



BACKGROUND

The investigation of soil and soil vapor at the HES was conducted primarily in response to concerns that historical irrigation activities may have impacted the HES playgrounds and contributed to potential public exposure to NIBW contaminants of concern (COCs). The COCs include trichloroethene (TCE), tetrachloroethene (PCE), 1,1-dichloroethene (1,1-DCE), trichloroethane (TCA), and chloroform (CFM). The school is located on the southeast corner of Granite Reef Road and East Oak Street (Figure 1). The investigation was performed to determine the nature and extent of any NIBW COCs that may be in the surface or sub-surface soil within areas that historically were irrigated at HES.

The HES investigation included two sampling events. The first event was conducted by Montgomery and Associates (Montgomery) on 31 July 2008, on behalf of the participating companies (PCs). CH2M HILL (Hill) provided oversight for this event and collected split samples on behalf of EPA. The second sampling event was conducted on 10 October 2008. Montgomery performed the sampling on behalf of the PCs, and ITSI provided oversight for this event and collected split samples on behalf of EPA. Arizona Department of Environmental Quality (ADEQ) representatives were present during both the July and October 2008 sampling events. This technical memorandum discussed the results of the two sampling events.

JULY 2008 SAMPLING EVENT

PCs Sampling Summary During the July 2008 sampling event, Montgomery collected both soil and soil vapor samples on behalf of the PCs. See Figure 2 for sample locations.

- **Soil Sampling** Montgomery collected a total of nine soil samples including one duplicate sample. The soil samples were collected from a depth of 0.5 feet to 1.0 foot below ground surface (bgs). The samples were sent to TestAmerica where they were analyzed using EPA Method 8260B. These soil analytical results were all reported below laboratory reporting limits.
- **Soil Vapor Sampling** In addition, Montgomery collected nine soil vapor samples from a depth of approximately seven feet bgs and submitted them to TestAmerica where they were analyzed by EPA Method TO15. PCE and TCE were reported in two samples and chloroform (CFM) was reported in all of the samples.

EPA Sampling Summary During the July 2008 sampling event, Hill collected split soil and soil vapor samples on behalf of EPA in conjunction with the sampling conducted by Montgomery as described above. See Figure 2 for sample locations.

- **Soil Sampling** Hill collected a total of three split soil samples, one each at boring location HES-B2, HES-B4, and HES-B6. Hill was not able to obtain a split soil sample from the same liner used by Montgomery due to the sampling methodology. To resolve the issue, Hill advanced a second boring immediately adjacent to each of Montgomery's original boring locations and split samples were obtained in this manner. These samples



were sent to the EPA Region 9 laboratory and analyzed using EPA Method 8260B. The analytical results were all below laboratory reporting limits.

- **Soil Vapor Sampling** Hill collected three split soil vapor samples at the same soil boring locations where they collected soil samples. (HES-SG-B2, HES-SG-B4, and HES-SG-B6). These samples were sent to the EPA Region 9 Laboratory and analyzed using EPA Method TO15. The analytical results for COCs were all below laboratory reporting limits. With the exception of HES-SG-4 where CFM was reported at 37 micrograms per cubic meter ($\mu\text{g}/\text{m}^3$).

Comparison of July 2008 Sampling Results The soil analytical results for all samples collected during the July 2008 sampling event on behalf of both the PCs and EPA were below laboratory reporting limits, and therefore were not tabulated for this technical memorandum. A comparison of the soil vapor results collected by Montgomery and analyzed by TestAmerica with the results for the split samples collected by Hill and analyzed by the EPA laboratory for the July 2008 sampling event is summarized below. Results of the soil vapor sampling are presented in Table 1.

