



**REVISED INTERIM CORRECTIVE MEASURE  
WORK PLAN—SWMU-11**

Exide Technologies  
Vernon, California

Revised October 23, 2008



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MEASURE  
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Vernon, California

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**PREPARED FOR**

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Project No. 2005-1299-04





October 23, 2008

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**Revised Interim Corrective Measure Work Plan—SWMU-11**  
**Exide Technologies**  
2700 South Indiana Street  
Vernon, California

Dear Mr. Chandler and Mr. Villamayor:

On behalf of Exide Technologies, (Exide) transmitted herewith are two paper copies, each including a CD, of the “*Revised Interim Corrective Measure Work Plan—SWMU-11*” for implementation of interim corrective measures at the subject site. We have incorporated our response to the Department of Toxic Substances Control comments from your letter of August 25, 2008 to Mr. Jack London of Exide.

If you have any questions or require additional information, please do not hesitate to call.

Respectfully submitted,

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## LIST OF ABBREVIATIONS AND ACRONYMS

AGC	Advanced GeoServices Corporation
amsl	above mean sea level
Bandini	Bandini Boulevard, Vernon, California
bgs	below ground surface
c-1,2-DCE	cis-1,2-dichloroethene
Cal/EPA	California Environmental Protection Agency
CEQA	California Environmental Quality Act
CHHSL	California Human Health Screening Level
CMS	Corrective Measures Study
Consent Order	Corrective Action Consent Order
COPC	chemical of potential concern
DTSC	California Department of Toxic Substances Control
E2	E2 Environmental, Inc.
Exide	Exide Technologies
ft	feet
GAC	granular activated carbon
GNB	GNB Technologies
Gould	Gould, Inc.
HASP	Health and Safety Plan
ICM	interim corrective measures
ICMWP	Interim Corrective Measures Work Plan
LACoFD	Los Angeles County Fire Department
LARWQCB	Los Angeles Regional Water Quality Control Board
NaOH	caustic soda
NAPL	non-aqueous-phase liquid
NL	NL Industries
NPDES	National Pollutant Discharge Elimination System
O&M	Operation and Maintenance
OMME	old mixed-metals extrusion building
PCE	tetrachloroethene
PFD	process flow diagram
PG	California Professional Geologist
PID	photo-ionization detector
PPE	personal protective equipment
ppmv	parts per million volume
RCRA	Resource Conservation and Recovery Act
RFI	RCRA Facility Investigation
ROI	radius of influence
SAP	Sampling and Analysis Plan
SCAQMD	South Coast Air Quality Management District
scfm	standard cubic feet per minute
Site	2700 South Indiana Street, Vernon, California.
SVE	soil vapor extraction

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SVOC	semivolatile organic compound
SWMU	solid waste management unit
TCE	trichloroethene
TOC	total organic carbon
<i>t</i> -1,2-DCE	trans-1,2-dichloroethene
µg/l	micrograms per liter
UN/DOT	United Nations or Department of Transportation
USCS	Unified Soil Classification System
USEPA	U.S. Environmental Protection Agency
VOC	volatile organic compound



## 1.0 INTRODUCTION

On February 25, 2002 (Docket No. P3-01/02-010), Exide Technologies (Exide) and the State of California Environmental Protection Agency (Cal/EPA)/Department of Toxic Substances Control (DTSC) signed a Corrective Action Consent Order (Consent Order) that provides the framework for conducting a Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) and Corrective Measures Study (CMS) at the Exide Vernon facility located at 2700 South Indiana Street (Site) in Vernon, California.

Within the framework of the Consent Order, the RFI is being implemented in phases. Phase 1 of the RFI, completed in August 2004, encompassed sediment sampling conducted in the concrete-lined drainage channel that runs through the Site. A report describing that activity entitled, “*Drainage Channel Sediment Sampling Report for the Vernon Exide Smelter*” (AGC, 2004), was submitted by Advanced GeoServices Corporation (AGC) on October 27, 2004. The Phase 2 RFI focused on three specific solid waste management units (SWMUs); SWMU-1, SWMU-6 and SWMU-11. A Draft Phase 2 RFI was submitted to DTSC on March 1, 2006 (AGC, 2006a). In their conditional approval letter of the Phase 2 RFI, dated June 30, 2006 (DTSC, 2006a), DTSC indicated that:

*“Interim Corrective Measures (ICM) need to be instituted to control the migration of the groundwater contamination to lower aquifers and from spreading laterally, and to prevent the contaminated soils from continuing to impact groundwater.”*

During a meeting held on September 13, 2006, DTSC and Exide agreed that the Interim Corrective Measures (ICMs) would be implemented in the SWMU-11 area to mitigate the impact of volatile organic compound (VOC)-contaminated soil on deeper ground water by source removal techniques. AGC and E2 Environmental, Inc. (E2) have prepared this Interim Corrective Measure Work Plan (ICMWP) on behalf of Exide to address that requirement. It was also agreed that it was premature to implement ICMS for ground water in SWMU-1, SWMU-6 and SWMU-11 areas until additional RFI phases are completed. The final Phase 2 RFI was submitted on October 1, 2006 (AGC, 2006b).

### 1.1 BACKGROUND

The Site is located at 2700 South Indiana Street in the City of Vernon, California, as shown on Figure 1. The property occupies a total area of approximately 15 acres, which is bounded by 26<sup>th</sup> Street towards the north and Bandini Boulevard (Bandini) towards the south. There is a 1.5±-acre parcel with approximately 190 feet (ft) of frontage along the north side of Bandini and 345 ft of frontage along the east side of Indiana Avenue, which is occupied by the Main Office Building. The remaining 13.5±-acre parcel extends along the west side of Indiana Avenue between Bandini and 26<sup>th</sup> Street (a distance of approximately 900 ft) and includes the active manufacturing areas. The 13.5±-acre parcel has approximately 1,000 ft of frontage along Bandini and 450 ft of frontage along 26<sup>th</sup> Street (Figure 2).



The Site is an operating battery recycling facility and is characteristic of the heavy industrial nature of the facility and surrounding land uses. Pavement, buildings, and structures almost cover the entire facility with a small grassy area near the Main Office Building, a few small isolated areas of landscaping or exposed soil being the exceptions. The Site is relatively flat with an average elevation of 175 to 180 ft above mean sea level (amsl) and topography that generally slopes from the northwest to the southeast. Notable landmarks include the Main Office Building (east of Indiana Avenue), the existing smelter building (near the intersection of Indiana Avenue and 26<sup>th</sup> Street), and the lined impoundment north of Bandini. A concrete-lined flood channel bisects the Site in a north-south direction, and a railroad right-of-way intersects the Site in an east-west direction, as shown on Figures 1 and 2.

Prior to 1922, the Site was reportedly the “boneyard” for a meat rendering plant. The area west of the channel and north of the railroad track and additional areas west of the Site were quarried for gravel.

In 1922, Morris P. Kirk & Sons, Inc. initiated lead smelting and metals processing operations at the Site. They continued operation until 1973, when NL Industries (NL) took control of the operation. In 1979, Gould, Inc. (Gould) took control of the facility and maintained operations until 1984. In 1984, GNB Technologies (GNB) bought the facility from Gould. In September 2000, Exide acquired GNB, including the Vernon facility.

Site operations from 1922 through 1973, included a battery breaking process for the purpose of recovering lead from lead-acid batteries, production of lead sheeting, the production of zinc alloys, and the manufacturing of extruded metal components. Accounts of the original operations indicate that the smelting and other metals processing activities took place in the Smelter Area (AGC, 2006b). Slag and waste acid produced by the operations were reportedly placed in SWMU-1 and -6 through 1973, prior to the time NL took control and operated the Site as stated above.

In 1982, the facility was the subject of a major modernization and reconstruction project that resulted in construction of the main smelter and battery breaking operations. The lined storm water retention basin was constructed in 1984.

SWMU-11 includes the old mixed-metals extrusion building (OMME) that was situated to the west of the engineering building (Figure 2). The building was approximately 10,000 square ft in size. The process performed in this area included the extrusion of metal bars and stock into various shapes. The building has been removed and the area is now paved with asphalt. It is unknown exactly when operations were started in this location; however, the mixed-metal operations were ceased in approximately 1978. During the operation of this unit, trichloroethene (TCE) was applied to metal bars as a cooling medium in the extrusion process. Existing ground water monitoring wells in the OMME area have detected dissolved TCE concentrations in the range of 120 to 5,500 micrograms per liter ( $\mu\text{g/l}$ ) since 1986. In addition, TCE concentrations have been detected in ground water monitoring well MW-15 located hydrologically downgradient in the parking lot across South Indiana Street (Figure 2) in the range of 89 to



1,600 µg/l. The highest observed TCE soil vapor result observed in SWMU-11 during the Phase 2 RFI was 220 µg/l at a depth of 5.0 ft in SSV-7.

Subsurface environmental investigations began at the Site in 1984. The abbreviated list below shows documents that pertain to activities at the Site regarding subsurface environmental characterization.

- “RCRA Facility Assessment,” conducted in October 1990 by the State of California Department of Health Services, Toxic Substances Control Program.
- “Water Quality Sampling and Analysis Plan,” as revised in June 1992, prepared by Lake Engineering and submitted to the DTSC.
- “Draft Phase I RFI Work Plan,” prepared by Lake Engineering in June 1994.
- “Part B Permit Application,” for the GNB Vernon facility, prepared by Lake Engineering (Revision No. 5, November 2000).
- “Current Conditions Report,” prepared by AGC in 2002.
- “Drainage Channel Sediment Sampling Report for the Vernon Exide Facility,” prepared by AGC in 2004. (AGC, 2004).
- “Phase 2 RCRA Facility Investigation, Exide Technologies Inc.,” prepared by AGC and E2 in October 2006. (AGC, 2006b).
- Periodic ground water monitoring has been ongoing at the Site since 1996.

## 1.2 OBJECTIVES OF THE ICM FOR SWMU-11 SOILS

Available Site-specific information collected in the vicinity of SWMU-11, including adsorbed VOC concentrations, vapor concentrations, and ground water characterization information was utilized to identify whether there are immediate threats to human health and/or the environment and if there is potential for the spread of contaminants at the facility that could be controlled or abated by the implementation of interim measures.

