2013 Groundwater Sampling and Hydrogeologic Investigation: Summary of Field Activities to Support Source Identification Study United Heckathorn Superfund Site, Richmond, California

PREPARED FOR:	United States Environmental Protection Agency (USEPA) Region 9
PREPARED BY:	CH2M HILL
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PROJECT NUMBER:	USEPA CONTRACT NO. EP-S9-08-04 USEPA WORK ASSIGNMENT NO. 025-RIFS-09R3 CH2M HILL PROJECT NO. 385441

Background

This technical memorandum summarizes the field activities in support of the groundwater investigation conducted between March 18 and March 28, 2013 at the United Heckathorn Superfund Site, in Richmond, California. CH2M HILL performed the groundwater investigation for the U.S. Environmental Protection Agency (USEPA) under Contract EP-S9-08-04 and Work Assignment No. 025-RIFS-09R3. The groundwater investigation was performed in accordance with the *Final Focused Feasibility Study Data Gaps Sampling and Analysis Plan (SAP) Addendum #2, Source Identification Study* (CH2M HILL, 2013) (SAP). Activities conducted at the site included collection of groundwater samples for analysis and a hydrogeologic investigation (tidal study and slug testing) to identify the source(s) of dichlorodiphenyltrichloroethane (DDT)[1] and Dieldrin that have been consistently measured in sediment and biota at the site since remediation was completed in 1997. Groundwater investigation activities were performed as one component of the Source Identification Study, which will include the full results of this groundwater investigation. The potential for contaminant transport to the Lauritzen Channel through leaching of pesticide-contaminated soils under the upland cap and groundwater transport to the channel will be evaluated and ruled in or out as a significant ongoing source of contamination. Groundwater seepage through contaminated embankment soils will also be evaluated. Results of the Source Identification Study will support the forthcoming Focused Feasibility Study (FFS) for the United Heckathorn Superfund Site.

[1] DDT is defined as the sum of 2,4'- and 4,4'-dichlorodiphenyltrichloroethane (DDT); 2,4'- and 4,4'-dichlorodiphenyldichloroethane (DDD); and 2,4'- and 4,4'-dichlorodiphenyldichloroethene (DDE)

Overview of Field Activities

Groundwater samples were collected from ten soil borings (GW13-05 through GW13-14) and two newly installed monitoring wells (MW13-01 and MW13-03) for a total of 12 samples. All of the sampled locations were located along the northern and eastern shoreline of the Lauritzen Channel (Figure 1). Two additional monitoring wells (MW13-02 and MW13-04) were constructed approximately 130 feet from the shoreline in line with the two monitoring wells adjacent to the channel, to allow estimation of the groundwater gradients and seepage velocity (Figure 1).

The groundwater samples were analyzed for DDT and Dieldrin, volatile organic compounds (VOCs), and semivolatile organic compounds (SVOCs). Hydraulic testing, including a water-level evaluation and tidal study were also performed.

Drilling Activities

Each soil boring location was marked with white paint. An Underground Safety Alert ticket was obtained for each boring (USA ticket numbers: 91876, 91892, 91900, 91907, 91914, 91927, 91936, 91945, 91951, 91958, 91984, 91990, 91992, and 91994). The locations were surveyed by a private utility locator, Subtronic Corp. (Martinez, CA), and each location was hand augered to clear the upper 5 feet. The concrete was cored by Osborne Concrete Coring & Cutting (Fremont, CA).

Drilling was completed by National Exploration, Wells, & Pumps, Inc. (Richmond, CA). Continuous soil cores were collected to confirm subsurface conditions, and allow the generation of continuous detailed lithological logs.

Boring and well construction applications were submitted to Contra Costa County (California) Department of Environmental Health; however, the county choose not to issue permits because they determined that issuance of permits would oblige them to conduct inspections of activities for which they had no legal enforcement jurisdiction based on the USEPA's Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) exemption. Soils were logged using Unified Soil Classification System (USCS) descriptions and are included in Attachment 1.

Direct Push Groundwater Sampling Locations

At the 10 groundwater sampling locations, Direct Push Technology (DPT) was successfully used to advance borings. The SAP proposed drilling to at least 5 feet below the water table to allow sufficient borehole length to obtain the required volume of water for sampling. Due to the presence of a dry fill layer, very low permeability soil beneath the fill, and very poor groundwater yield the static water level (i.e., water table) could not be definitively determined at the time of drilling. As a result, the boreholes were extended approximately 10 or more feet below the estimated water table at some locations. The field geologist estimated the location of the water table using soil moisture and the relative elevation of the borehole compared with the water level in the Lauritzen Channel. Drill rods were removed and a ¾-inch diameter temporary polyvinyl chloride (PVC) well casing was installed in each boring with 10-foot long 0.01-inch slotted screen and a filter sock over the screened interval.

This method allowed accumulation of groundwater from the full length of the borehole resulting in sufficient groundwater volume for sample collection, which took from several hours to overnight.

After sampling was completed, all boring locations were abandoned by placing neat-Portland cement from the bottom of the boring using a tremie pipe. All displaced groundwater was contained for disposal. The top 2 feet of the boring was completed using concrete to restore the surface to its original condition.

A photograph log of field activities is provided in Attachment 2.

Well Construction Locations

At the four well construction locations, drilling was completed using 6-inch diameter hollow-stem-augers. Drilling extended to 10 feet below the estimated water table based on soil moisture. Monitoring wells were constructed in each boring as described below.

Waste Management

All concrete slurry, concrete cores, and soil cuttings were placed in United States Department of Transportation (DOT)-approved 55-gallon drums and labeled appropriately. All waste was characterized and removed from the site by Belshire Environmental Services (Foothill Ranch, CA), a licensed hazardous waste hauler. Waste soil, trash, and concrete were disposed of at US Ecology (Beatty, NV) and waste water was disposed of at DeMenno Kerdon (Compton, CA), both facilities approved under the USEPA “Off-Site Rule”.

Monitoring Well Construction

Monitoring wells were constructed using 2-inch diameter, Schedule 40 PVC casing and screen. All but one of the wells (MW13-03) had a 10-foot screen interval with 0.01-inch slot screen. Monitoring well MW13-03 had a 15-foot screen interval. Number 2/16 filter pack sand extended from the bottom of the boring to 1 to 2 feet above the top of the screen interval. Two feet of time-release bentonite pellets were placed on top of the filter pack sand. Neat-Portland cement was placed using a tremie pipe from the bentonite plug to within 2 feet of the ground surface. Wells were completed by placing a flush-mounted well box with a higher-than-standard traffic rating to protect them from crushing by the solid-tired, oversize vehicles used at the site.

The wells were developed by bailing with a bottom suction bailer to remove the fines from the bottom of the well. The wells were then surged using a close-fitting surge block, surging for a minimum of 3 minutes per saturated foot of well screen. The wells were then pumped until pH, temperature, electrical conductivity and turbidity parameters stabilized, as measured using an in-line water quality instrument. A minimum of 3 and a maximum of 10 saturated well volumes were removed from each well and placed in DOT-approved 55-gallon drums that were labeled appropriately.

Monitoring Well Survey

The four wells and two points at the edge of the pier were surveyed. Each well location was surveyed at the ground surface, the edge of the rim, and the top of the north side of the casing. The two locations on the pier that were surveyed were marked with a survey nail to allow the surveyed location to be easily recognized. The two pier locations allowed for direct measurement of the water level in the channel using a free-hanging tape from a standard well water level meter at a location that remains flooded even during low tide. The survey results were reported horizontally to the nearest 0.01 feet in North American Datum (NAD) 1983 and the elevation to 0.01 feet in North American Vertical Datum (NAVD) 1988. Surveying was completed by Calvada Surveying (Corona, CA).

