

**Appendix A**  
**Closure Plan Acceptance and Certification of Closure**

DEPARTMENT OF HEALTH SERVICES  
TOXIC SUBSTANCES CONTROL DIVISION  
2151 BERKELEY WAY, ANNEX 7  
BERKELEY, CA 94704



August 28, 1987

D. B. Bordvick  
Tosco Corporation  
Avon Refinery  
Martinez, CA 94553

Re: Closure Plan Approval for the Oily Waste Surface Impoundments  
EPA ID# CAD000072751

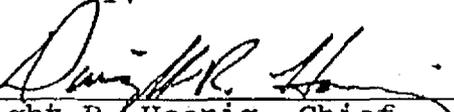
Dear Mr. Bordvick:

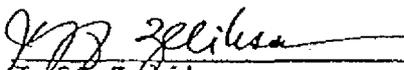
The California Department of Health Services (DHS) and the Region 9 office of the U.S. Environmental Protection Agency (EPA) have reviewed the Closure Plan, originally dated November 1985 with subsequent revisions as noted in Attachment A "Closure Plan Documents", for the closure of the two oily waste surface impoundments at Tosco's Avon refinery in Contra Costa County. Note that these revisions include modifications to the plan as noted in the first entry to "Closure Plan Documents".

Pursuant to Title 22 of the California Administrative Code, Section 67212 and the regulations adopted pursuant to the Resource Conservation and Recovery Act, 42 USC section 6901, et seq., your Closure Plan is determined to be acceptable with the modifications made by DHS and EPA and is hereby approved. The "Closure Plan Modifications" are included as Attachment B. You are required to comply with the specific steps of this approved Closure Plan. Please note that upon completion of closure, you and a registered professional engineer must certify that closure was conducted in accordance with the approved plan. Copies of the certification must be submitted to DHS and EPA.

Should you have questions regarding this approval, you may contact Andrew Hicks of the DHS Regional Office in Emeryville at (415) 540-3544.

Sincerely,

  
Dwight R. Hoenig, Chief  
California Department of Health Services  
North Coast California Section  
Toxic Substances Control Division

  
Jeff Zelikson  
Acting Division Director  
U.S. Environmental Protection Agency  
Toxic and Waste Management Division

Enclosures

8/28/87  
Date

ENVIRONMENTAL AFFAIRS MANAGER			
D. B. BORDVICK			
SEP 15 '87			
Referred to	Rec'd	Referred to	Rec'd
MGB		GBF	
RWC		WFK	
IAC		MOR	
MND		MAJ	
GEE		NEW	
		VI	
REPORT			
TAKEN ACTION			
FILE			
FOR YOUR USE			

9/10/87  
Date

cc: Tom Mumley  
SF Bay-RWQCB  
1111 Jackson Street, Suite 6040  
Oakland, CA 94607

Caroline Cabias  
PMS, DHS  
714 P Street  
Sacramento, CA 95814

Andrew Hicks  
NCCS-TSCD  
Department of Health Services  
2151 Berkeley Way, Annex 7  
Berkeley, Ca 94704

Dwight R. Hoenig  
NCCS-TSCD  
Department of Health Services  
2151 Berkeley Way, Annex 7  
Berkeley, CA 94704

Tosco Avon Refinery Closure Plan  
for the  
Oily Waste Surface Impoundments

CLOSURE PLAN DOCUMENTS

<u>Document</u>	<u>Date</u>
EPA modifications	August 24, 1987
Tosco's Original CP	November 25, 1985
Tosco Submittal	April 4, 1986
Tosco Submittal	June 20, 1986
Tosco Soils Report	Sept. 22, 1986 (Groundwater Monitoring Plan)
DHS approves winterization	Sept. 22, 1986
Tosco submits winterization oil report	Oct. 22, 1986
Tosco submittal	Feb. 6, 1987
Tosco submittal (Mark Group)	April 30, 1987
Tosco submittal	May 27, 1987
DHS letter	June 1, 1987
Tosco Drainage Plan	July 1, 1987
Latest Cost Estimate	June 19, 1987

11/11/87 D

TOSCO CORPORATION  
AVON REFINERY  
MARTINEZ, CA  
CAD 000072751

CLOSURE PLAN MODIFICATION

1. POST-CLOSURE CARE AND MONITORING

Post-closure monitoring and a post-closure permit shall be required. Until this permit is issued, the facility shall comply with interim status post-closure care and monitoring requirements set forth in 40 CFR 265 Subpart F, 40 CFR 265.116-120, 40 CFR 265.228.

2. SCHEDULE FOR CLOSURE

The owner/operator shall submit to DHS and EPA an updated schedule for closure activities in accordance with 40 CFR 265.113 and 40 CFR 265.112(b)(6) by October 15, 1987.

3. WASTE CHARACTERIZATION

The owner/operator shall submit to DHS and EPA a waste characterization which identifies all hazardous wastes historically disposed on-site by EPA ID number by October 30, 1987. The characterization shall discuss sources of the wastes, hazardous constituents, and reaction and degradation products.

4. COST ESTIMATE

As necessary, the owner/operator shall submit to DHS and EPA a revised cost estimate based on revisions to the closure plan in accordance with 40 CFR 265.142 within 30 days of determining that a revised cost estimate is necessary.

5. FINANCIAL ASSURANCE AND LIABILITY

The owner/operator shall demonstrate continuous compliance with 40 CFR 265.143. The owner/operator shall submit to DHS and EPA documentation of an increase in the amount of financial assurance to cover the increased closure cost estimate within 60 days after each revised cost estimate is due.

The owner/operator shall demonstrate continuous compliance with the liability requirements of 40 CFR 265.147 and the documentation requirements of 40 CFR 264.151.

The owner/operator shall comply with 40 CFR 265.148, in the event of bankruptcy.

6. SOIL CHARACTERIZATION.

The owner/operator shall prepare a characterization of soil contamination outside the boundaries of the impoundments. The characterization shall occur in two phases:

- a) The owner/operator shall submit to DHS and EPA a soil characterization plan by October 30, 1987.

The soil characterization plan shall provide a sound technical rationale, based on the waste characterization specified in Modification 3, for choosing proper constituents to define soil contamination outside the boundaries of the surface impoundments. If the waste characterization indicates that the owner/operator has not yet analyzed for all proper contaminants, the plan shall provide for further characterization by analysis for those additional contaminants, using test methods specified in 40 CFR 261 Appendix III, Tables 1 and 2.

- b) The owner/operator shall implement the soil characterization plan once it is approved by DHS and EPA.

7. PLAN ADDRESSING CONTAMINATED AREAS

The owner/operator shall address areas determined to be contaminated based on the soil characterization specified in Modification 6. This will occur in two phases:

- a) The owner/operator shall submit a plan addressing contaminated areas to DHS and EPA within 30 days of the final implementation of the soil characterization plan.

Based on site soil characterization, the owner/operator shall cap contaminated areas in accordance with Federal and State regulations. The owner/operator shall submit plans for the cap to DHS and EPA for approval.

- b) Upon approval by DHS and EPA, the owner/operator shall implement the plan.

8. EQUIPMENT DECONTAMINATION

The owner/operator shall use the following processes for equipment decontamination:

- a) When sampling the rinse water, 2 grab samples shall be taken each time decontamination is completed.

- b) The analyses shall be for all related constituents based on the waste characterization.
- c) If rinse water is a hazardous waste, it shall be treated, stored, or disposed at an interim status or permitted hazardous waste facility.

9. COMPLIANCE SCHEDULES

If any compliance schedules in the closure plan will be missed, the owner/operator shall write to DHS and EPA to request an extension within 7 days of the due date.

10. CORRECTIVE ACTION

Remaining contamination from solid waste management units shall be addressed in the future under §§3008(h) and/or §§3004(u) of the Hazardous and Solid Waste Amendments.

## DEPARTMENT OF HEALTH SERVICES

2151 BERKELEY WAY  
BERKELEY, CA 94704

December 6, 1988

## CERTIFIED MAIL

Duane B. Bordvick, Director  
Environmental Program  
Tosco Corporation - Avon Refinery  
Solano Way  
Martinez, CA 94553

Dear Mr. Bordvick:

ACCEPTANCE OF CLOSURE CERTIFICATION FOR TWO OILY WASTE SURFACE  
IMPOUNDMENTS AT TOSCO AVON REFINERY, MARTINEZ, CA,  
EPA CAD ID # 000072751

This office has received both your certification as the facility owner and an independent engineer's certification that the subject waste management unit has been closed in accordance with the approved closure plan. This letter is your acknowledgement that the Department of Health Services (DHS) now considers the subject unit officially closed.

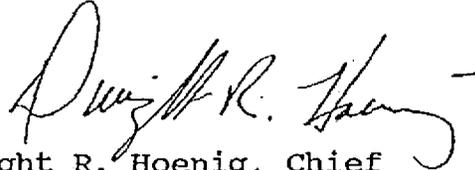
Please be advised that the subject unit is now in the post-closure care phase. Tosco must monitor and maintain the closed unit in accordance with the requirements of Articles 23 & 26 of Title 22, California Code of Regulations and of Parts 265.116 to 265.120 and 265.228 of Title 40 of Code of Federal Regulations. Tosco shall submit the documents and certification as required.

This acknowledgement of closure is not a certification that your facility does not pose any environmental or public health threat. This letter does not remove any liabilities associated with the past hazardous waste management practices which occurred on the site.

Duane B. Bordvick  
Page 2  
December 6, 1988

If you have any questions, please contact Wei-Wei Chui of my staff at (415) 540-3553.

Sincerely,



Dwight R. Hoenig, Chief  
Region 2  
Toxic Substances Control Division

Cert. Mail P 888 746 069

cc: Chrsity Camp, U.S. EPA, Region IX  
Richard McMurtry, SF Bay RWQCB  
John Adams, State Water Resources Control Board  
Rubia Bertram, TSCD, HQ - Financial Responsibility Unit  
Caroline Cabias, TSCD, HQ - HWMS

DRH:WWC:re

Director, Financial Assurance  
California Dept. of Toxic Substances Control  
1001 I Street  
Sacramento, CA 95814-2828

### GUARANTEE FOR LIABILITY COVERAGE

Guarantee made by this 4<sup>th</sup> day of March, 2008 by Tesoro Corporation, a business corporation organized under the laws of the State of Delaware, herein referred to as guarantor. This guarantee is made on behalf of Tesoro Refining & Marketing Company of 150 Solano Way, Martinez, CA which is our subsidiary, to any and all third parties who have sustained or may sustain bodily injury or property damage caused by sudden and/or nonsudden accidental occurrences arising from operation of the facility(ies)/transportable treatment unit(s) (TTU) covered by this guarantee.

### RECITALS

1. Guarantor meets or exceeds the financial test criteria and agrees to comply with the reporting requirements for guarantors as specified in California Code of Regulations, title 22, division 4.5, chapter 14 and 15, article 8, sections 66264.147 and 66265.147.
2. Tesoro Refining and Marketing Company owns or operates the following hazardous waste management facility(ies)/TTU(s) covered by this guarantee:

EPA Identification Number: CAR000091488  
Facility Name: Tesoro Refining & Marketing Company  
Facility Address: Tesoro Golden Eagle Refinery  
150 Solano Way  
Martinez, CA 94553

EPA Identification Number: CAD000072751  
Facility Name: Tesoro Refining & Marketing Company  
Facility Address: Tesoro Golden Eagle Refinery  
150 Solano Way  
Martinez, CA 94553

This corporate guarantee satisfies California Code of Regulations, title 22, division 4.5, chapter 14 and 15, article 8, third-party liability requirements for both sudden and nonsudden accidental occurrences in the above-named owner or operator facility(ies)/TTU(s) for coverage in the amount of \$4 million per facility/TTU per occurrence and \$8 million annual aggregate.

3. For value received from Tesoro Refining and Marketing Company, guarantor guarantees to any and all third parties who have sustained or may

sustain bodily injury or property damage caused by sudden and/or nonsudden accidental occurrences arising from operations of the facility(ies)/TTU(s) covered by this guarantee that in the event that Tesoro Refining and Marketing fails to satisfy a judgment or award based on a determination of liability for bodily injury or property damage to third parties caused by sudden and/or nonsudden accidental occurrences, arising from the operation of the above-named facility(ies)/TTU(s), or fails to pay an amount agreed to in settlement of a claim arising from or alleged to arise from such injury or damage, the guarantor will satisfy such judgment(s), award(s), or settlement agreement(s) up to the limits of coverage identified above.

4. Such obligation does not apply to the following:

(a) Bodily injury or property damage for which Tesoro Refining and Marketing Company is obligated to pay damages by reason of the assumption of liability in a contract or agreement. This exclusion does not apply to liability for damages that Tesoro Refining and Marketing Company would be obligated to pay in the absence of the contract or agreement.

(b) Any obligation of Tesoro Refining and Marketing under a workers' compensation, disability benefits, or unemployment compensation law or any similar laws.

(c) Bodily injury to:

(1) An employee of Tesoro Refining and Marketing Company arising from, and in the course of, employment by Tesoro Refining and Marketing Company; or

(2) The spouse, child, parent, brother, or sister of that employee as a consequence of, or arising from, and in the course of employment by Tesoro Refining and Marketing Company. This exclusion applies:

(A) Whether Tesoro Refining and Marketing Company may be liable as an employer or in any other capacity; and

(B) To any obligation to share damages with or repay another person who shall pay damages because of the injury to persons identified in paragraphs (A) and (B).

