PHASE II
ENVIRONMENTAL SITE ASSESSMENT

Proposed Science and Technology Center
Beverly Hills High School
241 Moreno Drive
Beverly Hills, California 90212

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PROFESSIONAL CERTIFICATION

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Beverly Hills High School
241 Moreno Drive
Beverly Hills, California 90212

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EXECUTIVE SUMMARY

UltraSystems Environmental (UltraSystems) conducted a Phase II Environmental Site Assessment (ESA) on the site and in the vicinity of the proposed Science and Technology Center (STC) at the Beverly Hills High School (BHHS) to: 1) characterize the chemical impact, if any, beneath the proposed STC, 2) evaluate risks to human health posed by any chemical impact identified, and 3) obtain data needed to assess options to mitigate these risks, if necessary. As currently planned, the proposed multi-story STC will be constructed within the existing 200-by-200 foot North Parking Lot at the northwest corner of the BHHS campus, and will have a footprint of approximately 18,000 square-feet.

During a geotechnical investigation to determine the pre-construction soil conditions of the site, a black oily soil was identified approximately 10 to 15 feet beneath the southeast corner of the North Parking Lot. Subsequently, the BHHS requested a study of the environmental condition of the North Parking Lot.

Based on the planned construction, four areas of potential concern (AOPC) are associated with the STC structure. A sampling and analysis plan (SAP) was implemented to determine if significant health risks were associated with the AOPCs. The AOPCs and risk assessment objectives are summarized below:

AOPC	Description	Risk Assessment Objective
1- STC Footprint	18,000 sqft. area for STC structure.	Demonstrate that no significant human health risks to construction workers, students and staff will result from short-or long-term exposures to soil and soil vapor that may migrate through the STC floor slab.
2 - Outside STC Footprint	Access-way and outdoor courtyard.	Demonstrate that no significant human health risks to construction workers, students and staff will result from short-term exposure to soils.
3 - Southeast Corner	Location of architectural wall.	
4 – Utility Trenches	Excavations along Heath Avenue.	

UltraSystems collected soil matrix or soil gas samples from 23 borings within the four AOPCs in December 2003 and April 2004. Soil matrix samples were collected up to 25 feet below the ground surface (bgs) and selectively analyzed for total petroleum hydrocarbons (TPHs), volatile organic compounds (VOCs), polyaromatic hydrocarbons (PAHs), semi-VOCs, and Title 22 Metals. Soil vapor samples were collected up to 10 feet bgs and selectively analyzed for VOCs, methane and hydrogen sulfide.

A Human Health Risk Assessment, following Department of Toxic Substances Control (DTSC) guidance, was used to determine if concentrations of chemicals of potential concern (COPCs) in soil matrix and soil vapor samples would result in adverse health effects to construction workers, students or staff. Based on the findings of the sampling effort and risk assessment:

- There are no potential adverse health effects to construction workers, students or staff during construction or to students and staff during attendance of the proposed STC from inhalation, ingestion or dermal contact with soil or soil vapors.
- Methane and hydrogen sulfide concentrations beneath the four AOPCs occur at safe levels.
- Soils beneath and near the proposed STC may be managed as non-hazardous waste, and maybe reused for on-site backfill. Chemical analysis data, included in this report, should be provided to vendors who may remove excess soil from the site.