Sample Collection Activities

Groundwater samples were collected from all temporary borings and monitoring wells MW13-1 and MW13-3 on March 21st and 22nd, 2013. Groundwater samples were collected using disposable tubing and a peristaltic pump. The depth to water was determined at each location to the nearest 0.01 foot. Table 1 presents a summary of the field parameters measured at each location. Field filtered samples for SVOCs (USEPA Method Contract Laboratory Program [CLP] Target Compound List [TCL} Semivolatiles) were filtered directly at the end of the tubing discharge point. Due to the elevated turbidity in the grab samples, multiple filters were necessary for samples GW13-08 and GW13-09. Unfiltered samples were then collected after the filter was removed. Samples were submitted to the laboratory as whole water samples for SVOC, VOC (USEPA Method CLP TCL Trace Volatiles), and organochlorine pesticides (USEPA Method E1699). Due to the low detection limit analyses required for organochlorine pesticides, samples were also submitted to the laboratory for filtering. All samples were pumped directly into pre-cleaned, pre-labeled containers which included the time and date of the sample collection. Field duplicates were collected at the rate of 1 field duplicate for every 10 field samples. Temperature, pH, and electrical conductivity were also measured for groundwater at each sampling location.

All samples for chemical analysis were collected in appropriate bottles as outlined in the SAP (CH2M HILL 2013), placed in a cooler at 4°C, and handled in accordance with chain-of-custody procedures. Characterization samples for VOC and SVOC analysis were sent to the CLP laboratory KAP Technologies (Spring, TX) and organochlorine pesticide samples were sent to Vista Analytical Laboratory (El Dorado Hills, CA). The laboratory chains of custody are provided in Attachment 3. All samples for waste characterization were sent to the EPA Region 9 laboratory (Richmond, CA).

Water Level Evaluation – Tidal Study

A study of tidal fluctuation in the Lauritzen Channel and all four newly- constructed monitoring wells was conducted from 4:00 PM on March 26 to 4:00 PM on March 29, 2013 to estimate mean water levels and propagation of tidal influence through the aquifer. A stilling well was placed in the Lauritzen Channel by strapping a 1-inch diameter, Schedule 40 PVC well casing with a 5 foot screen interval and a 0.01-inch slot size screen to a piling. The

purpose of the stilling well was to secure and minimize the effect of wave action on the data logging transducer placed in the channel.

An In-Situ. Inc. Level TROLL® 700 data logging pressure transducer with vented cables was placed in each monitoring well and the stilling well. Only vented cable transducers were used to eliminate the effects of barometric pressure changes during the period of the study. A laptop computer with Win-Situ® 5 (software) was used to program the pressure transducers and synchronize the clock time in all the transducers.

At the end of the tidal study, the depth to groundwater in each well was measured along with the depth from one of the surveyed points on the pier to the depth of the water in the Lauritzen Channel. The tidal study was run for 72 hours. Data were downloaded from the transducers and trimmed to remove anomalous readings associated with placement and removal of the transducers.

Slug Testing

Slug tests were conducted on all four of the newly- constructed monitoring wells on March 26th, 2013 (prior to the start of the tidal study) to estimate hydraulic conductivity of subsurface soils and allow estimation of groundwater flow velocities. Two "slug in" and two "slug out" tests were conducted on each well, with the extra test on each well as a backup in the event that mechanical or electronic problems resulted in unusable data from a particular test. Only one "slug in" and one "slug out" test were evaluated for each well because there were no technical anomalies and the two tests from each well provided substantially similar results.

Prior to conducting the slug test, the static water level in the well was measured to the nearest 0.01 foot. The "slug in" test was begun by starting the data recording on the Level TROLL® 700 data logging pressure transducers and then placing it in the monitoring well. The water level was then checked to ensure that only negligible displacement of water was caused by the transducer. A 1.5 inch diameter, 5-foot long displacement device was lowered rapidly (without allowing the device to free-fall) into the well until the top of the slug device was below the static water level. The test was allowed to run until the water level was static.

After completion of the "slug in" test, a "slug out" test conducted by rapidly removing the slug device and recording water levels until the water levels again were static. The "slug in" and "slug out" tests were repeated to ensure that data were available in the event that the first test did not provide useable data.

Although water level changes due to tidal influence occurred in all wells, the water level fluctuations during the test (typical several minutes) were not significant enough to impact the slug test analysis.

Reference

Final Focused Feasibility Study Data Gaps Sampling and Analysis Plan Addendum #2: Source Identification Study, United Heckathorn Superfund Site, Richmond, California. Prepared by CH2M HILL, dated February 2013.

Table

TABLE 1

Groundwater Sampling - Field Water Quality Measurements and Elevations - March 2013

United Heckathorn Superfund Site, Richmond, California

			Well Constructionand Elevation Data						Field Water Quality Parameters				
Well ID	**Groundwater Sample Collection Date & Time**		**Well Depth (ft)**	**X**	**Y**	**Screen Interval (ft below surface)**	**Depth to Water (ft)**	**Tubing Intake Depth (ft)**	**Temperature (^oC)**	**Field pH**	**Specific Conductivity (mS)**	**Conductivity (mS)**	**Comment**
MW13-01	3/25/2013	9:50	30	6023329.05	2163993.83	20-30	10.5	29	14.9	6.61	37.02	35.69	Tan and cloudy
MW13-02	NA	NA	25	6023536.06	2163403.65	14.5-24.5	NA	NA	NA	NA	NA	NA	
MW13-03	3/25/2013	15:30	33	6023282.26	2163398.94	18-33	11.5	32	15.1	6.65	34.96	34.62	Tan and cloudy
MW13-04	NA	NA	30.0	6023392.09	2163360.93	20-30	NA	NA	NA	NA	NA	NA	
GW13-05	3/21/2013	12:35	20	6023311.18	2164535.44	10-20	9.8	NR	21.6	6.66	43.50	43.5	
GW13-06	3/21/2013	13:34	20	6023376.60	2164512.24	9-19	10.8	NR	26.2	6.61	27.67	24.07	
GW13-07	3/22/2013	7:45	20	6023406.38	2164296.89	9-19	10.2	NR	15.06	6.54	21.54	17.67	
GW13-08	3/22/2013	10:30	30	6023373.35	2164162.65	20-30	10.3	NR	19.7	6.36	28.96	26.01	
GW13-09	3/22/2013	9:45	30	6023356.70	2164090.13	20-30	9.5	NR	17.2	6.45	35.32	30.07	
GW13-10	3/22/2013	12:10	30	6023327.88	2163914.65	20-30	10.4	29	18.3	6.73	28.09	27.20	Tan and cloudy
GW13-11	3/22/2013	12:45	30	6023340.97	2163840.06	20-30	7.5	29	17.9	6.71	32.23	31.61	Tan and cloudy
GW13-12	3/22/2013	13:30	30	6023309.89	2163760.18	20-30	10.1	29	17.6	6.67	23.95	22.06	Tan and very slightly cloudy
GW13-13	3/22/2013	11:15	30	6023310.98	2163700.38	20-30	9.6	29	17.9	6.72	27.09	24.62	Tan and slightly cloudy
GW13-14	3/22/2013	10:30	30	6023250.84	2163063.34	20-30	8.0	29	16.9	6.51	32.61	30.02	Tan and slightly cloudy

Notes:

°C - degrees Celsius

ft - feet

mg/L - milligram per liter

mS - milliSiemens

mV - millivolts

NR - not recorded

NTU - nephelometric turbidity unit

Figure

LEGEND

- Groundwater Sample Location
- Groundwater Monitoring Well - Sampled
- Groundwater Monitoring Well
- Removed Groundwater Well

B24 = Removed Groundwater Well Name
GW13-14 = Sample Location ID

N

0 62.5 125 250 Feet

Note:
Groundwater samples were collected at MW13-01 and MW13-03. These wells were also used for groundwater hydrogeologic evaluations. MW13-02 and MW13-04 were only used for groundwater hydrogeologic evaluations.

FIGURE 1
2013 GROUNDWATER SAMPLING LOCATIONS

UNITED HECKATHORN SUPERFUND SITE
RICHMOND, CALIFORNIA

CH2MHILL

D:\Projects\EPA_UnitedHeckathorn\MapFiles\2013\GroundwaterSampling_July2013.mxd

Attachment 1
Soil Boring Logs

PROJECT NUMBER: 385441.FI.01	BORING NUMBER: MW13-01 SHEET 1 OF 1

SOIL BORING LOG

PROJECT : March 2013 Groundwater Sampling and Hydraulic Evaluation LOCATION : United Heckathorn Superfund Site, Richmond, CA

ELEVATION : -- DRILLING CONTRACTOR : National Exploration, Wells and Pumps, Inc.