The highest observed TCE soil vapor concentration was 220 µg/l, or 40 parts per million by volume (ppmv). Other VOCs are typically on the order of 1 percent or less of the TCE concentrations. However, TCE concentrations in several samples are higher than the 1.77 µg/l California Human Health Screening Level (CHHSL) for migration into existing industrial buildings. A few samples had benzene concentrations up to 0.3 µg/l, which exceed the benzene CHHSL of 0.12 µg/l, and tetrachloroethene (PCE) concentrations up to 2 µg/l, which exceed the PCE CHHSL of 0.6 µg/l.



The objectives of this ICM are:

- to remediate the source area and reduce the potential for further contamination of the ground water by TCE and other VOCs; and
- to reduce the potential risk of vapor migration to indoor air.

Vapor migration of VOCs to ground water and to indoor air can be readily controlled and abated through a soil vapor extraction (SVE) system. It is expected that completion of a pilot-scale SVE system can reduce the TCE soil vapor concentrations to the extent that a full-scale SVE system will not be necessary. However, because this cannot be concluded with absolute certainty, this ICMWP is written on the premise that the pilot-scale system could conceivably be scaled up after the initial pilot-scale operational period.

### 1.3 WORK PLAN ORGANIZATION

This ICMWP is presented in several sections. Section 1.0 provides the introduction, background information, and objectives. Section 2.0 of this work plan presents a summary of existing conditions at the Site. The Site conceptual model of the SWMU-11 area is presented in Section 3.0. Selection of the interim remedial measures is addressed in Section 4.0. A description of the proposed interim remedial measure is included as Section 5.0. Remediation system design and installation considerations are presented in Section 6.0. Operation and maintenance of the system is described in Section 7.0 and Section 8.0 provides a schedule for implementation.



## 2.0 SUMMARY OF EXISTING CONDITIONS

This section presents a summary of the results from the investigations conducted to date in terms of site lithology, hydrogeology and soil, soil vapor, and ground water quality in the vicinity of SWMU-11. Figure 2 shows the general site layout. Lithologic and hydrogeologic information for the SWMU-11 area extending to and below the local ground water table has been obtained from three ground water monitoring wells: MW-11, MW-14 and PW-2. Two additional borings, HSA-24 and HSA-25, were drilled in the vicinity of SMWU-11 during Phase 2 RFI site activities. These borings are approximately 45 ft apart within the 60-foot by 40-foot footprint of the OMME and were drilled to just above the water table. An additional 23 temporary shallow soil vapor probes were installed and soil vapor samples were collected and analyzed for VOC concentrations at depths of up to 30 ft below ground surface (bgs) within the SWMU-11 vicinity.

### 2.1 SITE LITHOLOGIC AND HYDROGEOLOGIC CONDITIONS (SWMU-11)

Information from Site-specific drilling programs was used to prepare cross section C-C' (Figure 3). Figure 4 shows the lithologic configuration used in modeling induced vapor flow during proposed SVE operations. The values for total organic carbon (TOC) are based on data from Table 9 of the Phase 2 RFI report (AGC, 2006b). TOCs were 1400 milligrams per kilogram (mg/kg) and 1700 mg/kg in two samples at 5 ft bgs and 8.5 ft bgs, so a value of 1500 mg/kg was taken as representative for modeling purposes. The other three parameters shown on Figure 4, and defined on that figure, are typical values for each soil type as suggested in the software documentation (Waterloo, 1996).

Figure 5 shows borings, ground water monitoring wells, and temporary soil vapor probe locations in the vicinity of SWMU-11. The current interpretation of the site lithology indicates that in the SWMU-11 area, the upper 75 ft of the subsurface consists of an alternating sequence of very fine-grained to medium-grained units that are relatively continuous. There is a finer-grained zone (silty sands) from ground surface to approximately 10 ft bgs. From 10 to 15 ft bgs, there is poorly graded sand, which is underlain by another silty sand that extends from 15 to approximately 23 ft bgs. At approximately 23 to 26 ft bgs, there is sandy, silty clay, which will significantly impact vapor extraction. Below this depth is a thicker fine-grained (sandy clay) zone from approximately 26 to 45 ft bgs. Below 45 ft bgs, there are several thin (2 – 5 ft thick) interbedded zones clays, silts, silty sands and sand to total boring depth of 70 ft bgs. Logs for the borings are included in the Phase 2 RFI (AGC, 2006b).

Overall, very fine to fine-grained soils, which would be expected to exhibit medium to low air permeability values, comprise more than 75% of the lithologic sequence to a depth of approximately 45 ft bgs. Current interpretation is that this sequence is part of the overlying alluvial and Recent deposits above the Bellflower aquiclude.

Groundwater occurs at a depth of approximately 73 to 78 ft bgs (95 to 100 ft amsl) beneath the SWMU-11 area. Ground water beneath the SWMU-11 area flows to the south-southeast with a



hydraulic gradient of about 0.025 ft/ft. A ground water elevation contour map based on the June 2006 measurements is shown on Figure 6.

## 2.2 SOIL QUALITY

Soil samples have been collected and chemically analyzed from borings drilled in the SWMU-11 area to provide an indication of the extent of adsorbed chemicals that might occur at concentrations that make them target chemicals of potential concern (COPCs) in soil. To be a COPC, the chemical has to occur at concentrations above the U.S. Environmental Protection Agency (USEPA) or California-modified soil screening levels as described in the Phase 2 RFI. Selected soil samples have been analyzed for VOCs, semi-volatile organic compounds (SVOCs), priority pollutant metals including hexavalent chromium, pH, sulfate, and TOC. The results of the soil sample chemical analyses show that TCE is the only VOC in the SWMU-11 area that is a COPC. The results of the chemical analyses of the soil samples are summarized in Table 1.

## 2.3 SOIL VAPOR QUALITY

Soil vapor samples were collected from 23 temporary shallow vapor probes installed in the vicinity of SWMU-11 (Figure 5) during Phase 2 RFI site investigations. Fifty-five vapor samples were collected from those locations using the DTSC/Los Angeles Regional Water Quality Control Board (LARWQCB) vapor sampling guidance. The samples were analyzed for VOC concentrations onsite using EPA Method 8260B. The results are summarized in Table 2. Vapor samples were generally collected from two depths at each location, 5 ft bgs and 20 ft bgs, except at locations SSVP-1, which was sampled at 5, 20, and 30 ft bgs; SSVP-9, which was sampled at 20 ft bgs only, and SSVP-16, which was also sampled at 20 ft bgs only.

Trace levels of VOCs were detected at or slightly above the detection limits. TCE and PCE were detected in many of the soil vapor samples (Table 2). The concentrations were normally higher at the shallow depths and lower at deeper depths. PCE concentrations were about 100 times lower than TCE concentrations. The ranges of detectable concentrations for PCE and TCE are:

### PCE

- 5-foot sample:
  - Minimum 0.1 µg/l at SSVP-5 and SSVP-20
  - Maximum 2.0 µg/l at SSVP-7
- 20-foot sample:
  - Minimum: 0.1 µg/l at SSVP-15
  - Maximum: 0.8 µg/l at SSVP-2



## TCE

- 5-foot sample:
  - Minimum: 0.4 µg/l at SSVP-17
  - Maximum 220 µg/l at SSVP-7
- 20-foot sample:
  - Minimum 0.1 µg/l at SSVP-22
  - Maximum 79 µg/l at SSVP-2

Other, less frequently detected compounds include benzene from 0.1 to 0.3 µg/l, toluene at 0.3 to 0.6 µg/l, xylenes at 0.2 to 1 µg/l, two detections of 1,3,5-trimethylbenzene at 0.1 and 0.2 µg/l, one detection of ethylbenzene at 0.4 µg/l, chloroform at 0.1 to 1 µg/l, and four other chlorinated compounds ranging from 0.1 to 0.4 µg/l.

For certain other compounds, the analytical reporting limit is higher than the respective CHHSL. This includes vinyl chloride, with a CHHSL of 0.045 µg/l and carbon tetrachloride with a CHHSL of 0.085 µg/l.

Figures 7 through 13 show the subsurface distribution of TCE in soil vapor in the SWMU-11 area. The vapor survey indicates that the concentration of vapor-phase TCE decreases with depth and are highest in the northern area of the former location of the OMME building. The concentration of TCE in soil vapor decreases with depth, suggesting that the source was surficial in nature (Figure 14).

It should be noted that the concentration of soil vapor in the subsurface might not be representative of the concentration of the contaminant adsorbed on the soil particles. Vapor concentrations are the result of partitioning from the adsorbed-phase in soils. Therefore, due to differences in Henry's Law constants, partitioning coefficients, and other chemical and soil properties, the vapor concentration in soil may not include all of the chemicals present in the adsorbed-phase.

## 2.4 GROUND WATER QUALITY

There are three ground water monitoring wells, MW-11, MW-14 and PW-2 (Figure 5) located in the general vicinity of SWMU-11 that are sampled on a quarterly basis. VOCs historically found in these wells include chloroform, cis-1,2-dichloroethene (*c*-1,2-DCE), trans-1,2-dichloroethene (*t*-1,2-DCE), PCE, and TCE. The results of the ground water sample analyses indicate that VOCs are the most prevalent compounds in ground water beneath the SWMU-11 area. Figure 15 shows the second quarter 2006 concentration of TCE in shallow ground water beneath the SWMU-11 area. Ground water occurs at approximately 76 to 80 ft bgs at PW-2 and MW-11, respectively. The current maximum TCE concentration in ground water occurs below the SWMU-11 area.



The results of ground water sampling for June 2006, in the southeastern portions of the Site (MW-11, MW-14, MW-15 and PW-2), as depicted on Figure 15, show the highest TCE concentrations in the vicinity of PW-2 (3,600 µg/l) with decreasing concentrations downgradient of this well. TCE concentrations in soil vapor (Figures 7 and 10) were highest in the area immediately upgradient of PW-2, while, at the same time, soil vapor concentrations in the direction of ground water flow dropped quickly. This suggests that the ground water TCE concentrations observed in MW-11 are originating further upgradient.

