATION
"SIMULATION PERIODS (Data must be present for each item, even if it not used)"
------------------
Date type (US:1 UK:2)                  1
Starting date                     010194   Ending (date or day no.)   3652
Read theta(1) or pot'l(2)              1
No. of water applications            185
Years or cycles                        1 No. of crops                      1
K-Th-h from PSD:yes(1)no(0)            0 Trace 1(on), 0(off)               0
----------------------------------------------------------------------------
PROFILE DETAILS
---------------
Profile depth     (mm)       .1373E+04 Bottom boundary condition         2
Segment thickness (mm)       .1525E+03 :1 or 5,water table depth  .0000E+00
----------------------------------------------------------------------------
FOR UNIFORM PROFILE: (Any non-zero value here will override those in the
table of hydrological characteristics below unless K-Th-h calc. from PSD).
Soil bulk density Mg/cu.m    .0000E+00 Air -entry value' kPa     -.0000E+00
Exponent in Campbell's eq    .0000E+00 Sat'd K values (mm/day)    .0000E+00
---------------------------------------------------------------------------
CROP DATA
---------
Plants present: 1 yes, 0 no          1  Wilting point (soil) kPa -.2500E+04
Max(actual tran/potl tran)   .1000E+01 Min.root water pot'l (kpa)-.3000E+04
Roots: Const(1);growing(2)           1 Max.root water pot'l (kPa) .0000E+00
If 1: root length (m)         .500E+03 Root flow resistance term  .1050E+01
---------------------------------------------------------------------------
NUMBER OF OUTPUT FILES               2
  -- .OUT file --------                 ----- .SUM file ----------
                                       Summary print interval (d)        2
Node print frequency                 1 Three depth segments for the summary
Print options: 1, 2 or 3             2  file  (0's default to thirds of the
 1: Time intervals/print            1   profile)  (mm) :
 2: days/print                     1.0   Surface to [depth 1?]         305
 3: No. of prints (even)           14    Depth 1 to [depth 2?]         915
Tables printed: 1,2 or 3            3    Depth 2 to [depth 3?]        1373
***************************************************************************
***************************************************************************
          TIMES AT WHICH *.OUT FILE IS DESIRED (if print option = 3)
          --------------------------------------
        Date or    Time of day       Date or    Time of day
        Day no.  (to nearest tenth)  Day no.  (to nearest tenth)
        -------- ------------------ ----------- ----------------
            90          .2              180          .2
           240          .2              365          .2
           730          .2             1095          .2
          1461          .2             1826          .2
          2191          .2             2557          .2
          2992          .2             3287          .2
          3652          .2             3652          .8
************************************************************************
************************************************************************
Soil      Particle size distribution       Match K(h) at:
Layer       Clay    Silt    Rho   Organic      K     Matric    Retentivity
 no.                              carbon              pot'l    regression
              %       %   kg/dm3     %       mm/d    kPa       model no.
--------------------------------------    -----------------------------
```

```
  1        06      02     2.02       1.0       1209.6     0.        0
  2        06      02     2.02       1.0       1209.6     0.        0
  3        06      02     2.02       1.0       1209.6     0.        0
  4        06      02     2.02       1.0       1209.6     0.        0
  5        06      02     2.02       1.0       1209.6     0.        0
  6        06      02     2.02       1.0       1209.6     0.        0
  7        06      02     2.02       1.0       1209.6     0.        0
  8        06      02     2.02       1.0       1209.6     0.        0
  9        06      02     2.02       1.0       1209.6     0.        0
--------------------------------------------------------------------------
-
Particle density kg/dm3:  Clay    Sand  Organic matter
                          2.65    2.65       1.10
**********************************************************************
**********************************************************************
 Soil |Starting values | Hydrological Characteristics|   Root
layer |--------------- | ----------------------------|  fraction
 no.  | Pot'l or Theta |   AEV      BCAM      KS     | (for const
      | kPa            |   kPa                mm/d   | root distr)
----- |  ------ ------ |  -------   -----    -----   |   ------
 1       0.0   0.0950   -.284E-01  9.845   1209.6       0.500
 2       0.0   0.0890   -.284E-01  9.845   1209.6       0.200
 3       0.0   0.0850   -.284E-01  9.845   1209.6       0.120
 4       0.0   0.0840   -.284E-01  9.845   1209.6       0.080
 5       0.0   0.0900   -.284E-01  9.845   1209.6       0.050
 6       0.0   0.0810   -.284E-01  9.845   1209.6       0.050
 7       0.0   0.0960   -.284E-01  9.845   1209.6       0.000
 8       0.0   0.1030   -.284E-01  9.845   1209.6       0.000
 9       0.0   0.1050   -.284E-01  9.845   1209.6       0.000
******************************************************************
                          CROP DATA
                          ---------
 Crop Planting Emergence  Maturity    Harvest  Rel.   Crop   Plants   Pan
  no                     Root  Plant           root   cover  per     factor
    ...........Date or Day no ...........      depth  frac   sq. m
----------------------------------------------------------------------
  1   010194  010294  010294 010294  3653    1.00    0.02  2.000   1.00
**********************************************************************
                 RAIN/IRRIGATION AND WATER COMPOSITION
                 -------------------------------------
                    START       AMOUNT     RATE
                 Date or  Time of  mm      mm/day
                 Day no.    Day
***********************************************************************
3        0.4     9.00     100
4        0.4     4.50     100
5        0.4     0.50     100
27       0.4     6.75     100
84       0.4     2.50     100
131      0.4     3.00     100
208      0.4     20.75    100
221      0.4     44.50    100
222      0.4     0.25     100
259      0.4     1.50     100
324      0.4     0.25     100
367      0.4     3.00     100
382      0.4     2.50     100
```

383	0.4	1.50	100
384	0.4	0.25	100
396	0.4	0.25	100
397	0.4	0.25	100
455	0.4	0.50	100
456	0.4	0.25	100
559	0.4	1.00	100
561	0.4	1.75	100
588	0.4	1.25	100
589	0.4	1.75	100
590	0.4	2.50	100
639	0.4	1.50	100
727	0.4	0.25	100
733	0.4	0.50	100
734	0.4	1.00	100
735	0.4	10.75	100
739	0.4	3.75	100
788	0.4	6.50	100
789	0.4	0.25	100
790	0.4	7.50	100
808	0.4	1.75	100
809	0.4	1.50	100
814	0.4	0.25	100
815	0.4	4.75	100
816	0.4	5.00	100
978	0.4	2.00	100
1030	0.4	3.50	100
1044	0.4	1.75	100
1063	0.4	0.25	100
1064	0.4	0.25	100
1072	0.4	2.50	100
1073	0.4	0.25	100
1074	0.4	8.50	100
1075	0.4	0.25	100
1076	0.4	0.25	100
1081	0.4	0.75	100
1098	0.4	3.25	100
1100	0.4	4.00	100
1101	0.4	0.50	100
1102	0.4	0.50	100
1103	0.4	0.25	100
1132	0.4	7.25	100
1133	0.4	1.00	100
1139	0.4	0.25	100
1141	0.4	8.50	100
1157	0.4	18.50	100
1162	0.4	7.00	100
1181	0.4	8.25	100
1182	0.4	4.50	100
1183	0.4	0.25	100
1185	0.4	8.50	100
1186	0.4	0.25	100
1187	0.4	5.00	100
1221	0.4	7.50	100
1238	0.4	4.25	100
1321	0.4	3.50	100
1330	0.4	8.00	100

1331	0.4	1.50	100
1433	0.4	8.00	100
1434	0.4	12.25	100
1437	0.4	4.75	100
1438	0.4	0.25	100
1448	0.4	1.52	100
1457	0.4	11.18	100
1458	0.4	8.13	100
1460	0.4	0.25	100
1467	0.4	5.08	100
1468	0.4	17.27	100
1469	0.4	1.78	100
1471	0.4	5.33	100
1473	0.4	3.56	100
1476	0.4	3.05	100
1477	0.4	6.86	100
1480	0.4	0.25	100
1482	0.4	0.25	100
1500	0.4	9.91	100
1511	0.4	9.40	100
1519	0.4	0.25	100
1520	0.4	0.25	100
1546	0.4	6.86	100
1596	0.4	1.52	100
1597	0.4	0.51	100
1698	0.4	0.25	100
1702	0.4	1.02	100
1709	0.4	5.33	100
1740	0.4	0.76	100
1750	0.4	1.78	100
1779	0.4	17.02	100
1780	0.4	6.86	100
1851	0.4	0.25	100
1864	0.4	7.37	100
1865	0.4	0.51	100
1891	0.4	0.25	100
1892	0.4	1.78	100
1904	0.4	1.27	100
1910	0.4	3.05	100
1942	0.4	0.25	100
1944	0.4	0.76	100
1970	0.4	0.76	100
1971	0.4	0.51	100
2064	0.4	1.27	100
2089	0.4	3.56	100
2090	0.4	10.67	100
2141	0.4	1.27	100
2142	0.4	0.25	100
2165	0.4	6.10	100
2166	0.4	0.25	100
2182	0.4	7.37	100
2185	0.4	29.21	100
2186	0.4	1.52	100
2187	0.4	0.25	100
2188	0.4	0.25	100
2194	0.4	1.27	100
2195	0.4	4.57	100

2196	0.4	1.02	100
2212	0.4	0.51	100
2216	0.4	7.37	100
2234	0.4	0.25	100
2236	0.4	3.81	100
2237	0.4	0.25	100
2256	0.4	0.51	100
2261	0.4	8.13	100
2297	0.4	0.76	100
2299	0.4	2.03	100
2387	0.4	0.25	100
2388	0.4	0.76	100
2436	0.4	1.52	100
2588	0.4	0.76	100
2630	0.4	4.06	100
2783	0.4	4.06	100
2784	0.4	1.52	100
2809	0.4	3.30	100
2928	0.4	0.25	100
2934	0.4	7.37	100
2935	0.4	0.76	100
2938	0.4	0.25	100
2948	0.4	2.54	100
2981	0.4	1.78	100
3015	0.4	1.52	100
3082	0.4	3.05	100
3128	0.4	2.54	100
3129	0.4	0.25	100
3169	0.4	1.02	100
3177	0.4	0.25	100
3182	0.4	24.38	100
3192	0.4	2.29	100
3193	0.4	39.88	100
3265	0.4	13.97	100
3266	0.4	0.25	100
3280	0.4	6.10	100
3281	0.4	17.02	100
3299	0.4	0.51	100
3300	0.4	0.51	100
3324	0.4	10.67	100
3327	0.4	0.25	100
3328	0.4	0.25	100
3329	0.4	0.51	100
3335	0.4	11.18	100
3336	0.4	0.25	100
3338	0.4	1.02	100
3341	0.4	1.02	100
3362	0.4	5.59	100
3363	0.4	1.52	100
3374	0.4	3.05	100
3378	0.4	0.25	100
3381	0.4	0.25	100
3492	0.4	2.79	100
3511	0.4	2.03	100
3537	0.4	25.65	100
3622	0.4	6.60	100
3629	0.4	0.25	100

```
3630    0.4     1.02    100
***************************************************************************
"      POTENTIAL ET (WEEKLY TOTALS, mm) AND DEPTH TO WATER TABLE (mm)"
---------------------------------------------------------------------------
---------------------------------------------------------------------------
      WEEK NO.    ET   WATER TABLE
      ---------------------------
1        11.7    0
2        23.3    0
3        26.5    0
4        17.6    0
5        21.4    0
6        21.9    0
7        26.5    0
8        30.4    0
9        33.6    0
10       37.6    0
11       42.9    0
12       43.4    0
13       43.0    0
14       56.7    0
15       47.6    0
16       49.1    0
17       53.1    0
18       50.9    0
19       55.0    0
20       53.5    0
21       72.4    0
22       59.8    0
23       62.2    0
24       63.6    0
25       63.6    0
26       74.0    0
27       65.6    0
28       65.6    0
29       65.5    0
30       65.5    0
31       59.4    0
32       59.1    0
33       41.0    0
34       57.2    0
35       58.2    0
36       53.2    0
37       56.3    0
38       44.6    0
39       53.1    0
40       46.6    0
41       39.6    0
42       39.6    0
43       37.0    0
44       29.4    0
45       38.2    0
46       27.8    0
47       25.5    0
48       20.0    0
49       31.6    0
50       25.9    0
```

51	20.2	0
52	14.6	0
53	20.6	0
54	20.8	0
55	18.6	0
56	14.5	0
57	28.4	0
58	21.9	0
59	21.1	0
60	23.4	0
61	30.3	0
62	30.6	0
63	31.4	0
64	35.2	0
65	38.9	0
66	34.6	0
67	38.4	0
68	50.4	0
69	43.2	0
70	54.9	0
71	56.0	0
72	59.0	0
73	61.5	0
74	65.1	0
75	60.0	0
76	60.3	0
77	65.6	0
78	66.0	0
79	70.9	0
80	65.2	0
81	65.2	0
82	46.9	0
83	62.7	0
84	66.4	0
85	62.9	0
86	59.7	0
87	50.5	0
88	57.7	0
89	54.4	0
90	46.1	0
91	49.6	0
92	47.9	0
93	45.2	0
94	37.3	0
95	48.7	0
96	35.5	0
97	34.9	0
98	34.1	0
99	36.0	0
100	24.5	0
101	25.4	0
102	27.9	0
103	31.6	0
104	12.4	0
105	15.9	0
106	20.6	0
107	14.0	0

108	12.9	0
109	26.2	0
110	20.2	0
111	28.6	0
112	25.8	0
113	26.9	0
114	33.7	0
115	22.3	0
116	35.1	0
117	29.1	0
118	28.2	0
119	36.9	0
120	51.1	0
121	53.1	0
122	52.3	0
123	53.2	0
124	59.2	0
125	58.9	0
126	62.3	0
127	63.3	0
128	60.5	0
129	61.9	0
130	61.4	0
131	72.9	0
132	65.3	0
133	59.8	0
134	59.8	0
135	63.3	0
136	64.6	0
137	61.7	0
138	55.4	0
139	53.4	0
140	60.4	0
141	54.1	0
142	52.0	0
143	44.4	0
144	49.4	0
145	39.7	0
146	42.5	0
147	42.3	0
148	36.6	0
149	36.9	0
150	33.0	0
151	33.8	0
152	21.8	0
153	24.4	0
154	35.4	0
155	20.6	0
156	17.4	0
157	15.2	0
158	12.5	0
159	14.5	0
160	11.9	0
161	30.2	0
162	24.9	0
163	28.8	0
164	32.3	0

165	12.9	0
166	20.5	0
167	35.2	0
168	30.5	0
169	21.9	0
170	37.5	0
171	36.4	0
172	26.4	0
173	33.0	0
174	45.9	0
175	54.0	0
176	52.1	0
177	53.8	0
178	52.2	0
179	63.6	0
180	57.9	0
181	60.4	0
182	64.5	0
183	71.6	0
184	68.3	0
185	77.8	0
186	59.6	0
187	59.6	0
188	61.2	0
189	64.1	0
190	60.6	0
191	52.3	0
192	54.7	0
193		

222	41.2	0
223	44.6	0
224	41.3	0
225	35.7	0
226	49.9	0
227	51.1	0
228	55.3	0
229	54.1	0
230	60.8	0
231	59.2	0
232	53.5	0
233	63.1	0
234	65.9	0
235	60.2	0
236	68.8	0
237	72.0	0
238	66.1	0
239	68.0	0
240	68.0	0
241	63.1	0
242	60.5	0
243	64.8	0
244	63.0	0
245	65.4	0
246	62.0	0
247	53.1	0
248	44.5	0
249	53.9	0
250	54.7	0
251	49.5	0
252	49.6	0
253	44.0	0
254	37.6	0
255	33.6	0
256	40.1	0
257	36.3	0
258	28.1	0
259	14.1	0
260	26.4	0
261	26.4	0
262	19.0	0
263	20.0	0
264	23.8	0
265	23.1	0
266	23.6	0
267	26.0	0
268	24.9	0
269	21.8	0
270	28.2	0
271	20.7	0
272	34.1	0
273	33.2	0
274	36.3	0
275	32.8	0
276	41.2	0
277	31.9	0
278	42.8	0

279	48.8	0
280	49.2	0
281	49.1	0
282	48.6	0
283	54.4	0
284	50.8	0
285	58.3	0
286	49.0	0
287	60.1	0
288	63.9	0
289	69.2	0
290	63.9	0
291	66.0	0
292	73.0	0
293	73.0	0
294	72.6	0
295	51.9	0
296	64.4	0
297	66.0	0
298	58.3	0
299	63.2	0
300	56.9	0
301	62.5	0
302	55.8	0
303	61.2	0
304	41.3	0
305	42.3	0
306	44.5	0
307	47.1	0
308	33.2	0
309	28.1	0
310	30.4	0
311	19.6	0
312	22.1	0
313	19.2	0
314	27.7	0
315	14.3	0
316	17.8	0
317	17.5	0
318	6.6	0
319	12.1	0
320	13.3	0
321	18.1	0
322	14.4	0
323	33.1	0
324	29.0	0
325	23.5	0
326	34.0	0
327	27.4	0
328	34.0	0
329	40.3	0
330	40.4	0
331	48.1	0
332	53.6	0
333	52.4	0
334	41.7	0
335	59.0	0

336	60.6	0
337	55.2	0
338	57.2	0
339	58.9	0
340	63.2	0
341	65.0	0
342	66.3	0
343	64.7	0
344	70.5	0
345	70.8	0
346	70.8	0
347	49.7	0
348	70.4	0
349	68.2	0
350	68.0	0
351	64.3	0
352	54.5	0
353	55.3	0
354	57.1	0
355	56.1	0
356	56.0	0
357	48.0	0
358	52.8	0
359	50.9	0
360	44.3	0
361	37.5	0
362	37.3	0
363	22.9	0
364	22.8	0
365	25.0	0
366	23.1	0
367	25.3	0
368	18.5	0
369	18.6	0
370	17.7	0
371	20.5	0
372	26.1	0
373	29.4	0
374	22.9	0
375	20.9	0
376	15.4	0
377	25.6	0
378	23.0	0
379	25.3	0
380	27.1	0
381	38.5	0
382	34.4	0
383	44.8	0
384	45.1	0
385	51.5	0
386	52.8	0
387	54.8	0
388	59.3	0
389	60.4	0
390	62.3	0
391	68.0	0
392	63.2	0

393	60.8	0
394	69.5	0
395	68.1	0
396	68.5	0
397	66.2	0
398	60.1	0
399	60.1	0
400	57.7	0
401	64.4	0
402	60.7	0
403	66.9	0
404	61.9	0
405	61.9	0
406	62.9	0
407	57.0	0
408	50.5	0
409	52.4	0
410	45.0	0
411	48.1	0
412	50.1	0
413	42.3	0
414	38.0	0
415	41.2	0
416	29.9	0
417	36.0	0
418	24.9	0
419	21.6	0
420	31.4	0
421	22.3	0
422	23.4	0
423	24.9	0
424	16.9	0
425	20.6	0
426	12.4	0
427	26.9	0
428	17.4	0
429	32.0	0
430	26.8	0
431	35.3	0
432	43.3	0
433	30.5	0
434	47.7	0
435	43.0	0
436	45.8	0
437	42.7	0
438	34.5	0
439	50.4	0
440	51.1	0
441	57.5	0
442	51.3	0
443	58.6	0
444	56.4	0
445	58.3	0
446	61.3	0
447	57.4	0
448	62.9	0
449	63.7	0

450	70.1	0
451	68.2	0
452	68.2	0
453	64.8	0
454	63.1	0
455	54.3	0
456	66.4	0
457	58.9	0
458	60.2	0
459	56.1	0
460	56.7	0
461	45.4	0
462	52.4	0
463	47.6	0
464	35.7	0
465	42.0	0
466	41.9	0
467	50.7	0
468	34.7	0
469	33.2	0
470	34.3	0
471	19.8	0
472	23.5	0
473	19.8	0
474	14.2	0
475	25.9	0
476	21.8	0
477	15.6	0
478	18.6	0
479	12.7	0
480	18.4	0
481	23.1	0
482	19.2	0
483	20.5	0
484	19.3	0
485	25.1	0
486	35.3	0
487	42.6	0
488	30.2	0
489	45.3	0
490	32.7	0
491	44.9	0
492	48.7	0
493	55.4	0
494	58.3	0
495	58.8	0
496	56.9	0
497	50.3	0
498	60.6	0
499	65.7	0
500	62.3	0
501	65.7	0
502	74.2	0
503	71.9	0
504	66.2	0
505	66.2	0
506	71.1	0

507	62.4	0
508	66.8	0
509	63.8	0
510	53.4	0
511	59.5	0
512	60.3	0
513	60.7	0
514	49.0	0
515	56.0	0
516	52.3	0
517	47.3	0
518	50.0	0
519	38.0	0
520	42.0	0
521	30.2	0
522	30.7	0
523	24.2	0
524	24.8	0
525	25.0	0
526	15.5	0
527	21.3	0
528	20.1	0
529	18.6	0
530	17.1	0

APPENDIX E

HYDROLOGY STUDY CALCULATIONS

Rainfall Data Generation
Picacho Cut and Fill Site

Purpose: To generate intensity-duration data for the Picacho Cut and Fill Site using NOAA Atlas Precipitation-Frequency Map.

Criteria: Calculations to be used to generate the rainfall data are based on the site's location within California (Lower Colorado River Basin, Region 7 in Figure 19 of the NOAA Atlas 2 Volume XI-CA).

Given: $Y_{100} = 0.221 + 0.098(X_3/X_1) + 0.482[(X_3)(X_1/X_2)]$
Y_{100} = 100-yr 1-hr estimated valve
X_1 = 2-yr 6-hr value from precipitation-frequency maps = 1.0 inches
X_2 = 2-yr 24-hr value from precipitation-frequency maps = 1.2 inches
X_3 = 100-yr 6-hr value from precipitation-frequency maps = 3.0 inches

Solution:
$Y_{100} = 0.221 + 0.098(3.0/1.0) + 0.482[3.0(1.0/1.2)] = 1.72"$

Adjustment factor to obtain time duration estimates from 1-hr Values
From Table 12 of NOAA Atlas 2 Volume XI-CA

Duration (min)	Ratio to 1-hr		Depth (Inch)
5	0.29	1.72 (0.29) =	0.499
10	0.45	1.72 (0.45) =	0.774
15	0.57	1.72 (0.57) =	0.980
30	0.79	1.72 (0.79) =	1.359
60	1.0	1.72 (1.0) =	1.72
120			2.15
180			2.50

Calculate Intensity

Duration (min)	Depth (Inch)	Ratio	Intensity (in/hr)
5	0.499	(60/5)	5.988
10	0.774	(60/10)	4.644
15	0.980	(60/15)	3.920
30	1.359	(60/30)	2.718
60	1.72	(60/60)	1.720
120	2.15	(60/120)	1.075
180	2.50	(60/180)	0.833

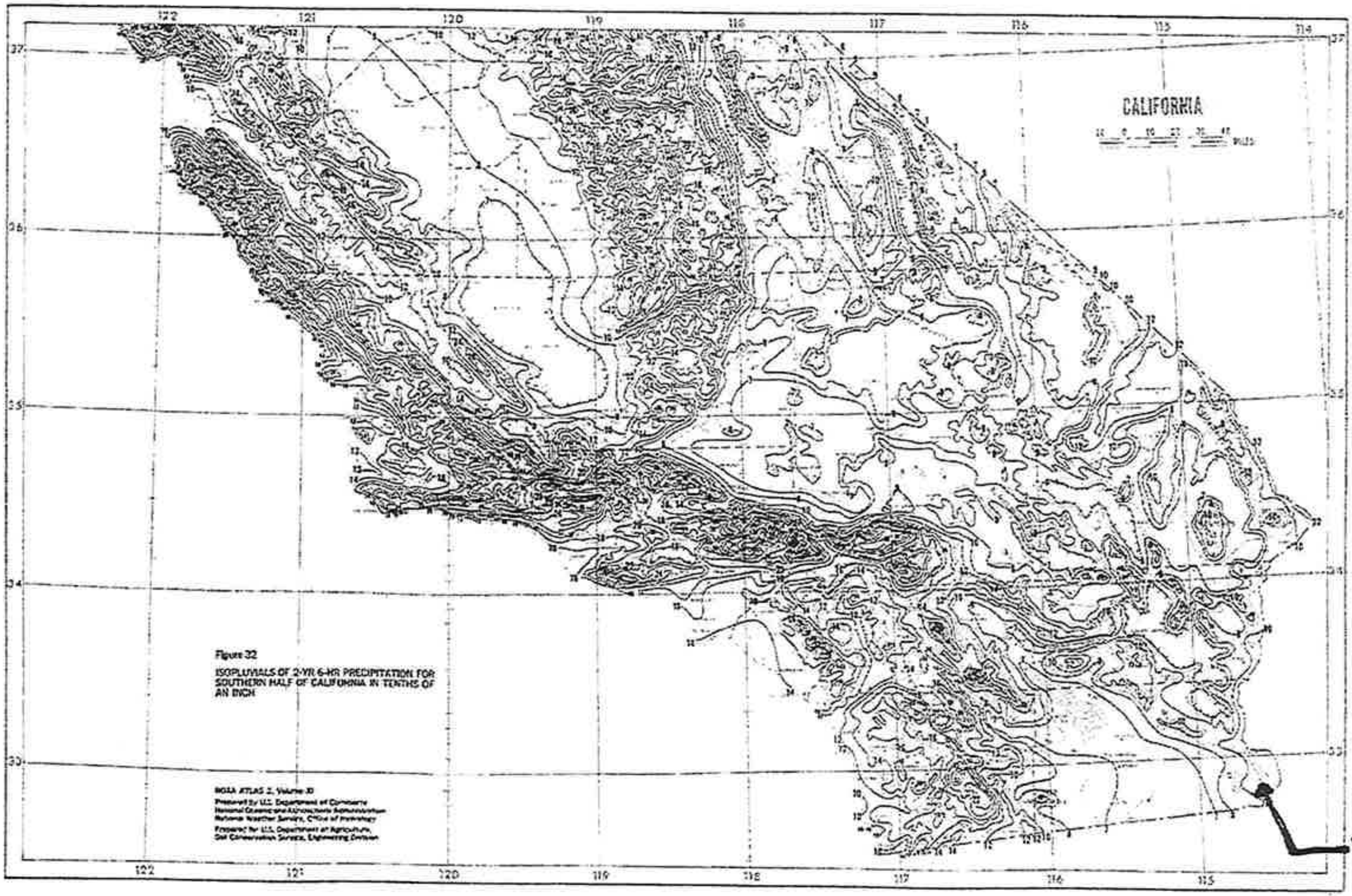


Figure 32

ISOPLUVIALS OF 2-YR 6-HR PRECIPITATION FOR SOUTHERN HALF OF CALIFORNIA IN TENTHS OF AN INCH

NOAA ATLAS 2, Volume XI
Prepared by U.S. Department of Commerce
National Oceanic and Atmospheric Administration
National Weather Service, Office of Hydrology
Prepared for U.S. Department of Agriculture,
Soil Conservation Service, Engineering Division

Picacho Solid
Waste Site
1.0 inch

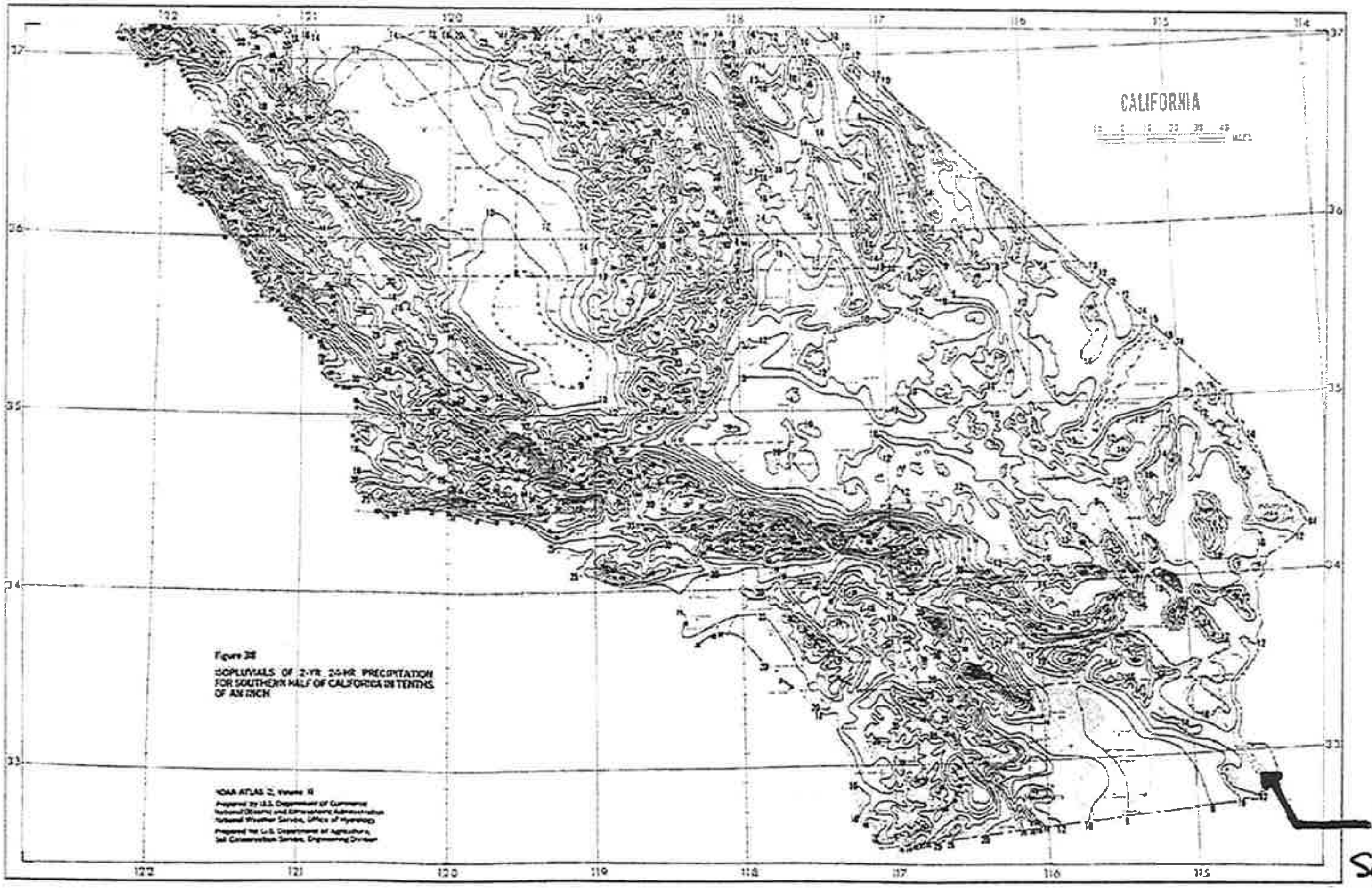


Figure 28

ISOPLUVIALS OF 2-YR 24-HR PRECIPITATION FOR SOUTHERN HALF OF CALIFORNIA IN TENTHS OF AN INCH

NOAA ATLAS 2, Volume XI

Prepared by U.S. Department of Commerce
National Oceanic and Atmospheric Administration
National Weather Service, Office of Hydrology

Prepared for U.S. Department of Agriculture,
Soil Conservation Service, Engineering Division

Picacho
Solid Waste
Site
1.2 inches

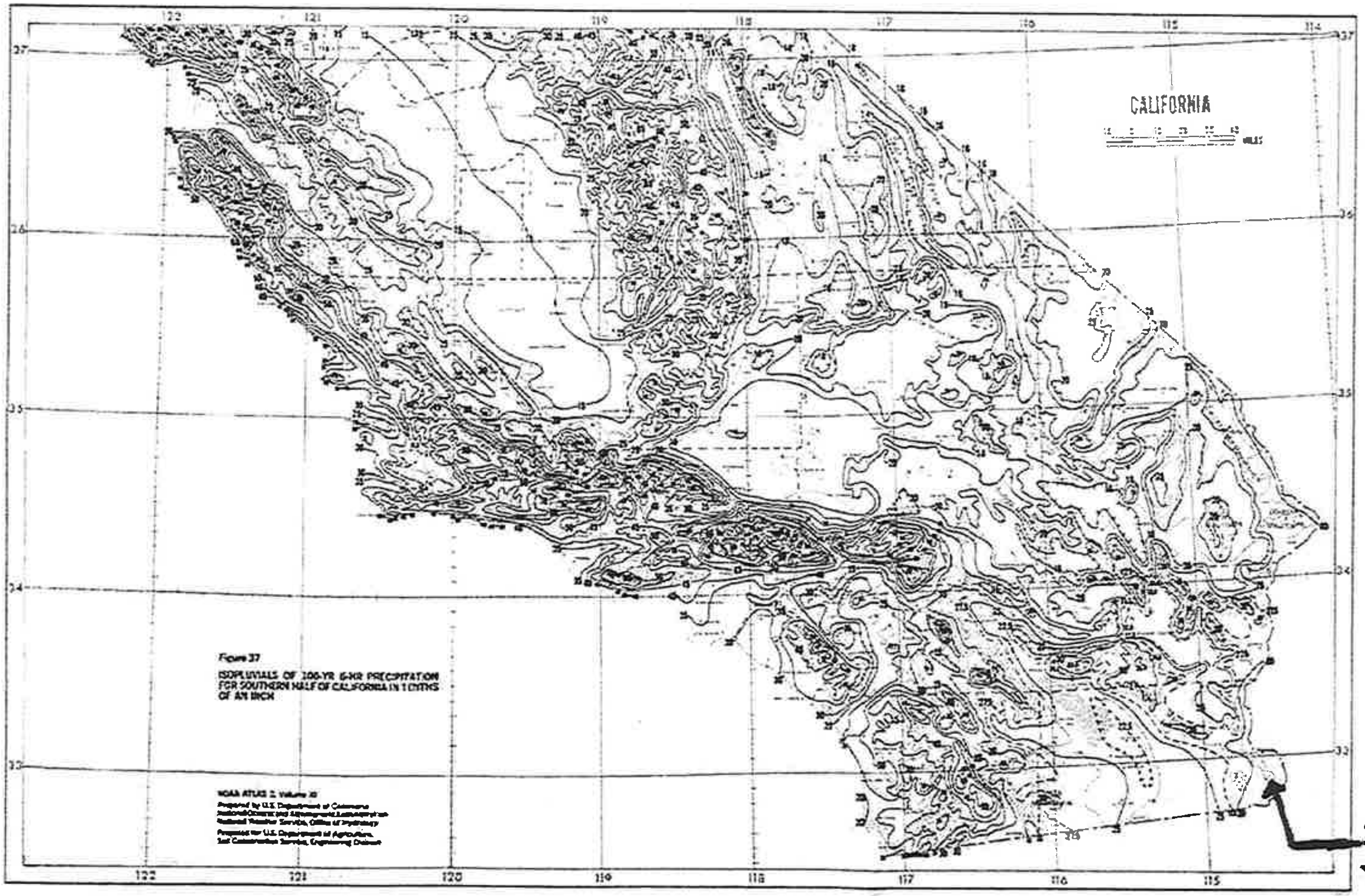


Figure 37

ISOPLUVIALS OF 100-YR 6-HR PRECIPITATION FOR SOUTHERN HALF OF CALIFORNIA IN TENTHS OF AN INCH

NOAA ATLAS 2, Volume XI

Prepared by U.S. Department of Commerce
National Oceanic and Atmospheric Administration
National Weather Service, Office of Hydrology

Prepared for U.S. Department of Agriculture,
Soil Conservation Service, Engineering Division

Picacho Solid
Waste Site
3.0 inches

Picacho Solid Waste Site

Table 12. *Adjustment factors to obtain n-min estimates from 1-hr values*

Duration (min)	5	10	15	30
Ratio to 1-hr	0.29	0.45	0.57	0.79

(Adopted from U.S. Weather Bureau Technical Paper No. 40, 1961.)

Table 13. *Precipitation data for depth-frequency atlas computation point 34°00' N., 117°00' W.*

	1-hr	2-hr	3-hr	6-hr	24-hr
2-yr	0.60	0.84	1.07	1.80	2.85
5-yr				1.86	4.10 ~~4.00~~
10-yr				2.20	4.85 ~~4.85~~
25-yr				2.78	5.90
50-yr				3.00	6.75
100-yr	1.38			3.60	7.75

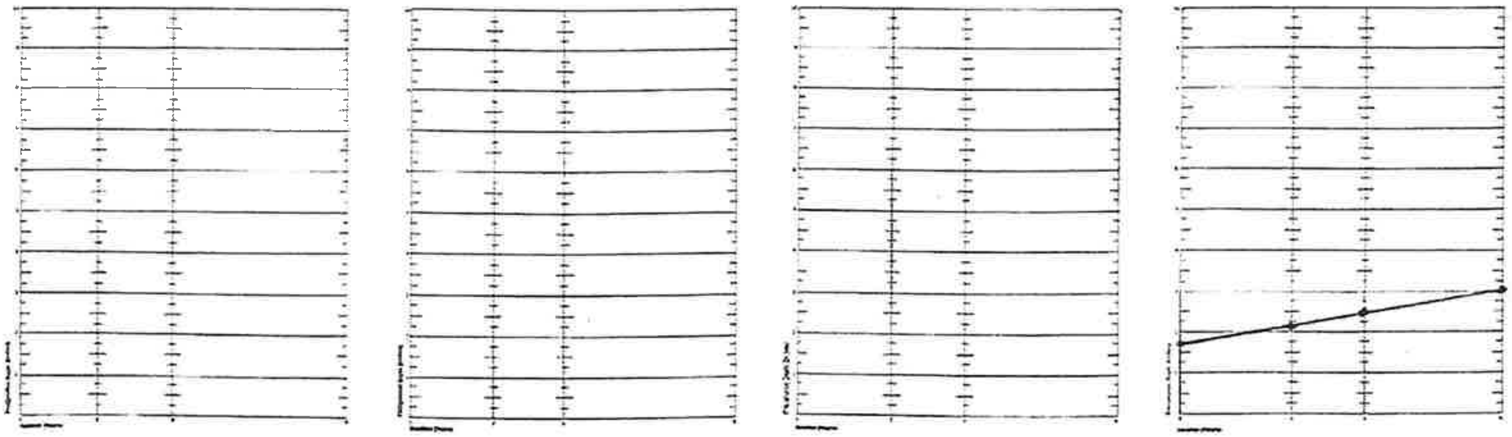


Figure 15. *Precipitation depth-duration diagram (1- to 6-hr).*

a. Northern Coast Ranges and western slopes of Siskiyou and Salmon Mountains (Region 1, fig. 18). Coast Ranges of California, including spillover zones, from Klamath River Basin in north to Mexican border (Region 3, figs. 18 and 19). Sacramento and San Joaquin River Valleys and coastal lowlands below 1,000 ft (Region 4, figs. 18 and 19).

b. Mountainous regions east of crest of Cascade Range, west of Continental Divide, and north of the southern boundary of the Snake River Basin (Region 2, fig. 18).

c. Southeastern desert region of California (Region 6, figs. 18 and 19).

d. Lower Colorado River Basin within California (Region 7, fig. 19).