- The data show a good correlation in the results for 1,1-DCE and 1,1,1-TCA. These COCs were not detected above laboratory practical quantitation limits (PQLs) in either the Montgomery sample results or Hill's split sample results. 1,1,1-TCA 1 was reported at $4.4 \mu\text{g}/\text{m}^3$ in HES-SG-5.
- The data show a good correlation in the results for chloroform. Both sets of results show that chloroform was detected in all samples, which agrees with an average Relative Percent Difference (RPD) of 5.3.
- The correlation for TCE and PCE results between the two sets of data was not strong. The PCE detected in sample HES-SG-2 at $7.6 \mu\text{g}/\text{m}^3$ and the TCE in sample HES-SG-6 at $6.1 \mu\text{g}/\text{m}^3$, as analyzed by TestAmerica, were not confirmed by results for the corresponding samples analyzed by the EPA laboratory. This may have been due to differences in laboratory PQLs, since the results reported by TestAmerica of ($7.6 \mu\text{g}/\text{m}^3$ for PCE and $6.1 \mu\text{g}/\text{m}^3$ for TCE) were both less than the EPA laboratory PQLs of $15 \mu\text{g}/\text{m}^3$ for PCE and $11 \mu\text{g}/\text{m}^3$ for TCE.
- Additionally, the PCE detected at $120 \mu\text{g}/\text{m}^3$ in sample HES-SG-6 collected by Montgomery and analyzed by TestAmerica was not confirmed by the EPA laboratory and is an order of magnitude above the EPA laboratory reporting limit of $14 \mu\text{g}/\text{m}^3$. Because the concentration of PCE exceeded the highest reporting limit for both laboratories (TestAmerica's reporting limit is $3.4 \mu\text{g}/\text{m}^3$), the difference in reporting limits would not account for the discrepancy in the concentrations.

The ITSI project chemist converted the units for soil vapor presented in TestAmerica's laboratory reports and EPA's Contract Laboratory Program (CLP) laboratory reports as necessary to standardize them for comparison. Specifically, TestAmerica's results from July 2008, reported in micrograms per liter ($\mu\text{g}/\text{L}$) were converted to $\mu\text{g}/\text{m}^3$. In addition, EPA's CLP laboratory results from July 2008, reported in parts per billion by volume (ppbv) were converted to $\mu\text{g}/\text{m}^3$.



ITSI performed a cursory review of the laboratory quality control for the analyses of all samples analyzed by both TestAmerica and the EPA laboratory for the July 2008 sampling event and found no issues. The samples were analyzed within holding times and under proper chain of custody. No COCs were found in method blanks above the laboratory PQLs. In addition, all laboratory control spikes and duplicates were within control limits for all compounds of concern. A summary of laboratory analytical results for soil vapor for July 2008 is presented in Table 1.

OCTOBER 2008 SAMPLING EVENT

On 10 October 2008, ITSI performed technical oversight of the PCs' contractor, Montgomery, as they conducted soil vapor sampling at the HES. In addition, ITSI conducted split sampling on behalf of EPA in conjunction with Montgomery. This second sampling event was conducted in response to EPA's concern over the soil vapor concentrations of PCE that were reported for the July sampling event at the HES. Although no soil contamination was detected, EPA preferred to be conservative and resample those areas that indicated the presence of PCE in the soil vapor during the July sampling event. ITSI prepared *Addendum 1 to the Sampling and Analysis Plan, North Indian Bend Wash Superfund Site* (ITSI, October 2008) to address the needs of this sampling event. The Addendum references and follows the guidance established in the *Sampling and Analysis Plan (SAP) for Soil and Soil Vapor Sampling at the Hohokam Elementary School, Scottsdale Arizona* (NIBW Participating Companies, 24 July 2008) and the *Quality Assurance Project Plan (QAPP) for Soil and Soil Vapor Sampling at the North Indian Bend Wash Superfund Site, Scottsdale, Arizona* (CH2M HILL, 2002).

- **Soil Sampling** ITSI obtained two primary soil samples and one quality control (QC) duplicate during this sampling event at approximately two feet bgs. One was collected from location HES-SG-3 at the southwest corner of the HES and one from location HES-SG-6 on the northeast corner of the HES (See Figure 2 for sample locations). The PCs did not collect soil samples during this event however, they cooperated in allowing ITSI to collect these two samples utilizing Montgomery's on-site consultant Johnson Environmental Technologies (JET). The two primary soil samples and the duplicate sample were collected by JET in accordance with the method described in Section 3.4.1 of the *SAP* (NIBW Participating Companies, 2008). Once JET had collected the soil samples, ITSI took aliquots of the samples using En Core® Samplers.

