

ESTIMATION OF COSTS TO PERFORM CLEANUP AT THE  
ASARCO EL PASO SMELTER  
ON BEHALF OF  
THE TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Prepared by

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## ON-SITE WASTE MANAGEMENT AND REMEDIES

The identification and selection of on-site waste management tasks is based on:

- Completion of the unfinished tasks specified in the TCEQ Corrective Action Directive (dated May 20, 2005), which includes the installation of groundwater remediation treatment systems and the long term operation and maintenance of the systems, covering 16 acres of area with asphalt pavement, and placement of waste material into repository cells.
- Additional tasks are necessary if the facility is no longer in operation. These tasks may include the demolition of structures, covering an additional 60 acres of slag with asphalt pavement, installation of a security fence to enclose the facility, and placement of the slag fine and dust (minus 50) piles in a fourth repository cell.
- The total cost estimate is \$52,005,186.

## COST INFORMATION ASSOCIATED WITH REMEDIES

### A. Demolition of Structures [\$8,883,799]

The TCEQ solicited engineering services from Shaw Environmental (Shaw) to assess the demolition costs for the existing buildings and structures. TCEQ staff accompanied Shaw during the field inspection and met with ASARCO onsite personnel to obtain demolition costs. Shaw provided the TCEQ with costs for the demolition, transportation and disposal.

### B. Groundwater – Treatment and Hydraulic Containment [\$21,868,372]

The groundwater is contaminated with arsenic, lead and cadmium. The most prevalent COC in the groundwater is arsenic. A groundwater treatment and hydraulic containment measure is needed to stop the contaminated groundwater from discharging into the Rio Grande.

The groundwater containment measures proposed by the TCEQ include:

1. A 3,000 linear-foot slurry wall situated along the northern portion of groundwater plume. The slurry wall is proposed because this area has the highest concentrations of metals in groundwater. [\$7,095,000]

ASARCO's *Engineering Evaluation and Cost Analysis* report prepared by CDW (CDW report) estimates that the slurry wall cost is \$590 per linear foot with \$9.83 per square foot of slurry wall surface. The TCEQ obtained the cost quotation of \$15 - \$20 per square foot from two experienced slurry wall remedial contractors; Environcon (Missoula, Montana; telephone number (406) 523-1150) and Remedial Construction Services (Recon) located in Houston, Texas (telephone

number (281)-955-2442). The telephone quotations are not site specific; therefore, the telephone estimates are generally higher when compared to the site-specific cost information prepared by CDW. The TCEQ examined the detailed cost information and did not have any objections to the cost assumptions in the report. Therefore, TCEQ accepts the cost assumptions from CDW.

An extraction system consisting of a network of 80 groundwater extraction wells is proposed to contain the contaminated groundwater from migrating to the Rio Grande. The location of the proposed extraction system would be along West Paisano Drive. A groundwater treatment plant is also needed to process and treat the contaminated groundwater extracted from the aquifer. Once the contaminated groundwater is treated to the treatment standard, the treated groundwater would be discharged from the treatment plant. [\$14,773,372.]

2. The estimated capital cost for the design and construction of a groundwater treatment system is estimated at \$5,000,000, with a 80-gallon per minute capacity. This cost estimate includes \$4,000,000 for the building construction and treatment plant installation; \$500,000 for the piping and distribution system from a series of extraction wells to the treatment plant; and \$500,000 for the engineering study and design. This estimate is based on TCEQ past cost information from groundwater construction projects and is not significantly higher than the cost from the CDW report which was based on a 76-gallon per minute capacity pump and treat system.

In addition to the estimated capital cost above, there is a cost associated with the groundwater operation. The operation and maintenance cost for the groundwater treatment system is based on TCEQ experience where a contractor was retained to operate a groundwater treatment system at Precision Machine State Superfund site in Odessa, Texas.

An accepted approach for estimating the time for restoration of the groundwater is to assume that an aquifer would be restored when more than three pore volumes of contaminated groundwater was flushed out of the aquifer. This timeframe of groundwater restoration was specified in the Record of Decision (ROD) issued by the U.S. Environmental Protection Agency (EPA) dated September 18, 1986, for the Sikes Disposal Pits Federal Superfund site in Crosby, Texas and the ROD issued by U.S. EPA dated September 25, 1990, for the Texarkana Wood Preserving Federal Superfund site in Texarkana, Texas.

A 50-year operation of the treatment system was based on processing three pore volumes of the contaminated groundwater water through the groundwater treatment plant with 80% operation efficiency.

C. Asphalt Paving [\$9,815000]

Additional asphalt paving is needed to cover waste and/or the soil with elevated metals to prevent direct contact, mitigate waste dust particles from blowing offsite, and prevent contaminated storm water runoff. The current construction specifications for the ASARCO plant consists of 1.5" Type C asphalt and 6" cold mix and cold laid asphalt material on top of 6" crushed slag as road base material. ASARCO estimated a \$2 million cost to complete the paving of the additional 16 acres of paving, which was required in the TCEQ's May 20, 2005 letter. Based on the 2005 ASARCO cost estimate, the unit cost is \$125,000 per acre or \$25.83 per square yard. This price is in line with the Texas Department of Transportation statewide construction average low bid unit price. The TECQ cost estimate is \$130,000 an acre with a 4% inflation adjustment.

D. Fencing [\$68,628]

The installation of a fence is needed to enclose the northern section of the site to limit public access to the abandoned site. The \$25 a foot for a standard 6-foot chain link fence is based on the contract price from the Texas Commission on Environmental Quality "Remedial Investigation and Removal Service Contract" Contract No. 582-6-49221.