## 2.5 DATA QUALITY AND VALIDATION

Analytical data associated with the Phase 2 RFI were validated by AGC (AGC, 2006b). The results reported in the Phase 2 RFI have been validated or qualified with general guidance from the *USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review*. The validation process included a review of the parameters listed below:

- Data Completeness
- Chain-of-Custody Documentation
- Holding Times
- Summaries of Initial and Continuing Calibrations
- Summaries of Laboratory and Field Blank Analysis Results
- Summaries of Matrix Spike and Matrix Spike Duplicate Recoveries
- Summaries of Laboratory Duplicate Analysis Results
- Summaries of Field Duplicate Analysis Results
- Summaries of Laboratory Control Sample Results
- Summaries of Surrogate Recoveries
- Quantitation Limits and Detection Limits

The full Analytical Quality Assurance Report for Organic Analyses is included in the Phase 2 RFI.



### 3.0 SITE CONCEPTUAL MODEL – SWMU-11

The purpose of the Site conceptual model is to develop an understanding of the potential risks to human health and the environment at the Site. The Site conceptual model is a schematic presentation of information about site conditions and potential impacts to receptors. The contamination sources are identified and linked to potential receptors through release mechanisms, potential pathways, and exposure routes.

#### 3.1 SOURCE AND CURRENT LOCATION OF CONTAMINANTS

During operations at the OMME (SWMU-11), TCE was applied to metal bars as a cooling medium in the extrusion process. It is possible that releases of TCE to the environment occurred throughout the operations at the OMME. It is unknown exactly when operations were started in this location; however, the OMME operations were discontinued in approximately 1978. The history of operations at the Site suggests that the possible releases of TCE to the environment in the OMME area should have ended at this time. Currently, the SWMU-11 area is covered with pavement and buildings.

#### 3.2 EXTENT OF SOIL VAPOR CONTAMINATION

TCE found in shallow soil vapor is believed to originate from surface releases of TCE in the vicinity of the OMME. The shallow soil vapor concentrations of TCE are higher in the 5-foot bgs vapor samples and decrease with depth (Figure 14). The geometry of the TCE vapor plume indicates that the plume extends to a greater depth to the south of the footprint of the former OMME, eventually dissipating just north of the material storage building.

#### 3.3 TRANSPORT

As TCE migrated vertically, through approximately 75 ft of unsaturated sediments, an adsorbed fraction attached to the soil particles and a free-phase fraction was held in the soil pores. TCE is highly volatile; therefore, a vapor-phase fraction was also partitioned off of the release. A dissolved-phase fraction entered the ground water and began to slowly migrate south southeasterly with the hydraulic gradient. Future phases of the RFI will better identify the nature of the TCE contamination in the ground water zone.

The adsorbed-phase of TCE is held by chemical forces to soil or carbon particles within the soil. Fine-grained material tends to have a higher sorptive capacity than coarse-grained materials. The free-phase is generally a liquid-phase of the contaminant that is held within the pore space of the material. Fine-grained materials also generally retain more than coarse-grained well-sorted materials. Transport for the free-phase is generally vertical along preferential pathways or through porous flow once capillary forces are overcome. Vapor-phase transport results from evaporation from the adsorbed and free-phases and diffusion through gas-filled soil pores. Vapor-phase transport is impacted by vapor permeability, which is in turn a direct function of soil moisture. TCE enters the soil water from both the free-phase and vapor-phase, depending on



Henry's Law constant and solubility. The soil water then moves vertically downward as recharge to the ground water and will tend to spread laterally in finer-grained, lower permeability materials. Because buildings or pavement cover the entire SWMU-11 area, the potential for continued transport by infiltrating surface water is significantly reduced.

### **3.4 HEALTH EFFECTS OF CONTAMINANTS**

Potential transport mechanisms and exposure pathways for VOCs in the soil are the inhalation of contaminated dust and VOC vapors from soil; incidental ingestion of and dermal contact with contaminated soil; inhalation of VOC vapors from ground water; and ingestion and dermal contact with contaminated ground water. Ingestion and dermal contact with contaminated ground water are not considered likely pathways in this case because there are no active municipal water supply wells screened in the uppermost aquifer within a mile downgradient of the Site. However, future phases of the RFI process will further investigate this pathway.

Possible health effects associated with inhalation of VOCs, specifically TCE, PCE, and *c*-1,2-DCE, may include cancer, liver and kidney damage, respiratory impairment, and damage to the central nervous system. USEPA classifies benzene as a known human carcinogen, based on several reports of increased incidence of nonlymphocytic leukemia in exposed workers and supporting animal studies.



## 4.0 SELECTION OF INTERIM CORRECTIVE MEASURES

The overall objective of the ICM proposed herein is to develop and implement a strategy that would mitigate VOC-impacted soil and soil vapor. The ICM is also designed to control the possible vertical migration of VOCs, while the need for long-term corrective action alternatives is evaluated.

### 4.1 PRESUMPTIVE REMEDIES

Presumptive remedies are preferred technologies for categorized sites that have been selected based on historical patterns of remedy selection and USEPA's scientific and engineering evaluation of performance data on technology implementation (USEPA, 1994). Presumptive remedies tend to accelerate remediation by limiting the number of technologies that are evaluated and by allowing focused site assessment activities.

USEPA has identified three presumptive remedies for VOCs in soil-contaminated sites.

- In-situ SVE and treatment
- Thermal desorption of excavated soil
- Incineration of excavated soil

Exide is an operating facility; therefore, soil excavation at this facility would cause an unreasonable disruption to site operations, potentially expose workers to health hazards, and result in employees losing their jobs. SVE provides the most proactive ICM with the least disruption at the Site.

To date there has been no significant on-site evaluation of the suitability of the subsurface conditions to SVE and treatment. However, based on our experience at other locations, the lithology appears to offer an acceptable opportunity for SVE. Exide is proposing to establish operations of the SVE for a period of 12 months or less, performing a series of short-term pilot tests to collect additional subsurface data concurrent with operating the system and removing contaminants.

### 4.2 SOIL VAPOR EXTRACTION AND TREATMENT

SVE is considered as the most appropriate option for the interim remediation of VOCs in the vadose zone because:

- TCE has a relatively high vapor pressure and Henry's Law constant making it conducive to removal by SVE.
- The lithology of the Site tends to concentrate the TCE in particular zones that can be discretely targeted for source removal.



- The Site is an active operating facility. SVE operations would not disrupt site operations.
- The Site is heavily developed and industrialized. SVE systems can be tailored to fit in extremely limited spaces.
- Shallow VOCs at the Site originate from the impacted soil in the subsurface. Negative air pressure induced by SVE is anticipated to create a net flow of air from above ground to the subsurface, thereby limiting the migration of VOCs in soil to ambient or indoor air.

Finally, it has been over 25 years since the use of TCE has ceased. Based on relatively stable concentrations of dissolved TCE in ground water and the rapid decrease in soil vapor concentrations of TCE with depth in the shallow soil, it appears that TCE remaining in the shallow subsurface is relatively immobile. By continuing to control infiltration from precipitation, the TCE plume in soil will remain relatively stable while SVE removes the source TCE. Therefore, the likelihood of migration of additional TCE to the ground water is minimized.

Vapor extraction is a proven and cost-effective technology for the reduction of VOCs in soil. Once extracted, VOCs may be treated using one of several technologies including granular activated carbon (GAC), catalytic oxidation, or thermal oxidation.



## 5.0 DESCRIPTION OF PROPOSED INTERIM CORRECTIVE MEASURE

This section presents the remedial objectives of the ICMWP and addresses the design and installation of the proposed ICM. The SVE system will be installed as a temporary system with several planned pilot tests. The SVE system will also be capable of being converted to a long-term remedial alternative, if needed, although current expectations are that the “temporary pilot system” will be capable of removing sufficient VOC mass to forgo conversion to a long-term system. Most of the engineering design parameters for the initial design proposed below are based on experience and published information. Periodic testing, as described later in this document, will be used to refine the design parameters and provide operational guidance.

Target chemicals are TCE and other VOCs that have been detected at much lower concentrations in both the vapor- and adsorbed-phases. The proposed SVE system will operate for an initial period of up to 12 months, until the scope of a final remedy is determined or until the shutdown criteria described in Section 5.5 are met. At that time, the SVE system may be expanded or terminated, as appropriate.

### 5.1 REMEDIAL OBJECTIVES

The primary remedial objectives of the proposed SVE system are:

- Capture VOC-containing vapors (primarily TCE) that may pose a potential threat to human health.
- Reduce the potential for vertical migration of VOCs through the unsaturated zone toward the underlying ground water.
- Source reduction of VOC mass in the shallow (less than 35 ft bgs) unsaturated zone.

The SVE installation will also be utilized for additional site characterization.

### 5.2 SYSTEM DESIGN

The preliminary design of the SVE pilot system consists of:

- Soil vapor monitoring probes at depths of approximately 9, 23, 30, and 35 ft bgs for collection of baseline vapor samples, operational monitoring, and pilot test monitoring.
- A series of shallow SVE wells installed to depths of approximately 8 ft bgs with screen intervals of 1 to 1.5 ft in length. The depth of the top of the screen is chosen to minimize short circuiting of air from the ground surface. The bottom is chosen to stay above the more permeable sand layer that starts at about 10 ft bgs, to ensure that gas flow into the well is mainly from the upper silty sand layer.



- A series of deeper SVE wells installed to depths of approximately 23 ft bgs with screen installed from approximately 18 to 23 ft bgs. The screen interval is chosen to induce gas flow through the lower silty sand layer. The clay layer below 23 ft bgs will not allow much gas flow, so there is no point in screening into this layer.
- Gas flow through the sand layer between the two silty sand layers will be induced by the vacuum created in the layers above and below the sand layer.
- A positive displacement blower capable of creating a vacuum of 15 inches of mercury to extract soil vapor.
- A granular activated carbon treatment system to treat up to 300 standard cubic ft per minute (scfm) of soil vapor extracted by the blower from SVE wells.

### 5.2.1 Vapor Probe Depths and Spacing

Five vapor monitoring probe nests, VP-1 through VP-5, are proposed at the locations shown on Figure 16. Each soil vapor monitoring probe nest will consist of screened intervals installed at depths of approximately 9, 23, 30, and 35 ft bgs. The vapor probe nests will be used to facilitate the collection of baseline soil vapor samples prior to operation of the SVE. Additionally, they will be used during both the pilot testing and operational phases of SVE system implementation.

The selected depth intervals will provide sufficient vapor sample information to evaluate system efficiency and allow changes to be made to the operation based on analysis of the data collected. Proposed vapor probe construction details are shown on Figure 17.