ADEQ requires that samples to be analyzed for volatile organic compounds (VOCs) be preserved to retard loss of volatiles, as specified in EPA Method 5035. To fulfill this requirement, ITSI utilized En Core® samplers. Although this differed from the method previously used at HES for collecting soil samples, ITSI believed that the En Core® method would provide the most reliable and accurate data; and the use of this method avoided both the difficulties of weighing samples in the field and the raised reporting limits which can result from alternate preservation methods. EPA Remedial Projects Manager (RPM) Jamey Watt approved this sampling modification during a meeting at ITSI's Tempe, Arizona office on 4 November 2008.

Samples taken by ITSI were labeled and shipped in accordance with the EPA laboratory protocol, using Forms II Lite software which generates sample labels, bottle tags, and



Chain of Custody forms that can then be electronically uploaded to the laboratory. Soil samples were sent to DataChem Laboratories, Inc., a CLP analytical testing facility in Salt Lake City, Utah and analyzed for the standard list of VOCs by EPA Method 8260B.

The QC field duplicate collected by ITSI was submitted to the EPA CLP laboratory. This sample was assigned a separate identification and recorded in the field logbook. The duplicate was analyzed independently from its primary counterpart. The results of the two samples were compared to assess the precision of the analytical system.

- **Soil Vapor Sampling** ITSI collected eight soil vapor split samples at depths of approximately six to seven feet bgs in conjunction with the primary samples collected by Montgomery. The soil vapor split samples were collected following the procedure outlined in the ITSI *Addendum, Quality Assurance Project Plan for Oversight of Groundwater, Treated Water, Soil, Vapor and Off-Gas Sampling* (October 2008). See Figure 2 for sample locations.

ITSI and Montgomery collected their primary and split samples simultaneously, using a manifold that split the vapor into separate streams, allowing multiple samples to be taken at the same flow rate.

ITSI was unable to utilize an EPA CLP laboratory for samples collected on their behalf, as at the time of this sampling event the EPA CLP laboratory did not have the resources available to process the soil vapor samples. EPA requested that ITSI contract a private laboratory.

Montgomery, on behalf of the PCs, collected both primary and split soil vapor samples during this event utilizing TestAmerica for one set of samples and Air Toxics Laboratory (ATL) for the second to obtain independent results. To provide an additional, independent analysis for this sampling event, ITSI contracted Columbia Analytical Services, Inc. (CAS), an analytical testing facility in Simi Valley, California to perform analyses for the split soil vapor samples obtained by ITSI. CAS is certified by the State of Arizona for analysis of vapor samples for VOCs by EPA Method TO-15. Soil vapor samples were analyzed using EPA Method TO-15 for the COCs at the site. PQLs and results for the contaminants of concern are indicated in Table 3.

For Quality Control and Quality Assurance of the soil vapor samples ITSI collected one field duplicate sample. The results of the field duplicate agreed within the required 30% RPD. An extra sample volume was collected and analyzed as a laboratory duplicate. The results of this sample agreed with the primary sample within the laboratory required 25% RPD. The Data Review Summary Report for soil vapor samples is presented as Appendix A.

Comparison of the October 2008 Sampling Results Analytical results for the ITSI soil samples analyzed by the EPA CLP laboratory and a comparison of the soil vapor samples analyzed by CAS, with Montgomery's soil vapor samples analyzed by TestAmerica and Air



Toxics for the October 2008 sampling event is summarized below. The results are presented in Table 2.