COMMON ABBREVIATIONS

AOC	Area of Concern
AOPC	Area of Potential Concern
ARAR	Applicable, Relevant or Appropriate Requirement
AST	Above Ground Storage Tank
ASTM	American Society for Testing and Materials
BAT	Best Available Technology
BACT	Best Available Control Technology
bgs	Below the ground surface
BMP	Best Management Practice
BTEX	Benzene, Toluene, Ethylbenzene, and Xylenes
Cal-EPA	California Environmental Protection Agency
CAP	Corrective Action Plan
CARs	Certified Analytical Reports
CCR	California Code of Regulations
CEQA	California Environmental Quality Act
CERCLA	Comprehensive Environmental Response, Compensation & Liability Act
CFR	Code of Federal Regulations
Cm^2/s	Centimeters per second
COC	Chain of Custody or Chemical of Concern
COPC	Chemical of Potential Concern
CUPA	Certified Unified Program Agency
CSM	Conceptual Site Model
CWA	Clean Water Act
DAF	Dilution-Attenuation Factor
DCA	Dichloroethane
DCE	Dichloroethene or Dichloroethylene
DHS	Department of Health Services
DIPE	Di-Isopropyl Ether
DNAPL	Dense non-aqueous phase liquid
DQO	Data Quality Objective
DTSC	Department of Toxic Substances Control
EB	Equipment blank
EIR	Environmental Impact Report
EQL	Estimated Quantification Limit (also LDL & PQL)
EPA	Environmental Protection Agency
ESA	Environmental Site Assessment
ETBE	Ethyl Tertiary-Butyl Ether
eV	Electron Volts
FIFRA	Federal Insecticide Fungicide and Rodenticide Act
FSP	Field Sampling Plan
g/mole	Grams per mole
HASP	Health and Safety Plan
HAZWOPER	Hazardous Waste and Operation
HEAST	Health Effects Assessment Summary Tables
HI	Hazard Index
HSA	Hollow-Stem Auger
HSC	Health and Safety Code
IRIS	Integrated Risk Information System
J "flag"	Chemical detected below the LDL, EQL or PQL
LACFD	Los Angeles County Fire Department
LADPW	Los Angeles Department of Public Works
LAFD	Los Angeles City Fire Department
LDL	Laboratory Detection Limit (also EQL and PQL)
LNAPL	Light non-aqueous phase liquid
LUST	Leaking Underground Storage Tank
mg/Kg	Milligrams per kilogram
mg/L	Milligrams per liter
mg/M^3	Milligrams per cubic meter
MDL	Method Detection Limit
MSL	Mean Sea level
ND	Not detected above method quantification limit
NEPA	National Environmental Policy Act
NFA	No Further Action
NPDES	National Pollution Discharge Elimination System
NPL	National Priority List
OCHCA	Orange County Health Care Agency
OEHHA	Office of Health Hazard Assessment
OVA	Organic Vapor Analyzer
O&G	Oil and Grease
O&M	Operation and Maintenance
PAHs	Polycyclic Aromatic Hydrocarbons
PCBs	Polychlorinated Biphenols
PCE	Perchloroethene, Perchloroethylene, Tetrachloroethene, Tetrachloroethylene or "Perc"
PEA	Preliminary Endangerment Assessment
PEF	Particulate Emissions Factor
PID	Photo-ionization Detector
ppb	Parts per billion
ppbv	Parts per billion by volume
ppm	Parts per million
ppmv	Parts per million by volume
PQL	Practical Quantification Limit (also EQL and LDL)
PRG	Preliminary Remediation Goal
PRGa	Preliminary Remediation Goals for Ambient Air
PRGi	Preliminary Remediation Goal for Industrial Use
PRGr	Preliminary Remediation Goal for Residential Use
PRP	Potential Responsible Party
QAPP	Quality Assurance Project Plan
QA/QC	Quality Assurance/Quality Control
RAP	Remedial Action Plan
RCRA	Resource Conservation and Recovery Act
REC	Recognized Environmental Condition
Rfc	Reference Concentration
Rfd	Reference Dose
RI/FS	Remedial Investigation/Feasibility Study
RME	Reasonable Maximum Exposure
RP	Responsible Party
RWQCB	Regional Water Quality Control Board
SAP	Sampling and Analysis Plan
SARA	Superfund Amendments and Reauthorization Act of 1986
SF	Slope Factor
SGS	Soil Gas Survey
SIC	Standard Industrial Classification
SLIC	Spills, Leaks, Investigation and Cleanup
SPCC	Spill Prevention Control and Countermeasure
SSL	Soil Screening Level
STLC	Soluble Threshold Limit Concentration
SVE	Soil Vapor Extraction
SVOC	Semi-Volatile Organic Compounds
SWIS	Solid Waste Information System
SWPPP	Storm Water Pollution Prevention Plan
TAME	Tertiary amyl-methyl Ether
TB	Trip blank
TBA	Tertiary Butyl Alcohol (tert-butanol)
TCA	Trichloroethane
TCE	Trichloroethene or Trichloroethylene
TCLP	Toxicity Characteristic Leaching Procedure
TD	Total Depth
TDS	Total Dissolved Solids
TMDL	Total Maximum Daily Load
TOC	Total Organic Carbon
TPCA	Toxic Pit Cleanup Act
TPH	Total Petroleum Hydrocarbons
TPHd	Total Petroleum Hydrocarbons as diesel
TPHg	Total Petroleum Hydrocarbons as gasoline
TPHo	Total Petroleum Hydrocarbons as oil
TRPH	Total Recoverable Petroleum Hydrocarbons
TSCA	Toxic Substances Control Act
TSS	Total Suspended Solids
TTLC	Total Threshold Limit Concentration
URF	Unit Risk Factor
USGS	United States Geologic Survey
ug/Kg	Micrograms per kilogram
ug/L	Micrograms per liter
ug/M^3	Micrograms per cubic meter
UST	Underground Storage Tank
VCP	Voluntary Cleanup Program
VES	Vapor Extraction System
VF	Volatilization Factor
VOC	Volatile Organic Compound
WDID	Waste Discharge Identification
WDR	Waste Discharge Requirement
WET	Waste Extraction Test
WOT	Waste Oil Tank