(d) Bodily injury or property, damages arising out of the ownership, maintenance, use, or entrustment to others of any aircraft, motor vehicle, or watercraft.

(e) Property damage to:

(1) Any property owned, rented, or occupied by Tesoro Refining and Marketing Company;

(2) Premises that are sold, given away, or abandoned by Tesoro Refining and Marketing Company if the property damage arises out of any part of those premises;

(3) Property loaned to Tesoro Refining and Marketing Company;

(4) Personal property in the care, custody, or control of Tesoro Refining and Marketing Company;

(5) That particular part of real property on which the Tesoro Refining and Marketing Company or any contractor or subcontractors working directly or indirectly on behalf of the Tesoro Refining and Marketing Company are performing operations, if the property damage arises out of these operations.

5. Guarantor agrees that if, at any time during or at the end of any fiscal year before termination of this guarantee, the guarantor fails to meet the financial test criteria, guarantor shall send within ninety (90) days, by certified mail, notice to the Department of Toxic Substances Control (DTSC) and to Tesoro Refining and Marketing Company that he or she intends to provide alternate liability coverage as specified in California Code of Regulations, title 22, division 4.5, chapter 14 and 15, article 8, sections 66264.147 and 66265.147, as applicable, in the name of Tesoro Refining and Marketing Company. Within 90 days after the end of such fiscal year, the guarantor shall establish such liability coverage unless Tesoro Refining and Marketing Company has done so.

6. The guarantor agrees to notify the DTSC by certified mail of a voluntary or involuntary proceeding under Title 11 (Bankruptcy), United States Code, naming guarantor as debtor, within ten (10) days after commencement of the proceedings.

7. Guarantor agrees that within thirty (30) days after being notified by the DTSC of a determination that the guarantor no longer meets the financial test criteria or that he or she is disallowed from continuing as a guarantor, he or she shall establish alternate liability coverage as specified in California Code of Regulations, title 22, division 4.5, chapter 14 and 15, article 8, sections 66264.147 and 66265.147 in the name of [insert owner/operator name], unless the [insert owner or operator name] has done so.

8. Guarantor reserves the right to modify this agreement to take into account amendment or modification of the liability requirements set by California Code of Regulations, title 22, division 4.5, chapter 14 and 15, article 8, sections 66264.147 and 66265.147, provided that such modification shall become effective only if DTSC does not disapprove the modification within thirty (30) days of receipt of notification of the modification.

(Notary) Date

(b) A valid final court order establishing a judgment against the Principal for bodily injury or property damage caused by sudden or nonsudden accidental occurrences arising from the operation of the Principal's facility/TTU or group of facility(ies)/TTU(s).

14. In the event of combination of this guarantee with another mechanism to meet liability requirements, this guarantee will be considered primary coverage.

I hereby certify that the wording of this guarantee is identical to the wording as specified in California Code of Regulations, title 22, section 66264.151, subsection (h)(2) and is being executed in accordance with the requirements of California Code of Regulations, title 22, division 4.5, chapter 14 and 15, article 8.

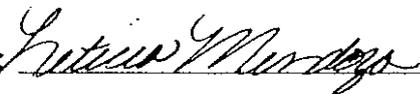
March 4, 2008

Tesoro Corporation



Otto C. Schwethelm  
Vice President and Chief Financial Officer

Signature of witness of notary:



Director, Financial Assurance  
California Dept. of Toxic Substances Control  
1001 I Street  
Sacramento, CA 95814-2828

Guarantee made this 4<sup>th</sup> day of March, 2008 by Tesoro Corporation, a business corporation organized under the laws of the State of Delaware, herein referred to as guarantor, to the Department of Toxic Substances Control (DTSC), obligee, on behalf of our subsidiary Tesoro Refining and Marketing Company of 150 Solano Way, Martinez, CA.

This guarantee is made on behalf of the Tesoro Refining and Marketing Company's Golden Eagle Refinery, which is our subsidiary to the DTSC.

#### RECITALS

1. Guarantor meets or exceeds the financial test criteria and agrees to comply with the reporting requirements for guarantors as specified in California Code of Regulations, title 22, division 4.5, chapter 14 and 15, article 8, section 66264.143, subsection (f), section 66264.145, subsection (f), section 66265.143, subsection (e), and section 66265.145, subsection (e).

2. Tesoro Refining and Marketing Company owns at least 50 percent of the voting stock of and/or operates the following hazardous waste management facility(ies)/transportable treatment unit(s) (TTU) covered by this guarantee:

EPA Identification Number: CAR000091488  
Facility Name: Tesoro Refining & Marketing Company  
Facility Address: Tesoro Golden Eagle Refinery  
150 Solano Way  
Martinez, CA 94553

EPA Identification Number: CAD000072751  
Facility Name: Tesoro Refining & Marketing Company  
Facility Address: Tesoro Golden Eagle Refinery  
150 Solano Way  
Martinez, CA 94553

3. "Closure plans" and "postclosure plans" as used below refer to the plans maintained as required by California Code of Regulations, title 22, division 4.5, chapters 14 and 15, article 7, for the closure and postclosure care of facilities/TTU(s) as identified above.

4. For value received from Tesoro Refining and Marketing Company, guarantor guarantees to DTSC that in the event that Tesoro Refining and Marketing Company fails to perform closure and postclosure care of the

above facility(ies)/TTU(s) in accordance with the closure or postclosure plans and other permit or interim status requirements whenever required to do so, the guarantor shall do so or establish a trust fund as specified in California Code of Regulations, title 22, division 4.5, chapter 14 and 15, article 8, as applicable, in the name of Tesoro Refining and Marketing Company in the amount of the current closure or postclosure cost estimates as specified in California Code of Regulations, title 22, division 4.5, chapter 14 and 15, article 8.

5. Guarantor agrees that if, at any time during or at the end of any fiscal year before the termination of this guarantee, the guarantor fails to meet the financial test criteria, guarantor shall send within 90 days, by certified mail, notice to DTSC and to Tesoro Refining and Marketing Company that he or she intends to provide alternate financial assurance as specified in California Code of Regulations, title 22, division 4.5, chapter 14 and 15, article 8 as applicable, in the name of Tesoro Refining and Marketing Company. Within 120 days after the end of such fiscal year or other occurrence, the guarantor shall establish such alternate financial assurance unless Tesoro Refining and Marketing Company has done so.

6. The guarantor agrees to notify DTSC by certified mail of a voluntary or involuntary proceeding under Title 11 (Bankruptcy), United States Code, naming guarantor as debtor within ten (10) days after commencement of the proceeding.

7. Guarantor agrees that within 30 days after being notified by DTSC of a determination that guarantor no longer meets the financial test criteria or that he or she is disallowed from continuing as a guarantor of closure or postclosure care, he or she shall establish alternate financial assurance as specified in California Code of Regulations, title 22, division 4.5, chapter 14 and 15, article 8, as applicable, in the name of Tesoro Refining and Marketing Company unless Tesoro Refining and Marketing Company has done so.

8. Guarantor agrees to remain bound under this guarantee notwithstanding any or all of the following: amendment or modification of the closure or postclosure plan, amendment or modification of the permit, the extension or reduction of the time of performance of closure or postclosure, or any other modification or alteration of an obligation of the owner or operator pursuant to California Code of Regulations, title 22, division 4.5.

9. Guarantor agrees to remain bound under this guarantee for as long as Tesoro Refining and Marketing Company shall comply with the applicable financial assurance requirements of California Code of Regulations, title 22, division 4.5 for the above listed facilities/TTUs, except as provided in paragraph 10 of this agreement.

10. Guarantor may terminate this guarantee by sending notice by certified mail to DTSC and to Tesoro Refining and Marketing Company, provided that

this guarantee may not be terminated unless and until the Tesoro Refining and Marketing Company obtains, and DTSC approve(s), alternate closure and/or postclosure care coverage complying with California Code of Regulations, title 22, division 4.5, chapter 14 and 15, article 8.

11. Guarantor agrees that if Tesoro Refining and Marketing Company fails to provide alternate financial assurance as specified in California Code of Regulations, title 22, division 4.5, chapter 14 and 15, article 8, as applicable, and obtain written approval of such assurance from DTSC within 90 days after a notice of cancellation by the guarantor is received by DTSC from guarantor, guarantor shall provide such alternate financial assurance in the name of Tesoro Refining and Marketing Company.

12. Guarantor expressly waives notice of acceptance of this guarantee by DTSC or by Tesoro Refining and Marketing Company. Guarantor also expressly waives notice of amendments or modifications of the closure and/or postclosure plan and of amendments or modifications of the facility/TTU permit(s).

The parties hereby certify that the wording of this guarantee is identical to the wording specified in California Code of Regulations, title 22, section 66264.151, subsection (h)(1) and is being executed in accordance with the requirements of California Code of Regulations, title 22, division 4.5, chapter 14 and 15, article 8.

March 4, 2008

Tesoro Corporation



Otto C. Schwethelm  
Vice President and Chief Financial Officer

Signature of witness or notary: Patricia M. Munday

Director, Financial Assurance  
California Dept. of Toxic Substances Control  
1001 I Street  
Sacramento, CA 95814-2828

To Whom It May Concern:

I am the chief financial officer of Tesoro Corporation. This letter is in support of this firm's use of the Financial Test to demonstrate financial assurance for liability coverage and closure and/or post closure care, as specified in California Code of Regulations (Cal. Code of Regs.), Title 22, Division 4.5, Chapter 14 and 15, Article 8.

1. The firm is the owner or operator of the following facilities/TTUs for which financial assurance for closure or post-closure care is demonstrated through the financial test as specified in Cal. Code of Regs. , Title 22, Division 4.5, Chapter 14 and 15, Article 8, Sections 66264.143[f], 66264.145[f], 66265.143[f], and 66265.145[f]. The current closure and/or post closure cost estimates covered by the test are shown for each facility/TTU: **None**.

2. This firm guarantees, through the guarantee as specified in of Cal. Code of Regs. Title 22, Division 4.5, Chapter 14 and 15, Article 8, Sections 66264. 143[f], 66264.145[f], 66265.143[f], and 66265.145[f] for the closure and/or post-closure care of the following facilities/TTUs owned or operated by the guaranteed party. The current cost estimates for the closure or post-closure care so guaranteed are shown for each facility/TTU:

EPA ID #CAR000091488  
Tesoro Refining & Marketing Company  
Tesoro Golden Eagle Refinery  
150 Solano Way  
Martinez, CA 94553

Closure: \$288,000  
Post-closure: N/A

Tiered Permitted Unit Operating Under  
Conditional Authorization

EPA ID #CAD000072751  
Tesoro Refining & Marketing Company  
Tesoro Golden Eagle Refinery  
150 Solano Way  
Martinez, CA 94553

Post-closure: \$2,285,000

The firm identified above is the direct or higher tier parent corporation of the owner or operator.

3. In states where the U .S. Environmental Protection Agency is not administering the financial requirements of Subpart H, Title 40 CFR, Parts 264 and 265, this firm as owner or operator or guarantor, is demonstrating financial assurance for the closure or post-closure care of the following facilities/TTUs through the use of a test equivalent or substantially equivalent to the financial test specified in Sections 66264.143[f], 66264.145[f], 66265.143[f], and 66265.145[f] of Cal. Code of Regs. Title 22, Division 4.5, Chapter 14 and 15, Article 8. The current closure and/or post-closure cost estimates covered by such a test are shown for each facility/TTU:

EPA #NDD006175467  
Tesoro Refining & Marketing Company  
Tesoro Mandan Refinery  
PO Box 5000  
Mandan, ND 58554

Closure: \$525,000

EPA #HID056786395  
Tesoro Hawaii Corporation  
Tesoro Kapolei Refinery  
91-325 Komohano Street  
Ewa Beach, HI 96707

Post-closure care: \$989,000

EPA #WAD009275082  
Tesoro Refining & Marketing Company  
Tesoro Anacortes Refinery  
10200 West March's Point Road  
Anacortes, WA 98221

Post-closure care: \$157,000

4. This firm is the owner or operator of the following facilities/TTUs for which financial assurance for closure, or if a disposal facility, post-closure care, is not demonstrated either to U.S. Environmental Protection Agency or a State through the financial test or any other financial assurance mechanism as specified in Cal. Code of Regs., Title 22, Division 4.5, Chapter 14 and 15, Article 8 or equivalent or substantially equivalent State mechanisms. The current closure and/or post-closure cost estimates not covered by such financial assurance are shown for each facility/TTU: None.

5. This firm is the owner or operator or guarantor of the following Underground Injection Control facilities for which financial assurance for plugging and abandonment is required under 40 CFR Part 144. The current closure cost estimates are shown for each facility. None

This firm is required to file a Form 10K with the Securities and Exchange Commission (SEC) for the latest fiscal year.

The fiscal year of this firm ends on December 31. The figures for the following items marked with an asterisk are derived from this firm's independently audited, year-end financial statements for the latest completed fiscal year, ended December 31, 2007.