DRILLING EQUIPMENT AND METHOD : Geoprobe 7700, Direct Push - Dual Probe

WATER LEVELS : -- START : 3/19/2013 END : 3/19/2013 LOGGER : R. Lucich/J. Salinas

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (%)	LAB SAMPLE	USCS CODE/ LITHOLOGY	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	WELL CONSTRUCTION DIAGRAM: WELL DIAMETER: 2" SCREENED INTERVAL: 20' - 30' BGS
					Concrete 0 - 8"	
				SW	**Gravelly Sand (SW)** 8" - 7.5' - dark grayish brown, moist, loose, medium to coarse grained, subrounded, gravel is fine to coarse grained	
5	5.0	50%				
				CL	**Clay (CL)** 7.5' - 9.5' - greenish gray, slightly moist, medium plasticity, medium hard	
10	10.0	95%		CH	**Clay (CH)** 9.5' - 15' - greenish black, moist, medium plasticity, slightly stiff	
15	15.0	100%		CL	**Clay (CL)** 15' - 22' - dark greenish gray, slightly moist, medium plasticity, stiff 17" - Color change to olive brown (2.5Y 4/3)	
20	20.0	95%		ML	**Clayey Silt (ML)** 22' - 23' - olive brown, moist, stiff	
25	25.0	100%		CL	**Clay (CL)** 23' - 29' - olive brown, moist, very stiff 27' - 28' - wet	
30	30.0			SM	**Silty Sand (SM)** 29' - 30' - olive brown, moist, very fine grained, slightly dense	
					End Drilling on 3/19/2013 Total Borehole Depth: 30.0 ft bgs	
35						

PROJECT NUMBER:	BORING NUMBER:
385441.FI.01	MW13-02 SHEET 1 OF 1

SOIL BORING LOG

PROJECT : March 2013 Groundwater Sampling and Hydraulic Evaluation LOCATION : United Heckathorn Superfund Site, Richmond, CA

ELEVATION : -- DRILLING CONTRACTOR : National Exploration, Wells and Pumps, Inc.

DRILLING EQUIPMENT AND METHOD : Geoprobe 7700, Direct Push - Dual Probe

WATER LEVELS : -- START : 3/19/2013 END : 3/19/2013 LOGGER : R. Lucich/J. Salinas

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (%)	LAB SAMPLE	USCS CODE/ LITHOLOGY	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	WELL CONSTRUCTION DIAGRAM: WELL DIAMETER: 2" SCREENED INTERVAL: 14.5' - 24.5' BGS
					Concrete 0 - 8"	
				GW	**Sandy Gravel (GW)** 8" - 5" - yellowish brown, dry, loose, fine to coarse sand and gravel, subangular	
5	5.0					
		10%			5' - 10' - No recovery	
10	10.0					
		100%		CL	**Silty Clay (CL)** 10' - 14' - gray, moist to very moist, medium stiff	
				CH	**Peaty Clay (CH)** 14' - 15' - dark grayish brown, very moist, slightly stiff, medium plasticity	
15	15.0			CL	14.5' - Change to very dark gray (10YR 3/1), moist, medium plasticity, slightly stiff	
		100%		ML	**Clay (CL)** 15' - 17' - dark greenish gray, moist, slightly stiff, medium plasticity **Clayey Silt (ML)** 17' - 21' - dark greenish gray, very moist, slightly stiff 20' - Becomes brown	
20	20.0					
		80%		SM	**Silty Sand (SM)** 21' - 23.5' - grayish brown, wet, slightly dense, fine grained 22' - Becomes yellowish brown	
25	25.0			SM	**Silty Sand (SM)** 23.5' - 25' - brown, wet, slightly dense, fine to coarse grained, subangular to subrounded, with minor fine subangular gravel	
					End Drilling on 3/19/2013 Total Borehole Depth: 25.0 ft bgs	
30						
35						

PROJECT NUMBER:	BORING NUMBER:
385441.FI.01	MW13-03 SHEET 1 OF 1

SOIL BORING LOG

PROJECT : March 2013 Groundwater Sampling and Hydraulic Evaluation LOCATION : United Heckathorn Superfund Site, Richmond, CA

ELEVATION : -- DRILLING CONTRACTOR : National Exploration, Wells and Pumps, Inc.

DRILLING EQUIPMENT AND METHOD : Geoprobe 7700, Direct Push - Dual Probe

WATER LEVELS : -- START : 3/20/2013 END : 3/20/2013 LOGGER : J. Salinas

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (%)	LAB SAMPLE	USCS CODE/ LITHOLOGY	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	WELL CONSTRUCTION DIAGRAM: WELL DIAMETER: 2" SCREENED INTERVAL: 18' - 33' BGS
					CONCRETE	
				GW	**Sandy Gravel (GW)** 8" - 5' - moist, loose, subangular clasts, fine to coarse sand and gravel	
5	5.0					
				CL	**Clay (CL)** 5' - 7' - dark gray, moist, soft, medium plasticity	
		50%		GW	**Gravel (GW)** 7' - 7.5' - very dark gray, loose, subangular, subangular clasts, some red clasts	
				GW	**Sandy Gravel (GW)** 7.5' - 11.5' - grayish brown, moist, loose	
10	10.0					
		75%		CL	**Clay (CL)** 11.5' - 16' - greenish black, moist, medium stiff, medium plasticity 14.5' - some rusting	
15	15.0					
		100%		ML	**Clayey Silt (ML)** 16' - 23' - dark greenish gray, moist, medium stiff, medium plasticity 18' - subangular, Color change to light olive brown (2.5Y 5/4)	
20	20.0					
		100%		GW	**Sandy Gravel (GW)** 23' - 25.5' - light olive brown, wet, loose, fine to coarse grained sand and gravel	
25	25.0					
		100%		CL	**Clay (CL)** 25.5' - 27' - dark greenish gray, wet, soft, medium plasticity, subangular, some subangular clasts	
				SW	**Sand (SW)** 27' - 27.5' - olive brown, wet, loose, subangular, fine to coarse grained	
				GW	**Gravel (GW)** 27.5' - 29.5' - olive brown, wet, loose, subangular	
30	30.0					
				SW	**Sand (SW)** 29.5' - 33' - olive brown, wet, loose, fine to coarse grained	
					End Drilling on 3/20/2013 Total Borehole Depth: 33.0 ft bgs	
35						

PROJECT NUMBER:	BORING NUMBER:
385441.FI.01	MW13-04 SHEET 1 OF 1

SOIL BORING LOG

PROJECT : March 2013 Groundwater Sampling and Hydraulic Evaluation LOCATION : United Heckathorn Superfund Site, Richmond, CA

ELEVATION : -- DRILLING CONTRACTOR : National Exploration, Wells and Pumps, Inc.