```
____________________________________________________________________________
****************************************************************************
              RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
             (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
          (c) Copyright 1983-2006 Advanced Engineering Software (aes)
              Ver. 13.1  Release Date: 06/15/2006  License ID 1211

                            Analysis prepared by:





 ************************** DESCRIPTION OF STUDY **************************
 * PICACHO SOLID WASTE SITE                                                 *
 * 100-YEAR 24-HR HYDROLOGY                                                 *
 * ARC      11/26/08                                                        *
 **************************************************************************

  FILE NAME: PICACHO.DAT
  TIME/DATE OF STUDY: 11:50 11/26/2008
============================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
============================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =  100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  24.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 1.00
  *USER-DEFINED TABLED RAINFALL USED*
  NUMBER OF [TIME,INTENSITY] DATA PAIRS =  7
   1)   5.000;  5.988
   2)  10.000;  4.644
   3)  15.000;  3.920
   4)  30.000;  2.718
   5)  60.000;  1.720
   6) 120.000;  1.075
   7) 180.000;  0.833
  *ANTECEDENT MOISTURE CONDITION (AMC) I ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.  (FT)     (FT)     SIDE / SIDE/ WAY    (FT)   (FT)  (FT)   (FT)    (n)
===  =====  =========  =================  ======  =====  ======  =====  =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
  *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

****************************************************************************
```

```
  FLOW PROCESS FROM NODE      1.01 TO NODE      1.02 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   350.00
  ELEVATION DATA: UPSTREAM(FEET) =    346.00  DOWNSTREAM(FEET) =    334.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.734
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.538
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap      SCS   Tc
       LAND USE            GROUP    (ACRES)  (INCH/HR)  (DECIMAL)   CN  (MIN.)
  NATURAL POOR COVER
  "BARREN"                   B         4.01      0.30      1.000     72   10.73
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =     15.29
  TOTAL AREA(ACRES) =      4.01   PEAK FLOW RATE(CFS) =     15.29

****************************************************************************
  FLOW PROCESS FROM NODE      1.02 TO NODE      1.03 IS CODE =  82
----------------------------------------------------------------------------
  >>>>>ADD SUBAREA RUNOFF TO MAINLINE, AT MAINLINE Tc,<<<<<
  >>>>>(AND COMPUTE INITIAL SUBAREA RUNOFF)<<<<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   575.00
  ELEVATION DATA: UPSTREAM(FEET) =    334.00  DOWNSTREAM(FEET) =    300.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.740
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.392
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap      SCS   Tc
       LAND USE            GROUP    (ACRES)  (INCH/HR)  (DECIMAL)   CN  (MIN.)
  NATURAL POOR COVER
  "BARREN"                   B         1.09      0.30      1.000     72   11.74
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =     1.09   INITIAL SUBAREA RUNOFF(CFS) =    4.01

  ** ADD SUBAREA RUNOFF TO MAINLINE AT MAINLINE Tc:
  MAINLINE Tc(MIN) =  10.73
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.538
  SUBAREA AREA(ACRES) =     1.09      SUBAREA RUNOFF(CFS) =    4.16
  EFFECTIVE AREA(ACRES) =       5.10   AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =         5.1       PEAK FLOW RATE(CFS) =      19.45

****************************************************************************
  FLOW PROCESS FROM NODE      1.02 TO NODE      1.03 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
```

```
  TIME OF CONCENTRATION(MIN.) =  10.73
  RAINFALL INTENSITY(INCH/HR) =   4.54
  AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  1.00
  EFFECTIVE STREAM AREA(ACRES) =        5.10
  TOTAL STREAM AREA(ACRES) =        5.10
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       19.45

****************************************************************************
  FLOW PROCESS FROM NODE      1.04 TO NODE      1.05 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    260.00
  ELEVATION DATA: UPSTREAM(FEET) =     346.00  DOWNSTREAM(FEET) =     338.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.739
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.714
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA       Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL POOR COVER
  "BARREN"                   B        1.02       0.30      1.000     72    9.74
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =       4.05
  TOTAL AREA(ACRES) =       1.02   PEAK FLOW RATE(CFS) =       4.05

****************************************************************************
  FLOW PROCESS FROM NODE      1.05 TO NODE      1.03 IS CODE =  91
----------------------------------------------------------------------------
  >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
  UPSTREAM NODE ELEVATION(FEET) =     338.00
  DOWNSTREAM NODE ELEVATION(FEET) =     300.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    110.00
  "V" GUTTER WIDTH(FEET) =   3.00   GUTTER HIKE(FEET) =  0.800
  PAVEMENT LIP(FEET) =  0.400   MANNING'S N = .0130
  PAVEMENT CROSSFALL(DECIMAL NOTATION) = 0.10000
  MAXIMUM DEPTH(FEET) =   2.00
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.699
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA       Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL POOR COVER
  "BARREN"                   B        0.01       0.30      1.000     72
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.07
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  33.55
  AVERAGE FLOW DEPTH(FEET) =   0.80   FLOOD WIDTH(FEET) =    3.00
  "V" GUTTER FLOW TRAVEL TIME(MIN.) =   0.05   Tc(MIN.) =    9.79
  SUBAREA AREA(ACRES) =    0.01       SUBAREA RUNOFF(CFS) =    0.04
  EFFECTIVE AREA(ACRES) =    1.03     AREA-AVERAGED Fm(INCH/HR) =   0.30
```

```
  AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =         1.0         PEAK FLOW RATE(CFS) =        4.08

         NOTE:TRAVEL TIME ESTIMATES BASED ON NORMAL DEPTH
         IN A FLOWING-FULL GUTTER(NORMAL DEPTH = GUTTER HIKE)


  END OF SUBAREA "V" GUTTER HYDRAULICS:
  DEPTH(FEET) =  0.80   FLOOD WIDTH(FEET) =    3.00
  FLOW VELOCITY(FEET/SEC.) =  33.55   DEPTH*VELOCITY(FT*FT/SEC) =  26.84
  LONGEST FLOWPATH FROM NODE      1.04 TO NODE      1.03 =     370.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      1.05 TO NODE      1.03 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    9.79
  RAINFALL INTENSITY(INCH/HR) =   4.70
  AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  1.00
  EFFECTIVE STREAM AREA(ACRES) =       1.03
  TOTAL STREAM AREA(ACRES) =       1.03
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       4.08

****************************************************************************
  FLOW PROCESS FROM NODE      1.06 TO NODE      1.03 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   625.00
  ELEVATION DATA: UPSTREAM(FEET) =    337.50  DOWNSTREAM(FEET) =    300.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   12.103
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.340
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL POOR COVER
  "BARREN"                   B        1.61      0.30      1.000    72   12.10
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
  SUBAREA RUNOFF(CFS) =      5.85
  TOTAL AREA(ACRES) =      1.61   PEAK FLOW RATE(CFS) =      5.85

****************************************************************************
  FLOW PROCESS FROM NODE      1.06 TO NODE      1.03 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
```

```
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  3 ARE:
  TIME OF CONCENTRATION(MIN.) =  12.10
  RAINFALL INTENSITY(INCH/HR) =   4.34
  AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  1.00
  EFFECTIVE STREAM AREA(ACRES) =        1.61
  TOTAL STREAM AREA(ACRES) =        1.61
  PEAK FLOW RATE(CFS) AT CONFLUENCE =        5.85

  ** CONFLUENCE DATA **
   STREAM        Q      Tc    Intensity   Fp(Fm)      Ap      Ae     HEADWATER
   NUMBER      (CFS)  (MIN.)  (INCH/HR)  (INCH/HR)          (ACRES)    NODE
      1        19.45  10.73     4.538   0.30( 0.30) 1.00       5.1        1.01
      2         4.08   9.79     4.699   0.30( 0.30) 1.00       1.0        1.04
      3         5.85  12.10     4.340   0.30( 0.30) 1.00       1.6        1.06

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  3 STREAMS.

  ** PEAK FLOW RATE TABLE **
   STREAM        Q      Tc    Intensity   Fp(Fm)      Ap      Ae     HEADWATER
   NUMBER      (CFS)  (MIN.)  (INCH/HR)  (INCH/HR)          (ACRES)    NODE
      1        27.66   9.79     4.699   0.30( 0.30) 1.00       7.0        1.04
      2        28.83  10.73     4.538   0.30( 0.30) 1.00       7.6        1.01
      3        28.14  12.10     4.340   0.30( 0.30) 1.00       7.7        1.06

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       28.83    Tc(MIN.) =    10.73
  EFFECTIVE AREA(ACRES) =        7.56   AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        7.7
  LONGEST FLOWPATH FROM NODE      1.06 TO NODE      1.03 =     625.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      1.01 TO NODE      1.06 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   645.00
  ELEVATION DATA: UPSTREAM(FEET) =    346.00  DOWNSTREAM(FEET) =    337.50

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   16.596
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.792
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL POOR COVER
  "BARREN"                   B       2.87      0.30      1.000     72   16.60
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =       9.02
  TOTAL AREA(ACRES) =       2.87   PEAK FLOW RATE(CFS) =       9.02

****************************************************************************
```

```
 FLOW PROCESS FROM NODE      1.06 TO NODE      2.03 IS CODE =  56
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    337.50  DOWNSTREAM(FEET) =    290.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   180.00   CHANNEL SLOPE =  0.2639
 GIVEN CHANNEL BASE(FEET) =    2.00   CHANNEL FREEBOARD(FEET) =  0.5
 "Z" FACTOR =   1.500   MANNING'S FACTOR = 0.013
 *ESTIMATED CHANNEL HEIGHT(FEET) =   0.76
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.780
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL POOR COVER
 "BARREN"                   B       2.50      0.30      1.000    72
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      12.94
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  20.61
 AVERAGE FLOW DEPTH(FEET) =   0.26   TRAVEL TIME(MIN.) =   0.15
 Tc(MIN.) =  16.74
 SUBAREA AREA(ACRES) =     2.50       SUBAREA RUNOFF(CFS) =    7.83
 EFFECTIVE AREA(ACRES) =      5.37     AREA-AVERAGED Fm(INCH/HR) =   0.30
 AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =       5.4         PEAK FLOW RATE(CFS) =      16.82
 GIVEN CHANNEL BASE(FEET) =    2.00   CHANNEL FREEBOARD(FEET) =  0.5
 "Z" FACTOR =   1.500   MANNING'S FACTOR = 0.013
 *ESTIMATED CHANNEL HEIGHT(FEET) =   0.80

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.30   FLOW VELOCITY(FEET/SEC.) =  22.68
 LONGEST FLOWPATH FROM NODE      1.01 TO NODE      2.03 =     825.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      3.01 TO NODE      3.02 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   130.00
 ELEVATION DATA: UPSTREAM(FEET) =    342.00  DOWNSTREAM(FEET) =    313.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.988
 SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 NATURAL POOR COVER
 "BARREN"                   B       2.07      0.30      1.000    72    5.00
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA RUNOFF(CFS) =     10.60
 TOTAL AREA(ACRES) =      2.07   PEAK FLOW RATE(CFS) =     10.60
============================================================================
 END OF STUDY SUMMARY:
```

```
  TOTAL AREA(ACRES)      =        2.1  TC(MIN.) =      5.00
  EFFECTIVE AREA(ACRES) =      2.07  AREA-AVERAGED Fm(INCH/HR)=  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap = 1.000
  PEAK FLOW RATE(CFS)    =      10.60
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

PICACHO CUT AND FILL SITE
BASIN SIZE EVALUATION
100-YEAR, 24-HOUR STORM EVENT

Required storm water detention volumes at the Picacho Cut and Fill Site were evaluated using the Flood Routing Analysis program from Advanced Engineering Software (AES). Due to the small size of the site, both Hydrology Area A and Area B were evaluated together as on large area. The analysis program results show a required storage volume was divided for the two basins.

The basin to the west of the site (bottom elevation 300 feet, high water line 308 feet) was determined to receive a flow rate of 28.83 cubic feet per second (cfs). This would equate to approximately 1.86 acre-feet. This basin is currently designed with a capacity of 2.5 acre-feet.

The basin to the south of the site (bottom elevation 290 feet, high water line 294 feet) was determined to receive a flow rate of 16.82 cfs. This would equate to approximately 1.09 acre-feet. This basin is currently designed with a capacity of 1.5 acre-feet.

Therefore, both basins are currently designed with adequate capacity.

PICACHO CUT AND FILL SITE
SUMMARY OF PROPOSED DRAINAGE CONTROL

Number	Drainage Structure	Location	Depth (in)	Max Dishcarge (cfs)	Peak Discharge (cfs)*	Normal Depth (ft)	Peak/Max Flow (%)	Slope (%)
1	Concrete V-Ditch	Downdrain to northern basin	18"	258	4.05	0.32	2%	43%
2	Concrete V-Ditch	Downdrain to Southern basin	18"	258	16.82	0.54	7%	43%
3	AC V-Ditch	Northern access road drainage channel	18"	59	19.45	0.98	33%	3.50%
4	AC V-Ditch	Southern access road drainage channel	18"	52	5.85	1.03	11%	2.70%

* Per Hydrology Analysis

Worksheet for Concrete V-Ditch- #1 Max Q

Project Description

Friction Method	Manning Formula	
Solve For	Discharge	

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.43000	ft/ft
Normal Depth	1.50	ft
Left Side Slope	2.00	ft/ft (H:V)
Right Side Slope	2.00	ft/ft (H:V)

Results

Discharge	258.47	ft³/s
Flow Area	4.50	ft²
Wetted Perimeter	6.71	ft
Top Width	6.00	ft
Critical Depth	4.01	ft
Critical Slope	0.00227	ft/ft
Velocity	57.44	ft/s
Velocity Head	51.27	ft
Specific Energy	52.77	ft
Froude Number	11.69	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	1.50	ft
Critical Depth	4.01	ft
Channel Slope	0.43000	ft/ft
Critical Slope	0.00227	ft/ft

Worksheet for Concrete V-Ditch- #1 Normal Depth

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.43000	ft/ft
Left Side Slope	2.00	ft/ft (H:V)
Right Side Slope	2.00	ft/ft (H:V)
Discharge	4.05	ft³/s

Results

Normal Depth	0.32	ft
Flow Area	0.20	ft²
Wetted Perimeter	1.41	ft
Top Width	1.26	ft
Critical Depth	0.76	ft
Critical Slope	0.00394	ft/ft
Velocity	20.32	ft/s
Velocity Head	6.42	ft
Specific Energy	6.73	ft
Froude Number	9.02	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.32	ft
Critical Depth	0.76	ft
Channel Slope	0.43000	ft/ft
Critical Slope	0.00394	ft/ft

Worksheet for Concrete V-Ditch- #2 Normal Depth

Project Description

Friction Method	Manning Formula	
Solve For	Normal Depth	

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.43000	ft/ft
Left Side Slope	2.00	ft/ft (H:V)
Right Side Slope	2.00	ft/ft (H:V)
Discharge	16.82	ft³/s

Results

Normal Depth	0.54	ft
Flow Area	0.58	ft²
Wetted Perimeter	2.41	ft
Top Width	2.15	ft
Critical Depth	1.34	ft
Critical Slope	0.00326	ft/ft
Velocity	29.01	ft/s
Velocity Head	13.08	ft
Specific Energy	13.62	ft
Froude Number	9.86	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.54	ft
Critical Depth	1.34	ft
Channel Slope	0.43000	ft/ft
Critical Slope	0.00326	ft/ft

Worksheet for AC V-Ditch - #3 Max Q

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Roughness Coefficient	0.016	
Channel Slope	0.03500	ft/ft
Normal Depth	1.50	ft
Left Side Slope	2.00	ft/ft (H:V)
Right Side Slope	2.00	ft/ft (H:V)

Results

Discharge	59.91	ft^3/s
Flow Area	4.50	ft^2
Wetted Perimeter	6.71	ft
Top Width	6.00	ft
Critical Depth	2.23	ft
Critical Slope	0.00417	ft/ft
Velocity	13.31	ft/s
Velocity Head	2.75	ft
Specific Energy	4.25	ft
Froude Number	2.71	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	1.50	ft
Critical Depth	2.23	ft
Channel Slope	0.03500	ft/ft
Critical Slope	0.00417	ft/ft

Worksheet for AC V-Ditch - #3 Normal Depth

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.016	
Channel Slope	0.03500	ft/ft
Left Side Slope	2.00	ft/ft (H:V)
Right Side Slope	2.00	ft/ft (H:V)
Discharge	19.45	ft³/s

Results

Normal Depth	0.98	ft
Flow Area	1.94	ft²
Wetted Perimeter	4.40	ft
Top Width	3.93	ft
Critical Depth	1.43	ft
Critical Slope	0.00485	ft/ft
Velocity	10.05	ft/s
Velocity Head	1.57	ft
Specific Energy	2.55	ft
Froude Number	2.53	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.98	ft
Critical Depth	1.43	ft
Channel Slope	0.03500	ft/ft
Critical Slope	0.00485	ft/ft

Worksheet for AC V-Ditch - #4 Max Q

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Roughness Coefficient	0.016	
Channel Slope	0.02700	ft/ft
Normal Depth	1.50	ft
Left Side Slope	2.00	ft/ft (H:V)
Right Side Slope	2.00	ft/ft (H:V)

Results

Discharge	52.62	ft³/s
Flow Area	4.50	ft²
Wetted Perimeter	6.71	ft
Top Width	6.00	ft
Critical Depth	2.12	ft
Critical Slope	0.00424	ft/ft
Velocity	11.69	ft/s
Velocity Head	2.13	ft
Specific Energy	3.63	ft
Froude Number	2.38	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	1.50	ft
Critical Depth	2.12	ft
Channel Slope	0.02700	ft/ft
Critical Slope	0.00424	ft/ft

Worksheet for AC V-Ditch - #4 Normal Depth

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.016	
Channel Slope	0.02700	ft/ft
Left Side Slope	2.00	ft/ft (H:V)
Right Side Slope	2.00	ft/ft (H:V)
Discharge	19.45	ft³/s

Results

Normal Depth	1.03	ft
Flow Area	2.13	ft²
Wetted Perimeter	4.62	ft
Top Width	4.13	ft
Critical Depth	1.43	ft
Critical Slope	0.00485	ft/ft
Velocity	9.12	ft/s
Velocity Head	1.29	ft
Specific Energy	2.32	ft
Froude Number	2.24	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	1.03	ft
Critical Depth	1.43	ft
Channel Slope	0.02700	ft/ft
Critical Slope	0.00485	ft/ft

APPENDIX F

SOIL LOSS ANALYSIS

PICACHO CUT AND FILL SITE

COVER SOIL EROSION CALCULATIONS

1.0 INTRODUCTION

Soil loss potential at the Picacho Cut and Fill Site (PCFS) due to water erosion was evaluated using the Revised Universal Soil Equation (RUSLE), developed by the U.S. Department of Agriculture, which considers soil and vegetation type as well as physical and climatic features of the landfill area. A brief discussion of this method is given below.

2.0 SOIL LOSS EVALUATION

The RUSLE can be used to evaluate landfill cover soil loss. This equation may be stated as:

A = R K LS C P, Where

A = Average annual soil loss, in tons per acre per year

R = Rainfall and runoff erosivity index

K = Soil erodibility factor

LS = Hill slope length and steepness factor

C = Cover-management factor

For the purpose of soil loss analysis, the landfill was divided into study areas based upon the average slopes of the final cover and surface drainage characteristics as shown on the Soil Loss Map (attached). The results of the analysis are shown in Table 1.

The RUSLE factors for the PCFS were assigned as follows:

R = 27.0	The site is located in a Type II area, where R is defined as $27.0p^{2.2}$. The variable "p" is the 2 year, 6-hour rainfall for the site area, which is 1.00 inches.
K = 0.06	It is assumed that the final cover material will have Pit Run Rock (gravel) mixed into the top six to eight inches of the proposed monolithic cover soil. This mixture should be 25-50 percent gravel. Based on this assumption and the attached chart for estimating "K" value class from soil texture, the K value was chosen to be 0.06.
LS	The final cover area was divided, according to average slope values, into subareas A through F. The top deck area, Area A, has a slope of

3 percent, as does Area E, which covers the bench area south of the top deck. The side slope areas, Areas B and F, have slopes of approximately 30 percent. Side slope Area C has a slope of approximately 25 percent, and side slope Area D has a slope of approximately 40 percent.

C = 0.05 The "cover-management factor" reflects the erosion reduction due to the presence of the gravel mixture in the top six inches of the final cover. This factor was estimated based on the attached table of C-Factor and P-Factor values, which lists a C-Factor of 0.05 for gravel.

P = 1.00 The "practice factor," which accounts for the effect of land management practices on reducing erosion, is estimated to be 1.00 for the entire landfill site. This is based on the value for gravel on the attached table of C-Factor and P-Factor values.