This firm is using Alternative I for Part A and Alternative I for Part B.

Part A. Liability Coverage for Accidental Occurrences

1. Amount of annual aggregate liability coverage to be demonstrated	\$ 8,000,000
2. Current assets .....	\$ 2,600,000,000
3. Current liabilities .....	\$ 2,494,000,000
4. Net working capital [line 2 minus line 3] .....	\$ 106,000,000
5. Tangible net worth .....	\$ 2,304,000,000

6. If less than 90 percent of assets are located in the United States,  
Give total United States assets ..... N/A
7. Is line 5 at least \$10 million? ..... Yes
8. Is line 4 at least 6 times line 1? ..... Yes
9. Is line 5 at least 6 times line 1? ..... Yes
10. Are at least 90 percent of assets located in the United States? ..... Yes
11. Is line 6 at least 6 times line 1? ..... N/A

Part B. Closure or Post-closure Care and Liability Coverage

Alternative I

1. Sum of current closure and post closure cost  
estimate (total of all cost estimates listed above).....\$ 4,244,000
2. Amount of annual aggregate liability coverage to  
be demonstrated.....\$ 8,000,000
3. Sum of lines 1 and 2 .....\$ 12,244,000
- \*4. Total liabilities (if any portion of your closure or  
post-closure cost estimates is included in your total  
liabilities, you may deduct that portion from this line  
and add that amount to lines 5 and 6).....\$ 5,076,000,000
- \*5. Tangible net worth.....\$ 2,304,000,000
- \*6. Net worth .....\$ 3,052,000,000
- \*7. Current assets.....\$ 2,600,000,000
- \*8. Current liabilities.....\$ 2,494,000,000
- \*9. Net working capital .....\$ 106,000,000
10. The sum of historical net income plus depreciation and  
amortization\* .....\$ 923,000,000
11. Total assets in United States (required only if  
less than 90% of firm's assets are located in  
the United States.) ..... N/A
12. Is line 5 at least \$10 million? ..... Yes
13. Is line 5 at least 6 times line 3? ..... Yes
14. Is line 9 at least 6 times line 3? ..... Yes
15. Are at least 90% of firm's assets located in the  
United States? If not, complete line 16 ..... Yes
16. Is line 11 at least 6 times line 3?..... N/A

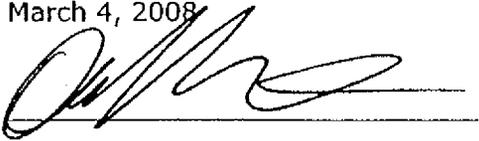
17. Is line 4 divided by line 6 less than 2.0?..... Yes

18. Is line 10 divided by line 4 greater than 0.1?..... Yes

19. Is line 7 divided by line 8 greater than 1.5?..... No

I hereby certify that this letter is worded as specified by the Department of Toxic Substances Control and is being executed in accordance with the requirement of Cal. Code of Regulations, Title 22, Division 4.5, Chapter 14 and 15, Article 8.

March 4, 2008



Otto C. Schwethelm  
Vice President and Chief Financial Officer



Deloitte & Touche LLP  
Suite 1100  
700 North St. Mary's  
San Antonio, TX 78205-3589  
USA

Tel: +1 210 224 1041  
Fax: +1 210 224 9456  
www.deloitte.com

## REPORT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM ON APPLYING AGREED-UPON PROCEDURES

To the Board of Directors  
Tesoro Corporation  
San Antonio, Texas

We have performed the procedures included in the Code of Federal Regulations (CFR) Title 40, Part 264, Section 143 (40 CFR 264.143), which were agreed to by the U.S. Environmental Protection Agency – Region 9, the California Department of Toxic Substances Control and Tesoro Corporation (the “Company”), solely to assist the specified parties in evaluating the Company’s compliance with the financial test option as of December 31, 2007, included in the accompanying letter dated March 4, 2008 from Otto C. Schwethelm, Vice President and Chief Financial Officer, of Tesoro Corporation. Management is responsible for the Company’s compliance with those requirements. This agreed-upon procedures engagement was conducted in accordance with attestation standards established by the American Institute of Certified Public Accountants, as adopted by the Public Company Accounting Oversight Board (PCAOB). The sufficiency of these procedures is solely the responsibility of the parties specified in this report. Consequently, we make no representation regarding the sufficiency of the procedures described below either for the purpose for which this report has been requested or for any other purpose.

The procedures that we performed and related findings are as follows:

1. We compared the amounts included in items two and three under the caption “Part A. Liability Coverage for Accidental Occurrences – Alternative I” and items six, seven, and eight under the caption “Part B. Closure or Post-closure Care and Liability Coverage – Alternative I” in the letter referred to above with the corresponding amounts in the audited financial statements of Tesoro Corporation as of and for the year ended December 31, 2007, on which we have issued our report dated February 28, 2008 (which report expressed an unqualified opinion and included an explanatory paragraph relating to a change in the Company’s method of accounting for refined product sales and purchases transactions with the same counterparty that have been entered into in contemplation of one another, and for its pension and other postretirement plans), and noted that such amounts were in agreement.
2. We recomputed from, or reconciled to, the financial statements referred to in procedure 1 the information included in items four and five under the caption “Part A. Liability Coverage for Accidental Occurrences – Alternative I” and items four, five, nine and ten under the caption “Part B. Closure or Post-closure Care and Liability Coverage – Alternative I” in the letter referred to above and noted no differences.

We were not engaged to, and did not, perform an examination, the objective of which would be the expression of an opinion on the accompanying letter dated March 4, 2008. Accordingly, we do not express such an opinion. Had we performed additional procedures, other matters might have come to our attention that would have been reported to you.

This report is intended solely for the information and use of the board of directors and management of Tesoro Corporation, the U.S. Environmental Protection Agency – Region 9 and the California Department of Toxic Substances Control, and is not intended to be and should not be used by anyone other than these specified parties.

*Deloitte & Touche LLP*

March 26, 2008

**Appendix C**  
**Certification of Recordation and Recorded Notice**  
**August 20, 1993**

File : 1016  
1040.3  
1061

Attachment E

**TOSCO  
CORPORATION**

Tosco Corporation  
2300 Clayton Road, Suite 1100  
Concord, California 94520-2100  
(510) 602-4000  
Fax (510) 602-4018

August 20, 1993

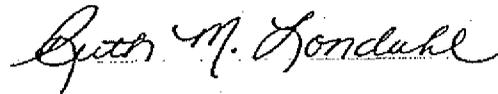
Department of Toxic Substances  
Control, Region 2  
700 Heinz Avenue, Building F, Suite 200  
Berkeley, California 94710  
Attention: Charlene Williams,  
Permitting Branch Chief

Re: Certificate of Recordation: Deed Notice

Dear Ms. Williams:

Enclosed please find a Certificate of Recordation and a copy of the recorded Notice concerning two hazardous waste management units located at the Avon Refinery in Martinez. This information is submitted pursuant to California Code of Regulations, Title 22, Sections 66265.116 and 66265.119. The language in the Deed Notice was reviewed and approved by DTSC's staff counsel, G. Lynn Thorpe, at a meeting on December 22, 1992.

Very truly yours,



Ruth M. Londahl  
Paralegal

:rml/Enclosure

cc: Elissa Warantz, Esq.  
John Staton ✓

# TOSCO CORPORATION

Tosco Corporation  
2300 Clayton Road, Suite 1100  
Concord, California 94520-2100  
(510) 602-4000  
Fax (510) 602-4018

August 20, 1993

Department of Toxic Substances  
Control, Region 2  
700 Heinz Avenue, Building F, Suite 200  
Berkeley, California 94710  
Attention: Charlene Williams,  
Permitting Branch Chief

Dear Ms. Williams:

### Certificate of Recordation

In accordance with Title 22, Section 66265.119(b)(2), Tosco Corporation hereby certifies that on July 16, 1993, Tosco Corporation recorded a notation on the deed to the property containing Tosco's Avon Refinery notifying any potential purchaser of the property that:

1. the land has been used to manage hazardous wastes;
2. use of the land is restricted under Title 22, Chapter 15, Section 7 of the California Code of Regulations; and
3. a survey plat and record of the type, location, and quantity of hazardous wastes managed of within each waste management unit has been submitted to the Contra Costa County Community Development Department and to the Department of Toxic Substances Control.

TOSCO CORPORATION, a  
Nevada corporation

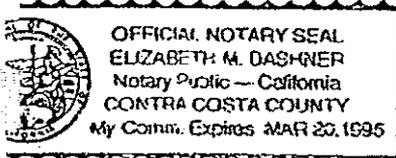
By: Rayford S. Thomas  
Rayford S. Thomas

Its: Assistant Secretary

State of California )  
 )  
County of Contra Costa )

On August 20, 1993, before me, Betty Dashner, Notary Public,  
personally appeared Rayford S. Thomas,

personally known to me -OR-  proved to me on the basis of  
satisfactory evidence to be the  
person(s) whose name(s) is/are  
subscribed to the within  
instrument and acknowledged to  
me that he/she/they executed the  
same in his/her/their authorized  
capacity(ies), and that by  
his/her/their signature(s) on the  
instrument the person(s), or the  
entity upon behalf of which the  
person(s) acted, executed the  
instrument.



WITNESS my hand and official  
seal.  
*Elizabeth M. Dashner*  
SIGNATURE OF NOTARY

OPTIONAL SECTION  
CAPACITY CLAIMED BY SIGNER

Though statute does not require the Notary to  
fill in the data below, doing so may prove  
invaluable to persons relying on the document.

- INDIVIDUAL
- CORPORATE OFFICER(S)  
Assistant Secretary  
TITLE(s)
- PARTNER(S)       LIMITED  
    GENERAL
- ATTORNEY-IN-FACT
- TRUSTEE(S)
- GUARDIAN/CONSERVATOR
- OTHER \_\_\_\_\_

SIGNER IS REPRESENTING;  
NAME OF PERSON(S) OR ENTITY(IES)  
Tosco Corporation

OPTIONAL SECTION

THIS CERTIFICATE MUST BE ATTACHED TO  
THE DOCUMENT DESCRIBED AT RIGHT:

TITLE OR TYPE OF DOCUMENT Certificate of Recordation

Though the data requested here is not required by law,  
it could prevent fraudulent reattachment of this form.

NUMBER OF PAGES 2 DATE OF DOCUMENT 8/20/93

SIGNER(S) OTHER THAN NAMED ABOVE \_\_\_\_\_

JUL 16 1993

RECORDED AT REQUEST OF

93 189938

JUL 16 1993

WHEN RECORDED, MAIL TO:

Tosco Corporation  
Avon Refinery  
Martinez, California 94553-1487  
Attention: C. A. Taylor

AT 2 O'CLOCK P M  
CONTRA COSTA COUNTY RECORDS  
STEPHEN L. WEIR  
COUNTY RECORDER

FEE:

*John*

50K 1875410 108

NOTICE

In accordance with Title 22, Section 66265.119 of the California Code of Regulations, notice is hereby given as follows:

1. This notice shall attach to and concern certain real property owned by Tosco Corporation and located in Contra Costa County, California, described in the Grant Deed recorded April 1, 1976, in Contra Costa County Records as Instrument Number 33617 at Book 7810, Page 415.

2. A portion of the real property referred to above has been used to manage hazardous wastes, and its use is restricted under Title 22, Chapter 15, Article 7 of the California Code of Regulations. A survey plat and a record of the type, location and quantity of hazardous wastes managed of within each waste management unit has been filed with the Contra Costa County Community Development Department and the California Department of Toxic Substances Control.

TOSCO CORPORATION,  
a Nevada corporation

By: James M. Cleary  
Its: Sr. Vice President

**Attachment 1  
Closure Plan  
of Oil Waste Surface Impoundments**

Plan  
CLOSURE OF THE OILY WASTE  
SURFACE IMPOUNDMENTS

Prepared for

Tosco Corporation  
Avon Refinery  
Martinez, California 94553

Prepared by

EA Engineering, Science, & Technology, Inc.  
41 Lafayette Circle, Suite A  
Lafayette, California 94549

November 1985

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## 1. INTRODUCTION/CLOSURE PERFORMANCE STANDARD

The Tosco Corporation Avon Refinery has two hazardous waste surface impoundments located on the site. These two impoundments, called the "oily waste surface impoundments", are the only site operations that are regulated under the Resource Conservation and Recovery Act (RCRA) and Chapter 6.5 of the California State Department of Health Services Hazardous Waste Control Law.

Tosco Corporation currently operates the oily waste surface impoundments under an interim status document issued by the California Department of Health Services. In early 1983 the U.S. Environmental Protection Agency requested that Tosco Corporation submit an application for a hazardous waste facility permit. Tosco Corporation submitted the Part B application in August of 1983. EPA was in the process of reviewing this application when Tosco Corporation decided that they would close the surface impoundments instead of pursuing the permit application. As a regulated interim status facility, Tosco Corporation is submitting this closure plan to the California Department of Health Services for approval, in compliance with California law.