1.0 INTRODUCTION

UltraSystems Environmental (UltraSystems) conducted a Phase II Environmental Site Assessment (ESA) in the vicinity of the proposed Science and Technology Center (STC) at the Beverly Hills High School (BHHS) to:

- Characterize the chemical impact, if any, beneath the proposed STC structure.
- Evaluate risks to human health posed by any chemical impact identified.
- Obtain data needed to assess options to mitigate these risks, if necessary.

The BHHS is located in Beverly Hills, California south of Santa Monica Boulevard and west of Moreno Drive adjacent to and north of the Beverly Hills Oil Field (Figure 1). Commercial buildings are west and north, residential apartments are east, and the BHHS campus is south of the proposed STC construction site.

As currently planned, the proposed multi-story STC will be constructed within the existing 200-by-200 foot North Parking Lot at the northwest corner of the BHHS campus (Figure 2). The structure will be used for secondary educational purposes, will require approximately 18,000 square-feet of land, and may require approximately five to ten feet of excavation to construct a foundation, place footings and/or re-compact fill (URS, August 26, 2003) (Figure 3).

During a geotechnical investigation to determine the pre-construction soil conditions of the site (URS, August 26, 2003), a visibly black oily soil with elevated concentrations of total petroleum hydrocarbons (TPH up to 8,700 mg/KG) was identified approximately 10 to 15 feet beneath the southeast corner of the North Parking Lot (Figure 3). Subsequently, the BHHS requested a study of the environmental condition of the North Parking Lot to assess the potential exposure to oil field gases, petroleum hydrocarbons and other chemicals by workers, students, faculty and maintenance personnel during and after STC construction. This document reports the findings of the Phase II ESA, which was conducted in general accordance with guidelines provided by the California Department of Toxic Substance Control (DTSC, January 1994) and US Environmental Protection Agency (USEPA, 1991and 2002).

A summary of the project background is provided below.

2.0 BACKGROUND

The North Parking Lot is paved with asphalt and contains several elevated trailer-size portable classrooms (Figure 3). The North Parking Lot is bounded on the east side by Heath Avenue, on the north by a one-story subterranean parking structure, and on the south by the five-story campus Building A. An eight to ten-foot high retaining wall supporting a multi-story garage and office structure delineates the western boundary. This structure reportedly has two basement levels (URS, August 26, 2003).

2.1 Hydrogeology

The site is north of the Cheviot (Beverly) Hills within the Santa Monica Basin (Figure 4). Surface deposits in the area are composed of upper Pleistocene alluvial sand sediments (Dibblee, 1991). The upper Pleistocene Lakewood formation occurs below the surface sediments and is also composed of alluvial deposits. The Lakewood Formation overlies the lower Pleistocene San Pedro formation. In the vicinity of the BHHS, the Lakewood formation is approximately 300 feet thick and the San Pedro formation is approximately 350 feet thick (Figure 5) (DWR, 1961).

Wells within the Beverly Hills Oil Field derive oil and gas from Tertiary rocks beneath the San Pedro formation (Barrows, 1974). Near-surface methane and hydrogen sulfide gases are often associated with oil and gas fields in the Los Angeles area. Historic oil and gas wells in the vicinity of the BHHS are shown on Figure 2, and are based on information provided by the California Division of Oil, Gas and Geothermal Resources (CDOG, August 17, 2002).