E. Engineering and Construction of Repository Cell 4. [\$5,848,000]

As part of the waste management strategy, an additional waste repository cell will need to be constructed to accommodate material. The cost estimate for the design and construction of repository cell 4 is based on the cell dimensions of approximately 500 feet by 500 feet and 33 feet high to accommodate the 303,000 cubic yards of material. The cell floor is comprised of a layer of a geosynthetic clay liner (GCL), High Density Polyethylene (HDPE) geomembrane and a geocomposite drainage layer. After the waste material is placed into the repository cell, a cell cover is constructed. The cover is comprised of asphalt, soil, GCL, flexible polyethylene material, and a geocomposite drainage layer underneath the asphalt. The unit price of installing the cell floor and cell cover is approximately \$2.00 per square foot. A unit price of \$7.00 per square foot was used which includes design, site preparation and installation.

F. Long-Term Monitoring of Engineering Control and Groundwater [\$3,284,095]

The cost estimate for long-term monitoring assumes that groundwater samples will be collected and analyzed on a semi-annual basis, using 30 monitor wells to assess the effectiveness of the groundwater treatment system. The cost per groundwater sample is estimated at \$150 per sample based on the Texas Commission on Environmental Quality "Remedial Investigation and Removal Service Contract" Contract No. 582-6-49221.

Semi-annual site inspections are needed for the long term management strategy to verify effective waste control. The fence, asphalt cap and groundwater treatment system are included in the site inspection. The \$5,000 for a contractor to produce semi-annual inspection reports includes costs associated with professionals, field technicians, draftsman, and administrative technicians

After facility operations cease, there will be no security staff and the TCEQ anticipates the perimeter fence may need to be repaired many times during the year to secure the site. Therefore, 1,300 linear feet out of 13,000 linear foot of fence is estimated for repair on an annual basis. Since the asphalt pavement will not be used for regular street traffic, the pavement should last longer than the normal 10-20 year asphalt road life cycle. The impact of weatherization on the pavement is very difficult to estimate. The TCEQ assumes that 0.5 % of the asphalt will need repair each year.

## **TABLES**

**Asarco El Paso Smelter - Cost Estimate Waste Management [Present Value Calculation]**  
**Sitewide Evaluation - June 2008**  
**El Paso, Texas**

	Quantities	units	Unit Price	Total
<b>Demolition of Structures [One time]</b>				
Demolition of Structures (steel)	264,141	sq. ft.	\$11	\$2,905,551
Demolition of Structures (Brick and concrete)	191,157	sq. ft.	\$17.50	\$3,345,248
Demolition of Structures (Wood railroad trusssets)	40,025	sq. ft.	\$40	\$1,601,000
Demolition of Structures (I-10 Bridge and Slag bridge)	17,625	sq. ft.	\$16	\$282,000
Demolition of two Smokestacks	1	Lump Sum	\$750,000	\$750,000
<b>Subtotal of demolition of structure</b>				<b>\$8,883,799</b>
<b>Groundwater [construction and 50 years operation]</b>				
Construction [One time]	3,000	feet	\$590	\$1,770,000
Slurry Wall/Bentonite soil mix, 3 feet wide) Design and installation	50	well	\$4,500	\$225,000
Additional Extraction Wells will use existing wells whenever possible				
Injection Well (800 foot injection well for discharge of treated groundwater)	1	well	\$100,000	\$100,000
Design and Construction of Groundwater Treatment system	1	system	\$5,000,000	\$5,000,000
<b>Subtotal of Groundwater construction</b>				<b>\$7,095,000</b>
<b>Continuous operation [Present value of 50 years annuity factor of 25.72976]</b>				
Operation and Maintenance (electrical and general maintenance)	25,72976	Annual Cost	\$350,000	\$9,005,416
Guard to protect equipment and G/W system (1 guard \$25 an hour)	25,72976	Annual Cost	\$213,600	\$5,495,877
Monitor Well Plugging and Abandonment [One time charge 50 years later, using Present Value factor of 0.2811]	0.22811	Lump Sum	\$64,800	\$14,782
Semi-annual groundwater reports [2 reports per year @ \$50000 per report]	25,72976	Annual Cost	\$10,000	\$257,298
<b>Subtotal of Groundwater operation</b>				<b>\$1,774,312</b>
<b>Subtotal of Groundwater construction and operation</b>				<b>\$21,868,372</b>
<b>Asphalt Paving to manage exposure [One time]</b>				
Acreage left to be paved from May 20, 2005 Corrective Action Directive letter	16	acres	\$130,000	\$2,080,000
Northern Section of Smelter	8	acres	\$130,000	\$975,000
Former Building and Process footprint	52	acres	\$130,000	\$6,760,000
<b>Subtotal of asphalt paving</b>				<b>\$9,815,000</b>
<b>Fencing to control access in Northern Section of the Smelter [One time]</b>				
	2800	feet	\$25	\$68,628
<b>Engineering Design and Construction of Disposal Unit Cell 4 [One time]</b>				
Engineer and Construction of Cell 4 for disposal of:	1	Cell	\$4,000,000	\$4,000,000
Minus 50 Slag waste pile (255,111 cubic yds.)				
Abrasive Blasting Area (1,111 cubic yds.)				
Soil underneath Process area (20,000 cubic yds Estimated)				
Category I soils from May 5, 2005 later (25,000 cubic yds Estimated)				
Excavation and Disposal of material in Cell 4 [One time]	303,000	cubic yds.	\$6	\$1,818,000
Verification of Waste Excavation of materials to Cell 4	100	soil samples	\$250	\$25,000
Completion Report	1	report	\$5,000	\$5,000
<b>Subtotal of design and construction of disposal unit cell 4</b>				<b>\$5,848,000</b>
<b>Long term monitoring of engineering control and groundwater [Present Value of 400 years annuity factor of 33.333]</b>				
Annual site inspection report is covered under the groundwater report for the first 50 years	0	reports	\$0	\$0
Monitoring and Sampling (Management of Waste) 30 wells bimannual (\$150 per sample)	33.333	Annual Cost	\$9,000	\$289,997
TCEQ Oversight	33.333	Annual Cost	\$11,024	\$367,463
Annual site inspection report [Present Value of 350 years annuity factor of 33.332]	33.332	Annual Cost	\$1,000	\$33,333
General repairs per year (Fence and Asphalt Cap)	33.332	Annual Cost	\$5,000	\$166,660
Assume 1% of fence is required repair [130 lf x \$25 LF]	33.333	Annual Cost	\$32,500	\$1,083,323
Assume 0.5% of 98 Acres asphalt cover is required repair [\$2.00/sf x 20,000 SF]	33.333	Annual Cost	\$40,000	\$1,333,320
Subtotal of long term monitoring	0	Lump Sum	\$0	\$0
Contingency for unexpected expense				
<b>SUBTOTAL FOR WASTE MANAGEMENT</b>				<b>\$49,767,893</b>
<b>Other Identified Costs</b>				
<b>TOTAL</b>				<b>\$2,237,293</b>
				<b>\$52,005,186.00</b>

