Appendix A

Tier 2 Biological Sampling and Analysis Results for the Baseline Ecological Risk Assessment

Halaco Superfund Site, Oxnard, California

Remedial Investigation

Prepared for

U.S. Environmental Protection Agency Region 9

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CH2MHILL®

325 East Hillcrest Drive, Suite 125
Thousand Oaks, California 91360

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Acronyms and Abbreviations

ARDL	Applied Research & Development Laboratory, Inc.
ASTM	ASTM International (formerly American Society for Testing and Materials)
BERA	baseline ecological risk assessment
BO	biological opinion
CLP	Contract Laboratory Program
COC	chain-of-custody
EPA	U.S. Environmental Protection Agency
FSP	Field Sampling Plan
FWS	U.S. Fish and Wildlife Service
GPS	global positioning system
Halaco	Halaco Engineering Co.
NAVD 88	North American Vertical Datum of 1988
NCL	Nature Conservancy Land
OID	Oxnard Industrial Drain
PAH	polycyclic aromatic hydrocarbon
PCB	polychlorinated biphenyl
QAPP	Quality Assurance Project Plan
RI	Remedial Investigation
Site	Halaco Engineering Co. Superfund Site
SVOC	semivolatile organic compound
TOC	total organic carbon
WMU	waste management unit

APPENDIX A

Tier 2 Biological Sampling and Analysis Results

This appendix provides the results of the Tier 2 biological testing at the Halaco Engineering Co. Superfund Site (Halaco Site, or Site) in Oxnard, California. Tier 2 biological samples were collected during June 2011 to evaluate potential ecological risks and support the preparation of the Baseline Ecological Risk Assessment (BERA) at the Halaco Site.

This appendix includes a description of the testing effort and a tabular summary of biological sampling results. These results will be combined with testing results from the Remedial Investigation (RI) sampling and analysis activities conducted from 2009 through 2011 for the following areas:

- Solid matrix sampling for the Nature Conservancy Land (NCL) areas (CH2M HILL, 2011a)
- Solid matrix sampling for the wetlands and beach areas (CH2M HILL, 2011b)
- Solid matrix sampling for the Oxnard Industrial Drain (OID) and lagoon (CH2M HILL, 2011c)
- Solid and soil gas matrix sampling for the Halaco Properties (CH2M HILL, 2011d)
- Surface water and groundwater sampling (CH2M HILL, 2012)
- Solid matrix step-out sampling (CH2M HILL, 2013)

The testing described in these six reports is part of the RI performed by the U.S. Environmental Protection Agency (EPA) for the Site. The testing was completed in accordance with a Sampling and Analysis Plan (SAP) prepared by EPA (2011). The SAP incorporates the Quality Assurance Project Plan (QAPP; CH2M HILL, 2009a) and Field Sampling Plan (FSP; CH2M HILL, 2009b) that were prepared to guide the RI sampling and analysis activities performed from 2009 through 2011.

A.1 Objectives

The samples were collected to perform the following analyses:

- Bioaccumulation modeling that compares contaminant concentrations in soil invertebrate, aquatic benthic invertebrate, and fish tissue with contaminant concentrations in collocated soil and sediment (“tissue residues”)
- Toxicity tests with contaminated sediments and laboratory test species (“bioassays”)

The following types of samples were collected:

- Terrestrial invertebrate, aquatic invertebrate, and fish tissue samples for laboratory analysis of metals and polychlorinated dibenzodioxins and dibenzofurans (dioxins/furans)
- Soil and sediment samples (collocated with the tissue samples) for laboratory analysis of metals, dioxins/furans, and other parameters
- Sediment samples (collocated with the tissue samples) for laboratory bioassays (“toxicity tests”) in which a test organism is exposed to the sediments

Field-collected benthic invertebrate, terrestrial invertebrate, and fish samples were analyzed together with the collocated soil and sediment samples for the constituents of ecological concern, which are metals and dioxins and furans. Sediment samples collected for bioassays were also analyzed for other constituents that may affect and help explain the response of the laboratory bioassay test organisms. These analytes are polycyclic aromatic hydrocarbons (PAHs), semivolatile organic compounds (SVOCs), chlorinated pesticides, polychlorinated biphenyls (PCBs), pH, total organic carbon (TOC), and grain size. The samples were collected at locations expected to have low, intermediate, and high contaminant concentrations based on past sampling results.

A.2 Sampling and Analysis Activities

This section describes the biological sampling and analysis activities for the samples that were collected during June 2011. To control measurement error, analytical measurements were undertaken as documented in the SAP and QAPP, and samples were collected and shipped as documented in the FSP and field standard operating procedures contained in the FSP. Figure A-1 shows the sampling locations. Table A-1 summarizes the samples that were collected and analyzed.

A.2.1 Field Sampling Activities

Samples were collected at the following locations:

- Terrestrial invertebrates, with collocated soil samples, were collected at 15 upland locations (5 high concentration, 5 mid-range, and 5 low concentration).
- Fish and benthic invertebrate samples, with collocated sediment samples, were collected at 15 aquatic locations (5 representing high concentrations, 5 mid-range, and 5 low concentrations). Sediment samples for benthic invertebrate bioassays were collected at the same 15 locations.

The high concentration samples were collected from the WMU-ditch and NCL-East. The medium concentration samples were collected from the NCL-East and the lagoon finger under the footbridge. The low concentration samples were collected from NCL-North, the wetlands area, and the lagoon fingers near the ocean.

The samples were collected at the planned sampling location. Samples were located using a global positioning system (GPS) unit to submeter accuracy (Trimble GeoXT). Some of the medium-concentration terrestrial samples at NCL-East were relocated to move them above the standing water level.

The water level at NCL-East and in the main lagoon was at approximately 8 feet elevation (North American Vertical Datum of 1988 [NAVD 88]) and steady during the sampling activities. The coastal sand berm was intact.

Photographs of select sampling activities are provided in Attachment A-1.

A.2.1.1 Terrestrial Samples

Surface soil samples were collected using an environmentally clean, disposable trowel. The soil was homogenized in place with the trowel and then placed into the appropriate sample containers.

Terrestrial invertebrates were collected by hand-picking and setting small pit-fall traps. These traps were set by digging a shallow hole, setting a plastic cup into the hole, and then backfilling the hole so the top of the cup was flush with ground surface. The cup was periodically checked for terrestrial invertebrates. The species and weights of invertebrate samples collected are summarized in Table A-2. The species collected included snails, sow bugs, beach hoppers, beetles, and spiders. The snail shell material was not analyzed by the laboratory.

A.2.1.2 Aquatic Samples

Sediment samples were collected using either an Eckman sampler or a hand auger deployed either from the bank or a small boat. The bottom sediments were too stiff at many locations to collect with an Eckman sampler so the sample material was collected instead using a stainless steel hand auger. The sediment sample material was homogenized in a stainless steel mixing bowl and then transferred into the appropriate sample containers. A large amount of sediment sample material (2 to 3 gallons) was required for the toxicity testing.

Benthic invertebrates were collected by kick net and opportunistically as by catch from the seine deployed to collect small fish. Fish were collected by deploying a 40-foot beach seine by hand and with the assistance of a small boat where the water was too deep to pull the seine by hand. Two types of fish were targeted at each location: water column fish and bottom-dwelling fish. The seine was approximately 40 feet long with

¼-inch openings. Fish collected from the seine were identified in the field, placed into separate plastic baggies by species, and then placed on wet ice during the day and in a refrigerator during the night for temporary storage while the fieldwork occurred. The species and weights of fish and invertebrate samples collected are summarized in Table A-2. Species collected included the following:

- Benthic Invertebrates
  - Dragonflies
  - Crayfish
  - Water boatmen
- Bottom Fish
  - Tidewater goby
  - Goldfish/carp
  - Staghorn sculpin
  - Long-jawed mudsucker
- Water Column Fish
  - Topsmelt

A.2.1.3 U.S. Fish and Wildlife Service Biological Opinion

The field sampling work was performed under the U.S. Fish and Wildlife Service (FWS) biological opinion (BO) for the RI sampling activities to be performed by EPA for the Halaco Site (8-8-10-F-3). The BO was provided in a letter to EPA dated February 26, 2010. EPA requested formal consultation with FWS in a letter dated November 12, 2009, because of the presence or potential presence of federally listed endangered or threatened species in the sampling areas. CH2M HILL provided a qualified biological monitor (Mr. Robert Hernandez) in the field to ensure that sampling at each location was in compliance with the BO.

A.2.1.4 U.S. Fish and Wildlife Service Authorizations to Handle and Ship Tidewater Goby

As described in a letter from FWS dated June 21, 2011, the two wildlife biologists (Mr. Earl Byron and Mr. Robert Hernandez) that performed the sampling activities spent considerable time in the field with a FWS senior biologist (Mr. Chris Dellith) on June 21, 2011, capturing, identifying, and releasing tidewater gobies. This letter authorized the two biologists to capture, identify, and release the federally endangered tidewater goby during sampling activities. FWS authorized the possession, transporting, and analysis of tissue of the tidewater goby in a memorandum to EPA dated June 20, 2011. These FWS documents are provided in Attachment A-2.

A.2.1.5 Access Agreements

The fieldwork was performed in accordance with access authorizations granted by The Nature Conservancy on November 9, 2009, and the City of Oxnard on October 8, 2009.

A.2.2 Sample Collection and Quality Control Samples

Samples for laboratory analysis were placed in containers as detailed in Table 5-3 of the FSP. The following quality control samples were collected as specified in the QAPP and FSP:

- Field duplicates were collected at a frequency of 1 in every 10 samples.
- Field equipment blanks were collected at a frequency of once per day when nondedicated sampling equipment was used.
- Extra volume for laboratory matrix spikes and matrix spike duplicates was collected at a frequency of 1 in every 20 collected samples.

The sample naming convention described in the FSP was used.

Duplicate samples were identified by adding “100” to the sample location number. For example, SM-OID-101-A is the duplicate sample for SM-OID-001-A.

A.2.3 Sample Custody and Tracking Procedures

Chain-of-custody (COC) procedures were followed in accordance with the FSP and QAPP. This included generating COC forms requesting analytical services from each of the analytical laboratories.
The EPA Forms II Lite program was used to generate sample labels, bottle tags, and COC forms;

track samples from the field to the laboratory; and facilitate electronic capture of sample information into databases.

All samples were placed on ice upon field collection, except the samples for grain size analysis, which did not require this step. The tissue samples were transferred to a refrigerator at the end of each sampling day and then sorted at the conclusion of sampling for shipment to the laboratories. The tissue samples were shipped on dry ice to Applied Research & Development Laboratory, Inc. (ARDL). The remaining samples were shipped on wet ice to the various laboratories performing the analyses, except the samples for grain size analysis, which did not require this step. All samples were shipped to the analytical laboratories using Federal Express to facilitate tracking from the field to the laboratory, except the sediment samples for toxicity testing, which were hand-couriered to the laboratory.

A.2.4 Sample Shipping and Laboratory Analysis

The surface water and groundwater samples collected for chemical analysis were analyzed in offsite laboratories as follows for the soil and sediment and tissue samples:

Soil and Sediment Samples

- **Metals for Soil and Sediment Samples.** The soil and sediment samples were analyzed for metals under the EPA Contract Laboratory Program (CLP) by Chemtech Consulting Group in Mountainside, New Jersey.
- **SVOCs, PCBs, and Pesticides for Sediment Samples.** The sediment samples were analyzed for SVOCs, PCBs, and pesticides under the EPA CLP by A4 Scientific, Inc., in The Woodlands, Texas.
- **Dioxins/Furans for Soil and Sediment Samples.** The soil and sediment samples were analyzed for dioxins/furans by Pace Environmental Services under contract to ARDL, who was under contract to EPA Region 7.
- **Pyrethroids for Sediment Samples.** Select sediment samples were analyzed for pyrethroids by Caltest Analytical Laboratory in Napa, California, under a special contract with EPA Region 9.
- **Toxicity Testing (Bioassays) for Sediment Samples.** The sediment samples were tested for toxicity (bioassays) by Nautilus Environmental under a special contract to EPA Region 9.
- **Total Organic Carbon (TOC) and pH for Sediment Samples.** The sediment samples were analyzed for TOC and pH by Curtis & Tompkins, Ltd., under the direction of the EPA Region 9 laboratory.
- **Grain Size Analysis for Sediment Samples.** The sediment samples were submitted for grain size analysis by PTS Environmental, Inc., in Santa Fe Springs, California, under subcontract to CH2M HILL. The samples were analyzed using ASTM International (ASTM) Method D4464M.

The soil and sediment samples were shipped directly to the laboratories that performed the analyses, except the samples analyzed for dioxins. The soil and sediment samples for dioxin analysis were first shipped to ARDL, which then forwarded the samples to Pace Environmental Services.

Tissue Samples

- **Metals for Tissue Samples.** The tissue samples were analyzed for metals by ARDL under contract to EPA Region 7, except for mercury. Mercury was analyzed by Pace Environmental Services under subcontract to ARDL.
- **Dioxins/Furans for Tissue Samples.** The tissue samples were analyzed for dioxins/furans by Pace Environmental Services under contract to ARDL, who was under contract to EPA Region 7.

The tissue samples were first shipped to ARDL, which weighed the samples. Samples with insufficient mass to analyze for metals, dioxins, and percent solids were prioritized by first analyzing metals, then dioxins,

and then percent solids. ARDL then shipped tissue samples to Pace Environmental Services for dioxin and mercury analysis.

A.2.5 Laboratory Data Validation

The laboratory analytical results were reviewed or validated as follows:

Soil and Sediment Samples

- **Metals for Soil and Sediment Samples.** The soil and sediment samples for metals analysis were validated through the EPA Computer-Aided Data Review and Evaluation automated data review process. This is equivalent to a stage S2BVE under EPA's national guidance for validating laboratory analytical data for Superfund use.
- **SVOCs, PCBs, and Pesticides for Sediment Samples.** The sediment samples for SVOC, PCB, and pesticide analysis were validated through EXES automated data review process and is a stage S3VE under EPA's national guidance. EPA subsequently determined that the laboratory analytical results for these constituents from A4 Scientific were not valid; therefore, the results are not used in this BERA or presented in this appendix.
- **Dioxins/Furans for Soil and Sediment Samples.** The soil and sediment samples for dioxin/furan analysis went through internal laboratory review.
- **Pyrethroids for Sediment Samples.** The sediment samples for pyrethroid analysis went through internal laboratory review.
- **Toxicity Testing (Bioassays) for Sediment Samples.** The sediment samples for toxicity testing (bioassays) went through internal laboratory review.
- **TOC and pH for Sediment Samples.** The sediment samples for TOC and pH analysis went through internal laboratory review.
- **Grain Size Analysis for Sediment Samples.** The sediment samples for grain size analysis went through internal laboratory review.

Tissue Samples

- **Metals for Tissue Samples.** The metals for tissue samples went through internal laboratory review.
- **Dioxins/Furans for Tissue Samples.** The dioxins/furans for tissue samples went through internal laboratory review.

A.3 Laboratory Analytical Results

The laboratory results are provided in the following tables, figures, and attachments in this appendix:

- Table A-3 provides the grain size analytical results for the solid sediment samples. The laboratory report by PTS is included as Attachment A-3.
- Table A-4 provides the pH and TOC analytical results for the sediment samples.
- Table A-5 provides the metals analytical results for the soil and sediment samples.
- Table A-6 provides the dioxin analytical results for the soil and sediment samples.
- Table A-7 provides the pyrethroid analytical results for the sediment samples.
- Table A-8 provides the toxicity testing (bioassay) results for the sediment samples. The laboratory report by Nautilus is provided in Attachment A-4.
- Table A-9 provides the percent solids analytical results for the tissue samples.

- Tables A-10a and A-10b provide the metals analytical results for the tissue samples. Table A-10a provides the data as reported by the laboratory, which includes weights on both a dry weight and wet weight basis. Table A-10b provides all of the data on a dry weight basis by dividing the wet weight results by the average percent solids for each species. The average percent solids for each species are provided in Table A-9.
- Table A-11 provides the dioxin analytical results for the tissue samples.

These data are analyzed in the BERA report.

As described above, EPA determined that the laboratory analytical results from A4 Scientific for SVOCs, pesticides, and PCBs for sediment samples were not valid; therefore, the results are not used in this BERA or presented in this appendix.

A.4 References

CH2M HILL. 2009a. *Quality Assurance Project Plan, Halaco Superfund Site Remedial Investigation, Oxnard, California.* September. Prepared for U.S. Environmental Protection Agency. December.

CH2M HILL. 2009b. *Field Sampling Plan, Halaco Superfund Site Remedial Investigation, Oxnard, California.* September. Prepared for U.S. Environmental Protection Agency. December.

CH2M HILL. 2011a. *Solid Matrix Sampling and Analysis Results for the NCL-East and NCL-North Areas, Halaco Superfund Site Remedial Investigation, Oxnard, California*. Prepared for U.S. Environmental Protection Agency. February.

CH2M HILL. 2011b. *Solid Matrix Sampling and Analysis Results for the Wetlands and Beach Areas, Halaco Superfund Site Remedial Investigation, Oxnard, California*. Prepared for U.S. Environmental Protection Agency. March.

CH2M HILL. 2011c. *Solid Matrix Sampling and Analysis Results for the Oxnard Industrial Drain and Lagoon Areas, Halaco Superfund Site Remedial Investigation, Oxnard, California*. Prepared for U.S. Environmental Protection Agency. June.

CH2M HILL. 2011d. *Solid Matrix and Soil Gas Sampling and Analysis Results for the Smelter Parcel and Waste Management Areas, Halaco Superfund Site Remedial Investigation, Oxnard, California*. Prepared for U.S. Environmental Protection Agency. August.

CH2M HILL. 2012. *Surface Water and Groundwater Sampling and Analysis, Halaco Superfund Site Remedial Investigation, Oxnard, California*. Prepared for U.S. Environmental Protection Agency. March.

CH2M HILL. 2013. *Step-out Solid Matrix Sampling and Analysis Results and Sediment Chromium Speciation, Halaco Superfund Site Remedial Investigation, Oxnard, California*. Prepared for U.S. Environmental Protection Agency. January.

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U.S. Fish and Wildlife Service. 2010. *Biological Opinion for the Halaco Engineering Company Superfund Site Remedial Investigation Sampling Activities, Oxnard, Ventura County, California (8-8-10-F-3)*. Letter to U.S. Environmental Protection Agency. February 26.

U.S. Fish and Wildlife Service. 2011a. *Authorization of Biologists for the Biological Opinion Issued for the Halaco Engineering Company Superfund Site Remedial Investigation Sampling Activities, Oxnard, Ventura County, California (8-8-10-F-3)*. Letter to U.S. Environmental Protection Agency. June 21.

U.S. Fish and Wildlife Service. 2011b. *Authorization to Possess, Transport, and Analyze Tidewater Goby Tissue from Ormond Lagoon, Ventura County, California.* Memorandum to U.S. Environmental Protection Agency. June 20.