Using the values listed above, the estimated average soil loss depth due to water erosion is 0.0013 inch per year.

3.0 DISCUSSION

Based on the above soil erosion analysis, the average soil loss depth for a soil density of 100 pounds per cubic foot is approximately 0.0013 inches per year or 0.23 tons/acre/year for the entire vegetated site. This value is well below the recommended USEPA maximum of 2.0 tons/acre/year. Over the 30-year post-closure period, the average soil loss over the entire site is estimated to be approximately 0.04 inches.

TABLE 1: REVISED UNIVERSAL SOIL LOSS ANALYSIS

STUDY AREA	AREA (ACRES)	R FACTOR	K FACTOR	SLOPE (%)	SLOPE LENGTH (FT)	LS FACTOR	C FACTOR	P FACTOR	TONS PER ACRE	ANNUAL SOIL LOSS (TONS/YEAR)	VOLUME (CY)
A	7.93	27.00	0.06	3.00	305	0.40	0.050	1.00	0.03	0.26	0.19
B	0.55	27.00	0.06	30.00	120	8.50	0.050	1.00	0.69	0.38	0.28
C	1.65	27.00	0.06	25.0	120	6.50	0.050	1.00	0.53	0.87	0.64
D	1.06	27.00	0.06	40.0	55	9.50	0.050	1.00	0.77	0.82	0.60
E	0.87	27.00	0.06	3.0	675.0	0.50	0.050	1.00	0.04	0.04	0.03
F	1.10	27.00	0.06	30.0	100	8.00	0.050	1.00	0.65	0.71	0.53
TOTAL	13.16								0.23	3.07	2.27

R:\CAD Data\DWG\Picacho\Soil Loss\Soil Loss Table 12-9-08: 12/9/2008

PICACHO SOLID WASTE SITE

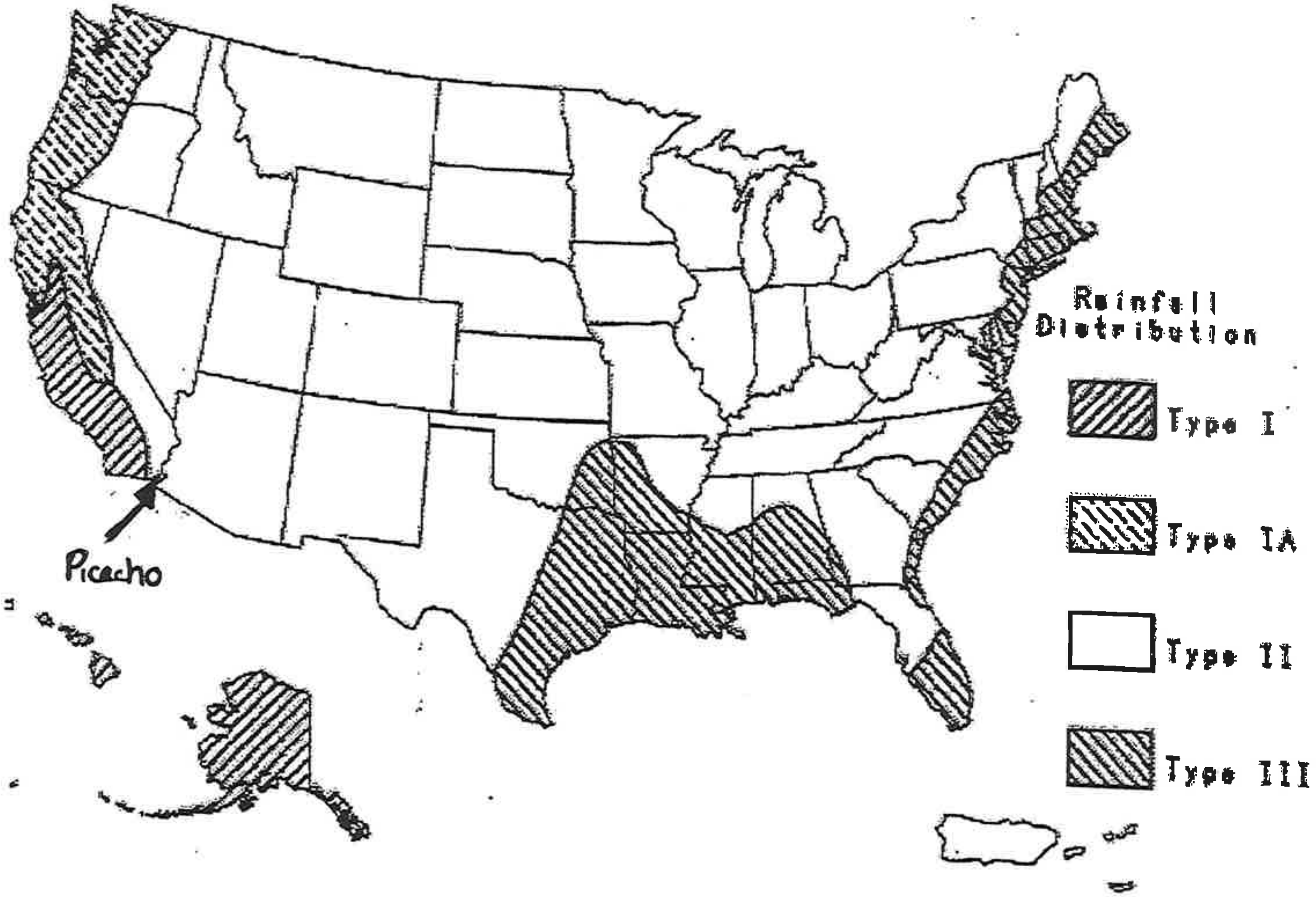


Figure B-2.—Approximate geographic boundaries for SCS rainfall distributions.

Picacho - Type II

$R = 27.0 P^{2.2}$

$= 27.0 (1.0)^{2.2}$

$= 27.0$

P = 2yr, 6-hr rainfall = 1.0in

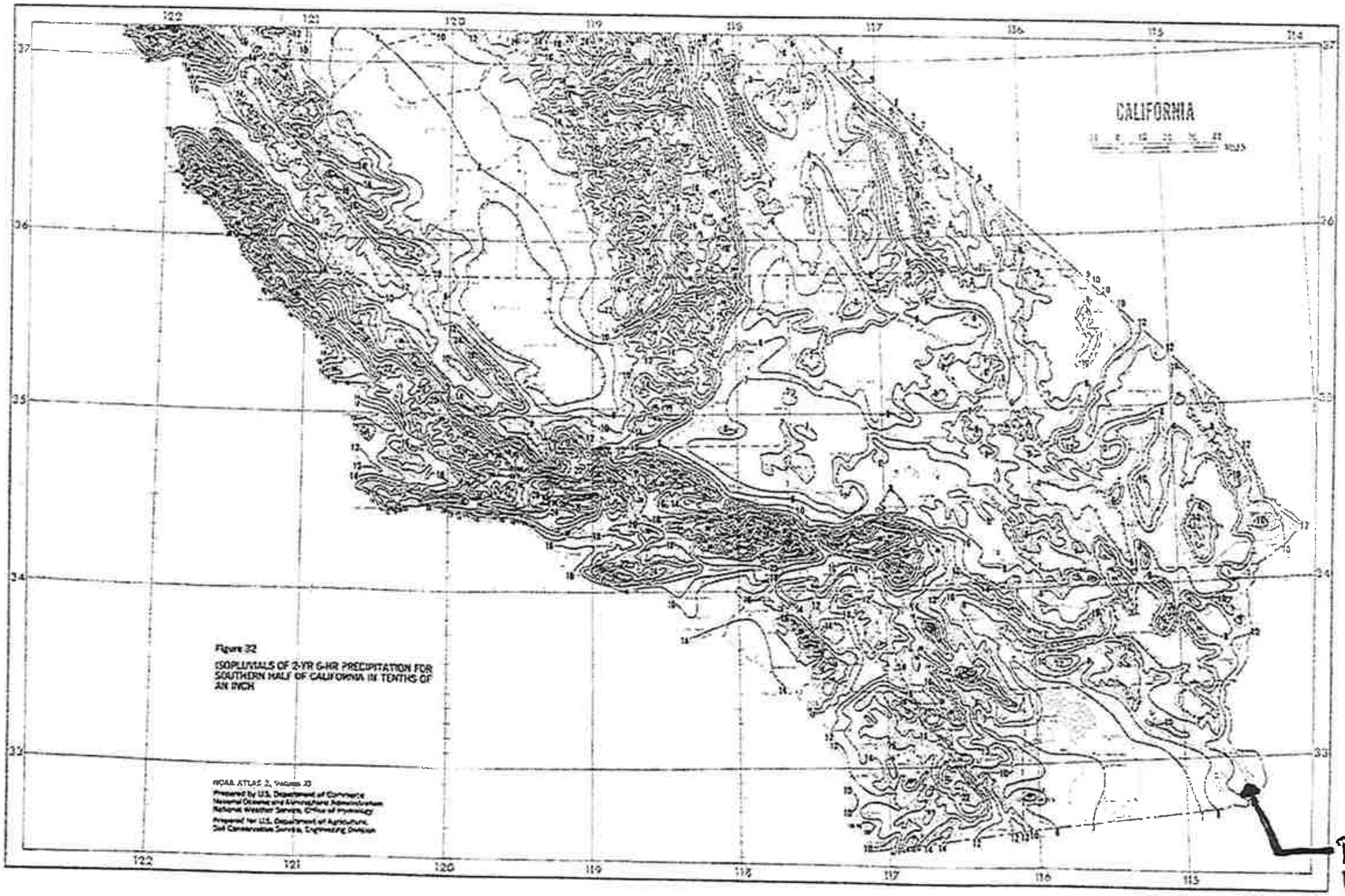


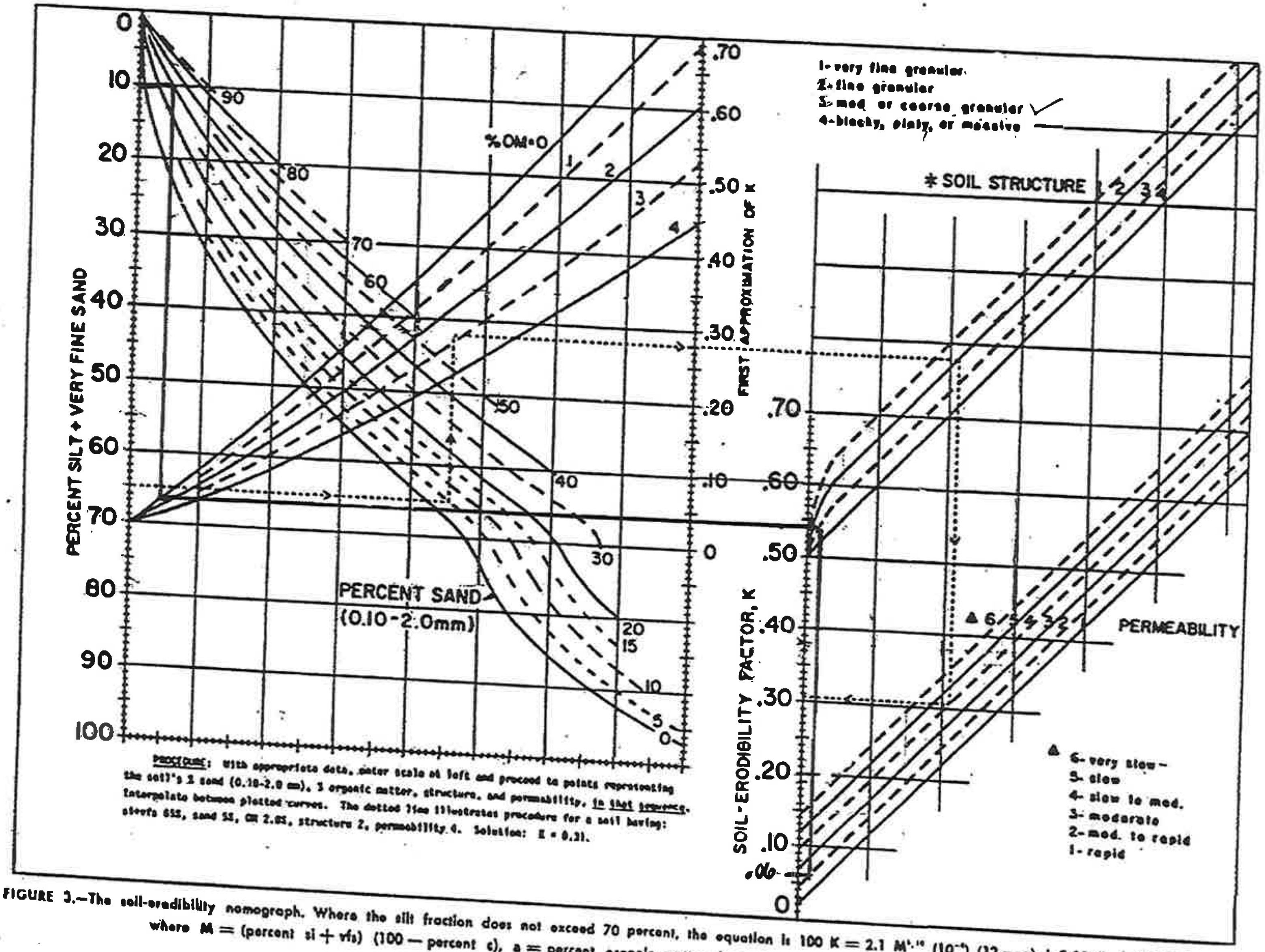
Figure 32

ISOPLUVIALS OF 2-YR 6-HR PRECIPITATION FOR SOUTHERN HALF OF CALIFORNIA IN TENTHS OF AN INCH

NOAA ATLAS 2, Volume XI
Prepared by U.S. Department of Commerce
National Oceanic and Atmospheric Administration
National Weather Service, Office of Hydrology
Prepared for U.S. Department of Agriculture,
Soil Conservation Service, Engineering Division

Picacho Solid
Waste Site
1.0 inch

Picacho Solid Waste Site



PROCEDURE: With appropriate data, enter scale at left and proceed to points representing the soil's % sand (0.10-2.0 mm), % organic matter, structure, and permeability, in that sequence. Interpolate between plotted curves. The dotted line illustrates procedure for a soil having: si+vfs 65%, sand 5%, OM 2.8%, structure 2, permeability 4. Solution: K = 0.31.

FIGURE 3.—The soil-erodibility nomograph. Where the silt fraction does not exceed 70 percent, the equation is $100\ K = 2.1\ M^{1.14}\ (10^{-4})\ (12 - a) + 3.25\ (b - 2) + 2.5\ (c - 3)$ where $M =$ (percent si + vfs) (100 — percent c), a = percent organic matter, b = structure code, and c = profile permeability class.

PICACHO SOLID WASTE SITE

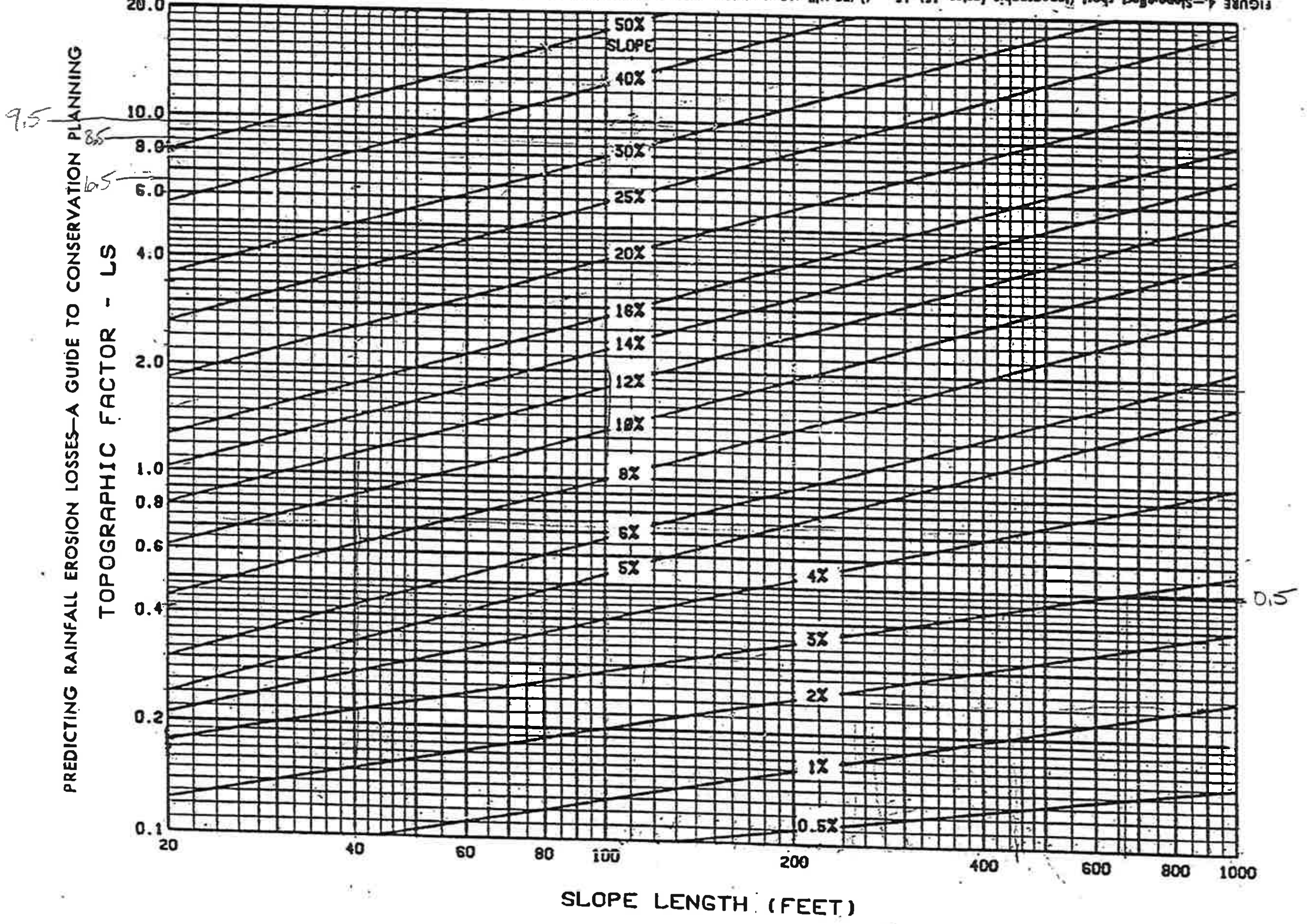


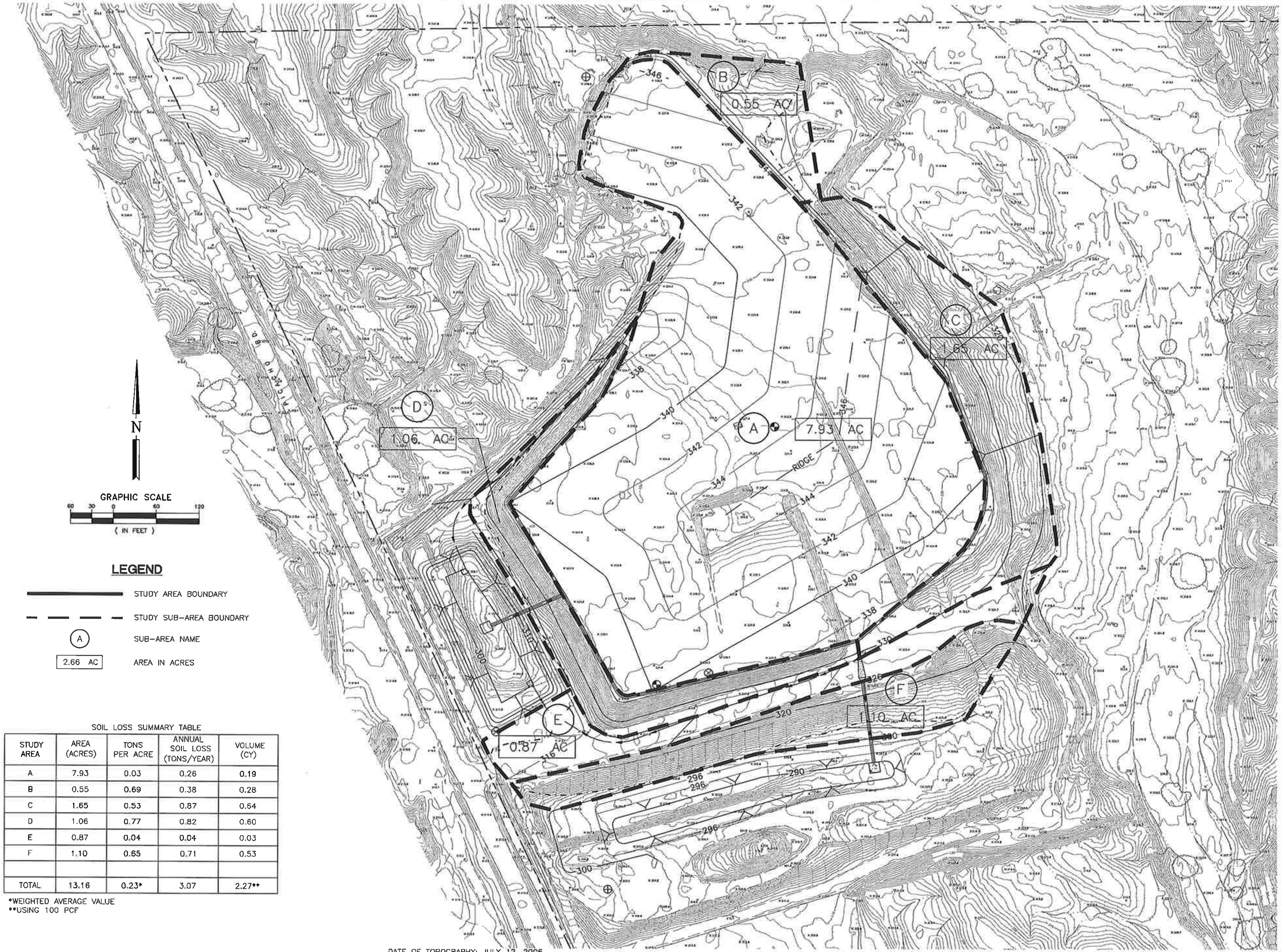
FIGURE 4.—Slope-effect chart (topographic factor, LS). LS = $(\lambda/72.6)^m (65.41 \sin^2\theta + 4.56 \sin\theta + 0.065)$ where λ = slope length in feet; θ = angle of slope; and m = 0.2 for gradients < 1 percent, 0.3 for 1 to 3 percent slopes, 0.4 for 3.5 to 4.5 percent slopes, and 0.5 for slopes of 5 percent or steeper.

Table 1: C-Factor and P-Factor Values for Rainfall Erosion Control Measures (from HDI, December, 1991).

Treatment		C-Factor	P-Factor
BARE SOIL			
Packed and Smooth		1.00	1.00
Freshly Disked		1.00	0.90
Rough Irregular Surface		1.00	0.90
SEDIMENT BASIN/TRAP		1.00	0.50[A]
STRAW BALE BARRIER, GRAVEL FILTER, SAND BAGS		1.00	0.80
SILT FENCE BARRIER		1.00	0.50
ASPHALT/CONCRETE PAVEMENT		0.01	1.00
PICACHO → GRAVEL (1/4" TO 1 1/2") @ 135 TONS/ACRE		0.05	1.00
ESTABLISHED NATIVE GRASS		Fig 4	1.00
SOD GRASS		0.01	1.00
TEMPORARY VEGETATION/COVER CROP		0.45[B]	1.00
HYDRAULIC MULCH @ 2 TONS/ACRE		0.10[C]	1.00
SOIL SEALANT		0.01 - 0.60[D]	1.00
EROSION CONTROL MATS/BLANKETS		0.10	1.00
HAY OR STRAW DRY MULCH @ 2 TONS/ACRE & ANCHORED Assumes planting of grass seed has occurred prior to application, otherwise C-Factor = 1.00.			
Slope (%)			
1 to 10		0.06	1.00
11 to 15		0.07	1.00
16 to 20		0.11	1.00
21 to 25		0.14	1.00
25 to 33		0.17	1.00
> 33		0.20	1.00
CONTOUR FURROWED SURFACE Must be maintained throughout construction activities, otherwise P-Factor = 1.00. Maximum length refers to down slope length.			
Slope (%)	Max Length (feet)		
1 to 2	400	1.00	0.60
3 to 5	300	1.00	0.50
6 to 8	200	1.00	0.50
9 to 12	120	1.00	0.60
13 to 16	80	1.00	0.70
17 to 20	60	1.00	0.80
> 20	50	1.00	0.80

NOTE: Use of other C-Factor of P-Factor values reported in this table should be substantiated by documentation

A: Should be constructed as the first step in over lot grading
B: Assumes planting occurs within optimal climatic conditions
C: Some limitation on use in arid and semi-arid climates
D: Value used must be substantiated by documentation



LEGEND

━━━	STUDY AREA BOUNDARY
— — —	STUDY SUB-AREA BOUNDARY
Ⓐ	SUB-AREA NAME
2.66 AC	AREA IN ACRES

SOIL LOSS SUMMARY TABLE

STUDY AREA	AREA (ACRES)	TONS PER ACRE	ANNUAL SOIL LOSS (TONS/YEAR)	VOLUME (CY)
A	7.93	0.03	0.26	0.19
B	0.55	0.69	0.38	0.28
C	1.65	0.53	0.87	0.64
D	1.06	0.77	0.82	0.60
E	0.87	0.04	0.04	0.03
F	1.10	0.65	0.71	0.53
TOTAL	13.16	0.23*	3.07	2.27**

*WEIGHTED AVERAGE VALUE
**USING 100 PCF

DATE OF TOPOGRAPHY: JULY 12, 2006

Sym	Descrip	Date	Apd

Revisions

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DEPARTMENT OF PUBLIC WORKS
155 SOUTH 11TH ST
EL CENTRO, CALIFORNIA, 92243-2853
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BAS
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CIVIL AND ENVIRONMENTAL ENGINEERS
1360 VALLEY VISTA DRIVE
DIAMOND BAR, CA. 91765 (909) 860-7777

Design __	Drawn __	Spvd
Chkd	Appd	Date 12-14-07

PICACHO CUT AND FILL SITE

SOIL LOSS MAP

Sheet 1 of 1
Rev

R:\CAD DATA\DWG\PICACHO\SOIL LOSS\SOIL LOSS 11-17-08.DWG

APPENDIX G

POST-CLOSURE MAINTENANCE/MONITORING FORMS

FORM A
PICACHO CUT AND FILL SITE
PERIMETER MONITORING CALIBRATION FORM

Technician ____________________

Date __________ **Time** ________

METER NAME MODEL	SERIAL NUMBER	STANDARD USED	(PRE-SAMPLING) INITIAL METER READING	CALIBRATED METER READING	(POST SAMPLING) FINAL METER READING	ADDITIONAL INFORMATION OBSERVATION

* CALIBRATED METER READING AFTER ADJUSTING SPAN CONTROLS.