2.1.1 Faulting

The Hollywood and the Santa Monica Faults mark the southern boundary of the Santa Monica Mountains to the north. The northwest-southeast trending Newport-Inglewood Fault Zone terminates at the Cheviot Hills south of the BHHS (Barrows, 1974). Based on review of the Geologic Map of the Beverly Hills and Van Nuys (South ½) Quadrangle (Dibblee, 1991), there are no identified faults within or adjacent to the BHHS.

2.1.2 Groundwater

The site is in Hollywood hydrologic sub-area 405.14 of the Los Angeles-San Gabriel Hydrologic Unit (RWQCB, June 13, 1994). Based on previous investigations, groundwater beneath the North Parking Lot occurs approximately 30 to 35 feet bgs (URS, August 26, 2003). The first regional aquifer in the vicinity of the BHHS is the Exposition Aquifer, which is estimated to be approximately 110 feet bgs within the Lakewood formation (DWR, 1961).

2.1.3 Surface Water

Ballona Creek is about 2 ¼ miles southeast of the BHHS, and drains the Hollywood-Piedmont to the north, Elysian Hills to the east, La Brea Plain and Santa Monica Basin (Figure 4). The creek flows west across the Newport-Inglewood Fault zone, through the Ballona Gap between Cheviot and Baldwin Hills, and discharges to the Pacific Ocean south of Marina Del Rey.

2.2 Previous Assessments

A geotechnical investigation and limited environmental assessment were conducted within the North Parking Lot, and these are discussed below.

2.2.1 Geotechnical Assessment

URS Corporation (URS) conducted a geotechnical investigation within the North Parking Lot to evaluate subsurface conditions to develop recommendations for the design and construction of the proposed STC. The URS investigation included:

- Drilling and sampling of five exploratory borings (B-1 through B-5) to depths ranging from 15 to 61.5 feet bgs (Figure 3).
- Laboratory testing of representative soil samples to evaluate plasticity index, strength and other geotechnical parameters for subsurface soils.
- Engineering analysis to provide geotechnical recommendations for design and construction of the proposed STC building structure.

While drilling in the southeast corner of the North Parking Lot (boring B-4) a black oily soil was encountered from approximately 10 to 15 feet bgs where perched groundwater was reportedly observed. Boring B-4 was terminated at a depth of approximately 15 feet bgs, and was backfilled with grout (URS, August 26, 2003). Exploratory boring logs prepared by URS are provided in Appendix A.

2.2.2 Environmental Assessment

Camp Dresser and McKee, Inc. (CDM) drilled four borings (SB-24 to SB-27) to a maximum depth of 25 feet bgs in the vicinity of URS boring B-4 to further assess the black oily soil in the southeast corner of the North Parking Lot (Figure 3). At least one background soil matrix sample (BG-1) was collected outside of the North Parking Lot. Selected soil samples were analyzed for:

- Total petroleum hydrocarbon (TPH) characterization (C-8 to C-40+) by EPA-Method 8015M.
- Volatile organic compounds (VOCs) by EPA-Method 8260B.
- Polycyclic aromatic hydrocarbons (PAHs) and semi-VOCs by EPA-Method 8270C.
- Selected Title 22 metals by EPA-Method 6010B.

The laboratory results reported by CDM (August 22, 2003) for TPH, VOCs, PAHs and semi-VOCs are summarized in Table 1, and metals are summarized in Table 2. Exploratory boring logs prepared by CDM are provided in Appendix A.

Based on the findings of these previous assessments and the occurrence of oilfield soil gases in the area, the following classes of compounds were included in the Phase II ESA sampling program: oilfield gases (methane and hydrogen sulfide), VOCs, PAHs, Semi-VOCs and selected Title 22 metals (UltraSystems, December 10, 2003).