Tables

TABLE A-1

Summary of Tier 2 Ecological Risk Assessment Samples

Baseline Ecological Risk Assessment, Halaco Site, Oxnard, California

				Terrestrial				Aquatic											
				Soil		Terrestrial Invertebrates		Sediment							Benthic Invertebrates		Bottom Fish		Water Column Fish
			Lab=>	CLP (Chemtech)	Pace	ARDL	Pace	CLP (Chemtech)	CLP (A4 Scientific)	Pace	Caltest	Nautilus	Region 9	PTS	ARDL	Pace	ARDL	Pace	ARDL
Sample Locations	No. of Sample Locations	Concentration Ranges	Sample Locations	Metals	Dioxins	Metals	Dioxins	Metals	SVOC, PCBs, Pesticides	Dioxins	Pyrethroids	Toxicity (Bioassay)	TOC, pH	Grain Size	Metals	Dioxins	Metals	Dioxins	Metals
Wetlands	5	Low	WLE-007	■	□	■	■	---	---	---	---	---	---	---	---	---	---	---	---
NCL North			WLW-008	■	■	■	□	---	---	---	---	---	---	---	---	---	---	---	---
			NNB-001	■	■	■	■	---	---	---	---	---	---	---	---	---	---	---	---
			NNB-006	■	■	■	■	---	---	---	---	---	---	---	---	---	---	---	---
			NNL-002	■	■	■	■	---	---	---	---	---	---	---	---	---	---	---	---
NCL East	5	Medium	NEL-025	■	□	■	■	---	---	---	---	---	---	---	---	---	---	---	---
			NEL-028	■	■	■	■	---	---	---	---	---	---	---	---	---	---	---	---
			NEL-040	■	■	□	□	---	---	---	---	---	---	---	---	---	---	---	---
			NEL-041	■	■	□	□	---	---	---	---	---	---	---	---	---	---	---	---
			NEL-043	■	■	□	□	---	---	---	---	---	---	---	---	---	---	---	---
WMU Ditch	5	High	DSC-002	■	■	■	■	---	---	---	---	---	---	---	---	---	---	---	---
			DSC-003	■	□	■	■	---	---	---	---	---	---	---	---	---	---	---	---
			DSC-004	■	■	■	□	---	---	---	---	---	---	---	---	---	---	---	---
			DSC-005	■	■	■	■	---	---	---	---	---	---	---	---	---	---	---	---
			DSC-008	■	■	■	□	---	---	---	---	---	---	---	---	---	---	---	---
Lagoon Finger	5	Low	LGF-007	---	---	---	---	■	■	■	■	■	■	■	□	□	□	□	■
			LGF-008	---	---	---	---	■	■	■	---	■	■	■	□	□	■■	■■	■
			LGF-009	---	---	---	---	■	■	■	---	■	■	■	□	□	■	■	■
			LGF-010	---	---	---	---	■	■	■	---	■	■	■	□	□	■	■	■
			LGF-012	---	---	---	---	■	■	■	---	■	■	■	□	□	■	■	■
Lagoon Finger	5	Medium	LGF-001	---	---	---	---	■	■	■	■	■	■	■	□	□	■■	■■	■
Lagoon Main,			LGF-003	---	---	---	---	■	■	■	■	■	■	■	□	□	■	■	■
NCL East			LGM-001	---	---	---	---	■	■	■	---	■	■	■	■■	■■	■	■	■
			LGM-003	---	---	---	---	■	■	□	■	■	■	■	□	□	■	■	■
			NEL-021	---	---	---	---	■	■	■	---	■	■	■	■	■	■	■	□
WMU Ditch	5	High	DSA-001	---	---	---	---	■	■	■	■	■	■	■	■■	■■	■	■	□
NCL East			DSA-003	---	---	---	---	■	■	■	---	■	■	■	■■	■■	■■	■	□
			DSA-006	---	---	---	---	■	■	■	---	■	■	■	■■	■■	■■	■	□
			NEL-007	---	---	---	---	■	■	■	---	■	■	■	■■	■■	■	■	□
			NEL-009	---	---	---	---	■	■	■	---	■	■	■	■	■	■■	■■	□

Notes:

■ Sample collected (not including duplicates)

■■ Two independent samples collected, each consisting of different species

□ Sample planned, but not collected

--- No sample planned

TABLE A-2

Tissue Samples Analyzed by Laboratory, Biological Sampling

Baseline Ecological Risk Assessment, Halaco Site, Oxnard, California

Tissue Type	Range	Sample ID	Sample Contents/Taxa	Mass (grams)	Percent Solids	Metals	Dioxins	Comment
Terrestrial Invertebrates	Low	TI-WLE-007-A	snails	52.92	■	■	■	*Shell material not analyzed*
		TI-WLW-008-A	sow bugs/mixed insects	5.78		■		
		TI-NNB-001-A	mixed insects	6.72		■	■	
		TI-NNB-006-A	snails	15.00		■	■	*Shell material not analyzed*
		TI-NNL-002-A	snails	95.34	■	■	■	*Shell material not analyzed*
	Medium	TI-NEL-025-A	beach hoppers, sow bugs, beetles	38.66	■	■	■	
		TI-NEL-028-A	beach hoppers, sow bugs, beetles	23.10	■	■	■	
		TI-NEL-040-A	-					*Sample not collected*
		TI-NEL-041-A	-					*Sample not collected*
		TI-NEL-043-A	-					*Sample not collected*
	High	TI-DSC-002-A	spiders/beetles/beach hoppers	12.26		■	■	
		TI-DSC-003-A	spiders/cricket	7.11		■	■	
		TI-DSC-004-A	spiders/beetles	5.21		■		
		TI-DSC-005-A	mixed insects	7.81		■	■	
		TI-DSC-008-A	spiders/beetles	4.65		■		
Benthic Invertebrates	Low	BI-LGF-007-A	-					*Sample not collected*
		BI-LGF-008-A	-					*Sample not collected*
		BI-LGF-009-A	-					*Sample not collected*
		BI-LGF-010-A	-					*Sample not collected*
		BI-LGF-012-A	-					*Sample not collected*
	Medium	BI-LGF-001-A	-					*Sample not collected*
		BI-LGF-003-A	-					*Sample not collected*
		BI-LGM-001-A	dragonflies/damselflies	9.33		■	■	
		BI-LGM-001-R	crayfish	13.10		■	■	
		BI-LGM-003-A	-					*Sample not collected*
		BI-NEL-021-A	waterboatmen	89.77	■	■	■	
	High	BI-DSA-001-A	mixed insects	6.49		■	■	
		BI-DSA-001-R	crayfish	30.68	■	■	■	
		BI-DSA-003-A	crayfish	36.86	■	■	■	
		BI-DSA-003-Z	mixed insects	8.03		■	■	
		BI-DSA-006-A	crayfish	17.88	■	■	■	
		BI-DSA-006-Z	mixed insects	4.74		■	■	
		BI-NEL-007-A	waterboatmen	65.90	■	■	■	
		BI-NEL-107-A	waterboatmen (duplicate)	46.66	■	■	■	
		BI-NEL-007-R	crayfish	31.57	■	■	■	
		BI-NEL-009-A	waterboatmen	56.81	■	■	■	
Bottom Fish	Low	FH-LGF-007-A	-					*Sample not collected*
		FH-LGF-008-A	Gobies	55.91	■	■	■	
		FH-LGF-008-Y	Goldfish/carp	18.83	■	■	■	
		FH-LGF-009-A	Gobies	31.31	■	■	■	
		FH-LGF-010-A	Gobies	48.41	■	■	■	
		FH-LGF-012-A	Gobies	28.59	■	■	■	
	Medium	FH-LGF-001-A	Staghorn sculpin	12.39		■	■	
		FH-LGF-001-X	Gobies	19.17		■	■	
		FH-LGF-003-A	Gobies	16.65		■	■	
		FH-LGM-001-A	Gobies	11.97		■	■	
		FH-LGM-003-A	Gobies	10.83		■	■	
		FH-NEL-021-A	Gobies	102.24	■	■	■	
	High	FH-DSA-001-A	Goldfish/carp	9.49		■	■	
		FH-DSA-003-A	Goldfish/carp	16.58	■	■	■	
		FH-DSA-003-X	Gobies	8.80		■		
		FH-DSA-006-A	Gobies	16.60	■	■	■	
		FH-DSA-006-Y	Goldfish/carp	9.25		■		
		FH-NEL-007-A	Gobies	11.88		■	■	
		FH-NEL-009-A	Gobies	30.97	■	■	■	
		FH-NEL-009-X	Long-jawed mudsuckers	48.93	■	■	■	
Water Column Fish	Low	FH-LGF-007-B	topsmelt	109.93	■	■		
		FH-LGF-107-B	topsmelt (duplicate)	102.37	■	■		
		FH-LGF-008-B	topsmelt	217.14	■	■		
		FH-LGF-009-B	topsmelt	304.82	■	■		
		FH-LGF-010-B	topsmelt	179.53	■	■		
		FH-LGF-012-B	topsmelt	158.74	■	■		
	Medium	FH-LGF-001-B	topsmelt	36.51	■	■		
		FH-LGF-003-B	topsmelt	73.12	■	■		
		FH-LGM-001-B	topsmelt	127.03	■	■		
		FH-LGM-003-B	topsmelt	<294	■	■		
		FH-NEL-021-B						*Sample not collected*
	High	FH-DSA-001-B	-					*Sample not collected*
		FH-DSA-003-B	-					*Sample not collected*
		FH-DSA-006-B	-					*Sample not collected*
		FH-NEL-007-B	-					*Sample not collected*
		FH-NEL-009-B	-					*Sample not collected*

TABLE A-3

Grain Size Analytical Results, Solid Matrix, Biological Sampling

Baseline Ecological Risk Assessment, Halaco Site, Oxnard, California

Range	Area	Sample ID	Date	Time	Mean Grain Size Description	Median Grain Size mm	Particle Size Distribution, wt. percent						Silt & Clay
							Gravel	Sand Size			Silt	Clay	
								Coarse	Medium	Fine			
Low	Lagoon	SD-LGF-007-A	6/23/11	16:25	Medium sand	0.437	-	-	52.8	46.6	0.4	0.2	0.6
	Finger	SD-LGF-008-A	6/23/11	16:35	Medium sand	0.661	-	-	75.7	23.2	0.9	0.2	1.1
	West	SD-LGF-009-A	6/23/11	16:50	Medium sand	0.581	-	-	68.7	30.5	0.6	0.2	0.8
	Lagoon	SD-LGF-010-A	6/23/11	16:00	Fine sand	0.275	-	-	8.0	89.6	2.0	0.4	2.4
	Finger	SD-LGF-012-A	6/23/11	15:35	Medium sand	0.408	-	-	48.8	36.3	13.4	1.5	14.9
	East	SD-LGF-112-A	6/23/11	15:35	Fine sand	0.389	-	-	46.9	37.1	14.4	1.6	16.0
Medium	Lagoon	SD-LGF-001-A	6/23/11	11:25	Silt	0.037	-	-	5.5	22.0	66.7	5.8	72.5
	Footbridge	SD-LGF-003-A	6/23/11	12:00	Fine sand	0.060	-	-	14.0	30.6	48.5	6.9	55.4
	Lagoon	SD-LGM-001-A	6/23/11	9:00	Fine sand	0.075	-	-	14.4	35.9	45.2	4.5	49.7
	Main	SD-LGM-003-A	6/23/11	17:05	Fine sand	0.121	-	-	16.6	44.8	34.7	4.0	38.6
	NCL-East	SD-NEL-021-A	6/23/11	9:10	Silt	0.042	-	-	4.3	28.0	56.9	10.8	67.7
High	WMU Ditch	SD-DSA-001-A	6/23/11	14:00	Fine sand	0.087	-	-	19.3	33.6	41.4	5.6	47.1
		SD-DSA-003-A	6/23/11	13:35	Fine sand	0.142	-	-	25.8	35.7	34.4	4.1	38.5
		SD-DSA-006-A	6/23/11	13:16	Fine sand	0.387	-	-	47.2	32.9	18.4	1.5	19.9
	NCL-East	SD-NEL-007-A	6/23/11	9:50	Fine sand	0.073	-	-	20.7	28.9	40.8	9.6	50.4
		SD-NEL-009-A	6/23/11	9:30	Silt	0.034	-	-	6.1	22.4	59.0	12.5	71.5

Notes:

Samples analyzed by PTS Laboratories, 8100 Secura Way, Santa Fe Springs, CA 90670.

TABLE A-4

pH and TOC Analytical Results, Solid Matrix, Biological Sampling

Baseline Ecological Risk Assessment, Halaco Site, Oxnard, California

Media	Range	Area	Sample ID	Date	Time	pH	TOC (%)
Sediment	Low	Lagoon	SD-LGF-007-A	6/23/11	16:25	8.1	0.03
		Finger	SD-LGF-008-A	6/23/11	16:35	8.2	0.05
		West	SD-LGF-009-A	6/23/11	16:50	8.1	0.05
		Lagoon	SD-LGF-010-A	6/23/11	16:00	8.0	0.05
		Finger	SD-LGF-012-A	6/23/11	15:35	7.8	0.46
		East	SD-LGF-112-A	6/23/11	15:35	7.6	0.34
	Medium	Lagoon	SD-LGF-001-A	6/23/11	11:25	7.8	1.2
		Footbridge	SD-LGF-003-A	6/23/11	11:48	8.0	1.3
		Lagoon	SD-LGM-001-A	6/23/11	9:00	8.0	1.3
		Main	SD-LGM-003-A	6/23/11	17:05	7.6	1.7
		NCL-East	SD-NEL-021-A	6/23/11	9:10	8.1	0.95
	High	WMU	SD-DSA-001-A	6/23/11	14:00	8.1	1.4
		Ditch	SD-DSA-003-A	6/23/11	13:35	7.9	0.49
			SD-DSA-006-A	6/23/11	13:16	7.6	1.4
		NCL-East	SD-NEL-007-A	6/23/11	9:50	8.0	1.0
			SD-NEL-009-A	6/23/11	9:30	8.2	1.2

Notes:

Samples analyzed by Curtis & Tompkins, Ltd. Analytical Laboratories, 2323 Fifth Street, Berkeley, CA 94710.

Samples were prepared and analyzed on 7/1/11, past the recommended holding time.

TABLE A-5

Metals Analytical Results, Solid Matrix, Biological Sampling

Baseline Ecological Risk Assessment, Halaco Site, Oxnard, California

Media	Range	Area	Sample ID	CLP ID	Date	Time	Aluminum Result	Q	Antimony Result	Q	Arsenic Result	Q	Barium Result	Q	Beryllium Result	Q	Cadmium Result	Q	Calcium Result	Q	Chromium Result	Q	Cobalt Result	Q	Copper Result	Q	Iron Result	Q	Lead Result	Q	Magnesium Result	Q	Manganese Result	Q	Mercury Result	Q	Nickel Result	Q	Potassium Result	Q	Selenium Result	Q	Silver Result	Q	Sodium Result	Q	Thallium Result	Q	Vanadium Result	Q	Zinc Result	Q
Soil	Low	Wetlands	SL-WLE-007-A	MY7Z92	6/23/11	13:15	1470		0.34	U	0.97	J	21.9		0.16	J	0.25	U	3300		3.4	J	3.4	U	3.6		6850		1.7		822		56.8		0.09	U	3		338	U	0.69	U	0.34	U	172	J	0.34	U	4.6	J	13.7	
			SL-WLW-008-A	MY7Z94	6/23/11	15:30	1470		0.35	U	0.94	J	18.7		0.15	J	0.25	U	2970		3.8	J	3.5	U	2.5		3950		2.9		918		52.1		0.09	U	3.3		370		0.69	U	0.35	U	116	J	0.35	U	32	J	18	
		NCL-North	SL-NNB-001-A	MY7Z96	6/24/11	7:30	8320		0.37	U	2.7	J	124		0.61		0.76		6390		12.3	J	5.9		16.9		16800		9.6		4700		282		0.1	U	15.7		3220		0.75	U	0.37	U	291	J	0.37	U	48.3	J	76.9	
			SL-NNB-006-A	MY7Z98	6/23/11	16:30	7100		0.36	U	2.5	J	89.1		0.53		0.66		5440		11.6	J	5.1		13.8		14600		8		3740		242		0.02	J	13.2		2840		1.4	U	0.36	U	254	J	0.36	U	18.9	J	60.5	
			SL-NNL-002-A	MY7ZA0	6/23/11	8:45	8200		0.39	U	2.9	J	115		0.58		0.82		5420		14.1	J	5.7		15		16400		11.5		4330		262		0.1	U	15.4		3200		1.5	U	0.39	U	362	J	0.39	U	22.2	J	63.1	
	Medium	NCL-East	SL-NEL-025-A	MY7ZA2	6/23/11	9:05	10800		0.5	U	3.3	J	152		0.81		1.1		9530		21.5	J	6.8		71		20500		44.3		7730		348		0.13	U	30.9		3650		2	U	0.5	U	2330		0.5	U	26.7	J	203	
			SL-NEL-028-A	MY7ZA4	6/23/11	9:40	9960		0.48	U	3.5	J	135		0.78		0.9		7300		15.3	J	6.3		36.2		17900		10		6020		303		0.13	U	17.9		2970		1.9	U	0.48	U	3050		0.48	U	24.5	J	79.5	
			SL-NEL-040-A	MY7ZA6	6/23/11	9:20	9730		0.43	U	3.2	J	134		0.76		1		7950		18.8	J	6.8		42		17000		20.3		7610		302		0.12	U	27.5		3360		1.7	U	0.43	U	13100		0.43	U	25.7	J	115	
			SL-NEL-041-A	MY7ZA8	6/23/11	10:00	8280		0.4		3	J	140		0.71		0.96		8740		16	J	5.1		34.4		15100		15		5110		282		0.02	J	16.9		2560		1.5	U	0.37	U	1270		0.37	U	21.3	J	86.8	
			SL-NEL-043-A	MY7ZB0	6/23/11	11:00	9330		0.48		3	J	157		0.78		0.83		6580		15.3	J	5.4		54.6		15400		19.5		6560		271		0.1	U	18		2880		1.5	U	0.38	U	8910		0.38	U	20.7	J	101	
	High	WMU	SL-DSC-002-A	MY7ZB2	6/23/11	14:50	23700		1.5		1.2	J	356		1.7		0.89		6310		30.1	J	5.4	U	534		6320		56.7		5020		325		0.15	U	29.8		543	U	1	U	0.51	U	830		0.51	U	71.9	J	436	
		Ditch	SL-DSC-003-A	MY7ZB4	6/23/11	14:40	99100		11.3		3.1	J	1760		12.2		5.6		23500		238	J	6.2		2410		6990		301		27000		1600		0.2	U	125		941		2.1		3.5	J-	3180		0.34	U	61.6	J	1860	
			SL-DSC-004-A	MY7ZB6	6/23/11	14:20	12400		0.76		1.5	J	121		0.86		0.58		3800		33.6	J	3.6	U	195		5220		19.7		2860		193		0.09	U	17.3		430		0.71	U	0.35	U	178	J	0.35	U	53.1	J	177	
			SL-DSC-005-A	MY7ZB8	6/23/11	14:00	8690		0.46		1.7	J	96.8		0.64		0.38		3810		22.9	J	3.4	U	149		6150		16.2		2320		161		0.09	U	11.2		397		0.69	U	0.35	U	199	J	0.35	U	43.9	J	147	
			SL-DSC-105-A	MY7ZJ2	6/23/11	14:00	16500		1.1		1.4	J	192		1		0.52		4170		33.3	J	3.5	U	319		6970		28.2		3630		267		0.09	U	22.6		405		0.7	U	0.35	U	218	J	0.35	U	42.5	J	267	
			SL-DSC-008-A	MY7ZC0	6/23/11	13:30	2630		0.55	U	1.5	J	42.3		0.25	J	0.97		8000		7	J	5.7	U	54.9		6110		16.5		2300		202		0.16	U	11.5		571	U	1.1	U	0.55	U	2020		0.55	U	68.7	J	265	
Sediment	Low	Lagoon	SD-LGF-007-A	MY7ZC2	6/23/11	16:25	1400		0.45	U	0.73	J	12.2	J	0.12	J	0.33	U	3890		4.4	J	4.5	U	1.9	J	4430		0.89	U	1040		54.1		0.12	U	3.1	J	445	U	0.9	U	0.45	U	1130		0.45	U	56.6	J	14.8	
		Finger	SD-LGF-008-A	MY7ZC9	6/23/11	16:35	1500		0.43	U	0.89	J	15.7	J	0.13	J	0.31	U	6160		4.5	J	4.4	U	2.8		4660		1.5		1250		59.1		0.11	U	3.1	J	436	U	0.85	U	0.43	U	1060		0.43	U	48.4	J	18.3	
		West	SD-LGF-009-A	MY7ZD3	6/23/11	16:50	1670		0.43	U	0.88	J	12.8	J	0.12	J	0.31	U	4490		4.2	J	4.3	U	2.2		4570		1.3		1220		55.4		0.11	U	3.1	J	426	U	0.86	U	0.43	UJ	1040		0.43	U	48.5	J	15.9	
		Lagoon	SD-LGF-010-A	MY7ZD7	6/23/11	16:00	1600		0.44	U	1.3	J	22		0.17	J	0.32	U	6810		5.2	J	4.8	U	2.1	J	5950		1.4		1200		74.3		0.11	U	3.6	J	476	U	0.89	U	0.44	U	975		0.44	U	46.8	J	14.5	
		Finger	SD-LGF-012-A	MY7ZE0	6/23/11	15:35	2250		0.65	U	1.1	J	26.4		0.19	J	0.47	U	26000		5.1	J	6.5	U	5.9		5800		2.2		1810		103		0.13	U	4.8	J	677		1.3	U	0.65	U	1670		0.65	U	62.6	J	28.5	
		East	SD-LGF-112-A	MY7ZJ3	6/23/11	15:35	2580		0.65	U	1	J	27.9		0.18	J	0.47	U	24700		5.7	J	6.5	U	6.2		6100		2		1800		99.7		0.13	U	4.8	J	713		1.3	U	0.65	U	1640		0.65	U	6.2	J	28.8	
	Medium	Lagoon	SD-LGF-001-A	MY7ZE5	6/23/11	11:25	12800		0.59		3.2	J	150		1.4		1.4		163000		16.5	J	6.1		81.6		17000		33.5		9480		425		0.36	U	21.6		3780		5.2		0.37	U	17400		0.37	U	23	J	247	
		Footbridge	SD-LGF-003-A	MY7ZE9	6/23/11	12:00	12200		0.85		3.3	J	181		1.2		1.3		128000		17.1	J	5		101		14300		32.2		6680		433		0.03	J	18		2710		2.4		0.34	U	5170		0.34	U	18.6	J	236	
		Lagoon	SD-LGM-001-A	MY7ZF3	6/23/11	9:00	8130		0.68		3	J	145		0.86		1		85900		15.5	J	4.2		62.9		13200		18.8		4920		408		0.19	U	14.5		2050		1.6		0.36	U	4150		0.36	U	15.3	J	210	
		Main	SD-LGM-003-A	MY7ZF7	6/23/11	17:05	6630		0.8		2.6	J	141		0.64	J	1		86500		11	J	6.9	U	50.8		11200		16		4490		393		0.18	U	12.1		1930		1.4	U	0.69	U	3780		0.69	U	15	J	195	
		NCL-East	SD-NEL-021-A	MY7ZG1	6/23/11	9:10	14400		0.67		3.5	J	221		1		0.57		8690		18.3	J	7.2		94.7		21700		26.5		7180		238		0.13	U	22.9		5030		0.95	U	0.47	U	1420		0.47	U	37.2	J	151	
	High	WMU	SD-DSA-001-A	MY7ZG5	6/23/11	14:00	67400		6.6		5.3	J	1470		4.9		3.8		44500		122	J	7.2	U	1370		12700		142		17200		1040		0.17	U	71.5		2180		2.9	U	1.8	J-	2600		0.71	U	29	J	1580	
		Ditch	SD-DSA-003-A	MY7ZG9	6/23/11	13:35	78200		7.3		5.3	J	1140		5.8		3.2		40700		153	J	7		1640		10300		200		15300		924		0.17	U	92.3		1460		2.8	U	2.7	J-	2170		1.4	U	37	J	1480	
			SD-DSA-006-A	MY7ZH3	6/23/11	13:16	35200		3.3		3.6	J	666		2.1		1.2		5550		66.2	J	6.1	U	815		8750		79		6060		309		0.16	U	41.4		890		1.4		1.1	J-	1400		0.58	U	74.7	J	624	
		NCL-East	SD-NEL-007-A	MY7ZH7	6/23/11	9:50	159000		11.4		7.4	J	2480		10.3		5.8		11800		342	J	11		3190		15800		274		42200		2100		0.05	J	158		4020		2		4.9	J-	2780		0.71	U	125	J	2560	
			SD-NEL-009-A	MY7ZJ1	6/23/11	9:30	12900		0.92		3	J	152		0.93		1.3		13300		25.8	J	7.1		57.6		20100		17.6		7820		255		0.14	U	21.5		4880		1.1	U	0.55	U	1360		0.55	U	58.2	J	106	