DRILLING EQUIPMENT AND METHOD : Geoprobe 7700, Direct Push - Dual Probe

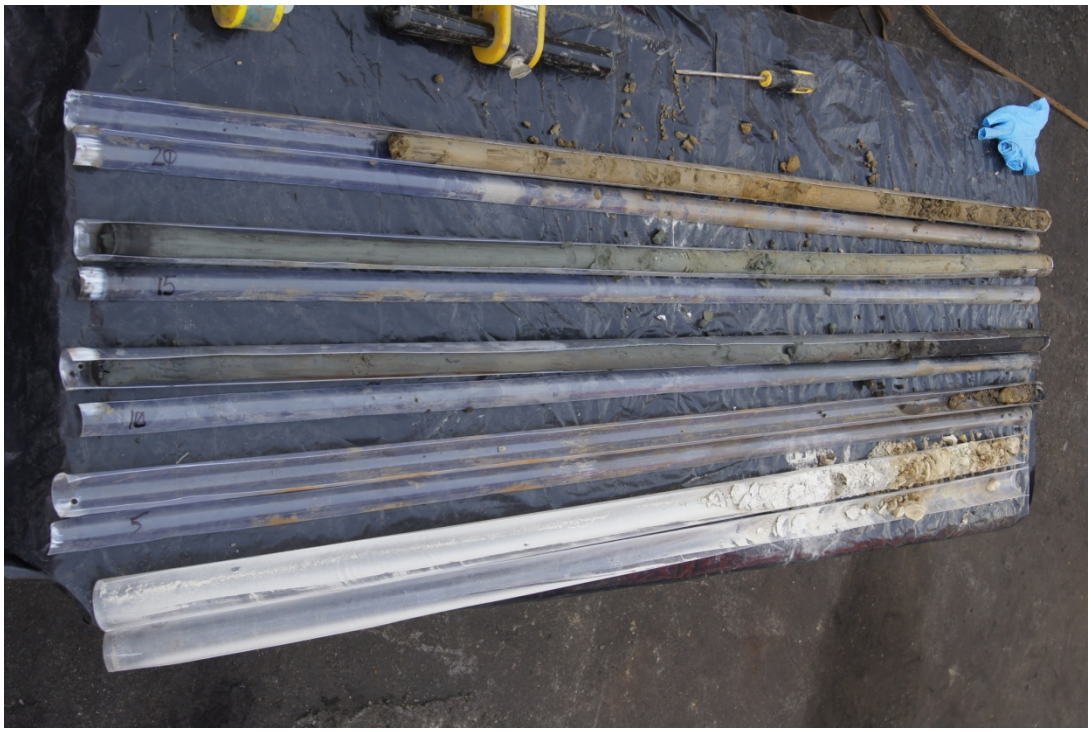
WATER LEVELS : -- START : 3/22/2013 END : 3/22/2013 LOGGER : R. Lucich

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (%)	LAB SAMPLE	USCS CODE/ LITHOLOGY	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	WELL CONSTRUCTION DIAGRAM: WELL DIAMETER: 2" SCREENED INTERVAL: 20' - 30' BGS
					Concrete 0-8"	
				SW	**Gravelly Sand (SW)** 8" - 6' - reddish brown, dry, loose, medium to coarse grained and subrounded gravel, fine to coarse grained, subrounded sand	
5						
				ML	**Sandy Silt (ML)** 6' - 7' - gray, moist, soft	
				SM	**Silty Sand (SM)** 7' - 8.5' - gray, wet, loose, very fine grained	
				ML	**Sandy Silt (ML)** 8.5' - 9' - gray, moist, soft	
10				SM	**Silty Sand (SM)** 9' - 12' - gray, wet, loose, very fine grained	
				ML	**Sandy Silt (ML)** 12' - 13.5' - gray, moist, soft	
				CH	**Peaty Clay (CH)** 13.5' -15' - very dark gray, moist, stiff, low plasticity	
15				CL	**Silty Clay (CL)** 15' - 17' - greenish gray, moist, slightly stiff, medium plasticity	
				SM	**Silty Sand (SM)** 17' - 20' - gray, very moist, slightly dense, very fine grained 19.5' - Becomes light olive brown (2.5Y 4/3)	
20				ML	**Sandy Silt (ML)** 20' - 25' - olive brown, very moist, slightly stiff, medium plasticity	
25				SM	**Silty Sand (SM)** 25' -30' - olive brown, wet, subrounded, slightly dense, very fine grained	
30					End Drilling on 3/22/2013 Total Borehole Depth: 30.0 ft bgs	
35						

Attachment 2
Photograph Log

Photograph 1: Concrete coring at GW13-10

Photograph 2: Installation of temporary well at grab groundwater location GW13-07.



Photograph 3: Soil cores in acetate liners for MW13-02.

Photograph 4: Example of a restored grab groundwater location.

Photograph 5: Example of a completed groundwater monitoring well with lid.

Attachment 3
Laboratory Chains of Custody

USEPA CLP Inorganics COC (LAB COPY)

DateShipped:
CarrierName:
AirbillNo:

CHAIN OF CUSTODY RECORD

Case #: 43378
Cooler #:

No: 9-031213-162429-0004 5

Lab: KAP Technologies Inc.
Lab Contact: Rao Alsakani
Lab Phone: 281-367-0065

Inorganic Sample #	Matrix/Sampler	Coll. Method	Analysis/Turnaround	Tag/Preservative/Bottles	Station Location	Collected	Organic Sample #	For Lab Use Only
Y8RJ5	Ground Water/		CLP SVOA	1025 (4C (+-2C)) (3)	MW13-03-0001F			
~~Y8RJ7~~	~~Water/~~		~~CLP TVOA, CLP SVOA~~	~~1042 (4C (+-2C) HCl), 1043 (4C (+-2C)) (4)~~	~~GW13-EB-02~~			
~~Y8RJ8~~	~~Water/~~		~~CLP TVOA, CLP SVOA~~	~~1044 (4C (+-2C) HCl), 1045 (4C (+-2C)) (4)~~	~~GW13-EB-03~~	~~[illegible] 3/18/13~~		
Y8RKØ ~~Y8RLH~~	~~Y8RK2~~	Water	CLP TVOA	1044 (4C (+-2C) HCL)	GW13-TB-04			
Y8RK3	water		CLP TVOA, CLP SVOA	(4C (+-2C) HCL) (4C (+-2C)) (4)	GW13-EB-04	3.21.13/1700		
Y8RJ8	water		CLP TVOA, CLP SVOA	4C (+-2C) HCL) 4C (+-2C) (4)	GW13-EB-03	3.20.13/1700		
Y8RK1	water		CLP TVOA, CLP SVOA	4C (+-2C) HCL) 4C (+-2C) (4)	GW13-EB-05	3.22.13/1400		

Sample(s) to be used for Lab QC: Y8RJ5

Shipment for Case Complete? N

Samples Transferred From Chain of Custody #

Analysis Key: CLP SVOA=CLP TCL Semivolatiles, CLP TVOA=CLP TCL Trace Volatiles

Items/Reason	Relinquished by	Date	Received by	Date	Time	Items/Reason	Relinquished By	Date	Received by	Date	Time
	[signature]	3/22/13									

Generated by CamScanner from intsig.com

USEPA CLP Organics COC (LAB COPY)

DateShipped:
CarrierName: FedEx
AirbillNo:

CHAIN OF CUSTODY RECORD

Case #: 43378
Cooler #:

No: 9-031512-115935-0002 5

Lab: KAP Technologies Inc.
Lab Contact: Rao Alsakani
Lab Phone: 281-367-0065

Organic Sample #	Matrix/Sampler	Coll. Method	Analysis/Turnaround	Tag/Preservative/Bottles	Station Location	Collected	Inorganic Sample #	For Lab Use Only
~~Y8RH0~~	~~Ground Water/~~		~~CLP SVOA, CLP TVOA~~	~~1000 (4C (+-2C)), 1027 (4C (+-2C) HCl) (4)~~	GW13-05-0001			
~~Y8RH1~~	~~Ground Water/~~		~~CLP SVOA~~	~~1001 (4C (+-2C)) (1)~~	~~GW13-05-0001F~~			
~~Y8RH2~~	~~Ground Water/~~		~~CLP SVOA, CLP TVOA~~	~~1002 (4C (+-2C)), 1028 (4C (+-2C) HCl) (4)~~	GW13-06-0001	3/22/13		
~~Y8RH3~~	~~Ground Water/~~		~~CLP SVOA~~	~~1003 (4C (+-2C)) (1)~~	~~GW13-06-0001F~~			
Y8RH4	Ground Water/		CLP SVOA, CLP TVOA	1004 (4C (+-2C)), 1029 (4C (+-2C) HCl) (4)	GW13-07-0001	3/22/13 0745		
Y8RH5	Ground Water/		CLP SVOA	1005 (4C (+-2C)) (1)	GW13-07-0001F	3/22/13 0745		
Y8RH8	Ground Water/		CLP SVOA, CLP TVOA	1008 (4C (+-2C)), 1031 (4C (+-2C) HCl) (4)	GW13-08-0001	3/22/13 ~~0815~~ 1030		
Y8RH9	Ground Water/		CLP SVOA	1009 (4C (+-2C)) (1)	GW13-08-0001F	3/22/13 ~~0815~~ 1030		
Y8RI0	Ground Water/		CLP SVOA, CLP TVOA	1010 (4C (+-2C)), 1032 (4C (+-2C) HCl) (4)	GW13-09-0001	3/22/13 0945		
Y8RI1	Ground Water/		CLP SVOA	1011 (4C (+-2C)) (1)	GW13-09-0001F	3/22/13 0945		
Y8RI2	Ground Water/		CLP SVOA, CLP TVOA	1012 (4C (+-2C)), 1033 (4C (+-2C) HCl) (4)	GW13-10-0001	3/22/13 1210		
Y8RI3	Ground Water/		CLP SVOA	1013 (4C (+-2C)) (1)	GW13-10-0001F	3/22/13 1210		
~~Y8RJ6~~	~~Water/~~		~~CLP TVOA, CLP SVOA~~	~~1040 (4C (+-2C) HCl), 1041 (4C (+-2C)) (4)~~	~~GW13-FB-01~~	3/22/13		