2.3 Proposed STC

2.3.1 Configuration

The proposed STC will require the removal of existing classroom trailers and asphalt, and subsequent grading of the North Parking Area. Based on the geotechnical findings, the STC building will be constructed in an L-shaped configuration parallel to the west and north boundaries of the North Parking Area. As currently planned, the structure may require up to five to ten feet of excavation to construct a foundation, place footings and/or re-compact fill. An asphalt-paved access-way will separate the STC Building from the west and north site boundaries. The remainder of the site will be a concrete-paved outdoor courtyard with some planter areas. An architectural wall may be placed in the southeast corner of the site for aesthetic purposes. Various temporary five to ten foot trenches may run along Heath Avenue east and south of the North Parking Lot (Figure 3) to bury sewer laterals and conduit-piping containing utility lines to service the STC building.

2.3.2 Areas of Potential Concern

Based on the planned construction, four areas of potential concern (AOPC) are associated with the STC structure. The sampling and analysis plan (SAP) was implemented to determine if significant health risks were associated with the AOPCs. The AOPCs and risk assessment objectives are summarized below:

AOPC	Description	Risk Assessment Objective
1- STC Footprint	18,000 sqft. area for STC structure.	Demonstrate that no significant human health risks to construction workers, students and staff will result from short-or long-term exposures to soil and soil vapor that may migrate through the STC floor slab.
2 - Outside STC Footprint	Access-way and outdoor courtyard.	Demonstrate that no significant human health risks to construction workers, students and staff will result from short-term exposure to soils.
3 - Southeast Corner	Location of architectural wall.	
4 – Utility Trenches	Excavations along Heath Avenue.	

AOPCs are identified on Figure 3.

3.0 SAMPLING AND ANALYSIS

Sampling objectives within the North Parking Lot were dependent on the AOPC. The primary objectives are summarized below.

- AOPC-1: Assess soil and soil vapor within five to 10 feet of the surface that may be excavated during STC construction (borings B-12 to B-18).
- AOPC-2: Delineate the extent of petroleum hydrocarbon impact between the southeast corner of the North Parking Lot and the proposed STC footprint, and assess soil vapors (borings B-7 to B-11).
- AOPC-3: Verify the presence and concentration of petroleum hydrocarbons previously identified beneath the southeast corner of the North Parking Lot, and assess soil vapors (borings B-6, B28 and B-29).
- AOPC-4: Assess soils that may be excavated during placement of utilities within Heath Avenue, and assess soil vapors (borings B-19 to B-27).

Boring locations are provided in Figure 6.

The Phase II ESA field program was conducted in general accordance with the Data Quality Objectives (DQOs), Sampling and Analysis Plan (SAP), Health and Safety Plan (HASP), and Quality Assurance Project Plan (QAPP) included in the Phase II ESA Workplan submitted previously to BHHS (UltraSystems, December 10, 2003). The fieldwork was implemented in December 2003 and April 2004, and was conducted under the direct supervision of a California Registered Geologist. Soil from the borings was described according to the unified soil classification system, and these descriptions and other relevant field data were recorded on exploratory boring logs (Appendix A). Exploratory borings were filled with either bentonite slurry or hydrated bentonite chips, and a concrete patch was used to repair the surface. Soil cuttings and wash water generated during drilling were placed in 55-gallon Department of Transportation (DOT)-approved drums, temporarily stored in the fenced area directly behind the trash dumpsters northeast of the temporary classroom trailers, and then properly disposed.

The SAP for the Phase II ESA is described by task below.

3.1 Task 1 - Prefield Activities

Prior to fieldwork, the following activities were completed:

- Proposed boring locations were marked at the site.
- Underground services alert (USA) was notified of the boring locations to clear underground utilities.
- All fieldwork was coordinated with BHHS administration or their designee.

Sampling activities are discussed below.

3.2 Task 2 - Shallow Borings

Soil matrix and/or soil gas samples were collected at depths up to 10 feet bgs using the direct-push method at 23 borings (B-6 to B-29). One background soil sample (BG-2) was collected within the traffic island at a depth of approximately two feet bgs east of the North Parking Lot (Figure 2). Soil samples were collected in acetate tubes, properly preserved, and submitted to a State-Certified laboratory for analysis. Soil vapor samples were collected in field-vials and Summa canisters. The field-vial samples were analyzed for methane and hydrogen sulfide using a State-certified mobile laboratory, and Summa canister samples were analyzed for VOCs at the laboratory used to analyze the soil samples. Soil matrix and soil vapor sampling using the direct-push method are described in more detail in the SAP of the Workplan (UltraSystems, December 10, 2003).