Notes:

Units are in mg/kg

Data Qualifiers (Q):

U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit listed in the table.

J = The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.

TABLE A-6
Dioxin Analytical Results, Solid Matrix, Biological Sampling
Baseline Ecological Risk Assessment, Halaco Site, Oxnard, California

Media	Range	Sample ID	CLP ID	Date	Time	% Solids	Basis	2,3,7,8-TCDF Result	Q	2,3,7,8-TCDD Result	Q	1,2,3,7,8-PeCDF Result	Q	2,3,4,7,8-PeCDF Result	Q	1,2,3,7,8-PeCDD Result	Q	1,2,3,4,7,8-HxCDF Result	Q	1,2,3,6,7,8-HxCDF Result	Q	2,3,4,6,7,8-HxCDF Result	Q	1,2,3,7,8,9-HxCDF Result	Q	1,2,3,4,7,8-HxCDD Result	Q	1,2,3,6,7,8-HxCDD Result	Q	1,2,3,7,8,9-HxCDD Result	Q	1,2,3,4,6,7,8-HpCDF Result	Q	1,2,3,4,7,8,9-HpCDF Result	Q	1,2,3,4,6,7,8-HpCDD Result	Q	OCDF Result	Q	OCDD Result	Q	Total TCDF Result	Q	Total TCDD Result	Q	Total PeCDF Result	Q	Total PeCDD Result	Q	Total HxCDF Result	Q	Total HxCDD Result	Q	Total HpCDF Result	Q	Total HpCDD Result	Q	Effective 2,3,7,8-TCDD
WHO 2005 TEF								0.1		1		0.03		0.3		1		0.1		0.1		0.1		0.1		0.1		0.1		0.1		0.01		0.01		0.01		0.0003		0.0003																		
Soil	Low	SL-WLW-008-A	Y7Z94	6/23/11	15:30	99.6	D	1	U	1	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	8.8		10	U	64		1	U	1	U	5	U	5	U	5	U	5	U	5	U	5	U	23		0.107
		SL-NNB-001-A	Y7Z96	6/24/11	7:30	96.8	D	1	U	1	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	7.2		5	U	14		56		200		3		1	U	9		5	U	5	U	5	U	14		38		0.289
		SL-NNB-006-A	Y7Z98	6/23/11	16:30	95.9	D	1	U	1	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	13		43		190		1.2		1	U	5	U	5	U	5	U	5	U	6.9		33		0.200
		SL-NNL-002-A	Y7ZA0	6/23/11	8:45	94	D	1	U	1	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	13		5	U	38		84		390		2.4		1	U	5	U	5	U	7.8		6.9		13		76		0.652
	Medium	SL-NEL-028-A	Y7ZA4	6/23/11	9:40	75.3	D	1	U	1	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	10	U	18		1	U	1	U	5	U	5	U	5	U	5	U	5	U	5	U	0.005
		SL-NEL-040-A	Y7ZA6	6/23/11	9:20	82.1	D	2.2		1	U	5	U	5	U	5	U	5	U	5	U	5.4	J	5	U	5	U	5	U	5	U	19		5	U	30		28		210		46		13		32		16		25		37		29		71		1.321
		SL-NEL-041-A	Y7ZA8	6/23/11	10:00	98.1	D	1	U	1	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	6.9		5	U	16		19		160		2		1.3		5	U	5	U	5	U	5	U	16		42		0.283
		SL-NEL-043-A	Y7ZB0	6/23/11	11:00	95.5	D	1	U	1	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	17		5	U	9.9		26		70		3.8		1.7		5	U	5	U	7.6		5	U	24		22		0.298
	High	SL-DSC-002-A	Y7ZB2	6/23/11	14:50	72.4	D	1	U	1	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	10	U	10	U	1	U	1	U	5	U	5	U	5	U	5	U	5	U	5	U	-
		SL-DSC-004-A	Y7ZB6	6/23/11	14:20	99.1	D	1	U	1	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	7.5		5	U	5.6		10		28		5.7		1.4		5	U	5	U	5	U	5.6		7.5		14		0.142
		SL-DSC-005-A	Y7ZB8	6/23/11	14:00	96.9	D	1	U	1	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	6.7		5	U	7		10	U	46		1.5		1	U	5	U	5	U	5	U	5	U	6.7		16		0.151
		SL-DSC-105-A	Y7ZJ2	6/23/11	14:00	98.4	D	1	U	1	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	10	U	20		1	U	1	U	5	U	5	U	5	U	5	U	5	U	5	U	0.006
		SL-DSC-008-A	Y7ZC0	6/23/11	13:30	48.6	D	1	U	1	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5.4	J	5	U	9.3	J	10	U	54		16		3.1		5	U	5	U	5	U	5	U	5.4	J	23		0.163
Sediment	Low	SD-LGF-007-A	Y7ZC2	6/23/11	16:25	75.2	D	1	U	1	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	10	U	10	U	1	U	1	U	5	U	5	U	5	U	5	U	5	U	5	U	-
		SD-LGF-008-A	Y7ZC9	6/23/11	16:35	77.6	D	1	U	1	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5.7		10	U	73		1	U	4.2		5	U	5	U	5	U	5	U	5	U	15		0.079
		SD-LGF-009-A	Y7ZD3	6/23/11	16:50	78.1	D	1	U	1	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	10	U	35		1	U	1	U	5	U	5	U	5	U	5	U	5	U	5	U	0.011
		SD-LGF-010-A	Y7ZD7	6/23/11	16:00	72.8	D	1	U	1	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	10	U	12		1	U	1	U	5	U	5	U	5	U	5	U	5	U	5	U	0.004
		SD-LGF-012-A	Y7ZE0	6/23/11	15:35	69.9	D	1	U	1	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	10	U	25		1	U	1	U	5	U	5	U	5	U	5	U	5	U	5	U	0.008
		SD-LGF-112-A	Y7ZJ3	6/23/11	15:35	67.7	D	1	U	1	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	6.4		5	U	19		22		170		1	U	1	U	5	U	5	U	5	U	5	U	6.4		44		0.312
	Medium	SD-LGF-001-A	Y7ZE5	6/23/11	11:25	29.6	D	3.8		1	U	5	U	7.2		5	U	7		6.9		9.9		5	U	5	U	6.1		5.3		62		5	U	110		73		870		74		15		78		33		69		77		120		250		8.063
		SD-LGF-003-A	Y7ZE9	6/23/11	12:00	43.7	D	7.4		1	U	5	U	18		7		17		18		24		7.9		5.8		13		9.7		110		5	U	170		130		1300		180		61		170		120		200		220		180		440		25.909
		SD-LGM-001-A	Y7ZF3	6/23/11	9:00	49.3	D	2.1		1	U	5	U	5	U	5	U	5	U	5	U	5.4		5	U	5	U	6.2		5	U	45		5	U	120		110		1100		32		4.1		34		5.6		51		56		90		310		3.383
		SD-NEL-021-A	Y7ZG1	6/23/11	9:10	71.7	D	2		1	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	19		5	U	26		28		230		36		6.7		22		5.9		13		22		19		64		0.727
	High	SD-DSA-001-A	Y7ZG5	6/23/11	14:00	48.2	D	20		2.4		25		52		10		68		69		94		26		14		31		24		460		40		310		610		1400		480		170		660		350		630		570		800		740		72.053
		SD-DSA-003-A	Y7ZG9	6/23/11	13:35	49.4	D	13		1.5		16		35		6.1		43		5	U	50		15		8.3		16		14		200		29		150		300		560		320		120		330		210		360		260		230		360		38.558
		SD-DSA-006-A	Y7ZH3	6/23/11	13:16	57.8	D	5.1		1	U	6.3		13		5	U	14		14		19		5.5		5	U	5.7		5.3		75		11		60		100		220		130		41		150		59		140		96		110		140		12.505
		SD-NEL-007-A	Y7ZH7	6/23/11	9:50	62.2	D	1	U	1	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	10	U	12	J	18		3		5	U	5	U	5	U	5	U	5	U	5	U	0.004
		SD-NEL-009-A	Y7ZJ1	6/23/11	9:30	67.7	D	1	U	1	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	10	U	12	J	2.3		1	U	5	U	5	U	5	U	5	U	5	U	5	U	0.004

Notes:
Units are in ng/kg
WHO 2005 TEF = Word Health Organization 2005 Toxicity Equivalency Factor
Data Qualifiers (Q):
U = The analyte was analyzed for, but was not detected at a level greater than or equal to the detection limit listed in this table.
J = The analyte was positively identified and the associated numerical value is the approximate concentration of the analyte in the sample (because quality control criteria were not met, or the concentration of the analyte was below the reporting limit).

TABLE A-7

Pyrethroid Analytical Results, Solid Matrix, Biological Sampling

Baseline Ecological Risk Assessment, Halaco Site, Oxnard, California

	Lagoon Finger - Footbridge						Lagoon - Main			Lagoon Finger - Outer			Ditch South of WMU		
	SD-LGF-001-A			SD-LGF-003-A			SD-LGM-003-A			SD-LGF-007-A			SD-DSA-001-A		
	Y7ZF3			Y7ZE9			Y7ZF7			Y7ZC2			Y7ZG5		
Parameters	**Result**	**RL**	**MDL**	**Result**	**RL**	**MDL**	**Result**	**RL**	**MDL**	**Result**	**RL**	**MDL**	**Result**	**RL**	**MDL**
Allethrin	ND	2.6	0.52	ND	3.4	0.52	ND	66.4	10	ND	0.33	0.05	ND	3.5	0.53
Bifenthrin	11.9	2.6	1	5.5	3.4	1	J37.1	66.4	20	J0.20	0.33	0.1	4.8	3.5	1.1
Chlorpyrifos	J2.2	2.6	1.2	ND	3.4	1.2	J52.2	66.4	24	J0.16	0.33	0.12	ND	3.5	1.3
Cyfluthrin	ND	2.6	1.1	ND	3.4	1.1	ND	66.4	22	ND	0.33	0.11	ND	3.5	1.2
Lambda-Cyhalothrin	ND	2.6	0.62	ND	3.4	0.62	ND	66.4	12	ND	0.33	0.06	ND	3.5	0.64
Cypermethrin	ND	2.6	1	ND	3.4	1	ND	66.4	20	ND	0.33	0.1	ND	3.5	1.1
Diazinon	ND	2.6	0.93	ND	3.4	0.93	ND	66.4	18	ND	0.33	0.09	ND	3.5	0.95
Deltamethrin:Tralomethrin	ND	2.6	1.2	ND	3.4	1.2	ND	66.4	24	ND	0.33	0.12	ND	3.5	1.3
Esfenvalerate:Fenvalerate	ND	2.6	1.3	ND	3.4	1.3	ND	66.4	26	ND	0.33	0.13	ND	3.5	1.4
Fenpropathrin	ND	2.6	0.73	ND	3.4	0.73	ND	66.4	14	ND	0.33	0.07	ND	3.5	0.74
Tau-Fluvalinate	ND	2.6	0.41	ND	3.4	0.42	ND	66.4	8	ND	0.33	0.04	ND	3.5	0.42
Permethrin	11.1	2.6	1.1	7.8	3.4	1.1	ND	66.4	22	J0.12	0.33	0.11	11.3	3.5	1.2
Tetramethrin	ND	2.6	0.62	ND	3.4	0.62	ND	66.4	12	ND	0.33	0.06	ND	3.5	0.64

Notes:

Units are in µg/kg

Samples analyzed by CALTEST Analytical Laboratory, 1885 North Kelly Road, Napa, CA 94558

RL = Reporting Limit: the quantitation limit at which the laboratory is able to detect an analyte

MDL = Method Detection Limit

ND = Not Detected: indicates analyte has not been detected at or above the RL.

J = Estimated analytical result value detected below the RL and above the MDL.

TABLE A-8

Bioassay Analytical Results, Solid Matrix, Biological Sampling

Baseline Ecological Risk Assessment, Halaco Site, Oxnard, California

Range	Area	Sample ID	Date	Time	Lab Batch	28-day Survival Mean (%]	42-day Survival Mean (%]	28-day Growth (mg/ organism)	42-day Growth (mg/ organism)	42-day Reproduction (neonates/ female)
Low	Lagoon	SD-LGF-007-A	6/23/11	16:25	1	75.0	67.5	0.29	0.36	4.9
	Finger	SD-LGF-008-A	6/23/11	16:35	2	54.2	56.3	0.29	0.48	5.6
	West	SD-LGF-009-A	6/23/11	16:50	1	19.2	10.0	0.18	0.42	0.0
	Lagoon	SD-LGF-010-A	6/23/11	16:00	1	53.3	48.8	0.27	0.34	2.5
	Finger	SD-LGF-012-A	6/23/11	15:35	1	53.3	55.0	0.35	0.46	1.0
	East	SD-LGF-112-A	6/23/11	15:35	2	67.5	72.5	0.35	0.41	6.9
Medium	Lagoon	SD-LGF-001-A	6/23/11	11:25	1	90.0	92.5	0.28	0.30	3.4
	Footbridge	SD-LGF-003-A	6/23/11	12:00	1	84.2	78.8	0.24	0.31	2.8
	Lagoon	SD-LGM-001-A	6/23/11	9:00	2	70.8	63.8	0.26	0.49	4.1
	Main	SD-LGM-003-A	6/23/11	17:05	2	62.5	70.0	0.45	0.39	4.4
	NCL-East	SD-NEL-021-A	6/23/11	9:10	2	83.3	77.5	0.21	0.32	4.9
High	WMU	SD-DSA-001-A	6/23/11	14:00	1	84.2	86.3	0.29	0.34	4.6
	Ditch	SD-DSA-003-A	6/23/11	13:35	2	95.8	95.0	0.27	0.24	5.9
		SD-DSA-006-A	6/23/11	13:16	2	94.2	88.8	0.25	0.26	2.9
	NCL-East	SD-NEL-007-A	6/23/11	9:50	1	28.3	26.3	0.17	0.32	0.0
		SD-NEL-009-A	6/23/11	9:30	2	85.0	78.8	0.22	0.33	5.6
Laboratory	Batch 1	t initiated on July 6, 2011			1	94.2	92.5	0.23	0.27	3.5
Control	Batch 2	t initiated on July 7, 2011			2	86.7	90.0	0.33	0.29	5.5

Notes:

Samples analyzed by Nautilus Environmental, 4340 Vandever Avenue, San Diego, CA 92120

TABLE A-9

Percent Solids Analytical Results, Tissue Matrix, Biological Sampling

Baseline Ecological Risk Assessment, Halaco Site, Oxnard, California

Tissue Type	Sample Contents/Taxa	Mass (grams)	Sample ID	Date	Time	Result	Average
Terrestrial Invertebrates	beachhoppers, sowbugs, beetles	6	TI-NEL-025-A	6/23/11	9:00	28.2	26.6
	beachhoppers, sowbugs, beetles	3	TI-NEL-028-A	6/23/11	9:50	25.0	
	snails	5	TI-NNL-002-A	6/23/11	8:30	15.1	17.4
	snails	5	TI-WLE-007-A	6/23/11	13:15	19.6	
Benthic Invertebrates	crayfish	2	BI-DSA-001-R	6/22/11	13:00	21.2	25.8
	crayfish	2	BI-DSA-003-R	6/22/11	11:00	28.3	
	crayfish	2	BI-DSA-006-A	6/22/11	13:00	18.9	
	crayfish	3	BI-NEL-007-R	6/22/11	15:55	34.9	
	waterboatmen	5	BI-NEL-007-A	6/22/11	15:55	15.8	14.5
	waterboatmen (duplicate)		BI-NEL-107-A	6/22/11	15:55	14.4	
	waterboatmen	5	BI-NEL-009-A	6/22/11	16:00	14.0	
	waterboatmen	5	BI-NEL-021-A	6/22/11	15:30	13.9	
Fish	Gobies	1.5	FH-DSA-006-A	6/22/11	13:05	22.3	21.4
	Gobies	5	FH-LGF-008-A	6/22/11	9:00	21.2	
	Gobies	3	FH-LGF-009-A	6/22/11	10:00	22.3	
	Gobies	5	FH-LGF-010-A	6/21/11	16:45	18.8	
	Gobies	3	FH-LGF-012-A	6/21/11	15:00	20.2	
	Gobies	1.75	FH-NEL-009-A	6/22/11	16:05	24.5	
	Gobies	22	FH-NEL-021-A	6/22/11	15:30	20.4	
	topsmelt	3	FH-LGF-001-B	6/21/11	13:00	13.5	18.3
	topsmelt	3	FH-LGF-003-B	6/21/11	13:50	13.9	
	topsmelt	17	FH-LGF-007-B	6/22/11	8:00	19.4	
	topsmelt (duplicate)	30	FH-LGF-107-B	6/22/11	8:00	18.7	
	topsmelt	50	FH-LGF-008-B	6/22/11	9:05	19.2	
	topsmelt	180	FH-LGF-009-B	6/22/11	10:05	21.1	
	topsmelt	90	FH-LGF-010-B	6/21/11	16:50	18.2	
	topsmelt	70	FH-LGF-012-B	6/21/11	15:05	20.7	
	topsmelt	30	FH-LGM-001-B	6/21/11	12:00	19.6	
	topsmelt	185	FH-LGM-003-B	6/21/11	11:05	19.1	
	Goldfish/carp	3	FH-LGF-008-Y	6/22/11	9:10	22.5	22.5
	Long-jawed mudsuckers	3	FH-NEL-009-X	6/22/11	16:06	24.1	24.1
Average (all samples)						20.3	

