Cleath-Harris Geologists, Inc.
11545 Los Osos Valley Road, Suite C-3
San Luis Obispo, California 93405
(805) 543-1413

Technical Memorandum

Date: September 27, 2012

From: Spencer Harris, HG 633

To: Karl Hadler, P.E., Carollo Engineers

SUBJECT: Hydrogeologic Survey of Los Osos Water Recycling Facility Site

This memorandum summarizes the subsurface hydrogeology of the Los Osos Water Recycling Facility (LOWRF) site, based on available information. The purpose of this memorandum is to provide an interpretation of groundwater conditions to facilitate development of a potable water supply for future LOWRF operations.

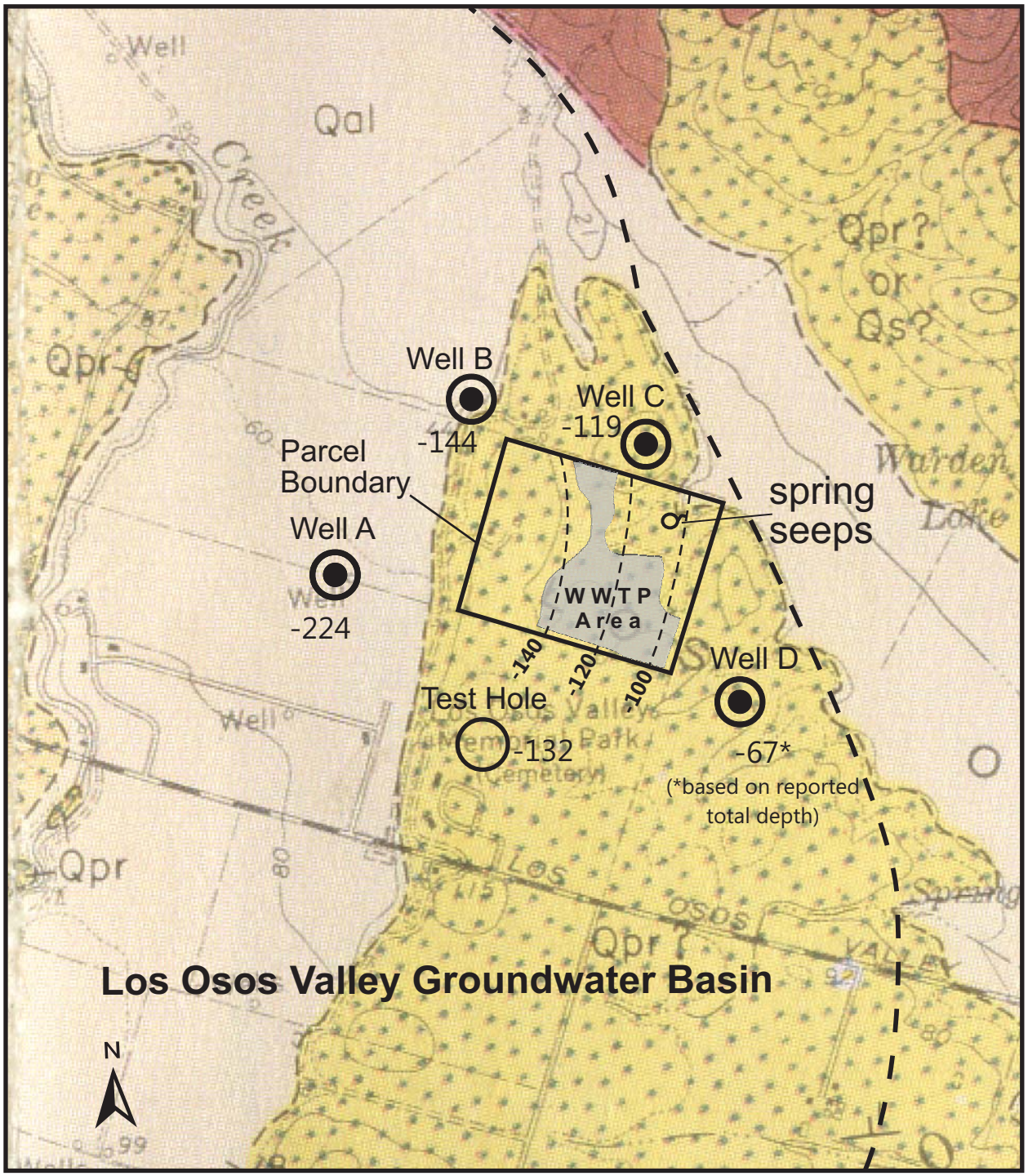
Site Location

The LOWRF site is located at the eastern edge of the Los Osos Valley groundwater basin. Setbacks from environmentally sensitive habitat restrict site development to an irregular footprint on the parcel (Figure 1). Ground surface elevations within the footprint range from approximately 65 to 85 feet above mean sea level.

Site Hydrogeology

Two geotechnical investigations were performed at the site and on adjacent properties to the south and east (Fugro, 2004, 2007). These investigations included cone penetrometer test (CPT) borings that were advanced to depths of up to 100 feet (most were 50 feet or less), and included water level soundings. In addition to the CPT logs, available information on private wells and one deep test hole surrounding the LOWRF site was reviewed.