3.3 Task 3 - Deeper Soil Sampling

Hollow-stem auger (HSA) drilling equipment was used to extend five borings (B-6 and B-8 to B-11) from approximately 10 to 25 feet bgs and to drill boring B-7a adjacent to boring B-7. Soil samples were collected from these borings at approximately 15, 20 and 25 feet bgs to delineate the extent of soil containing elevated TPH concentrations by driving a modified California type split-spoon sampler into undisturbed soil using a 140-pound slide hammer with a 30-inch drop. Soil matrix samples were collected in stainless steel rings, properly preserved, field-screened using a photoionization detector (PID), and submitted to the State-certified laboratory for analysis. Soil matrix sampling procedures using HSA drilling equipment are described in more detail in the SAP of the Workplan (UltraSystems, December 10, 2003).

3.4 Task 4 - Laboratory Analyses

The analytical program for soil vapor, soil matrix and quality assurance and quality control (QA/QC) samples was conducted according to the schedule contained in the Workplan (UltraSystems, December 10, 2003). The analytical program is summarized below.

3.4.1 Soil Vapor

- Soil vapor samples were selectively analyzed for methane, hydrogen sulfide and VOCs using a mobile laboratory. The laboratory methods used are provided in Table 3.

- Selected Summa canister samples collected at a depth of approximately 10 feet bgs were analyzed for VOCs by Method TO-14A at the fixed laboratory.

3.4.2 Soil Matrix

- All soil samples were analyzed for TPH Characterization (C5 to C40) by EPA Method 8015M.

- Selected soil samples collected within each AOPC and the background sample (BG-2) were analyzed for VOCs by EPA Method 8260B, PAHs and semi-VOCs by EPA Method 8270C, and Title 22 Metals by EPA method 6010B.

3.4.3 QA/QC

- Aqueous equipment blanks were delivered to the laboratory for analysis of VOCs by EPA Method 8260B.

- Duplicates were collected for 10% of the soil samples (but not less than 2), and were analyzed for VOCs by EPA Method 8260B, PAHs and semi-VOCs by EPA Method 8270C, and Title 22 Metals by EPA method 6010B.

Laboratory-certified analytical reports are included in Appendix B for soil matrix samples and in Appendix C for soil gas samples.

4.0 RESULTS

Laboratory results for organic compounds and Title 22 metals for soil matrix samples are provided in Tables 1 and 2, respectively, and laboratory results for oilfield gases and VOCs in soil vapor samples are provided in Table 3. The data are presented separately for each AOPC in each table. Below is a discussion of the results.

4.1 Soil Vapor

4.1.1 Oilfield Gases

In AOPC-3, methane gas was originally detected at 82,000 and 130,000 ppmv at depths of five and ten feet, respectively, in one boring (B-6) in December 2003. The next day this location was drilled using a hollow-steam auger to sample deeper soils from 15 to 25 feet in keeping with the SAP. Methane was noted in the work area during drilling. After sampling, the drill hole was plugged with grout. Five additional soil gas sampling points (SB-25 to 27, B-28 and B-29) approximately 20 feet apart were subsequently sampled within AOPC-3 in April 2004. The high methane concentrations could not be reproduced at these borings. This result suggests that an isolated pocket of methane originally occurred at one sampled location (B-6) within AOPC-3, but dissipated while drilling the hollow-stem auger hole. A cross section illustrating the vertical distribution of methane concentrations detected in soil vapor samples within AOPC-1 through -4 is provided in Figure 7. Methane and hydrogen sulfide within and near the proposed STC are at acceptable and safe levels.

4.1.2 Volatile Organic Compounds

Several VOCs were detected in soil vapor samples collected in each of the AOPCs. These are discussed further in Section 5.

4.2 Soil Matrix

4.2.1 Organics

The highest concentrations of total TPH (up to 8,700 mg/KG) were detected in soil samples collected at depths of approximately 10 and 15 feet bgs within AOPC-3. Lower concentrations of total TPH (up to 636 mg/KG) were detected in soil samples collected within AOPC-2, and intermediate total TPH concentrations (up to 1,254 mg/KG) were detected within AOPC-1. A cross section illustrating the vertical distribution of total TPH concentrations detected in soil matrix samples within AOPC-1 through -4 is provided in Figure 7.