TABLE A-10a

Metals Analytical Results, Tissue Matrix, Biological Sampling (mixed dry and wet weight)

Baseline Ecological Risk Assessment, Halaco Site, Oxnard, California

Biota	Range	Sample Contents/Taxa	Mass (grams)	Average % Solids	Lab Sample ID	Date	Time	Percent Solids	Weight Basis	Aluminum Result	Q	Antimony Result	Q	Arsenic Result	Q	Barium Result	Q	Beryllium Result	Q	Cadmium Result	Q	Calcium Result	Q	Chromium Result	Q	Cobalt Result	Q	Copper Result	Q	Iron Result	Q	Lead Result	Q	Magnesium Result	Q	Manganese Result	Q	Mercury Result	Q	Nickel Result	Q	Potassium Result	Q	Selenium Result	Q	Silver Result	Q	Sodium Result	Q	Thallium Result	Q	Vanadium Result	Q	Zinc Result	Q
Terrestrial Inverts	Low	snails	5.0	17.4	TI-WLE-007-A	6/23/11	13:15	19.6	D	388		5.10	U	3.06	U	118		1.02	U	5.31		42500		5.10	U	5.10	U	202		982		3.06	U	4640		45.7		0.091		15.3	U	5270		5.10	U	5.10	U	6940		2.55	U	5.10	U	161	
		sow bugs/mixed insects	0.2	26.6	TI-WLW-008-A	6/24/11	08:00	100	W	688		2.17	U	1.30	U	29.9		0.435	U	0.870	U	28400		2.17	U	2.17	U	39.5		1170		2.52		1390		22.0		0.017		6.52	U	2700		2.17	U	2.17	U	1670		1.09	U	2.20		51.6	
		mixed insects	0.3	26.6	TI-NNB-001-A	6/23/11	17:00	100	W	682		1.67	U	1.00	U	120		0.333	U	0.667	U	49500		1.67		1.67	U	87.5		1250		1.52		1880		25.4		0.048		5.00	U	3450		1.67	U	1.67	U	3190		0.833	U	2.50		84.2	
		snails	0.5	17.4	TI-NNB-006-A	6/23/11	16:30	100	W	270		1.00	U	0.600	U	44.0		0.200	U	0.870		2850		1.00	U	1.00	U	18.4		546		0.640		773		17.8		0.0078 J		3.00	U	1210		1.00	U	1.00	U	1230		0.500	U	1.10		29.1	
		snails	5.0	17.4	TI-NNL-002-A	6/23/11	08:30	15.1	D	985		6.62	U	3.97	U	87.9		1.32	U	4.77		19700		6.62	U	6.62	U	60.1		1920		3.97	U	5450		84.4		0.18	U	19.9	U	5890		6.62	U	6.62	U	5350		3.31	U	6.62	U	197	
	Medium	beach hoppers, sow bugs, beetles	6	26.6	TI-NEL-025-A	6/23/11	09:00	28.2	D	1310		3.55	U	2.13	U	64.1		0.709	U	1.42	U	66900		4.54		3.55	U	63.9		3120		8.55		4530		68.6		0.063		10.6	U	5030		3.55	U	3.55	U	11100		1.77	U	4.79		98.4	
		beach hoppers, sow bugs, beetles	3	26.6	TI-NEL-028-A	6/23/11	09:50	25.0	D	2310		4.00	U	2.40	U	66.4		0.800	U	1.60	U	53200		5.92		4.00	U	65.3		3700		6.08		4390		85.7		0.067		12.0	U	5800		4.00	U	4.00	U	10500		2.00	U	7.52		95.2	
	High	spiders/beetles/beach hoppers	0.7	26.6	TI-DSC-002-A	6/23/11	14:50	100	W	3110		1.00	U	0.600	U	71.7		0.200	U	0.700		27300		6.63		1.00	U	230		1040		8.65		1790		59.9		0.03		3.94		2070		1.75		1.00	U	2930		0.500	U	2.01		115	
		spiders/cricket	0.25	26.6	TI-DSC-003-A	6/23/11	14:40	100	W	1960		1.79	U	1.07	U	28.3		0.357	U	0.714	U	5590		3.98		1.79	U	97.2		336		5.73		973		30.4		0.03		5.36	U	2450		1.79	U	1.79	U	1380		0.893	U	1.79	U	95.7	
		spiders/beetles	0.2	26.6	TI-DSC-004-A	6/23/11	14:40	100	W	1750		4.17	U	2.50	U	49.6		0.833	U	1.67	U	5900		4.17	U	4.17	U	135		647		5.21		1420		39.7		0.053		12.5	U	2750		4.17	U	4.17	U	1680		2.08	U	4.17	U	105	
		mixed insects	0.5	26.6	TI-DSC-005-A	6/23/11	14:00	100	W	2810		1.00	U	0.600	U	43.1		0.200	U	0.400	U	12800		11.2		1.00	U	106		477		5.86		1260		47.1		0.015		5.62		2130		1.09		1.00	U	2190		0.500	U	1.72		84.9	
		spiders/beetles	0.05	26.6	TI-DSC-008-A	6/23/11	13:30	100	W	214		9.09	U	5.45	U	18.2	U	1.82	U	3.64	U	1260		9.09	U	9.09	U	30.8		130		5.45	U	677		19.4		0.015 J		27.3	U	3700		9.09	U	9.09	U	1210		4.55	U	9.09	U	82.6	
Benthic Inverts	Medium	dragonflies/damselflies	0.5	26.6	BI-LGM-001-A	6/21/11	11:00	100	W	20.0	U	1.00	U	0.600	U	2.00	U	0.200	U	0.400	U	271		1.00	U	1.00	U	3.71		26.7		0.600	U	169		21.1		0.002 U		3.00	U	1320		1.00	U	1.00	U	979		0.500	U	1.00	U	13.7	
		crayfish	0.5	25.8	BI-LGM-001-R	6/21/11	11:05	100	W	28.4		1.00	U	0.600	U	4.15		0.200	U	0.400	U	25300		1.00	U	1.00	U	18.9		102		0.600	U	638		76.3		0.0084 J		3.00	U	1520		1.00	U	1.00	U	1280		0.500	U	1.00	U	14.3	
		waterboatmen	5	14.5	BI-NEL-021-A	6/22/11	15:30	13.9	D	595		7.19	U	4.32	U	75.2		1.44	U	2.88	U	10600		7.19	U	7.19	U	91.2		699		4.60		2500		77.9		0.011 U		21.6	U	10100		7.19	U	7.19	U	8950		3.60	U	7.19	U	262	
	High	mixed insects	0.5	26.6	BI-DSA-001-A	6/22/11	13:30	100	W	22.3		1.00	U	0.600	U	2.00	U	0.200	U	0.400	U	279		1.00	U	1.00	U	4.38		23.0		0.600	U	180		13.6		0.0015 U		3.00	U	1120		1.00	U	1.00	U	835		0.500	U	1.00	U	15.3	
		crayfish	2	25.8	BI-DSA-001-R	6/22/11	13:00	21.2	D	521		4.72	U	2.83	U	34.1		0.943	U	1.89	U	103000		4.72	U	4.72	U	404		307		2.83	U	3960		941		0.0069 U		14.2	U	10400		5.75		4.72	U	10300		2.36	U	4.72	U	104	
		crayfish	2	25.8	BI-DSA-003-A	6/22/11	11:00	28.3	D	199		3.53	U	2.12	U	33.1		0.707	U	1.41	U	157000		3.53	U	3.53	U	173		112		2.12	U	4320		428		0.0051 U		10.6	U	6580		3.53	U	3.53	U	8680		1.77	U	3.53	U	74.7	
		mixed insects	0.3	26.6	BI-DSA-003-Z	6/22/11	11:05	100	W	43.9		1.95	U	1.17	U	3.91	U	0.391	U	0.781	U	493		1.95	U	1.95	U	16.0		43.8		1.17	U	361		43.0		0.0086 J		5.86	U	1980		2.30		1.95	U	1330		0.977	U	1.95	U	46.7	
		crayfish	2	25.8	BI-DSA-006-A	6/22/11	13:00	18.9	D	802		5.29	U	3.17	U	71.9		1.06	U	2.12	U	115000		5.29	U	5.29	U	501		701		3.17	U	4860		1640		0.0075 U		15.9	U	13500		7.94		5.29	U	9850		2.65	U	5.29	U	261	
		mixed insects	0.4	26.6	BI-DSA-006-Z	6/22/11	13:05	100	W	45.3		1.00	U	0.600	U	11.2		0.200	U	0.400	U	6760		1.00	U	1.00	U	14.2		69.3		0.600	U	240		31.2		0.002 U		3.00	U	1070		1.00	U	1.00	U	790		0.500	U	1.00	U	37.7	
		waterboatmen	5	14.5	BI-NEL-007-A	6/22/11	15:55	15.8	D	19200		6.33	U	3.80	U	329		2.03		2.53	U	14900		24.9		6.33	U	332		2100		22.6		6580		479		0.0092 U		21.5		6290		6.33	U	6.33	U	3950		3.16	U	6.58		462	
		waterboatmen (duplicate)		14.5	BI-NEL-107-A	6/22/11	15:55	14.4	D	4400		6.94	U	4.17	U	88.7		1.39	U	2.78	U	11700		13.5		6.94	U	140		922		10.5		3060		240		0.01 U		20.8	U	8670		6.94	U	6.94	U	5210		3.47	U	6.94	U	464	
		crayfish	3	25.8	BI-NEL-007-R	6/22/11	15:55	34.9	D	204		2.87	U	1.72	U	66.3		0.573	U	1.15	U	211000		4.07		2.87	U	111		171		1.72	U	7650		154		0.0042 U		8.60	U	6900		3.21		2.87	U	6850		1.43	U	2.87	U	93.2	
		waterboatmen	5	14.5	BI-NEL-009-A	6/22/11	16:00	14.0	D	322		7.14	U	4.29	U	52.5		1.43	U	2.86	U	14100		10.1		7.14	U	87.2		726		4.29	U	1650		113		0.01 U		21.4	U	6450		7.14	U	7.14	U	3650		3.57	U	7.14	U	307	
Bottom Fish	Low	Gobies	5	21.4	FH-LGF-008-A	6/22/11	09:00	21.2	D	94.3	U	4.72	U	2.83	U	9.43	U	0.943	U	1.89	U	26500		7.59		4.72	U	9.43	U	107		2.83	U	1390		29.7		0.015 J		14.2	U	11300		6.32		4.72	U	3250		2.36	U	4.72	U	121	
		Goldfish/carp	3	22.5	FH-LGF-008-Y	6/22/11	09:10	22.5	D	91.4		4.44	U	2.67	U	31.1		0.889	U	1.78	U	50000		5.82		4.44	U	8.89	U	351		2.67	U	2020		28.4		0.013 J		13.3	U	13100		6.80		4.44	U	4310		2.22	U	4.44	U	359	
		Gobies	3	21.4	FH-LGF-009-A	6/22/11	10:00	22.3	D	89.7	U	4.48	U	2.69	U	8.97	U	0.897	U	1.79	U	26500		5.92		4.48	U	8.97	U	100		2.69	U	1290		26.9		0.016 J		13.5	U	12100		7.04		4.48	U	3410		2.24	U	4.48	U	105	
		Gobies	5	21.4	FH-LGF-010-A	6/21/11	16:45	18.8	D	106	U	5.32	U	3.19	U	10.6	U	1.06	U	2.13	U	29800		8.88		5.32	U	10.6	U	218		3.19	U	1510		66.5		0.0078 U		16.0	U	12500		6.49		5.32	U	4110		2.66	U	5.32	U	109	
		Gobies	3	21.4	FH-LGF-012-A	6/21/11	15:00	20.2	D	128		4.95	U	2.97	U	9.90	U	0.990	U	1.98	U	38200		6.73		4.95	U	9.90	U	367		2.97	U	1800		62.5		0.0071 U		14.9	U	14900		8.32		4.95	U	4690		2.48	U	4.95	U	110	
	Medium	Staghorn sculpin	1	24.1	FH-LGF-001-A	6/21/11	13:05	100	W	20.0	U	1.00	U	0.600	U	2.00	U	0.200	U	0.400	U	8700		1.00	U	1.00	U	2.20		24.6		0.600	U	350		4.44		0.0021 J		3.00	U	2190		1.21		1.00	U	789		0.500	U	1.00	U	16.7	
		Gobies	1	21.4	FH-LGF-001-X	6/21/11	13:10	100	W	20.0	U	1.00	U	0.600	U	2.00	U	0.200	U	0.400	U	8060		1.00	U	1.00	U	2.00	U	17.3		0.600	U	342		5.71		0.0015 U		3.00	U	2010		1.55		1.00	U	722		0.500	U	1.00	U	22.6	
		Gobies	1	21.4	FH-LGF-003-A	6/21/11	13:45	100	W	20.0	U	1.00	U	0.600	U	2.00	U	0.200	U	0.400	U	9030		1.00	U	1.00	U	2.00	U	29.3		0.600	U	374		6.95		0.0022 U		3.00	U	2040		1.58		1.00	U	720		0.500	U	1.00	U	26.6	
		Gobies	0.6	21.4	FH-LGM-001-A	6/21/11	11:00	100	W	20.0	U	1.00	U	0.600	U	2.00	U	0.200	U	0.400	U	7100		1.00	U	1.00	U	2.00	U	32.3		0.600	U	322		7.59		0.002 U		3.00	U	2660		1.43		1.00	U	803		0.500	U	1.00	U	22.5	
		Gobies	0.4	21.4	FH-LGM-003-A	6/21/11	11:00	100	W	28.6		1.00	U	0.600	U	2.00	U	0.200	U	0.400	U	6820		1.00	U	1.00	U	2.00	U	57.2		0.600	U	321		8.99		0.0027 U		3.00	U	1920		1.44		1.00	U	629		0.500	U	1.00	U	29.9	
		Gobies	22	21.4	FH-NEL-021-A	6/22/11	15:30	20.4	D	365		4.90	U	2.94	U	18.6		0.980	U	1.96	U	40300		4.90	U	4.90	U	11.8		331		2.94	U	1950		39.0		0.007 U		14.7	U	14400		7.16		4.90	U	4460		2.45	U	4.90	U	155	
	High	Goldfish/carp	0.3	22.5	FH-DSA-001-A	6/22/11	13:30	100	W	46.8		1.18	U	0.706	U	2.35	U	0.235	U	0.471	U	6940		2.06		1.18	U	2.35	U	47.0		0.706	U	349		7.82		0.0025 U		3.53	U	2420		1.73		1.18	U	867		0.588	U	1.18	U	53.7	
		Goldfish/carp	0.5	22.5	FH-DSA-003-A	6/22/11	11:00	100	W	20.0	U	1.00	U	0.600	U	2.00	U	0.200	U	0.400	U	9440		1.00	U	1.00	U	2.39		29.0		0.600	U	422		11.8		0.0021 U		3.00	U	2500		1.52		1.00	U	928		0.500	U	1.00	U	62.8	
		Gobies	0.25	21.4	FH-DSA-003-X	6/22/11	11:05	100	W	54.1		2.24	U	1.35	U	4.48	U	0.448	U	0.897	U	13200		2.24	U	2.24	U	4.48	U	55.7		1.35	U	524		30.0		0.0045 J		6.73	U	3770		2.24	U	2.24	U	1090		1.12	U	2.24	U	34.2	
		Gobies	1.5	21.4	FH-DSA-006-A	6/22/11	13:05	22.3	D	138		4.48	U	2.69	U	8.97	U	0.897	U	1.79	U	40300		4.48	U	4.48	U	8.97	U	151		2.69	U	1610		42.9		0.018 J		13.5	U	12500		7.76		4.48	U	3770		2.24	U	4.48	U	148	
		Goldfish/carp	0.25	22.5	FH-DSA-006-Y	6/22/11	13:00	100	W	20.0	U	1.00	U	0.600	U	2.00	U	0.200	U	0.400	U	2320		1.00	U	1.00	U	2.00	U	23.2		0.600	U	123		9.15		0.002 U		3.00	U	645		1.00	U	1.00	U	224		0.500	U	1.00	U	17.3	
		Gobies	0.25	21.4	FH-NEL-007-A	6/22/11	15:50	100	W	62.0		1.00	U	0.600	U	2.34		0.200	U	0.400	U	4680		1.00	U	1.00	U	2.00	U	51.5		0.600	U	272		10.3		0.0022 U		3.00	U	1650		1.00	U	1.00	U	539		0.500	U	1.00	U	20.4	
		Gobies	1.75	21.4	FH-NEL-009-A	6/22/11	16:05	24.5	D	304		4.08	U	2.45	U	13.2		0.816	U	1.63	U	25400		4.08	U	4.08	U	10.7		273		2.45	U	1470		39.0		0.0057 U		12.2	U	11400		5.84		4.08	U	3420		2.04	U	4.08	U	138	
		Long-jawed mudsuckers	3	24.1	FH-NEL-009-X	6/22/11	16:06	24.1	D	83.0	U	4.15	U	2.49	U	8.30	U	0.830	U	1.66	U	18600		4.15	U	4.15	U	8.30	U	97.8		2.49	U	816		14.3		0.015 J		12.4	U	9800		4.15	U	4.15	U	4020		2.07	U	4.15	U	103	
Water Column Fish	Low	topsmelt	17	18.3	FH-LGF-007-B	6/22/11	08:00	19.4	D	103	U	5.15	U	3.09	U	10.3	U	1.03	U	2.06	U	41400		5.15	U	5.15	U	10.3	U	172		3.09	U	2160		43.9		0.019 J		15.5	U	10400		8.30		5.15	U	3330		2.58	U	5.15	U	209	
		topsmelt (duplicate)	30	18.3	FH-LGF-107-B	6/22/11	08:00	18.7	D	107	U	5.35	U	3.21	U	10.7	U	1.07	U	2.14	U	39300		5.35	U	5.35	U	10.7	U	121		3.21	U	1840		35.0		0.017 J		16.0	U	7980		5.40		5.35	U	3010		2.67	U	5.35	U	143	
		topsmelt	50	18.3	FH-LGF-008-B	6/22/11	09:05	19.2	D	104	U	5.21	U	3.13	U	10.4	U	1.04	U	2.08	U	34900		5.21	U	5.21	U	10.4	U	120		3.13	U	1760		33.8		0.02 J		15.6	U	9800		6.04		5.21	U	3130		2.60	U	5.21	U	146	
		topsmelt	180	18.3	FH-LGF-009-B	6/22/11	10:05	21.1	D	94.8	U	4.74	U	2.84	U	9.48	U	0.948	U	1.90	U	34300		4.74	U	4.74	U	9.48	U	122		2.84	U	1590		31.4		0.015 J		14.2	U	11100		5.59		4.74	U	3310		2.37	U	4.74	U	123	
		topsmelt	90	18.3	FH-LGF-010-B	6/21/11	16:50	18.2	D	110	U	5.49	U	3.30	U	11.0	U	1.10	U	2.20	U	32900		5.49	U	5.49	U	14.1		244		3.30	U	1680		44.0		0.018 J		16.5	U	9530		5.49	U	5.49	U	3460		2.75	U	5.49	U	137	
		topsmelt	70	18.3	FH-LGF-012-B	6/21/11	15:05	20.7	D	96.6	U	4.83	U	2.90	U	9.66	U	0.966	U	1.93	U	25300		4.83	U	4.83	U	9.66	U	360		2.90	U	1430		30.9		0.019 J		14.5	U	9990		4.83	U	4.83	U	3480		2.42	U	4.83	U	108	
	Medium	topsmelt	3	18.3	FH-LGF-001-B	6/21/11	13:00	13.5	D	148	U	7.41	U	4.44	U	14.8	U	1.48	U	2.96	U	50000		7.41	U	7.41	U	14.8	U	153		4.44	U	2270		35.1		0.011 U		22.2	U	5350		7.41	U	7.41	U	2870		3.70	U	7.41	U	208	
		topsmelt	3	18.3	FH-LGF-003-B	6/21/11	13:50	13.9	D	144	U	7.19	U	4.32	U	14.4	U	1.44	U	2.88	U	41000		7.19	U	7.19	U	14.4	U	210		4.32	U	2280		52.4		0.019 J		21.6	U	8370		7.19		7.19	U	3990		3.60	U	7.19	U	158	
		topsmelt	30	18.3	FH-LGM-001-B	6/21/11	12:00	19.6	D	102	U	5.10	U	3.06	U	10.2	U	1.02	U	2.04	U	38700		5.10	U	5.10	U	10.2	U	144		3.06	U	1780		40.5		0.019 J		15.3	U	10100		5.77		5.10	U	3500		2.55	U	5.10	U	136	
		topsmelt	185	18.3	FH-LGM-003-B	6/21/11	11:05	19.1	D	105	U	5.24	U	3.14	U	10.5	U	1.05	U	2.09	U	17400		5.24	U	5.24	U	10.5	U	121		3.14	U	1150		34.1		0.016 J		15.7	U	4650		5.24	U	5.24	U	2210		2.62	U	5.24	U	84.7	

Notes:

Units are in mg/kg

Results are a combination of wet weight (W) and dry weight (D) as reported by the laboratory.