The geotechnical investigations concluded the Giacomazzi site is underlain by Paso Robles Formation clay, sands and gravels through the total depth of investigation. Information from off-site well logs and regional studies indicate that beneath the Paso Robles Formation are marine sands and sandstone associated with the Careaga Formation (no surface outcrops), and Franciscan Formation metavolcanics. The Paso Robles and Careaga Formations are considered water-bearing (permeable) sediments and part of the Los Osos Valley groundwater basin. The LOWRF site overlies the basin's lower aquifer.



Scale: 1" = 1000'

Map Geology:
C.A. Hall, Jr., et al, 1979
Geologic Map of the
San Luis Obispo-
San Simeon Region,
California
U.S.G.S. Map I-1097

Legend:
Qal - alluvial deposits
Qs - dune sand
Qpr - Paso Robles Fm
Kjfmv - Franciscan Fm
metavolcanics

Approximate Basin Limits

Interpreted Base of
Permeable Sediments
(elevation contour in feet) -140

Data point with interpreted
base of permeable sediments
(elevation in feet) Well A -224

Figure 1

Base of Permeable Sediments
LOWRF Site
San Luis Obispo County

Cleath-Harris Geologists

Off-site well information was used to map elevation contours on the base of permeable sediments beneath the site (Figure 1). Bedrock appears to rise approximately 40 feet across the LOWRF area footprint, from approximately 220 feet below ground surface (-140 feet elevation) on the west side to 180 feet below ground surface (-100 feet elevation) on the east side. Well logs and one electric log indicate that there is an aquifer zone approximately 20 feet thick overlying bedrock. Other shallower aquifers may also be present.

Groundwater levels from on-site CPT boreholes ranged from 35 to 48 feet below ground surface (estimated groundwater elevations of 45-48 feet above mean sea level). These elevations are consistent with the spring seeps elevation at the northeast corner of the parcel. The direction of shallow groundwater flow beneath the site is interpreted to be to the northeast, toward Warden Lake, based on the spring seeps.

Well A is deeper and more productive than the other wells shown on Figure 1. A step drawdown test was conducted at Well A in 2006 (Ripley, 2006), at rates of 100, 200 and 300 gpm. The transmissivity of the lower aquifer at this location was estimated to be 3,400 gallons per day per foot, with a hydraulic conductivity of 40 gallons per day per square foot (5.3 feet per day). By comparison, a yield of 40 gpm was reported on the well completion report for Well B based on air-lift testing, a yield of 50 gpm was reported on the well completion report for Well C based on air-lift testing, and the pumping rate at Well D is reportedly 15-20 gpm (no well completion report; flow rate and total depth only).

Saturated ground and standing surface water with no visible flow was observed in the northeast drainage. The electrical conductivity (EC) of the pools in this drainage was measured at 5,600 µmhos/cm during site reconnaissance. This EC exceeds the secondary California maximum contaminant level (MCL) for drinking water of 1,600 µmhos/cm. The source of elevated EC is unknown and may be due in part to evaporation. The elevated EC in the surface pools does not necessarily indicate that a lower aquifer groundwater well at the site would experience similar elevated mineralization. Nevertheless, some level of treatment for the LOWRF facilities source water may be expected, based on a water quality at nearby Well D.

Groundwater samples were collected at Well D for water quality analyses on September 18, 2012. The water has a sodium-magnesium chloride-bicarbonate character with a total dissolved solids concentration of 820 mg/l and no reported nitrate. Constituents tested with concentrations that exceed the secondary MCL standards include electrical conductivity (reported at 1,650 µmhos/cm), manganese (reported at 530 µg/l), and odor (reported Threshold Odor Number of 8). A mild hydrogen sulfide odor was noted during sampling. The iron concentration was also reported at the secondary MCL of 300 µg/l (see attached laboratory analytical report for all results and MCL concentrations). Well D is approximately 600 feet east of the LOWRF site, and for planning purposes should be considered representative of groundwater quality beneath the site.

References

Fugro, 2004, "Technical Memorandum, Summary of Preliminary Geotechnical Input, Andres Site, Los Osos Wastewater Project, Los Osos Community Services District, San Luis Obispo County, California," dated June 24.

Fugro, 2007, "Preliminary Geotechnical Report, Los Osos Waterwater Project, Los Osos Mortuary, Giacomazzi, and Branin properties, San Luis Obispo County, California," dated July 17.

Hall, C.A., Ernst, W.G., Prior, S.W., and Weise, J.W. ,1979, *Geologic Map of the San Luis Obispo-San Simeon Region, California*, United States Geologic Survey MAP I-1097.

Ripley-Pacific, 2006, Los Osos Wastewater Management Plan Update, Technical Memorandum #3, "Groundwater Conditions in the East Part of the Los Osos Valley Groundwater Basin", dated July 10.

ATTACHMENT

Laboratory Analytical Report - WELL D

September 26, 2012

Cleath-Harris Geologists
11545 Los Osos Valley Road
San Luis Obispo, CA 93405

Lab ID : CC 1282930
Customer : 8-514

Laboratory Report

Introduction: This report package contains total of 10 pages divided into 3 sections:

Case Narrative	(3 pages)	: An overview of the work performed at FGL.
Sample Results	(2 pages)	: Results for each sample submitted.
Quality Control	(5 pages)	: Supporting Quality Control (QC) results.