Special Instructions:

Shipment for Case Complete? N
Samples Transferred From Chain of Custody #

Analysis Key: CLP SVOA=CLP TCL Semivolatiles, CLP TVOA=CLP TCL Trace Volatiles

Items/Reason	Relinquished by	Date	Received by	Date	Time	Items/Reason	Relinquished By	Date	Received by	Date	Time
	3/22/13										

Generated by CamScanner from intsig.com

USEPA CLP Inorganics COC (LAB COPY)

DateShipped:
CarrierName:
AirbillNo:

CHAIN OF CUSTODY RECORD

Case #: 43378
Cooler #:

No: 9-031213-162429-00045

Lab: KAP Technologies Inc.
Lab Contact: Rao Alsakani
Lab Phone: 281-367-0065

Inorganic Sample #	Matrix/Sampler	Coll. Method	Analysis/Turnaround	Tag/Preservative/Bottles	Station Location	Collected	Organic Sample #	For Lab Use Only
Y8RH6	Ground Water/		CLP SVOA, CLP TVOA	1006 (4C (+-2C)), 1030 (4C (+-2C) HCl) (4)	GW13-93-0001	3/22/13 0815		
Y8RH7	Ground Water/		CLP SVOA	1007 (4C (+-2C)) (1)	GW13-93-0001F	3/22/13 0815		
Y8RI4	Ground Water/		CLP SVOA, CLP TVOA	1014 (4C (+-2C)), 1034 (4C (+-2C) HCl) (4)	GW13-11-0001	3/22/13 1245		
Y8RI5	Ground Water/		CLP SVOA	1015 (4C (+-2C)) (1)	GW13-11-0001F	3/22/13 1245		
Y8RI6	Ground Water/		CLP SVOA, CLP TVOA	1016 (4C (+-2C)), 1035 (4C (+-2C) HCl) (4)	GW13-12-0001	3/22/13 1330		
Y8RI7	Ground Water/		CLP SVOA	1017 (4C (+-2C)) (1)	GW13-12-0001F	3/22/13 1330		
Y8RI8	Ground Water/		CLP SVOA, CLP TVOA	1018 (4C (+-2C)), 1036 (4C (+-2C) HCl) (4)	GW13-13-0001	3/22/13 1115		
Y8RI9	Ground Water/		CLP SVOA	1019 (4C (+-2C)) (1)	GW13-13-0001F	3/22/13 1115		
Y8RJ0	Ground Water/		CLP SVOA, CLP TVOA	1020 (4C (+-2C)), 1037 (4C (+-2C) HCl) (4)	GW13-14-0001	3/22/13 1030		
Y8RJ1	Ground Water/		CLP SVOA	1021 (4C (+-2C)) (1)	GW13-14-0001F	3/22/13 1030		
~~Y8RJ2~~	~~Ground Water/~~		~~CLP SVOA, CLP TVOA~~	~~1022 (4C (+-2C)), 1038 (4C (+-2C) HCl) (4)~~	~~MW13-01-0001~~			RDL 3/22/13
~~Y8RJ3~~	~~Ground Water/~~		~~CLP SVOA~~	~~1023 (4C (+-2C)) (1)~~	~~MW13-01-0001F~~			RDL 3/22/13
~~Y8RJ4~~	~~Ground Water/~~		~~CLP SVOA, CLP TVOA~~	~~1024 (4C (+-2C)), 1039 (4C (+-2C) HCl) (12)~~	~~MW13-03-0001~~			RDL 3/22/13

Sample(s) to be used for Lab QC: Y8RJ4, Y8RJ5

Shipment for Case Complete? N
Samples Transferred From Chain of Custody #

Analysis Key: CLP SVOA=CLP TCL Semivolatiles, CLP TVOA=CLP TCL Trace Volatiles

Items/Reason	Relinquished by	Date	Received by	Date	Time	Items/Reason	Relinquished By	Date	Received by	Date	Time
	Roger Dhiel	3/22/13									

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USEPA CLP Inorganics COC (LAB COPY)

DateShipped:
CarrierName:
AirbillNo:

CHAIN OF CUSTODY RECORD

Case #: 43378
Cooler #:

No: 9-031213-162429-0006

Lab: KAP Technologies Inc.
Lab Contact: Rao Alsakani
Lab Phone: 281-367-0065

Inorganic Sample #	Matrix/Sampler	Coll. Method	Analysis/Turnaround	Tag/Preservative/Bottles	Station Location	Collected	Organic Sample #	For Lab Use Only
~~Y8RH6~~	~~Ground Water/~~		~~CLP SVOA, CLP TVOA~~	~~1006 (4C (+-2C)), 1036 (4C (+-2C) HCl) (4)~~	~~GW13-93-0001~~			
~~Y8RH7~~	~~Ground Water/~~		~~CLP SVOA~~	~~1007 (4C (+-2C)) (1)~~	~~GW13-93-0001F~~			
~~Y8RI4~~	~~Ground Water/~~		~~CLP SVOA, CLP TVOA~~	~~1014 (4C (+-2C)), 1034 (4C (+-2C) HCl) (4)~~	~~GW13-11-0001~~	3/26/13		
~~Y8RI5~~	~~Ground Water/~~		~~CLP SVOA~~	~~1015 (4C (+-2C)) (1)~~	~~GW13-11-0001F~~			
~~Y8RI6~~	~~Ground Water/~~		~~CLP SVOA, CLP TVOA~~	~~1016 (4C (+-2C)), 1035 (4C (+-2C) HCl) (4)~~	~~GW13-12-0001~~			
~~Y8RI7~~	~~Ground Water/~~		~~CLP SVOA~~	~~1017 (4C (+-2C)) (1)~~	~~GW13-12-0001F~~			
~~Y8RI8~~	~~Ground Water/~~		~~CLP SVOA, CLP TVOA~~	~~1018 (4C (+-2C)), 1036 (4C (+-2C) HCl) (4)~~	~~GW13-13-0001~~			
~~Y8RI9~~	~~Ground Water/~~		~~CLP SVOA~~	~~1019 (4C (+-2C)) (1)~~	~~GW13-13-0001F~~			
~~Y8RJ0~~ Y8RK4	Ground Water/	3/26/13	~~CLP SVOA~~, CLP TVOA	~~1020 (4C (+-2C)), 1037~~ (4C (+-2C) HCl) ~~(4)~~ (1)	~~GW13-14-0001~~ GW13-TB-05	3/25/13 ~~3/26/13~~	0800	
~~Y8RJ1~~	~~Ground Water/~~		~~CLP SVOA~~	~~1021 (4C (+-2C)) (1)~~	~~GW13-14-0001F~~			
Y8RJ2	Ground Water/		CLP SVOA, CLP TVOA	1022 (4C (+-2C)), 1038 (4C (+-2C) HCl) (4)	MW13-01-0001	3/25/13 0950		
Y8RJ3	Ground Water/		CLP SVOA	1023 (4C (+-2C)) (1)	MW13-01-0001F	3/25/13 0950		
Y8RJ4	Ground Water/		CLP SVOA, CLP TVOA	1024 (4C (+-2C)), 1039 (4C (+-2C) HCl) (12)	MW13-03-0001	3/25/13 1530		
Y8RJ5	Groundwater		CLP SVOA	[4C (±2C)] (3)	MW13-03-0001F	3/25/13 1530		

Sample(s) to be used for Lab QC: Y8RJ4, Y8RJ5

Shipment for Case Complete? N

Samples Transferred From Chain of Custody #

Analysis Key: CLP SVOA=CLP TCL Semivolatiles, CLP TVOA=CLP TCL Trace Volatiles

Items/Reason	Relinquished by	Date	Received by	Date	Time	Items/Reason	Relinquished By	Date	Received by	Date	Time
	Roger Dlusal	3-26-13									

Generated by CamScanner from intsig.com

USEPA CLP Organics COC (LAB COPY)

DateShipped:

CarrierName: FedEx

AirbillNo:

CHAIN OF CUSTODY RECORD

Case #: 43378

Cooler #:

No: 9-031512-115935-0002

Lab: KAP Technologies Inc.