Data Qualifiers (Q):

U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit listed in the table.

J = The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.

TABLE A-10b

Metals Analytical Results, Tissue Matrix, Biological Sampling (all dry weight)

Baseline Ecological Risk Assessment, Halaco Site, Oxnard, California

Biota	Range	Sample Contents/Taxa	Mass (grams)	Average % Solids	Lab Sample ID	Date	Time	Percent Solids	Weight Basis	Aluminum Result	Q	Antimony Result	Q	Arsenic Result	Q	Barium Result	Q	Beryllium Result	Q	Cadmium Result	Q	Calcium Result	Q	Chromium Result	Q	Cobalt Result	Q	Copper Result	Q	Iron Result	Q	Lead Result	Q	Magnesium Result	Q	Manganese Result	Q	Mercury Result	Q	Nickel Result	Q	Potassium Result	Q	Selenium Result	Q	Silver Result	Q	Sodium Result	Q	Thallium Result	Q	Vanadium Result	Q	Zinc Result	Q
Terrestrial Inverts	Low	snails	5.0	17.4	TI-WLE-007-A	6/23/11	13:15	19.6	D	388		5	U	3	U	118		1	U	5		42500		5	U	5	U	202		982		3	U	4640		46		0.091		15	U	5270		5	U	5	U	6940		3	U	5	U	161	
		sow bugs/mixed insects	0.2	26.6	TI-WLW-008-A	6/24/11	08:00	100.0	D conv	2586		8	U	5	U	112		2	U	3	U	106767		8	U	8	U	148		4398		9		5226		83		0.064		25	U	10150		8	U	8	U	6278		4	U	8		194	
		mixed insects	0.3	26.6	TI-NNB-001-A	6/23/11	17:00	100.0	D conv	2564		6	U	4	U	451		1	U	3	U	186090		6		6	U	329		4699		6		7068		95		0.180		19	U	12970		6	U	6	U	11992		3	U	9		317	
		snails	0.5	17.4	TI-NNB-006-A	6/23/11	16:30	100.0	D conv	1552		6	U	3	U	253		1	U	5		16379		6	U	6	U	106		3138		4		4443		102		0.045	J	17	U	6954		6	U	6	U	7069		3	U	6		167	
		snails	5.0	17..4	TI-NNL-002-A	6/23/11	08:30	15.1	D	985		7	U	4	U	88		1	U	5		19700		7	U	7	U	60		1920		4	U	5450		84		0.180	U	20	U	5890		7	U	7	U	5350		3	U	7	U	197	
	Medium	beach hoppers, sow bugs, beetles	6	26.6	TI-NEL-025-A	6/23/11	09:00	28.2	D	1310		4	U	2	U	64		1	U	1	U	66900		5		4	U	64		3120		9		4530		69		0.063		11	U	5030		4	U	4	U	11100		2	U	5		98	
		beach hoppers, sow bugs, beetles	3	26.6	TI-NEL-028-A	6/23/11	09:50	25.0	D	2310		4	U	2	U	66		1	U	2	U	53200		6		4	U	65		3700		6		4390		86		0.067		12	U	5800		4	U	4	U	10500		2	U	8		95	
	High	spiders/beetles/beach hoppers	0.7	26.6	TI-DSC-002-A	6/23/11	14:50	100.0	D conv	11692		4	U	2	U	270		1	U	3		102632		25		4	U	865		3910		33		6729		225		0.113		15		7782		7		4	U	11015		2	U	8		432	
		spiders/cricket	0.25	26.6	TI-DSC-003-A	6/23/11	14:40	100.0	D conv	7368		7	U	4	U	106		1	U	3	U	21015		15		7	U	365		1263		22		3658		114		0.113		20	U	9211		7	U	7	U	5188		3	U	7	U	360	
		spiders/beetles	0.2	26.6	TI-DSC-004-A	6/23/11	14:40	100.0	D conv	6579		16	U	9	U	186		3	U	6	U	22180		16	U	16	U	508		2432		20		5338		149		0.199		47	U	10338		16	U	16	U	6316		8	U	16	U	395	
		mixed insects	0.5	26.6	TI-DSC-005-A	6/23/11	14:00	100.0	D conv	10564		4	U	2	U	162		1	U	2	U	48120		42		4	U	398		1793		22		4737		177		0.056		21		8008		4		4	U	8233		2	U	6		319	
		spiders/beetles	0.05	26.6	TI-DSC-008-A	6/23/11	13:30	100.0	D conv	805		34	U	20	U	68	U	7	U	14	U	4737		34	U	34	U	116		489		20	U	2545		73		0.056	J	103	U	13910		34	U	34	U	4549		17	U	34	U	311	
Benthic Inverts	Medium	dragonflies/damselflies	0.5	26.6	BI-LGM-001-A	6/21/11	11:00	100.0	D conv	75	U	4	U	2	U	8	U	1	U	2	U	1019		4	U	4	U	14		100		2	U	635		79		0.008	U	11	U	4962		4	U	4	U	3680		2	U	4	U	52	
		crayfish	0.5	25.8	BI-LGM-001-R	6/21/11	11:05	100.0	D conv	110		4	U	2	U	16		1	U	2	U	98062		4	U	4	U	73		395		2	U	2473		296		0.033	J	12	U	5891		4	U	4	U	4961		2	U	4	U	55	
		waterboatmen	5	14.5	BI-NEL-021-A	6/22/11	15:30	13.9	D	595		7	U	4	U	75		1	U	3	U	10600		7	U	7	U	91		699		5		2500		78		0.011	U	22	U	10100		7	U	7	U	8950		4	U	7	U	262	
	High	mixed insects	0.5	26.6	BI-DSA-001-A	6/22/11	13:30	100.0	D conv	84		4	U	2	U	8	U	1	U	2	U	1049		4	U	4	U	16		86		2	U	677		51		0.006	U	11	U	4211		4	U	4	U	3139		2	U	4	U	58	
		crayfish	2	25.8	BI-DSA-001-R	6/22/11	13:00	21.2	D	521		5	U	3	U	34		1	U	2	U	103000		5	U	5	U	404		307		3	U	3960		941		0.007	U	14	U	10400		6		5	U	10300		2	U	5	U	104	
		crayfish	2	25.8	BI-DSA-003-R	6/22/11	11:00	28.3	D	199		4	U	2	U	33		1	U	1	U	157000		4	U	4	U	173		112		2	U	4320		428		0.005	U	11	U	6580		4	U	4	U	8680		2	U	4	U	75	
		mixed insects	0.3	26.6	BI-DSA-003-Z	6/22/11	11:05	100.0	D conv	165		7	U	4	U	15	U	1	U	3	U	1853		7	U	7	U	60		165		4	U	1357		162		0.032	J	22	U	7444		9		7	U	5000		4	U	7	U	176	
		crayfish	2	25.8	BI-DSA-006-A	6/22/11	13:00	18.9	D	802		5	U	3	U	72		1	U	2	U	115000		5	U	5	U	501		701		3	U	4860		1640		0.008	U	16	U	13500		8		5	U	9850		3	U	5	U	261	
		mixed insects	0.4	26.6	BI-DSA-006-Z	6/22/11	13:05	100.0	D conv	170		4	U	2	U	42		1	U	2	U	25414		4	U	4	U	53		261		2	U	902		117		0.008	U	11	U	4023		4	U	4	U	2970		2	U	4	U	142	
		waterboatmen	5	14.5	BI-NEL-007-A	6/22/11	15:55	15.8	D	19200		6	U	4	U	329		2		3	U	14900		25		6	U	332		2100		23		6580		479		0.009	U	22		6290		6	U	6	U	3950		3	U	7		462	
		waterboatmen (duplicate)		14.5	BI-NEL-107-A	6/22/11	15:55	14.4	D	4400		7	U	4	U	89		1	U	3	U	11700		14		7	U	140		922		11		3060		240		0.010	U	21	U	8670		7	U	7	U	5210		3	U	7	U	464	
		crayfish	3	25.8	BI-NEL-007-R	6/22/11	15:55	34.9	D	204		3	U	2	U	66		1	U	1	U	211000		4		3	U	111		171		2	U	7650		154		0.004	U	9	U	6900		3		3	U	6850		1	U	3	U	93	
		waterboatmen	5	14.5	BI-NEL-009-A	6/22/11	16:00	14.0	D	322		7	U	4	U	53		1	U	3	U	14100		10		7	U	87		726		4	U	1650		113		0.010	U	21	U	6450		7	U	7	U	3650		4	U	7	U	307	
Bottom Fish	Low	Gobies	5	21.4	FH-LGF-008-A	6/22/11	09:00	21.2	D	94	U	5	U	3	U	9	U	1	U	2	U	26500		8		5	U	9	U	107		3	U	1390		30		0.015	J	14	U	11300		6		5	U	3250		2	U	5	U	121	
		Goldfish/carp	3	22.5	FH-LGF-008-Y	6/22/11	09:10	22.5	D	91		4	U	3	U	31		1	U	2	U	50000		6		4	U	9	U	351		3	U	2020		28		0.013	J	13	U	13100		7		4	U	4310		2	U	4	U	359	
		Gobies	3	21.4	FH-LGF-009-A	6/22/11	10:00	22.3	D	90	U	4	U	3	U	9	U	1	U	2	U	26500		6		4	U	9	U	100		3	U	1290		27		0.016	J	14	U	12100		7		4	U	3410		2	U	4	U	105	
		Gobies	5	21.4	FH-LGF-010-A	6/21/11	16:45	18.8	D	106	U	5	U	3	U	11	U	1	U	2	U	29800		9		5	U	11	U	218		3	U	1510		67		0.008	U	16	U	12500		6		5	U	4110		3	U	5	U	109	
		Gobies	3	21.4	FH-LGF-012-A	6/21/11	15:00	20.2	D	128		5	U	3	U	10	U	1	U	2	U	38200		7		5	U	10	U	367		3	U	1800		63		0.007	U	15	U	14900		8		5	U	4690		2	U	5	U	110	
	Medium	Staghorn sculpin	1	24.1	FH-LGF-001-A	6/21/11	13:05	100.0	D conv	83	U	4	U	2	U	8	U	1	U	2	U	36100		4	U	4	U	9		102		2	U	1452		18		0.009	J	12	U	9087		5		4	U	3274		2	U	4	U	69	
		Gobies	1	21.4	FH-LGF-001-X	6/21/11	13:10	100.0	D conv	93	U	5	U	3	U	9	U	1	U	2	U	37664		5	U	5	U	9	U	81		3	U	1598		27		0.007	U	14	U	9393		7		5	U	3374		2	U	5	U	106	
		Gobies	1	21.4	FH-LGF-003-A	6/21/11	13:45	100.0	D conv	93	U	5	U	3	U	9	U	1	U	2	U	42196		5	U	5	U	9	U	137		3	U	1748		32		0.010	U	14	U	9533		7		5	U	3364		2	U	5	U	124	
		Gobies	0.6	21.4	FH-LGM-001-A	6/21/11	11:00	100.0	D conv	93	U	5	U	3	U	9	U	1	U	2	U	33178		5	U	5	U	9	U	151		3	U	1505		35		0.009	U	14	U	12430		7		5	U	3752		2	U	5	U	105	
		Gobies	0.4	21.4	FH-LGM-003-A	6/21/11	11:00	100.0	D conv	134		5	U	3	U	9	U	1	U	2	U	31869		5	U	5	U	9	U	267		3	U	1500		42		0.013	U	14	U	8972		7		5	U	2939		2	U	5	U	140	
		Gobies	22	21.4	FH-NEL-021-A	6/22/11	15:30	20.4	D	365		5	U	3	U	19		1	U	2	U	40300		5	U	5	U	12		331		3	U	1950		39		0.007	U	15	U	14400		7		5	U	4460		2	U	5	U	155	
	High	Goldfish/carp	0.3	22.5	FH-DSA-001-A	6/22/11	13:30	100.0	D conv	208		5	U	3	U	10	U	1	U	2	U	30844		9		5	U	10	U	209		3	U	1551		35		0.011	U	16	U	10756		8		5	U	3853		3	U	5	U	239	
		Goldfish/carp	0.5	22.5	FH-DSA-003-A	6/22/11	11:00	100.0	D conv	89	U	4	U	3	U	9	U	1	U	2	U	41956		4	U	4	U	11		129		3	U	1876		52		0.009	U	13	U	11111		7		4	U	4124		2	U	4	U	279	
		Gobies	0.25	21.4	FH-DSA-003-X	6/22/11	11:05	100.0	D conv	253		10	U	6	U	21	U	2	U	4	U	61682		10	U	10	U	21	U	260		6	U	2449		140		0.021	J	31	U	17617		10	U	10	U	5093		5	U	10	U	160	
		Gobies	1.5	21.4	FH-DSA-006-A	6/22/11	13:05	22.3	D	138		4	U	3	U	9	U	1	U	2	U	40300		4	U	4	U	9	U	151		3	U	1610		43		0.018	J	14	U	12500		8		4	U	3770		2	U	4	U	148	
		Goldfish/carp	0.25	22.5	FH-DSA-006-Y	6/22/11	13:00	100.0	D conv	89	U	4	U	3	U	9	U	1	U	2	U	10311		4	U	4	U	9	U	103		3	U	547		41		0.009	U	13	U	2867		4	U	4	U	996		2	U	4	U	77	
		Gobies	0.25	21.4	FH-NEL-007-A	6/22/11	15:50	100.0	D conv	290		5	U	3	U	11		1	U	2	U	21869		5	U	5	U	9	U	241		3	U	1271		48		0.010	U	14	U	7710		5	U	5	U	2519		2	U	5	U	95	
		Gobies	1.75	21.4	FH-NEL-009-A	6/22/11	16:05	24.5	D	304		4	U	2	U	13		1	U	2	U	25400		4	U	4	U	11		273		2	U	1470		39		0.006	U	12	U	11400		6		4	U	3420		2	U	4	U	138	
		Long-jawed mudsuckers	3	24.1	FH-NEL-009-X	6/22/11	16:06	24.1	D	83	U	4	U	2	U	8	U	1	U	2	U	18600		4	U	4	U	8	U	98		2	U	816		14		0.015	J	12	U	9800		4	U	4	U	4020		2	U	4	U	103	
Water Column Fish	Low	topsmelt	17	18.3	FH-LGF-007-B	6/22/11	08:00	19.4	D	103	U	5	U	3	U	10	U	1	U	2	U	41400		5	U	5	U	10	U	172		3	U	2160		44		0.019	J	16	U	10400		8		5	U	3330		3	U	5	U	209	
		topsmelt (duplicate)	30	18.3	FH-LGF-107-B	6/22/11	08:00	18.7	D	107	U	5	U	3	U	11	U	1	U	2	U	39300		5	U	5	U	11	U	121		3	U	1840		35		0.017	J	16	U	7980		5		5	U	3010		3	U	5	U	143	
		topsmelt	50	18.3	FH-LGF-008-B	6/22/11	09:05	19.2	D	104	U	5	U	3	U	10	U	1	U	2	U	34900		5	U	5	U	10	U	120		3	U	1760		34		0.020	J	16	U	9800		6		5	U	3130		3	U	5	U	146	
		topsmelt	180	18.3	FH-LGF-009-B	6/22/11	10:05	21.1	D	95	U	5	U	3	U	9	U	1	U	2	U	34300		5	U	5	U	9	U	122		3	U	1590		31		0.015	J	14	U	11100		6		5	U	3310		2	U	5	U	123	
		topsmelt	90	18.3	FH-LGF-010-B	6/21/11	16:50	18.2	D	110	U	5	U	3	U	11	U	1	U	2	U	32900		5	U	5	U	14		244		3	U	1680		44		0.018	J	17	U	9530		5	U	5	U	3460		3	U	5	U	137	
		topsmelt	70	18.3	FH-LGF-012-B	6/21/11	15:05	20.7	D	97	U	5	U	3	U	10	U	1	U	2	U	25300		5	U	5	U	10	U	360		3	U	1430		31		0.019	J	15	U	9990		5	U	5	U	3480		2	U	5	U	108	
	Medium	topsmelt	3	18.3	FH-LGF-001-B	6/21/11	13:00	13.5	D	148	U	7	U	4	U	15	U	1	U	3	U	50000		7	U	7	U	15	U	153		4	U	2270		35		0.011	U	22	U	5350		7	U	7	U	2870		4	U	7	U	208	
		topsmelt	3	18.3	FH-LGF-003-B	6/21/11	13:50	13.9	D	144	U	7	U	4	U	14	U	1	U	3	U	41000		7	U	7	U	14	U	210		4	U	2280		52		0.019	J	22	U	8370		7		7	U	3990		4	U	7	U	158	
		topsmelt	30	18.3	FH-LGM-001-B	6/21/11	12:00	19.6	D	102	U	5	U	3	U	10	U	1	U	2	U	38700		5	U	5	U	10	U	144		3	U	1780		41		0.019	J	15	U	10100		6		5	U	3500		3	U	5	U	136	
		topsmelt	185	18.3	FH-LGM-003-B	6/21/11	11:05	19.1	D	105	U	5	U	3	U	11	U	1	U	2	U	17400		5	U	5	U	11	U	121		3	U	1150		34		0.016	J	16	U	4650		5	U	5	U	2210		3	U	5	U	85	

Notes:

Units are in mg/kg

Results are all in dry weight, either as reported by the laboratory (D) or converted from wet weight reported by the laboratory (D conv)

Dry weight converted from laboratory-reported wet weight (D conv) = Wet weight (W)/Percent solids

Data Qualifiers (Q):

U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit listed in the table.

J = The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.