FORM B
PICACHO CUT AND FILL SITE
PROBE MONITORING DATA SHEET

Technician ____________________

Date ____________ **Time** ____________

PROBE NUMBER		A	B	C
		to	to	to
Time:	Pressure inches of water			
	Gas (%)			
	Gas (PPM)			
		to	to	to
Time:	Pressure inches of water			
	Gas (%)			
	Gas (PPM)			
		to	to	to
Time:	Pressure inches of water			
	Gas (%)			
	Gas (PPM)			
		to	to	to
Time:	Pressure inches of water			
	Gas (%)			
	Gas (PPM)			
		to	to	to
Time:	Pressure inches of water			
	Gas (%)			
	Gas (PPM)			
		to	to	to
Time:	Pressure inches of water			
	Gas (%)			
	Gas (PPM)			

FORM C
PICACHO CUT AND FILL SITE
GROUNDWATER WELL MAINTENANCE RECORD

DATE: ____________________

WELL I.D.# __________________

W.O.#: ____________________

TYPE OF WORK

- **Seal** ☐
- **Casing** ☐
- **Discharge Piping** ☐
- **Valves** ☐

WORK PERFORMED: ____

SKETCH:

SIGNED BY: __________________________

FORM D
PICACHO CUT AND FILL SITE
RECORD OF DISPOSAL AREA SURVEY MONUMENTATION MONITORING

Disposal Area Survey Monument	Completion of Closure Construction		5th Year		10th Year		15th Year		20th Year		25th Year		30th Year	
	Elevation	Location	Elevation	Location	Elevation	Location	Elevation	Location	Elevation	Location	Elevation	Location	Elevation	Location

FORM E
PICACHO CUT AND FILL SITE
DRAINAGE INSPECTION REPORT

PROJECT DESCRIPTION ____________________

CREW MEMBERS ____________________

WEATHER CONDITIONS ____________________

DATE ____________________

	YES	NO
TEST FOR GASES	____	____
TEST FOR OXYGEN	____	____
VENTILATION REQ'D	____	____
RESPIRATORS REQ'D.	____	____
CONTINUOUS INSP.	____	____
SPOT INSP.	____	____

ITEM	CONDITION	REMARKS	REPAIR/CORRECTIVE ACTION TAKEN
Open-Channels			
Downdrains			
Top Deck Diversion Berms			
Retention Basins			

____
INSPECTOR

Picacho Solid Waste Site FCPCMP
(L:\Imperial\9899\Reports\Fcpcmp\Form-E:10/21/2010)

FORM F
PICCACHO CUT AND FILL SITE
FINAL COVER INSPECTION DATA SHEET

INSPECTOR: ____________________ **DATE:** ____________

WEATHER CONDITIONS: ____________________ **TIME:** ____________

ITEM	CONDITION	REMARKS	REPAIR/CORRECTIVE ACTION TAKEN
Areas of the Vegetative Cover Requiring Replanting			
Eroded Portions of the Erosion-Resistant Layer			
Rill/Gully Erosions on the Final Cover			
Areas Lacking Free Drainge			
Areas Damaged by Equipment Operation			
Differential Settlement of the Final Cover			

APPENDIX H

METHANE GAS DETECTION MONITORING RESULTS

METHANE GAS DETECTION
MONITORING RESULTS

SOLID WASTE SITE: PICACHO

QUARTER: [✓ 1] 2 3 4 YEAR: 2007

LOCATION	TEMP/TIME	DATE	%METHANE	READER	COMMENTS
WEST PERIMETER	73° - 7:12	2-3-07	0%	M.Q.	WAIK PERIMETER
SOUTH PERIMETER	73° - 7:23	2-3-07	0%	M.Q.	WAIK PERIMETER
EAST PERIMETER	73° - 7:32	2-3-07	0%	M.Q.	WAIK PERIMETER
NORTH PERIMETER	73° - 7:40	2-3-07	0%	M.Q.	WAIK PERIMETER
metal container	73° - 7:47	2-3-07	0%	M.Q	Around CONTAINER
Current CELL	73° - 7:49	2-3-07	0%	M.Q.	UP & DOWN CELL AREA

Ga\solidwst\forms\methanegasdetection

METHANE GAS DETECTION
MONITORING RESULTS

SOLID WASTE SITE: PICACHO

QUARTER: 1 [✓ 2] 3 4 YEAR: 2007

LOCATION	TEMP/TIME	DATE	%METHANE	READER	COMMENTS
current CELL	102° - 11:00 AM	6-9-07	0%	M.Q.	UP & DOWN CELL AREA
METAL container	102° - 11:04	6-9-07	0%	M.Q.	in & AROUND container
North PERIMETER	102° - 11:09	6-9-07	0%	M.Q.	WAlK PERIMETER
EAST PERIMETER	102° 11:13	6-9-07	0%	M.Q.	WAlK PERIMETER
SOUTH PERIMETER	102° 11:20	6-9-07	0%	M.Q.	WAlK PERIMETER
WEST PERIMETER	102° - 11:27	6-9-07	0%	M.Q	WAlK PERIMETER

Ga\solidwst\forms\methanegasdetection

METHANE GAS DETECTION
MONITORING RESULTS

SOLID WASTE SITE: PiCACHO

QUARTER: 1 2 [✓ 3] 4 YEAR: 2007

LOCATION	TEMP/TIME	DATE	%METHANE	READER	COMMENTS
Current CELL	114° - 12:30 PM	8-16-07	0%	M.Q.	up & Down CELL AREA
METAL CONTAINER	114° - 12:34	8-16-07	0%	M.Q.	AROUND CONTAINER
NORTH PERIMETER	114° - 12:40	8-16-07	0%	M.Q.	WAIK PERIMETER
EAST PERIMETER	114° - 12:46	8-16-07	0%	M.Q.	WAIK PERIMETER
SOUTH PERIMETER	114° - 12:54	8-16-07	0%	M.Q.	WAIK PERIMETER
WEST PERIMETER	114° - 1:02	8-16-07	0%	M.Q.	WAIK PERIMETER

METHANE GAS DETECTION
MONITORING RESULTS

SOLID WASTE SITE: PICACHO

QUARTER: 1 2 3 [✓ 4] YEAR: 2007

LOCATION	TEMP/TIME	DATE	%METHANE	READER	COMMENTS
METAL CONTAINER	89° - 1:00	10-9-07	0%	M.Q.	AROUND CONTAINER
CURRENT CELL	89° - 1:01	10-9-07	0%	M.Q.	ACROSS CELL
NORTH PERIMETER	89° - 1:06	10-9-07	0%	M.Q.	WAIK PERIMETER
EAST PERIMETER	89° - 1:13	10-9-07	0%	M.Q.	WAIK PERIMETER
SOUTH PERIMETER	89° - 1:21	10-9-07	0%	M.Q.	WAIK PERIMETER
WEST PERIMETER	89° - 1:27	10-9-07	0%	M.Q.	WAIK PERIMETER

Ga\solidwst\forms\methanegasdetection

METHANE GAS DETECTION
MONITORING RESULTS

SOLID WASTE SITE: PICACHO

QUARTER: [✓ 1] 2 3 4 YEAR: 2008

LOCATION	TEMP/TIME	DATE	%METHANE	READER	COMMENTS
METAL CONTAINER	87° - 8:00	3-15-08	0%	M.Q.	AROUND CONTAINER
CURRENT CELL	87° - 8:03	3-15-08	0%	M.Q.	ACROSS CELL
NORTH PERIMETER	87° - 8:05	3-15-08	0%	M.Q.	WALK PERIMETER
EAST PERIMETER	87° - 8:12	3-15-08	0%	M.Q.	WALK PERIMETER
SOUTH PERIMETER	87° - 8:21	3-15-08	0%	M.Q.	WALK PERIMETER
WEST PERIMETER	87° - 8:29	3-15-08	0%	M.Q.	WALK PERIMETER

METHANE GAS DETECTION
MONITORING RESULTS

SOLID WASTE SITE: PICACHO

QUARTER: 1 [✓ 2] 3 4 YEAR: 2008

LOCATION	TEMP/TIME	DATE	%METHANE	READER	COMMENTS
CURRENT CELL	108° - 9:00	6-14-08	0%	M.Q.	ACROSS CELL
METAL CONTAINER	108° - 9:02	6-14-08	0%	M.Q.	AROUND CONTAINER
NORTH PERIMETER	108° - 9:07	6-14-08	0%	M.Q.	WALK PERIMETER
EAST PERIMETER	108° - 9:14	6-14-08	0%	M.Q.	WALK PERIMETER
SOUTH PERIMETER	108° - 9:26	6-14-08	0%	M.Q.	WALK PERIMETER
WEST PERIMETER	108° - 9:35	6-14-08	0%	M.Q.	WALK PERIMETER

METHANE GAS DETECTION
MONITORING RESULTS

SOLID WASTE SITE: PICACHO

QUARTER: 1 2 [✓ 3] 4 YEAR: 2008

LOCATION	TEMP/TIME	DATE	%METHANE	READER	COMMENTS
METAL CONTAINER	108° - 7:49	7-29-08	0%	M.Q.	AROUND CONTAINER
CORRENT CELL	108° - 7:51	7-29-08	0%	M.Q.	ACROSS CELL
NORTH PERIMETER	108° - 7:56	7-29-08	0%	M.Q.	WAIK PERIMETER
EAST PERIMETER	108° - 8:03	7-29-08	0%	M.Q.	WAIK PERIMETER
SOUTH PERIMETER	108° - 8:13	7-29-08	0%	M.Q.	WAIK PERIMETER
WEST PERIMETER	108° - 8:21	7-29-08	0%	M.Q.	WAIK PERIMETER

METHANE GAS DETECTION
MONITORING RESULTS

SOLID WASTE SITE: Picacho

QUARTER: 1 2 3 [✓ 4] YEAR: 2008

LOCATION	TEMP/TIME	DATE	%METHANE	READER	COMMENTS
North Perimeter	86 12^{30}	12-5-08	0%	R.D	walk perimeter
East perimeter	86° 12^{37}	12-5-08	0%	R.D	walk perimeter
south Perimeter	86 12^{48}	12-5-08	0%	R.D	walk perimeter
west perimeter	86 12^{54}	12-5-08	0%	R.D	walk perimeter
Current cell	86 1^{04}	12-5-08	0%	R.D	working face
metal container	86 1^{15}	12-5-08	0%	R.D	around container

APPENDIX I

LANDFILL COVER STABILITY RESULT

FIGURE I.1

EXPLANATION:

◓ GROUNDWATER MONITORING WELL LOCATION

B-3 ⊗ APPROXIMATE LOCATION OF SURFACE SAMPLE

—·—·— APPROXIMATE LOCATION OF LIMIT OF REFUSE

— — — APPROXIMATE LOCATION OF PROPERTY BOUNDARY

PICACHO SOLID WASTE SITE
IMPERIAL COUNTY, CALIFORNIA

SAMPLE LOCATION MAP

Geo-Logic
ASSOCIATES

Draft	Date	Project No.
JGF	8/2010	2010-0045

Title: Picacho Landfill_Closure Plan
Comments: Maximum Slope Height-Static
File Name: Picacho Final Closure_Max Slope Height.gsz
Date: 8/31/2010
Time: 9:23:33 AM
Method: Morgenstern-Price
Optimize Critical Slip Surface Location: Yes
Slip Surface Option: Entry and Exit
Horz Seismic Load: 0

Name: Cover Soils
Model: Mohr-Coulomb
Unit Weight: 118 pcf
Cohesion: 125 psf
Phi: 30 °

Name: Refuse
Model: Mohr-Coulomb
Unit Weight: 80 pcf
Cohesion: 200 psf
Phi: 30 °

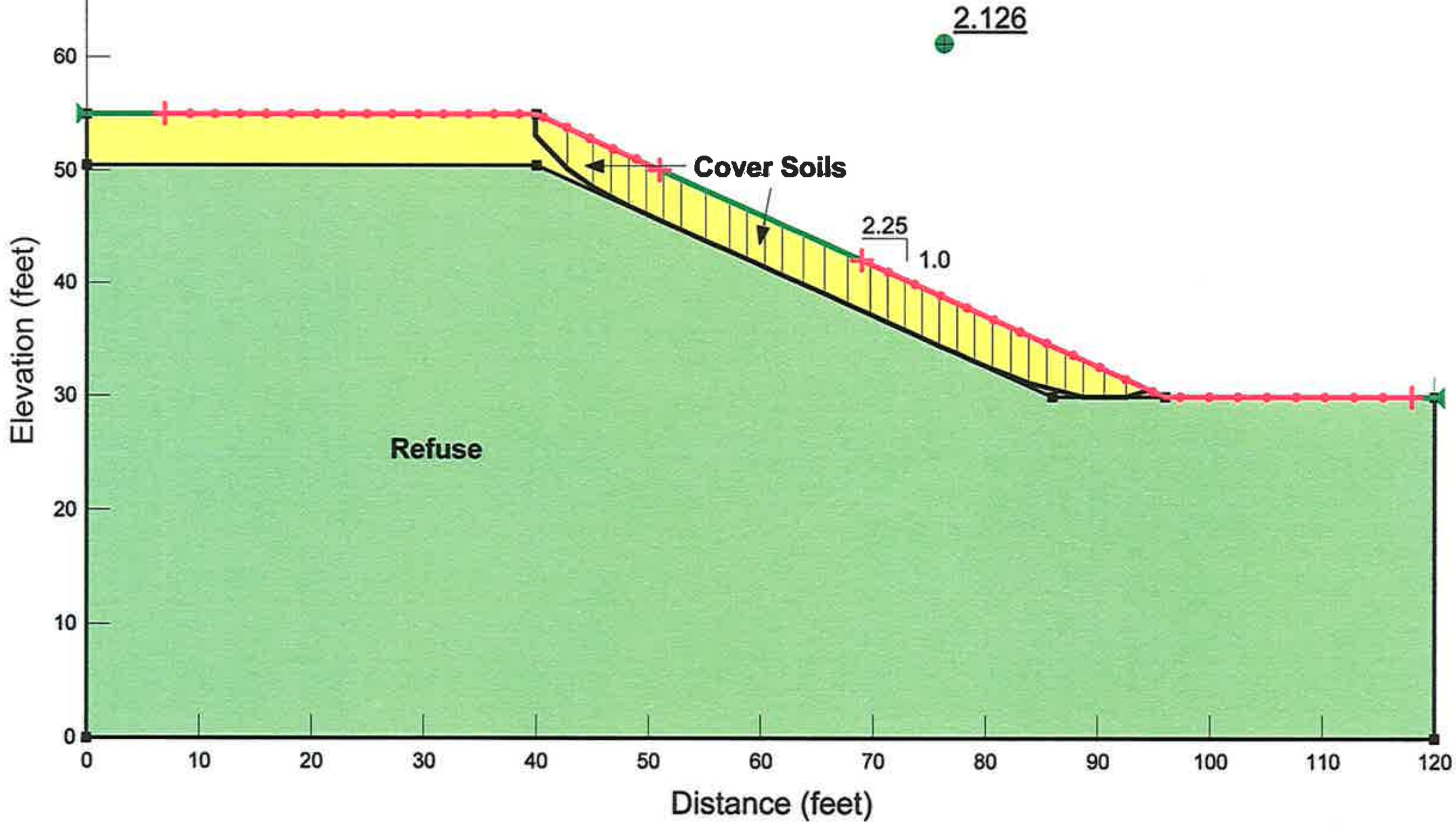


Figure I.2

Geo-Logic
ASSOCIATES

Title: Picacho Landfill_Closure Plan
Comments: Maximum Slope Height-Dynamic
File Name: Picacho Final Closure_Max Slope Height_eq.gsz
Date: 8/31/2010
Time: 10:18:48 AM
Method: Morgenstern-Price
Optimize Critical Slip Surface Location: Yes
Slip Surface Option: Entry and Exit
Horz Seismic Load: 0.395

Name: Cover Soils
Model: Mohr-Coulomb
Unit Weight: 118 pcf
Cohesion: 125 psf
Phi: 30 °

Name: Refuse
Model: Mohr-Coulomb
Unit Weight: 80 pcf
Cohesion: 200 psf
Phi: 30 °

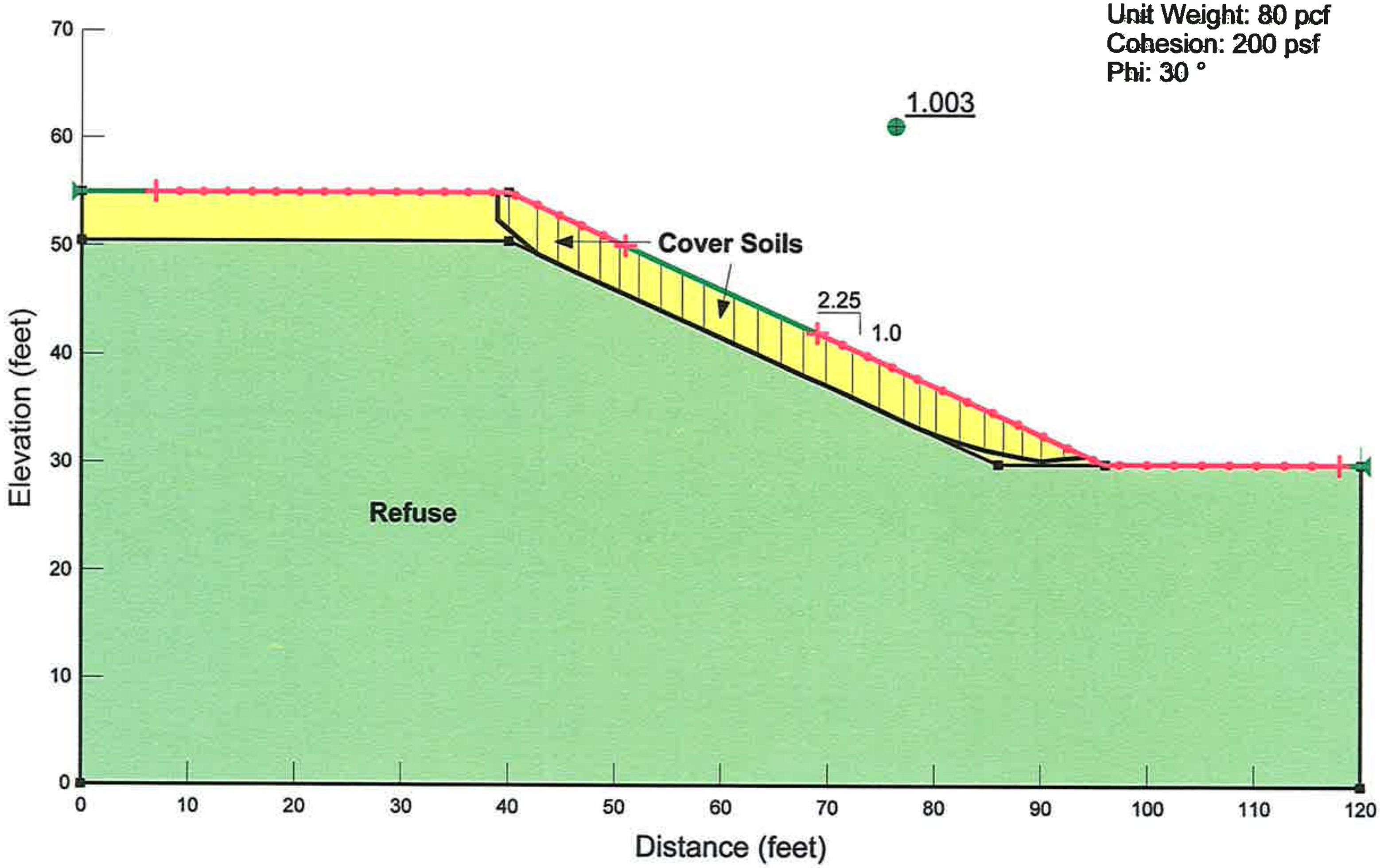
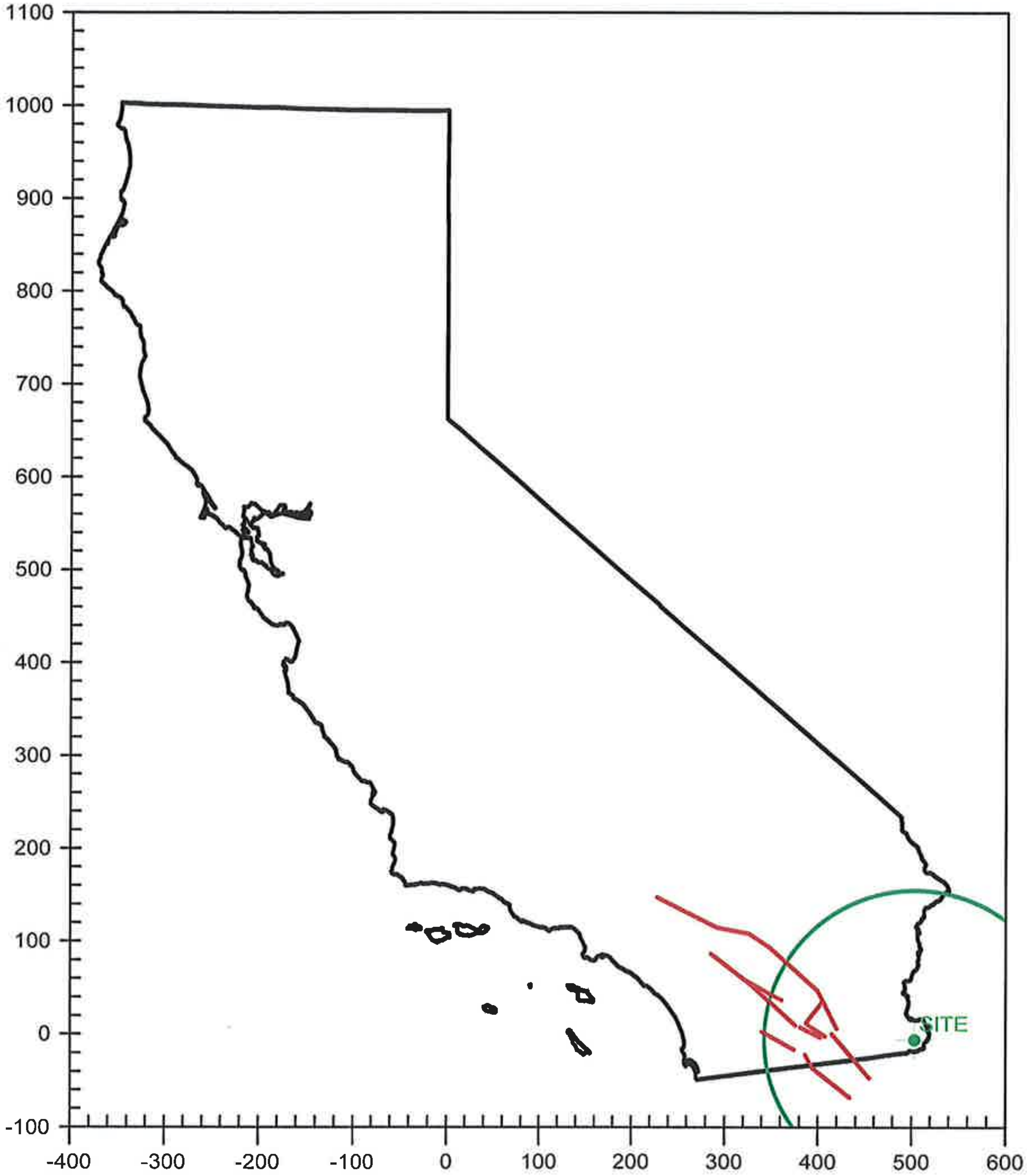


Figure I.3

Geo-Logic
ASSOCIATES

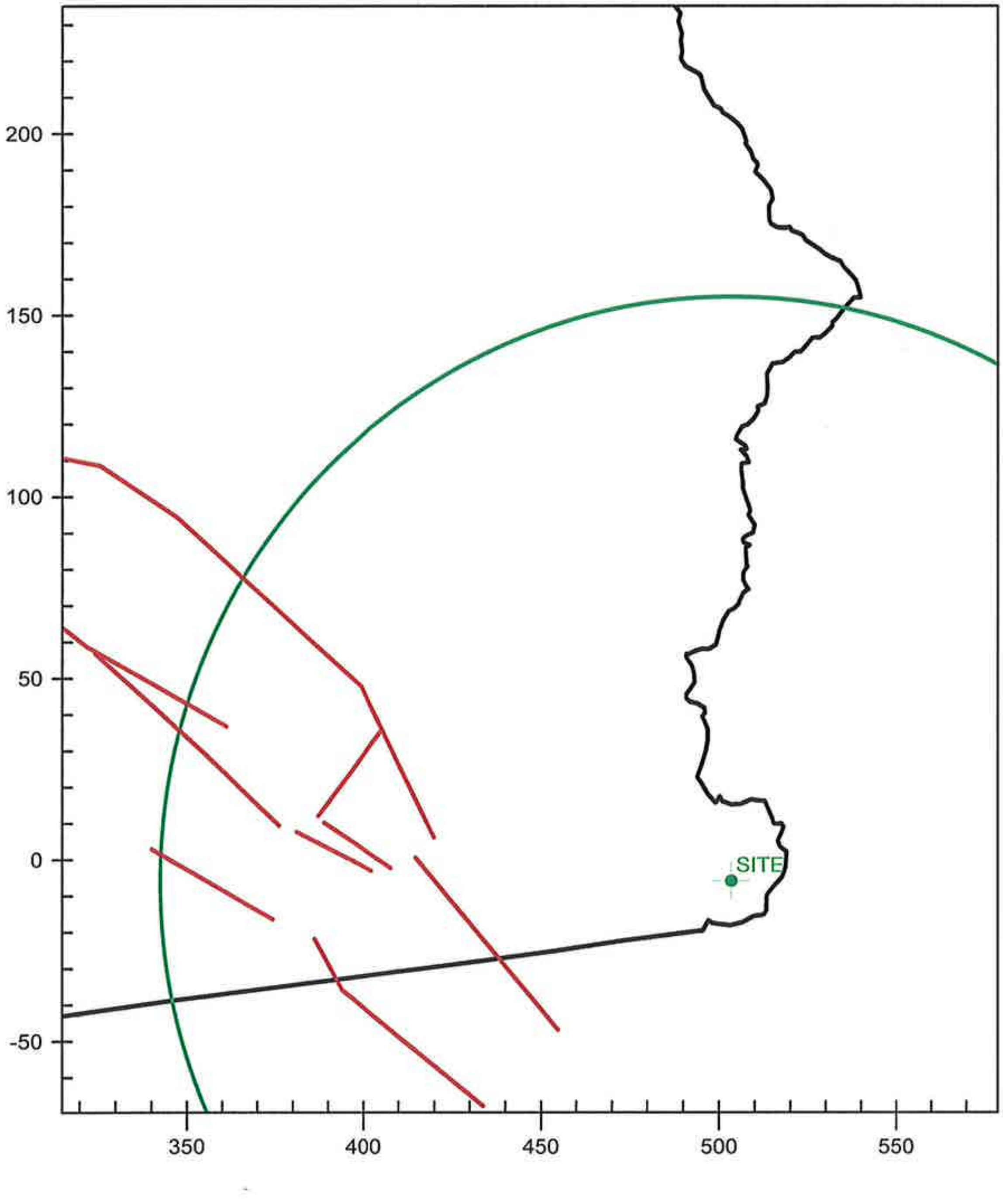
CALIFORNIA FAULT MAP

Picacho LF



CALIFORNIA FAULT MAP

Picacho LF



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                   *                     *
                   *    Version 3.00     *
                   *                     *
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                DETERMINISTIC ESTIMATION OF
          PEAK ACCELERATION FROM DIGITIZED FAULTS


JOB NUMBER: 2010-0045
                                                 DATE: 08-25-2010

JOB NAME: Picacho LF

CALCULATION NAME: MPE  Analysis

FAULT-DATA-FILE NAME: C:\Program Files\EQFAULT1\CDMG-MPE.dat

SITE COORDINATES:
   SITE LATITUDE:  32.8130
   SITE LONGITUDE:  114.6230

SEARCH RADIUS:   100  mi

ATTENUATION RELATION:   3) Boore et al. (1997) Horiz. - NEHRP D (250)
   UNCERTAINTY (M=Median, S=Sigma): M       Number of Sigmas:  0.0
   DISTANCE MEASURE:  cd_2drp
   SCOND:   0
   Basement Depth:  5.00 km     Campbell SSR:        Campbell SHR:
   COMPUTE PEAK HORIZONTAL ACCELERATION

FAULT-DATA FILE USED:  C:\Program Files\EQFAULT1\CDMG-MPE.dat

MINIMUM DEPTH VALUE (km):  0.0
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                              ---------------
                              EQFAULT SUMMARY
                              ---------------


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                       DETERMINISTIC SITE PARAMETERS
                       -----------------------------

Page  1
-------------------------------------------------------------------------------
                                |              |ESTIMATED MPE  EARTHQUAKE EVENT
                                | APPROXIMATE  |------------------------------
          ABBREVIATED           |  DISTANCE    |   MPE    |   PEAK    |EST. SITE
          FAULT  NAME           |  mi   (km)   |EARTHQUAKE|   SITE    |INTENSITY
                                |              | MAG.(Mw) | ACCEL. g  |MOD.MERC.
================================|==============|==========|==========|=========
IMPERIAL                        |  39.5(  63.5)|   7.0    |   0.093   |   VII
BRAWLEY SEISMIC ZONE            |  52.5(  84.5)|   6.4    |   0.054   |   VI
LAGUNA SALADA                   |  57.8(  93.0)|   6.3    |   0.048   |   VI
SUPERSTITION HILLS (San Jacinto)|  59.5(  95.7)|   5.9    |   0.038   |    V
SUPERSTITION MTN. (San Jacinto) |  62.9( 101.2)|   6.1    |   0.040   |    V
ELMORE RANCH                    |  66.5( 107.1)|   5.4    |   0.027   |    V
SAN ANDREAS - Coachella         |  73.3( 118.0)|   7.1    |   0.060   |   VI
SAN ANDREAS - Southern          |  73.3( 118.0)|   7.3    |   0.067   |   VI
SAN JACINTO - BORREGO           |  79.7( 128.3)|   6.1    |   0.033   |    V
ELSINORE-COYOTE MOUNTAIN        |  80.3( 129.3)|   6.2    |   0.035   |    V
SAN JACINTO-ANZA                |  92.5( 148.8)|   6.9    |   0.045   |   VI
SAN JACINTO-COYOTE CREEK        |  95.1( 153.0)|   6.2    |   0.031   |    V
*******************************************************************************
-END OF SEARCH-   12 FAULTS FOUND WITHIN THE SPECIFIED SEARCH RADIUS.

THE IMPERIAL                         FAULT IS CLOSEST TO THE SITE.
IT IS ABOUT 39.5 MILES (63.5 km) AWAY.