## **FIGURES**

# ASARCO

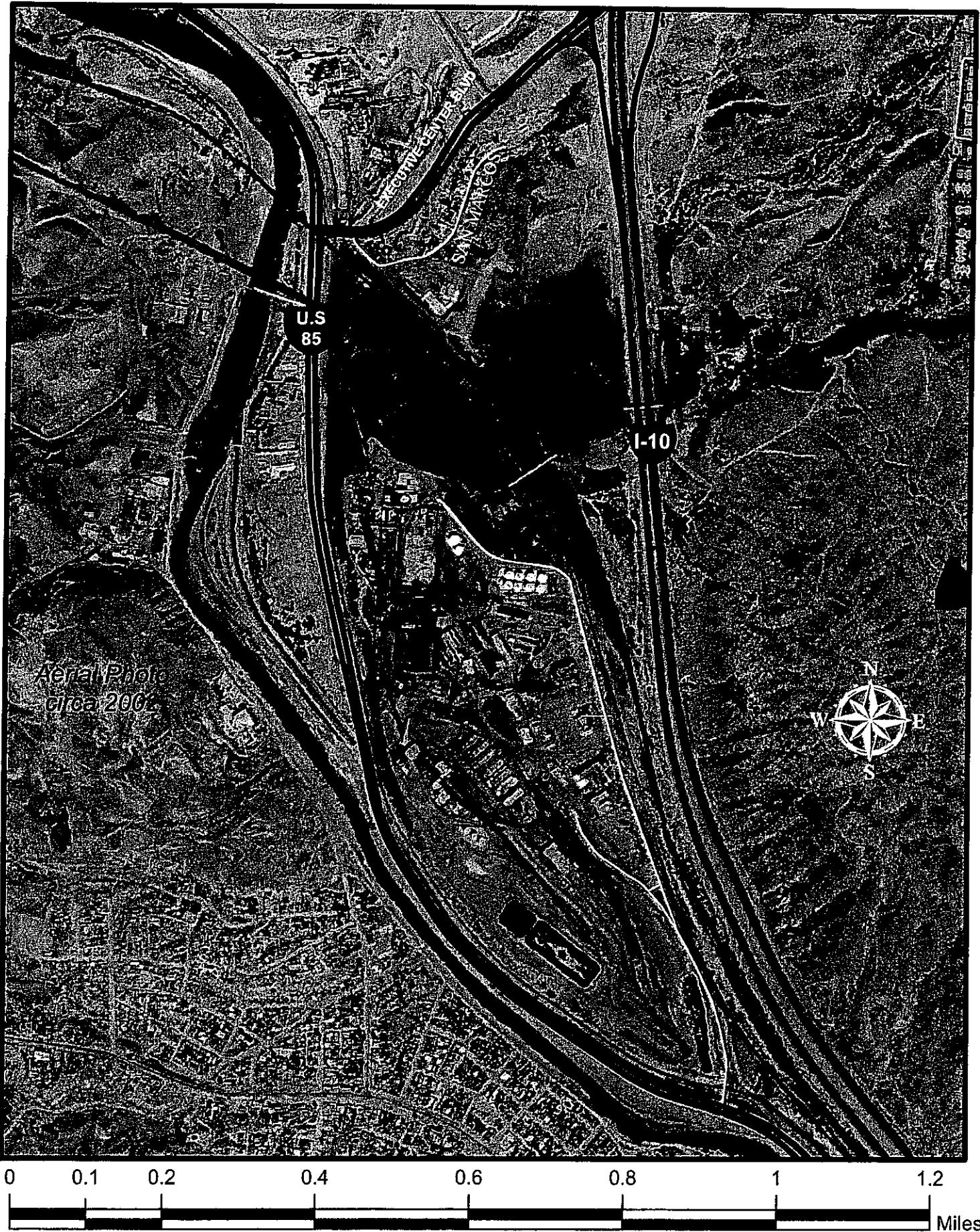