TABLE A-11

Dioxin Analytical Results, Tissue Matrix, Biological Sampling

Baseline Ecological Risk Assessment, Halaco Site, Oxnard, California

Biota	Range	Sample Contents/Taxa	Average % Solids	Sample ID	Date	Time	% Solids	Basis	2,3,7,8-TCDF Result	Q	2,3,7,8-TCDD Result	Q	1,2,3,7,8-PeCDF Result	Q	2,3,4,7,8-PeCDF Result	Q	1,2,3,7,8-PeCDD Result	Q	1,2,3,4,7,8-HxCDF Result	Q	1,2,3,6,7,8-HxCDF Result	Q	2,3,4,6,7,8-HxCDF Result	Q	1,2,3,7,8,9-HxCDF Result	Q	1,2,3,4,7,8-HxCDD Result	Q	1,2,3,6,7,8-HxCDD Result	Q	1,2,3,7,8,9-HxCDD Result	Q	1,2,3,4,6,7,8-HpCDF Result	Q	1,2,3,4,7,8,9-HpCDF Result	Q	1,2,3,4,6,7,8-HpCDD Result	Q	OCDF Result	Q	OCDD Result	Q	Total TCDF Result	Q	Total TCDD Result	Q	Total PeCDF Result	Q	Total PeCDD Result	Q	Total HxCDF Result	Q	Total HxCDD Result	Q	Total HpCDF Result	Q	Total HpCDD Result	Q
Terrestrial Inverts	Low	snails	17.4	TI-WLE-007-A	6/23/11	13:15	100	W	1	U	1	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	10	U	10	U	1	U	1	U	5	U	5	U	5	U	5	U	5	U	5	U
		mixed insects	26.6	TI-NNB-001-A	6/23/11	17:00	100	W	9.1	U	9.1	U	45	U	45	U	45	U	45	U	45	U	45	U	45	U	45	U	45	U	45	U	45	U	45	U	45	U	91	U	91	U	9.1	U	9.1	U	45	U	45	U	45	U	45	U	45	U	45	U
		snails	17.4	TI-NNB-006-A	6/23/11	16:30	100	W	3.7	U	3.7	U	19	U	19	U	19	U	19	U	19	U	19	U	19	U	19	U	19	U	19	U	19	U	19	U	19	U	37	U	37	U	3.7	U	3.7	U	19	U	19	U	19	U	19	U	19	U	19	U
		snails	17.4	TI-NNL-002-A	6/23/11	8:30	100	W	0.94	U	0.94	U	4.7	U	4.7	U	4.7	U	4.7	U	4.7	U	4.7	U	4.7	U	4.7	U	4.7	U	4.7	U	4.7	U	4.7	U	11		9.4	U	120		0.94	U	0.94	U	4.7	U	4.7	U	4.7	U	4.7	U	4.7	U	18	
	Medium	beach hoppers, sow bugs, beetles	26.6	TI-NEL-025-A	6/23/11	9:00	100	W	3.2		0.99	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	15		9.9	U	130		45		1.9		5.3		5	U	5	U	5.5		5	U	90	
		beach hoppers, sow bugs, beetles	26.6	TI-NEL-028-A	6/23/11	9:50	100	W	0.88	U	0.88	U	4.4	U	4.4	U	4.4	U	4.4	U	4.4	U	4.4	U	4.4	U	4.4	U	4.4	U	4.4	U	4.4	U	4.4	U	4.4	U	8.8	U	11		3.6		1.6		4.4	U	4.4	U	4.4	U	4.4	U	4.4	U	4.4	U
	High	spiders/beetles/beach hoppers	26.6	TI-DSC-002-A	6/23/11	14:50	100	W	2.3	U	2.3	U	11	U	11	U	11	U	11	U	11	U	11	U	11	U	11	U	11	U	11	U	11	U	11	U	11	U	23	U	23	U	2.3	U	2.3	U	11	U	11	U	11	U	11	U	11	U	11	U
		spiders/cricket	26.6	TI-DSC-003-A	6/23/11	14:40	100	W	14	U	14	U	71	U	71	U	71	U	71	U	71	U	71	U	71	U	71	U	71	U	71	U	71	U	71	U	71	U	140	U	140	U	14	U	14	U	71	U	71	U	71	U	71	U	71	U	71	U
		mixed insects	26.6	TI-DSC-005-A	6/23/11	14:00	100	W	7.7	U	7.7	U	38	U	38	U	38	U	38	U	38	U	38	U	38	U	38	U	38	U	38	U	38	U	38	U	38	U	77	U	77	U	7.7	U	7.7	U	38	U	38	U	38	U	38	U	38	U	38	U
Benthic Inverts	Medium	dragonflies/damselflies	26.6	BI-LGM-001-A	6/21/11	11:00	100	W	3.4	U	3.4	U	17	U	17	U	17	U	17	U	17	U	17	U	17	U	17	U	17	U	17	U	17	U	17	U	17	U	34	U	34	U	3.4	U	3.4	U	17	U	17	U	17	U	17	U	17	U	17	U
		crayfish	25.8	BI-LGM-001-R	6/21/11	11:05	100	W	1.6	U	1.6	U	7.8	U	7.8	U	7.8	U	7.8	U	7.8	U	7.8	U	7.8	U	7.8	U	7.8	U	7.8	U	7.8	U	7.8	U	7.8	U	16	U	16	U	1.6	U	1.6	U	7.8	U	7.8	U	7.8	U	7.8	U	7.8	U	7.8	U
		waterboatmen	14.5	BI-NEL-021-A	6/22/11	15:30	100	W	0.97	U	0.97	U	4.9	U	4.9	U	4.9	U	4.9	U	4.9	U	4.9	U	4.9	U	4.9	U	4.9	U	4.9	U	4.9	U	4.9	U	4.9	U	9.7	U	9.7	U	0.97	U	1.1		4.9	U	4.9	U	4.9	U	4.9	U	4.9	U	4.9	U
	High	mixed insects	26.6	BI-DSA-001-A	6/22/11	13:30	100	W	7.7	U	7.7	U	38	U	38	U	38	U	38	U	38	U	38	U	38	U	38	U	38	U	38	U	38	U	38	U	38	U	77	U	77	U	7.7	U	7.7	U	38	U	38	U	38	U	38	U	38	U	38	U
		crayfish	25.8	BI-DSA-001-R	6/22/11	13:00	100	W	0.86	U	0.86	U	4.3	U	4.3	U	4.3	U	4.3	U	4.3	U	4.3	U	4.3	U	4.3	U	4.3	U	4.3	U	4.3	U	4.3	U	4.3	U	8.6	U	8.6	U	0.86	U	0.86	U	4.3	U	4.3	U	4.3	U	4.3	U	4.3	U	4.3	U
		crayfish	25.8	BI-DSA-003-A	6/22/11	11:00	100	W	0.71	U	0.71	U	3.6	U	3.6	U	3.6	U	3.6	U	3.6	U	3.6	U	3.6	U	3.6	U	3.6	U	3.6	U	3.6	U	3.6	U	3.6	U	7.1	U	7.1	U	0.71	U	0.71	U	3.6	U	3.6	U	3.6	U	3.6	U	3.6	U	3.6	U
		mixed insects	26.6	BI-DSA-003-Z	6/22/11	11:05	100	W	10	U	10	U	50	U	50	U	50	U	50	U	50	U	50	U	50	U	50	U	50	U	50	U	50	U	50	U	50	U	100	U	100	U	10	U	10	U	50	U	50	U	50	U	50	U	50	U	50	U
		crayfish	25.8	BI-DSA-006-A	6/22/11	13:00	100	W	1.1	U	1.1	U	5.6	U	5.6	U	5.6	U	5.6	U	5.6	U	5.6	U	5.6	U	5.6	U	5.6	U	5.6	U	5.6	U	5.6	U	5.6	U	11	U	11	U	1.1	U	1.1	U	5.6	U	5.6	U	5.6	U	5.6	U	5.6	U	5.6	U
		mixed insects	26.6	BI-DSA-006-Z	6/22/11	13:05	100	W	14	U	14	U	71	U	71	U	71	U	71	U	71	U	71	U	71	U	71	U	71	U	71	U	71	U	71	U	71	U	140	U	140	U	14	U	14	U	71	U	71	U	71	U	71	U	71	U	71	U
		waterboatmen	14.5	BI-NEL-007-A	6/22/11	15:55	100	W	1.7		0.49	U	2.4	U	4.4		2.4	U	4.4		3.8		4.3		2.4	U	2.4	U	2.4	U	2.4	U	7.4		2.4	U	6		8.1		23		29		3.3		42		6.3		32		13		14		18	
		waterboatmen (duplicate)	14.5	BI-NEL-107-A	6/22/11	15:55	100	W	0.66		0.48	U	2.4	U	2.4	U	2.4	U	2.4	U	2.4	U	2.4	U	2.4	U	2.4	U	2.4	U	2.4	U	2.4	U	2.4	U	2.4	U	4.8	U	5.3		5.8		2.3		2.4	U	2.4	U	2.4	U	2.4	U	2.4	U	3.6	
		crayfish	25.8	BI-NEL-007-R	6/22/11	15:55	100	W	0.72	U	0.72	U	3.6	U	3.6	U	3.6	U	3.6	U	3.6	U	3.6	U	3.6	U	3.6	U	3.6	U	3.6	U	3.6	U	3.6	U	3.6	U	7.2	U	7.2	U	0.72	U	0.72	U	3.6	U	3.6	U	3.6	U	3.6	U	3.6	U	3.6	U
		waterboatmen	14.5	BI-NEL-009-A	6/22/11	16:00	100	W	0.55		0.49	U	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U	4.9	U	4.9	U	3.3		1.2		2.5	U	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
Bottom Fish	Low	Gobies	21.4	FH-LGF-008-A	6/22/11	9:00	100	W	0.94	U	0.94	U	4.7	U	4.7	U	4.7	U	4.7	U	4.7	U	4.7	U	4.7	U	4.7	U	4.7	U	4.7	U	4.7	U	4.7	U	4.7	U	9.4	U	9.4	U	0.94	U	0.94	U	4.7	U	4.7	U	4.7	U	4.7	U	4.7	U	4.7	U
		Goldfish/carp	22.5	FH-LGF-008-Y	6/22/11	9:10	100	W	2.8	U	2.8	U	14	U	14	U	14	U	14	U	14	U	14	U	14	U	14	U	14	U	14	U	14	U	14	U	14	U	28	U	28	U	2.8	U	2.8	U	14	U	14	U	14	U	14	U	14	U	14	U
		Gobies	21.4	FH-LGF-009-A	6/22/11	10:00	100	W	1.1	U	1.1	U	5.4	U	5.4	U	5.4	U	5.4	U	5.4	U	5.4	U	5.4	U	5.4	U	5.4	U	5.4	U	5.4	U	5.4	U	5.4	U	11	U	11	U	1.1	U	1.1	U	5.4	U	5.4	U	5.4	U	5.4	U	5.4	U	5.4	U
		Gobies	21.4	FH-LGF-010-A	6/21/11	16:45	100	W	0.95	U	0.95	U	4.8	U	4.8	U	4.8	U	4.8	U	4.8	U	4.8	U	4.8	U	4.8	U	4.8	U	4.8	U	4.8	U	4.8	U	4.8	U	9.5	U	9.5	U	0.95	U	0.95	U	4.8	U	4.8	U	4.8	U	4.8	U	4.8	U	4.8	U
		Gobies	21.4	FH-LGF-012-A	6/21/11	15:00	100	W	1.1	U	1.1	U	5.4	U	5.4	U	5.4	U	5.4	U	5.4	U	5.4	U	5.4	U	5.4	U	5.4	U	5.4	U	5.4	U	5.4	U	5.4	U	11	U	11	U	1.1	U	1.1	U	5.4	U	5.4	U	5.4	U	5.4	U	5.4	U	5.4	U
	Medium	Staghorn sculpin	24.1	FH-LGF-001-A	6/21/11	13:05	100	W	3	U	3	U	15	U	15	U	15	U	15	U	15	U	15	U	15	U	15	U	15	U	15	U	15	U	15	U	15	U	30	U	30	U	3	U	3	U	15	U	15	U	15	U	15	U	15	U	15	U
		Gobies	21.4	FH-LGF-001-X	6/21/11	13:10	100	W	1.7	U	1.7	U	8.6	U	8.6	U	8.6	U	8.6	U	8.6	U	8.6	U	8.6	U	8.6	U	8.6	U	8.6	U	8.6	U	8.6	U	8.6	U	17	U	17	U	1.7	U	1.7	U	8.6	U	8.6	U	8.6	U	8.6	U	8.6	U	8.6	U
		Gobies	21.4	FH-LGF-003-A	6/21/11	13:45	100	W	2.7	U	2.7	U	14	U	14	U	14	U	14	U	14	U	14	U	14	U	14	U	14	U	14	U	14	U	14	U	14	U	27	U	27	U	2.7	U	2.7	U	14	U	14	U	14	U	14	U	14	U	14	U
		Gobies	21.4	FH-LGM-001-A	6/21/11	12:05	100	W	4	U	4	U	20	U	20	U	20	U	20	U	20	U	20	U	20	U	20	U	20	U	20	U	20	U	20	U	20	U	40	U	40	U	4	U	4	U	20	U	20	U	20	U	20	U	20	U	20	U
		Gobies	21.4	FH-LGM-003-A	6/21/11	11:00	100	W	6.7	U	6.7	U	33	U	33	U	33	U	33	U	33	U	33	U	33	U	33	U	33	U	33	U	33	U	33	U	33	U	67	U	67	U	6.7	U	6.7	U	33	U	33	U	33	U	33	U	33	U	33	U
		Gobies	21.4	FH-NEL-021-A	6/22/11	15:20	100	W	0.93	U	0.93	U	4.6	U	4.6	U	4.6	U	4.6	U	4.6	U	4.6	U	4.6	U	4.6	U	4.6	U	4.6	U	4.6	U	4.6	U	4.6	U	9.3	U	9.3	U	0.93	U	0.93	U	4.6	U	4.6	U	4.6	U	4.6	U	4.6	U	4.6	U
	High	Goldfish/carp	22.5	FH-DSA-001-A	6/22/11	13:30	100	W	20	U	20	U	100	U	100	U	100	U	100	U	100	U	100	U	100	U	100	U	100	U	100	U	100	U	100	U	100	U	200	U	200	U	20	U	20	U	100	U	100	U	100	U	100	U	100	U	100	U
		Goldfish/carp	22.5	FH-DSA-003-A	6/22/11	11:00	100	W	4.8	U	4.8	U	24	U	24	U	24	U	24	U	24	U	24	U	24	U	24	U	24	U	24	U	24	U	24	U	24	U	48	U	48	U	4.8	U	4.8	U	24	U	24	U	24	U	24	U	24	U	24	U
		Gobies	21.4	FH-DSA-006-A	6/22/11	13:05	100	W	2.7	U	2.7	U	14	U	14	U	14	U	14	U	14	U	14	U	14	U	14	U	14	U	14	U	14	U	14	U	14	U	27	U	27	U	2.7	U	2.7	U	14	U	14	U	14	U	14	U	14	U	14	U
		Gobies	21.4	FH-NEL-007-A	6/22/11	15:50	100	W	10	U	10	U	50	U	50	U	50	U	50	U	50	U	50	U	50	U	50	U	50	U	50	U	50	U	50	U	50	U	100	U	100	U	10	U	10	U	50	U	50	U	50	U	50	U	50	U	50	U
		Gobies	21.4	FH-NEL-009-A	6/22/11	16:05	100	W	1.2	U	1.2	U	6.2	U	6.2	U	6.2	U	6.2	U	6.2	U	6.2	U	6.2	U	6.2	U	6.2	U	6.2	U	6.2	U	6.2	U	6.2	U	12	U	12	U	1.2	U	1.2	U	6.2	U	6.2	U	6.2	U	6.2	U	6.2	U	6.2	U
		Long-jawed mudsuckers	24.1	FH-NEL-009-X	6/22/11	16:06	100	W	1	U	1	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	10	U	10	U	1	U	1	U	5	U	5	U	5	U	5	U	5	U	5	U

Notes:

Units are in ng/kg

Data Qualifiers (Q):

U = The analyte was analyzed for, but was not detected at a level greater than or equal to the detection limit listed in this table.

J = The analyte was positively identified and the associated numerical value is the approximate concentration of the analyte in the sample (because quality control criteria were not met, or the concentration of the analyte was below the reporting limit).

UJ = The analyte was not detected at a level greater than or equal to the detection limit. However, the reported detection limit is approximate.

Figures

LEGEND

2011 Tier 2 ERA Biological Sampling Locations

Aquatic Locations

- Low Metals Concentration
- Medium Metals Concentration
- High Metals Concentration

Terrestrial Locations

- Low Metals Concentration
- Medium Metals Concentration
- High Metals Concentration

Historical OID Alignment

- 1929 OID
- 1959 OID
- 1969 Pond

Ground Elevation Contours (ft msl) (AMEC, 2006)

- 2 ft Contour
- 10 ft Contour

NEL-21* - 2011 location that was sampled from biological tissue at an alternate location from the 2010 sample

N

0 200 400

Feet

1 inch = 400 feet

FIGURE A-1
Tier 2 Biological Sample Locations
HALACO SITE REMEDIAL INVESTIGATION
OXNARD, CALIFORNIA

DVR \\MNUSTRICTGFS01\PROJECTS\HALACO\MAPFILES\ERA\HALACO_ERA_FIG2_5_BIOLOGYSAMPLES.MXD GPERDEW 11/14/2012 2:57:54 PM

Attachment A-1
Photographs of Biological Sampling Activities

Photo 1: Deploying the seine by small boat in the main lagoon.

Photo 2: Deploying the seine by hand in the OID.

Photo 3: Deploying the seine by hand in the main lagoon.

Photo 4: Small fish caught with seine.

Photo 5: Top smelt caught with seine.

Photo 6: XXXX caught with seine.

Photo 7: Small carp caught with seine.

Photo 8: Large carp caught with seine (released).

Photo 9: Viewing small fish caught with seine.

Photo 10: Viewing benthic invertebrates caught with net.

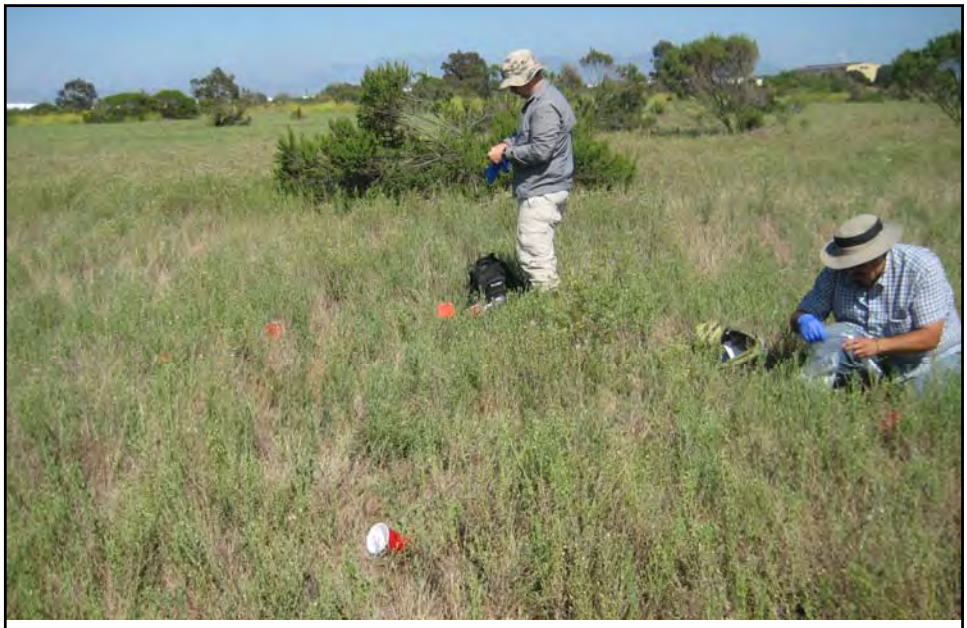


Photo 11: Deploying pitfall traps at NCL East.

Photo 12: Pitfall traps deployed at NCL East.

Attachment A-2
U.S. FWS Letters (Authorization to Handle and Ship Tidewater Goby)

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Ventura Fish and Wildlife Office
2493 Portola Road, Suite B
Ventura, California 93003

IN REPLY REFER TO:
81440-2011-TA-0380

June 21, 2011

Wayne Praskins, Project Manager
U.S. Environmental Protection Agency, Region IX
75 Hawthorne Street
San Francisco, California 94105

Subject: Authorization of Biologists for the Biological Opinion Issued for the Halaco Engineering Company Superfund Site Remedial Investigation Sampling Activities, Oxnard, Ventura County, California (8-8-10-F-3)

Dear Mr. Praskins:

We are responding to a request, dated June 15, 2011, and received in our office via electronic mail (email) that same day sent on your behalf by Mark Wuttig of CH2MHill, for our authorization of Earl Byron and Robert Hernandez to independently capture, identify, and release the federally endangered tidewater goby (*Eucyclogobius newberryi*). The subject request was made pursuant to the Biological Opinion for the Halaco Engineering Company Superfund Site Remedial Investigation Sampling Activities, Oxnard, Ventura County, California (8-8-10-F-3), which requires our approval of persons proposed to conduct activities related to the tidewater goby in association with the subject project.

Earl Byron and Robert Hernandez spent considerable time in the field with U.S. Fish and Wildlife Service Senior Biologist Chris Dellith on June 21, 2011, capturing, identifying, and releasing tidewater gobies. Pursuant to Mr. Dellith's observations working with Mr. Byron and Mr. Hernandez, we conclude that Mr. Byron and Mr. Hernandez possess the necessary training and experience to independently capture, identify, and release the tidewater goby. Therefore, Mr. Byron and Mr. Hernandez are hereby authorized to perform the requested activities involving the tidewater goby pursuant to the subject biological opinion.

Please note that this authorization is valid only for activities described in biological opinion 8-8-10-F-3 and conducted pursuant to the subject project. If you have any questions regarding this authorization, please contact Jenny Marek of my staff at (805) 644-1766, extension 325.