Lab Contact: Rao Alsakani

Lab Phone: 281-367-0065

Organic Sample #	Matrix/Sampler	Coll. Method	Analysis/Turnaround	Tag/Preservative/Bottles	Station Location	Collected	Inorganic Sample #	For Lab Use Only
Y8RH0	Ground Water/		CLP SVOA, CLP TVOA	1000 (4C (+-2C)), 1027 (4C (+-2C) HCl) (4)	GW13-05-0001			
Y8RH1	Ground Water/		CLP SVOA	1001 (4C (+-2C)) (1)	GW13-05-0001F			
Y8RH2	Ground Water/		CLP SVOA, CLP TVOA	1002 (4C (+-2C)), 1028 (4C (+-2C) HCl) (4)	GW13-06-0001			
Y8RH3	Ground Water/		CLP SVOA	1003 (4C (+-2C)) (1)	GW13-06-0001F			
Y8RH4	Ground Water/		CLP SVOA, CLP TVOA	1004 (4C (+-2C)), 1029 (4C (+-2C) HCl) (4)	GW13-07-0001			
Y8RH5	Ground Water/		CLP SVOA	1005 (4C (+-2C)) (1)	GW13-07-0001F			
Y8RH8	Ground Water/		CLP SVOA, CLP TVOA	1008 (4C (+-2C)), 1031 (4C (+-2C) HCl) (4)	GW13-08-0001			
Y8RH9	Ground Water/		CLP SVOA	1009 (4C (+-2C)) (1)	GW13-08-0001F	TF 3/20/13		
Y8RI0	Ground Water/		CLP SVOA, CLP TVOA	1010 (4C (+-2C)), 1032 (4C (+-2C) HCl) (4)	GW13-09-0001			
Y8RI1	Ground Water/		CLP SVOA	1011 (4C (+-2C)) (1)	GW13-09-0001F			
Y8RI2	Ground Water/		CLP SVOA, CLP TVOA	1012 (4C (+-2C)), 1033 (4C (+-2C) HCl) (4)	GW13-10-0001			
Y8RI3	Ground Water/		CLP SVOA	1013 (4C (+-2C)) (1)	GW13-10-0001F			
Y8RJ6	Water/		CLP TVOA, CLP SVOA	1040 (4C (+-2C) HCl), 1041 (4C (+-2C)) (4)	GW13-EB-01	3/18/13 1630		

Special Instructions:

Shipment for Case Complete? N

Samples Transferred From Chain of Custody #

Analysis Key: CLP SVOA=CLP TCL Semivolatiles, CLP TVOA=CLP TCL Trace Volatiles

Items/Reason	Relinquished by	Date	Received by	Date	Time	Items/Reason	Relinquished By	Date	Received by	Date	Time
	Jamara Jones	3/20/13									

USEPA CLP Inorganics COC (LAB COPY)

DateShipped:
CarrierName:
AirbillNo:

CHAIN OF CUSTODY RECORD

Case #: 43378
Cooler #:

No: 9-031213-162429-0004

Lab: KAP Technologies Inc.
Lab Contact: Rao Alsakani
Lab Phone: 281-367-0065

Inorganic Sample #	Matrix/Sampler	Coll. Method	Analysis/Turnaround	Tag/Preservative/Bottles	Station Location	Collected	Organic Sample #	For Lab Use Only
~~Y8RJ5~~	~~Ground Water/~~		CLP SVOA	1025 (4C (+-2C)) (3)	MW13-03-0001F	~~JF~~ 3/20/13		
Y8RJ7	Water/		CLP TVOA, CLP SVOA	1042 (4C (+-2C) HCl), 1043 (4C (+-2C)) (4)	GW13-EB-02	3/19/13 1700		
~~Y8RJ8~~	~~Water/~~		~~CLP TVOA, CLP SVOA~~	~~1044 (4C (+-2C) HCl), 1045 (4C (+-2C)) (4)~~	~~GW13-EB-03~~	~~JF~~ 3/20/13		
Y8RJ9	Water/		CLP TVOA	1044 (4C (+-2C) HCl) (1)	GW13-TB-01			

Sample(s) to be used for Lab QC: Y8RJ5

Shipment for Case Complete? N

Samples Transferred From Chain of Custody #

Analysis Key: CLP SVOA=CLP TCL Semivolatiles, CLP TVOA=CLP TCL Trace Volatiles

Items/Reason	Relinquished by	Date	Received by	Date	Time	Items/Reason	Relinquished By	Date	Received by	Date	Time
	Jaimare Jaime	3/20/13									

E2 Consulting Engineers, Inc.

CHAIN OF CUSTODY RECORD: UHGW_V001

1300229

2.1°C

2013 March Groundwater

Project Name: United Heckathorn
Project Number: 43378
Project Manager:
Sample Manager:
Cell Number:
Fax/Email:

Container: 1 L Amber Glass
Preservatives: 4C (+-2C)
Filtered: n
Holding Time: 7 Days

Ship To:
Vista Analytical Laboratory
1104 Windfield Way
El Dorado Hills, CA 95762
916-673-1520
Sample Receiving

SAMPLE ID	DATE	TIME	Matrix	Pesticides (E1699)		Number of Containers	COMMENTS
~~GW13-10-0001~~			~~GW~~	~~X~~		~~1~~	
~~GW13-10-0001F~~			~~GW~~	~~X~~		1	~~Filter on Receipt~~
~~GW13-11-0001~~			~~GW~~	~~X~~		~~1~~	
~~GW13-11-0001F~~			~~GW~~	~~X~~		1	~~Filter on Receipt~~
~~GW13-12-0001~~			~~GW~~	~~X~~		~~1~~	
~~GW13-12-0001F~~			~~GW~~	~~X~~		~~1~~	~~Filter on Receipt~~
~~GW13-13-0001~~			~~GW~~	~~X~~		~~1~~	
~~GW13-13-0001F~~			~~GW~~	~~X~~		1	~~Filter on Receipt~~
~~GW13-14-0001~~			~~GW~~	~~X~~		~~1~~	
~~GW13-14-0001F~~			~~GW~~	~~X~~		1	~~Filter on Receipt~~
MW13-01-0001	3/25/13	0950	GW	X		~~4~~ 1	
MW13-01-0001F	3/25/13	0950	GW	X		1	Filter on Receipt
					TOTAL NUMBER OF CONTAINERS	~~33~~ 2	

JMS 3/26/13

Signatures		Date/Time
Sampled by		
Relinquished by	Roger D Lewis	3-26-13/1730
Received by	Bettis Benedict	3/27/13 1060
Relinquished by		
Received by		

Shipping Details
Method of shipment:
Shipping Company:
On ice: yes / no:
Airbill No.:
Shipping Date:

Special Instructions:

Report Copy to:
Ruth Siegmund
ruth.siegmund@e2.com

E2 Consulting Engineers, Inc.