LARGEST MAXIMUM-EARTHQUAKE SITE ACCELERATION: 0.0925 g
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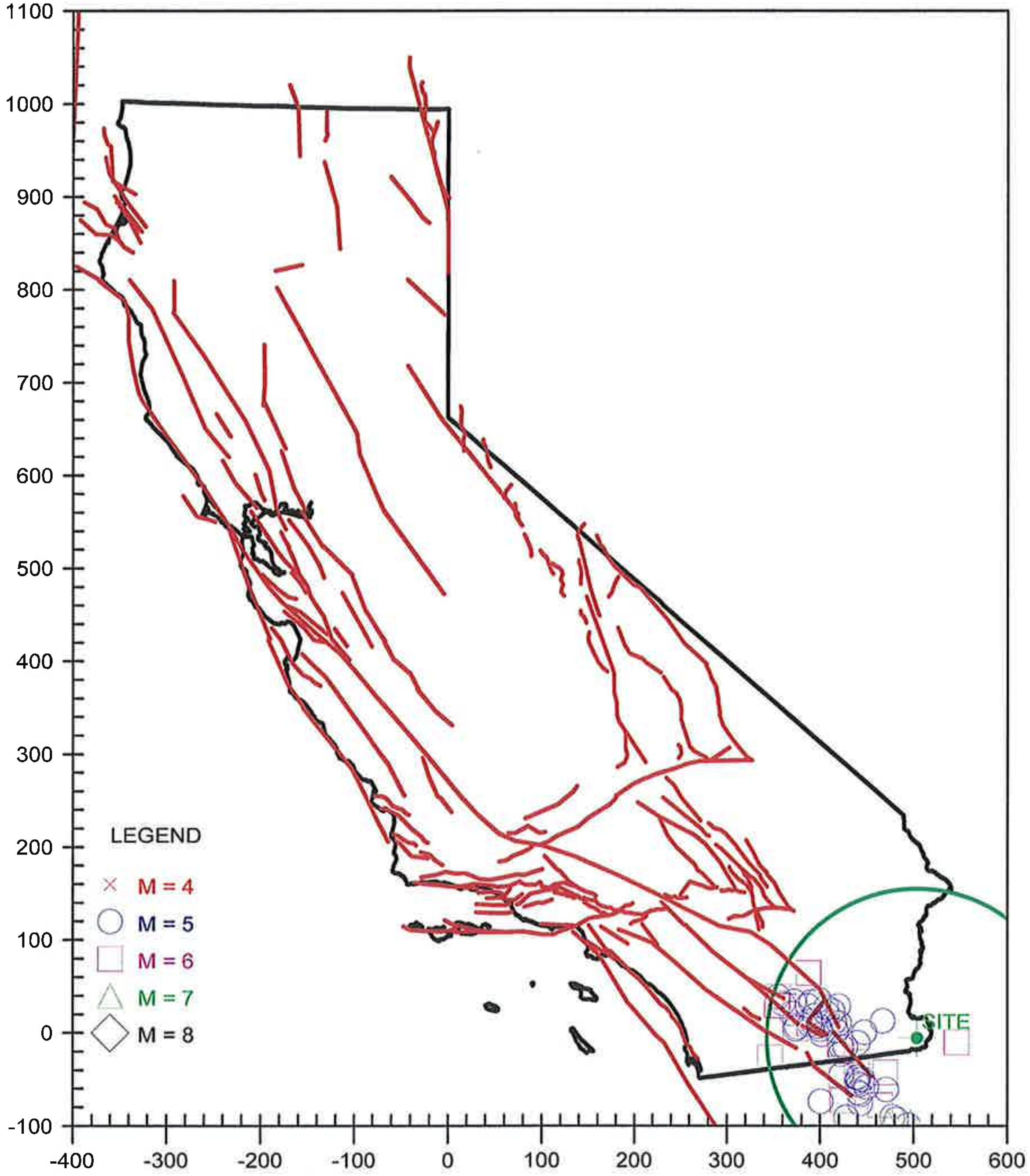
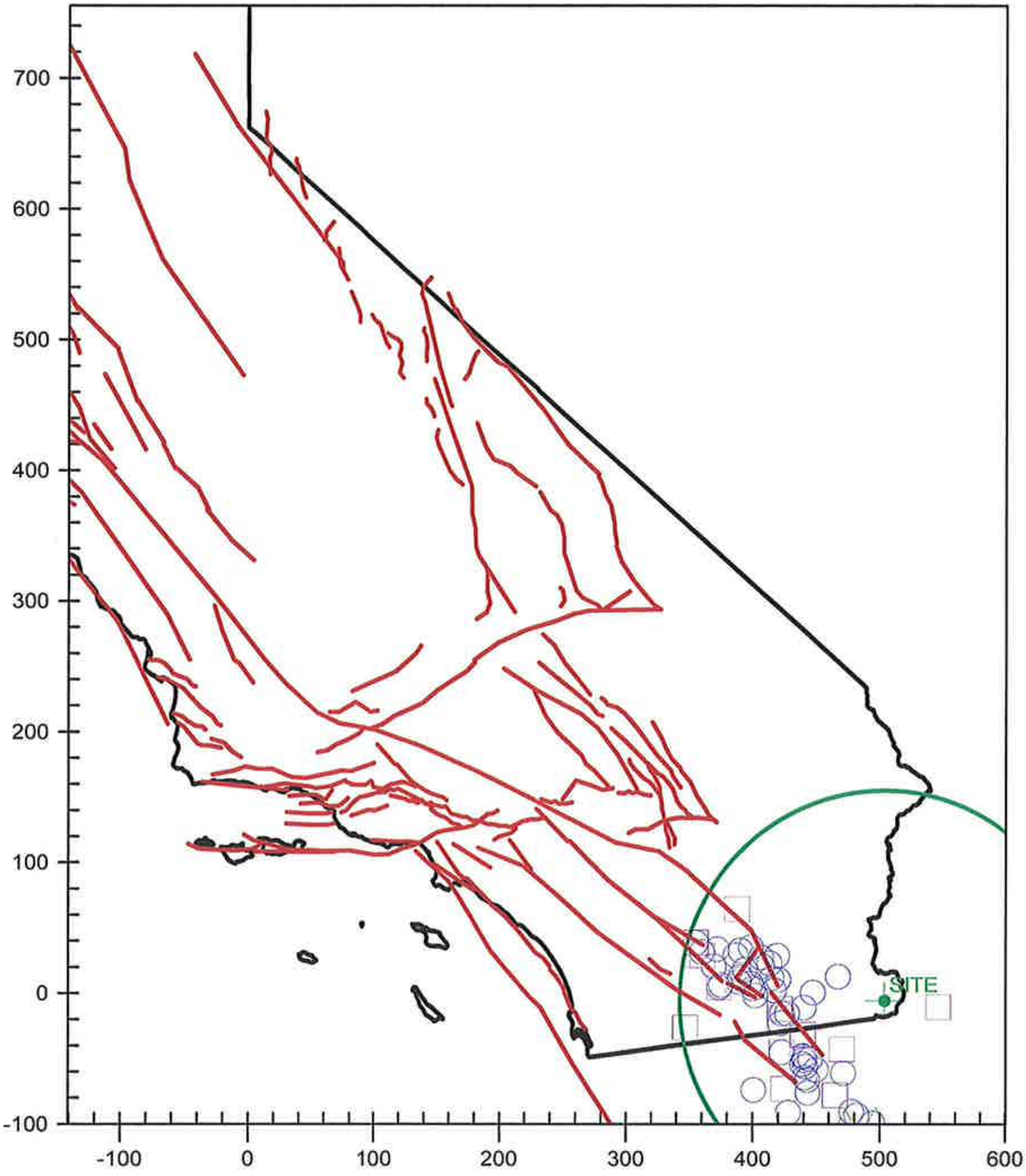
EARTHQUAKE EPICENTER MAP

Picacho LF



EARTHQUAKE EPICENTER MAP

Picacho LF



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                        *     E Q S E A R C H   *
                        *                       *
                        *     Version 3.00      *
                        *                       *
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                            ESTIMATION OF
                        PEAK ACCELERATION FROM
                     CALIFORNIA EARTHQUAKE CATALOGS

JOB NUMBER: 2010-0045
                                                     DATE: 08-25-2010

JOB NAME:                    Picacho LF

EARTHQUAKE-CATALOG-FILE NAME: C:\Program Files\EQSEARCH\ALLQUAKE-2009.DAT

SITE COORDINATES:
   SITE LATITUDE:  32.8143
   SITE LONGITUDE:  114.6217

SEARCH DATES:
           START DATE:   1800
           END DATE:   2010

SEARCH RADIUS:
           100.0 mi
           160.9 km

ATTENUATION RELATION:   3) Boore et al. (1997) Horiz. - NEHRP D (250)
   UNCERTAINTY (M=Median, S=Sigma): M       Number of Sigmas:  0.0
   ASSUMED SOURCE TYPE:  DS [SS=Strike-slip, DS=Reverse-slip, BT=Blind-thrust]
   SCOND:   0  Depth Source:  A
   Basement Depth:  5.00 km     Campbell SSR:        Campbell SHR:
   COMPUTE PEAK HORIZONTAL ACCELERATION

MINIMUM DEPTH VALUE (km):  0.0
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                         EARTHQUAKE SEARCH RESULTS
                         -------------------------

Page  1
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    |       |        |          |  TIME  |     |     | SITE  |SITE|  APPROX.
FILE| LAT.  | LONG.  |   DATE   | (UTC)  |DEPTH|QUAKE| ACC.  | MM |  DISTANCE
CODE| NORTH | WEST   |          | H M Sec| (km)| MAG.|   g   |INT.|  mi  [km]
----+-------+--------+----------+--------+-----+-----+-------+----+------------
DMG |33.0000|115.0000|05/03/1872| 1 0 0.0|  0.0| 5.50| 0.072 | VI | 25.4( 40.9)
T-A |32.7500|114.1700|11/09/1852| 0 0 0.0|  0.0| 6.30| 0.105 | VII| 26.6( 42.8)
DMG |32.5000|115.0000|11/29/1852|20 0 0.0|  0.0| 6.50| 0.104 | VII| 30.9( 49.7)
DMG |32.9000|115.2170|10/11/1935|14 6 0.0|  0.0| 5.00| 0.043 | VI | 35.0( 56.4)
DMG |32.9000|115.2170|06/06/1938| 242 0.0|  0.0| 5.00| 0.043 | VI | 35.0( 56.4)
DMG |32.9000|115.2170|09/08/1935|17 3 0.0|  0.0| 5.00| 0.043 | VI | 35.0( 56.4)
DMG |32.8000|115.3000|05/28/1917| 6 6 0.0|  0.0| 5.50| 0.051 | VI | 39.4( 63.4)
DMG |32.3330|115.0000|04/25/1955|1043 8.0|  0.0| 5.20| 0.043 | VI | 39.9( 64.1)
PAS |32.6140|115.3180|10/15/1979|231653.4| 12.3| 6.60| 0.086 | VII| 42.7( 68.8)
GSP |32.4450|115.2670|05/24/2006|042028.5|  5.0| 5.40| 0.043 | VI | 45.4( 73.0)
GSE |32.3690|115.2240|06/01/1999|151801.9|  5.0| 5.10| 0.036 |  V | 46.6( 75.0)
GSG |32.4680|115.3170|02/19/2008|224130.7| 10.0| 5.10| 0.036 |  V | 47.0( 75.6)
GSG |32.4560|115.3150|02/09/2008|071205.8|  2.0| 5.10| 0.036 |  V | 47.3( 76.1)
PAS |32.7660|115.4410|10/15/1979|231930.0|  9.3| 5.20| 0.038 |  V | 47.7( 76.7)
GSG |32.4680|115.3340|02/12/2008|043237.9| 13.0| 5.00| 0.034 |  V | 47.8( 76.9)
GSG |32.4390|115.3170|02/11/2008|182931.8|  2.0| 5.10| 0.036 |  V | 48.0( 77.3)
PAS |32.3930|115.3110|02/07/1987| 34514.8|  6.0| 5.40| 0.041 |  V | 49.5( 79.7)
GSG |32.4120|115.3330|11/20/2008|192303.3|  3.0| 5.30| 0.038 |  V | 49.8( 80.2)
DMG |32.7670|115.4830|05/19/1940| 55134.0|  0.0| 5.50| 0.042 | VI | 50.1( 80.6)
DMG |32.7670|115.4830|05/19/1940| 63540.0|  0.0| 5.50| 0.042 | VI | 50.1( 80.6)
DMG |32.7670|115.4830|05/19/1940| 455 0.0|  0.0| 5.50| 0.042 | VI | 50.1( 80.6)
DMG |32.7670|115.4830|05/19/1940| 63320.0|  0.0| 5.00| 0.033 |  V | 50.1( 80.6)
PAS |32.1850|115.0760|06/09/1980| 32819.4|  5.0| 6.10| 0.058 | VI | 50.9( 81.9)
DMG |32.8000|115.5000|06/23/1915| 456 0.0|  0.0| 6.25| 0.062 | VI | 51.0( 82.0)
DMG |32.8000|115.5000|06/23/1915| 359 0.0|  0.0| 6.25| 0.062 | VI | 51.0( 82.0)
DMG |32.7330|115.5000|05/19/1940| 43640.9|  0.0| 6.70| 0.078 | VII| 51.3( 82.5)
MGI |32.7000|115.5000|01/01/1927|13 0 0.0|  0.0| 5.30| 0.037 |  V | 51.6( 83.0)
DMG |33.0000|115.5000|02/26/1930| 230 0.0|  0.0| 5.00| 0.031 |  V | 52.5( 84.5)
DMG |33.0000|115.5000|12/17/1955| 6 729.0|  0.0| 5.40| 0.039 |  V | 52.5( 84.5)
DMG |32.3000|115.3000|02/01/1954| 42357.0|  0.0| 5.20| 0.035 |  V | 53.1( 85.4)
DMG |32.3000|115.3000|02/01/1954|13 529.0|  0.0| 5.10| 0.033 |  V | 53.1( 85.4)
DMG |32.3000|115.3000|02/01/1954| 432 2.0|  0.0| 5.60| 0.043 | VI | 53.1( 85.4)
GSG |32.3190|115.3220|02/22/2002|193241.8|  7.0| 5.70| 0.045 | VI | 53.2( 85.6)
PAS |32.9280|115.5390|10/16/1979| 61948.7|  9.2| 5.10| 0.033 |  V | 53.8( 86.5)
PAS |32.9270|115.5400|10/16/1979| 54910.2| 10.4| 5.10| 0.033 |  V | 53.8( 86.6)
GSH |32.0660|114.9480|10/03/1994|140048.6| 10.0| 5.20| 0.034 |  V | 55.0( 88.6)
DMG |32.5000|115.5000|05/01/1918| 432 0.0|  0.0| 5.00| 0.030 |  V | 55.5( 89.3)
DMG |32.5000|115.5000|11/05/1923|22 7 0.0|  0.0| 5.00| 0.030 |  V | 55.5( 89.3)
MGI |32.5000|115.5000|04/16/1925| 330 0.0|  0.0| 5.00| 0.030 |  V | 55.5( 89.3)
DMG |32.5000|115.5000|01/01/1927| 81645.0|  0.0| 5.75| 0.045 | VI | 55.5( 89.3)
DMG |32.5000|115.5000|04/19/1906| 030 0.0|  0.0| 6.00| 0.051 | VI | 55.5( 89.3)
DMG |32.5000|115.5000|11/07/1923|2357 0.0|  0.0| 5.50| 0.039 |  V | 55.5( 89.3)
MGI |32.5000|115.5000|04/16/1925| 520 0.0|  0.0| 5.30| 0.035 |  V | 55.5( 89.3)
DMG |32.5000|115.5000|09/08/1921|1924 0.0|  0.0| 5.00| 0.030 |  V | 55.5( 89.3)
DMG |32.5000|115.5000|01/01/1927| 91330.0|  0.0| 5.50| 0.039 |  V | 55.5( 89.3)
PAS |33.0140|115.5550|10/16/1979| 65842.8|  9.1| 5.50| 0.039 |  V | 55.8( 89.8)
GSG |32.0380|114.9060|12/08/2001|233610.7| 10.0| 5.80| 0.046 | VI | 56.1( 90.3)
DMG |33.1670|115.5000|12/20/1935| 745 0.0|  0.0| 5.00| 0.030 |  V | 56.4( 90.7)
DMG |32.0000|114.7500|12/31/1934|1845 0.0|  0.0| 7.10| 0.090 | VII| 56.7( 91.3)
PAS |32.2110|115.3030|05/05/1978|21 315.8|  6.0| 5.20| 0.033 |  V | 57.5( 92.6)
PAS |31.9770|114.7790|12/07/1976|125956.3|  8.0| 5.00| 0.029 |  V | 58.5( 94.2)
DMG |33.1170|115.5670|07/29/1950|143632.0|  0.0| 5.50| 0.038 |  V | 58.6( 94.3)
DMG |33.1170|115.5670|07/28/1950|175048.0|  0.0| 5.40| 0.036 |  V | 58.6( 94.3)
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                              -------------------------
                              EARTHQUAKE SEARCH RESULTS
                              -------------------------

Page  2
-------------------------------------------------------------------------------------
    |       |         |          |  TIME    |     |     | SITE  |SITE|  APPROX.
FILE| LAT.  |  LONG.  |   DATE   |  (UTC)   |DEPTH|QUAKE| ACC.  | MM |  DISTANCE
CODE| NORTH |  WEST   |          | H M Sec  | (km)| MAG.|   g   |INT.|  mi   [km]
----+-------+---------+----------+--------+-----+-----+-------+----+------------
DMG |32.0000|115.0000|11/21/1915| 01342.0|  0.0| 7.10| 0.085 | VII| 60.4( 97.2)
PAS |33.0980|115.6320|04/26/1981|12 928.4|  3.8| 5.70| 0.040 |  V | 61.7( 99.3)
DMG |32.9000|115.7000|10/02/1928|19 1 0.0|  0.0| 5.00| 0.027 |  V | 62.8(101.1)
GSP |33.1600|115.6370|09/02/2005|012719.8|  9.0| 5.10| 0.029 |  V | 63.5(102.1)
DMG |32.9500|115.7170|06/14/1953| 41729.9|  0.0| 5.50| 0.035 |  V | 64.2(103.3)
DMG |32.2500|115.5000|12/30/1934|1352 0.0|  0.0| 6.50| 0.059 | VI | 64.3(103.4)
DMG |32.9830|115.7330|01/24/1951| 717 2.6|  0.0| 5.60| 0.036 |  V | 65.5(105.4)
DMG |31.9830|115.2000|02/24/1935| 145 0.0|  0.0| 6.00| 0.044 | VI | 66.6(107.1)
PAS |33.0820|115.7750|11/24/1987| 15414.5|  4.9| 5.80| 0.039 |  V | 69.3(111.6)
DMG |33.2330|115.7170|10/22/1942| 15038.0|  0.0| 5.50| 0.033 |  V | 69.7(112.1)
DMG |31.8000|114.5000|08/07/1966|173626.7|  0.0| 6.30| 0.050 | VI | 70.4(113.3)
PAS |32.0840|115.4710|01/10/1976|125815.8| 12.3| 5.00| 0.025 |  V | 70.6(113.7)
DMG |33.0330|115.8210|09/30/1971|224611.3|  8.0| 5.10| 0.026 |  V | 71.1(114.5)
DMG |33.0000|115.8330|01/08/1946|185418.0|  0.0| 5.40| 0.031 |  V | 71.4(114.9)
PAS |33.0130|115.8390|11/24/1987|131556.5|  2.4| 6.00| 0.042 | VI | 71.9(115.7)
DMG |33.2160|115.8080|04/25/1957|215738.7| -0.3| 5.20| 0.027 |  V | 74.1(119.2)
DMG |33.1830|115.8500|04/25/1957|222412.0|  0.0| 5.10| 0.025 |  V | 75.5(121.6)
DMG |32.2500|115.7500|12/01/1958| 6 2 0.0|  0.0| 5.50| 0.031 |  V | 76.4(122.9)
DMG |32.2500|115.7500|12/01/1958| 350 0.0|  0.0| 5.00| 0.024 | IV | 76.4(122.9)
DMG |32.2500|115.7500|12/01/1958| 32118.0|  0.0| 5.80| 0.036 |  V | 76.4(122.9)
DMG |32.9830|115.9830|05/23/1942|154729.0|  0.0| 5.00| 0.023 | IV | 79.8(128.4)
DMG |32.9670|116.0000|10/22/1942|181326.0|  0.0| 5.00| 0.023 | IV | 80.6(129.7)
DMG |32.9670|116.0000|10/21/1942|162654.0|  0.0| 5.00| 0.023 | IV | 80.6(129.7)
DMG |32.9670|116.0000|10/21/1942|162519.0|  0.0| 5.00| 0.023 | IV | 80.6(129.7)
DMG |32.9670|116.0000|10/21/1942|162213.0|  0.0| 6.50| 0.050 | VI | 80.6(129.7)
DMG |31.7000|115.1000|01/09/1941|102842.0|  0.0| 5.50| 0.029 |  V | 81.8(131.7)
DMG |31.7000|115.1000|02/05/1941|1333 6.0|  0.0| 5.00| 0.022 | IV | 81.8(131.7)
DMG |31.7000|114.1000|07/22/1964|103412.0|  0.0| 5.00| 0.022 | IV | 82.7(133.2)
DMG |31.6670|115.0830|07/07/1940|1843 0.0|  0.0| 5.00| 0.022 | IV | 83.7(134.6)
DMG |31.6670|115.0830|12/07/1940|221627.0|  0.0| 6.00| 0.037 |  V | 83.7(134.6)
DMG |31.6670|115.0830|04/29/1936| 850 0.0|  0.0| 5.00| 0.022 | IV | 83.7(134.6)
T-A |33.5000|115.8200|05/00/1868| 0 0 0.0|  0.0| 6.30| 0.043 | VI | 83.9(135.0)
DMG |33.1130|116.0370|04/09/1968| 3 353.5|  5.0| 5.20| 0.024 |  V | 84.5(136.0)
DMG |33.2310|116.0040|05/26/1957|155933.6| 15.1| 5.00| 0.022 | IV | 85.0(136.8)
DMG |31.6000|115.2000|05/31/1954| 8 624.0|  0.0| 5.20| 0.023 | IV | 90.4(145.5)
DMG |33.1900|116.1290|04/09/1968| 22859.1| 11.1| 6.40| 0.043 | VI | 91.0(146.5)
PAS |31.9270|115.7770|07/17/1975|182447.0| 17.3| 5.00| 0.021 | IV | 91.1(146.5)
DMG |33.2170|116.1330|08/15/1945|175624.0|  0.0| 5.70| 0.029 |  V | 91.8(147.7)
DMG |31.5000|114.3000|03/28/1969|151940.4|  0.0| 5.30| 0.024 | IV | 92.7(149.1)
DMG |31.5000|115.0000|01/24/1903| 5 0 0.0|  0.0| 7.00| 0.058 | VI | 93.4(150.3)
DMG |31.5000|114.2000|02/03/1964| 84336.0|  0.0| 5.00| 0.020 | IV | 94.0(151.3)
DMG |31.5000|114.2000|03/22/1969|1823 2.1|  0.0| 5.20| 0.022 | IV | 94.0(151.3)
PAS |31.8900|115.8210|05/08/1985|234020.8|  6.0| 5.00| 0.020 | IV | 94.7(152.4)
DMG |33.2000|116.2000|05/28/1892|1115 0.0|  0.0| 6.30| 0.039 |  V | 95.2(153.2)
DMG |31.5000|114.1000|03/23/1969|1539 1.1|  0.0| 5.20| 0.022 | IV | 95.7(154.1)
DMG |31.7000|115.6000|05/27/1962| 14535.0|  0.0| 5.10| 0.021 | IV | 95.8(154.2)
DMG |33.2830|116.1830|03/19/1954| 95429.0|  0.0| 6.20| 0.037 |  V | 96.0(154.4)
DMG |33.2830|116.1830|03/23/1954| 41450.0|  0.0| 5.10| 0.021 | IV | 96.0(154.4)
DMG |33.2830|116.1830|03/19/1954|102117.0|  0.0| 5.50| 0.026 |  V | 96.0(154.4)
DMG |33.2830|116.1830|03/19/1954| 95556.0|  0.0| 5.00| 0.020 | IV | 96.0(154.4)
GSP |31.6280|115.5110|02/07/2003|103404.8|  7.0| 5.00| 0.020 | IV | 97.0(156.1)
DMG |31.5000|114.0000|04/22/1945| 94548.0|  0.0| 5.30| 0.023 | IV | 97.7(157.3)
DMG |32.7000|116.3000|02/24/1892| 720 0.0|  0.0| 6.70| 0.048 | VI | 97.8(157.3)
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                               EARTHQUAKE SEARCH RESULTS
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Page  3
-------------------------------------------------------------------------------
    |       |        |          | TIME   |     |     | SITE  |SITE|  APPROX.
FILE| LAT.  | LONG.  |   DATE   | (UTC)  |DEPTH|QUAKE|  ACC. | MM |  DISTANCE
CODE| NORTH | WEST   |          | H M Sec| (km)| MAG.|   g   |INT.|  mi   [km]
----+-------+--------+----------+--------+-----+-----+-------+----+------------
DMG |31.4000|114.3000|03/21/1969| 53956.4|  0.0| 5.00| 0.019 | IV | 99.4(160.0)

*******************************************************************************
-END OF SEARCH-   107 EARTHQUAKES FOUND WITHIN THE SPECIFIED SEARCH AREA.

TIME PERIOD OF SEARCH:   1800  TO  2010

LENGTH OF SEARCH TIME:   211  years

THE EARTHQUAKE CLOSEST TO THE SITE IS ABOUT 25.4 MILES (40.9 km) AWAY.

LARGEST EARTHQUAKE MAGNITUDE FOUND IN THE SEARCH RADIUS: 7.1

LARGEST EARTHQUAKE SITE ACCELERATION FROM THIS SEARCH: 0.105 g

COEFFICIENTS FOR GUTENBERG & RICHTER RECURRENCE RELATION:
  a-value=  1.243
  b-value=  0.350
  beta-value=  0.806