Case Narrative

This Case Narrative pertains to the following samples:

Sample Description	Date Sampled	Date Received	FGL Lab ID #	Matrix
Andre Domestic Well (WELL D)	09/18/2012	09/18/2012	CC 1282930-001	DW

Sampling and Receipt Information: The sample was received, prepared and analyzed within the method specified holding except those as listed in the table below. The holding time for Fluoride, pH are listed as immediate. Logistically this is very difficult to obtain. FGL policy is to analyze all samples requiring Fluoride, pH on the same day of receipt at the laboratory. If this presents any problem please call.

Lab ID	Analyte/Method	Required Holding Time	Actual Holding Time
CC 1282930-001	pH	15	1390.8 Minutes

All samples arrived on ice. All samples were checked for pH if acid or base preservation is required (except for VOAs). For details of sample receipt information, please see the attached Chain of Custody and Condition Upon Receipt Form.

Quality Control: All samples were prepared and analyzed according to the following tables:

Inorganic - Metals QC

200.7	09/20/2012:213904 All analysis quality controls are within established criteria.
	09/20/2012:210489 All preparation quality controls are within established criteria.
200.8	09/20/2012:213907 All analysis quality controls are within established criteria.

Corporate Offices & Laboratory
853 Corporation Street
Santa Paula, CA 93060
TEL: (805)392-2000
Env FAX: (805)525-4172 / Ag FAX: (805)392-2063
CA NELAP Certification No. 01110CA

Office & Laboratory
2500 Stagecoach Road
Stockton, CA 95215
TEL: (209)942-0182
FAX: (209)942-0423
CA ELAP Certification No. 1563

Office & Laboratory
563 E. Lindo Avenue
Chico, CA 95926
TEL: (530)343-5818
FAX: (530)343-3807
CA ELAP Certification No. 2670

Office & Laboratory
3442 Empresa Drive, Suite D
San Luis Obispo, CA 93401
TEL: (805)783-2940
FAX: (805)525-4172
CA ELAP Certification No. 2775

Field Office
Visalia, California
TEL: (559)734-9473
Mobile: (559)737-2399
FAX: (559)734-8435

September 26, 2012 | Lab ID : CC 1282930
Cleath-Harris Geologists | Customer : 8-514

Inorganic - Metals QC

200.8	09/20/2012:210495 All preparation quality controls are within established criteria, except: The following note applies to Lead: 435 Sample matrix may be affecting this analyte. Data was accepted based on the LCS or CCV recovery.
245.1	09/20/2012:213906 All analysis quality controls are within established criteria.
	09/20/2012:210493 All preparation quality controls are within established criteria.

Inorganic - Wet Chemistry QC

2120B	09/19/2012:213799 All analysis quality controls are within established criteria.
	09/19/2012:210444 All preparation quality controls are within established criteria.
2130B	09/20/2012:214096 All analysis quality controls are within established criteria.
	09/20/2012:210647 All preparation quality controls are within established criteria.
2150B	09/19/2012:210446 All preparation quality controls are within established criteria.
2320B	09/20/2012:213773 All analysis quality controls are within established criteria.
	09/20/2012:210461 All preparation quality controls are within established criteria.
2510B	09/19/2012:213811 All analysis quality controls are within established criteria.
	09/19/2012:210431 All preparation quality controls are within established criteria.
2540CE	09/20/2012:210488 All preparation quality controls are within established criteria.
300.0	09/20/2012:213832 All analysis quality controls are within established criteria.
	09/19/2012:210466 All preparation quality controls are within established criteria.
4500-H B	09/19/2012:210447 All preparation quality controls are within established criteria.
4500HB	09/19/2012:213804 All analysis quality controls are within established criteria.
5540C	09/19/2012:213820 All analysis quality controls are within established criteria.
	09/19/2012:210459 All preparation quality controls are within established criteria.

September 26, 2012 Lab ID : CC 1282930
Cleath-Harris Geologists Customer : 8-514

Certification:: I certify that this data package is in compliance with NELAC standards, both technically and for completeness, except for any conditions listed above. Release of the data contained in this data package is authorized by the Laboratory Director or his designee, as verified by the following electronic signature.

KD:DMB

Approved By **Kelly A. Dunnahoo, B.S.** Digitally signed by Kelly A. Dunnahoo, B.S.
Title: Laboratory Director
Date: 2012-09-26

September 26, 2012

Lab ID : CC 1282930-001
Customer ID : 8-514

Cleath-Harris Geologists
11545 Los Osos Valley Road
San Luis Obispo, CA 93405

Sampled On : September 18, 2012-15:17
Sampled By : Spencer Harris
Received On : September 18, 2012-16:03
Matrix : Drinking Water