### 5.2.2 Vapor Extraction Well Installation

To address the areas containing the highest concentrations of TCE in soil in the SWMU-11 area, four locations with two vapor wells at each location, a shallow and a deeper well, will be installed. Wells will be named SVE-1S and SVE-1D through SVE-4S and SVE-4D. The proposed locations of the vapor wells are shown on Figure 16. All four locations will be nested wells with well casings perforated in both the upper and lower vadose zones installed. Proposed well construction details for these nested wells are shown on Figure 18.

### 5.2.3 SVE Treatment System Design

The ICM is a vapor extraction and carbon treatment system. Currently, Exide is planning on using a portable system that has previously been permitted for use at “various locations” (VL) by the South Coast Air Quality Management District (SCAQMD). However, based on system availability, it may be necessary to obtain the permits for a fixed system operation. Additional information about the anticipated system is presented below.

The proposed system includes a 15-HP extraction blower with a variable frequency drive to allow for flow rate adjustments up to 300 scfm. The SCAQMD VL permit allows for flexibility in the amount of carbon to be used to remove VOCs from the extracted soil vapor. The system



can be used with two, three, or four vessels, each containing between 200 and 10,000 pounds of carbon. For the system proposed as part of this ICMWP, two vessels, each containing 400 pounds of carbon, will be used to treat the extracted soil vapor prior to discharge to the atmosphere.

A licensed electrical contractor will install 230v, 3-phase electrical power to the unit from local service. Utilization of the selected SVE treatment system requires no further permitting through SCAQMD, but would require a notification of the intent to use the equipment at the Site. Further, the selected SVE treatment equipment is permitted to treat vapors containing chlorinated and fluorinated VOCs, including those present at the facility.

The selection and design of the initial vapor treatment equipment may be modified following pilot testing activities. However, as a first approximation, the following design parameters are used:

- A total vapor extraction flow rate of 300 scfm, based on extraction at a rate of up to 37 scfm from each of four well screens in the upper and lower vadose zones.
- An average initial VOC concentration of 20 ppmv in the extracted soil vapor, with the dominant compound TCE. PCE and acetone are expected at lower relative concentrations.
- A total initial VOC mass loading of 3 pounds per day.
- VOC mass loading decreasing to less than 1 pound per day after the first few days of operation.

#### 5.2.3.1 Vapor Treatment Using Carbon

The vapor extraction/treatment unit will be used for pilot testing and for interim soil corrective measures. This approach allows remediation to occur concurrently with the pilot testing. The schedule provided (Table 4) shows operation of the system over a period of approximately 5 months with sampling/testing conducted at the beginning and end of the operating period. The SVE system may be used at the facility for up to 12 months under the VL permit issued by SCAQMD.

The proposed location for the vapor treatment equipment is near the southern end of the engineering building or in the material storage area, depending on infrastructure constraints, as shown on Figure 19. This proposed location has been reviewed and approved by the current site owner. The SVE system includes a skid-mounted 15-HP extraction blower and a 50-gallon moisture knockout tank. The emission stack is also mounted to the skid, having a total height of 14 ft. The process flow diagram for vapor treatment by carbon is shown on Figure 20.

SCAQMD allows flexibility in the amount of carbon used for treatment. Specifically, the VL permit for the system specified in this ICWMP allows between two and four vessels, each containing between 200 and 10,000 pounds of carbon. With the design estimate of 3 pounds per



day of VOCs and an assumption of 10 percent mass loading onto the carbon, the carbon usage rate would be 30 pounds per day initially, but this is expected to drop to less than 10 pounds per day within the first few days of operation.

#### 5.2.3.2 *Alternative Treatment Technologies*

Using carbon as an initial treatment option allows implementation of a relatively proven and rapid remedial method with significant flexibility. After the first few months of implementing the interim remedial measures, if it becomes apparent that the carbon treatment option is not cost-effective, then the selection, design, procurement, and installation of an alternative treatment technology would commence. The carbon system would continue until the alternative treatment option is ready to go online. Other potentially cost-effective treatment technologies are catalytic oxidation and thermal oxidation.

##### 5.2.3.2.1 Catalytic Oxidation Option

A process diagram for treatment using catalytic oxidation is shown on Figure 21. For treatment using catalytic oxidization, vapors drawn from an extraction blower pass through a flame arrestor then through the cold side of a heat exchanger, where it is preheated by the exit gas. A preheat burner is used to further raise the vapor temperature to a level necessary for oxidation of VOCs. The heated vapor passes through the catalytic reactor, where the catalyst facilitates oxidation of the VOCs. The catalyst enables the oxidation to take place at lower temperatures, typically 850°F for PCE and TCE. Upon leaving the catalytic reactor, the vapor passes through the hot side of the heat exchanger, transferring heat to the incoming stream.

The products of the oxidation reaction of the chlorinated hydrocarbons present at the Site include carbon dioxide and water. Also generated are acid gases, including hydrochloric acid. A scrubber will be used to neutralize the acid gas prior to discharge to the atmosphere. Upon entering the scrubber unit, the vapor stream is cooled in a quench section by contact with a liquid neutralizing solution, such as caustic soda (NaOH). The vapor then travels up through the scrubber tower, where it is brought into contact with additional neutralizing solution before being discharged through the stack. In the neutralization solution, the reaction of the caustic soda with the acid gases produces salts, such as sodium chloride and sodium bicarbonate. Options for disposal of this brine include discharge to the sanitary sewer, or transport to an off-site treatment facility.

##### 5.2.3.2.2 Thermal Oxidation Option

As a second alternative, the vapor stream could be treated using a thermal oxidation unit. The thermal oxidation process is essentially the same as the catalytic oxidation process, except there is no catalyst. Absent the catalyst, the vapor stream is heated to a higher temperature, typically 1,400°F, for the oxidation reaction to occur. Thermal oxidation requires more supplemental fuel than the catalytic option, but requires no change-out of the catalyst. Also, destruction efficiencies are typically higher using the thermal oxidation option.

The catalytic and thermal oxidation options would require both electricity and natural gas. A water supply and an ion exchange unit to produce deionized water, and a supply of NaOH are required for the neutralization process. If the spent neutralization solution is to be transported



off site, a brine holding tank will be required. Alternatively, if this process solution can be discharged, hookups to either the sanitary sewer or the Site's water treatment system will be required.

Detailed designs for either the catalytic or thermal oxidation processes will be provided if it is determined that these technologies would be most viable after pilot testing and initial interim remediation using carbon.

### 5.2.3.3 *System Piping and Details*

Each SVE well will be connected to a common manifold pipe leading to the treatment compound area. Piping will be placed in engineered trenches since these will be in a traffic area. Each SVE wellhead, located in an appropriately rated traffic box, will be fitted with a quick disconnect port that can be used to monitor wellhead vacuum and collect vapor samples. Ports for insertion of a hot-wire anemometer will be installed in individual well pipes and the common manifold pipe to measure the total vapor flow rate extracted from all of the SVE wells. A valve will be installed at each wellhead to isolate and close the SVE wells individually.

The common manifold will be connected to a vapor/liquid cyclone separator, or knockout pot. Any liquid entrained in the extracted soil vapor will be separated from the vapor in the knockout pot and will be disposed of according to applicable regulations and guidelines. The knockout pot will be connected to the system blower, which is expected to extract up to 300 scfm of gas at a vacuum of up to 10 inches of mercury. Gas flow rates and vapor concentrations entering the SVE and treatment system may be optimized by opening and closing individual wells. The common manifold will also include a dilution line to allow atmospheric air to enter the blower diluting the TCE concentrations in the inlet vapor stream to protect the treatment equipment. System optimization should minimize use of the dilution air valve. Any vapors discharged from the blower will be treated prior to emission to the atmosphere.

## 5.3 VAPOR EXTRACTION PILOT TESTS

In addition to operational monitoring, a series of vapor extraction pilot tests will be conducted in the vadose zone over the course of the planned one year of operation.

### 5.3.1 Pilot Test Procedures and Data Analysis

Two pilot tests will be performed in both the lower and upper vadose zones using wells SVE-1S, SVE-1D, SVE-4S and SVE-4D. Vapor will be extracted from each of the selected well casings in succession. Each test will include extracting vapor at a minimum of three stepped flow rates (e.g., flow rates of 10, 20, and 40 scfm). Actual flow rates will be determined in the field based on airflow yield. During the tests in each well, the remaining wells and vapor points will be used as observation points. A series of shallow and deep tests will be run in all four wells after the first two weeks of SVE operation. A second series of tests will be run after about 6 months of SVE operation.



For each pilot test, the induced vacuum in the extraction and observation wells will be recorded at approximately 30 minute intervals. Also, VOC concentrations in the extracted vapor will be measured at regular intervals using a photo-ionization detector (PID). When consecutive vacuum level measurements at each monitoring point show less than 10 % difference, the system will be considered stable, and flow rate will be increased to the next step, or the test will be stopped if it is the last step. At the end of each flow step, a sample of the extracted vapor will be collected in a Summa canister. The samples will be submitted to CalScience, Inc. of Garden Grove, California for VOC analysis using EPA Method TO-15. Sample handling procedures will be conducted as described in the Phase 2 RFI Work Plan (AGC, 2005).

The induced vacuum measurements recorded during each test will be evaluated using analytical solutions for radial gas flow to a well.

The results of the data reduction, along with the laboratory analytical and geomechanical results, will provide information on the zone of influence and mass recovery rates associated with vapor extraction within the areas of concern. Using the results of the pilot testing, the design parameters for the ICM will be refined, including:

- The required number of vapor extraction wells, and horizontal and vertical well placement.
- Total vapor extraction volumetric airflow rate.
- VOC mass loading.

#### **5.4 OPERATING STRATEGY**

The ICM operating objective for soils focus on reducing the mass of TCE and other VOCs in the vadose zone to limit the VOCs as a source to ground water and minimize potential exposure of workers to inhalation of vapors. The system will be run for approximately one year or until the shutdown criteria described below are reached, and DTSC concurs with shutdown of the SVE system.

The SVE system will be designed to operate 24 hours per day, 7 days per week. As VOC concentrations in the inlet vapor stream decrease, the system may be operated in a cyclical fashion. The decision to change to cyclical or pulsed operation will be based on the criteria presented below in Section 5.5, Shutdown Evaluation. Operating in this fashion will allow the adsorbed- and vapor-phases to equilibrate and higher mass removal and increased efficiency will be realized. The SVE system operation will continue until the pre- and post VOC concentrations of the cyclical operations are within approximately 10 percent of each other.