Tosco intends to close the oily waste surface impoundments according to the provisions of Title 22, California Administrative Code, paragraph 67316(b). This closure plan describes the steps that will be taken to:

1. Eliminate free liquid (Section 5.1);
2. Stabilize the remaining waste to a bearing capacity sufficient to support the final cover (Section 5.5);
3. Cover the surface impoundment with a final cover designed and constructed to:

- a. minimize the downward entry of water into the closed impoundment throughout a period of at least 100 years (Section 5.5 and Section 7)
- b. function with minimum maintenance (Section 5.5)
- c. promote drainage and minimize erosion or abrasion of the cover (Section 5.5)
- d. accomodate settling and subsidence so that the cover's integrity is monitored (Section 7)
- e. accomodate lateral and vertical forces generated by the maximum credible earthquake so that the integrity of the cover is maintained (Section 9)
- f. preclude ponding of rainfall or run-on over the closed area (Section 5.5), and
- g. satisfy the performance criteria of 22CAC Section 67288 (f) to provide a cover design that will remain unimpaired for at least 100 years (Section 5.5, Section 7, and Section 9).

Any liquid remaining in the impoundments at the beginning of the closure period will be removed. The remaining residues and contaminated soil will be covered with an earthen backfill and a vegetative cover.

The closure procedure proposed herein will provide protection for human health and the environment, and will minimize the potential for post-closure escape of hazardous waste, hazardous waste constituents, leachate, contaminated rainfall or waste decomposition products to the ground or surface waters or to the atmosphere. Thus, this closure plan will achieve the closure performance standard specified in 22CAC paragraph 67211.

## 2. FACILITY INFORMATION

### 2.1 GENERAL PLANT DESCRIPTION

The Avon Refinery is located about 3 miles east of Martinez, California, on the southern shore of Suisun Bay in Contra Costa County. The refinery property includes approximately 2,100 acres. The property is generally bounded to the north by the Southern Pacific railroad right-of-way and Suisun Bay; to the west by Pacheco slough; to the south by the Southern Pacific pumping station, Memory Gardens Cemetery and Mallard Reservoir; to the east by the Sacramento Northern Railroad right-of-way; and to the northeast by the Concord Naval Weapons Station. The street address of the refinery is

Tosco Corporation  
/ Avon Refinery  
Solano Way  
Martinez, California 94553  
EPA ID No. CAD000072751

The refinery was originally constructed by Associated Oil Company in 1913. Ownership subsequently passed through a variety of companies until the refinery was acquired by Tosco on April 1 1976. The purpose of the refinery is to produce refined petroleum products, principally gasoline and diesel fuel, from crude oil produced in the San Joaquin Valley and Alaska.

The principal process units are distillation, "cracking", reforming, and alkylation. The first two processes use crude oil delivered to the refinery to make lighter commercial-grade petroleum products while removing impurities. The last two processes upgrade intermediate streams to make additional gasoline.

## 2.2 OPERATION OF HAZARDOUS WASTE SURFACE IMPOUNDMENTS

Historically, oily sludges were delivered by truck to the oily waste surface impoundments. After adequate time had been allowed for the particulates in the oily waste to settle out, the supernatant oil was drawn off for reprocessing. The impoundments also received other oily wastes, including tank bottoms and emulsions. The practice of delivering waste to the impoundments was terminated in late 1983.

### 3. GENERAL SITE CHARACTERISTICS

In early 1985, Tosco Corporation contracted with The MARK Group, a hydrogeological consulting firm, to undertake a comprehensive hydrogeologic assessment of the facility. The work included regional stratigraphy, regional water levels, gradients, flow direction, water quality, and location and construction of wells on the Tosco property and within a 1-mile radius of the facility. The following information has been extracted from several reports submitted to Tosco by the MARK Group (1985).

#### 3.1 TOPOGRAPHY

The Tosco facility primarily occupies the lowlands area adjacent to Suisun Bay. Generally, the topography of the refinery ranges between 0 to 140 feet above mean sea level. The eastern portion of the facility, which includes the area of the oily waste surface impoundments, does not vary more than 10 feet in elevation. In the immediate area of the impoundments, the elevation is approximately 5 feet above mean sea level.

#### 3.2 CLIMATE

The climate of the Tosco refinery is typical of northern California, which is characterized by warm, dry summers and cool, wet winters. No long-term published temperature records were found for any station close to the site. Table 1 lists a 10-year record for a precipitation station which is located at the Contra Costa County Flood Control District office in Martinez, California. The table compares the precipitation data measured at the Tosco facility from 1980 through 1984 with the 10-year record for Martinez. The mean annual precipitation for the past five years at the facility has been around 23 inches. Rantz (1974) found that the mean precipitation for the time period between 1931 and 1970 was 25 inches.

TABLE 1 ANNUAL PRECIPITATION (INCHES) FOR TOSCO REFINERY AREA

<u>Sampling Period</u>	<u>Contra Costa (Seasonal)</u>	<u>Avon Refinery</u>	
		<u>Calendar</u>	<u>Seasonal</u>
1984(a)		11.81	
Jul 1983 - Jun 1984(b)	16.35		
1983		35.37	
Jul 1982 - Jun 1983	32.95		38.20
1982		29.78	
Jul 1981 - Jun 1982	31.34		28.16
1981		20.54	
Jul 1980 - Jun 1981	10.95		18.41
1980		17.68	
Jul 1979 - Jun 1980	23.89		17.06
Jul 1978 - Jun 1979	15.41		
Jul 1977 - Jun 1978	27.86		
Jul 1976 - Jun 1977	8.00		
Jul 1975 - Jun 1976	5.63		
Jul 1974 - Jun 1975	16.62		

(a) Calendar year.

(b) Seasonal year.

Source: Contra Costa Flood Control District, Martinez, Calif.

Evaporation measurements for the area surrounding the facility are scarce. A Class-A evaporation pan was operated at Mallard Reservoir from 1930 to 1944; however, during that time, only five years had complete evaporation measurements for all months. The mean evaporation for the five years (1937, 1938, 1940, 1941, and 1942) was reported to be about 55 inches. Another Class-A pan has been monitored at the Antioch pump plant, which is approximately 18 miles east of the site. The mean evaporation for the time period between 1949 and 1978 was about 73 inches.

Wind data for the Martinez area are primarily derived from studies conducted by Shell Oil Company, which is 2 miles west of Tosco. These studies found that during the dry period (May-September), 90-95 percent of all surface winds had a westerly component. During the night, approximately 50 percent of all winds had speeds in the range of 6-10 miles per hour (mph), and during the daytime about 45 percent of the winds had speeds ranging from 11 to 15 mph. Wind speeds in excess of 21 mph are rare.

### 3.3 DRAINAGE

Four creeks drain Ygnacio Valley, and the total area of the watershed tributary to the valley is 130 square miles. The main stream which flows through this valley is Walnut Creek. It has a drainage area of approximately 98 square miles, and a total length of approximately 25 miles. Walnut Creek discharges into Pacheco Creek west of the Tosco facility. Pacheco Creek, in turn, becomes Pacheco Slough when it discharges into Suisun Bay.

A map showing contours of mean annual runoffs for the time period of 1931-1970, prepared by Rantz (1974) on the basis of 76 stream gauging stations, indicates that the mean annual runoff for the Tosco site is estimated to be between 0.5 and 5 inches.

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### 3.3 DRAINAGE

Four creeks drain Ygnacio Valley, and the total area of the watershed tributary to the valley is 130 square miles. The main stream which flows through this valley is Walnut Creek. It has a drainage area of approximately 98 square miles, and a total length of approximately 25 miles. Walnut Creek discharges into Pacheco Creek west of the Tosco facility. Pacheco Creek, in turn, becomes Pacheco Slough when it discharges into Suisun Bay.

A map showing contours of mean annual runoffs for the time period of 1931-1970, prepared by Rantz (1974) on the basis of 76 stream gauging stations, indicates that the mean annual runoff for the Tosco site is estimated to be between 0.5 and 5 inches.

Rantz's mean annual runoff map does not take into account that a majority of the Tosco site is covered by asphalt, concrete and other impervious materials. In Woodward-Clyde Consultants' September 1984 report, "Percentage of Storm Runoff Treated by Existing Storm Sewer System at Tosco's Avon Refinery", it was calculated that approximately 91 percent of all precipitation that falls on the Tosco site runs off into the storm sewer system.

### 3.4 GEOLOGY/HYDROGEOLOGY

The purpose of this section is to provide a very brief and general description of the geology and hydrogeology in the refinery region. A more detailed discussion is included in Appendix B. The text of Appendix B is excerpted from a report prepared for Tosco by the MARK Group (1985).

The stratigraphy in the area of the Avon Refinery consists of Bay Mud, younger alluvium, older alluvium, and Cretaceous and Tertiary bedrock. In many areas of the refinery, the Bay Mud has been covered with several feet of fill material. In general, the sediments have a slope of less than 1 degree to the north. Two exceptions are the bedrock, which is steeply dipping, and an anticline just east of Pacheco Slough which has caused the older alluvial deposits to slope 8-10 degrees to the east.

The Bay Mud increases in thickness from south to north across the site and reaches thicknesses of nearly 40 feet at the northern end. The younger alluvium consists of thin alluvial/fluvial and marsh deposits (primarily unconsolidated clays with lenses and layers of sand, silt, and minor gravel). The younger alluvium was deposited coincident with the Bay Mud but is the result of terrestrial rather than bay/marine deposition. The older alluvium underlies the entire site, but varies in thickness from thin on the hills to 450 feet or more in the valley basins. The

majority of the unit is clay and silt, but it contains beds of sand and gravel up to 40 feet thick.

The refinery is underlain by a discontinuous water-bearing zone that occurs at a depth of 20 to 40 feet and is enveloped by silty clay. Below this zone is an apparently continuous 20-35 feet thick clay aquitard. Underlying the aquitard, a 20-35 feet thick sand zone exists at a depth between 60 to 95 feet. This zone appears to be confined or semi-confined by the overlying aquitard. Field tests are planned for early 1986 to confirm this condition.

In general, regional ground water flow is from the south to the north with discharge into Suisun Bay. Locally, ground water flow is influenced by several recharge and discharge sites on or near the refinery. In the area of the oily waste surface impoundments, a ground water flow reversal occurs. In this area, the flow is from the north to the south with some seasonal variability.

#### 4. CHARACTERISTICS OF THE OILY WASTE SURFACE IMPOUNDMENT AREA

The surface impoundment area consists of two impoundments hereafter referred to as West Impoundment and the East Impoundment. The table below summarizes the pertinent dimensions of the two impoundments.

	<u>Approximate Depth (ft)</u>	<u>Approximate Area (ft<sup>2</sup>)</u>	<u>Approximate Capacity (ft<sup>3</sup>)</u>
West Impoundment	6	58,800	300,000
East impoundment	6	70,500	300,000

The long axis of the impoundments is in the north-south direction. The west impoundment has been drained of liquid waste for the past 2 years. Most of the sludge and residue has also been removed. A thin layer of sludge cake still remains.

Both impoundments were excavated below the previous land surface in an area that was once part of the coke storage area. A small above-grade dike exists on the east side of the east impoundment. The natural grade in this area slopes gently to the east. See Appendix A for photos of the area.

##### 4.1 IMPOUNDMENT SUBSURFACE SOIL CONDITIONS

The local subsoil is composed of Bay Mud/Marsh deposits that may significantly influence the geochemistry of the ground water because of (1) the high, natural organic carbon content of the clays and peats; (2) the relatively large amount of the fine grained material, and its lesser hydraulic conductivity with respect to the underlying younger alluvium; and (3) the relatively high salinity of the water-bearing zones.

The high natural organic carbon content of the Bay Muds represents the most significant control on the ambient ground water quality and on the transport of introduced organic and

inorganic chemicals. Some of the more important geochemical processes that may occur in the presence of high concentrations of organic carbon in the substrate include:

- a high degree of adsorption of many organic chemicals and metals directly onto naturally occurring organic carbon surfaces,
- lowering of the oxidation potential (pE) of the ground water, which affects the mobility of many metals, and
- transformation of organic and inorganic compounds into different compounds.

Ground water associated with naturally occurring organic sequences (peat) is often enriched in inorganic and organic compounds that are otherwise found in relatively low levels in the natural environment. This phenomenon is attributable to:

- bioaccumulation of trace and heavy metals in the material comprising the peats (particularly arsenic from marine water),
- rapid changes in the geochemical controls (e.g., pE and pH) associated with these deposits (these changes can result in precipitation of some metals from ground water), and
- microbial activities, which can create and destroy organic compounds.

The adsorptive capacity of naturally occurring organic material for metals and organic compounds is well established (Cherry et al. 1983). The high natural organic compound content of the peats and clays of the Bay Mud/Marsh deposits probably adsorbs large amounts of metal ions from solution.

A change in the pE of ground water can have significant effects upon the mobility of metals with multiple valence states, such as arsenic, chromium, and mercury (Cherry et al. 1983). Changes in pE can result in precipitation or dissolution of various minerals containing heavy metals.

Transformations of inorganics and organics can also have significant effects on the ground water chemistry. Compounds may be altered, destroyed, or created. In some cases, compounds of increased or decreased toxicity may result (Alexander 1981).