Description : Andre Domestic Well (WELL D)
Project : LOWRF Hydrogelogic Survey

Sample Result - Inorganic

Constituent	Result	PQL	Units	MCL/AL	Sample Preparation Method	Sample Preparation Date/ID	Sample Analysis Method	Sample Analysis Date/ID
General Mineral[P:1'4]								
Total Hardness as CaCO3	371	2.5	mg/L		200.7	09/20/12:210489	200.7	09/20/12:213904
Calcium	58	1	mg/L		200.7	09/20/12:210489	200.7	09/20/12:213904
Magnesium	55	1	mg/L		200.7	09/20/12:210489	200.7	09/20/12:213904
Potassium	3	1	mg/L		200.7	09/20/12:210489	200.7	09/20/12:213904
Sodium	169	1	mg/L		200.7	09/20/12:210489	200.7	09/20/12:213904
Total Cations	14.8	0.1	meq/L		200.7	09/20/12:210489	200.7	09/20/12:213904
Boron	0.3	0.1	mg/L		200.7	09/20/12:210489	200.7	09/20/12:213904
Copper	ND	10	ug/L	1000[2]	200.7	09/20/12:210489	200.7	09/20/12:213904
Iron	300	50	ug/L	300[2]	200.7	09/20/12:210489	200.7	09/20/12:213904
Manganese	530	10	ug/L	50[2]	200.7	09/20/12:210489	200.7	09/20/12:213904
Zinc	ND	20	ug/L		200.7	09/20/12:210489	200.7	09/20/12:213904
SAR	3.8	0.1	--		200.7	09/20/12:210489	200.7	09/20/12:213904
Total Alkalinity (as CaCO3)	380	10	mg/L		2320B	09/20/12:210461	2320B	09/20/12:213773
Hydroxide	ND	10	mg/L		2320B	09/20/12:210461	2320B	09/20/12:213773
Carbonate	ND	10	mg/L		2320B	09/20/12:210461	2320B	09/20/12:213773
Bicarbonate	470	10	mg/L		2320B	09/20/12:210461	2320B	09/20/12:213773
Sulfate	ND	2	mg/L	500[2]	300.0	09/19/12:210466	300.0	09/20/12:213832
Chloride	309	5*	mg/L	500[2]	300.0	09/19/12:210466	300.0	09/20/12:213832
Nitrate	ND	0.4	mg/L	45	300.0	09/19/12:210466	300.0	09/20/12:213832
Nitrite as N	ND	0.1	mg/L	1	300.0	09/19/12:210466	300.0	09/20/12:213832
Nitrate + Nitrite as N	ND	0.1	mg/L	10	300.0	09/19/12:210466	300.0	09/20/12:213832
Fluoride	ND	0.1	mg/L	2	300.0	09/19/12:210466	300.0	09/20/12:213832
Total Anions	16.4	0.1	meq/L		2320B	09/20/12:210461	2320B	09/20/12:213773
pH	7.3	--	units		4500-H B	09/19/12:210447	4500HB	09/19/12:213804
Specific Conductance	1650	1	umhos/cm	1600[2]	2510B	09/19/12:210431	2510B	09/19/12:213811
Total Dissolved Solids	820	20	mg/L	1000[2]	2540CE	09/20/12:210488	2540C	09/21/12:213938
MBAS Extraction	ND	0.1	mg/L	0.5[2]	5540C	09/19/12:210459	5540C	09/19/12:213820
Aggressiveness Index	12.0	1	--		4500-H B	09/19/12:210447	4500HB	09/19/12:213804
Langlier Index (20°C)	0.1	1	--		4500-H B	09/19/12:210447	4500HB	09/19/12:213804
Metals, Total[P:1'5]								
Aluminum	ND	10	ug/L	1000	200.8	09/20/12:210495	200.8	09/20/12:213907
Antimony	ND	1	ug/L	6	200.8	09/20/12:210495	200.8	09/20/12:213907
Arsenic	4	2	ug/L	10	200.8	09/20/12:210495	200.8	09/20/12:213907
Barium	170	0.2	ug/L	1000	200.8	09/20/12:210495	200.8	09/20/12:213907
Beryllium	ND	1	ug/L	4	200.8	09/20/12:210495	200.8	09/20/12:213907

Corporate Offices & Laboratory
853 Corporation Street
Santa Paula, CA 93060
TEL: (805)392-2000
Env FAX: (805)525-4172 / Ag FAX: (805)392-2063
CA NELAP Certification No. 01110CA

Office & Laboratory
2500 Stagecoach Road
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TEL: (209)942-0182
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CA ELAP Certification No. 1563

Office & Laboratory
563 E. Lindo Avenue
Chico, CA 95926
TEL: (530)343-5818
FAX: (530)343-3807
CA ELAP Certification No. 2670

Office & Laboratory
3442 Empresa Drive, Suite D
San Luis Obispo, CA 93401
TEL: (805)783-2940
FAX: (805)525-4172
CA ELAP Certification No. 2775

Field Office
Visalia, California
TEL: (559)734-9473
Mobile: (559)737-2399
FAX: (559)734-8435

September 26, 2012 Lab ID : CC 1282930-001
Description : Andre Domestic Well (WELL D) Customer ID : 8-514

Sample Result - Inorganic

Constituent	Result	PQL	Units	MCL/AL	Sample Preparation		Sample Analysis	
					Method	Date/ID	Method	Date/ID
Metals, Total[P:1'5]								
Boron	0.32	0.02	mg/L		200.8	09/20/12:210495	200.8	09/20/12:213907
Cadmium	ND	0.2	ug/L	5	200.8	09/20/12:210495	200.8	09/20/12:213907
Chromium	2	1	ug/L	50	200.8	09/20/12:210495	200.8	09/20/12:213907
Lead	ND	0.2	ug/L	15	200.8	09/20/12:210495	200.8	09/20/12:213907
Mercury	ND	0.02	ug/L	2	245.1	09/20/12:210493	245.1	09/20/12:213906
Nickel	ND	1	ug/L	100	200.8	09/20/12:210495	200.8	09/20/12:213907
Selenium	2	2	ug/L	50	200.8	09/20/12:210495	200.8	09/20/12:213907
Silver	ND	1	ug/L	100[2]	200.8	09/20/12:210495	200.8	09/20/12:213907
Thallium	ND	0.2	ug/L	2	200.8	09/20/12:210495	200.8	09/20/12:213907
Vanadium	ND	2	ug/L		200.8	09/20/12:210495	200.8	09/20/12:213907
Wet Chemistry[AGT:1]								
Color	ND	5	units	15	2120B	09/19/12:210444	2120B	09/19/12:213799
Odor	8	1	TON	3	2150B	09/19/12:210446	2150B	09/19/12:213803
Turbidity	1.9	0.2	NTU	5	2130B	09/20/12:210647	2130B	09/20/12:214096