The radius of influence (ROI) for the system is currently only estimated. Pilot testing described above will be conducted to refine the ROI of the extraction wells. If it is determined that the ROI is less than 30 ft, additional SVE wells will be installed. Additional SVE wells may also be installed at other locations or at greater depths if ongoing assessment activities indicate they would be beneficial to the extraction and treatment program.



## 5.5 SHUTDOWN EVALUATION

The following criteria establish guidelines for evaluation of the ability of the system to decrease the VOC concentrations in the soil vapor. Both pilot test data and operational monitoring data will be collected to evaluate the first three of the following general shutdown criteria:

- Reduction of the spatial pattern of VOC contamination.
- Decrease in vapor concentrations of TCE and other minor VOCs.
- Rebound minimization of system.
- Confirmation soil gas analytical results.
- Modeling of vapor migration to ground water.

The final two criteria will be evaluated only after consultation and presentation of data to DTSC.

Shutdown of an SVE system is more often based on system performance rather than meeting remediation goals. Generally, graphs of concentration versus time or mass removal rates versus time are constructed. As the concentration or mass removal rate reaches an asymptotic value and remains relatively constant, continued operation of the SVE system does not provide any additional remedial results. If the change in concentration or mass removal rate does not vary by more than 5% in a 6-week period, as measured weekly, the asymptote will be assumed to have been reached.

Once the asymptote has been reached, the system will be pulsed to evaluate the rebound effect common in SVE system operation. During pulsing, shutdown will be for a minimum of two weeks. After a short operational period (typically two hours), VOC concentrations at each SVE wellhead will be measured. As a general guideline, if the concentration at the wellhead is more than twice the concentration prior to shutdown, the cyclical operational cycle will be restarted until the asymptotic concentration is again reached.

DTSC will be advised whenever changes of the operating mode are indicated.



## 6.0 SYSTEM INSTALLATION

### 6.1 PERMITTING

As previously noted, if the VL-permitted system is used, no additional permitting is required from SCAQMD to begin vapor extraction testing. Because the vapor extraction wells will not extend down to ground water, the Los Angeles County Department of Health Services will not require any well permits. Also, an existing SCAQMD Permit to Construct/Operate a soil remediation system at various locations will be used for the extraction/carbon treatment system equipment.

The VL permit allows continuous use at a given facility for up to 12 months. If it is determined after the initial months of operation that continued use of carbon as a treatment option is effective and will extend beyond 12 months, a site-specific “fixed location” Permit to Construct and Permit to Operate will be obtained from SCAQMD.

A construction permit for an electrical power supply will also be required prior to implementation of the initial interim remedial measures using the carbon treatment option. The electrical permit will be obtained from the City of Vernon Department of Building and Safety.

After an initial period using carbon, if it is determined that either catalytic or thermal oxidation treatment would be more effective in the long-term, the required permits will be obtained from the appropriate agencies, including the following:

- A fixed location Permit to Construct and Permit to Operate will be obtained from SCAQMD for the catalytic or thermal oxidation units.
- Construction plans for installation of the catalyst or thermal oxidation systems will be submitted to the City of Vernon Planning Department and the Department of Building and Safety, and the Los Angeles County Building Department. The permitting process will include all building, mechanical, plumbing, and electrical plan checks.
- The option for discharge of the spent neutralization solution to the facility treatment system negates the need for a National Pollutant Discharge Elimination System (NPDES) permit. If discharge to the sanitary sewer is selected by Exide, an application will be made to the Los Angeles County Sanitation Districts.
- A Final Plan Check will be performed by the Los Angeles County Fire Department (LACoFD). The required documentation for a Fire Department Permit includes an approved SCAQMD permit and proof of approval from the City of Vernon.



During trenching, an SCAQMD Rule 1166 permit and associated monitoring may be required based on the anticipated volume of soil to be removed.

If a fixed location permit is required, Exide will provide DTSC with a work plan addendum to describe the permitting requirements.

## **6.2 VAPOR WELL AND PROBE INSTALLATION**

### **6.2.1 Permitting**

As noted above, none of the planned vapor wells or probes will extend to ground water. Therefore, well permits are not required.

### **6.2.2 Underground Service Alert**

Underground Service Alert will be notified at least 48 hours before drilling begins. The area was cleared for installation of the shallow soil vapor monitoring probes during Phase 2 RFI field activities. No additional on-site activities for identification of underground utilities will be performed for installation of the wells and probes. However, if proposed trenching is in any areas not previously cleared, an underground utility surveyor will be retained to clear the on-site trench corridors.

### **6.2.3 Health and Safety**

AGC and E2 will review the current site Health and Safety Plan (HASP) for applicability to the planned field activities and subsequent SVE operation and maintenance (O&M) tasks. DTSC will be advised after the review and if an addendum is deemed necessary, it will be provided to DTSC for review and approval.

### **6.2.4 Drilling Methods**

A California State-licensed well contractor will install all vapor probes and vapor extraction wells using a hollow stem auger.

### **6.2.5 Soil Sampling and Analysis**

Either a California Professional Geologist (PG) or a geologist working under the direct supervision of a California PG will log all boreholes. Boreholes will be logged using the Unified Soil Classification System (USCS). Soils encountered during drilling will be visually classified and recorded on field boring logs. Relatively undisturbed soil samples will be collected at 5-foot intervals using a Modified California sampler and at changes in lithology.

Soil samples will be collected using the same techniques as described in the Phase 2 RFI. The DTSC-approved work plan for the Phase 2 RFI includes a Sampling and Analysis Plan (SAP) for soil sampling. All samples collected for VOC analyses will be collected using EPA Method 5035. Continuous soil sampling will be conducted across the proposed well screen depth intervals.



Soil subsamples collected from each boring at 9, 15, 23, and 30 ft bgs intervals will be retained for chemical analysis. Additional soil subsamples may be retained for chemical analysis at the discretion of the field geologist, based on the field screening for VOCs. If elevated PID readings indicate the presence of non-aqueous-phase liquid (NAPL), laboratory analysis will be conducted for confirmation. All soil subsamples retained for chemical analysis will be submitted to CalScience, Inc. of Garden Grove, California, for analysis for VOCs using USEPA Method 5035/8260B. CalScience is certified by the California Department of Health Services to perform this method of analysis.

Additionally, two soil subsamples from each of the vapor well borings will be submitted for geomechanical testing. Specifically, subsamples collected at 9 and 23 ft bgs will be retained. Each of these samples will be analyzed for the geomechanical test parameters listed in Table 3. These parameters may be utilized in the pilot test data reduction and in any modeling of VOC migration within the vadose zone. These parameters will also provide site-specific input data for risk assessment. Detailed field procedures for hollow stem auger drilling and collection of soil samples for classification, field VOC screening, sample handling, chemical analysis, and geomechanical testing were presented in the SAP for the Phase 2 RFI Work Plan (AGC, 2005). During vapor probe and vapor well installation, additional unspecified soil sampling and chemical analyses may be conducted at the discretion of the field geologist.

#### **6.2.6 Soil Vapor Probe Construction Details**

The soil vapor probe clusters will consist of four probes in a single boring. A schematic of these probes is shown on Figure 17.

Soil vapor probes will be installed at depths of approximately 9, 23, 30, and 35 ft bgs. The probes will be constructed of nominal 1-inch diameter Schedule 40 polyvinyl chloride (PVC) with approximately one foot of well screen extending from the depth indicated to total depth of the probe. The well screen slot size will be 0.020 inches and the sand pack will be No. 3 Monterey sand. The sand pack will be approximately 4 ft extending 1.5 ft above and below the screened section. All seals will be constructed from bentonite pellets, chips, or granules hydrated in place using a tremmie tube. All wells and probes will be completed at the surface with a flush-mounted traffic-rated cover.

#### **6.2.7 SVE Extraction Well Installation**

The SVE extraction wells will consist of two wells completed in a single boring. A schematic of these probes is shown on Figure 18.

The SVE wells will be installed at depths of approximately 8 and 23 ft bgs. The boring will be completed to a depth of 30 ft bgs to confirm lithology. Each SVE well will be constructed of nominal 2-inch diameter Schedule 40 PVC. The well screen slot size will be 0.020 inches and the sand pack will be No. 3 Monterey sand. The sand pack will extend approximately 1.5 ft above and below the screened section. In the shallow zone, a 1.5-foot screen will be installed. In the deep zone, a 5-foot screen will be installed. All seals will be constructed from bentonite pellets, chips, or granules hydrated in place using a tremmie tube. At least 3 ft of concrete will be placed



at the ground surface. All wells and probes will be completed at the surface with a flush-mounted traffic-rated cover.

### **6.2.8 Decontamination**

All downhole drilling equipment will be steam cleaned prior to use and between borings. Steam cleaning will be performed in a designated area and waste generated during the process will be collected and disposed of as described below.

Sampling equipment will be decontaminated using the procedures outlined in the Phase 2 RFI Work Plan.

### **6.2.9 Waste Management**

Construction and investigation generated waste, such as decontamination water, soil cuttings, and personal protective equipment (PPE) will be segregated and stored in either 55-gallon United Nations or Department of Transportation (UN/DOT)-approved drums or sealed bins. The waste will be characterized and disposed accordingly. It is anticipated that all waste generated by the ICMWP will be non-hazardous waste. Liquid waste is generally disposed of in the site water treatment system. Soil is generally disposed of in the smelters. However, as noted, all waste generated will be disposed of according to the site-specific criteria and plans. PPE will be disposed of by the Exide waste handler contractor.

## **6.3 PIPING**

The piping between the wells and the SVE system will be installed in trenches that are approximately 3 ft bgs and will consist of standard 2-inch diameter Schedule 40 PVC. Soil removed from the trenches will be field screened using a PID, and assuming innocuous field-screening results, such soil will be placed back into the trenches once the piping has been laid. Trenches on public right-of-way will be backfilled with 2-sack slurry and finished to match the existing grade. If field-screening results indicate the potential presence of VOCs in soils, such soil will be segregated, stockpiled on the Exide property in a secure area, and tested for the presence of VOCs using EPA Method 8260B. If VOCs are not detected, the segregated soil will be either reused during SVE system installation or spread on the Site. If VOCs are detected, the segregated soil will be segregated on site in bins, characterized, and disposed of by Exide's waste handler contractor. All trenching activities will be monitored for dust. If appropriate, dust mitigation will be implemented. If SCAQMD Rule 1166 monitoring is required based on anticipated volume of material removed, a permitted Rule 1166 monitoring plan will be implemented and the plan requirements will be met.