CHAIN OF CUSTODY RECORD: UHGW_V001 1300229

2013 March Groundwater

Project Name: United Heckathorn
Project Number: 43378
Project Manager:
Sample Manager:
Cell Number:
Fax/Email:

Container: 1 L Amber Glass
Preservatives: 4C (+-2C)
Filtered: n
Holding Time: 7 Days

Ship To:
Vista Analytical Laboratory
1104 Windfield Way
El Dorado Hills, CA 95762
916-673-1520
Sample Receiving

SAMPLE ID	DATE	TIME	Matrix	Pesticides (E1699)		Number of Containers	COMMENTS
MW13-03-0001	3/25/13	1530	GW	X		3	Additional volume for MS/MSD
MW13-03-0001F	3/25/13	1530	GW	X		3	Filter on Receipt, Additional volume for MS/MSD
~~GW13-EB-01~~			~~Water~~	~~X~~		~~1~~	
~~GW13-EB-02~~			~~Water~~	~~X~~		~~1~~	
~~GW13-EB-03~~			~~Water~~	~~X~~		~~1~~	
					TOTAL NUMBER OF CONTAINERS	~~33~~ 6	

MS 3/26/13

Signatures		Date/Time
Sampled by	Roger D Lucid	
Relinquished by	Roger D Lucid	3-26-13/1730
Received by	Bettina Bennett	3/27/13 1050
Relinquished by		
Received by		

Shipping Details
Method of shipment:
Shipping Company:
On ice: yes / no:
Airbill No.:
Shipping Date:

Special Instructions:

Report Copy to:
Ruth Siegmund
ruth.siegmund@e2.com

1300216

E2 Consulting Engineers, Inc.

CHAIN OF CUSTODY RECORD: UHGW_V001 0.5°C

2013 March Groundwater

Project Name: United Heckathorn
Project Number: 43378
Project Manager:
Sample Manager:
Cell Number:
Fax/Email:

Container: 1 L Amber Glass
Preservatives: 4C (+-2C)
Filtered: n
Holding Time: 7 Days

Ship To:
Vista Analytical Laboratory
1104 Windfield Way
El Dorado Hills, CA 95762
916-673-1520
Sample Receiving

SAMPLE ID	DATE	TIME	Matrix	Pesticides (E1699)	Number of Containers	COMMENTS
GW13-05-0001	3/21/13	1200	GW	X	1	
GW13-05-0001F	3/21/13	1200	GW	X	1	Filter on Receipt
GW13-06-0001	3/21/13	1334	GW	X	1	
GW13-06-0001F	3/21/13	1334	GW	X	1	Filter on Receipt
GW13-07-0001			GW	X	1	
GW13-07-0001F			GW	X	1	Filter on Receipt
GW13-93-0001			GW	X	1	
GW13-93-0001F			GW	X	1	Filter on Receipt
GW13-08-0001			GW	X	1	
GW13-08-0001F			GW	X	1	Filter on Receipt
GW13-09-0001			GW	X	1	
GW13-09-0001F			GW	X	1	Filter on Receipt
				TOTAL NUMBER OF CONTAINERS	~~33~~ 4	

J Franck 3/21/13

Signatures		Date/Time
Sampled by		
Relinquished by	Jamaica Franck	3/21/13 1700
Received by		
Relinquished by		
Received by	Kathryn Benedict	3/22/13 0935

Shipping Details
Method of shipment: fedex priority overnite
Shipping Company:
On ice: yes / no:
Airbill No.:
Shipping Date: 3/21/13

Special Instructions:

Report Copy to:
Ruth Siegmund
ruth.siegmund@e2.com

1300221 0.9°C 2.1°C 0.8°C

E2 Consulting Engineers, Inc.

CHAIN OF CUSTODY RECORD: UHGW_V001

2013 March Groundwater

Project Name: United Heckathorn
Project Number: 43378
Project Manager:
Sample Manager:
Cell Number:
Fax/Email:

Container: 1 L Amber Glass
Preservatives: 4C (+-2C)
Filtered: n
Holding Time: 7 Days

Ship To:
Vista Analytical Laboratory
1104 Windfield Way
El Dorado Hills, CA 95762
916-673-1520
Sample Receiving

SAMPLE ID	DATE	TIME	Matrix	Pesticides (E1699)	Number of Containers	COMMENTS
~~GW13-05-0001~~			~~GW~~		~~1~~	
~~GW13-05-0001F~~			~~GW~~	~~X~~	~~1~~	~~Filter on Receipt~~
~~GW13-06-0001~~			~~GW~~		~~1~~	
~~GW13-06-0001F~~			~~GW~~	~~X~~	~~1~~	~~Filter on Receipt~~
GW13-07-0001	3/22/13	0745	GW	X	1	
GW13-07-0001F	3/22/13	0745	GW	X	1	Filter on Receipt
GW13-93-0001	3/22/13	0815	GW	X	1	
GW13-93-0001F	3/22/13	0815	GW	X	1	Filter on Receipt
GW13-08-0001	3/22/13	1030	GW	X	1	
GW13-08-0001F	3/22/13	1030	GW	X	1	Filter on Receipt
GW13-09-0001	3/22/13	0945	GW	X	1	
GW13-09-0001F	3/22/13	0945	GW	X	1	Filter on Receipt
				TOTAL NUMBER OF CONTAINERS	~~33~~ 8	

	Signatures	Date/Time
Sampled by	Roger D Lunt	
Relinquished by		3-22-13/1730
Received by		
Relinquished by		
Received by		

Shipping Details

Method of shipment:
Shipping Company:
On ice: yes / no:
Airbill No.:
Shipping Date:

Special Instructions:

Report Copy to:
Ruth Siegmund
ruth.siegmund@e2.com

1300221

0.9°C
2.1°C
0.8°C

E2 Consulting Engineers, Inc.

CHAIN OF CUSTODY RECORD: UHGW_V001

2013 March Groundwater

Project Name: United Heckathorn
Project Number: 43378
Project Manager:
Sample Manager:
Cell Number:
Fax/Email:

Container: 1 L Amber Glass
Preservatives: 4C (+-2C)
Filtered: n
Holding Time: 7 Days

Ship To:
Vista Analytical Laboratory
1104 Windfield Way
El Dorado Hills, CA 95762
916-673-1520
Sample Receiving

SAMPLE ID	DATE	TIME	Matrix	Pesticides (E1699)		Number of Containers	COMMENTS
GW13-10-0001	3/22/13	1210	GW	X		1	
GW13-10-0001F	3/22/13	1210	GW	X		1	Filter on Receipt
GW13-11-0001	3/22/13	1245	GW	X		1	
GW13-11-0001F	3/22/13	1245	GW	X		1	Filter on Receipt
GW13-12-0001	3/22/13	1330	GW	X		1	
GW13-12-0001F	3/22/13	1330	GW	X		1	Filter on Receipt
GW13-13-0001	3/22/13	1115	GW	X		1	
GW13-13-0001F	3/22/13	1115	GW	X		1	Filter on Receipt
GW13-14-0001	3/22/13	1030	GW	X		1	
GW13-14-0001F	3/22/13	1030	GW	X		1	Filter on Receipt
~~MW13-01-0001~~			~~GW~~	~~X~~	GS	1	
~~MW13-01-0001F~~			~~GW~~	~~X~~		1	Filter on Receipt
					TOTAL NUMBER OF CONTAINERS	~~33~~ 10	

	Signatures	Date/Time
Sampled by		
Relinquished by	Roger D Lunif	3-22-13/1730
Received by		
Relinquished by		
Received by		

Shipping Details

Method of shipment:
Shipping Company:
On ice: yes / no:
Airbill No.:
Shipping Date:

Special Instructions:

Report Copy to:
Ruth Siegmund
ruth.siegmund@e2.com

E2 Consulting Engineers, Inc.

CHAIN OF CUSTODY RECORD: UHGW_V001

2013 March Groundwater

1300209

0.6°C

Project Name: United Heckathorn
Project Number: 43378
Project Manager:
Sample Manager:
Cell Number:
Fax/Email:

Container:	1 L Amber Glass
Preservatives:	4C (+-2C)
Filtered:	n
Holding Time	7 Days

Ship To:
Vista Analytical Laboratory
1104 Windfield Way
El Dorado Hills, CA 95762
916-673-1520
Sample Receiving

SAMPLE ID	DATE	TIME	Matrix	Pesticides (E1699)		Number of Containers	COMMENTS
~~MW13-03-0001~~			GW	X	TF 3/20/13	~~3~~	Additional volume for MS/MSD
~~MW13-03-0001F~~			GW	X		~~3~~	Filter on Receipt, Additional volume for MS/MSD
GW13-EB-01	3.18.13	1630	Water	X		1	
GW13-EB-02	3.19.13	1700	Water	X		1	
~~GW13-EB-03~~			Water	X	TF 3/20/13	~~1~~	
					TOTAL NUMBER OF CONTAINERS	~~33~~ 2	

Signatures		Date/Time
Sampled by		
Relinquished by	[illegible]	3/20/13 1600
Received by	[illegible]	3/21/13 0908
Relinquished by		
Received by		

Shipping Details

Method of shipment: priority overnight
Shipping Company: fedex
On ice: yes / no:
Airbill No.:
Shipping Date:

Special Instructions:

Report Copy to:
Ruth Siegmund
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#1300221 0.9°C 2.1°C 0.8°C

E2 Consulting Engineers, Inc.