Sincerely,

Roger P. Root
Assistant Field Supervisor

TAKE PRIDE IN AMERICA

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Ventura Fish and Wildlife Office
2493 Portola Road, Suite B
Ventura, California 93003

IN REPLY REFER TO:
81440-2011-EC-0020

June 20, 2011

Memorandum

To: Remedial Project Manager, Environmental Protection Agency, Region 9, San Francisco, California (Attn: Wayne Praskins)

From: Assistant Field Supervisor, Ventura Fish and Wildlife Office, Ventura, California

Subject: Authorization to Possess, Transport, and Analyze Tidewater Goby Tissue from Ormond Lagoon, Ventura County, California

This memorandum documents the U.S. Fish and Wildlife Service's (Service) authorization of the U.S. Environmental Protection Agency (EPA) possessing, transporting, and analyzing tissue of the endangered tidewater goby (*Eucyclogobius newberryi*). The EPA will conduct tidewater goby sampling activities to support the Remedial Investigation/ Feasibility Study of the Halaco Engineering Company Superfund Site in Oxnard, Ventura County, California, pursuant to section 104 of the Comprehensive Environmental Response, Compensation, and Liability Act. Service Senior Biologist, Chris Dellith, is an authorized individual under permit TE-034093-19 (issued to the Ventura Fish and Wildlife Office pursuant to section 10(a)(1)(A) of the Federal Endangered Species Act of 1973, as amended) to independently conduct activities with the tidewater goby. Mr. Dellith will oversee collection of the tidewater gobies and will then transfer custody of the specimens to the EPA after collection activities are complete, at which time the EPA will possess, transport, and analyze the tidewater goby tissue on behalf of the Service under the auspices of permit number TE-034093-19.

If you have any questions regarding this memorandum, please contact Jenny Marek of the Ventura Fish and Wildlife Office at (805) 644-1766, extension 325.

cc:
Mark Wuttig, CH2MHill
Jim Soutee, CH2MHill

TAKE PRIDE IN AMERICA

Attachment A-3
Geotechnical Laboratory Results

PTS Laboratories, Inc.

8100 Secura Way • Santa Fe Springs, CA 90670
Telephone (562) 347-2500 • Fax (562) 907-3610

July 13, 2011

Mark Wuttig
CH2M HILL
325 East Hillcrest Drive, Suite 125
Thousand Oaks, CA 91360

Re: PTS File No: 41429
Physical Properties Data
Halaco Superfund Site; 41470

Dear Mr. Wuttig:

Please find enclosed report for Physical Properties analyses conducted upon samples received from your Halaco Superfund Site; 41470 project. All analyses were performed by applicable ASTM, EPA, or API methodologies. An electronic version of the report has previously been sent to your attention via the internet. The samples are currently in storage and will be retained for thirty days past completion of testing at no charge. Please note that the samples will be disposed of at that time. You may contact me regarding storage, disposal, or return of the samples.

PTS Laboratories appreciates the opportunity to be of service. If you have any questions or require additional information, please give Rachel Spitz a call at (562) 347-2504.

Sincerely,
PTS Laboratories

for Rachel Spitz

Michael Mark Brady, P.G.
District Manager

Encl.

PTS Laboratories

Project Name: Halaco Superfund Site
Project Number: 41470

PTS File No: 41429
Client: CH2M Hill

TEST PROGRAM - 20110628

CORE ID	Depth ft.	Core Recovery ft.	Grain Size Analysis ASTM D4464M					Notes
		Plugs:	Grab					
Date Received: 20110628								
SD-DSA-001-A	Surface Sediment	Grab	X					
SD-DSA-003-A	Surface Sediment	Grab	X					
SD-DSA-006-A	Surface Sediment	Grab	X					
SD-LGF-001-A	Surface Sediment	Grab	X					
SD-LGF-003-A	Surface Sediment	Grab	X					
SD-LGF-007-A	Surface Sediment	Grab	X					
SD-LGF-008-A	Surface Sediment	Grab	X					
SD-LGF-009-A	Surface Sediment	Grab	X					
SD-LGF-010-A	Surface Sediment	Grab	X					
SD-LGF-012-A	Surface Sediment	Grab	X					
SD-LGF-112-A	Surface Sediment	Grab	X					
SD-LGM-001-A	Surface Sediment	Grab	X					
SD-LGM-003-A	Surface Sediment	Grab	X					
SD-NEL-007-A	Surface Sediment	Grab	X					
SD-NEL-009-A	Surface Sediment	Grab	X					
SD-NEL-021-A	Surface Sediment	Grab	X					
TOTALS:	16 bags		16					16

Laboratory Test Program Notes
Standard TAT for basic analysis is 10-15 business days.
Return all materials to client.

PTS Laboratories

Project Name: Halaco Superfund Site
Project Number: PO 936778

PTS File No: 41429
Client: CH2M Hill

TEST PROGRAM - 20110628

CORE ID	Depth ft.	Core Recovery ft.	Grain Size Analysis ASTM D4464M					Notes
		Plugs:	Grab					
Date Received: 20110628								
SD-DSA-001-A	Surface Sediment	Grab	X					
SD-DSA-003-A	Surface Sediment	Grab	X					
SD-DSA-006-A	Surface Sediment	Grab	X					
SD-LGF-001-A	Surface Sediment	Grab	X					
SD-LGF-003-A	Surface Sediment	Grab	X					
SD-LGF-007-A	Surface Sediment	Grab	X					
SD-LGF-008-A	Surface Sediment	Grab	X					
SD-LGF-009-A	Surface Sediment	Grab	X					
SD-LGF-010-A	Surface Sediment	Grab	X					
SD-LGF-012-A	Surface Sediment	Grab	X					
SD-LGF-112-A	Surface Sediment	Grab	X					
SD-LGM-001-A	Surface Sediment	Grab	X					
SD-LGM-003-A	Surface Sediment	Grab	X					
SD-NEL-007-A	Surface Sediment	Grab	X					
SD-NEL-009-A	Surface Sediment	Grab	X					
SD-NEL-021-A	Surface Sediment	Grab	X					
TOTALS:	16 bags		16					16

Laboratory Test Program Notes
Standard TAT for basic analysis is 10-15 business days.
Return all materials to client.

Grain Size Analysis ASTM D4464M	Return samples est.
79	Cost +20%
$1,264	$60

	Cooler Return at $30
	$1,354.00
P.O. Balance	$646.00
Change order amount	$708.00

Test Program Acknowledgement

Electronic Signature: Mark Wuttig
Date: 30-Jun-11

PTS Laboratories, Inc.

CH2M Hill
PTS File No: 41429

PARTICLE SIZE SUMMARY

(METHODOLOGY: ASTM D422/D4464M)

PROJECT NAME: Halaco Superfund Site
PROJECT NO: 41470

Sample ID	Depth, ft.	Mean Grain Size Description (1)	Median Grain Size mm	Particle Size Distribution, wt. percent						Silt & Clay
				Gravel	Sand Size			Silt	Clay	
					Coarse	Medium	Fine			
SD-DSA-001-A	Surface Sediment	Fine sand	0.087	0.00	0.00	19.31	33.62	41.44	5.63	47.07
SD-DSA-003-A	Surface Sediment	Fine sand	0.142	0.00	0.00	25.80	35.73	34.40	4.07	38.47
SD-DSA-006-A	Surface Sediment	Fine sand	0.387	0.00	0.00	47.19	32.92	18.40	1.49	19.89
SD-LGF-001-A	Surface Sediment	Silt	0.037	0.00	0.00	5.47	22.02	66.70	5.81	72.51
SD-LGF-003-A	Surface Sediment	Fine sand	0.060	0.00	0.00	14.00	30.65	48.49	6.87	55.35
SD-LGF-007-A	Surface Sediment	Medium sand	0.437	0.00	0.00	52.80	46.60	0.42	0.18	0.60
SD-LGF-008-A	Surface Sediment	Medium sand	0.661	0.00	0.00	75.66	23.19	0.94	0.21	1.15
SD-LGF-009-A	Surface Sediment	Medium sand	0.581	0.00	0.00	68.72	30.51	0.60	0.17	0.77
SD-LGF-010-A	Surface Sediment	Fine sand	0.275	0.00	0.00	8.00	89.58	2.01	0.41	2.42
SD-LGF-012-A	Surface Sediment	Medium sand	0.408	0.00	0.00	48.79	36.27	13.43	1.50	14.93
SD-LGF-112-A	Surface Sediment	Fine sand	0.389	0.00	0.00	46.93	37.08	14.43	1.55	15.98
SD-LGM-001-A	Surface Sediment	Fine sand	0.075	0.00	0.00	14.38	35.90	45.20	4.51	49.72
SD-LGM-003-A	Surface Sediment	Fine sand	0.121	0.00	0.00	16.61	44.76	34.67	3.95	38.63
SD-NEL-007-A	Surface Sediment	Fine sand	0.073	0.00	0.00	20.72	28.87	40.79	9.62	50.41

(1) Based on Mean from Trask

PTS Laboratories, Inc.

CH2M Hill
PTS File No: 41429

PARTICLE SIZE SUMMARY

(METHODOLOGY: ASTM D422/D4464M)

PROJECT NAME: Halaco Superfund Site
PROJECT NO: 41470

Sample ID	Depth, ft.	Mean Grain Size Description (1)	Median Grain Size mm	Particle Size Distribution, wt. percent						Silt & Clay
				Gravel	Sand Size			Silt	Clay	
					Coarse	Medium	Fine			
SD-NEL-009-A	Surface Sediment	Silt	0.034	0.00	0.00	6.10	22.41	58.99	12.51	71.49
SD-NEL-021-A	Surface Sediment	Silt	0.042	0.00	0.00	4.29	28.03	56.91	10.77	67.68

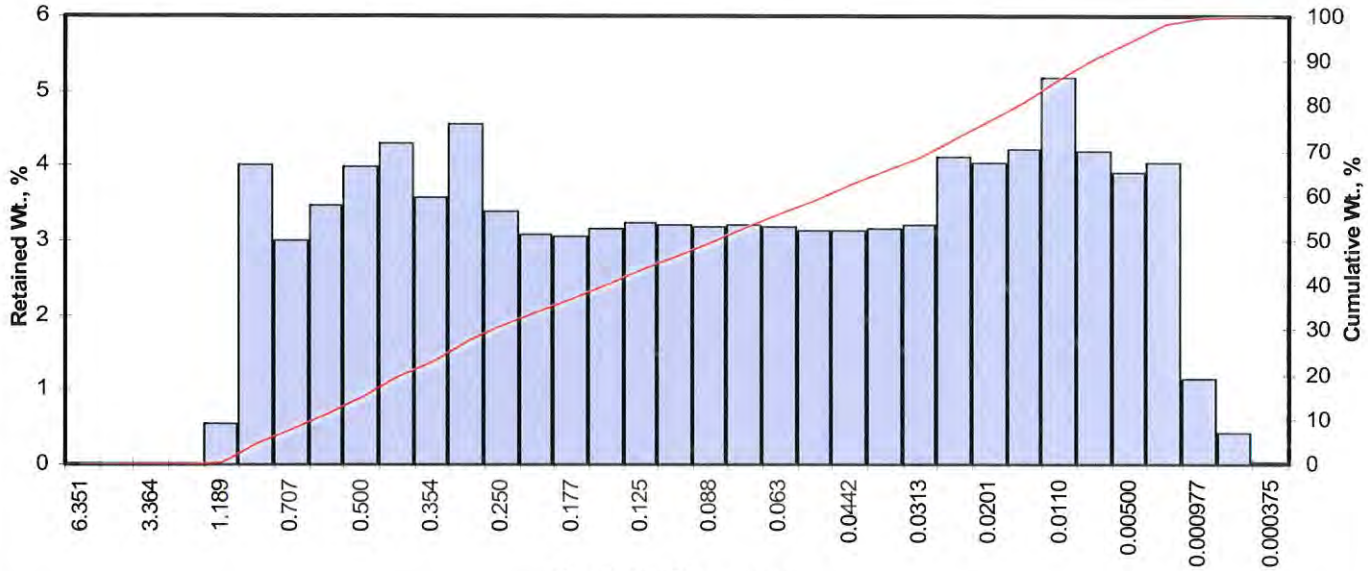
(1) Based on Mean from Trask

PTS Laboratories, Inc.

Particle Size Analysis - ASTM D4464M

Client:	CH2M Hill	**PTS File No:**	41429
Project:	Halaco Superfund Site	**Sample ID:**	SD-DSA-001-A
Project No:	41470	**Depth, ft:**	Surface Sediment

Grv	Sand Size			Silt	Clay
	crs	medium	fine		



Opening Inches	Opening Millimeters	Phi of Screen	U.S. No.	Sample Weight, grams	Increment Weight, percent	Cumulative Weight, percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	0.54	0.54	0.54
0.0331	0.841	0.25	20	4.02	4.02	4.56
0.0278	0.707	0.50	25	3.00	3.00	7.56
0.0234	0.595	0.75	30	3.47	3.47	11.03
0.0197	0.500	1.00	35	3.99	3.99	15.02
0.0166	0.420	1.25	40	4.29	4.29	19.31
0.0139	0.354	1.50	45	3.57	3.57	22.88
0.0117	0.297	1.75	50	4.55	4.55	27.43
0.0098	0.250	2.00	60	3.40	3.40	30.83
0.0083	0.210	2.25	70	3.09	3.09	33.92
0.0070	0.177	2.50	80	3.04	3.04	36.96
0.0059	0.149	2.75	100	3.16	3.16	40.12
0.0049	0.125	3.00	120	3.22	3.22	43.34
0.0041	0.105	3.25	140	3.20	3.20	46.54
0.0035	0.088	3.50	170	3.19	3.19	49.73
0.0029	0.074	3.75	200	3.20	3.20	52.93
0.0025	0.063	4.00	230	3.17	3.17	56.10
0.0021	0.053	4.25	270	3.12	3.12	59.22
0.00174	0.0442	4.50	325	3.13	3.13	62.35
0.00146	0.0372	4.75	400	3.16	3.16	65.51
0.00123	0.0313	5.00	450	3.21	3.21	68.72
0.000986	0.0250	5.32	500	4.11	4.11	72.83
0.000790	0.0201	5.64	635	4.04	4.04	76.87
0.000615	0.0156	6.00		4.22	4.22	81.09
0.000435	0.0110	6.50		5.17	5.17	86.26
0.000308	0.00781	7.00		4.20	4.20	90.46
0.000197	0.00500	7.65		3.91	3.91	94.37
0.000077	0.00195	9.00		4.04	4.04	98.41
0.000038	0.000977	10.00		1.14	1.14	99.55
0.000019	0.000488	11.00		0.41	0.41	99.96
0.000015	0.000375	11.38		0.04	0.04	100.00
TOTALS				100.00	100.00	100.00

Cumulative Weight Percent greater than			
Weight percent	Phi Value	Particle Size Inches	Particle Size Millimeters
5	0.29	0.0323	0.820
10	0.68	0.0246	0.626
16	1.06	0.0189	0.481
25	1.62	0.0128	0.326
40	2.74	0.0059	0.150
50	3.52	0.0034	0.087
60	4.31	0.0020	0.050
75	5.49	0.0009	0.022
84	6.28	0.0005	0.013
90	6.94	0.0003	0.008
95	7.85	0.0002	0.004

Measure	Trask	Inman	Folk-Ward
Median, phi	3.52	3.52	3.52
Median, in.	0.0034	0.0034	0.0034
Median, mm	0.087	0.087	0.087
Mean, phi	2.52	3.67	3.62
Mean, in.	0.0069	0.0031	0.0032
Mean, mm	0.174	0.079	0.081
Sorting	3.831	2.612	2.453
Skewness	0.977	0.057	0.101
Kurtosis	0.246	0.449	0.800
Grain Size Description (ASTM-USCS Scale)		Fine sand (based on Mean from Trask)	

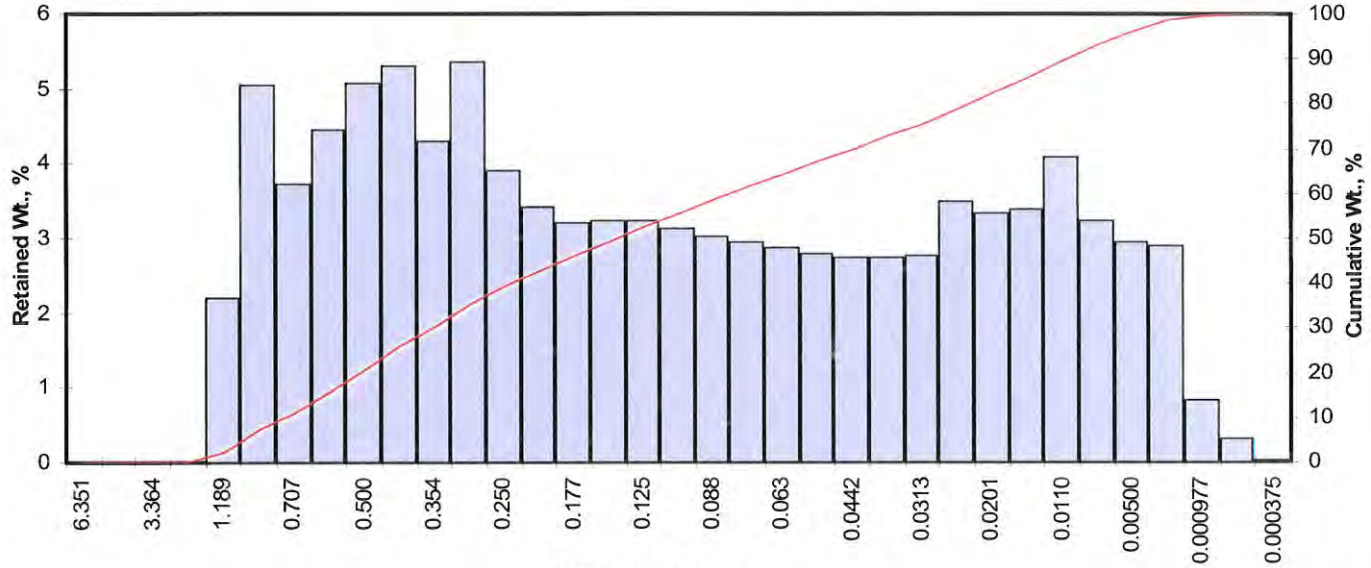
Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	19.31
Fine Sand	200	33.62
Silt	>0.005 mm	41.44
Clay	<0.005 mm	5.63
	Total	100

PTS Laboratories, Inc.