- Soil analytical results for all COCs were below their respective laboratory reporting limits in all samples collected by ITSI during the October 2008 sampling event and analyzed by the EPA CLP laboratory. (Montgomery did not collect soil samples during this event.)
- No COCs other than chloroform were reported above their laboratory reporting limits in the soil vapor split samples collected by ITSI and analyzed by CAS.
- Chloroform was detected in six of the eight soil vapor samples collected by ITSI and analyzed by CAS, at the following locations and concentrations:
 - HES-SG-1 at 28 $\mu\text{g}/\text{m}^3$
 - HES-SG-4 at 7.2 $\mu\text{g}/\text{m}^3$
 - HES-SG-5 at 22 $\mu\text{g}/\text{m}^3$
 - HES SG-6 at 17 $\mu\text{g}/\text{m}^3$
 - HES-SG-7 at 13 $\mu\text{g}/\text{m}^3$
 - HES-SG-8 at 7.1 $\mu\text{g}/\text{m}^3$
- All soil vapor samples collected by Montgomery and analyzed by ATL were reported below laboratory reporting limits for all COCs with exception of chloroform. Chloroform was detected in six of the eight soil vapor samples, at the following locations and concentrations:
 - HES-SG-1 at 26 $\mu\text{g}/\text{m}^3$
 - HES-SG-4 at 6.0 $\mu\text{g}/\text{m}^3$
 - HES-SG-5 at 19 $\mu\text{g}/\text{m}^3$
 - HES-SG-6 at 16 $\mu\text{g}/\text{m}^3$
 - HES-SG-7 at 11 $\mu\text{g}/\text{m}^3$
 - HES-SG-8 at 6.5 $\mu\text{g}/\text{m}^3$
- The soil vapor samples collected by Montgomery and analyzed by TestAmerica were all below laboratory reporting limits for all COCs, with the following exceptions:
 - TCE in HES-SG-7 at 3.6 $\mu\text{g}/\text{m}^3$
 - PCE in HES-SG-8 at 5.6 $\mu\text{g}/\text{m}^3$
 - Chloroform in HES-SG-1 at 38 $\mu\text{g}/\text{m}^3$
 - Chloroform in HES-SG-4 at 6.8 $\mu\text{g}/\text{m}^3$
 - Chloroform in HG-SG-5 at 31 $\mu\text{g}/\text{m}^3$
 - Chloroform in HES-SG-6 at 19 $\mu\text{g}/\text{m}^3$
 - Chloroform in HES-SG-7 at 9.3 $\mu\text{g}/\text{m}^3$
 - Chloroform in HES-SG-8 at 7.3 $\mu\text{g}/\text{m}^3$
- Results for the field duplicate, Montgomery's primary samples, and Montgomery's split samples were within the required RPD of 30.

ITSI compared the three sets of results and found that there is a discrepancy in the PQLs between the laboratories. These PQLs are presented in Table 3. While the PQLs achieved by CAS and TestAmerica were comparable, those reported by ATL were higher by a factor of approximately



two. Raised reporting limits could possibly result in the masking of low-level concentrations of COCs; however, the PQLs achieved by all three laboratories are well below the California Human Health Screening Levels (CHHSLs).

CHHSLs are concentrations of 54 hazardous chemicals in soil and soil gas that the California Environmental Protection Agency (Cal/EPA) considers to be below thresholds of concern for risks to human health. The thresholds of concern used to develop the CHHSLs are an excess lifetime cancer risk of one in one million (10^{-6}) and a hazard quotient of 1.0 for noncancer health effects. The CHHSLs were developed using standard exposure assumptions and chemical toxicity values published by the U.S. EPA and the Cal/EPA.

During a teleconference held on 2 December 2008 with Mr. Watt and representatives from ITS International Testing Services (ITSI) and Montgomery, it was agreed that the CHHSLs would be appropriate to use at this site as protective values for soil vapor and soil. Information regarding CHHSLs in the evaluation of contaminated properties may be found at California Environmental Protection Agency website below: www.calepa.ca.gov/brownfields/documents/2005/CHHSLsGuide.pdf.

The overall correlation between split sample results was good, as seen by the agreement of the chloroform results. The RPD was 14.6% for the three sets of results. With the exception of the two low-level hits of TCE and PCE reported by TestAmerica in samples HES-SG-7 and HES-SG-8, all other data are in agreement.

CONCLUSIONS

A thorough review of the analytical data from both the July 2008 and October 2008 sampling events at the HES shows that there are no COCs in the soil or the soil vapor that exceed the CHHSLs. The highest concentration of any COC detected during either of the sampling events was $150 \mu\text{g}/\text{m}^3$ of TCE in HES-SG-2 during the July 2008 sampling event. The CHHSL for TCE is $528 \mu\text{g}/\text{m}^3$. There are no established residential CHHSLs for 1,1DCE and CFM. This would indicate that there is no threat to human health or the environment present at HES in either the soil or soil vapor as a result of COCs present at the NIBW Superfund Site.