ND=Non-Detected. PQL=Practical Quantitation Limit. Containers: (AGT) Amber Glass TFE-Cap, (P) Plastic Preservatives: H2SO4 pH < 2, HNO3 pH < 2
‡Surrogate. * PQL adjusted for dilution.
MCL = Maximum Contamination Level. 2 - Secondary Standard. 3 - CDPH Notification Level. AL = Regulatory Action Level.

September 26, 2012 Lab ID : CC 1282930
Cleath-Harris Geologists Customer : 8-514

Quality Control - Inorganic

Constituent	Method	Date/ID	Type	Units	Conc.	QC Data	DQO	Note
Metals								
Boron	200.7	(SP 1209567-001)	MS	mg/L	4.000	89.5 %	75-125	
			MSD	mg/L	4.000	90.8 %	75-125	
			MSRPD	mg/L	798.8	1.3%	≤20.0	
	200.7	09/20/12:213904AC	CCV	ppm	5.000	94.5 %	90-110	
			CCB	ppm		0.046	0.10	
			CCV	ppm	5.000	95.6 %	90-110	
			CCB	ppm		0.020	0.10	
Calcium	200.7	(SP 1209567-001)	MS	mg/L	12.00	89.7 %	75-125	
			MSD	mg/L	12.00	68.7 %	<¼	
			MSRPD	mg/L	798.8	1.9%	≤20.0	
	200.7	09/20/12:213904AC	CCV	ppm	25.00	94.7 %	90-110	
			CCB	ppm		0.008	1.0	
			CCV	ppm	25.00	95.5 %	90-110	
			CCB	ppm		-0.001	1.0	
Copper	200.7	(SP 1209567-001)	MS	ug/L	800.0	95.2 %	75-125	
			MSD	ug/L	800.0	94.4 %	75-125	
			MSRPD	ug/L	798.8	0.9%	≤20.0	
	200.7	09/20/12:213904AC	CCV	ppm	1.000	95.4 %	90-110	
			CCB	ppm		-0.0004	0.01	
			CCV	ppm	1.000	96.2 %	90-110	
			CCB	ppm		-0.0003	0.01	
Iron	200.7	(SP 1209567-001)	MS	ug/L	3992	92.9 %	75-125	
			MSD	ug/L	3992	92.2 %	75-125	
			MSRPD	ug/L	798.8	0.7%	≤20.0	
	200.7	09/20/12:213904AC	CCV	ppm	5.000	94.6 %	90-110	
			CCB	ppm		0.0016	0.05	
			CCV	ppm	5.000	95.4 %	90-110	
			CCB	ppm		0.0005	0.05	
Magnesium	200.7	(SP 1209567-001)	MS	mg/L	12.00	99.1 %	75-125	
			MSD	mg/L	12.00	88.9 %	75-125	
			MSRPD	mg/L	798.8	2.0%	≤20.0	
	200.7	09/20/12:213904AC	CCV	ppm	25.00	96.8 %	90-110	
			CCB	ppm		0.003	1.0	
			CCV	ppm	25.00	97.6 %	90-110	
			CCB	ppm		0.007	1.0	
Manganese	200.7	(SP 1209567-001)	MS	ug/L	800.0	93.6 %	75-125	
			MSD	ug/L	800.0	92.7 %	75-125	
			MSRPD	ug/L	798.8	1.0%	≤20.0	
	200.7	09/20/12:213904AC	CCV	ppm	1.000	95.0 %	90-110	
			CCB	ppm		0.00003	0.01	
			CCV	ppm	1.000	95.4 %	90-110	
			CCB	ppm		0.00003	0.01	
Potassium	200.7	(SP 1209567-001)	MS	mg/L	12.00	106 %	75-125	
			MSD	mg/L	12.00	104 %	75-125	
			MSRPD	mg/L	798.8	1.3%	≤20.0	
	200.7	09/20/12:213904AC	CCV	ppm	25.00	95.2 %	90-110	
			CCB	ppm		-0.12	1.0	
			CCV	ppm	25.00	95.8 %	90-110	
			CCB	ppm		-0.11	1.0	
Sodium	200.7	(SP 1209567-001)	MS	mg/L	12.00	120 %	75-125	
			MSD	mg/L	12.00	81.1 %	75-125	
			MSRPD	mg/L	798.8	3.0%	≤20.0	
	200.7	09/20/12:213904AC	CCV	ppm	25.00	96.1 %	90-110	
			CCB	ppm		0.02	1.0	
			CCV	ppm	25.00	96.9 %	90-110	