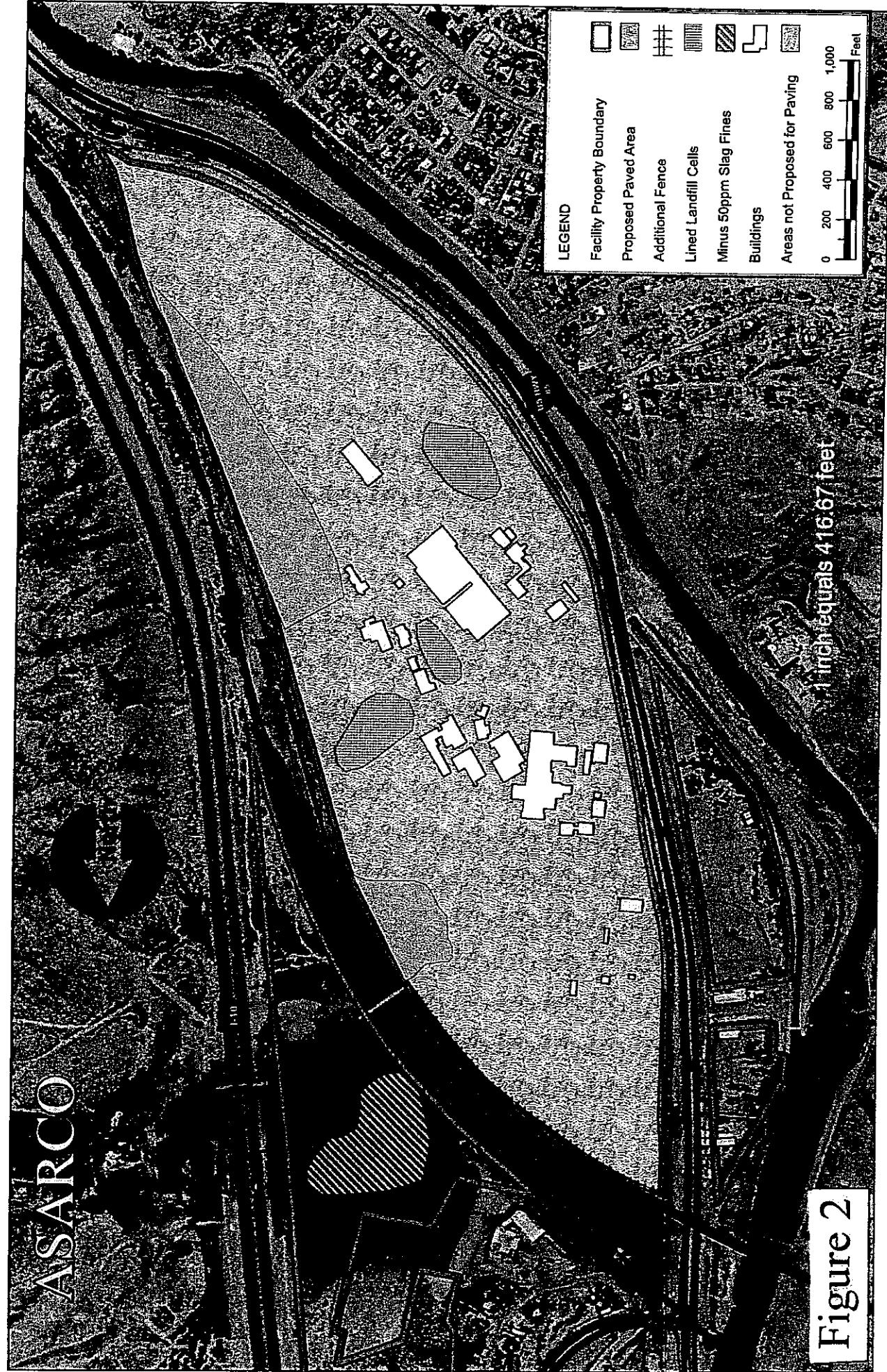
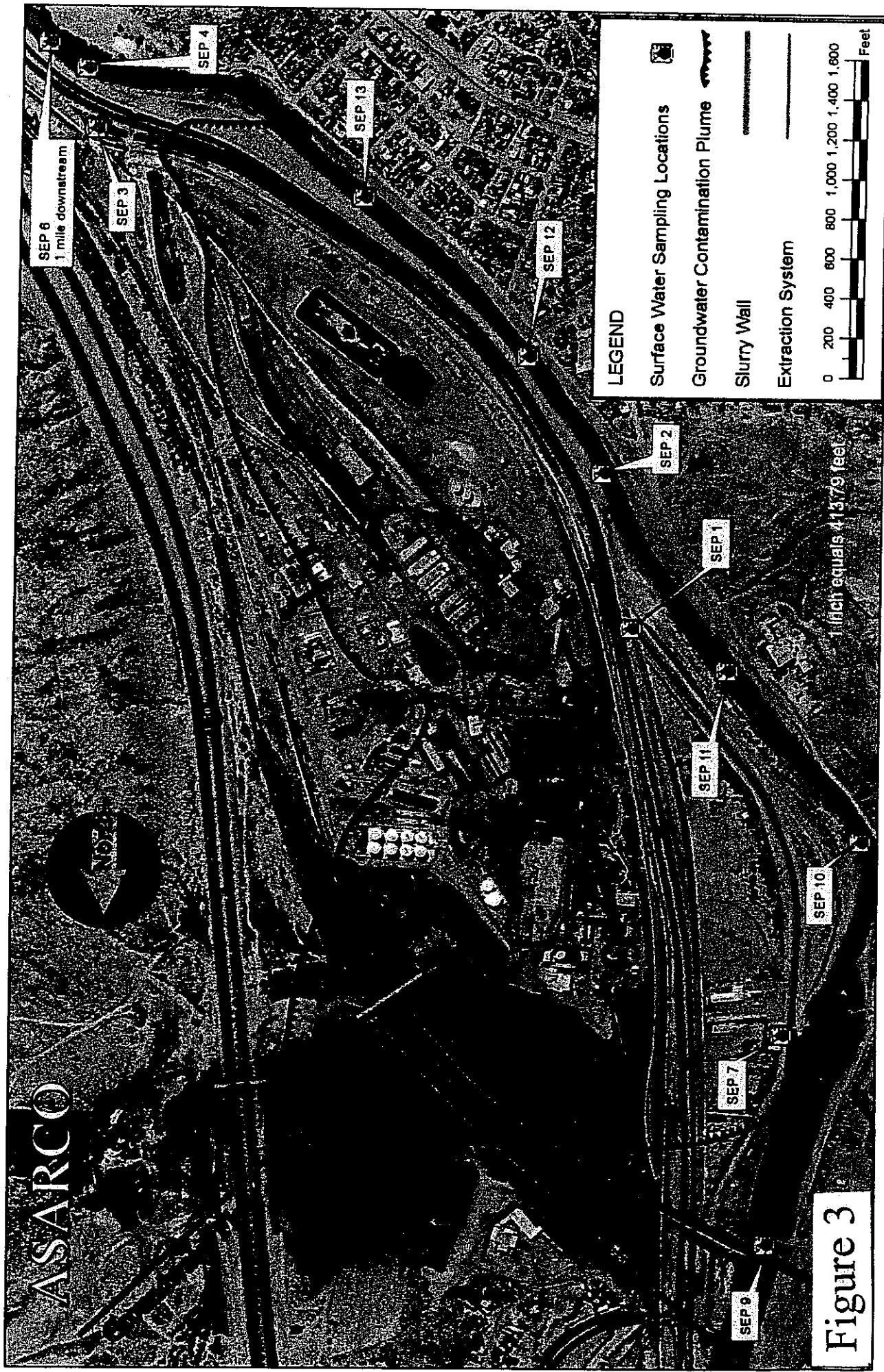