ITSI's project chemist found no issues with the Quality Control (QC) parameters for any of the laboratories based on their laboratory reports.

Please call Larry Phillips (925) 946-3363, with any questions or comments on this technical memorandum.

ATTACHMENTS

Tables

- Table 1 – Results of Soil Vapor Sampling, Hohokam Elementary School, July 2008
- Table 2 – Results of Soil Vapor Sampling, Hohokam Elementary School, October 2008
- Table 3 – Practical Quantitation Limits

Memorandum (Continued)

Soil Vapor Sampling Event at Hohokam Elementary School in Scottsdale, AZ., NIBW Superfund Site, October 10, 2008.



Figures

- Figure 1 – Site Location Map
- Figure 2 – Sample Locations

Appendices

- Appendix A – Data Review Summary Report

**Table 1. Results of Soil Vapor Sampling
Hohokam Elementary School
July 2008**

Sample ID	Location	1,1-Dichloroethene		Trichloroethene		Tetrachloroethene		Chloroform		1,1,1-Trichloroethane	
		Montgomery	CH2MHill	Montgomery	CH2MHill	Montgomery	CH2MHill	Montgomery	CH2MHill	Montgomery	CH2MHill
		TA ug/m3	EPA ug/m3	TA ug/m3	EPA ug/m3	TA ug/m3	EPA ug/m3	TA ug/m3	EPA ug/m3	TA ug/m3	EPA ug/m3
HES-SG-1	1	<4.0	NS	<5.5	NS	9	NS	<5.0	NS	<5.5	NS
HES-SG-2*	2	<2.0	<8.7	<2.8	<12	7.6	<15	9.9	10 J	<2.8	<12
HES-SG-3	3	<2.8	NS	150	NS	<3.4	NS	4.9	NS	<2.8	NS
HES-SG-4*	4	<10	<7.1	<14	<9.7	<17	<12.2	36	37	<14	<9.8
HES-SG-5	5	<2.0	NS	<2.8	NS	<3.4	NS	3.9	NS	4.4	NS
HES-SG-6*	6	<2.0	<7.9	6.1	<11	120	<14	4.9	5.4 J	<2.8	<11
HES-SG-7	7	<10	NS	<14	NS	<17	NS	<12	NS	<14	NS
HES-SG-8	8	<2.0	NS	<2.8	NS	<3.4	NS	<2.5	NS	<2.8	NS
HES-SG-9	DUP	<2.1	NS	<2.8	NS	<3.4	NS	<2.5	NS	<2.8	NS

Notes:

* Split Samples

Bold types indicates hits above the laboratory reporting limit.

ug/m3= micrograms per cubic meter

TA = TestAmerica

EPA = US Environmental Protection Agency Region 9 Laboratory

J = Analyte should be considered an estimated value

NS = Not Sampled

Montgomery = Montgomery & Associates

California Human Health Screening Levels (CHHSLs) for Residential Land Use

Trichloroethene = 528 µg/m3

Tetrachloroethene = 180 µg/m3

1,1,1-Trichloroethane = 991,000 µg/m3

All results are below the established residential CHHSLs.

The CHHSLs for 1,1-dichloroethene and chloroform have not been established.