Corporate Offices & Laboratory
853 Corporation Street
Santa Paula, CA 93060
TEL: (805)392-2000
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September 26, 2012 Lab ID : CC 1282930
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Quality Control - Inorganic

Constituent	Method	Date/ID	Type	Units	Conc.	QC Data	DQO	Note
Metals								
Sodium	200.7	09/20/12:213904AC	CCB	ppm		0.11	1.0	
Zinc	200.7		MS	ug/L	800.0	91.1 %	75-125	
		(SP 1209567-001)	MSD	ug/L	800.0	90.8 %	75-125	
			MSRPD	ug/L	798.8	0.4%	≤20.0	
	200.7	09/20/12:213904AC	CCV	ppm	1.000	93.0 %	90-110	
			CCB	ppm		-0.0002	0.02	
			CCV	ppm	1.000	93.8 %	90-110	
			CCB	ppm		0.0006	0.02	
Aluminum	200.8		MS	ug/L	24.98	99.9 %	75-125	
		(CC 1282943-001)	MSD	ug/L	24.98	99.5 %	75-125	
			MSRPD	ug/L	4.992	0.090	≤10	
	200.8	09/20/12:213907AC	CCV	ppb	120.0	95.9 %	90-110	
			CCB	ppb		-0.2	10	
			CCV	ppb	120.0	96.4 %	90-110	
			CCB	ppb		0.09	10	
Antimony	200.8		MS	ug/L	3.000	114 %	75-125	
		(CC 1282943-001)	MSD	ug/L	3.000	110 %	75-125	
			MSRPD	ug/L	4.992	0.12	≤1	
	200.8	09/20/12:213907AC	CCV	ppb	120.0	101 %	90-110	
			CCB	ppb		0.32	1	
			CCV	ppb	120.0	100 %	90-110	
			CCB	ppb		1.20	1	
Arsenic	200.8		MS	ug/L	5.000	111 %	75-125	
		(CC 1282943-001)	MSD	ug/L	5.000	106 %	75-125	
			MSRPD	ug/L	4.992	0.23	≤2	
	200.8	09/20/12:213907AC	CCV	ppb	120.0	98.0 %	90-110	
			CCB	ppb		-0.02	2	
			CCV	ppb	120.0	98.2 %	90-110	
			CCB	ppb		0.09	2	
Barium	200.8		MS	ug/L	4.990	111 %	75-125	
		(CC 1282943-001)	MSD	ug/L	4.990	105 %	75-125	
			MSRPD	ug/L	4.992	2.4%	≤20	
	200.8	09/20/12:213907AC	CCV	ppb	120.0	102 %	90-110	
			CCB	ppb		0.002	1	
			CCV	ppb	120.0	102 %	90-110	
			CCB	ppb		0.05	1	
Beryllium	200.8		MS	ug/L	5.018	102 %	75-125	
		(CC 1282943-001)	MSD	ug/L	5.018	97.4 %	75-125	
			MSRPD	ug/L	4.992	4.9%	≤20	
	200.8	09/20/12:213907AC	CCV	ppb	120.0	94.8 %	90-110	
			CCB	ppb		-0.002	0.2	
			CCV	ppb	120.0	96.4 %	90-110	
			CCB	ppb		0.029	0.2	
Boron	200.8		MS	ug/L	25.00	66.8 %	<¼	
		(CC 1282943-001)	MSD	ug/L	25.00	48.4 %	<¼	
			MSRPD	ug/L	4.992	2.6%	≤20	
	200.8	09/20/12:213907AC	CCV	ppb	120.0	100 %	90-110	
			CCB	ppb		0.3	20	
			CCV	ppb	120.0	101 %	90-110	
			CCB	ppb		1.9	20	
Cadmium	200.8		MS	ug/L	5.000	118 %	75-125	
		(CC 1282943-001)	MSD	ug/L	5.000	114 %	75-125	
			MSRPD	ug/L	4.992	3.3%	≤20	
	200.8	09/20/12:213907AC	CCV	ppb	120.0	100 %	90-110	