Figure 1



add'l 60 acres of paving



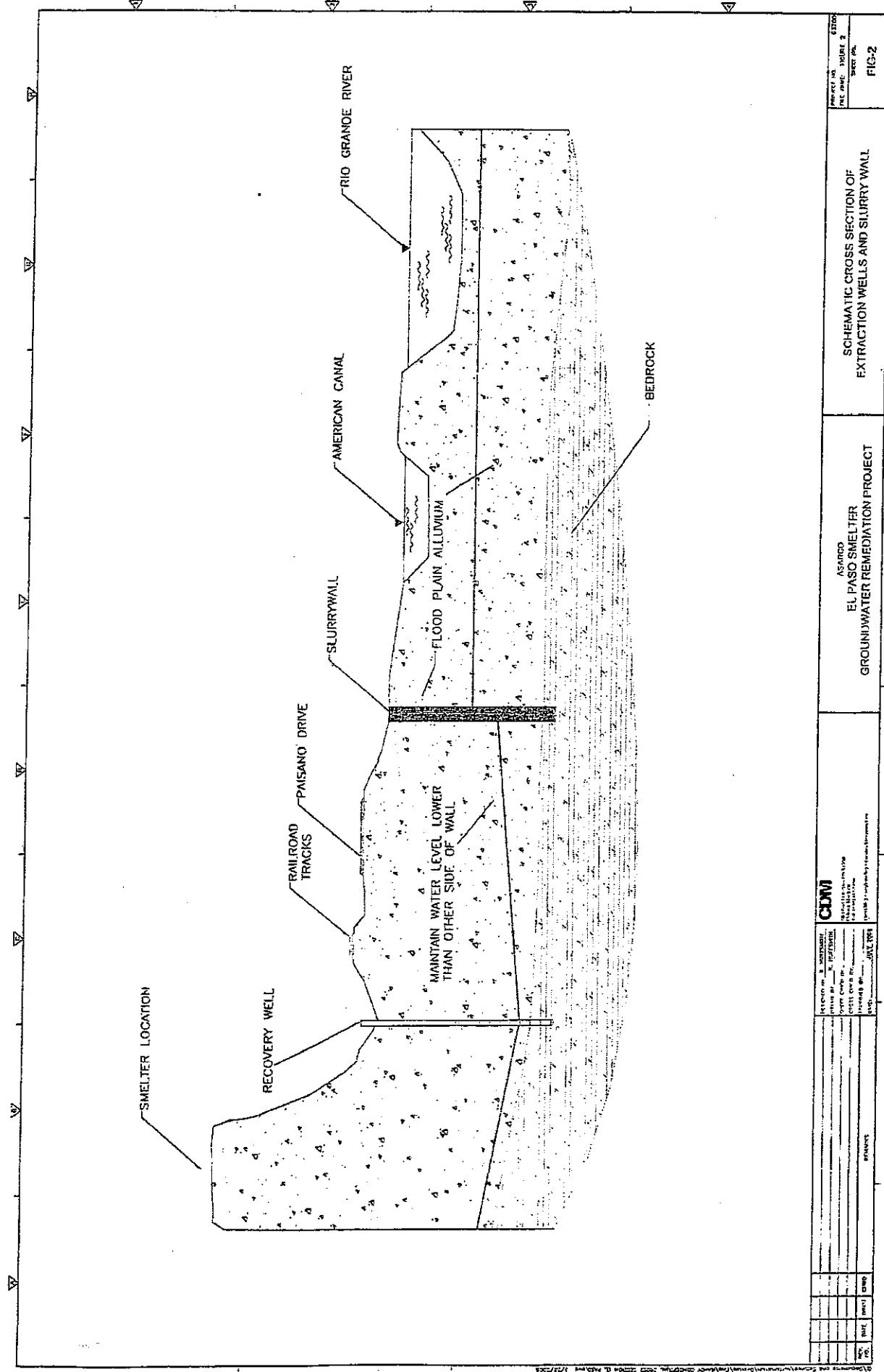
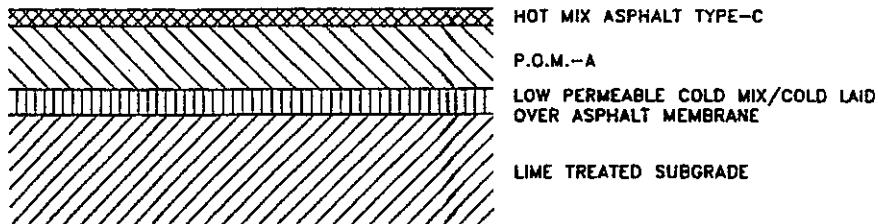