An electrical contractor will be hired to perform the electrical connections. The skid-mounted extraction unit and treatment system (GAC vessels), will be installed on a concrete pad. When system installation is completed, equipment will be checked for proper operation, and piping and fittings will be checked for leaks by low pressure testing. An initial assessment of the system's effectiveness and efficiency will be conducted during the start-up period, which may continue for approximately one month.



## 6.4 SOIL VAPOR EXTRACTION SYSTEM

The SVE extraction/treatment unit will be skid- or trailer-mounted and installed on the Exide property in proximity to the Engineering Building and Material Storage Building in the SWMU-11 area (Figure 19). The SVE system will comply with the design specifications above. Detailed design specifications will be provided in the O&M plan for the SVE system.

The skid-mounted extraction unit will be connected to a treatment system consisting of two 1,000-pound vapor-phase carbon (GAC) vessels installed in series to treat the extracted soil vapors. Treated soil vapors will be discharged to the atmosphere under SCAQMD permit. Condensate water that may be generated will be collected, stored in a holding tank, and disposed of in the site water treatment system or through the Exide contracted waste handler, depending on the results of condensate characterization. The condensate holding tank will be equipped with level alarms to shutdown the extraction unit when high alarm condition is triggered. Once a week, or as often as necessary, the condensate water will be transported to one of the compounds for treatment and discharge. See Figure 20 for view of a generalized process flow diagram (PFD) of the proposed vapor extract and carbon treatment system. Figure 21 is a PFD for a system with a catalytic oxidation treatment option.

### 6.4.1 System Installation and Start-up

Following the receipt of the appropriate permits, the SVE system will be installed. An installation contractor will be retained to conduct the trenching and connections, and to install the equipment, the SVE wellheads, and participate in the start-up activities.

During this initial period of operation, the mechanical components of the system will be monitored to assess whether the system is operating properly and to ensure compliance with discharge limits specified in the SCAQMD permit. If necessary, corrective measures will be implemented. Information gathered during the start-up period will be used to modify system operations. The monitoring data will be used to evaluate chemical recovery rates and the efficiency of the SVE system. During start-up activities, it is expected that up to 10 vapor samples will be collected from the influent ports of each extraction unit. The vapor samples will be analyzed for VOCs by EPA Method TO-14A/TO-15.



## 7.0 SYSTEM OPERATION AND MAINTENANCE PROGRAM

### 7.1 OPERATIONAL SCHEDULE

It is intended that the system will operate on a 24-hour basis. However, the system design will include built-in alarms and shutdown mechanisms (details to be provided in the O&M plan) should the system malfunction. The extraction system will be equipped with telemetry to enable E2 to be informed of system operations while not at the Site, including system shutdowns. E2 or a designated subcontractor will respond to the shutdown by visiting the Site, inspecting/repairing the equipment as necessary, and restarting the system. Engineering personnel will review and evaluate the cause of each event to evaluate if the system is reaching the point of diminishing returns on performance and an operational change is required.

The O&M plan will contain information on contact telephone numbers, equipment specifications and manuals, start-up/shutdown procedures, monitoring/sampling procedure forms, permits, and as-built drawings. This O&M plan will be developed while DTSC is performing its California Environmental Quality Act (CEQA) analysis and after final selection of the equipment contractor and construction of extraction and monitoring wells. The O&M plan will be provided to DTSC for its review/approval prior to installing the SVE system.

The Site will be inspected weekly to make as needed adjustments and/or repairs, and to monitor the system including recording operating parameters and collecting system performance/compliance air samples. On a weekly basis, E2 will collect vapor samples from the influent and effluent ports of the extraction unit and monitor the samples using a PID. On a bi-weekly basis, vapor samples will be collected from the influent port of the extraction unit to evaluate the performance of the systems. On a monthly basis, vapor samples will be collected from the effluent port of each extraction unit to comply with SCAQMD permit restrictions. The collected samples will be sent to a California State-certified laboratory for analysis, under standard chain-of-custody protocols. Vapor samples will be analyzed for VOCs by EPA Method TO-14A/TO-15.

All soil vapor sampling activities will follow procedures to be established in the O&M plan and those presented in the Phase 2 RFI Work Plan. Refer to Table 4 for a diagram of the anticipated schedule of activities.

### 7.2 PERFORMANCE EVALUATION AND REPORTING

On a monthly basis, E2 will collect vapor samples from the monitoring probes and analyze for VOCs by EPA Method TO-14A/TO-15. During the first three months of operation, E2 will submit monthly reports to describe the status of the SVE system, a summary of operating conditions, and the results of the vapor probe sampling. Thereafter, reports will be submitted on a quarterly basis. Information in these reports will include:



- Hours of operation during the reporting period
- Flow rates and wellhead vacuums
- Influent and effluent concentration of VOCs in the extracted vapors
- Summary of non-routine repairs or modifications, if any
- Date and time of sampling
- Mass removal rates and total mass removed
- A table summarizing the laboratory results
- Laboratory results and chain-of-custody documents

As part of the performance evaluation, modifications will be made to enhance the SVE system performance.



## 8.0 PROJECT SCHEDULE

The anticipated schedule for implementation of the ICM is presented in Table 4. The project schedule consists of five tasks: design, permitting, well installation, construction, and system start-up. The schedule begins on October 22, 2008, and assumes a 6-week review process for this document. During this period, final design drawings will be completed and contractor bids will be obtained.

Installation of the vapor wells will commence upon obtaining the CEQA negative declaration and DTSC's review and approval of this work plan. Well installation is expected to take approximately three weeks to complete.

Construction of the SVE infrastructure is expected to take approximately six weeks and will begin after the vapor wells are installed. Testing, final inspections, and approval of the system for operation are expected to take another three weeks.

Once this work plan is approved, calendar dates will be assigned to the schedule and a copy provided to DTSC.

If the VL-permitted unit is not available or appropriate for the project, additional time will be required to obtain appropriate permits. Currently, it is estimated that it will take approximately 90 days to obtain the appropriate permits for a non-VL-permitted system. This determination will be made during the final design phase of the program.

If it is determined that carbon is not cost-effective, actions would be taken to implement the catalytic or thermal treatment options. These actions would include new Plans and Specifications, a new O&M Plan, associated permitting, procurement, and construction. Treatment using the carbon unit would continue until the oxidation unit is ready to go online. If it is found that carbon treatment remains as the most effective option, an application would be submitted to SCAQMD for a fixed location Permit to Construct/Operate to allow continued operation beyond the 12 months specified under the VL permit, if necessary.



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# *Tables*

**Table 1**  
**SUMMARY OF SOIL SAMPLE ANALYTICAL RESULTS - SWMU-11**

Exide Technologies, Inc.  
2700 South Indiana Street, Vernon, CA

SWMU	Boring ID	Sample Date	Depth	Results for Volatile Organic Compounds Analyzed by EPA Method 8260B (µg/kg)							Results for PAH Analyzed by EPA Method 8310 (µg/kg)			
				Acetone	Benzene	cis-1,2-Dichloroethene	m,p-Xylene	Tetrachloroethene	Toluene	Trichloroethene	Anthracene	Benzo(a)anthracene	Chrysene	Indeno(1,2,3-cd)pyr
11	HSA-24	12/05/05	8.5	9.4J	0.87	<0.82	<1.6	<0.82	0.64J	2.5	2J	<50	<50	<50
11	HSA-24	12/05/05	70.0	5.9J	0.34J	0.29J	<1.8	<0.89	0.26J	130	<50	<50	<50	<50
11	HSA-24*	12/05/05	70.0	5.7J	0.62J	<0.86	<1.7	<0.86	0.37J	150	2J	4.3J	52	<50
11	HSA-25	12/06/05	5.0	18J	1.1	<1.1	0.32J	0.24J	0.78J	13	2.1J	<50	7.4J	19J
11	HSA-25	12/06/05	70.0	15J	0.13J	<1.1	<2.1	<1.1	0.23J	21	<50	<50	3.5J	<50

Boring ID	Sample Date	Depth	Results for Metals Analyzed by EPA Methods 6010B, 7471A and 7196A (mg/kg)															
			Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Lead	Mercury	Nickel	Silver	Thallium	Vanadium	Zinc
HSA-24	12/05/05	8.5	10,500	<0.75	5.04	94.4	0.261	0.371J	10.7	10.1	11.9	3.7	0.219	8.62	<0.25	<0.75	27.9B	44.8
HSA-24	12/05/05	70.0	13,000	<0.75	7.79	106	0.362	0.453J	12.9	11.7	15.3	3.54	0.0289J	10.7	<0.25	<0.75	35.8B	51.4
HSA-24*	12/05/05	70.0	13,100	<0.75	7.1	111	0.352	0.477J	13.9	11.8	16.7	3.84	0.0336J	11.1	<0.25	<0.75	35.1B	52.6
HSA-25	12/06/05	5.0	11,400B	0.931	6.76	105	0.284	2.76	13B	10.8	17.9	459	0.0359J	10.8B	0.05J	1.6	26.4	1,690
HSA-25	12/06/05	70.0	5,160B	<0.75	2.74	63	0.174J	0.195J	5.6B	4.8	8.45	3.09	0.0185J	4.78B	<0.25	0.925	14.7	81.9

Boring ID	Sample Date	Depth	EPA Method 9045C	EPA Method 9038	EPA Method 9060
			pH (solid)	Sulfate (mg/kg)	TOC (mg/kg)
HSA-24	12/05/05	8.5	7.2	220	1,700
HSA-24	12/05/05	70.0	7.24	280	<500
HSA-24*	12/05/05	70.0	6.94	600	<500
HSA-25	12/06/05	5.0	9.14	700	1,400
HSA-25	12/06/05	70.0	7.79	260	<500

Notes:

Only constituents with concentrations above the method detection limit are listed.

\* duplicate analytical sample

ENC Sampled by Encore sampler

J - The analyte was positively identified; the numerical value is approximate.

B - The associated laboratory blank reported contamination.

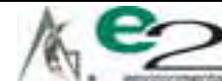
E - Analyte amount exceeds calibration range. Amount quantitated by extrapolation.