CHAIN OF CUSTODY RECORD: UHGW_V001

2013 March Groundwater

Project Name: United Heckathorn
Project Number: 43378
Project Manager:
Sample Manager:
Cell Number:
Fax/Email:

Container: 1 L Amber Glass
Preservatives: 4C (+-2C)
Filtered: n
Holding Time: 7 Days

Ship To:
Vista Analytical Laboratory
1104 Windfield Way
El Dorado Hills, CA 95762
916-673-1520
Sample Receiving

SAMPLE ID	DATE	TIME	Matrix	Pesticides (E1699)	Number of Containers	COMMENTS
~~MW13-03-0001~~			~~GW~~	~~X~~	~~3~~	Additional volume for MS/MSD
~~MW13-03-0001F~~			~~GW~~	~~X~~	~~3~~	Filter on Receipt, Additional volume for MS/MSD
~~GW13-EB-01~~			~~Water~~	~~X~~	~~1~~	
~~GW13-EB-02~~			~~Water~~	~~X~~	~~1~~	
~~GW13-EB-03~~			~~Water~~	~~X~~	~~1~~	
GW13-EB-03	3-20-13	1700	Water	X	1	
GW13-EB-04	3-22-13	1700	Water	X	1	
GW13-EB-05	3-22-13	1800	Water	X	1	
				TOTAL NUMBER OF CONTAINERS	~~33~~ 3	

	Signatures	Date/Time
Sampled by		
Relinquished by	[signature]	3-22-13/1730
Received by		
Relinquished by		
Received by		

Shipping Details

Method of shipment:
Shipping Company:
On ice: yes / no:
Airbill No.:
Shipping Date:

Special Instructions:

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Summary of Field Activities
Tier 1 Sediment Transport Study
United Heckathorn Superfund Site, Richmond, California

PREPARED FOR:	United States Environmental Protection Agency Region 9
PREPARED BY:	CH2M HILL
DATE:	January 4, 2013
PROJECT NUMBER:	USEPA CONTRACT NO. EP-S9-08-04 USEPA WORK ASSIGNMENT NO. 025-RIFS-09R3 CH2M HILL PROJECT NO. 385441

Background

In December 2012, high-resolution multibeam bathymetric and side-scan sonar surveys were performed at the United Heckathorn Site in Richmond, California in accordance with the *Preliminary Draft Tier 1 Sediment Transport Study Sampling and Analysis Plan* (SAP) (CH2M HILL, 2012). The results of the surveys will be incorporated into the Tier 1 Sediment Transport Study.

Survey Activities

Bathymetric and side-scan sonar surveys were conducted in the Lauritzen Channel and a portion of the Santa Fe Channel (near the mouth of the Lauritzen Channel). Mr. Ken Israel and Mr. Mike Stecher of Sea Engineering, Inc. (SEI) mobilized to the site on December 3, 2012 to prepare the survey vessel and set up the real-time kinematic global positioning system (RTK GPS) base station for the survey. The base station was set up at the Auto Warehouse location (identified as BM1) following approval from Mr. Michael Williams at the Port of Richmond, and Mr. Jeremy Maxwell, the Operations Manager at the Auto Warehousing Company in Richmond, California. SEI met with CH2M HILL on December 4, 2012 to conduct the surveys. The weather on the day of the survey was overcast and the water within the Lauritzen Channel was calm. No vessels were present in any of the Levin-Richmond Terminal Corporation berths on the eastern side of the Lauritzen Channel. Additionally, Manson Construction Co. had moved all but a few barges from the western side of the Lauritzen Channel. A photographic log of the field activities is provided in Attachment 1.

The survey vessel was a 25-foot diesel, jet-propelled, aluminum-hulled boat owned by SEI. The survey equipment was pole-mounted on the survey vessel. Both surveys used high-accuracy, dual frequency, real-time kinematic GPS (RTK-GPS) for precise horizontal and vertical positioning (accuracy within a few centimeters, which is the current limit of the RTK-GPS positioning technology).

Bathymetric Survey

The high-resolution multibeam bathymetric survey was conducted to define detailed bathymetric contours and morphology of the bed surface. The survey was run along the shore-parallel depth contours, progressing in an offshore to onshore direction with each pass.

Sonar equipment was comprised of a high-frequency, high-resolution multi-beam Reson 7125 sonar with wide swath width (approximately 160 degrees). The sonar was paired with a POS MV Wavemaster motion reference unit (MRU) which measured vessel motion (pitch, roll, heave) and heading, and an RTK-GPS. An Odom Digibar Pro sound velocitysensor was used to measure the speed of sound in the water column during the surveying for proper correction of acoustic signals. The surveys were performed in accordance with the U.S. Army Corps of Engineers Hydrographic Surveying manual, EM 1110-2-1003 (USACE, 2004). Bathymetric elevations were surveyed to accuracies of less than 0.2 feet in the vertical and horizontal.

Side-Scan Sonar Survey

A dual-frequency side-scan sonar survey was performed to provide an aerial view of the channel bottom relief, and allow identification of flat bottom areas and debris. Transects provided 200 percent bottom coverage to ensure the best possible mosaic of all side scan imagery in the survey area.

A dual-frequency CMAX CM2 side-scan sonar was used to conduct the survey. The CM2 is a 325/780 kHz sonar with user-selectable swath ranges up to 150 meters per side. The towfish was pulled behind the vessel by a cable secured through an onboard davit.

Findings

The results of the surveys will be presented in January 2013 as a supplement to this memo. The survey information will be used in the Tier 1 Sediment Transport study.

References

CH2M HILL. 2012. *Preliminary Draft. Preliminary Draft Tier 1 Sediment Transport Study Sampling and Analysis Plan, United Heckathorn Superfund Site, Richmond, California.* November.

United States Army Corps of Engineers (USACE). 2004. Hydrographic Surveying. EM 1110 2-1003 31. April. Online: http://140.194.76.129/publications/eng-manuals/EM_1110-2-1003_pfl/toc.htm

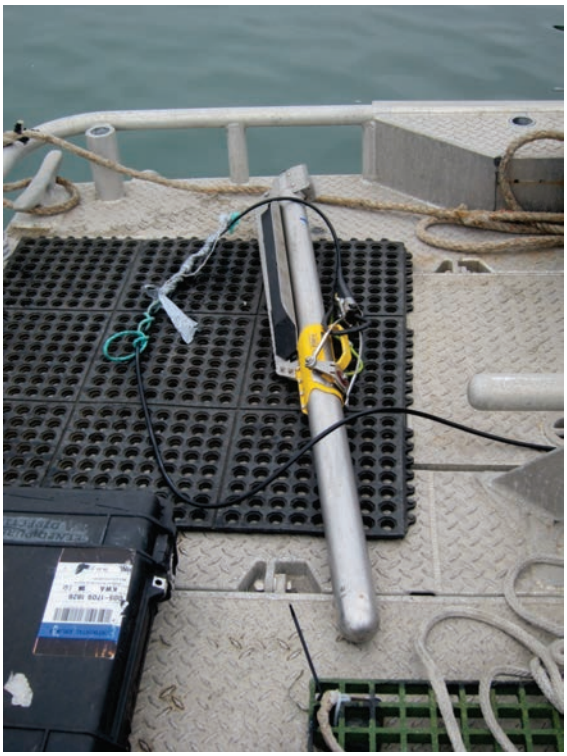
Attachment 1
Photograph Log

Photograph 1: View of SEI's survey boat.

Photograph 2: View of SEI attaching GPS unit to multibeam survey equipment.

Photograph 3: View of SEI lowering side-scan survey equipment into the channel.

Photograph 4: View of RTK-GPS unit on boat.



Photograph 4: View of side-scan survey equipment on boat.

Photograph 5: View of multibeam survey equipment in water