FIGURE 4

ASPHALT PAVING CROSS SECTION  
(Provided by ASARCO EL Paso Plant)

	LAYERED THICKNESS (INCHES)	$s_{cf}$	$s_n$
HOT MIX ASPHALTIC CONCRETE TYPE-C	1.5	0.44	0.66
P.O.M.-A COLD MIX/COLD LAID	4.0	(ASSUMED) 0.30	1.20
LOW PERMEABLE COLD MIX/COLD LAID OVER ASPHALT MEMBRANE	2.0	(ASSUMED) 0.28	0.56
LIME TREATED SUBGRADE (VERSABIND)	6.0	(ASSUMED) 0.14	0.84

WSN = 3.26

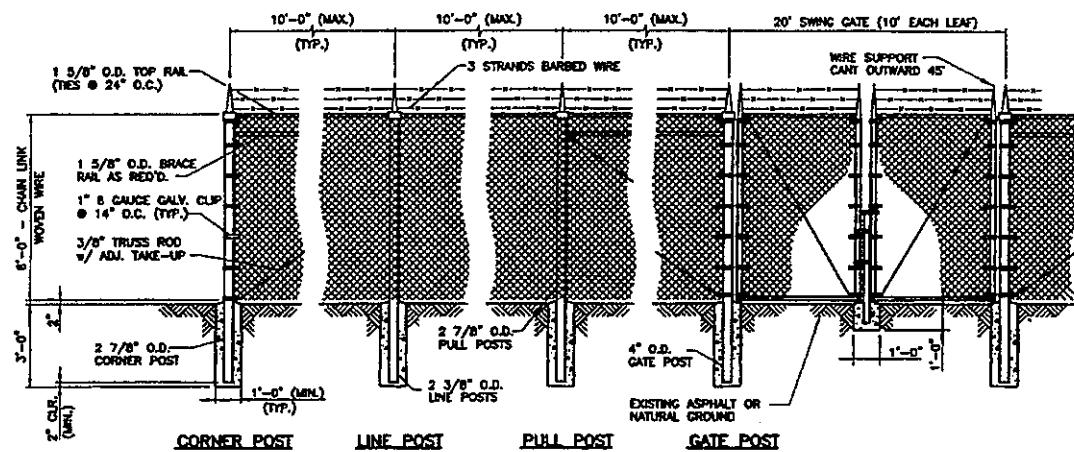


NOTE: GEOGRID TENSAR CAPITOL BX-1100 MAY BE USED IN PLACE OF LIME TREATED SUBGRADE.

 <b>Raba Kistner</b> <small>Engineering • Testing • Environmental Facilities • Infrastructure</small>	<b>LIGHT TRAFFIC RECOMMENDED PAVEMENT CROSS-SECTION</b>	PROJECT No.:
		ASF05-245-01
		<b>FIGURE 3</b>

Figure 5

## CHAIN LINK FENCE CROSS SECTION



NOTES:

1. REFER TO SECTION 02831 FOR PRODUCT AND INSTALLATION REQUIREMENTS.



**FIGURE 02831-01**

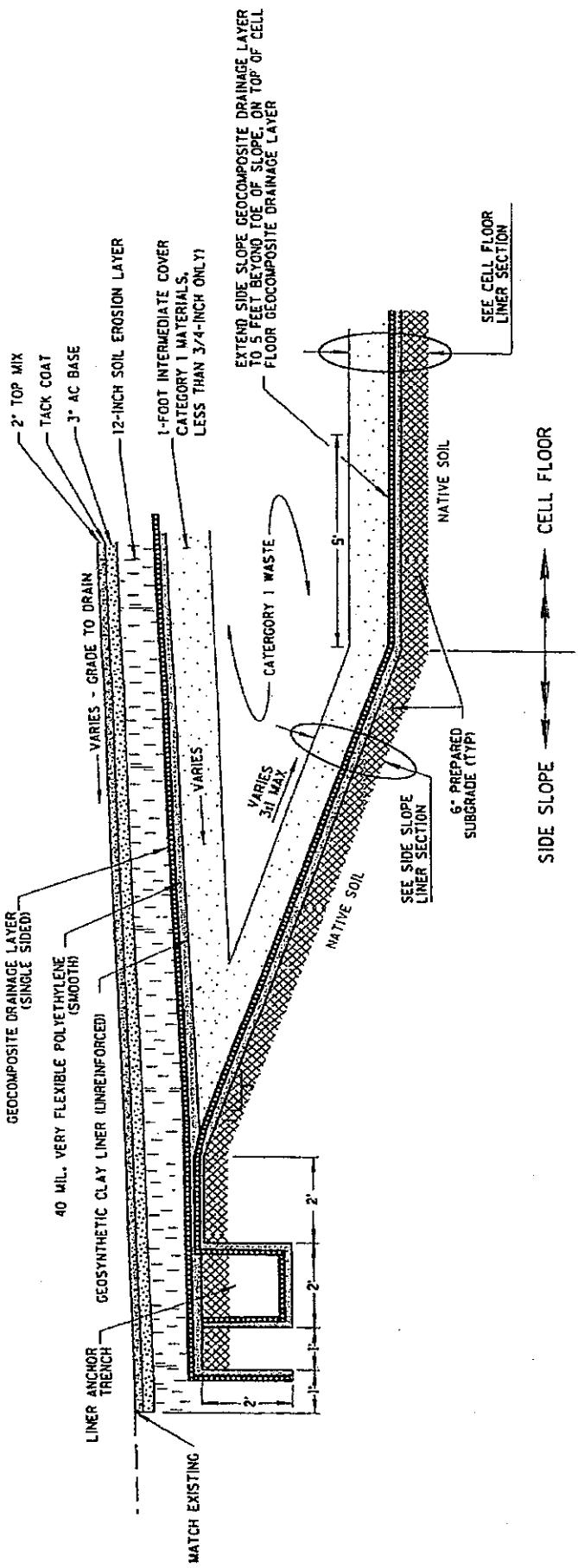
TEXAS NATURAL RESOURCE  
CONSERVATION COMMISSION

CHAIN LINK FENCE  
INSTALLATION

REVISION: 04-17-2000	FILE: 02831-01	SCALE: NTS
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Figure 6

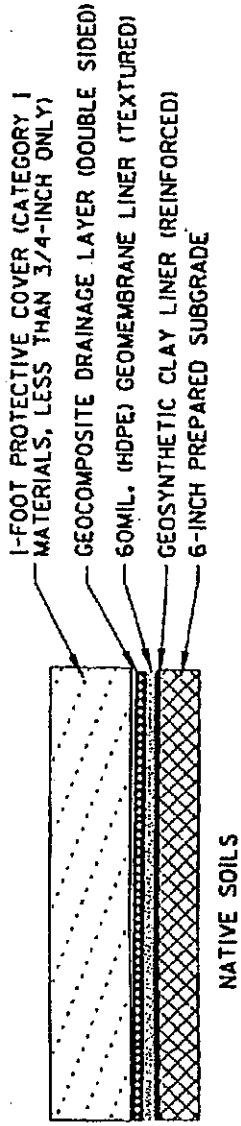
TYPICAL REPOSITORY CELL LINER DESIGN



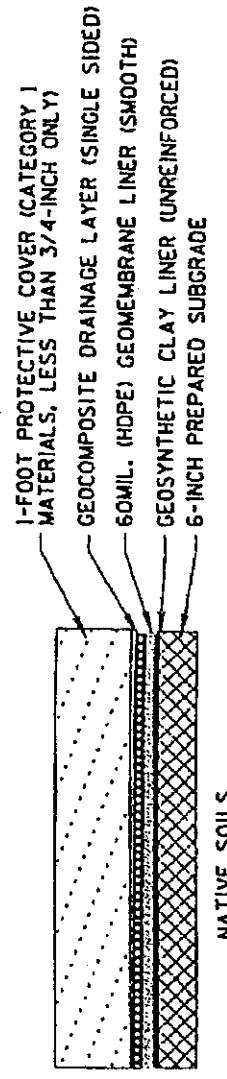
ARCADIS "Remedial Waste Repository Design ASARCO Incorporated El Paso, Texas" September 12, 2005

Figure 7

TYPICAL REPOSITORY CELL LINER CROSS SECTION



TYPICAL LINER  
SECTION (SIDE SLOPE)