------------------------------------
TABLE OF MAGNITUDES AND EXCEEDANCES:
------------------------------------

  Earthquake | Number of Times | Cumulative
   Magnitude |    Exceeded     | No. / Year
  -----------+-----------------+------------
     4.0     |       107       |   0.50952
     4.5     |       107       |   0.50952
     5.0     |       107       |   0.50952
     5.5     |        45       |   0.21429
     6.0     |        22       |   0.10476
     6.5     |         9       |   0.04286
     7.0     |         3       |   0.01429
```
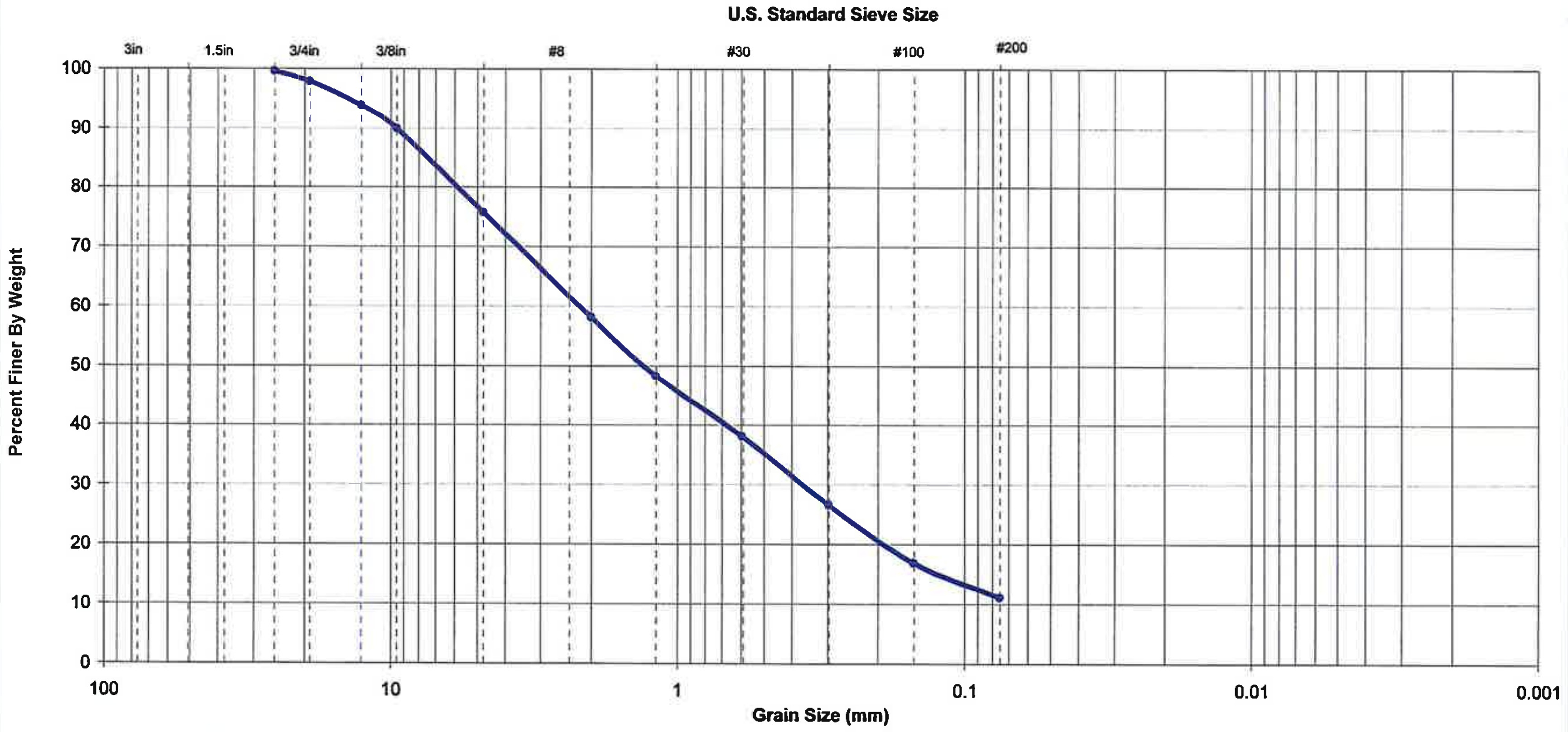
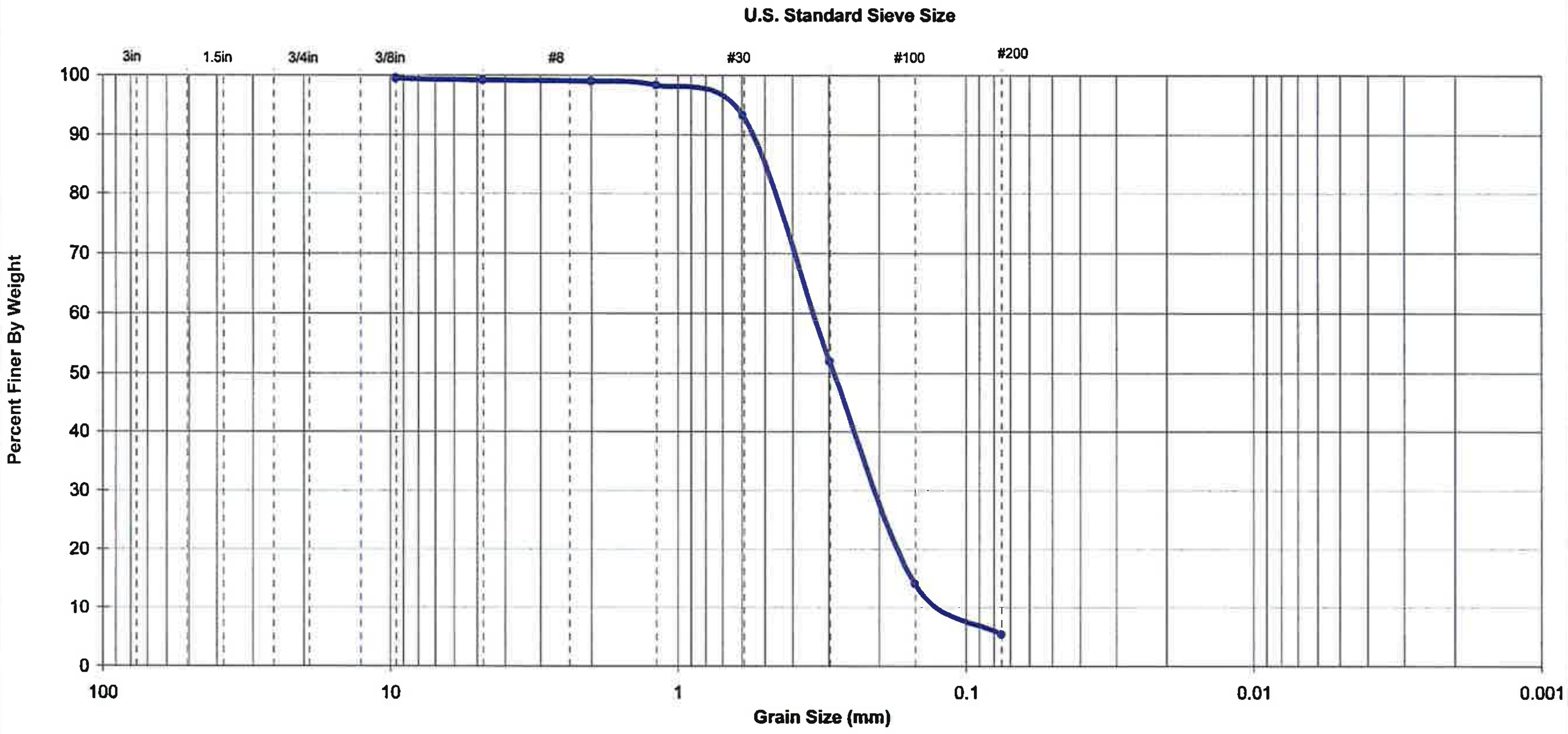

GRAIN SIZE ANALYSIS - ASTM D 422



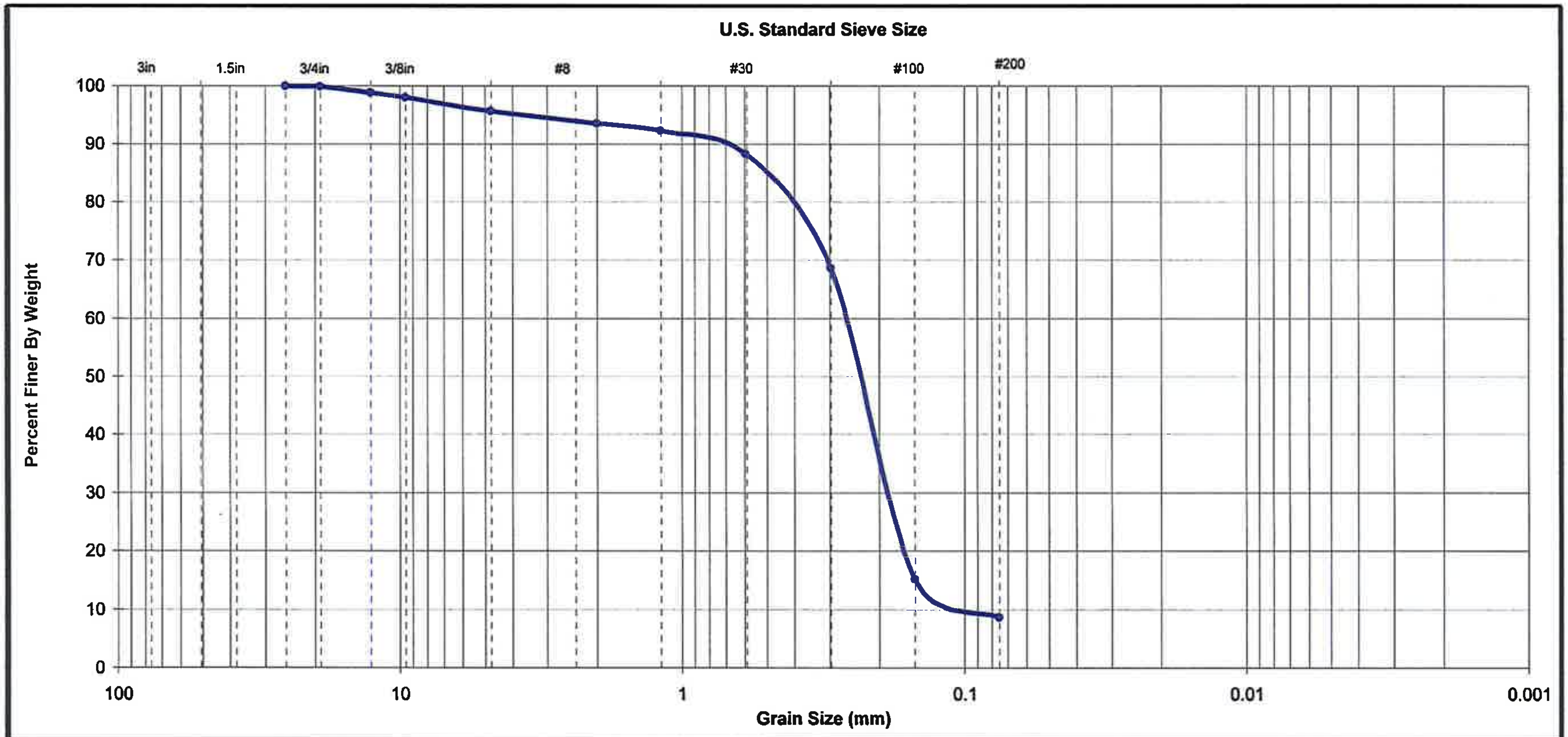
Boring / Sample No.	Initial Dry Density (pcf)	Initial Moist. (%)	Test Dry Density (pcf)	Test Moist. (%)	Percent Passing No. 200 Sieve	LL	PL	PI	Unified Soil Class.	Description
B-1 @ 0-1'					11.2				SW-SM	Well-graded sand

GRAIN SIZE ANALYSIS - ASTM D 422



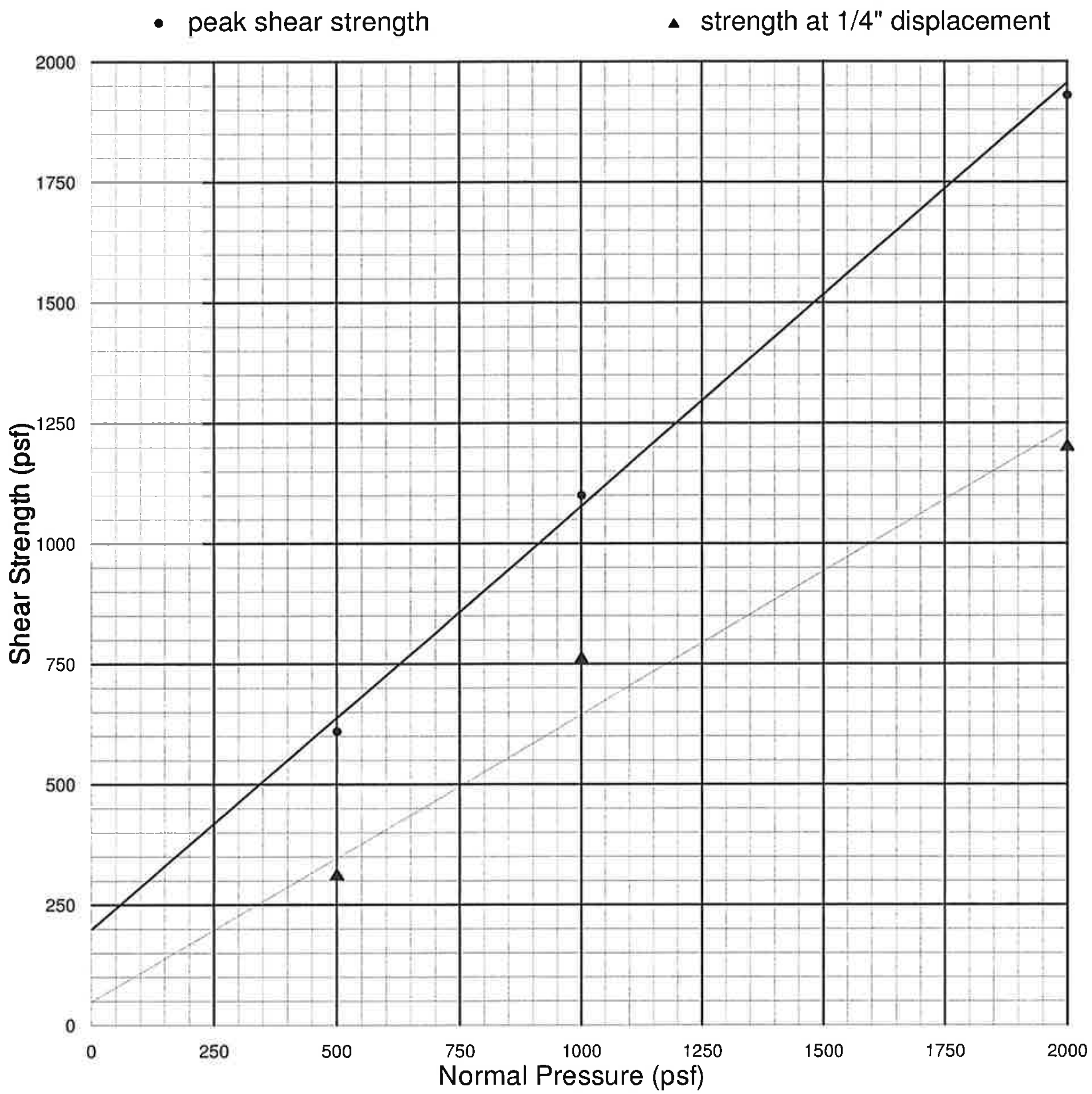
Boring / Sample No.	Initial Dry Density (pcf)	Initial Moist. (%)	Test Dry Density (pcf)	Test Moist. (%)	Percent Passing No. 200 Sieve	LL	PL	PI	Unified Soil Class.	Description
B-2 @ 0-1'					5.4				SW-SM	Well-graded sand

GRAIN SIZE ANALYSIS - ASTM D 422



Boring / Sample No.	Initial Dry Density (pcf)	Initial Moist. (%)	Test Dry Density (pcf)	Test Moist. (%)	Percent Passing No. 200 Sieve	LL	PL	PI	Unified Soil Class.	Description
B-3 @ 0-1'					8.7				SW-SM	Well-graded sand

DIRECT SHEAR TEST - ASTM D-3080

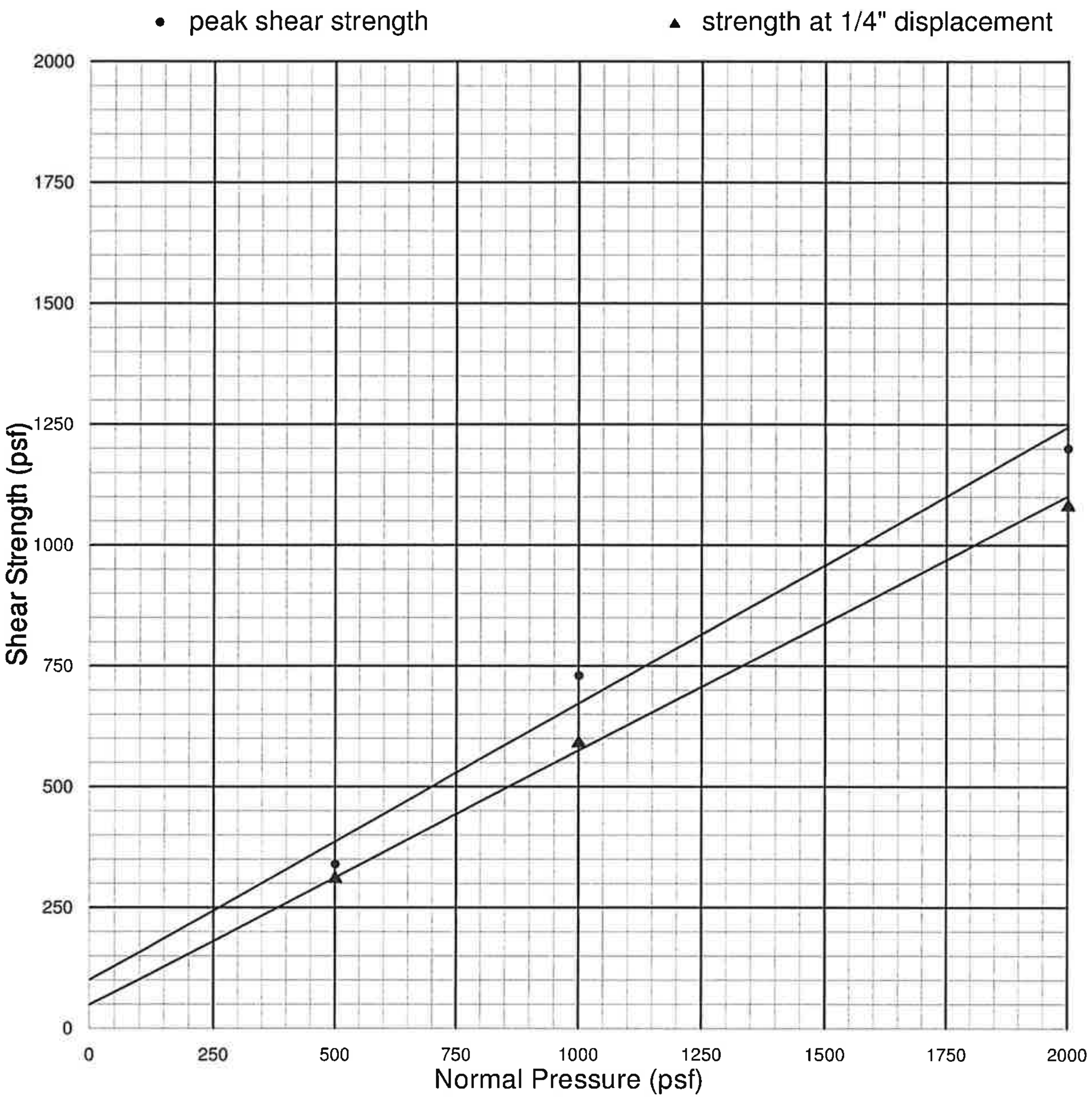


Strain Rate: 0.0042 in. / min.

Sample	Type	Description	Dry Density (pcf)	Initial W.C (%)	Final W.C. (%)
B1@ 0-1'	Remolded & Saturated	Silty Sand w. trace Clay	118.4	8.5	14.8

Normal Pressure (psf)	Peak Shear Strength (psf)	Ultimate Shear Strength (psf)
500	610 @ 0.0400"	310
1000	1100 @ 0.0350"	760
2000	1930 @ 0.0550"	1200
	C = 200 psf	C = 50 psf
	ϕ = 42 deg.	ϕ = 31 deg.

DIRECT SHEAR TEST - ASTM D-3080

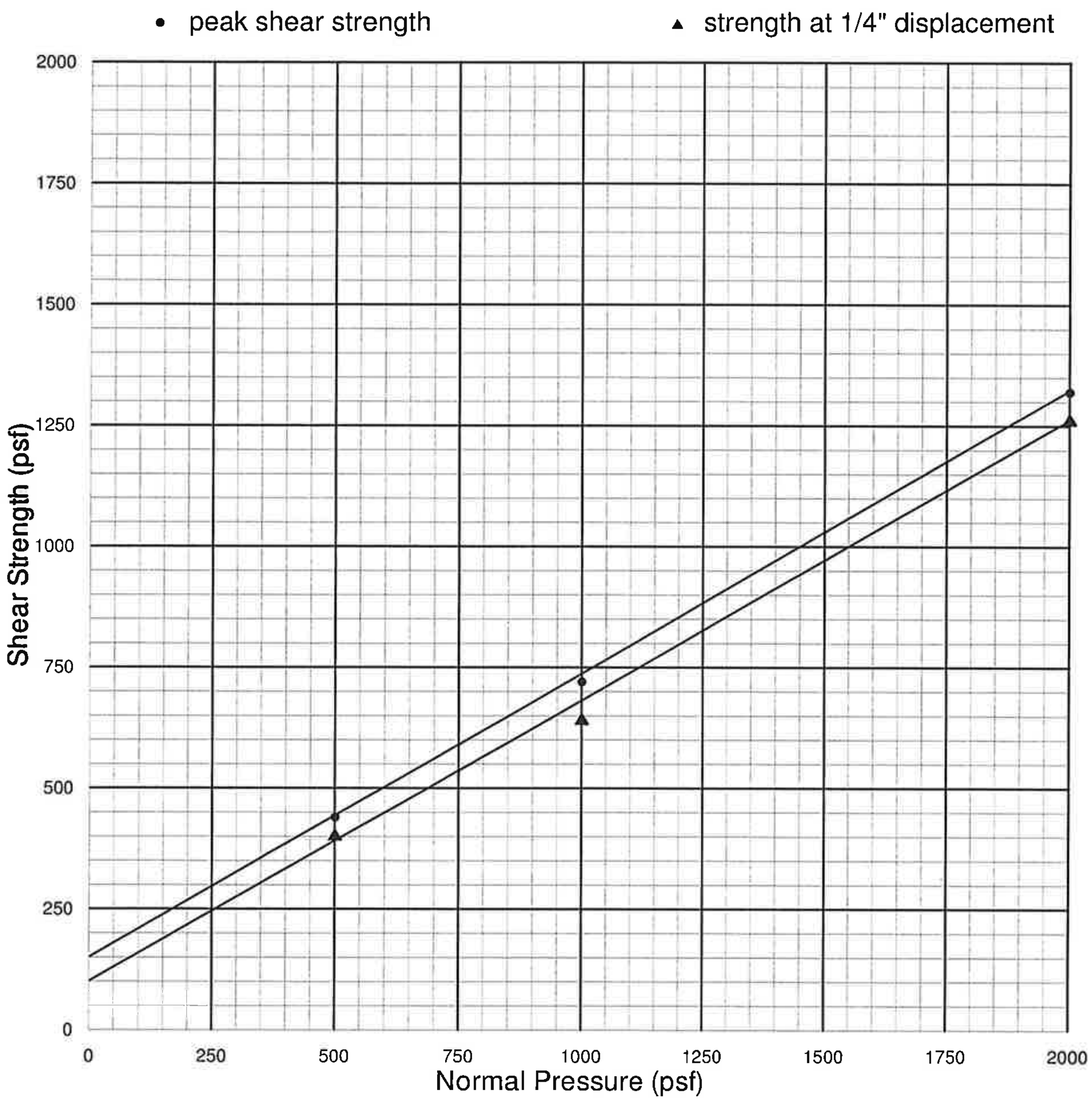


Strain Rate: 0.0042 in. / min.

Sample	Type	Description	Dry Density (pcf)	Initial W.C (%)	Final W.C. (%)
B2@ 0-1'	Remolded & Saturated	F.M. Sand	101.7	13.5	17.3

Normal Pressure (psf)	Peak Shear Strength (psf)	Ultimate Shear Strength (psf)
500	340 @ 0.0550"	310
1000	730 @ 0.0350"	590
2000	1200 @ 0.0650"	1080
	C = 100 psf	C = 50 psf
	ϕ = 30 deg.	ϕ = 28 deg.

DIRECT SHEAR TEST - ASTM D-3080



Strain Rate: 0.0042 in. / min.

Sample	**Type**	**Description**	**Dry Density (pcf)**	**Initial W.C (%)**	**Final W.C. (%)**
B3@ 0-1'	Remolded & Saturated	F.M. Sand	103.1	13.0	19.0

Normal Pressure (psf)	Peak Shear Strength (psf)	Ultimate Shear Strength (psf)
500	440 @ 0.0700"	400
1000	720 @ 0.0350"	640
2000	1320 @ 0.0750"	1260
	C = 150 psf	C = 100 psf
	ϕ = 30 deg.	ϕ = 30 deg.

MAXIMUM DENSITY TEST ASTM D1557

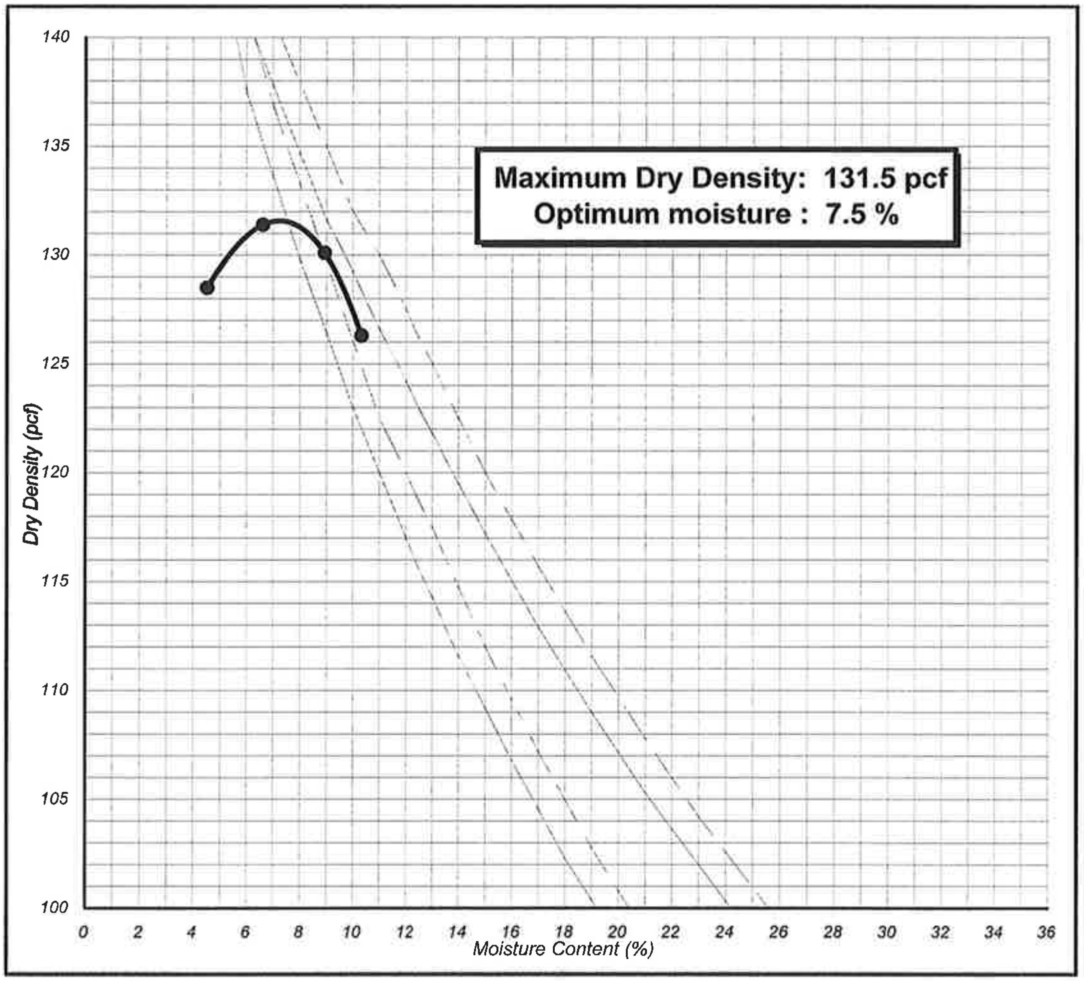
Job Name Picacho LF Closure **Date:** 8/25/2010

Job No. 2010-0045 **By:** LD

Boring/Sample No. B-1 @ 0-1'

Description: Orange Brown, F.C. Silty Sand w. Gravel & trace Clay

Method: C	Mold Volume (cf): **0.0750**	Blows: **56**	Layers: **5**	
Specimen	A	B	C	D	E
Total Wet Weight (lbs)	**17.22**	**17.04**	**17.10**	**16.66**	
Weight of Mold (lbs)	6.59	6.59	6.59	6.59	
Wet Weight of Soil (lbs)	10.63	10.45	10.51	10.07	
Wet Density (pcf)	141.7	139.3	140.1	134.3	
Moisture Can No.					
Dry Weight					
Moisture Content (%)	**8.9**	**10.3**	**6.6**	**4.5**	
Dry Density (pcf)	130.1	126.3	131.4	128.5	

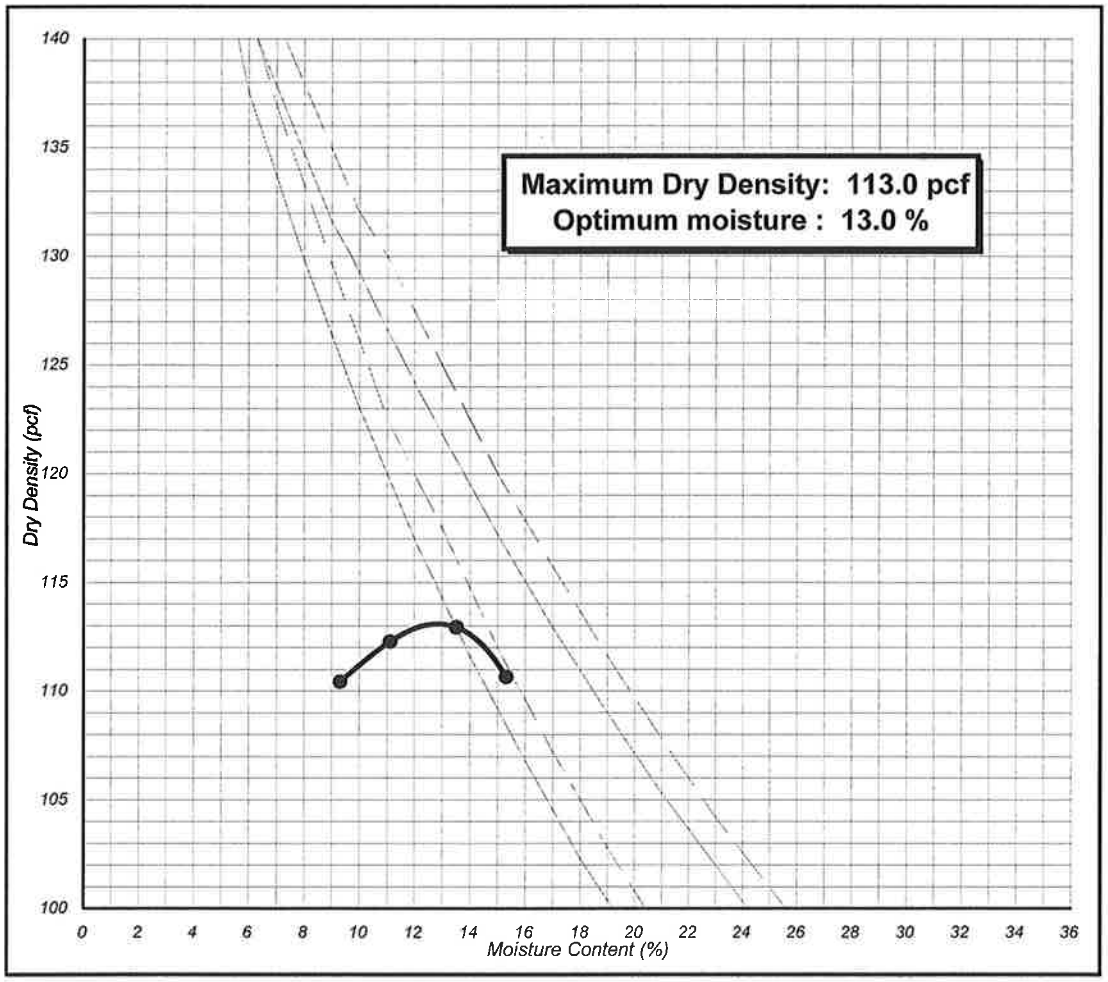


GeoLogic Associates

MAXIMUM DENSITY TEST ASTM D1557

Job Name	Picacho LF	**Date:**	8/26/2010
Job No.	2010-0045	**By:**	LD
Boring/Sample No.	B-2 @ 0-1'		
Description:	L. Brown, F.M. Sand		

Method: **A**	Mold Volume (cf): **0.0333**		Blows: **25**	Layers: **5**	
Specimen	A	B	C	D	E
Total Wet Weight (lbs)	**8.21**	**8.19**	**8.10**	**7.96**	
Weight of Mold (lbs)	3.94	3.94	3.94	3.94	
Wet Weight of Soil (lbs)	4.27	4.25	4.16	4.02	
Wet Density (pcf)	128.2	127.6	124.7	120.7	
Moisture Can No.					
Dry Weight					
Moisture Content (%)	**13.5**	**15.3**	**11.1**	**9.3**	
Dry Density (pcf)	112.9	110.7	112.3	110.4	



GeoLogic Associates

MAXIMUM DENSITY TEST ASTM D1557

Job Name Picacho LF

Job No. 2010-0045

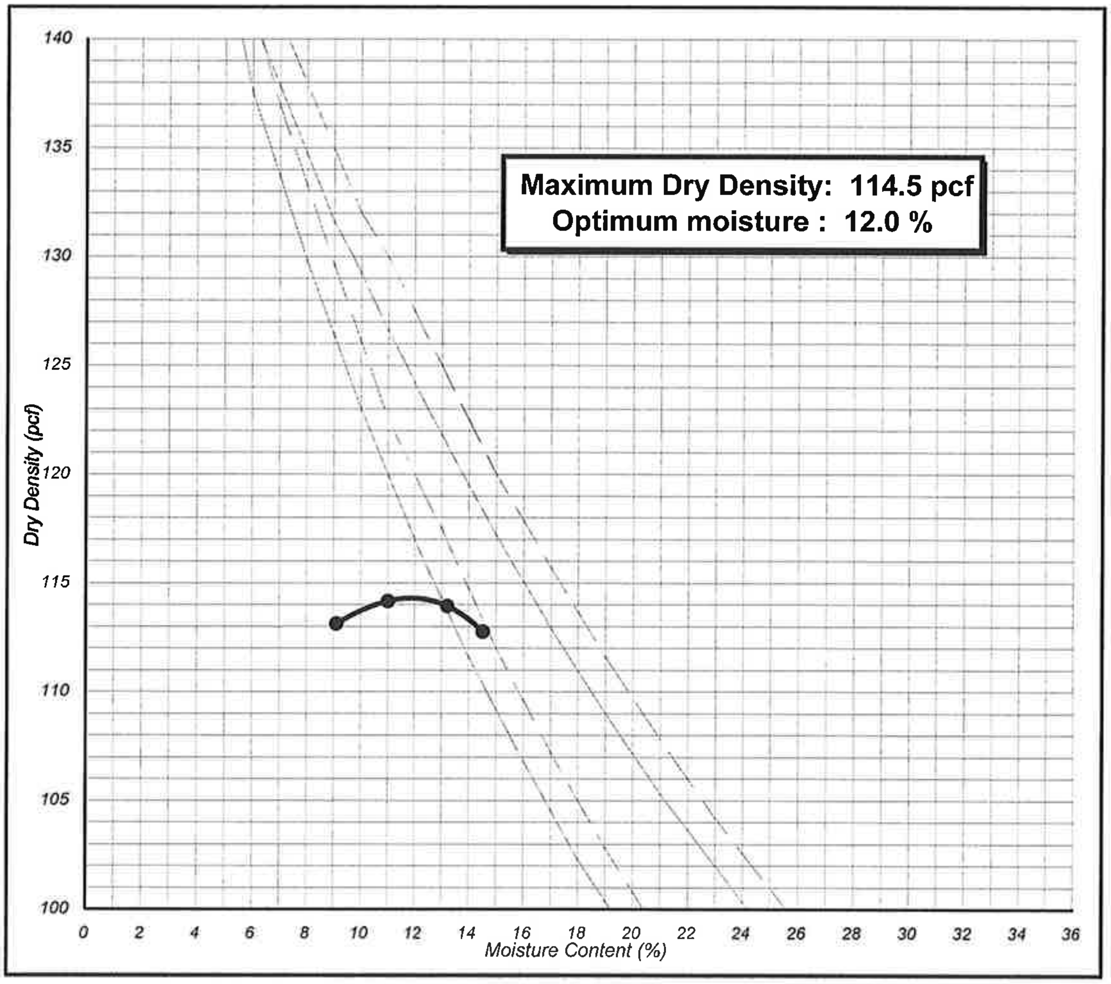
Boring/Sample No. B-3 @ 0-1'

Description: L. Brown, F.M. Sand w. F. Gravel

Date: 8/26/2010

By: LD

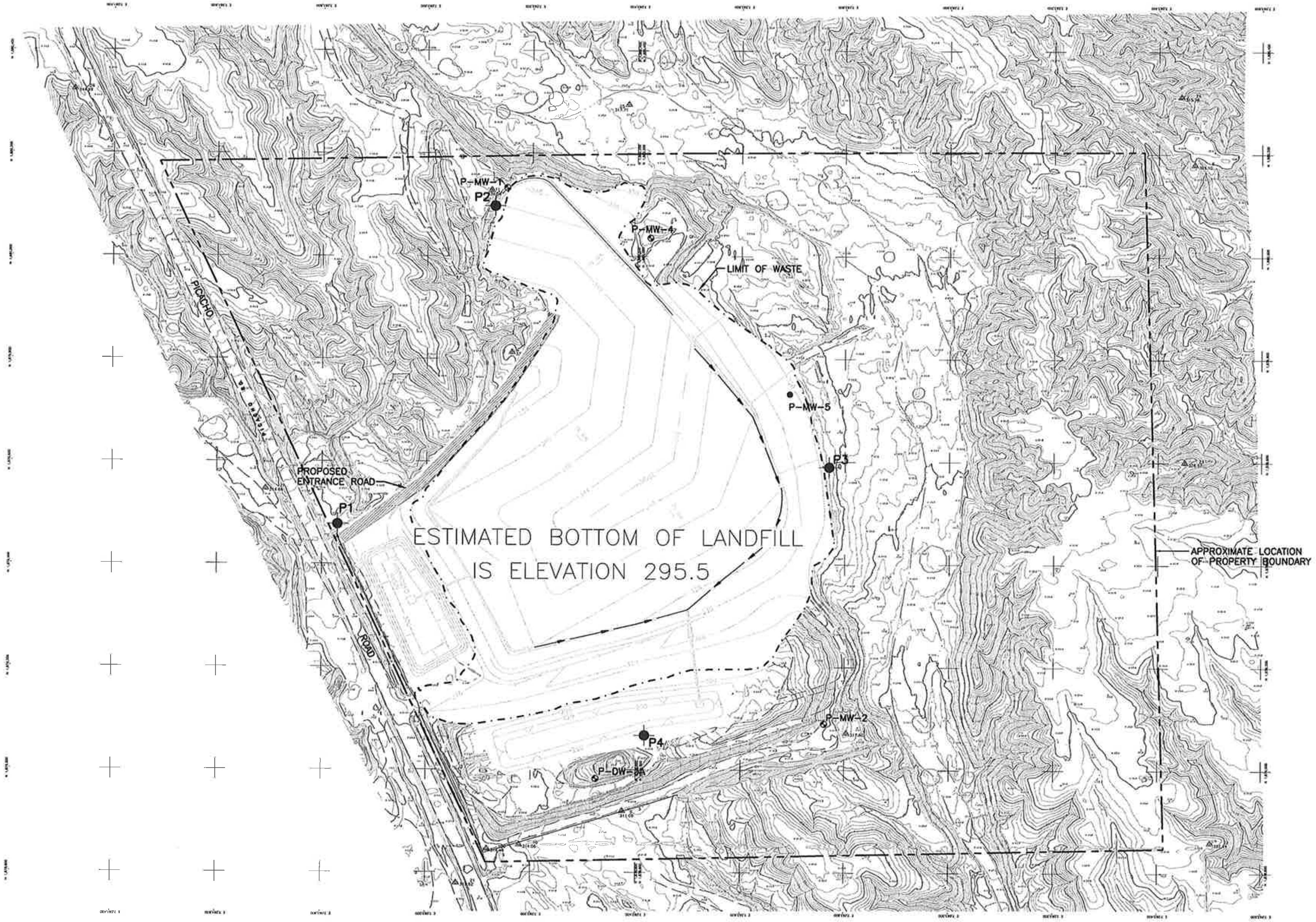
Method: B	Mold Volume (cf): **0.0333**	Blows: **25**		Layers: **5**	
Specimen	A	B	C	D	E
Total Wet Weight (lbs)	**8.16**	**8.24**	**8.24**	**8.05**	
Weight of Mold (lbs)	3.94	3.94	3.94	3.94	
Wet Weight of Soil (lbs)	4.22	4.30	4.30	4.11	
Wet Density (pcf)	126.7	129.0	129.1	123.4	
Moisture Can No.					
Dry Weight					
Moisture Content (%)	**11.0**	**13.2**	**14.5**	**9.1**	
Dry Density (pcf)	114.2	113.9	112.8	113.1	

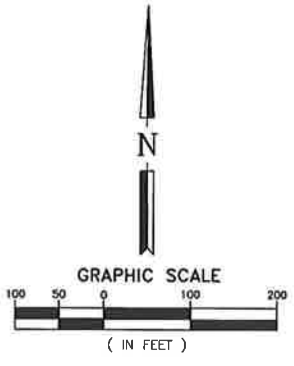


GeoLogic Associates

APPENDIX J

LANDFILL GAS MIGRATION MONITORING PROBE PLAN
(PROPOSED)





LEGEND

- —·—·— APPROXIMATE LIMIT OF WASTE
- —··—··— APPROXIMATE LOCATION OF PROPERTY BOUNDARY
- —— 320 —— EXISTING INDEX CONTOURS
- ⊗ GROUNDWATER MONITORING WELL
- ⊕ PROPOSED GAS MIGRATION MONITORING PROBE

DISTANCE BETWEEN LFG PERIMETER PROBES ALONG COMPLIANCE BOUNDARY

PROBES	FEET
P1–P2	916
P2–P3	918
P3–P4	914
P4–P1	951

NOTE:

PROBE DEPTHS, SHOWN IN THE PROBE SCHEDULE, HAVE BEEN COMPUTED BASED ON THE JULY 2006 AERIAL PHOTOGRAPH, PREPARED BY ANALYTICAL PHOTOMETRIC SURVEYS, INC. AND GRADE ELEVATION SHOWN ON THE JULY 2006 AERIAL TOPO. PROBE DESIGN IS TO BE VERIFIED AND MAY BE MODIFIED BASED ON THE ACTUAL FIELD CONDITIONS ENCOUNTERED DURING DRILLING.

TITLE-27 PROBE SCHEDULE

PROBE ID	GRADE ELEV. (FEET)	BTM OF L.F. ELEV. (FEET)	"A" CASING DEPTH			"B" CASING DEPTH			"C" CASING DEPTH			BORING DEPTH (FEET)
			SOLID (FEET)	PERF (FEET)	TOTAL (FEET)	SOLID (FEET)	PERF (FEET)	TOTAL (FEET)	SOLID (FEET)	PERF (FEET)	TOTAL (FEET)	
P1	319.0	295.5	6.0	17.5	23.5	16.0	7.5	23.5	–	–	–	23.5
P2	344.0	295.5	6.0	14.0	20.0	25.0	23.5	48.5	30.0	18.5	48.5	48.5
P3	311.0	295.5	6.0	9.5	15.5	–	–	–	–	–	–	15.5
P4	296.3	295.5	6.0	5.0	11.0	–	–	–	–	–	–	11.0
											DRILLING TOTAL (VF)	98.5

BASED ON AERIAL PHOTOGRAPHY PERFORMED ON JULY 12, 2006.

DATE OF TOPOGRAPHY: JULY 12, 2006

Sym	Descrip	Date	Apd

Revisions

COUNTY OF IMPERIAL
DEPARTMENT OF PUBLIC WORKS
155 SOUTH 11TH ST
EL CENTRO, CALIFORNIA, 92243-2853
Phone: (619) 339-4462

BAS
BRYAN A. STIRRAT & ASSOCIATES
CIVIL AND ENVIRONMENTAL ENGINEERS
1360 VALLEY VISTA DRIVE
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Design -- Drawn -- File 86568DB
Chkd ____ Appd ____ Date 12-14-07

PICACHO CUT AND FILL SITE

LFG PERIMETER MONITORING PROBE LOCATIONS

Sheet 1 of 1
Rev

ICDPW
Public Works works for the Public

COUNTY OF
IMPERIAL

DEPARTMENT OF
PUBLIC WORKS

155 S. 11th Street
El Centro, CA
92243

Tel: (760) 482-4462
Fax: (760) 352-1272

October 27, 2010

Ms. Heather White
Supervisor, Tribal Solid Waste Team
Office of Pollution and Solid Waste
U. S. EPA, Region 9
75 Hawthorne Street (WST-7)
San Francisco, CA 94105

SUBJECT: Picacho Solid Waste Site Final Closure and Post Closure Maintenance Plan (FCPCMP) and Pesticide Pit Plan

Dear Ms. White:

Enclosed for your use are a Final Closure and Post Closure Maintenance Plan (FCPCMP) and Pesticide Pit Plan for the Picacho Solid Waste Site. Copies are also being provided to Bureau of Indian Affairs, and the Federal U. S. Environmental Protection Agency.

These documents have been revised by Bryan A. Stirrat and Associates to include comments by USEPA, CIWMB, RWQCB, LEA, Brenda Tomaras, and SECOR International, the Tribe's consultant.

Should you have any questions please feel free to contact Jose Castaneda, Administrative Analyst of this office. Thank you.

Regards,

William S. Brunet, P. E.
Director of Public Works

BY:

Frank Fiorenza
Deputy Director of Public Works – Engineering

Attachment

Jc/ga

ICDPW

Public Works works for the Public

COUNTY OF
IMPERIAL

DEPARTMENT OF
PUBLIC WORKS

155 S. 11th Street
El Centro, CA
92243

Tel: (760) 482-4462
Fax: (760) 352-1272

October 27, 2010

Mr. John Krause
Bureau of Indian Affairs
Western Regional Office
2600 N. Central Avenue
4th Floor Mailroom Mail Code 620EM
Phoenix, AZ 85004

SUBJECT: Picacho Solid Waste Site Final Closure and Post Closure Maintenance Plan (FCPCMP) and Pesticide Pit Plan

Dear Mr. Krause:

Enclosed for your use are a Final Closure and Post Closure Maintenance Plan (FCPCMP) and Pesticide Pit Plan for the Picacho Solid Waste Site. Copies are also being provided to Bureau of Indian Affairs, and the Federal U. S. Environmental Protection Agency.

These documents have been revised by Bryan A. Stirrat and Associates to include comments by USEPA, CIWMB, RWQCB, LEA, Brenda Tomaras, and SECOR International, the Tribe's consultant.

Should you have any questions please feel free to contact Jose Castaneda, Administrative Analyst of this office. Thank you.

Regards,

William S. Brunet, P. E.
Director of Public Works

BY:

Frank Fiorenza
Deputy Director of Public Works – Engineering

Attachment

Jc/ga

P:\FINALS\Letter Quechan Tribe Picacho FCPCMP(approved wsb).doc

ICDPW

Public Works works for the Public

COUNTY OF IMPERIAL

DEPARTMENT OF PUBLIC WORKS

155 S. 11th Street
El Centro, CA
92243

Tel: (760) 482-4462
Fax: (760) 352-1272

October 27, 2010

Mike Jackson, Sr.
President
Quechan Tribe
350 Picacho Road
Winterhaven, CA 92283

SUBJECT: Picacho Solid Waste Site Final Closure and Post Closure Maintenance Plan (FCPCMP) and Pesticide Pit Plan

Dear Mr. Jackson:

Enclosed for your use are a Final Closure and Post Closure Maintenance Plan (FCPCMP) and Pesticide Pit Plan for the Picacho Solid Waste Site. Copies are also being provided to Bureau of Indian Affairs, and the Federal U. S. Environmental Protection Agency.

These documents have been revised by Bryan A. Stirrat and Associates to include comments by USEPA, CIWMB, RWQCB, LEA, Brenda Tomaras, and SECOR International, the Tribe's consultant.

Should you have any questions please feel free to contact Jose Castaneda, Administrative Analyst of this office. Thank you.

Regards,

William S. Brunet, P. E.
Director of Public Works

BY:

Frank Fiorenza
Deputy Director of Public Works – Engineering

Attachment

Jc/ga

Public Works works for the Public

COUNTY OF
IMPERIAL

DEPARTMENT OF
PUBLIC WORKS

55 S. 11th Street
El Centro, CA
92243

l: (760) 482-4462
x: (760) 352-1272

May 4, 2012

Mr. Lars Seifert, REHS
Imperial County
Division of Environmental Health
Local Enforcement Agency (LEA)
797 Main Street, Suite B
El Centro, CA 92243

SUBJECT: Submittal of the Picacho Cut and Fill Site Final Closure Post Closure Maintenance Report; County Project No. 4547W

Dear Mr. Seifert,

The Imperial County Department of Public Works (ICDPW) is pleased to submit one (1) copy of the Final Closure/Post-Closure Maintenance Plan (FCPCMP) (Revision 2: October 2010) for the Picacho Cut and Fill Site (PCFS). The FCPCMP is one (1) volume. Volume I contains Text, Tables, Figures, Drawings, and Appendix's "A-J". The most recent Inspection Report is included, along with the approval resolution from the Quechan Tribe.

Should you have any questions, please do not hesitate to contact Jose Castaneda, Administrative Analyst II of this Department.

Respectfully,

William S. Brunet, PE
Director of Public Works

BY:
John Gay

John Gay, P.E.
Deputy Director of Public Works- Engineering

Av/dm

Attachment

IMPERIAL COUNTY

MAY 04 2012

ENVIRONMENTAL
HEALTH

Exhibit F – Regulatory Agency Approval of the Final Closure Post Closure Maintenance Plan

TOMARAS & OGAS, LLP

10755-F SCRIPPS POWAY PARKWAY #281 • SAN DIEGO, CALIFORNIA 92131
TELEPHONE (858) 554-0550 • FACSIMILE (858) 777-5765 • WWW.MTOWLAW.COM

Kathryn A. Ogas
Brenda L. Tomaras

kogas@mtowlaw.com
btomaras@mtowlaw.com

April 30, 2012

Mr. Jared Blumenfeld
Regional Administrator
United States Environmental Protection Agency
Region IX; 75 Hawthorne Street
San Francisco, CA 94105

Re: Site Flexibility Waiver for the Closure of the Picacho Landfill on the Quechan Indian Reservation

Dear Mr. Blumenfeld:

The County of Imperial and the Quechan Indian Tribe have spent nearly twenty years working on developing an appropriate and sufficient closure plan for the closure of the Picacho Landfill which the County has operated on the Quechan Indian Reservation for nearly forty years.

In the course of working with the County to devise an appropriate plan, the Tribe requested the technical assistance of the Bureau of Indian Affairs (BIA) and the Environmental Protection Agency (EPA). Staff for both the BIA and EPA have reviewed and advised the Tribe on both the Closure Plan and the two items requiring a site flexibility waiver: the final cover and the water monitoring plan.

Pursuant to the enclosed resolution, the Tribal Council has approved the Final Closure Plan for the Picacho Landfill and requests the EPA to move forward on the issuance of the site flexibility waivers.

Should you have any questions, please do not hesitate to contact me.

Very truly yours,

TOMARAS & OGAS, LLP

Brenda L. Tomaras

Brenda L. Tomaras
Attorneys for the Quechan Indian Nation

QUECHAN INDIAN TRIBE
Ft. Yuma Indian Reservation

P.O. Box 1899
Yuma, Arizona 85366-1899
Phone (760) 572-0213
Fax (760) 572-2102

RESOLUTION

R-259-11

A RESOLUTION TO APPROVE AND ADOPT THE FINAL CLOSURE/POST-CLOSURE MAINTENANCE PLAN FOR THE PICACHO LANDFILL

WHEREAS: THE QUECHAN INDIAN TRIBE OF THE FORT YUMA INDIAN RESERVATION IS A FEDERALLY-RECOGNIZED INDIAN TRIBE ORGANIZED UNDER A CONSTITUTION AND BYLAWS RATIFIED BY THE TRIBE ON NOVEMBER 28, 1936, AND APPROVED BY THE SECRETARY OF THE INTERIOR ON DECEMBER 18, 1936, WITH REVISED AMENDMENTS APPROVED ON NOVEMBER 18, 1974, AND MAY 21, 1997; AND

WHEREAS: THE TRIBAL COUNCIL IS THE GOVERNING BODY OF THE TRIBE PURSUANT TO THE TRIBE'S INHERENT AUTHORITY AND ARTICLE IV OF THE TRIBE'S CONSTITUTION AND BY-LAWS AND HAS ALL THE LEGISLATIVE POWERS AND RESPONSIBILITIES OF THE TRIBE'S GOVERNMENT; AND

WHEREAS: THE PICACHO LANDFILL WAS AN ONGOING OPERATION AT THE TIME THE LAND ENCOMPASSING THE LANDFILL WAS TAKEN INTO TRUST FOR THE TRIBE BY THE UNITED STATES GOVERNMENT; AND

WHEREAS: ACCORDING TO DISCUSSIONS WITH THE DEPARTMENT OF INTERIOR, THE PICACHO LANDFILL HAS BEEN IN OPERATION IN ONE FORM OR ANOTHER SINCE APPROXIMATELY THE 1940S; AND

WHEREAS: FROM AROUND 1977 FORWARD, THE COUNTY OPERATED THE LANDFILL ON TRIBAL LANDS PURSUANT TO A LEASE FOR $1.00 PER YEAR FOR 50 ACRES NEGOTIATED AND APPROVED BY THE DEPARTMENT OF INTERIOR, BUREAU OF INDIAN AFFAIRS ("BIA"); AND

WHEREAS: SAID LEASE EXPIRED IN 1995 AND WAS NEVER RENEWED BY THE COUNTY AND BUREAU OF INDIAN AFFAIRS; AND

WHEREAS: THE COUNTY INITIATED PLANS TO CLOSE THE PICACHO LANDFILL AS OF 1995 AND THE TRIBE, COUNTY, STATE AND FEDERAL AUTHORITIES HAVE CONTINUOUSLY MET AND NEGOTIATED A CLOSURE PLAN SINCE THAT TIME; AND

WHEREAS: THE TRIBE REQUESTED TECHNICAL ASSISTANCE FROM THE BIA AND THE UNITED STATES ENVIRONMENTAL PROTECTION AGENCY ("EPA") TO ASSURE THAT ON-GOING REVISIONS TO THE CLOSURE PLAN WOULD PROVIDE FOR AN ADEQUATE CLOSURE AND PROTECT THE TRIBE, ITS PROPERTY AND ITS PEOPLE; AND

WHEREAS: THE PICACHO CUT AND FILL SITE FINAL CLOSURE/POST CLOSURE PLAN AS DATED JUNE 2009, FURTHER REVISED ON OCTOBER 27, 2010 AND FURTHER AMENDED BY EPA COMMENTS ON THE CLOSURE PLAN DATED FEBRUARY 10, 2011 HAS BEEN REVIEWED AND SUPPORTED BY THE BIA AND EPA TECHNICAL EXPERTS; AND

WHEREAS: IN ADDITION TO THE CLOSURE PLAN, THE COUNTY'S CONSULTANTS DEVELOPED A PLAN TO TEST THE PESTICIDE PIT AT THE LANDFILL TO PROVIDE ASSURANCES THAT IT WILL NOT POSE A DANGER TO THE TRIBE, ITS PROPERTY OR ITS PEOPLE; AND

WHEREAS: THE BIA AND EPA AGAIN PROVIDED TECHNICAL ASSISTANCE IN REVIEWING THE PROPOSED PESTICIDE PIT TEST PLAN AND SUPPORT THE VERSION ISSUED JULY 30, 2009; AND

WHEREAS: THE TRIBE DESIRES A CLEAN, COMPREHENSIVE, AND SUSTAINABLE CLOSURE OF THE PICACHO LANDFILL.

NOW, THEREFORE BE IT RESOLVED: THAT BASED UPON THE RECOMMENDATION OF ITS TECHNICAL EXPERTS, THE QUECHAN INDIAN TRIBE OF THE FORT YUMA INDIAN RESERVATION THROUGH ITS TRIBAL COUNCIL APPROVES THE PICACHO LANDFILL FINAL CLOSURE/POST-CLOSURE MAINTENANCE PLAN DATED JUNE 2009, FURTHER REVISED OCTOBER 27, 2010 AND AMENDED ON FEBRUARY 10, 2011; AND

BE IT FURTHER RESOLVED: THAT BASED UPON THE RECOMMENDATION OF ITS TECHNICAL EXPERTS, THE QUECHAN INDIAN TRIBE OF THE FORT YUMA INDIAN RESERVATION THROUGH ITS TRIBAL COUNCIL APPROVES THE PICACHO PESTICIDE PIT TESTING PLAN ISSUED JULY 30, 2009; AND

BE IT FURTHER RESOLVED: THAT THE TRIBAL COUNCIL INTENDS TO SUBMIT THE NECESSARY REQUESTS TO THE EPA FOR SITE FLEXIBILITY WAIVERS AS REQUIRED BY THE APPROVED PLAN; AND

BE IT FINALLY RESOLVED: THAT THE TRIBAL COUNCIL INTENDS TO PURSUE ANY OTHER AGREEMENTS NECESSARY TO ASSURE THAT THE TRIBE IS SATISFIED WITH THE POST-CLOSURE MAINTENANCE OF THE LANDFILL.

CERTIFICATION

THIS FOREGOING RESOLUTION WAS PRESENTED AT A **SPECIAL COUNCIL MEETING** OF THE QUECHAN TRIBAL COUNCIL WHICH CONVENED ON **DECEMBER 8, 2011**, DULY APPROVED BY A VOTE OF _5__ FOR, _0_ AGAINST, __0__ ABSTAINING, __1__ABSENT, BY THE TRIBAL COUNCIL OF THE QUECHAN TRIBE, PURSUANT TO THE AUTHORITY VESTED IN IT BY SECTION 16 OF THE REORGANIZATION ACT OF JUNE 18, 1934 (48 STAT. 984) AS AMENDED BY THE ACT OF JUNE 15, 1935 (49 STAT. 378) AND ARTICLE IV OF THE QUECHAN TRIBAL CONSTITUTION AND BY-LAWS. THIS RESOLUTION IS EFFECTIVE AS OF THE DATE OF ITS APPROVAL.

QUECHAN INDIAN TRIBE
BY:

KEENY ESCALANTI, SR., PRESIDENT
QUECHAN TRIBAL COUNCIL

ROSEANA WILLIAMS, INTERIM SECRETARY
QUECHAN TRIBAL COUNCIL

regulations.gov
Your Voice in Federal Decision-Making

Site-Specific Flexibility for Closure and Monitoring of Picacho Landfill: Final Determination to Approve

This Rule document was issued by the **Environmental Protection Agency** (EPA)

For related information, **Open Docket Folder**

Action

Final rule.

Summary

The Environmental Protection Agency, Region IX, is making a final determination to approve two Site-Specific Flexibility Requests (SSFRs) from Imperial County (County or Imperial County) to close and monitor the Picacho Solid Waste Landfill (Picacho Landfill or Landfill). The Picacho Landfill is a commercial municipal solid waste landfill (MSWLF) operated by Imperial County from 1977 to the present on the Quechan Indian Tribe of the Fort Yuma Indian Reservation in California.

EPA is promulgating a site-specific rule proposed on April 7, 2016, that approves an alternative final cover and a modification to the prescribed list of groundwater detection-monitoring parameters for ongoing monitoring for the Picacho Landfill.

Dates

This final rule is effective on October 6, 2016.

Addresses

EPA has established a docket for this action under Docket ID No. EPA-R09-RCRA-2015-0445. All documents in the docket are listed in the *http://www.regulations.gov* index. Publicly available docket materials are available electronically in *http://www.regulations.gov* and in hard copy at the EPA Library, located at the Environmental Protection Agency, Region IX, 75 Hawthorne Street, San Francisco, California. The EPA Library is open from 9:00 a.m. to 4:00 p.m., Monday through Thursday, excluding legal holidays, and is located in a secured building. To review docket materials at the EPA Library, it is recommended that the public make an appointment by calling (415) 947-4406 during normal business hours. Copying arrangements will be made through the EPA Library and billed directly to the recipient. Copying costs may be waived depending on the total number of pages copied.