The clays and silts of the Bay Mud and Marsh deposits represent a significant reservoir for adsorption of organic compounds and dissolved metals that have a high ionic potential, such as hexavalent chromium. Although the ionic strength of the shallow ground water is relatively high, resulting in saturation of the available adsorption sites, the high ionic potential or ratio of charge to ionic radius of many metal species should result in extensive cation exchange between the interstitial fluid and the substrate. The lower permeabilities of these finer materials should also result in ample time for rate-dependent adsorption reactions to occur. In general, metals and organic compounds detected in the soil cores of the Bay Mud/Marsh deposits are expected to be immobile.

#### 4.2 LOCAL GEOLOGIC/HYDROGEOLOGIC SETTING

Regional soils, geology, and hydrogeology have been described in reports prepared for Tosco by the MARK Group and Woodward-Clyde; that information has been summarized in Appendix B. The local geologic setting was addressed by the MARK Group in a report to Tosco Corporation on 28 August 1985. The report, entitled "Report Phase I - Oily Waste Surface Impoundments", is quoted herein.

Based upon the geologic logs of wells and borings around the impoundments, cross-sections A-A and B-B are presented in Drawings 2 and 3 respectively (Appendix D). Drawing 1 (Appendix D) shows the locations of these cross-sections. Section A-A' is a west-east section through both impoundments. In this section the surficial soil consists of clayey silts and fine sands. This unit is generally 1-3 feet thick. Below the silts is a 5-7 foot thick poorly sorted sand unit which contains visible evidence of coke. Underneath the coke is a 2-3 foot thick peat unit which represents deposition in a marsh environment. The next geologic unit descending in depth is a 5-8 foot thick layer of plastic clay. This clay appears to be present in all of the boreholes; however, in cross-section B-B' it appears that this clay unit thins in a southerly direction.

Below the clay is a relatively thick 8-10 foot thick layer of silty sand. This unit appears to be the first major water-bearing zone below the impoundments. Directly below the silty sand unit is a thick clay unit. The borehole log for 23-M indicates that this clay unit is at least 20 feet thick. This unit would act as an aquitard between the upper and lower water-bearing zones. As evidenced by its presence in MB-6, the clay aquitard does appear to have lateral continuity under the site, at least in the north-south direction. Other boreholes drilled by MARK did not extend deep enough to encounter the aquitard.

An assessment of ground water flow directions in the area of the oily waste surface impoundments was submitted to Tosco in a letter dated 30 July 1985 (Appendix E). In general, ground water is encountered approximately 7-9 feet below land surface on the outside of the impoundments. It is encountered at a depth of approximately one to two feet below the bottom of the west impoundment. The general ground water direction is from north to south.

#### 4.3 INTERIM STATUS GROUND WATER MONITORING

Interim Status ground water monitoring has been conducted for the oily waste surface impoundments. The local flow direction of the uppermost aquifer is in the north to south direction with some seasonal variability. On July 31, 1985 Tosco submitted to the California Regional Water Quality Control Board (CRWQCB) a summary of the ground water monitoring program and the results of ground water analysis since May 1984. A copy of this report, which was prepared by the MARK Group, is included as Appendix F.

After the closure period and certification of closure, Tosco Corporation will initiate the post-closure ground water monitoring required by 22CAC Section 67217, as described in Section 6 of the post-closure plan.

## 5. CLOSURE METHOD

The closure procedure will ensure that all residue and contaminated subsoil will be stabilized and covered to minimize post-closure care. The stabilization will be accomplished by removing any free-standing liquid and then allowing the impoundments to dry. The impoundments will then be backfilled using low-permeability soil available on-site. The backfill material will be installed in 6-8 inch lifts. Each lift will be compacted to ensure the stability of the final cover and to further reduce the permeability of the backfill material. The backfill material will be graded to a 3-5% slope and will be seeded to establish a vegetative cover. This procedure will ensure the long-term stability of the closed impoundments and prevent precipitation from percolating through the backfilled material.

The methods employed in cover construction and stabilization will be standard construction practices used in earth-moving operations. The operation will be supervised by one or more persons experienced in earth moving and hazardous waste handling. Certification of closure will be provided by an independent registered professional engineer as outlined in Section 13 of this plan.

### 5.1 QUANTITY OF LIQUID

The west impoundment has been empty of liquid waste since late 1983. The east impoundment will be drained of accumulated liquid waste before closure begins. It is anticipated that some precipitation may be accumulated in the impoundments when closure begins. This liquid, based on a mean annual rainfall of 23 inches and evaporation potential of 55 inches, will be very minimal. As much liquid as practical will be pumped out by vacuum truck, and handled as hazardous waste.

## 5.2 QUANTITY AND CHARACTERISTICS OF SLUDGE/CONTAMINATED RESIDUALS

Both impoundments have historically contained the same waste and have been in operation the same length of time. In addition, both impoundments have been cleaned out several times during their existence.

The west impoundment contains a very thin layer of sludge (<1 inch). This impoundment has remained dry for the past few years, and therefore the sludge is in the form of a cake at the bottom of the impoundment. The sludge is brown to dark brown in color, has a flocculant appearance, and an estimated volume of less than 200 cubic yards (CY). No odor is apparent.

The east impoundment has about 2 feet of standing water and oil with very little solids content (less than 2 percent). Settled sludge is concentrated at the bottom in the form of a solid layer. Due to their similar history, it is expected that the east impoundment will contain the same amount and type of sludge after standing liquids have been removed as is found in the west impoundment.

The MARK Group extracted soil cores from the dry bottom of the west impoundment. The analyses of the top 12 inches of the core are presented here as characteristic of the sludge and contaminated residuals. Sample No. MB-8-1, MB-9-1, and MB-10-1 were analyzed for the following constituents (mean concentrations, in mg/kg, are presented):

	<u>Benzene</u>	<u>Toluene</u>	<u>Xylene</u>	<u>Lead</u>	<u>Chromium</u>	<u>Oil/Grease</u>
Concentration	0.513	3.637	0.867	458	0.37	40,000

### 5.3 EQUIPMENT USED FOR CLOSURE

The following equipment or equipment of equal capability will be used during the closure operation:

#### Caterpillar D8H bulldozer tractor

flywheel hp	300
bare tractor weight, lb	49,700
bulldozer weight, lb	11,300

#### Caterpillar 966C 4-wheel-drive loaders (2)

capacity, CY	3
flywheel hp	170
weight, lb	32,000

#### common sheepsfoot roller

weight, lb	20,000
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#### dump trucks (3)

capacity, CY	6
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### 5.4 STABILIZATION AND COVER PROCEDURE/SURFACE RECLAMATION

After the liquid has been removed, the impoundments will be allowed to dry to a point where heavy construction equipment can be employed. It is expected that only tractor vehicles (bulldozer) will be able to work in the dry impoundment due to the potential for inadequate traction. After several lifts of earth fill have been applied and compacted, other types of earth moving equipment may be able to travel over the impoundment surface. It is expected that the bulldozer will have a

coefficient of traction of approximately 0.70\* (clay loam, wet). This would give the bulldozer a usable pull of 61,000 lbs x 0.70 = 42,700 lbs, or 21 tons. This is more than adequate to pull a 10 ton sheepsfoot roller and to push soil.

Earth fill material will be obtained from other areas of the refinery and will consist of well-graded soil mixtures as approved by the engineer.

The extent of grading of the surface areas will be sufficient to establish reasonably smooth contours, and to control storm runoff. Existing surfaces shall be graded to provide stable slopes and surfaces to receive fill materials.

The water content of the earthfill material prior to and during compaction shall be distributed uniformly throughout each layer of the material. The allowable ranges of placement water content are based on design considerations. Compaction and field density tests will be conducted to verify the desired degree of compaction.

The earthfill will be compacted to at least 90 percent of the maximum dry density obtained by the Proctor Compaction Test (ASTM A-698) with a moisture content varying from natural to 2 percent over optimum. As far as practicable, the material shall be brought to the proper water content in the borrow areas before excavation.

Supplementary water, if required, shall be added to the material by sprinkling on the earthfill, and shall be mixed uniformly throughout the layer.

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\* The Standard Handbook for Civil Engineers, Frederick S. Merritt, 2nd edition, 1976, pg 13/17.

The distribution and gradation of the materials throughout the earthfill will be as directed, and will be such that the fills will be free from lenses, pockets, streaks, or layers of material differing substantially in texture or gradation from the surrounding material.

The combined excavation and placing operations shall be such that the materials, when compacted in the earthfill, will be blended sufficiently to secure the best practicable degree of compaction. Successive loads of material shall be placed on the earthfill so as to produce the best practicable distribution of the material, subject to the approval of the engineer. To accomplish this, the construction manager may designate the locations in the earthfill where the individual loads shall be deposited.

The earthfill shall be placed in continuous, approximately horizontal layers not more than 12 inches in thickness (loose measure) and shall be compacted by a roller. If, in the opinion of the engineer, the surface of the prepared foundation of the rolled surface of any layer or earthfill is too dry or smooth to bond properly with the layer of material to be placed thereon, it shall be moistened and/or worked with a harrow, scarifier, or other suitable equipment, in an approved manner to a sufficient depth to provide a satisfactory bonding surface before the next succeeding layer of earthfill material is placed.

A sheepsfoot roller or equivalent will be used for compaction. The weight of a roller when fully loaded will not be less than 1,000 pounds per foot of length of drum. The loading used in the roller drums and operation of the rollers will be as required to obtain the desired compaction. The bulldozer used for pulling the sheepsfoot roller will have sufficient power to pull the roller satisfactorily when drums are fully loaded with sand and water.

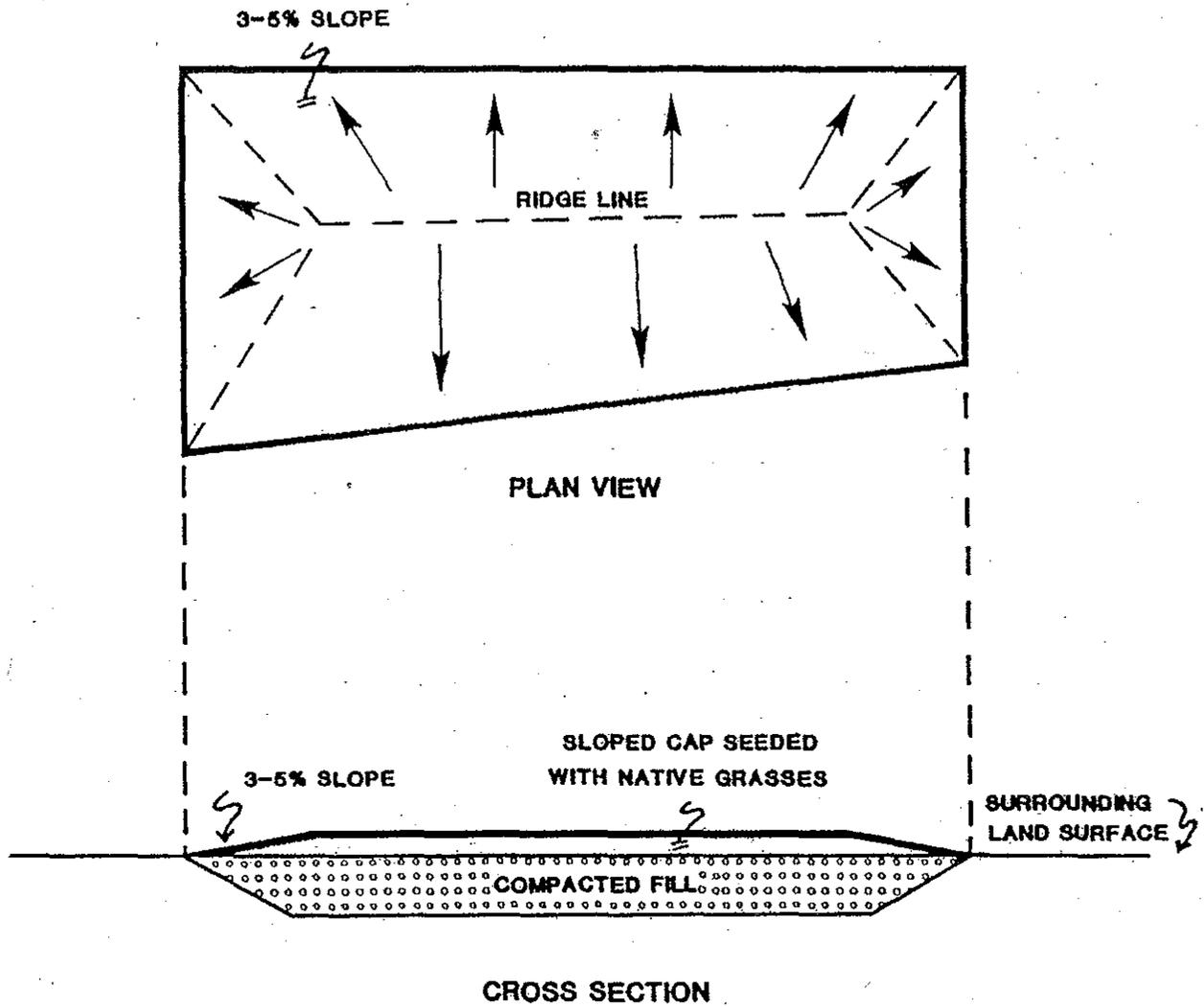


Figure 1. Generalized plan for cap construction (not to scale).