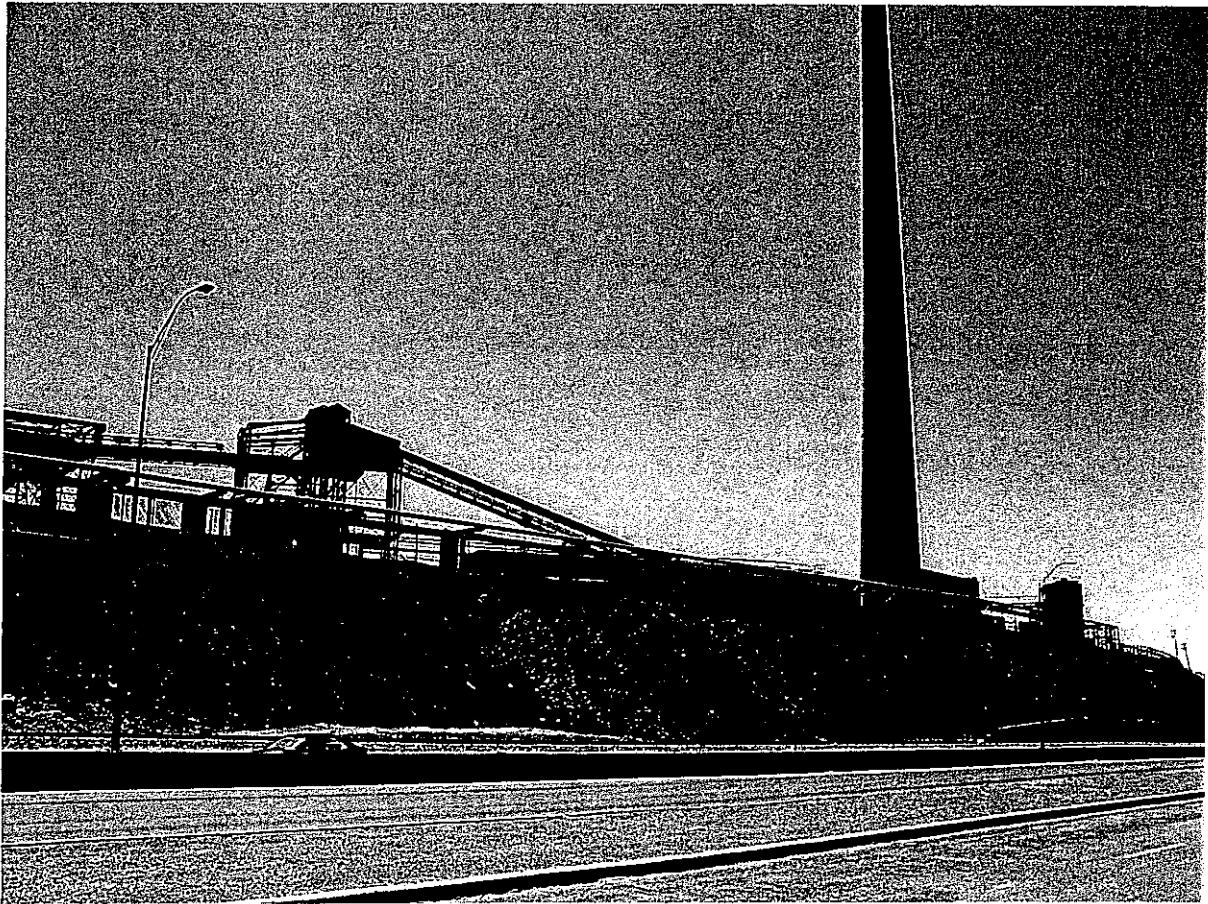


TYPICAL LINER  
SECTION (CELL FLOOR)

ARCADIS "Remedial Waste Repository Design ASARCO Incorporated El Paso, Texas" September 12, 2005  
Figure 8

## **ASARCO PHOTOGRAPHS**

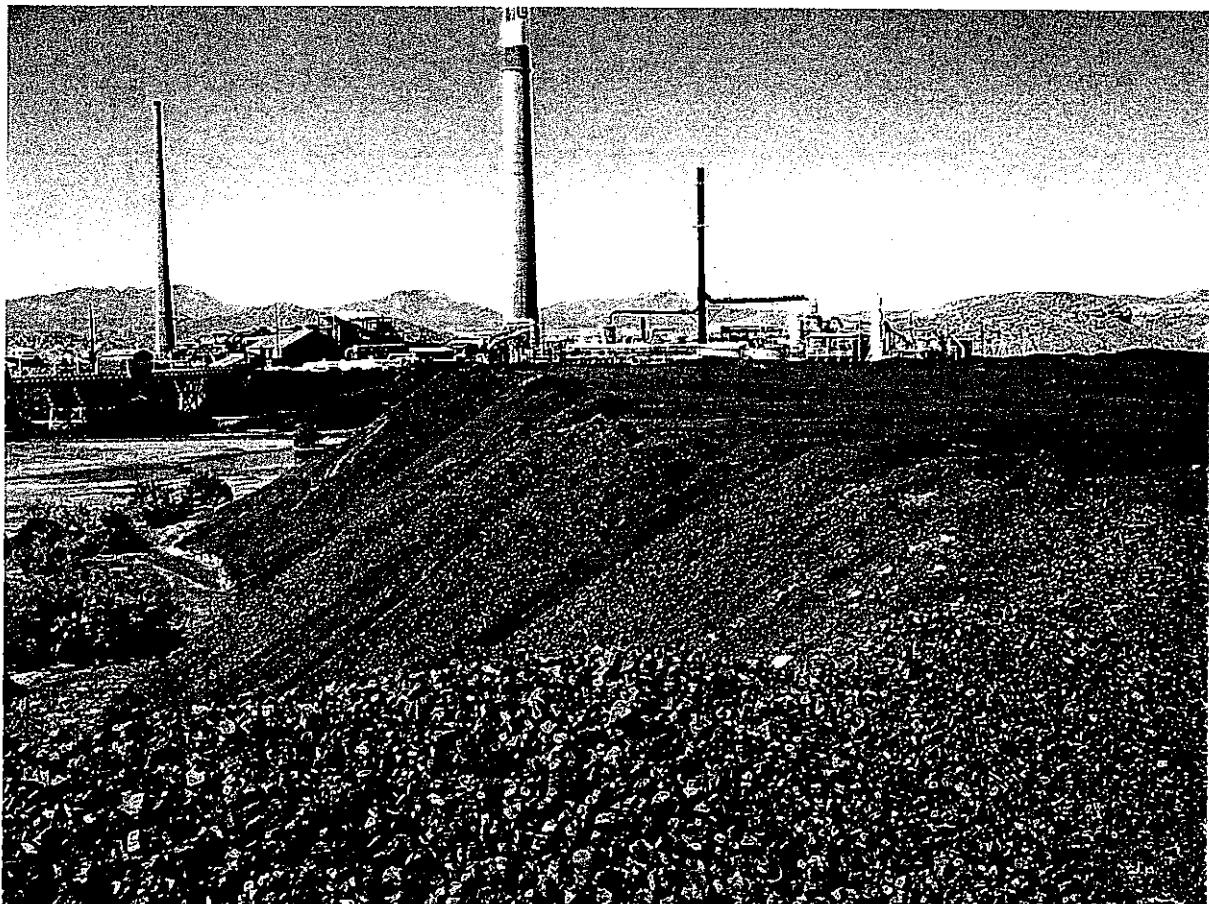
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Looking Southeast at northern section of the ASARCO Smelter along Paisano Drive.



2. Looking east at exposed slag in northern section of the ASARCO smelter.



3. Looking southwest at minus 50 slag/dust and fines pile in foreground and the ASARCO smelter in background.