**Table 2. Results of Soil Vapor Sampling
Hohokam Elementary School
October 2008**

Sample ID	Location	1,1-Dichloroethene			Trichloroethene			Tetrachloroethene			Chloroform			1,1,1-Trichloroethane		
		M&A	M&A	ITSI	M&A	M&A	ITSI	M&A	M&A	ITSI	M&A	M&A	ITSI	M&A	M&A	ITSI
		ATL ug/m3	TA ug/m3	CAS ug/m3	ATL ug/m3	TA ug/m3	CAS ug/m3	ATL ug/m3	TA ug/m3	CAS ug/m3	ATL ug/m3	TA ug/m3	CAS ug/m3	ATL ug/m3	TA ug/m3	CAS ug/m3
HES-SG-1	1	<5.0	<1.98	<2.5	<6.8	<2.69	<2.5	<8.6	<3.39	<2.5	26	38	28	<6.9	<2.73	<2.5
HES-SG-2	2	<4.3	<1.98	<2.3	<5.8	<2.69	<2.3	<7.3	<3.39	<2.3	<3.2	<2.44	<2.3	<5.9	<2.73	<2.3
HES-SG-3	3	<5.5	<1.98	<2.2	<7.4	<2.69	<2.2	<9.4	<3.39	<2.2	<4.0	<2.44	<2.2	<7.5	<2.73	<2.2
HES-SG-9	3 (DUP)	<5.0	NS	NS	<6.8	NS	NS	<8.6	NS	NS	<3.7	NS	NS	<6.9	NS	NS
HES-SG-4	4	<4.7	<1.98	<2.5	<6.4	<2.69	<2.5	<8.1	<3.39	<2.5	6.0	6.8	7.2	<6.5	<2.73	<2.5
HES-SG-5	5	<4.8	<2.02	<2.5	<6.5	<2.74	<2.5	<8.2	<3.46	<2.5	19	31	22	<6.6	<2.78	<2.5
HES-SG-6	6	<4.5	<3.96	<2.4	<6.2	<5.37	<2.4	<7.8	<6.78	<2.4	16	19	17	<6.2	<5.46	<2.4
HES-SG-10	6 (DUP)	NS	<3.96	NS	NS	<5.37	NS	NS	<6.78	NS	NS	19	NS	NS	<5.46	NS
HES-SG-7	7	<5.7	<1.98	<2.3	<7.8	3.6	<2.3	<9.8	<3.39	<2.3	11	9.3	13	<7.9	<2.73	<2.3
HES-SG-8	8	<4.9	<1.98	<2.5	<6.6	<2.69	<2.5	<8.4	5.6	<2.5	6.5	7.3	7.1	<6.7	<2.73	<2.5

Notes:

Bold types indicates hits above the laboratory reporting limit.

ug/m3= micrograms per cubic meter

ATL= Air Toxics Laboratory

TA = TestAmerica

CAS = Columbia Analytical Services

NS = Not Sampled

M&A = Montgomery & Associates

ITSI = Innovative Technical Solutions, Inc.

California Human Health Screening Levels (CHHSLs) for Residential Land Use

Trichloroethene = 528 µg/m3

Tetrachloroethene = 180 µg/m3

1,1,1-Trichloroethane = 991,000 µg/m3

All results are below the established residential CHHSLs.

The CHHSLs for 1,1-dichloroethene and chloroform have not been established.

**Table 3. Practical Quantitation Limits for October Soil Vapor Sampling Event
Hohokam Elementary School
North Indian Bend Wash Superfund Site (NIBW)**

	1,1-Dichloroethene (ug/m3)	Trichloroethene (ug/m3)	Tetrachloroethene (ug/m3)	Chloroform (ug/m3)	1,1,1-Trichloroethane (ug/m3)
Columbia Analytical Services	2.5 ^a	2.5	2.5	2.5	2.5
Air Toxics Laboratories	5.0	6.8	8.6	3.7	6.9
TestAmerica	2.0	2.7	3.4	2.4	2.7

Notes:

ug/m³ = micrograms per cubic meter

Reporting limits do not take into account variations resulting from differences in individual canister volumes.

^a Does not meet original QAPP PQL of 2.0 ug/m3.

California Human Health Screening Levels (CHHSLs) for Residential Land Use

Trichloroethene = 528 µg/m3

Tetrachloroethene = 180 µg/m3

1,1,1-Trichloroethane = 991,000 µg/m3

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The CHHSLs for 1,1-dichloroethene and chloroform have not been established.