For Further Information Contact

Steve Wall, Land Division, Mail Code LND 2-3 U.S. Environmental Protection Agency, 75 Hawthorne Street, San Francisco, CA 94105-3901;

Comment Period Closed

ID: EPA-R09-RCRA-2015-0445-0019

View original printed format: PDF

Document Information

Date Posted:
Oct 6, 2016

RIN:
Not Assigned

CFR:
40 CFR Part 258

Federal Register Number:
2016-23839

Show More Details

Comments

0
Comments Received *

Docket Information

This document is contained in
EPA-R09-RCRA-2015-0445

Related Dockets:
None

Related RINs:
None

Related Documents:
- Courtesy Notice Public Meeting Canceled
- Tentative Determination to Approve Site Specific Flexibility...

telephone number: (415) 972-3381; fax number: (415) 947-3564; email address: *wall.steve@epa.gov.*

Supplementary Information

I. What did EPA propose?

After completing a review of Imperial County's Picacho Landfill Final Closure/Post-Closure Maintenance Plan and the associated SSFRs, EPA proposed this rulemaking in the Federal Register. The proposed determination was published at 81 FR 20274, April 7, 2016. EPA proposed to approve an alternative final cover that varies from the final closure requirements of 40 CFR 258.60(a) but meets the criteria at 40 CFR 258.60(b), and alternative groundwater detection monitoring parameters for post-closure monitoring in accordance with 40 CFR 258.54(a).

II. Legal Authority for This Action

Under sections 1008, 2002, 4004, and 4010 of the Resource Conservation and Recovery Act of 1976 (RCRA) as amended by the Hazardous and Solid Waste Amendments of 1984 (HSWA), 42 U.S.C. 6901 *et seq.,* Congress required EPA to establish revised minimum federal criteria for MSWLFs, including landfill location restrictions, operating standards, design standards, and requirements for ground water monitoring, corrective action, closure and post-closure care, and financial assurance. Under RCRA section 4005, states are to develop permit programs for facilities that may receive household hazardous waste or waste from conditionally exempt small quantity generators of hazardous waste, and EPA is to determine whether the state's program is adequate to ensure that such facilities will comply with the revised federal criteria.

The MSWLF criteria are set forth in the Code of Federal Regulations at 40 CFR part 258. These regulations are prescriptive, self-implementing and apply directly to owners and operators of MSWLFs. Many of these criteria include a flexible performance standard as an alternative to the prescriptive, self-implementing regulation. The flexible standard is not self-implementing, and requires approval by the Director of an EPA-approved state MSWLF permitting program. However, EPA's approval of a state program generally does not extend to Indian Country because states generally do not have authority over Indian Country. For this reason, owners and operators of MSWLF units located in Indian Country cannot take advantage of the flexibilities available to those facilities that are within the jurisdiction of an EPA-approved state program. However, the EPA has the authority under sections 2002, 4004, and 4010 of RCRA to promulgate site-specific rules to enable such owners and operators to use the flexible standards. See *Yankton Sioux Tribe* v. *EPA,* 950 F. Supp. 1471 (D.S.D. 1996); *Backcountry Against Dumps* v. *EPA,* 100 F.3d 147 (D.C. Cir. 1996). EPA refers to such rules as “Site-Specific Flexibility Determinations.” EPA has developed guidance for owners and operators on preparing a request for such a site-specific rule, entitled “Site-Specific Flexibility Requests for Municipal Solid Waste Landfills in Indian Country, Draft Guidance,” EPA530-R-97-016 (August 1997) (Draft Guidance).

III. Background

The Picacho Landfill is located on Quechan tribal lands on the Fort Yuma Indian Reservation approximately four miles north-northeast of the community of Winterhaven, in Imperial County, California. The Picacho Landfill is a commercial MSWLF operated by Imperial County from 1977 to the present. The landfill site is approximately 12.5 acres.

In January 2006, the Tribe requested that EPA provide comments on the County's closure plan. Between 2006 and 2011, EPA worked with the Tribe, the Bureau of Indian Affairs (BIA) and the County to develop the closure plan. During this time, EPA also reviewed the SSFRs to determine whether they met technical and regulatory requirements. On October 27, 2010, Imperial County submitted its Picacho Final Closure/Post-Closure Maintenance Plan. EPA provided a final round of comments on February 10, 2011, which Imperial County incorporated as an addendum. On April 30, 2012, the Tribe approved the Picacho Landfill Final Closure/Post-Closure Maintenance Plan as amended, and, pursuant to EPA's Draft Guidance, the Tribe forwarded to EPA two SSFRs that had been submitted by Imperial County to close and monitor the Picacho Landfill. The requests sought EPA approval to use an alternative final cover meeting the performance requirements of 40 CFR 258.60(a), and to modify the prescribed list of groundwater detection-monitoring parameters provided in 40 CFR 258.54(a)(1) and (2) for ongoing monitoring.

IV. Basis for Final Determination

EPA is basing its final determination to approve the site-specific flexibility requests on the Tribe's approval, dated April 30, 2012, EPA's independent review of the Picacho Landfill Final Closure/Post-Closure Maintenance Plan as amended, and the associated SSFRs.

A. Alternative Final Cover SSFR: Alternative Final Cover System

The regulations require the installation of a final cover system specified in 40 CFR 258.60(a), which consists of an infiltration layer with a minimum of 18 inches of compacted clay with a permeability of 1×10^{-5} cm/sec, covered by an erosion layer with a minimum six inches of topsoil. Imperial County sought approval for an alternative final cover designed to satisfy the performance criteria specified in 40 CFR 258.60(b); Imperial County proposed to replace this with an alternative cover consisting of two and a half feet of native soil to control infiltration covered by six inches of a soil gravel mixture to control erosion.

EPA is basing its final determination on a number of factors, including: (1) Research showing that prescriptive, self-implementing requirements for final covers, comprised of low permeability compacted clay, do not perform well in the arid west. The clay dries out and cracks, which allows increased infiltration along the cracks; (2) Research showing that in arid environments thick soil covers comprised of native soil can perform as well or better than the prescriptive cover; and (3) Imperial County's analysis demonstrates, based on site-specific climatic conditions and soil properties, that the proposed alternative soil final cover will achieve equivalent reduction in infiltration as the prescriptive cover design and that the proposed erosion layer provides equivalent protection from wind and water erosion. This analysis is provided in Appendix D and Appendix D-1 of the Picacho Landfill Final Closure/Post-Closure Maintenance Plan dated October 27, 2010 and amended by EPA's comments dated February 20, 2011.

B. Groundwater Monitoring SSFR: Alternative Detection Monitoring Parameters

The regulations require post-closure monitoring of 15 heavy metals, listed in 40 CFR part 258, Appendix I. Imperial County proposed to replace these, with the exception of arsenic, with the alternative inorganic indicator parameters chloride, nitrate as nitrogen, sulfate, and total dissolved solids.

EPA's final determination is based on the fact that the County has performed over 15 years of semi-annual groundwater monitoring at the site, and during that time arsenic was the only heavy metal detected at a value that slightly exceeded the federal maximum contaminant level (MCL), a standard used for drinking water.

V. Summary of Public Comments Received and Response to Comments

EPA received one anonymous public comment during the public comment period stating support for EPA's Tentative Determination to Approve Site-Specific Flexibility for Closure and Monitoring of the Picacho Landfill, as proposed in the Federal Register on April 7, 2016.

VI. Additional Findings

In order to comply with the National Historic Preservation Act, 54 U.S.C. 100101 *et seq.,* Imperial County Department of Public Works will coordinate with the Tribe to arrange for a qualified Native American monitor to be present during any work. If buried or previously unidentified resources are located during project activities, all work within the vicinity of the find will cease, and the provisions of 36 CFR 800.13(b) will be implemented. If, during the course of the Landfill closure activities, previously undocumented archaeological material or human remains are encountered, all work shall cease in the immediate area and a qualified archaeologist shall be retained to evaluate the significance of the find and recommend further management actions.

Though no known threatened or endangered species or their habitat exist on the site, in order to ensure compliance with the Endangered Species Act, 16 U.S.C. 1536 *et seq.,* a preconstruction survey will be conducted prior to cover installation to ensure no threatened or endangered species are present. In particular, the survey will look for the presence of desert tortoises, which may occur in Imperial County. Should desert tortoises or other threatened or endangered species be encountered in the survey, or at any time during the closure of the Picacho Landfill, the County shall contact the U.S. Fish and Wildlife Service to develop avoidance measures to ensure that impacts to the species are minimized. Following closure and vegetation restoration activities, the project site may become suitable for threatened and endangered species. This would be a beneficial effect.

Under Executive Order 12866, “Regulatory Planning and Review” (58 FR 51735, October 4, 1993), this rule is not of general applicability and therefore is not a regulatory action subject to review by the Office of Management and Budget (OMB).

This rule does not impose an information collection burden under the provisions of the Paperwork Reduction Act of 1995 (44 U.S.C. 3501 *et seq.*) because it applies to a particular facility only.

Because this rule is of particular applicability relating to a particular facility, it is not subject to the regulatory flexibility provisions of the Regulatory Flexibility Act (5 U.S.C. 601 *et seq.*), or to sections 202, 204, and 205 of the Unfunded Mandates Reform Act of 1995 (UMRA) (Pub. L. 104-4). Because this rule will affect only a particular facility, it will not significantly or uniquely affect small governments, as specified in section 203 of UMRA.

Because this rule will affect only a particular facility, this proposed rule does not have federalism implications. It will not have substantial direct effects on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government, as specified in Executive Order 13132, “Federalism,” (64 FR 43255, August 10, 1999). Thus, Executive Order 13132 does not apply to this rule.

This rule also is not subject to Executive Order 13045, “Protection of Children from Environmental Health Risks and Safety Risks” (62 FR 19885, April 23, 1997), because it is not economically significant as defined in Executive Order 12866, and because the Agency does not have reason to believe the environmental health or safety risks posed by this action present a risk to children. The basis for this belief is EPA's analysis of the potential risks posed by Imperial County's alternative final cover and alternative groundwater detection-monitoring parameters proposals and the standards set forth in this rulemaking.

This rule is not subject to Executive Order 13211, “Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use” (66 FR 28355, May 22, 2001), because it is not a significant regulatory action under Executive Order 12866.

As required by section three of Executive Order 12988, “Civil Justice Reform,” (61 FR 4729, February 7, 1996), in issuing this rule, EPA has taken the necessary steps to eliminate drafting errors and ambiguity, minimize potential litigation, and provide a clear legal standard for affected conduct.

Executive Order 13175, entitled “Consultation and Coordination with Indian Tribal Governments,” (65 FR 67249, November 9, 2000), calls for EPA to develop an accountable process to ensure “meaningful and timely input by tribal officials in the development of regulatory policies that have tribal implications.” *See* also “EPA Policy for the Administration of Environmental Programs on Indian Reservations,” (November 8, 1984) and “EPA Policy on Consultation and Coordination with Indian Tribes,” (May 4, 2011). EPA consulted with the Quechan Tribe throughout Imperial County's development of its closure and monitoring plans for the Picacho Landfill.

List of Subjects in 40 CFR Part 258

Environmental protection, Final cover, Monitoring, Municipal landfills, Post-closure care groundwater, Reporting and recordkeeping requirements, Waste treatment and disposal, Water pollution control.

Dated: September 22, 2016.
Alexis Strauss,
Acting Regional Administrator, Region IX.

For the reasons stated in the preamble, 40 CFR part 258 is amended as follows:

Part 258 Criteria for Municipal Solid Waste Landfills

Regulatory Text

---

1. The authority citation for part 258 continues to read as follows:

Authority:

33 U.S.C. 1345(d) and (e); 42 U.S.C. 6902(a), 6907, 6912(a), 6944, 6945(c) and 6949a(c), 6981(a).

Subpart F Closure and Post Closure Care

Regulatory Text

2. Section 258.62 is amended by removing “[Reserved]” at the end of the section and adding paragraph (b) to read as follows:

§ 258.62 Approval of site-specific flexibility requests in Indian country.

* * * * *

(b) *Picacho Municipal Solid Waste Landfill—alternative list of detection monitoring parameters and alternative final cover.* This paragraph (b) applies to the Picacho Landfill, a Municipal Solid Waste Landfill operated by Imperial County on the Quechan Indian Tribe of the Fort Yuma Indian Reservation in California.

(1) In accordance with § 258.54(a), the owner and operator may modify the list of heavy metal detection monitoring parameters specified in appendix I of this part, as required during Post-Closure Care by § 258.61(a)(3), by replacing monitoring of the inorganic constituents, with the exception of arsenic, with the inorganic indicator parameters chloride, nitrate as nitrogen, sulfate, and total dissolved solids.

(2) In accordance with § 258.60(b), the owner and operator may replace the prescriptive final cover set forth in § 258.60(a), with an alternative final cover as follows:

(i) The owner and operator may install an evapotranspiration cover system as an alternative final cover for the 12.5 acre site.

(ii) The alternative final cover system shall be constructed to achieve an equivalent reduction in infiltration as the infiltration layer specified in § 258.60(a)(1) and (2), and provide an equivalent protection from wind and water erosion as the erosion layer specified in § 258.60(a)(3).

(iii) The final cover system shall consist of a minimum three-foot-thick multi-layer cover system comprised, from bottom to top, of:

(A) A minimum 30-inch thick infiltration layer consisting of:

(*1*) Existing intermediate cover; and

(*2*) Additional cover soil which, prior to placement, shall be wetted to optimal moisture and thoroughly mixed to near uniform condition, and the material shall then be placed in lifts with an uncompacted thickness of six to eight inches, spread evenly and compacted to 90 percent of the maximum dry density, and shall:

(*i*) Exhibit a grain size distribution that excludes particles in excess of three inches in diameter;

(*ii*) Have a minimum fines content (percent by weight passing U.S. No. 200 Sieve) of seven percent for an individual test and eight percent for the average of ten consecutive tests;

(*iii*) Have a grain size distribution with a minimum of five percent smaller than five microns for an individual test and six percent for the average of ten consecutive tests; and

(*iv*) Exhibit a maximum saturated hydraulic conductivity on the order of 1.0E-03 cm/sec.; and

(*3*) A minimum six-inch surface erosion layer comprised of a rock/soil admixture. The surface erosion layer admixture and gradations for 3% slopes and 3:1 slopes are detailed below:

(*i*) 3% slopes: For the 3% slopes the surface admixture shall be composed of pea gravel (3/8-inch to 1/2-inch diameter) mixed with cover soil at the ratio of 25% rock to soil by volume with a minimum six-inch erosion layer.

(*ii*) For the 3:1 side slopes the surface admixture shall be composed of either: gravel/rock (3/4-inch to one-inch diameter) mixed with additional cover soil as described in paragraph (b)(2)(iii)(A)(*2*) of this section at the ratio of 50% rock to soil by volume and result in a minimum six-inch erosion layer, or gravel/rock (3/4-inch to two-inch diameter) mixed with additional cover soil as described in paragraph (b)(2)(iii)(A)(*2*) of this section at the ratio of 50% rock to soil by volume and result in a minimum 12-inch erosion layer.

(*iii*) The owner and operator shall place documentation demonstrating compliance with the provisions of this section in the operating record.

(*iv*) All other applicable provisions of this part remain in effect.

(B) [Reserved]

[FR Doc. 2016-23839 Filed 10-5-16; 8:45 am]
BILLING CODE 6560-50-P

dichlormid (2,2-dichloro-*N,N*-di-2-propenylacetamide).

* * * * *

[FR Doc. 2016–24214 Filed 10–5–16; 8:45 am]

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ENVIRONMENTAL PROTECTION AGENCY

40 CFR Part 258

[EPA–R09–RCRA–2015–0445; FRL–9953–45–Region 9]

Final Determination To Approve Site-Specific Flexibility for Closure and Monitoring of the Picacho Landfill

AGENCY: Environmental Protection Agency (EPA).

ACTION: Final rule.

SUMMARY: The Environmental Protection Agency, Region IX, is making a final determination to approve two Site-Specific Flexibility Requests (SSFRs) from Imperial County (County or Imperial County) to close and monitor the Picacho Solid Waste Landfill (Picacho Landfill or Landfill). The Picacho Landfill is a commercial municipal solid waste landfill (MSWLF) operated by Imperial County from 1977 to the present on the Quechan Indian Tribe of the Fort Yuma Indian Reservation in California.

EPA is promulgating a site-specific rule proposed on April 7, 2016, that approves an alternative final cover and a modification to the prescribed list of groundwater detection-monitoring parameters for ongoing monitoring for the Picacho Landfill.

DATES: This final rule is effective on October 6, 2016.