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Quality Control - Inorganic

Constituent	Method	Date/ID	Type	Units	Conc.	QC Data	DQO	Note
Metals								
Cadmium	200.8	09/20/12:213907AC	CCB	ppb		0.005	0.2	
			CCV	ppb	120.0	100 %	90-110	
			CCB	ppb		0.037	0.2	
Chromium	200.8		MS	ug/L	5.000	106 %	75-125	
		(CC 1282943-001)	MSD	ug/L	5.000	101 %	75-125	
			MSRPD	ug/L	4.992	4.1%	≤20	
	200.8	09/20/12:213907AC	CCV	ppb	120.0	99.0 %	90-110	
			CCB	ppb		0.004	1	
			CCV	ppb	120.0	99.0 %	90-110	
			CCB	ppb		0.04	1	
Lead	200.8		MS	ug/L	5.000	110 %	75-125	
		(CC 1282943-001)	MSD	ug/L	5.000	126 %	75-125	435
			MSRPD	ug/L	4.992	13.1%	≤20	
	200.8	09/20/12:213907AC	CCV	ppb	120.0	99.4 %	90-110	
			CCB	ppb		0.004	0.2	
			CCV	ppb	120.0	99.6 %	90-110	
			CCB	ppb		0.038	0.2	
Nickel	200.8		MS	ug/L	5.000	97.4 %	75-125	
		(CC 1282943-001)	MSD	ug/L	5.000	108 %	75-125	
			MSRPD	ug/L	4.992	8.9%	≤20	
	200.8	09/20/12:213907AC	CCV	ppb	120.0	94.5 %	90-110	
			CCB	ppb		0.02	1	
			CCV	ppb	120.0	94.3 %	90-110	
			CCB	ppb		0.04	1	
Selenium	200.8		MS	ug/L	4.998	114 %	75-125	
		(CC 1282943-001)	MSD	ug/L	4.998	110 %	75-125	
			MSRPD	ug/L	4.992	0.23	≤2	
	200.8	09/20/12:213907AC	CCV	ppb	120.0	97.9 %	90-110	
			CCB	ppb		0.1	2	
			CCV	ppb	120.0	98.0 %	90-110	
			CCB	ppb		0.19	2	
Silver	200.8		MS	ug/L	4.992	101 %	75-125	
		(CC 1282943-001)	MSD	ug/L	4.992	96.4 %	75-125	
			MSRPD	ug/L	4.992	0.23	≤1	
	200.8	09/20/12:213907AC	CCV	ppb	120.0	99.4 %	90-110	
			CCB	ppb		0.001	1	
			CCV	ppb	120.0	99.5 %	90-110	
			CCB	ppb		0.04	1	
Thallium	200.8		MS	ug/L	4.998	112 %	75-125	
		(CC 1282943-001)	MSD	ug/L	4.998	107 %	75-125	
			MSRPD	ug/L	4.992	4.3%	≤20	
	200.8	09/20/12:213907AC	CCV	ppb	120.0	99.0 %	90-110	
			CCB	ppb		0.003	0.2	
			CCV	ppb	120.0	99.2 %	90-110	
			CCB	ppb		0.042	0.2	
Vanadium	200.8		MS	ug/L	5.000	110 %	75-125	
		(CC 1282943-001)	MSD	ug/L	5.000	104 %	75-125	
			MSRPD	ug/L	4.992	0.25	≤2	
	200.8	09/20/12:213907AC	CCV	ppb	120.0	98.2 %	90-110	
			CCB	ppb		-0.04	2	
			CCV	ppb	120.0	98.5 %	90-110	
			CCB	ppb		0.02	2	
Mercury	245.1	09/20/12:210493AC	Blank	ug/L		ND	<0.02	
			LCS	ug/L	0.2000	96.2 %	85-115	

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Quality Control - Inorganic

Constituent	Method	Date/ID	Type	Units	Conc.	QC Data	DQO	Note
Metals								
Mercury	245.1		MS	ug/L	0.2000	99.1 %	75-125	
		(CC 1282912-001)	MSD	ug/L	0.2000	104 %	75-125	
			MSRPD	ug/L	0.2000	4.3%	≤20	
	245.1	09/20/12:213906AC	CCV	ppt	200.0	102 %	90-110	
			CCB	ppt		2.5	20	
			CCV	ppt	200.0	104 %	90-110	
			CCB	ppt		1.6	20	
Wet Chem								
Color	2120B	(SP 1209529-001)	Dup	units		0.0	5	
	2120B	09/19/12:213799jmg	CCB	units		0.00	5.0	
			CCV	units	10.00	100 %	90-110	
Turbidity	2130B	(CC 1282921-001)	Dup	NTU		0.7%	2.47	
	2130B	09/20/12:214096jam	CCB	NTU		0.097	0.2	
			CCV	NTU	2.000	100 %	90-110	
			CCB	NTU		0.078	0.2	
			CCV	NTU	2.000	102 %	90-110	
Odor	2150B	(SP 1209529-001)	Dup	TON		0.0	1	
Alkalinity (as CaCO3)	2320B	(CC 1282888-001)	Dup	mg/L		0.3%	3.42	
	2320B	09/20/12:213773AMB	CCV	mg/L	234.9	104 %	90-110	
			CCV	mg/L	234.9	108 %	90-110	
Bicarbonate	2320B	(CC 1282888-001)	Dup	mg/L		0.3%	4.78	
Carbonate	2320B	(CC 1282888-001)	Dup	mg/L		0.0	10	
Hydroxide	2320B	(CC 1282888-001)	Dup	mg/L		0.0	10	
Conductivity	2510B	09/19/12:213811CTL	ICB	umhos/cm		0.08	1	
			ICV	umhos/cm	996.0	102 %	95-105	
			CCV	umhos/cm	996.0	102 %	95-105	
E. C.	2510B	09/19/12:210431CTL	Blank	umhos/cm		ND	<1	
		(CC 1282917-001)	Dup	umhos/cm		0.0%	10	
Solids, Total Dissolved	2540CE	09/20/12:210488CHL	Blank	mg/L		ND	<20	
			LCS	mg/L	995.0	97.3 %	90-110	
		(CC 1282930-001)	Dup	mg/L		0.1%	10.0	
Chloride	300.0	09/19/12:210466CHL	LCS	mg/L	25.00	96.9 %	90-110	
			MS	mg/L	500.0	101 %	86-128	
		(STK1238908-001)	MSD	mg/L	500.0	102 %	86-128	
			MSRPD	mg/L	500.0	0.9%	≤23.0	
	300.0	09/20/12:213832CHL	CCB	ppm		-0.36	1	
			CCV	ppm	25.00	102 %	90-110	
			CCB	ppm		-0.50	1	
			CCV	ppm	25.00	103 %	90-110	
Fluoride	300.0	09/19/12:210466CHL	LCS	mg/L	2.500	92.3 %	90-110	
			MS	mg/L	50.00	93.6 %	81-126	
		(STK1238908-001)	MSD	mg/L	50.00	94.5 %	81-126	
			MSRPD	mg/L	500.0	1.0%	≤12.1	
	300.0	09/20/12:213832CHL	CCB	ppm		-0.047	0.1	
			CCV	ppm	2.500	97.8 %	90-110	
			CCB	ppm		-0.048	0.1	
			CCV	ppm	2.500	98.9 %	90-110	
Nitrate	300.0	09/19/12:210466CHL	LCS	mg/L	20.00	96.8 %	90-110	
			MS	mg/L	400.0	101 %	88-124	
		(STK1238908-001)	MSD	mg/L	400.0	102 %	88-124	
			MSRPD	mg/L	500.0	0.8%	≤29.1	
	300.0	09/20/12:213832CHL	CCB	ppm		-0.360	0.4	
			CCV	ppm	20.00	100 %	90-110	
			CCB	ppm		-0.376	0.4	