VOCs, PAHs and Semi-VOCs were detected only in soil matrix samples collected within AOPC-3 at a depth of approximately 10 feet bgs, but were not detected in soil samples collected from AOPC-1, -2 and -4. Based on exploratory log lithologic descriptions (see Appendix A) and laboratory results for total TPH (Table 1), soils containing high TPH (greater 3,000 mg/KG) are limited to the 35- by-45 foot area of AOPC-3. No TPH was detected in AOPC-4.

VOCs detected in soil vapor samples are different from VOCs detected in the soil matrix samples collected within AOPC-3. As stated previously, no VOCs were detected in soil matrix samples collected within AOPC-1, -2 and -4. These results suggest that VOCs in the soil matrix (Table 1) within AOPC-3 are probably not the source of VOCs within soil vapors (Table 3). The source or sources of VOCs in soil vapor apparently are outside of the North Parking Lot.

4.2.2 Title 22 Metals
Unlike many organic compounds, metals are not volatile and do not occur in soil vapor. Average concentrations of Title 22 metals in southern California soil, and mean, standard deviation, maximum and minimum statistics for Title 22 metal concentrations for soil matrix samples collected within the North Parking Lot are provided in Table 2. With one exception, concentrations of Title 22 metals are consistent with the background concentrations (BG-1 and 2), are consistent with average concentrations for southern California soil, or are within one standard deviation of the computed mean (Table 2). The concentration of arsenic in one soil sample collected at a depth of approximately 10 feet bgs within AOPC-3 is greater than the background concentrations and is greater than one standard deviation of the mean. The maximum depth of excavation proposed for AOPC-3, however, is five feet bgs.

4.2.3 Duplicates
There is poor agreement for TPH, VOC, PAH and Title 22 metal concentrations between most duplicate soil matrix samples (Tables 1 and 2). This finding suggests that the near surface sediments within the North Parking Lot are heterogeneous over very small distances.

4.2.4 Hazardous Waste Criteria
Concentrations of VOCs, PAHs, Semi-VOCs and Title 22 metals detected in the soil matrix samples were compared to state and federal criteria used to evaluate waste as potentially hazardous. These criteria are included in Tables 1 and 2, and are defined below.

<u>Total Threshold Limit Concentration (TTLC):</u> A solid material with concentrations of specific elements or compounds equal to or above the total threshold limit concentrations (TTLCs) is considered a hazardous solid waste because of the persistent and bioaccumulative nature of the specific toxic substance present (22 CCR Chapter 11, Article 3, Section 66261.24 (a)(1)(B)).

<u>Ten Times the Soluble Threshold Limit Concentration (10xSTLC):</u> A solid material which, after treatment through a waste extraction test (WET), produces dissolved concentrations of specific elements or compounds equal to or above the soluble threshold limit concentrations (STLCs) is considered a solid hazardous waste because of the extractable and persistent bio-accumulative nature of the specific toxic substance. The STLC is based on a ten to one dilution in a citric acid solution. For this reason, the STLC cannot be exceeded unless the analyzed concentration in the solid is greater than ten times the STLC (10xSTLC)(22 CCR Chapter 11, Article 3, Section 66261.24 (a)(1)(B)).

<u>Twenty Times the Toxicity Characteristic Leaching Procedure (20x CLP):</u> The EPA assigned a toxicity characteristic concentration using the toxicity characteristic leaching procedure (TCLP) for certain carcinogens and toxic chemicals. Soils or solids with a carcinogenic or toxic chemical concentration above the TCLP criteria are not acceptable for landfill disposal without prior treatment. The TCLP criteria are based on a 20 to one dilution in an acetic acid solution. For this reason, the TCLP standard cannot be exceeded unless the analyzed concentration in the soil or solid is greater than 20 times the TCLP criteria (20xTCLP) (22 CCR Chapter 11, Article 3, Section 66261.24 (a)(1)(B)).

No chemical concentrations in soil matrix samples collected within AOPCs-1 through –4 exceeded TTLC, 10xSTLC or 20xTCLP hazardous waste criteria.