**Table 2**  
**ANALYTICAL SOIL VAPOR RESULTS FOR VOLATILE ORGANIC COMPOUNDS**

Exide Technologies, Inc.  
 2700 South Indiana Street, Vernon, CA

SWMU	Boring ID	Depth	Sample Date	Analyzed by EPA Method 8260B (µg/L)											
				1, 2-Dichloropropane	1,3,5-Trimethylbenzene	Benzene	Chloroform	Chloromethane	cis-1,2-Dichloroethene	Ethyl benzene	m,p-Xylene	Tetrachloroethene	Toluene	trans-1,2-Dichloroethene	Trichloroethene
11	SSVP-1	5.0	12/05/05	<0.1	<0.1	<0.1	<b>0.7</b>	<0.1	<0.1	<0.1	<0.2	<b>1.2</b>	<0.3	<0.1	<b>81</b>
11	SSVP-1	5.0	12/05/05	<2	<2	<2	<2	<2	<2	<2	<4	<2	<5	<2	<b>71</b>
11	SSVP-1	5.0	12/05/05	<0.1	<0.1	<0.1	<b>0.8</b>	<0.1	<0.1	<0.1	<0.2	<b>1.4</b>	<0.3	<0.1	<b>90</b>
11	SSVP-1	15.0	12/05/05	<0.1	<b>0.1</b>	<b>0.3</b>	<b>1.0</b>	<0.1	<0.1	<0.1	<b>0.2</b>	<b>2.8</b>	<b>0.4</b>	<0.1	<b>170</b>
11	SSVP-1*	15.0	12/05/05	<2	<2	<2	<2	<2	<2	<2	<4	<2	<5	<2	<b>170</b>
11	SSVP-1	30.0	12/08/05	<0.2	<0.2	<0.2	<2	<0.2	<b>0.3</b>	<0.2	<0.4	<0.2	<0.5	<0.2	<b>32</b>
11	SSVP-1*	30.0	12/08/05	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.4	<0.2	<0.5	<0.2	<b>14</b>
11	SSVP-2	5.0	12/06/05	<0.2	<0.2	<b>0.2</b>	<b>0.3</b>	<0.2	<0.2	<0.2	<0.4	<b>2.0</b>	<0.5	<0.2	<b>110</b>
11	SSVP-2	20.0	12/06/05	<0.2	<0.2	<b>0.3</b>	<b>0.4</b>	<b>0.2</b>	<0.2	<0.2	<0.4	<b>0.8</b>	<b>0.5</b>	<0.2	<b>79</b>
11	SSVP-3	5.0	12/07/05	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.4	<b>0.7</b>	<0.5	<0.2	<b>77</b>
11	SSVP-3	20.0	12/07/05	<0.2	<0.2	<b>0.3</b>	<2	<0.2	<0.2	<0.2	<0.4	<0.2	<b>0.6</b>	<0.2	<b>27</b>
11	SSVP-4	5.0	12/06/05	<0.2	<0.2	<b>0.2</b>	<b>0.3</b>	<0.2	<0.2	<0.2	<b>0.4</b>	<b>0.6</b>	<b>0.6</b>	<0.2	<b>100</b>
11	SSVP-4	17.0	12/06/05	<0.2	<b>0.2</b>	<b>0.2</b>	<2	<0.2	<0.2	<0.2	<0.4	<0.2	<0.5	<0.2	<b>5.1</b>
11	SSVP-5	5.0	12/07/05	<0.1	<0.1	<b>0.1</b>	<b>0.1</b>	<0.1	<0.1	<0.1	<0.2	<b>0.1</b>	<b>0.3</b>	<0.1	<b>48</b>
11	SSVP-5	20.0	12/06/05	<0.1	<0.1	<b>0.1</b>	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<b>0.4</b>	<0.1	<b>1.2</b>
11	SSVP-6	5.0	12/06/05	<0.2	<0.2	<0.2	<b>0.3</b>	<0.2	<b>0.3</b>	<0.2	<0.4	<b>0.4</b>	<0.5	<0.2	<b>110</b>
11	SSVP-6	20.0	12/06/05	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.4	<0.2	<0.5	<0.2	<b>1.1</b>
11	SSVP-7	5.0	12/07/05	<0.2	<0.2	<0.2	<b>0.8</b>	<0.2	<0.2	<0.2	<0.4	<b>1.6</b>	<0.5	<0.2	<b>220</b>
11	SSVP-7	20.0	12/07/05	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.4	<0.2	<0.5	<0.2	<b>4.9</b>
11	SSVP-8	5.0	12/06/05	<0.2	<0.2	<0.2	<b>0.2</b>	<0.2	<0.2	<0.2	<0.4	<b>1.3</b>	<0.5	<0.2	<b>84</b>
11	SSVP-8	20.0	12/06/05	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.4	<0.2	<0.5	<0.2	<b>1.0</b>
11	SSVP-9	20.0	12/07/05	<0.1	<0.1	<b>0.1</b>	<0.1	<0.1	<0.1	<0.1	<b>0.2</b>	<0.1	<0.3	<0.1	<b>0.4</b>
11	SSVP-9 <sup>+</sup>	20.0	12/07/05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<0.1	<0.1
11	SSVP-10	5.0	12/07/05	<0.2	<0.2	<b>0.3</b>	<2	<0.2	<b>0.3</b>	<0.2	<b>0.4</b>	<0.2	<b>0.7</b>	<0.2	<b>28</b>
11	SSVP-10	20.0	12/07/05	<b>0.4</b>	<0.2	<b>0.3</b>	<2	<0.2	<0.2	<0.2	<0.4	<0.2	<b>0.6</b>	<0.2	<b>0.4</b>



**Table 2**  
**ANALYTICAL SOIL VAPOR RESULTS FOR VOLATILE ORGANIC COMPOUNDS**

Exide Technologies, Inc.  
 2700 South Indiana Street, Vernon, CA

SWMU	Boring ID	Depth	Sample Date	Analyzed by EPA Method 8260B (µg/L)											
				1, 2-Dichloropropane	1,3,5-Trimethylbenzene	Benzene	Chloroform	Chloromethane	cis-1,2-Dichloroethene	Ethyl benzene	m,p-Xylene	Tetrachloroethene	Toluene	trans-1,2-Dichloroethene	Trichloroethene
11	SSVP-11*	5.0	12/07/05	<0.2	<0.2	<b>0.2</b>	<b>0.3</b>	<0.2	<0.2	<0.2	<0.4	<b>0.6</b>	<b>0.5</b>	<b>0.2</b>	<b>130</b>
11	SSVP-11	5.0	12/07/05	<0.2	<0.2	<0.2	<b>0.3</b>	<0.2	<0.2	<0.2	<0.4	<b>0.6</b>	<0.5	<0.2	<b>120</b>
11	SSVP-11	20.0	12/07/05	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.4	<0.2	<0.5	<0.2	<b>0.7</b>
11	SSVP-12	5.0	12/06/05	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.4	<b>0.4</b>	<0.5	<0.2	<b>54</b>
11	SSVP-12*	5.0	12/06/05	<0.2	<0.2	<b>0.2</b>	<2	<0.2	<0.2	<0.2	<0.4	<b>0.5</b>	<b>0.6</b>	<0.2	<b>53</b>
11	SSVP-12	20.0	12/06/05	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.4	<0.2	<0.5	<0.2	<b>26</b>
11	SSVP-13	5.0	12/07/05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<0.1	<b>0.7</b>
11	SSVP-13*	20.0	12/06/05	<0.1	<0.1	<b>0.1</b>	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<0.1	<b>1.5</b>
11	SSVP-13	20.0	12/06/05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<0.1	<b>1.7</b>
11	SSVP-14	5.0	12/07/05	<0.1	<0.1	<b>0.1</b>	<0.1	<0.1	<0.1	<0.1	<b>0.2</b>	<0.1	<0.3	<0.1	<b>2.3</b>
11	SSVP-14 <sup>+</sup>	20.0	12/07/05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<0.1	<b>11</b>
11	SSVP-14	20.0	12/07/05	<0.1	<0.1	<b>0.1</b>	<0.1	<0.1	<0.1	<0.1	<b>0.2</b>	<0.1	<b>0.3</b>	<0.1	<b>11</b>
11	SSVP-15	5.0	12/06/05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<0.1	<b>19</b>
11	SSVP-15 <sup>+</sup>	20.0	12/06/05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<0.1	<b>2.3</b>
11	SSVP-15	20.0	12/06/05	<0.1	<0.1	<b>0.1</b>	<0.1	<0.1	<0.1	<0.1	<b>0.2</b>	<b>0.1</b>	<0.3	<0.1	<b>31</b>
11	SSVP-16	20.0	12/05/05	<0.1	<0.1	<b>0.1</b>	<0.1	<0.1	<0.1	<0.1	<b>0.2</b>	<0.1	<0.3	<0.1	<b>0.2</b>
11	SSVP-17	5.0	12/05/05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<0.1	<b>0.4</b>
11	SSVP-17	20.0	12/05/05	<0.1	<0.1	<b>0.1</b>	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<0.1	<b>1.1</b>
11	SSVP-18	5.0	12/05/05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<0.1	<0.1
11	SSVP-18	20.0	12/05/05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<0.1	<b>1.8</b>
11	SSVP-19	5.0	12/07/05	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.4	<b>0.2</b>	<b>0.5</b>	<0.2	<b>47</b>
11	SSVP-19	20.0	12/07/05	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.4	<0.2	<0.5	<0.2	<b>0.4</b>
11	SSVP-20	5.0	12/08/05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<b>0.1</b>	<0.3	<0.1	<b>18</b>
11	SSVP-20	20.0	12/08/05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<b>0.3</b>	<0.1	<b>0.3</b>	<0.1	<b>4.0</b>



**Table 2**  
**ANALYTICAL SOIL VAPOR RESULTS FOR VOLATILE ORGANIC COMPOUNDS**

Exide Technologies, Inc.  
 2700 South Indiana Street, Vernon, CA

SWMU	Boring ID	Depth	Sample Date	Analyzed by EPA Method 8260B (µg/L)												
				1, 2-Dichloropropane	1,3,5-Trimethylbenzene	Benzene	Chloroform	Chloromethane	cis-1,2-Dichloroethene	Ethyl benzene	m,p-Xylene	Tetrachloroethene	Toluene	trans-1,2-Dichloroethene	Trichloroethene	
11	SSVP-21	5.0	12/08/05	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<b>0.4</b>	<b>0.5</b>	<0.5	<0.2	<b>48</b>
11	SSVP-21	20.0	12/08/05	<0.2	<0.2	<b>0.3</b>	<2	<b>0.2</b>	<0.2	<0.2	<b>0.4</b>	<b>1.0</b>	<0.2	<b>0.9</b>	<0.2	<b>21</b>
11	SSVP-22	5.0	12/08/05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<b>0.2</b>	<0.3	<0.1	<b>33</b>
11	SSVP-22	20.0	12/08/05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<0.1	<b>0.1</b>
11	SSVP-23	5.0	12/08/05	<0.1	<0.1	<0.1	<b>0.1</b>	<0.1	<0.1	<0.1	<0.1	<0.2	<b>0.1</b>	<0.3	<0.1	<b>41</b>
11	SSVP-23	20.0	12/08/05	<0.1	<0.1	<0.1	<b>0.1</b>	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<0.1	<b>35</b>

Notes:

Only constituents with concentrations above the method detection limit are listed.