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Quality Control - Inorganic

Constituent	Method	Date/ID	Type	Units	Conc.	QC Data	DQO	Note
Wet Chem								
Nitrate	300.0	09/20/12:213832CHL	CCV	ppm	20.00	101 %	90-110	
Nitrite	300.0	09/19/12:210466CHL	LCS	mg/L	15.00	103 %	90-110	
			MS	mg/L	300.0	98.8 %	91-121	
		(STK1238908-001)	MSD	mg/L	300.0	98.2 %	91-121	
			MSRPD	mg/L	500.0	0.6%	≤23.8	
	300.0	09/20/12:213832CHL	CCB	ppm		-0.143	0.3	
			CCV	ppm	15.00	103 %	90-110	
			CCB	ppm		-0.142	0.3	
			CCV	ppm	15.00	106 %	90-110	
Sulfate	300.0	09/19/12:210466CHL	LCS	mg/L	50.00	95.5 %	90-110	
			MS	mg/L	1000	99.0 %	78-137	
		(STK1238908-001)	MSD	mg/L	1000	98.4 %	78-137	
			MSRPD	mg/L	500.0	0.5%	≤12.3	
	300.0	09/20/12:213832CHL	CCB	ppm		-1.00	2	
			CCV	ppm	50.00	101 %	90-110	
			CCB	ppm		-1.13	2	
			CCV	ppm	50.00	102 %	90-110	
pH	4500-H B	(CC 1282910-001)	Dup	units		0.09%	4.80	
	4500HB	09/19/12:213804CJJ	CCV	units	8.000	100 %	95-105	
			CCV	units	8.000	101 %	95-105	
MBAS	5540C	09/19/12:213820AMM	CCB	mg/L		0.0542	0.25	
			CCB	mg/L		0.0542	0.25	
MBAS Extraction	5540C	09/19/12:210459AMM	Blank	mg/L		ND	<0.1	
			LCS	mg/L	0.5000	100 %	65-109	
			BS	mg/L	0.5000	89.3 %	65-109	
			BSD	mg/L	0.5000	87.6 %	65-109	
			BSRPD	mg/L	0.5000	0.0088	≤0.1	

Definition

ICV	: Initial Calibration Verification - Analyzed to verify the instrument calibration is within criteria.
ICB	: Initial Calibration Blank - Analyzed to verify the instrument baseline is within criteria.
CCV	: Continuing Calibration Verification - Analyzed to verify the instrument calibration is within criteria.
CCB	: Continuing Calibration Blank - Analyzed to verify the instrument baseline is within criteria.
Blank	: Method Blank - Prepared to verify that the preparation process is not contributing contamination to the samples.
LCS	: Laboratory Control Standard/Sample - Prepared to verify that the preparation process is not affecting analyte recovery.
MS	: Matrix Spikes - A random sample is spiked with a known amount of analyte. The recoveries are an indication of how that sample matrix affects analyte recovery.
MSD	: Matrix Spike Duplicate of MS/MSD pair - A random sample duplicate is spiked with a known amount of analyted. The recoveries are an indication of how that sample matrix affects analyte recovery.
BS	: Blank Spikes - A blank is spiked with a known amount of analyte. It is prepared to verify that the preparation process is not affecting analyte recovery.
BSD	: Blank Spike Duplicate of BS/BSD pair - A blank duplicate is spiked with a known amount of analyte. It is prepared to verify that the preparation process is not affecting analyte recovery.
Dup	: Duplicate Sample - A random sample with each batch is prepared and analyzed in duplicate. The relative percent difference is an indication of precision for the preparation and analysis.
MSRPD	: MS/MSD Relative Percent Difference (RPD) - The MS relative percent difference is an indication of precision for the preparation and analysis.
BSRPD	: BS/BSD Relative Percent Difference (RPD) - The BS relative percent difference is an indication of precision for the preparation and analysis.
ND	: Non-detect - Result was below the DQO listed for the analyte.
<¼	: High Sample Background - Spike concentration was less than one forth of the sample concentration.
DQO	: Data Quality Objective - This is the criteria against which the quality control data is compared.

Explanation

435	: Sample matrix may be affecting this analyte. Data was accepted based on the LCS or CCV recovery.