A final slope of 3-5% will be constructed to maintain adequate drainage from the covers. If needed to promote vegetation, a six inch layer of topsoil will be applied to the top of the cover. This will be seeded with common grasses, while deep rooting vegetation will be discouraged. A generalized illustration of cap construction is presented in Figure 1.

## 6. PERSONNEL SAFETY

The purpose of the safety plan is to establish requirements for protecting the health and safety of workers during closure activities.

During the construction operation, the designated project safety officer will be present to monitor and direct the activities. He or she will be responsible for safe practices and adherence of the workers to the protective equipment requirements.

Safety precautions will be taken during the closure procedure to ensure the safety of site workers. Safety precautions will be instituted to protect workers from the dangers of working with heavy equipment and from potential exposure to airborne contaminants. Routine Tosco safety procedures will be instituted according to the Tosco Safety Manual, 1985 edition (Tosco 1985).

Mechanical disturbance of the waste residuals and contaminated subsurface soil may generate airborne particles, possibly containing heavy metals and organics, that could potentially impact the health of workers breathing the ambient air. At a minimum, the following safety equipment will be used by site personnel involved in the closure procedure:

- appropriate half-face air-purifying respirator (MSHA/NIOSH approved)
- chemical-resistant clothing (coveralls; tyvex suits or equivalent)
- gloves (outer), chemical-resistant
- boots (outer), chemical-resistant, steel toe and shank
- boot covers (outer), chemical-resistant (disposable)

- hard hat
- safety glasses and side shields.

If conditions warrant, additional protective equipment may be specified by the safety officer or by the refinery's industrial hygiene staff.

## 7. BEARING CAPACITY/SETTLEMENT POTENTIAL

The principles of foundation engineering can be used to assess the magnitude of potential settling during the post-closure period. The assessment presented in this section demonstrates that settling during the post-closure period will not significantly impair the condition or function of the final cover.

For the purpose of this assessment, the following facts and assumptions were used:

1. The backfill material will behave in a manner analogous to a spread footing for a building.
2. The vertical pressure exerted by the backfill material on the subsurface units can be determined by reference to standard compression charts (see Figure 2).
3. The backfill material will occupy a volume of approximately 470 ft x 150 ft x 8 ft (length x width x depth).
4. The density of the backfill material will be 110 lbs/ft<sup>3</sup>, yielding a dead load pressure of 880 lbs/ft<sup>2</sup>. (This is a conservative assumption using typical values for soft clays under saturated conditions).

The first step in the assessment is to determine the preconstruction pressure in the clay units below the impoundments. Woodward-Clyde (1982) found unconfined compressive strengths in well no. 23M to be greater than 1,000 lb/ft<sup>2</sup> below 14 feet with a substantial increase at 38 feet to greater than 10,000 lb/ft<sup>2</sup>. The horizons between 14 feet and 38 feet consist primarily of clay. For purposes of the settlement calculation,

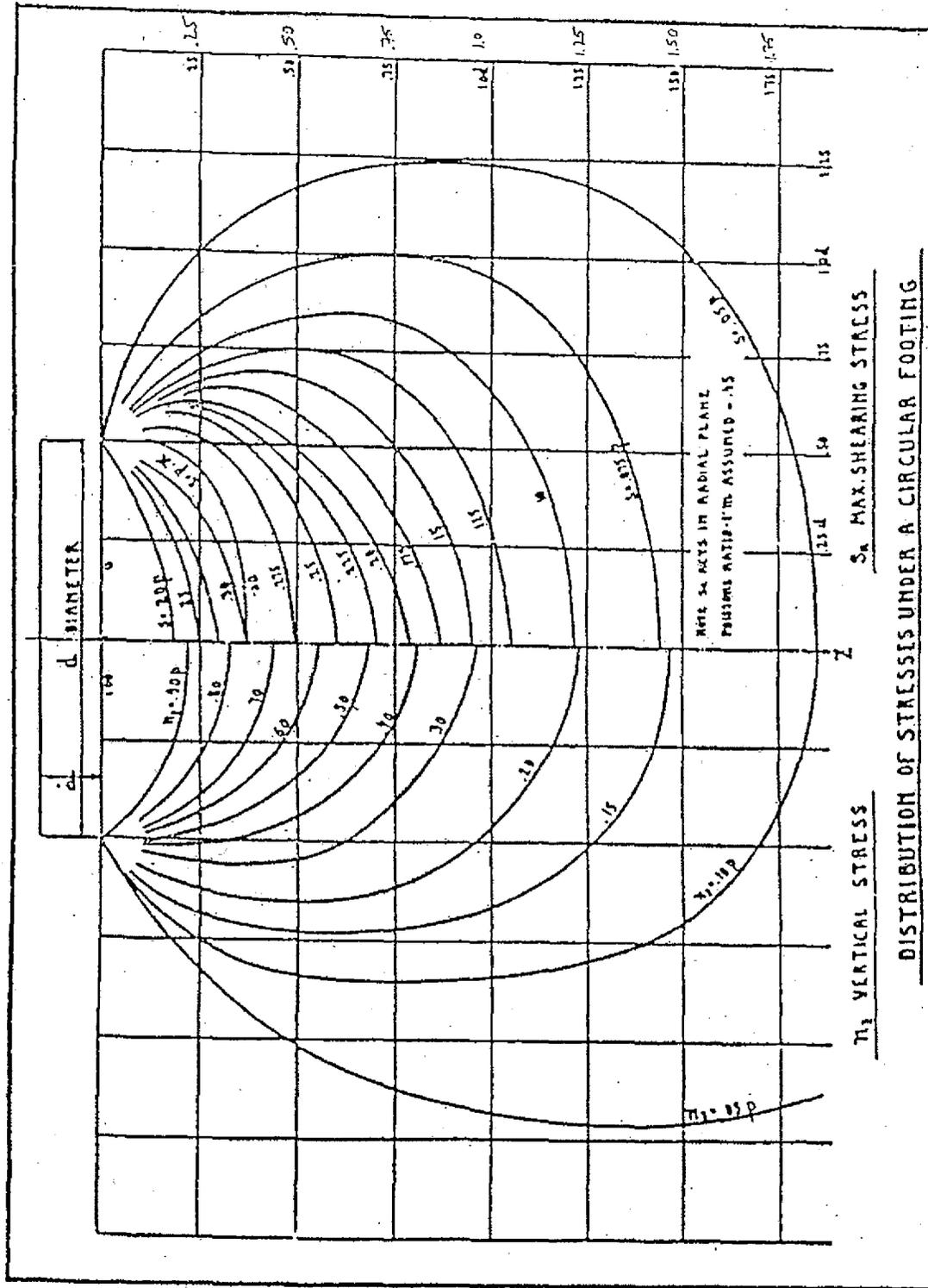


Figure 2. Standard compression chart.

it will be assumed that this interval will respond uniformly to the applied load. This is a reasonable assumption based on the uniformity of the unconfined compression results. Because of the high unconfined compression results below 38 feet (and by reason of the depth itself) it is assumed that this material has been prestressed to such an extent that the overburden from the backfill will not affect it.

A simplified cross section of the impoundment area is presented in Figure 3. The impoundment excavation is approximately equal in depth to the first silty clay horizon encountered. The bottom of the surface impoundment is approximately 1 foot above the water table.

The following formula, derived by Boussinesq and Westergaard (Sowers and Sowers 1970), can be used to estimate the potential compression resulting from the backfill:

$$\Delta H = \frac{HC_c}{1 + e_o} \log_{10} \frac{P_o + \Delta P}{P_o}$$

where  $\Delta H$  = change in compression

$C_c$  = compressive index

$e_o$  = void ratio =  $V_v/V_s$

$V_v$  = volume of void

$V_s$  = volume of solid

$\Delta P$  = change in pressure

$P_o$  = original pressure exerted on the midpoint of each sub-surface horizon prior to the impoundment excavation.

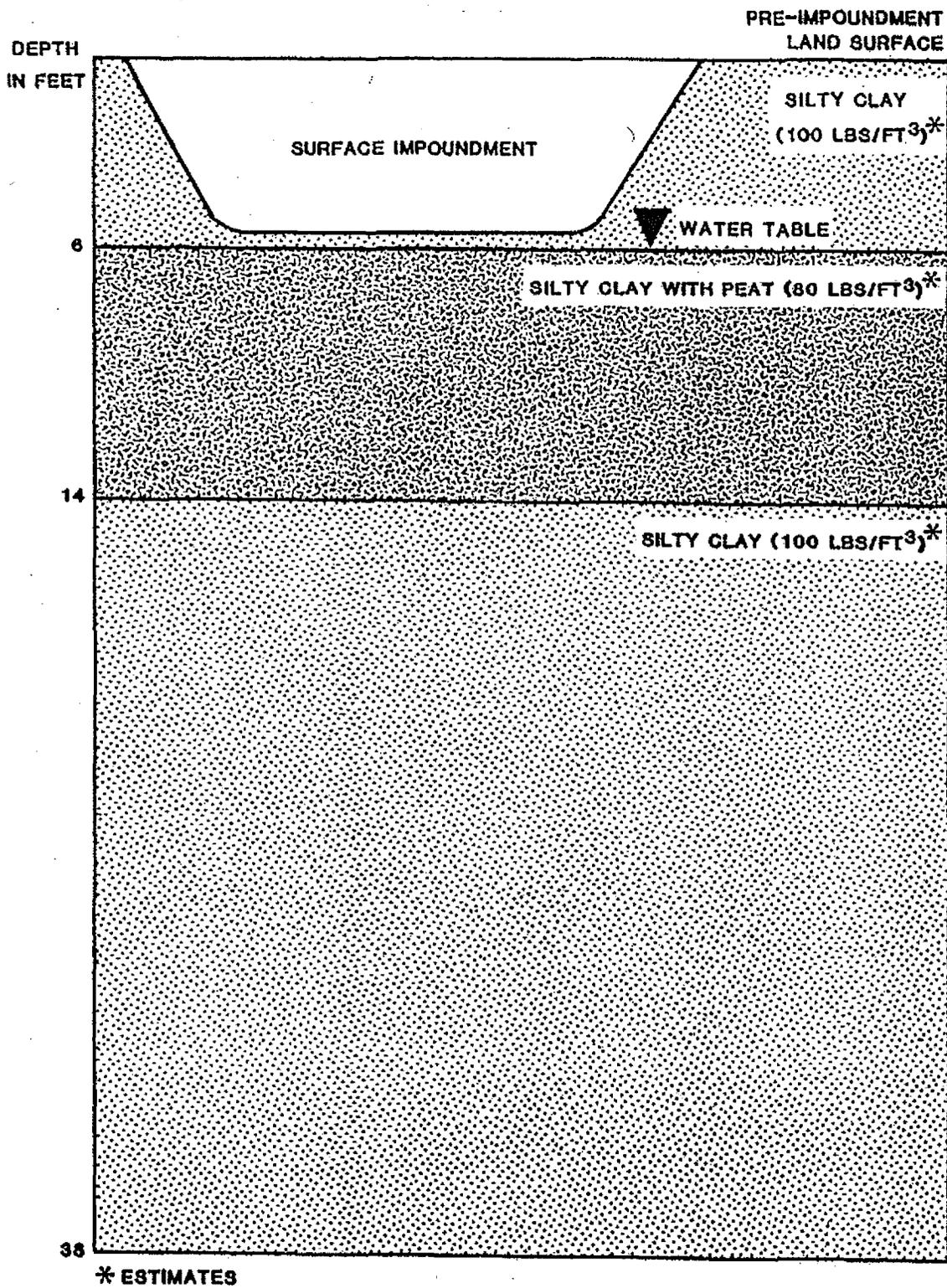


Figure 3. Cross section of the impoundment area—  
Woodward/Clyde Consultants.

The original pressure ( $P_0$ ) can be calculated according to the following equation:

$$P_0 = \sum_{i=1}^n (P_i \times Z_i)$$

where

$P_i$  = the density of soil layer  $i$

$Z_i$  = the depth of soil layer  $i$

Applying this formula to the major soil layers underlying the oily waste impoundments and using typical density values of 100 lb/ft<sup>3</sup> and 80 lb/ft<sup>3</sup> for silty clay and silty clay with peat, respectively, results in the following calculations:

Po for the midpoint of the lowermost silty clay layer:

silty clay (6 ft) (100 lb/ft <sup>3</sup> )	= 600 lb/ft <sup>2</sup>
silty clay with peat (8 ft)(80 lb/ft <sup>3</sup> - 62.4 lb/ft <sup>3</sup> *)	= 141 lb/ft <sup>2</sup>
silty clay (1/2)** (24 ft)(100 lb/ft <sup>3</sup> - 62.4 lb/ft <sup>3</sup> )	= 451 lb/ft <sup>2</sup>
	1192 lb/ft <sup>2</sup>

\* The value 62.4 is the bouyancy factor for water which offsets downward pressure in those soil layers lying below the water table (i.e., the silty clay with peat layer and the lowermost silty clay layer).

\*\* The factor 1/2 is used because the calculation for  $P_0$  is at the mid-point of the layer under consideration.