5.0 HUMAN HEALTH RISK ASSESSMENT

The objective of the Human Health Risk Assessment for the proposed Science and Technology Center (STC) at the Beverly Hills High School (BHHS) was to determine if chemical concentrations present in soil matrix and soil gas samples would result in adverse health effects to exposed individuals. More detail regarding the Human Health Risk Assessment is provided in Appendix D. Based on the assessment findings to date, the environmental media of concern are:

- Soil up to a depth of approximately 10 feet below the ground surface (bgs) that may be exposed during site construction and where chemicals in the soil could be transported through air via dust-borne particulates.
- Vapors potentially emitted from the subsurface, through the foundation slab, and into the breathing zone of future occupants of the proposed STC.

This human health risk assessment focused on compounds that are termed chemicals of potential concern (COPC). COPCs are chemicals in the soil or vapor beneath the proposed STC that are present at concentrations higher than acceptable levels established by regulatory agencies for either an industrial or residential setting. To err on the conservative side, the COPCs in this health risk assessment are the chemicals that exceeded the acceptable levels for a residential setting. Arsenic was the only COPC detected in soil matrix samples collected within AOPC-1 (STC footprint), AOPC-2 (outside STC footprint) and AOPC-3 (southeast corner). There were no soil matrix COPCs in AOPC-4 (utility trenches).

To add conservatism to the Human Health Risk Assessment, the courtyard and access road were assumed to remain unpaved. With the exception of isolated planter areas, the proposed courtyard and access road adjacent to the STC structure (AOPC-2 and -3) will be paved to further minimize potential exposure of native soils to students and staff attending the STC. The potentially exposed populations at the proposed STC are:

- Future construction workers.
- Future students and school staff.

Future construction workers were assumed to be involved with construction activities for a period of one and one-half years, 250 days a year, and to have potential exposure pathways through:

- Incidental ingestion of soil and dust,
- Inhalation of dust particles in outdoor air, and
- Dermal contact with soil.

Future students and school staff were assumed to be potentially exposed to soil or soil vapors through:

- Incidental ingestion of outdoor soil and indoor dust.
- Inhalation of suspended particulates in outdoor air and indoor dust.
- Dermal contact with outdoor soil and indoor dust.
- Inhalation of vapors mixed with indoor air.

The likelihood of an increased risk of cancer or other health effects due to the intake of arsenic for these different groups were estimated. U.S.EPA considers a risk range of one-in-one-million to one-in-ten thousand (1E-06 to 1E-04) as an acceptable target range to manage human-health cancer risk (40 CFR, Section 300.430(e)(2)(i)(A); U.S.EPA, 1991). The results indicated that the increased risk of cancer for construction workers was estimated to be two-in-one million, which is within the acceptable range established by EPA. The estimated increased risk of cancer to students and staff who could be exposed to arsenic in the soil was five in 100 million, which is approximately two to four orders of magnitude below EPA's acceptable range.

The human health risk assessment also evaluated the possibility that vapors from chemicals beneath the STC could eventually migrate through the foundation slab of the STC building and disperse through indoor air. The DTSC-modified Johnson and Ettinger Screening Model was used to predict the chemical concentrations in indoor air of the proposed STC . The results show that the estimated increased risk of cancer due to potential exposures to carcinogenic chemicals in indoor air is at the acceptable level of one-in-one million. When the calculated concentrations of noncarcinogenic chemicals in the indoor air of the building were compared to the levels known to cause health effects, the ratio or hazard index was 0.024. These results demonstrate that the indoor air chemical concentrations at the proposed STC would not potentially cause health effects.

Based on the findings of the Human Health Risk Assessment, there are no potential adverse health effects to construction workers, students or staff due to the chemicals present in soil or soil vapors beneath the proposed STC.

6.0 CONCLUSIONS

Based on the results of the environmental site assessment and Human Health Risk Assessment, UltraSystems has reached the following conclusions:

- There are no potential adverse health effects to construction workers, students or staff during construction or to students and staff during attendance of the proposed STC from inhalation, ingestion or dermal contact with soil or soil vapors.

- Methane and hydrogen sulfide concentrations beneath the four AOPCs occur at safe levels.

- Soils beneath and near the proposed STC may be managed as non-hazardous waste, and maybe reused for on-site backfill. Chemical analysis data, included in this report, should be provided to vendors that may remove excess soil from the site.

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