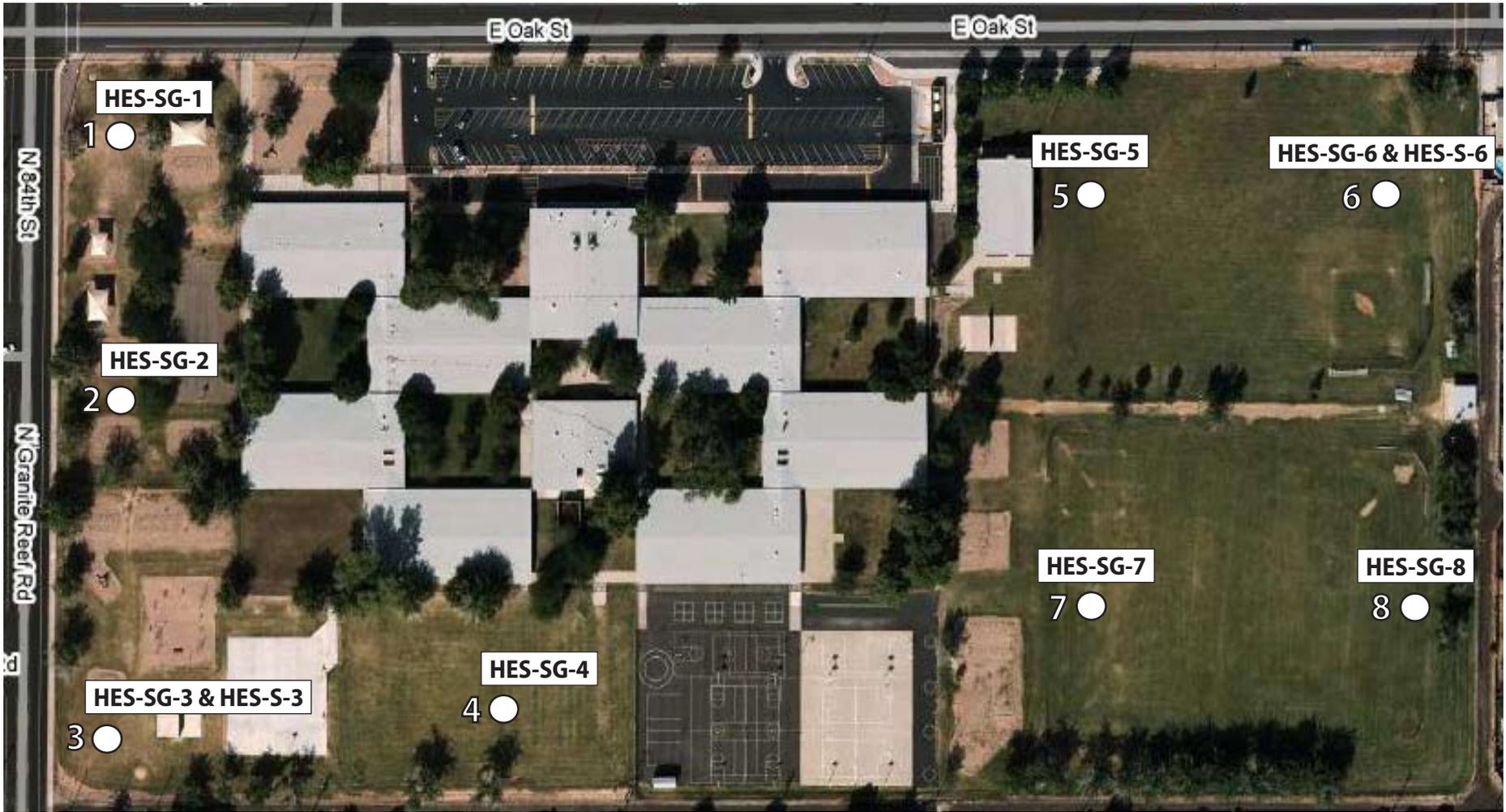


Source: Figure 1 - Site Location Map, Hohokam Elementary School, North Indian Bend Wash, CH2M HILL.



Hohokam Elementary School
North Indian Bend Wash Superfund Site
Scottsdale, Arizona

Figure 1
Site Location Map



Source: Figure 2 - Soil and Soil Vapor Sampling Locations, Hohokam Elementary School, North Indian Bend Wash, CH2M HILL.