Po for the midpoint of the silty clay with peat layer:

silty clay  $(6 \text{ ft})(100 \text{ lb/ft}^3) = 600 \text{ lb/ft}^2$

silty clay with peat

$(1/2)(8 \text{ ft})(80 \text{ lb/ft}^3 - 62.4 \text{ lb/ft}^3) = 70 \text{ lb/ft}^2$

670 lb/ft<sup>2</sup>

These calculated values of  $P_o$  can then be coupled with typical values and constants to generate estimated values for settling capacity ( $\Delta H$ ).

Depth of Layers	Average Depth (ft)	Depth Below Fill (ft)	Z/b	Influence Factor	P + Po +Po Sum	Log Po	Thickness of Layers (in) H	Cc 1+e <sub>o</sub>	$\Delta H$ (in)
6	10	4	0.02	1.00	880 670 1550	0.36	96	0.15	5.2
14	26	20	0.14	0.90	792 1192 1984	0.22	288	0.13	8.3

The typical values used in this table are:

$b = \text{long axis of impoundment} = 140 \text{ ft}$

$C_c (\text{silty clay}) = 0.2$

$C_c (\text{silty clay + peat}) = 0.3$

$e_o (\text{silty clay}) = 0.5$

$e_o (\text{silty clay + peat}) = 1.0$

This assessment indicates that the expected settling capacity (compression) for the final cover is between one and two feet. This estimate is made by summing the expected change in compression (H) for the silty clay with peat layer (5.2 in) and the silty clay layer (8.3 in). This is not an unreasonable amount and would not damage the integrity of the final cover.

Normal post-closure care, as described in the post-closure plan, will maintain the final slope.

## 8. EARTHQUAKE EVALUATION

In the vicinity of the refinery, the Concord fault is mapped as three separate traces (Figure 4). The western trace was mapped by Sharp (1973) as a northwestward projection of the main fault trace. The evidence for the fault in this area consists of:

1. the linear nature of Walnut Creek
2. the linear, down-to-the-west topographic scarp along the west edge of Tract 1
3. a warp in the Atchinson, Topeka, and Santa Fe railroad bridge across Walnut Creek suggesting possible right-lateral creep on a fault between the abutments
4. a possible bend in the Waterfront Road bridge across Pacheco Slough, consistent with right-lateral creep near the west abutment.

The middle trace of the Concord fault in the vicinity of the refinery is a short (1,400 foot) segment located within the refinery complex. This segment was also mapped by Sharp (1973) and is based solely on fault creep evidence.

Woodward-Clyde Consultants (1982) calculated the stability of dikes on the site given the maximum credible earthquake on the Concord-Green Valley fault. Horizontal deformities were calculated for the bio-oxidation pond along Pacheco Slough and the narrow dike between the surge pond and clean water canal.

The undrained shear strength of bay mud was obtained from the estimated present effective stresses and  $c/p$  (shear strength/effective confining pressure) value of 0.25. The latter value being obtained from laboratory analysis. The undrained shear strength of the fill that is largely above the water table



Figure 4. Map illustrating hypothesized locations of Concord Fault.

was selected as 900 psf. The static factor of safety was calculated from a modified version of the computer program STABR (developed at U.C. Berkeley) as greater than 1.5.

Horizontal deformations near these units were calculated to be approximately two to four feet. The vertical deformation of the crest is expected to be one to two feet. It was unlikely, given the factor of safety, that gross failure of any dikes would occur.

The closed surface impoundments are largely excavated below the ambient land surface, although a minor dike exists on the eastern side of the east impoundment. Dike stability is therefore not a concern because of the minor portion of dike that borders the impoundment and the small displacements estimated by Woodward-Clyde.

The function of the cover is not expected to be impaired by the maximum credible earthquake. The cover is essentially composed of six feet of earthen material which would yield with any horizontal or vertical displacement of ambient land surface. No seams or rigid materials are used in the construction of the cover, so the small amount of expected yield would be evenly attenuated throughout the cover and should not result in any tension cracks or other openings that could impair the cover design.

## 9. POTENTIAL FOR POST-CLOSURE MIGRATION AND ADVERSE IMPACTS

Following closure, it is deemed highly unlikely that environmentally deleterious concentrations of toxic constituents will migrate from the site and cause adverse impacts to human health or the environment. This conclusion is based on a consideration of present levels of contamination, site characteristics, and cover design.

The available data indicate that the soil underlying the oily waste surface impoundments is currently contaminated with benzene, toluene, xylenes, lead, chromium, and oil and grease. These constituents have the greatest potential to adversely impact human health and the environment by either:

1. migrating down to a drinking water aquifer (approximately 300 feet) and causing a human health hazard, or
2. migrating horizontally (approximately 7,000 feet) and entering Suisun Bay waters and causing an aquatic life hazard.

Even under current conditions (no stabilization or cover) there is no indication that these contaminants would reach drinking waters or bay waters in deleterious concentrations. Available data indicate that soil contamination is highest in the uppermost few feet and rapidly attenuates with depth. The uppermost aquifer (approximately 7-9 feet below the ground surface) does not show any contamination from the site. This lack of movement is apparently due to the generally high adsorbency of the soil and the very low permeability of the shallow clay layer.

Following site closure, the stabilization of the soil, the construction of the cover, and the surface reclamation should prevent precipitation from percolating through the contaminated soil. The elimination of this percolation process should

minimize the probability of migration of contaminants to drinking waters or bay waters.

## 10. EQUIPMENT DECONTAMINATION

Equipment used during all closure activities will be decontaminated in a safe and professional manner, as required by 22 CAC, Section 67214. All procedures and safety equipment will be in accordance with OSHA requirements.

All decontamination residues and disposable supplies will be treated as hazardous and disposed of in accordance with State and Federal regulations.

All safety equipment utilized during closure (respirators, suits, gloves, boots, masks, sampling devices, etc.) will either be decontaminated (verified by wipe testing, Appendix F) or properly disposed of according to Federal and State regulations.

All personnel will be instructed as to the required safety equipment and decontamination procedures to be used during closure.

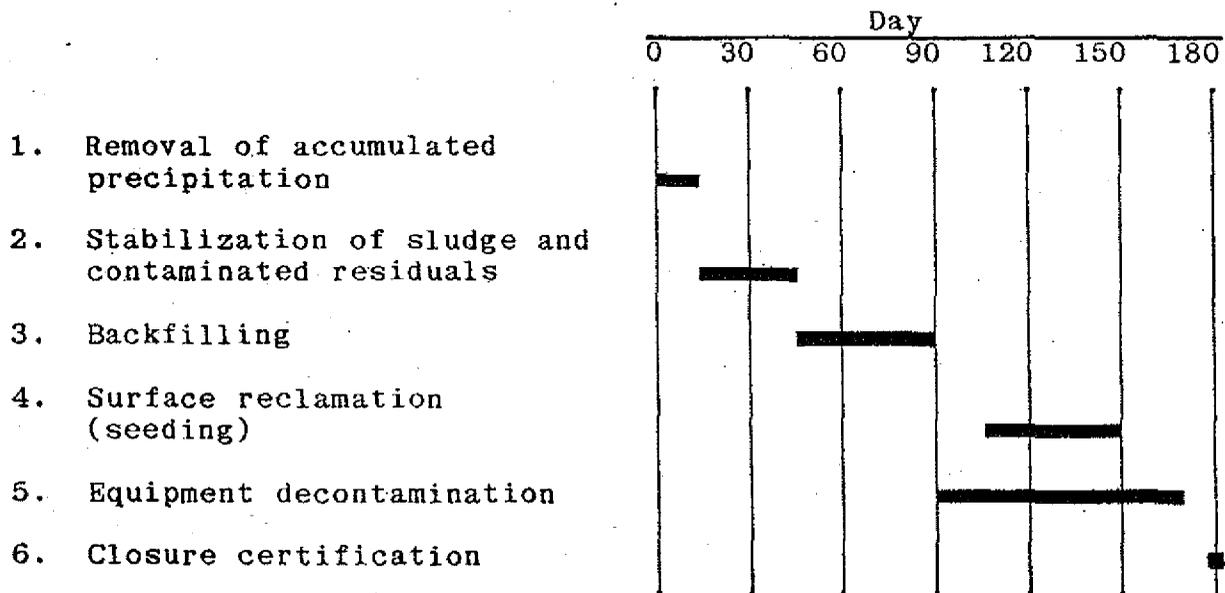
Decontamination will take place on a large plastic tarpaulin (or equivalent) with sandbags placed around the perimeter to contain any contaminants or cleaning liquids. The sandbags will act as berms, with the tarp passing over the sandbags and then secured under them. Contaminated equipment will be driven on, or placed on, this tarpaulin and decontaminated with water. All material and liquids, including the tarpaulin, will be handled as a hazardous waste unless testing is completed to determine if the residues are hazardous. The following major items will be available for decontaminating equipment:

- steam cleaning units
- hydroblast units
- polyethylene tarpaulin.

## 11. SCHEDULE FOR CLOSURE

A schedule is presented here to track the events of closure. It is expected that closure will begin in May or June 1986. This will depend on the time needed for review and approval by DOHS and weather conditions in the months preceding closure.

A few months of dry weather will be required so that liquid handling will be at a minimum. It is not practical to conduct closure activities during the rainy months of the year, since this would tend to make liquid handling much more difficult. Therefore, it is imperative that closure begin in late spring or early summer.



## 12. CLOSURE COST ESTIMATE

All costs are based on contract labor and equipment and include overhead and profit. Included in equipment costs are all necessary labor to meet OSHA minimum requirements for safe operation of equipment. This cost estimate assumes that all liquid is removed prior to closure.

### ITEMS:

#### A. Mobilization and Demobilization

1 Dozer, 300-HP	\$	135
2 Front end loaders		270
1 Sheepsfoot roller		135

#### B. Bulk Excavation and Grading

2 Front end loaders (1 1/2 CY capacity) @ \$2.22/CY x 15,000 CY		33,300
1 Dozer, 300-HP @ \$1.64/CY x 15,000 CY		24,600
15,000 CY of local fill		No Charge

#### C. Compaction

Sheepsfoot, common fill 6"-8" lifts @ \$1.74/CY x 15,000 CY		26,400
20 Proctor compaction tests @ \$100/test		2,000

#### D. Hauling

6 CY dump truck 1 mile round trip with 3.3 loads/hr @ \$2.67/CY x 15,000 CY		40,050
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E. Vegetated Cover

Topsoil - buy, load, haul 5 miles, spread  
with 6" depth (1 CY will cover 7.3 ft<sup>2</sup>  
to a depth of 6")

$$\text{\$10/CY} \times \frac{\text{CY}}{7.3 \text{ ft}^2} \times 60,000 \text{ CY}$$

81,700

F. Seeding

Common grasses @ \\$0.06/yd<sup>2</sup> x 6,670 yd<sup>2</sup>

400

G. Closure Inspection and Certification

32 hrs. @ \\$70/hr

2,240

H. Decontamination

32 man-hours @ \\$20/hr

640

wipe test @ \\$150/test x 4 tests

600

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**\\$212,470**

### 13. CERTIFICATION OF CLOSURE

As required by Section 67215, when closure is completed, Tosco Corporation shall submit to the California Department of Health Services, certification by the owner/operator and by an independent, qualified professional engineer, registered in California, that the oily waste surface impoundments have been closed in accordance with the specifications of this approved closure plan.

#### 14. FINANCIAL ASSURANCE

A Surety Bond, backed by letters-of-credit as collateral, has been established to guarantee that funds are available to cover the costs of closure and post-closure. The existing bond for \$1.8 million exceeds the estimated costs for the closure/post-closure activities. Therefore, Tosco will formally petition the Department of Health Services for a reduction in the Surety Bond, based upon this plan.

Upon completion of closure activities and certification of closure, Tosco will again request a reduction in the Surety Bond. Tosco will continue to provide the required financial assurance for post-closure monitoring and maintenance.