ADDRESSES: EPA has established a docket for this action under Docket ID No. EPA–R09–RCRA–2015–0445. All documents in the docket are listed in the *http://www.regulations.gov* index. Publicly available docket materials are available electronically in *http://www.regulations.gov* and in hard copy at the EPA Library, located at the Environmental Protection Agency, Region IX, 75 Hawthorne Street, San Francisco, California. The EPA Library is open from 9:00 a.m. to 4:00 p.m., Monday through Thursday, excluding legal holidays, and is located in a secured building. To review docket materials at the EPA Library, it is recommended that the public make an appointment by calling (415) 947–4406 during normal business hours. Copying arrangements will be made through the EPA Library and billed directly to the recipient. Copying costs may be waived depending on the total number of pages copied.

FOR FURTHER INFORMATION CONTACT: Steve Wall, Land Division, Mail Code LND 2–3 U.S. Environmental Protection Agency, 75 Hawthorne Street, San Francisco, CA 94105–3901; telephone number: (415) 972–3381; fax number: (415) 947–3564; email address: *wall.steve@epa.gov.*

SUPPLEMENTARY INFORMATION:

I. What did EPA propose?

After completing a review of Imperial County's Picacho Landfill Final Closure/Post-Closure Maintenance Plan and the associated SSFRs, EPA proposed this rulemaking in the **Federal Register**. The proposed determination was published at 81 FR 20274, April 7, 2016. EPA proposed to approve an alternative final cover that varies from the final closure requirements of 40 CFR 258.60(a) but meets the criteria at 40 CFR 258.60(b), and alternative groundwater detection monitoring parameters for post-closure monitoring in accordance with 40 CFR 258.54(a).

II. Legal Authority for This Action

Under sections 1008, 2002, 4004, and 4010 of the Resource Conservation and Recovery Act of 1976 (RCRA) as amended by the Hazardous and Solid Waste Amendments of 1984 (HSWA), 42 U.S.C. 6901 *et seq.,* Congress required EPA to establish revised minimum federal criteria for MSWLFs, including landfill location restrictions, operating standards, design standards, and requirements for ground water monitoring, corrective action, closure and post-closure care, and financial assurance. Under RCRA section 4005, states are to develop permit programs for facilities that may receive household hazardous waste or waste from conditionally exempt small quantity generators of hazardous waste, and EPA is to determine whether the state's program is adequate to ensure that such facilities will comply with the revised federal criteria.

The MSWLF criteria are set forth in the Code of Federal Regulations at 40 CFR part 258. These regulations are prescriptive, self-implementing and apply directly to owners and operators of MSWLFs. Many of these criteria include a flexible performance standard as an alternative to the prescriptive, self-implementing regulation. The flexible standard is not self-implementing, and requires approval by the Director of an EPA-approved state MSWLF permitting program. However, EPA's approval of a state program generally does not extend to Indian Country because states generally do not have authority over Indian Country. For this reason, owners and operators of MSWLF units located in Indian Country cannot take advantage of the flexibilities available to those facilities that are within the jurisdiction of an EPA-approved state program. However, the EPA has the authority under sections 2002, 4004, and 4010 of RCRA to promulgate site-specific rules to enable such owners and operators to use the flexible standards. See *Yankton Sioux Tribe* v. *EPA,* 950 F. Supp. 1471 (D.S.D. 1996); *Backcountry Against Dumps* v. *EPA,* 100 F.3d 147 (D.C. Cir. 1996). EPA refers to such rules as ''Site-Specific Flexibility Determinations.'' EPA has developed guidance for owners and operators on preparing a request for such a site-specific rule, entitled ''Site-Specific Flexibility Requests for Municipal Solid Waste Landfills in Indian Country, Draft Guidance,'' EPA530–R–97–016 (August 1997) (Draft Guidance).

III. Background

The Picacho Landfill is located on Quechan tribal lands on the Fort Yuma Indian Reservation approximately four miles north-northeast of the community of Winterhaven, in Imperial County, California. The Picacho Landfill is a commercial MSWLF operated by Imperial County from 1977 to the present. The landfill site is approximately 12.5 acres.

In January 2006, the Tribe requested that EPA provide comments on the County's closure plan. Between 2006 and 2011, EPA worked with the Tribe, the Bureau of Indian Affairs (BIA) and the County to develop the closure plan. During this time, EPA also reviewed the SSFRs to determine whether they met technical and regulatory requirements. On October 27, 2010, Imperial County submitted its Picacho Final Closure/Post-Closure Maintenance Plan. EPA provided a final round of comments on February 10, 2011, which Imperial County incorporated as an addendum. On April 30, 2012, the Tribe approved the Picacho Landfill Final Closure/Post-Closure Maintenance Plan as amended, and, pursuant to EPA's Draft Guidance, the Tribe forwarded to EPA two SSFRs that had been submitted by Imperial County to close and monitor the Picacho Landfill. The requests sought EPA approval to use an alternative final cover meeting the performance requirements of 40 CFR 258.60(a), and to modify the prescribed list of groundwater detection-monitoring parameters provided in 40 CFR 258.54(a)(1) and (2) for ongoing monitoring.

IV. Basis for Final Determination

EPA is basing its final determination to approve the site-specific flexibility requests on the Tribe's approval, dated April 30, 2012, EPA's independent review of the Picacho Landfill Final Closure/Post-Closure Maintenance Plan as amended, and the associated SSFRs.

A. Alternative Final Cover SSFR: Alternative Final Cover System

The regulations require the installation of a final cover system specified in 40 CFR 258.60(a), which consists of an infiltration layer with a minimum of 18 inches of compacted clay with a permeability of 1×10^{-5} cm/sec, covered by an erosion layer with a minimum six inches of topsoil. Imperial County sought approval for an alternative final cover designed to satisfy the performance criteria specified in 40 CFR 258.60(b); Imperial County proposed to replace this with an alternative cover consisting of two and a half feet of native soil to control infiltration covered by six inches of a soil gravel mixture to control erosion.

EPA is basing its final determination on a number of factors, including: (1) Research showing that prescriptive, self-implementing requirements for final covers, comprised of low permeability compacted clay, do not perform well in the arid west. The clay dries out and cracks, which allows increased infiltration along the cracks; (2) Research showing that in arid environments thick soil covers comprised of native soil can perform as well or better than the prescriptive cover; and (3) Imperial County's analysis demonstrates, based on site-specific climatic conditions and soil properties, that the proposed alternative soil final cover will achieve equivalent reduction in infiltration as the prescriptive cover design and that the proposed erosion layer provides equivalent protection from wind and water erosion. This analysis is provided in Appendix D and Appendix D–1 of the Picacho Landfill Final Closure/Post-Closure Maintenance Plan dated October 27, 2010 and amended by EPA's comments dated February 20, 2011.

B. Groundwater Monitoring SSFR: Alternative Detection Monitoring Parameters

The regulations require post-closure monitoring of 15 heavy metals, listed in 40 CFR part 258, Appendix I. Imperial County proposed to replace these, with the exception of arsenic, with the alternative inorganic indicator parameters chloride, nitrate as nitrogen, sulfate, and total dissolved solids.

EPA's final determination is based on the fact that the County has performed over 15 years of semi-annual groundwater monitoring at the site, and during that time arsenic was the only heavy metal detected at a value that slightly exceeded the federal maximum contaminant level (MCL), a standard used for drinking water.

V. Summary of Public Comments Received and Response to Comments

EPA received one anonymous public comment during the public comment period stating support for EPA's Tentative Determination to Approve Site-Specific Flexibility for Closure and Monitoring of the Picacho Landfill, as proposed in the **Federal Register** on April 7, 2016.

VI. Additional Findings

In order to comply with the National Historic Preservation Act, 54 U.S.C. 100101 *et seq.,* Imperial County Department of Public Works will coordinate with the Tribe to arrange for a qualified Native American monitor to be present during any work. If buried or previously unidentified resources are located during project activities, all work within the vicinity of the find will cease, and the provisions of 36 CFR 800.13(b) will be implemented. If, during the course of the Landfill closure activities, previously undocumented archaeological material or human remains are encountered, all work shall cease in the immediate area and a qualified archaeologist shall be retained to evaluate the significance of the find and recommend further management actions.

Though no known threatened or endangered species or their habitat exist on the site, in order to ensure compliance with the Endangered Species Act, 16 U.S.C. 1536 *et seq.,* a preconstruction survey will be conducted prior to cover installation to ensure no threatened or endangered species are present. In particular, the survey will look for the presence of desert tortoises, which may occur in Imperial County. Should desert tortoises or other threatened or endangered species be encountered in the survey, or at any time during the closure of the Picacho Landfill, the County shall contact the U.S. Fish and Wildlife Service to develop avoidance measures to ensure that impacts to the species are minimized. Following closure and vegetation restoration activities, the project site may become suitable for threatened and endangered species. This would be a beneficial effect.

Under Executive Order 12866, ''Regulatory Planning and Review'' (58 FR 51735, October 4, 1993), this rule is not of general applicability and therefore is not a regulatory action subject to review by the Office of Management and Budget (OMB).

This rule does not impose an information collection burden under the provisions of the Paperwork Reduction Act of 1995 (44 U.S.C. 3501 *et seq.*) because it applies to a particular facility only.

Because this rule is of particular applicability relating to a particular facility, it is not subject to the regulatory flexibility provisions of the Regulatory Flexibility Act (5 U.S.C. 601 *et seq.*), or to sections 202, 204, and 205 of the Unfunded Mandates Reform Act of 1995 (UMRA) (Pub. L. 104–4). Because this rule will affect only a particular facility, it will not significantly or uniquely affect small governments, as specified in section 203 of UMRA.

Because this rule will affect only a particular facility, this proposed rule does not have federalism implications. It will not have substantial direct effects on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government, as specified in Executive Order 13132, ''Federalism,'' (64 FR 43255, August 10, 1999). Thus, Executive Order 13132 does not apply to this rule.

This rule also is not subject to Executive Order 13045, ''Protection of Children from Environmental Health Risks and Safety Risks'' (62 FR 19885, April 23, 1997), because it is not economically significant as defined in Executive Order 12866, and because the Agency does not have reason to believe the environmental health or safety risks posed by this action present a risk to children. The basis for this belief is EPA's analysis of the potential risks posed by Imperial County's alternative final cover and alternative groundwater detection-monitoring parameters proposals and the standards set forth in this rulemaking.

This rule is not subject to Executive Order 13211, ''Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use'' (66 FR 28355, May 22, 2001), because it is not a significant regulatory action under Executive Order 12866.

As required by section three of Executive Order 12988, ''Civil Justice Reform,'' (61 FR 4729, February 7, 1996), in issuing this rule, EPA has taken the necessary steps to eliminate drafting errors and ambiguity, minimize potential litigation, and provide a clear legal standard for affected conduct.

Executive Order 13175, entitled ''Consultation and Coordination with Indian Tribal Governments,'' (65 FR 67249, November 9, 2000), calls for EPA to develop an accountable process to ensure ''meaningful and timely input by tribal officials in the development of regulatory policies that have tribal implications.'' *See* also ''EPA Policy for the Administration of Environmental Programs on Indian Reservations,'' (November 8, 1984) and ''EPA Policy on Consultation and Coordination with Indian Tribes,'' (May 4, 2011). EPA consulted with the Quechan Tribe throughout Imperial County's development of its closure and monitoring plans for the Picacho Landfill.

List of Subjects in 40 CFR Part 258

Environmental protection, Final cover, Monitoring, Municipal landfills, Post-closure care groundwater, Reporting and recordkeeping requirements, Waste treatment and disposal, Water pollution control.

Dated: September 22, 2016.

Alexis Strauss,

Acting Regional Administrator, Region IX.

For the reasons stated in the preamble, 40 CFR part 258 is amended as follows:

PART 258—CRITERIA FOR MUNICIPAL SOLID WASTE LANDFILLS

■ 1. The authority citation for part 258 continues to read as follows:

Authority: 33 U.S.C. 1345(d) and (e); 42 U.S.C. 6902(a), 6907, 6912(a), 6944, 6945(c) and 6949a(c), 6981(a).

Subpart F—Closure and Post-Closure Care

■ 2. Section 258.62 is amended by removing ''[Reserved]'' at the end of the section and adding paragraph (b) to read as follows:

§ 258.62 Approval of site-specific flexibility requests in Indian country.

* * * * *

(b) *Picacho Municipal Solid Waste Landfill—alternative list of detection monitoring parameters and alternative final cover.* This paragraph (b) applies to the Picacho Landfill, a Municipal Solid Waste Landfill operated by Imperial County on the Quechan Indian Tribe of the Fort Yuma Indian Reservation in California.

(1) In accordance with § 258.54(a), the owner and operator may modify the list of heavy metal detection monitoring parameters specified in appendix I of this part, as required during Post-Closure Care by § 258.61(a)(3), by replacing monitoring of the inorganic constituents, with the exception of arsenic, with the inorganic indicator parameters chloride, nitrate as nitrogen, sulfate, and total dissolved solids.

(2) In accordance with § 258.60(b), the owner and operator may replace the prescriptive final cover set forth in § 258.60(a), with an alternative final cover as follows:

(i) The owner and operator may install an evapotranspiration cover system as an alternative final cover for the 12.5 acre site.

(ii) The alternative final cover system shall be constructed to achieve an equivalent reduction in infiltration as the infiltration layer specified in § 258.60(a)(1) and (2), and provide an equivalent protection from wind and water erosion as the erosion layer specified in § 258.60(a)(3).

(iii) The final cover system shall consist of a minimum three-foot-thick multi-layer cover system comprised, from bottom to top, of:

(A) A minimum 30-inch thick infiltration layer consisting of:

(*1*) Existing intermediate cover; and

(*2*) Additional cover soil which, prior to placement, shall be wetted to optimal moisture and thoroughly mixed to near uniform condition, and the material shall then be placed in lifts with an uncompacted thickness of six to eight inches, spread evenly and compacted to 90 percent of the maximum dry density, and shall:

(*i*) Exhibit a grain size distribution that excludes particles in excess of three inches in diameter;

(*ii*) Have a minimum fines content (percent by weight passing U.S. No. 200 Sieve) of seven percent for an individual test and eight percent for the average of ten consecutive tests;

(*iii*) Have a grain size distribution with a minimum of five percent smaller than five microns for an individual test and six percent for the average of ten consecutive tests; and

(*iv*) Exhibit a maximum saturated hydraulic conductivity on the order of 1.0E–03 cm/sec.; and

(*3*) A minimum six-inch surface erosion layer comprised of a rock/soil admixture. The surface erosion layer admixture and gradations for 3% slopes and 3:1 slopes are detailed below:

(*i*) 3% slopes: For the 3% slopes the surface admixture shall be composed of pea gravel (3⁄8-inch to 1⁄2-inch diameter) mixed with cover soil at the ratio of 25% rock to soil by volume with a minimum six-inch erosion layer.

(*ii*) For the 3:1 side slopes the surface admixture shall be composed of either: gravel/rock (3⁄4-inch to one-inch diameter) mixed with additional cover soil as described in paragraph (b)(2)(iii)(A)(*2*) of this section at the ratio of 50% rock to soil by volume and result in a minimum six-inch erosion layer, or gravel/rock (3⁄4-inch to two-inch diameter) mixed with additional cover soil as described in paragraph (b)(2)(iii)(A)(*2*) of this section at the ratio of 50% rock to soil by volume and result in a minimum 12-inch erosion layer.

(*iii*) The owner and operator shall place documentation demonstrating compliance with the provisions of this section in the operating record.

(*iv*) All other applicable provisions of this part remain in effect.

(B) [Reserved]

[FR Doc. 2016–23839 Filed 10–5–16; 8:45 am]

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FEDERAL COMMUNICATIONS COMMISSION

47 CFR Part 73

[MB Docket No. 02–376, RM–10617, RM–10690; DA 16–1062]

Radio Broadcasting Services; Sells, Willcox, and Davis-Monthan Air Force Base, Arizona

AGENCY: Federal Communications Commission.

ACTION: Final rule; dismissal of application for review.

SUMMARY: In this document, the Media Bureau (Bureau) dismisses as moot the Application for Review filed jointly by KZLZ, LLC (KZLZ) and Lakeshore Media, LLC, the current and former licensee, respectively, of Station KWCX–FM. While the AFR was pending, KZLZ filed a minor modification application to change the community of license of Station KWCX–FM from Willcox to Tanque Verde, Arizona. Once the requested facility modification to Station KWCX–FM was granted, the assignment at Willcox was deleted, and this in turn rendered moot any Section 307(b) comparison between Davis-Monthan AFB and the deleted Willcox assignment.

DATES: Effective October 6, 2016.

FOR FURTHER INFORMATION CONTACT: Adrienne Denysyk, Media Bureau, (202) 418–2700.

SUPPLEMENTARY INFORMATION: This is a synopsis of the Bureau's *Letter,* DA 16–1062, released September 21, 2016. The full text of this document is available for inspection and copying during normal business hours in the FCC Reference Information Center (Room CY–A257), 445 12th Street SW., Washington, DC 20554.