\* duplicate analytical sample

+ Tedlar bag sample analyzed at HP Labs

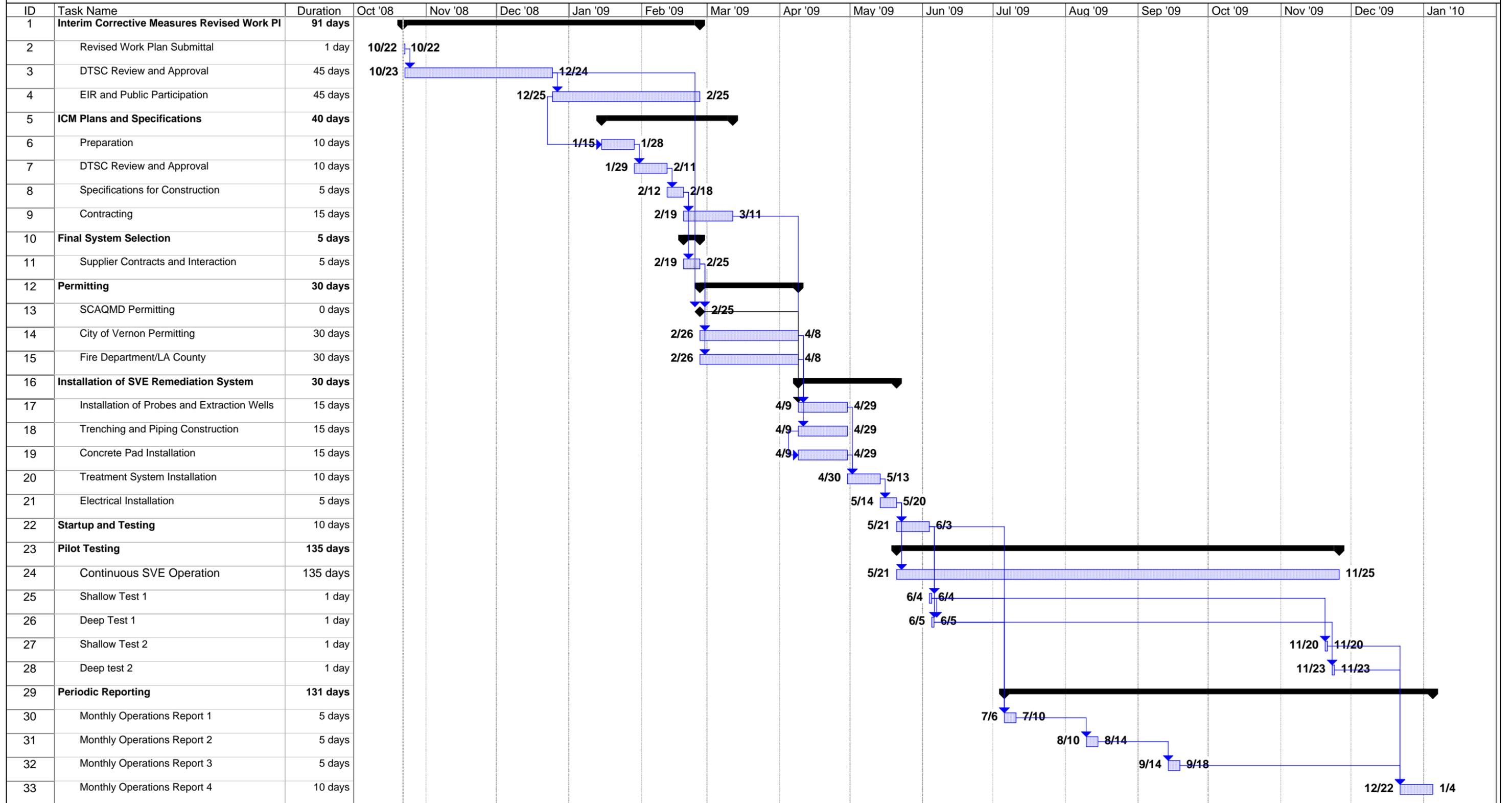


**Table 3**

**GEOMECHANICAL TEST METHODS**  
Exide Technologies, Inc.  
2700 South Indiana Street Vernon, California

<b>Parameter</b>	<b>Method</b>
Soil Classification	ASTM D2487
Total Organic Carbon	ASTM D4129-82M
Total Porosity	Calculated from Density & Specific Gravity
Moisture Content	ASTM D2216
Dry Density	ASTM D2937
Bulk Density	ASTM D2937
Specific Gravity	ASTM D854
Particle Size Distribution	ASTM D422
Saturated Hydraulic Conductivity	ASTM D5084
Air Permeability	API RP40

**Table 4**  
**ANTICIPATED INTERIM**  
**CORRECTIVE MEASURE SCHEDULE**  
 Exide Technologies  
 2700 South Indiana Street Vernon, California



Project: sveinstall-08  
 Date: Wed 10/22/08

Task		Summary		Rolled Up Progress		Project Summary	
Progress		Rolled Up Task		Split		Group By Summary	
Milestone		Rolled Up Milestone		External Tasks		Deadline	

Page 1



# *Figures*

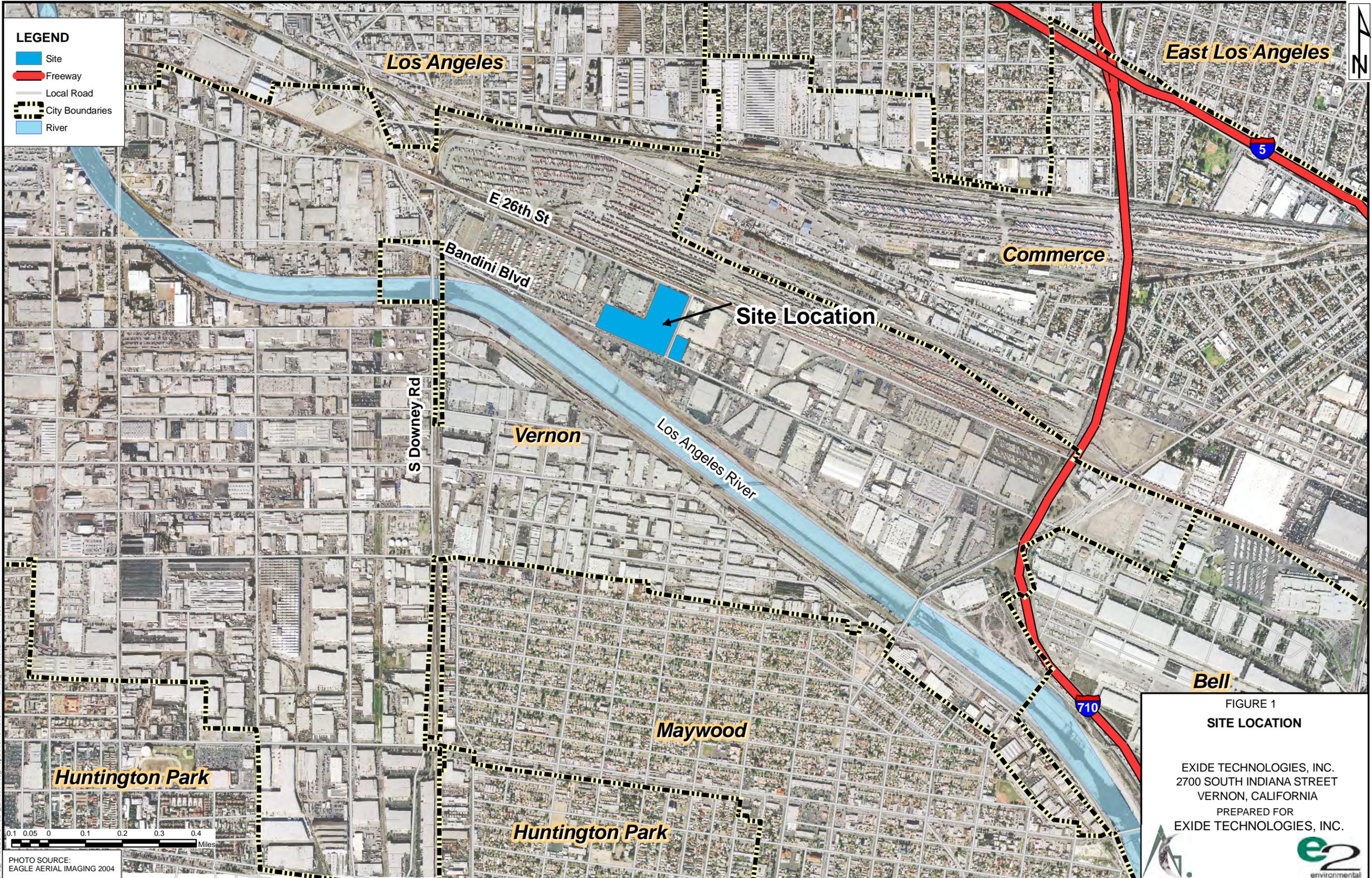


FIGURE 1  
SITE LOCATION

EXIDE TECHNOLOGIES, INC.  
2700 SOUTH INDIANA STREET  
VERNON, CALIFORNIA  
PREPARED FOR  
EXIDE TECHNOLOGIES, INC.