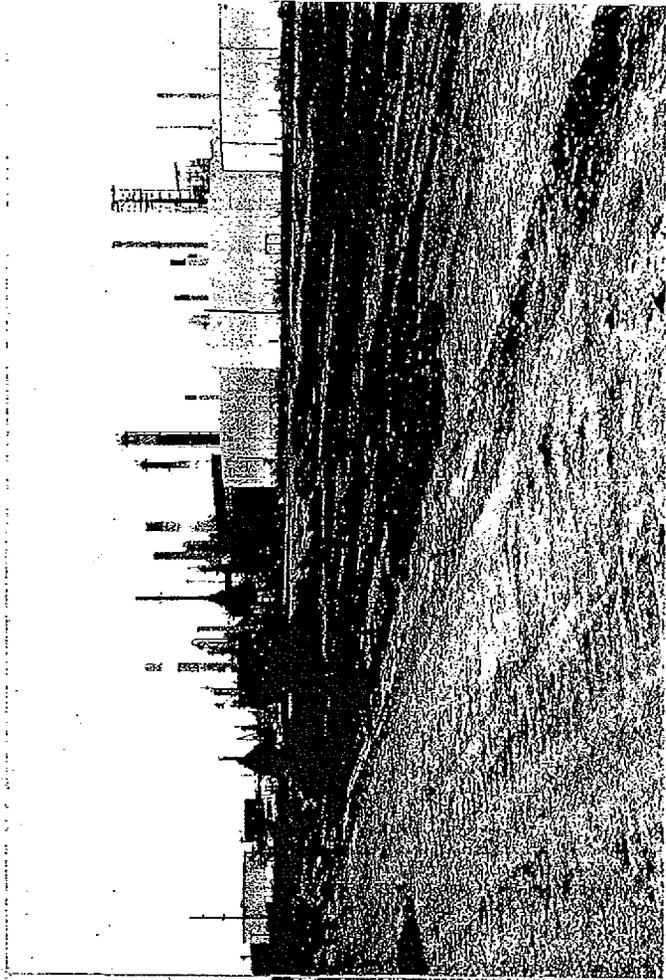
APPENDIX A  
PHOTOGRAPHS OF SURFACE IMPOUNDMENTS



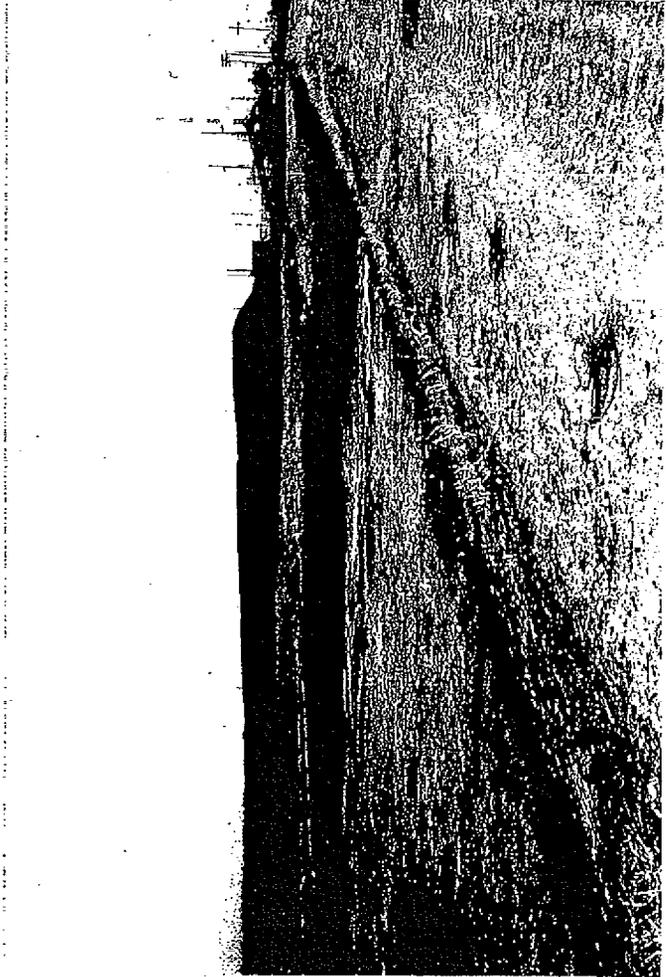
Oily waste surface impoundments (looking north).



Oily waste surface impoundments (looking south).



West impoundment with dry sludge cake.

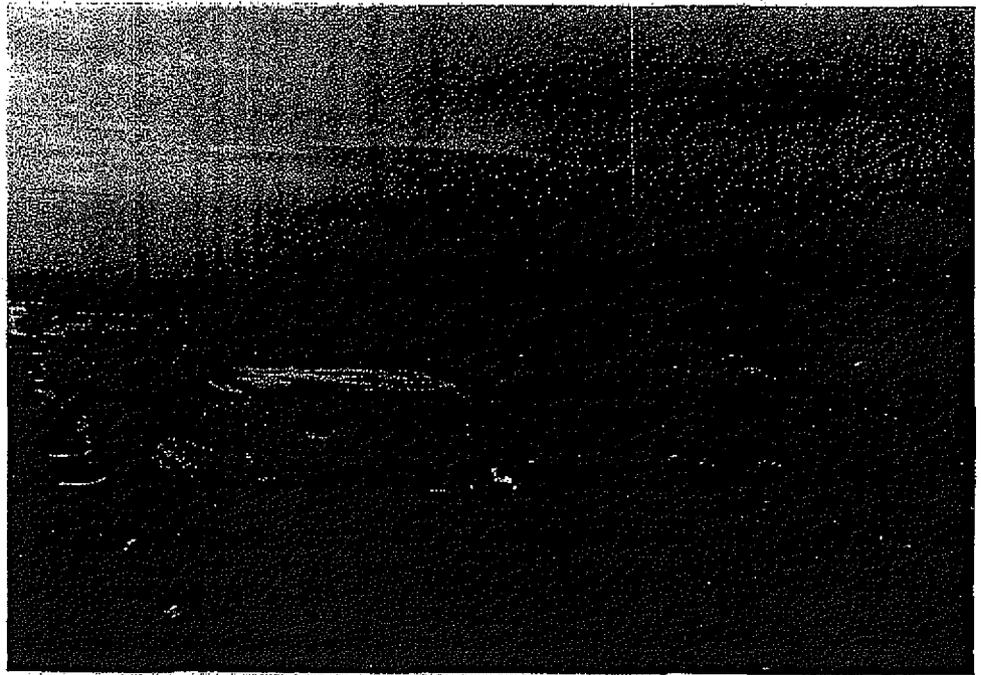


East impoundment with oily water.

Aerial view of impoundment site looking south.



Aerial view of impoundment site looking north.



APPENDIX B

SOILS, REGIONAL GEOLOGY, AND HYDROGEOLOGY

## APPENDIX B: SOILS, REGIONAL GEOLOGY AND HYDROGEOLOGY

(Excerpted from a MARK Group report to Tosco, 1985)

### Soils

Soils underlying the Avon facility largely determine the geochemistry of the area. The major soil units influencing the quality of ground water immediately below the surface are the Bay Mud and Marsh deposits.

Bay Mud is present in the low-lying areas along the shoreline and Pacheco Slough. It extends to about a 5-foot elevation above mean sea level. Bay Mud deposits may reach 40 feet in thickness at the northern end of the site, as described in the boring log for well 4M. Thin, discontinuous sand units are found within the Bay Mud. The Bay Mud is very heterogenous across the site, and the only conclusions which can be reached about its distribution are that it thickens from south to north over the site and that it is absent on the ridges. The younger alluvium consists of thin alluvial/fluvial and marsh deposits. This unit was deposited coincident to the Bay Mud, but represents terrestrial deposition, rather than bay/marine. This recent alluvium consists mostly of unconsolidated clays, with lenses and layers of sand, silt, and minor gravel.

It is difficult to determine where the younger alluvium ceases and the older alluvium begins. In the monitoring wells installed by WCC, a distinction was made between the two, based on several factors. These factors included the stiffness of the soil (the older alluvium is stiffer), color, plasticity index, and an occasional moisture/density ratio.

### Regional Geology and Hydrogeology

Stratigraphy of the site consists of fill, Bay Mud, younger alluvium, older alluvium (probably equivalent to the Montezuma

Formation), and Cretaceous and Tertiary bedrock. Except for the bedrock, which is steeply dipping, the sediments typically have a slope of less than 1 degree to the north. An anticline, which formed the hills just east of Pacheco Slough, has caused older alluvial deposits to slope 8-10 degrees to the east.

Because deposition between the older and younger alluvial units was not continuous, the top of the older alluvium is an unconformity. The older alluvium underlies the entire site, but ranges from thin on the hill crests to 450 feet or more in thickness in the valley basins. The majority of the unit is clay and silt, but it has beds of sand and gravel up to 40 feet thick. However, most of these discontinuous sands are less than 15 feet thick. The top of what appears to be a fairly continuous sand approximately 20 feet thick is found at a depth of 60 feet below land surface. Deposition from the meandering channel of an ancestral Walnut Creek is probably responsible for this sand body. The alluvial clay units which are shown on the cross-sections represent floodplain and overbank deposits. Within the clay units are varying thicknesses of discontinuous silt, sand, and gravel lenses.

Surrounding the TOSCO site, the top of the bedrock surface is an angular unconformity. This erosion surface was likely formed when the land surface was exposed to erosion during a period when the relative sea level was much lower than today. The stratum above the unconformity is dipping in a different direction than the bedrock below, and therefore this surface represents an angular unconformity. Folding of the bedrock pre- and post-dated the unconformity in the vicinity of TOSCO. Cretaceous bedrock, dipping approximately 60 degrees westerly, is seen exposed in the Vine Hill area. The hill where the TOSCO tank farm is located shows evidence of Quaternary-Age folding because it has folded the older alluvium, forming an anticline.

From the exposures along Vine Hill, the surface of the bedrock

(the unconformity) dips steeply toward Pacheco Slough to a sub-sea depth greater than 100 feet (-105 feet in well MW-202). The surface of the bedrock has been uplifted under the TOSCO tank farm and has been reported at an elevation of +65 feet in Tract 4 (Earth Sciences Associates, July, 1981, p. 8). The surface of the bedrock then dips steeply down to the east again, and it is not found in well 6-11 (east side of tank farm), which reached an elevation of -440 feet. To the east of the site, Tertiary rocks may immediately underlie the unconformity. In boreholes G-6, G-6A, and MW-211 near Vine Hill, fractures were reported in the bedrock. This is in an area of steeply inclined strata. In other wells which have been reviewed, no fractures were reported. Joints have not been reported on the geologic maps. A field check for the presence of joints and/or other discontinuities in the bedrock in the vicinity of the TOSCO site was conducted in July 1985. No bedrock was found outcropping on the TOSCO site, but calcareous filled vertical fractures were found in site outcrops of the older alluvium. Offsite, on the west side of Pacheco Slough, some intersecting joint sets were observed in the outcropping bedrock. These joint sets are poorly developed and, for the most part, closed.

Several major fault zones are found in the Bay Area. These are the San Andreas, Hayward, and Calaveras fault zones. These faults are found from 13 to 32 miles away and are briefly described by the Woodward-Clyde Consultant (WCC) report (1982) when discussing maximum potential earthquake magnitudes in a section on dike stability. Their report also discussed potential surface faulting by the Concord fault, which may transect the TOSCO site.

Based upon geologic logs of boreholes and water levels measured in wells, the following information was obtained:

The TOSCO facility is underlain by a discontinuous water-bearing zone that occurs at a depth between 20 and 40 feet thick and is

enveloped by silty clay within the Bay Muds and younger and older alluvial deposits. The Bay Mud also contains discontinuous lenses of peat that are generally less than 10 feet thick. Although data are inconclusive as to whether the shallow water-bearing zones contained within the Bay Mud or younger alluvium are hydraulically separated from the underlying aquifer within the older alluvium, a somewhat continuous 20-35 foot thick clay aquitard is present. WCC (1982) suggested that the two zones are hydraulically connected because of similarities of water levels measured within shallow and deep wells, and because the water quality for water samples collected from shallow and deep wells are similar. Because of improper well construction, the conclusions presented by WCC cannot be supported. Pump tests will be performed by MARK Group in January 1986 to investigate this question.

Below the intervening aquitard, a 20-35 foot thick sand zone underlies the facility at a depth of between 60 and 95 feet, and it can be correlated from borehole lithologic logs over the entire TOSCO region. This zone appears to be confined or semi-confined, although additional field tests are needed to confirm this suspected condition.

Regional investigations for the upper part of Clayton Valley, the valley in which the TOSCO facility is located, concluded that the transmissivities for the alluvial deposits ranged from 1,170 to 11,000 gpd/ft. In the lower part of the valley, the transmissivities for the deeper alluvial deposits ranged from 24,000 to 62,900 gpd/ft, with a storage coefficient of 0.027. Well production rates for the region vary from 100 to 130 gpm; however, sustained well productions can be as high as 800 gpm.

WCC (1982) conducted two short aquifer tests (4 hour duration) and 10 slug or falling head tests on shallow wells, and laboratory permeability tests were conducted on 18 soil samples. The hydraulic conductivities for the two aquifer tests were

$1.6 \times 10^{-3}$  cm/sec. The analysis of the slug test data indicated that the younger alluvium had an average hydraulic conductivity of  $3.7 \times 10^{-5}$  cm/sec, whereas the older alluvium had an average value of  $1.6 \times 10^{-3}$  cm/sec.

Laboratory-derived values of permeability for peat materials were  $2 \times 10^{-6}$  cm/sec, and one organic clay sample had a permeability of  $1 \times 10^{-3}$  cm/sec. The permeability of seven samples of clay taken from the older alluvium averaged  $5 \times 10^{-8}$  cm/sec. These low values would restrict vertical movement of water, if the clays are free of discontinuities.

Based upon water level measurements taken from the WCC wells in May 1985 and some B&C wells, there appear to be five local ground water recharge areas for the shallow zone. They are the bio-oxidation pond, the sludge drying beds, the Isocracker complex, the ridge east of Pacheco Slough, and the hill north of Waterfront Road.

Ground water in the shallow zone discharges on the TOSCO facility into Pacheco Slough, Hastings Slough and the wetlands located on the north and east sides of the facility. The regional ground-water discharge is Suisun Bay, to the north of the facility.

Using the water level elevations from wells screened in the older alluvium, there appears to be a ground-water recharge area in the tank farm area, which is east of the Isocracker complex. Ground water also discharges from the older alluvial aquifer toward the marsh area on the east side of the facility and to Pacheco Slough.