LEGEND

- Hohokam Elementary School (HES) Sampling Locations
- HES-SG-3** ITSI Split-Sampling Soil Vapor Sample ID (October 2008)
- HES-S-3** ITSI Split-Sampling Soil Sample ID (October 2008)



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Hohokam Elementary School
 North Indian Bend Wash Superfund Site
 Scottsdale, Arizona

Figure 2
 Soil and Soil Vapor Sampling Locations

**Data Review Summary Report
North Indian Bend Wash Oversight
Columbia Analytical Services Report No. 08100190
Sampling Date: 10/10/08**

DATE: November 25, 2008
PROJECT: Contract EP-S9-08-03, Task Order 0007; ITSI Project No. 07163.0008

Level III validation of the submitted data package was performed by the ITSI Project Chemist according to the following guidelines:

- *USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review*, October 1999;
- *Soil and Soil Vapor Sampling and Analysis Plan, Hohokam Elementary School, Scottsdale, Arizona*, June, 2008;
- *Addendum 1 to the Sampling and Analysis Plan, Hohokam Elementary School, Scottsdale, Arizona*, October 2008; and
- *Compendium Method TO-15, Determination of Volatile Organic Compounds (VOCs) in Air Collected in Specially- Prepared Canisters and Analyzed by Gas Chromatography/Mass Spectrometry (GC/MS)*, January 1999.

The data were reviewed for holding times, blanks, surrogate recoveries, laboratory control samples (LCSs), laboratory duplicate samples, initial calibrations, continuing calibration verifications (CCVs), internal standards, and field QC Samples. In addition, the sample results, target compound lists, and detection limits were reviewed to verify that project analytical requirements were met.

The following table presents the field sample identification (ID), the corresponding laboratory sample ID, and the test method requested for each sample according to the chain-of-custody records:

Field Sample ID	Laboratory Sample ID	Requested Test Method
HES-SG-3	P0803385-001	EPA TO-15
HES-SG-2	P0803385-002	EPA TO-15
HES-SG-2-DUP	P0803385-003	EPA TO-15
HES-SG-1	P0803385-004	EPA TO-15
HES-SG-4	P0803385-005	EPA TO-15
HES-SG-7	P0803385-006	EPA TO-15
HES-SG-8	P0803385-007	EPA TO-15
HES-SG-6	P0803385-008	EPA TO-15
HES-SG-5	P0803385-009	EPA TO-15

GENERAL COMMENTS:

Documentation that sample custody was maintained was present on the chain-of-custody form.

The following paragraphs highlight the essential findings of the data validation effort.

**Data Review Summary Report
North Indian Bend Wash Oversight
Columbia Analytical Services Report No. 08100190
Sampling Date: 10/10/08**

VOLATILE ORGANIC COMPOUNDS (VOCs) by GC/MS (8260B)

Overall, the data are usable as reported.

A. **Holding Times**

The technical holding time criteria were met for all project samples.

B. **Blanks**

Target analytes were not observed in any laboratory method blanks associated with the project samples.

C. **Surrogate Recoveries**

Surrogate spike recoveries met QC acceptance criteria for all project samples.

D. **Internal Standards**

Internal standard areas and retention times met QC acceptance criteria for all project samples.

E. **Laboratory Control Samples**

QC criteria were met for the laboratory control samples associated with the project samples.

F. **Laboratory Duplicates**

QC criteria were met for the laboratory duplicate samples associated with the project samples.

G. **Initial Calibrations**

Initial calibration criteria were met for all calibration standards associated with the project samples.

H. **Initial Calibration Verification and Continuing Calibrations**

Continuing calibration criteria were met for all continuing calibration standards associated with the project samples.

I. **Field QC Samples–Field Duplicates**

QC criteria were met for field duplicate samples identified within this sample delivery group.

J. **Field QC Samples–Field Blanks**

There were no field blanks identified with this sample delivery group.

K. **Reporting Limits**

The laboratory reporting limits for VOCs in air met the project-required reporting limits, with the following exception:

1. The reporting limits for all compounds are approximately five-fold higher than those listed in the table supplied by the laboratory and included as part of Addendum 1 to the SAP. This is due to a reduction in the sample volume analyzed from that listed on the table (0.4L versus 1.0L).

**Data Review Summary Report
North Indian Bend Wash Oversight
Columbia Analytical Services Report No. 08100190
Sampling Date: 10/10/08**

SUMMARY

No data qualifications were required for the project samples included in the data package. There were no rejected results.

USABILITY

Quality control criteria were met and the data were considered acceptable. Based upon the Level III data validation, results are considered valid and usable for project purposes.