Particle Size Analysis - ASTM D4464M

Client:	CH2M Hill	**PTS File No:**	41429
Project:	Halaco Superfund Site	**Sample ID:**	SD-DSA-003-A
Project No:	41470	**Depth, ft:**	Surface Sediment

Grv	Sand Size			Silt	Clay
	crs	medium	fine		



Opening Inches	Opening Millimeters	Phi of Screen	U.S. No.	Sample Weight, grams	Increment Weight, percent	Cumulative Weight, percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	2.20	2.20	2.20
0.0331	0.841	0.25	20	5.04	5.04	7.24
0.0278	0.707	0.50	25	3.73	3.73	10.97
0.0234	0.595	0.75	30	4.46	4.46	15.43
0.0197	0.500	1.00	35	5.07	5.07	20.50
0.0166	0.420	1.25	40	5.30	5.30	25.80
0.0139	0.354	1.50	45	4.29	4.29	30.09
0.0117	0.297	1.75	50	5.35	5.35	35.44
0.0098	0.250	2.00	60	3.90	3.90	39.34
0.0083	0.210	2.25	70	3.41	3.41	42.75
0.0070	0.177	2.50	80	3.21	3.21	45.96
0.0059	0.149	2.75	100	3.24	3.24	49.20
0.0049	0.125	3.00	120	3.24	3.24	52.44
0.0041	0.105	3.25	140	3.13	3.13	55.57
0.0035	0.088	3.50	170	3.02	3.02	58.59
0.0029	0.074	3.75	200	2.94	2.94	61.53
0.0025	0.063	4.00	230	2.87	2.87	64.40
0.0021	0.053	4.25	270	2.79	2.79	67.19
0.00174	0.0442	4.50	325	2.75	2.75	69.94
0.00146	0.0372	4.75	400	2.75	2.75	72.69
0.00123	0.0313	5.00	450	2.76	2.76	75.45
0.000986	0.0250	5.32	500	3.48	3.48	78.93
0.000790	0.0201	5.64	635	3.34	3.34	82.27
0.000615	0.0156	6.00		3.40	3.40	85.67
0.000435	0.0110	6.50		4.08	4.08	89.75
0.000308	0.00781	7.00		3.24	3.24	92.99
0.000197	0.00500	7.65		2.94	2.94	95.93
0.000077	0.00195	9.00		2.90	2.90	98.83
0.000038	0.000977	10.00		0.82	0.82	99.65
0.000019	0.000488	11.00		0.32	0.32	99.97
0.000015	0.000375	11.38		0.03	0.03	100.00
TOTALS				**100.00**	**100.00**	**100.00**

Cumulative Weight Percent greater than

Weight percent	Phi Value	Particle Size Inches	Particle Size Millimeters
5	0.03	0.0386	0.981
10	0.43	0.0291	0.740
16	0.78	0.0230	0.583
25	1.21	0.0170	0.432
40	2.05	0.0095	0.242
50	2.81	0.0056	0.142
60	3.62	0.0032	0.081
75	4.96	0.0013	0.032
84	5.82	0.0007	0.018
90	6.54	0.0004	0.011
95	7.44	0.0002	0.006

Measure	Trask	Inman	Folk-Ward
Median, phi	2.81	2.81	2.81
Median, in.	0.0056	0.0056	0.0056
Median, mm	0.142	0.142	0.142
Mean, phi	2.11	3.30	3.14
Mean, in.	0.0091	0.0040	0.0045
Mean, mm	0.232	0.101	0.114
Sorting	3.664	2.522	2.384
Skewness	0.827	0.194	0.221
Kurtosis	0.274	0.469	0.811
Grain Size Description (ASTM-USCS Scale)		Fine sand (based on Mean from Trask)	

Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	25.80
Fine Sand	200	35.73
Silt	>0.005 mm	34.40
Clay	<0.005 mm	4.07
	Total	**100**

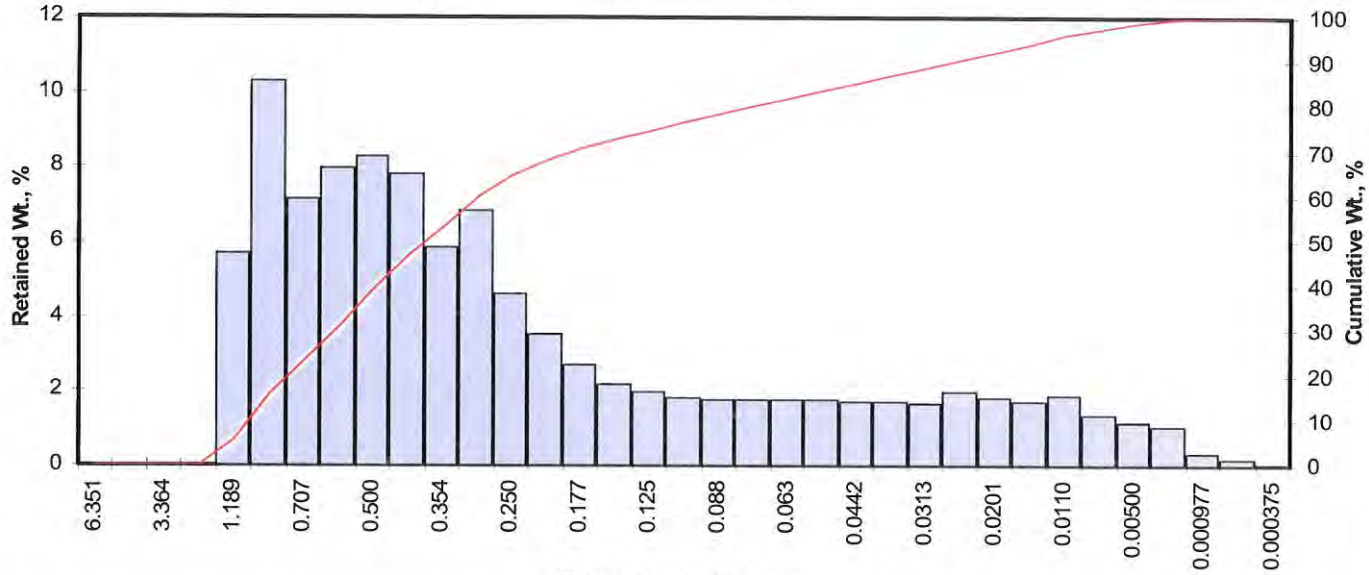
PTS Laboratories, Inc.

Particle Size Analysis - ASTM D4464M

Client: CH2M Hill
Project: Halaco Superfund Site
Project No: 41470

PTS File No: 41429
Sample ID: SD-DSA-006-A
Depth, ft: Surface Sediment

Grv	Sand Size			Silt	Clay
	crs	medium	fine		



Opening Inches	Opening Millimeters	Phi of Screen	U.S. No.	Sample Weight, grams	Increment Weight, percent	Cumulative Weight, percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	5.69	5.69	5.69
0.0331	0.841	0.25	20	10.30	10.30	15.99
0.0278	0.707	0.50	25	7.15	7.15	23.15
0.0234	0.595	0.75	30	7.98	7.98	31.13
0.0197	0.500	1.00	35	8.25	8.25	39.38
0.0166	0.420	1.25	40	7.81	7.81	47.19
0.0139	0.354	1.50	45	5.85	5.85	53.04
0.0117	0.297	1.75	50	6.83	6.83	59.88
0.0098	0.250	2.00	60	4.60	4.60	64.48
0.0083	0.210	2.25	70	3.51	3.51	67.99
0.0070	0.177	2.50	80	2.67	2.67	70.66
0.0059	0.149	2.75	100	2.18	2.18	72.84
0.0049	0.125	3.00	120	1.94	1.94	74.78
0.0041	0.105	3.25	140	1.81	1.81	76.59
0.0035	0.088	3.50	170	1.76	1.76	78.35
0.0029	0.074	3.75	200	1.76	1.76	80.11
0.0025	0.063	4.00	230	1.76	1.76	81.87
0.0021	0.053	4.25	270	1.74	1.74	83.61
0.00174	0.0442	4.50	325	1.72	1.72	85.33
0.00146	0.0372	4.75	400	1.69	1.69	87.02
0.00123	0.0313	5.00	450	1.65	1.65	88.67
0.000986	0.0250	5.32	500	1.99	1.99	90.67
0.000790	0.0201	5.64	635	1.79	1.79	92.46
0.000615	0.0156	6.00		1.70	1.70	94.16
0.000435	0.0110	6.50		1.86	1.86	96.02
0.000308	0.00781	7.00		1.35	1.35	97.37
0.000197	0.00500	7.65		1.14	1.14	98.51
0.000077	0.00195	9.00		1.05	1.05	99.56
0.000038	0.000977	10.00		0.30	0.30	99.86
0.000019	0.000488	11.00		0.13	0.13	99.99
0.000015	0.000375	11.38		0.01	0.01	100.00
TOTALS				**100.00**	**100.00**	**100.00**

Cumulative Weight Percent greater than			
Weight percent	Phi Value	Particle Size Inches	Particle Size Millimeters
5	-0.34	0.0499	1.267
10	-0.04	0.0405	1.029
16	0.25	0.0331	0.841
25	0.56	0.0267	0.679
40	1.02	0.0194	0.493
50	1.37	0.0152	0.387
60	1.76	0.0117	0.296
75	3.03	0.0048	0.122
84	4.31	0.0020	0.051
90	5.21	0.0011	0.027
95	6.23	0.0005	0.013

Measure	Trask	Inman	Folk-Ward
Median, phi	1.37	1.37	1.37
Median, in.	0.0152	0.0152	0.0152
Median, mm	0.387	0.387	0.387
Mean, phi	1.32	2.28	1.98
Mean, in.	0.0158	0.0081	0.0100
Mean, mm	0.401	0.206	0.254
Sorting	2.356	2.028	2.009
Skewness	0.745	0.448	0.463
Kurtosis	0.278	0.619	1.089
Grain Size Description (ASTM-USCS Scale)		Fine sand (based on Mean from Trask)	

Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	47.19
Fine Sand	200	32.92
Silt	>0.005 mm	18.40
Clay	<0.005 mm	1.49
	Total	**100**

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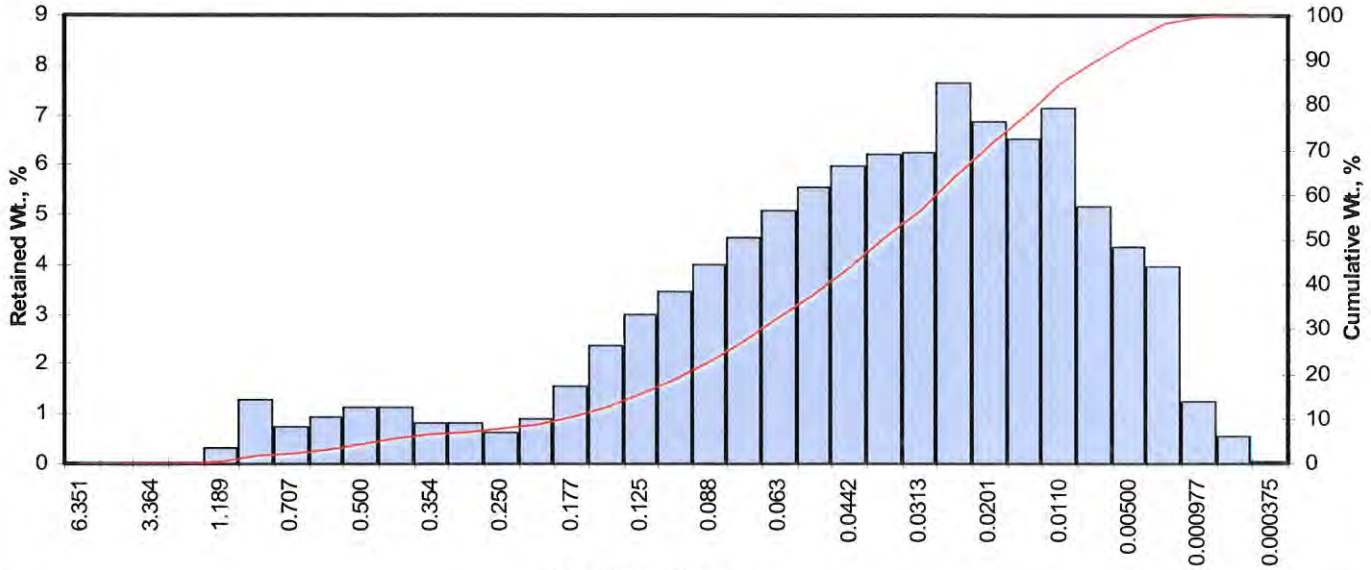
Phone: (562) 907-3607
Fax: (562) 907-3610

PTS Laboratories, Inc.

Particle Size Analysis - ASTM D4464M

Client:	CH2M Hill	**PTS File No:**	41429
Project:	Halaco Superfund Site	**Sample ID:**	SD-LGF-001-A
Project No:	41470	**Depth, ft:**	Surface Sediment

Grv	Sand Size			Silt	Clay
	crs	medium	fine		



Opening Inches	Opening Millimeters	Phi of Screen	U.S. No.	Sample Weight, grams	Increment Weight, percent	Cumulative Weight, percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	0.31	0.31	0.31
0.0331	0.841	0.25	20	1.27	1.27	1.58
0.0278	0.707	0.50	25	0.73	0.73	2.31
0.0234	0.595	0.75	30	0.92	0.92	3.23
0.0197	0.500	1.00	35	1.12	1.12	4.35
0.0166	0.420	1.25	40	1.12	1.12	5.47
0.0139	0.354	1.50	45	0.80	0.80	6.27
0.0117	0.297	1.75	50	0.82	0.82	7.09
0.0098	0.250	2.00	60	0.62	0.62	7.71
0.0083	0.210	2.25	70	0.90	0.90	8.61
0.0070	0.177	2.50	80	1.55	1.55	10.16
0.0059	0.149	2.75	100	2.36	2.36	12.52
0.0049	0.125	3.00	120	2.98	2.98	15.50
0.0041	0.105	3.25	140	3.46	3.46	18.96
0.0035	0.088	3.50	170	3.98	3.98	22.94
0.0029	0.074	3.75	200	4.55	4.55	27.49
0.0025	0.063	4.00	230	5.10	5.10	32.59
0.0021	0.053	4.25	270	5.55	5.55	38.14
0.00174	0.0442	4.50	325	5.96	5.96	44.10
0.00146	0.0372	4.75	400	6.20	6.20	50.30
0.00123	0.0313	5.00	450	6.23	6.23	56.53
0.000986	0.0250	5.32	500	7.64	7.64	64.17
0.000790	0.0201	5.64	635	6.88	6.88	71.05
0.000615	0.0156	6.00		6.53	6.53	77.58
0.000435	0.0110	6.50		7.12	7.12	84.70
0.000308	0.00781	7.00		5.16	5.16	89.86
0.000197	0.00500	7.65		4.33	4.33	94.19
0.000077	0.00195	9.00		3.97	3.97	98.16
0.000038	0.000977	10.00		1.23	1.23	99.39
0.000019	0.000488	11.00		0.56	0.56	99.95
0.000015	0.000375	11.38		0.05	0.05	100.00
TOTALS				**100.00**	**100.00**	**100.00**

Cumulative Weight Percent greater than			
Weight percent	Phi Value	Particle Size Inches	Particle Size Millimeters
5	1.15	0.0178	0.452
10	2.47	0.0071	0.180
16	3.04	0.0048	0.122
25	3.61	0.0032	0.082
40	4.33	0.0020	0.050
50	4.74	0.0015	0.037
60	5.15	0.0011	0.028
75	5.86	0.0007	0.017
84	6.45	0.0005	0.011
90	7.02	0.0003	0.008
95	7.92	0.0002	0.004

Measure	Trask	Inman	Folk-Ward
Median, phi	4.74	4.74	4.74
Median, in.	0.0015	0.0015	0.0015
Median, mm	0.037	0.037	0.037
Mean, phi	4.34	4.74	4.74
Mean, in.	0.0019	0.0015	0.0015
Mean, mm	0.049	0.037	0.037
Sorting	2.177	1.707	1.881
Skewness	1.002	0.003	-0.029
Kurtosis	0.187	0.985	1.237
Grain Size Description (ASTM-USCS Scale)		Silt (based on Mean from Trask)	

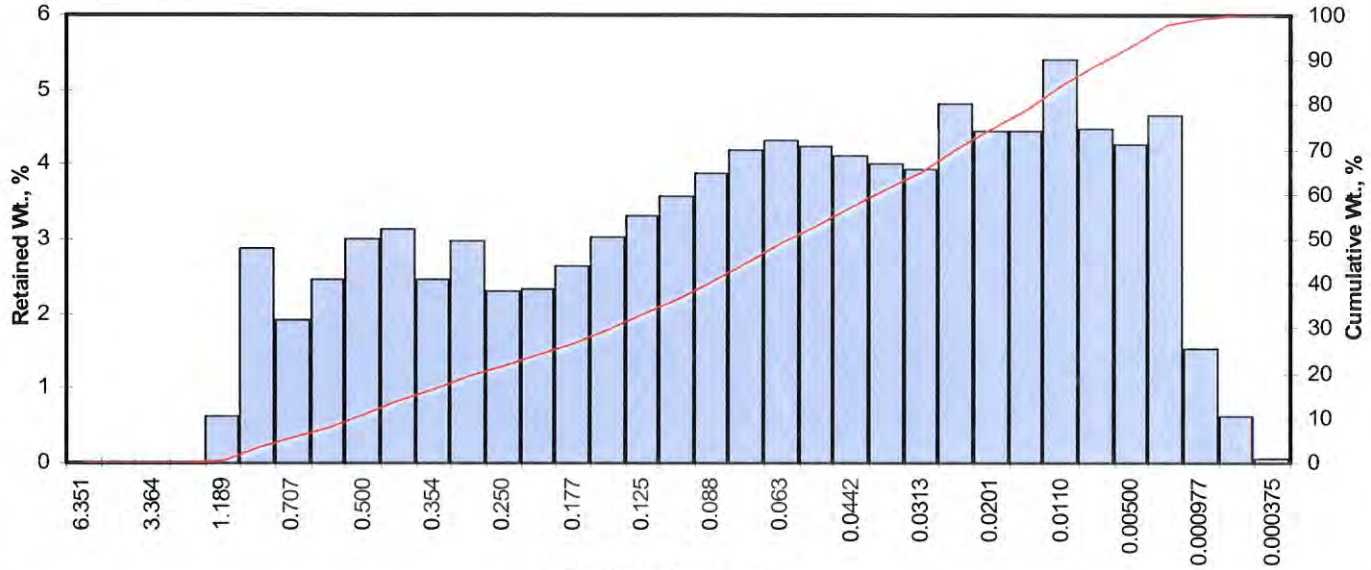
Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	5.47
Fine Sand	200	22.02
Silt	>0.005 mm	66.70
Clay	<0.005 mm	5.81
	Total	**100**

PTS Laboratories, Inc.

Particle Size Analysis - ASTM D4464M

Client:	CH2M Hill	**PTS File No:**	41429
Project:	Halaco Superfund Site	**Sample ID:**	SD-LGF-003-A
Project No:	41470	**Depth, ft:**	Surface Sediment

Grv	Sand Size			Silt	Clay
	crs	medium	fine		



Opening Inches	Opening Millimeters	Phi of Screen	U.S. No.	Sample Weight, grams	Increment Weight, percent	Cumulative Weight, percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	0.61	0.61	0.61
0.0331	0.841	0.25	20	2.88	2.88	3.49
0.0278	0.707	0.50	25	1.92	1.92	5.41
0.0234	0.595	0.75	30	2.45	2.45	7.86
0.0197	0.500	1.00	35	3.00	3.00	10.86
0.0166	0.420	1.25	40	3.14	3.14	14.00
0.0139	0.354	1.50	45	2.45	2.45	16.45
0.0117	0.297	1.75	50	2.97	2.97	19.42
0.0098	0.250	2.00	60	2.29	2.29	21.71
0.0083	0.210	2.25	70	2.33	2.33	24.04
0.0070	0.177	2.50	80	2.63	2.63	26.67
0.0059	0.149	2.75	100	3.02	3.02	29.69
0.0049	0.125	3.00	120	3.31	3.31	33.00
0.0041	0.105	3.25	140	3.56	3.56	36.56
0.0035	0.088	3.50	170	3.89	3.89	40.45
0.0029	0.074	3.75	200	4.20	4.20	44.65
0.0025	0.063	4.00	230	4.33	4.33	48.98
0.0021	0.053	4.25	270	4.25	4.25	53.23
0.00174	0.0442	4.50	325	4.12	4.12	57.35
0.00146	0.0372	4.75	400	4.01	4.01	61.36
0.00123	0.0313	5.00	450	3.92	3.92	65.28
0.000986	0.0250	5.32	500	4.80	4.80	70.08
0.000790	0.0201	5.64	635	4.45	4.45	74.53
0.000615	0.0156	6.00		4.46	4.46	78.99
0.000435	0.0110	6.50		5.41	5.41	84.39
0.000308	0.00781	7.00		4.47	4.47	88.86
0.000197	0.00500	7.65		4.27	4.27	93.13
0.000077	0.00195	9.00		4.65	4.65	97.78
0.000038	0.000977	10.00		1.53	1.53	99.31
0.000019	0.000488	11.00		0.63	0.63	99.94
0.000015	0.000375	11.38		0.06	0.06	100.00
TOTALS				100.00	100.00	100.00

Cumulative Weight Percent greater than			
Weight percent	Phi Value	Particle Size Inches	Particle Size Millimeters
5	0.45	0.0289	0.734
10	0.93	0.0207	0.525
16	1.45	0.0144	0.365
25	2.34	0.0078	0.197
40	3.47	0.0035	0.090
50	4.06	0.0024	0.060
60	4.67	0.0016	0.039
75	5.68	0.0008	0.020
84	6.46	0.0004	0.011
90	7.17	0.0003	0.007
95	8.19	0.0001	0.003

Measure	Trask	Inman	Folk-Ward
Median, phi	4.06	4.06	4.06
Median, in.	0.0024	0.0024	0.0024
Median, mm	0.060	0.060	0.060
Mean, phi	3.21	3.96	3.99
Mean, in.	0.0043	0.0025	0.0025
Mean, mm	0.108	0.064	0.063
Sorting	3.179	2.505	2.425
Skewness	1.036	-0.040	0.013
Kurtosis	0.171	0.546	0.951
Grain Size Description (ASTM-USCS Scale)		Fine sand (based on Mean from Trask)	

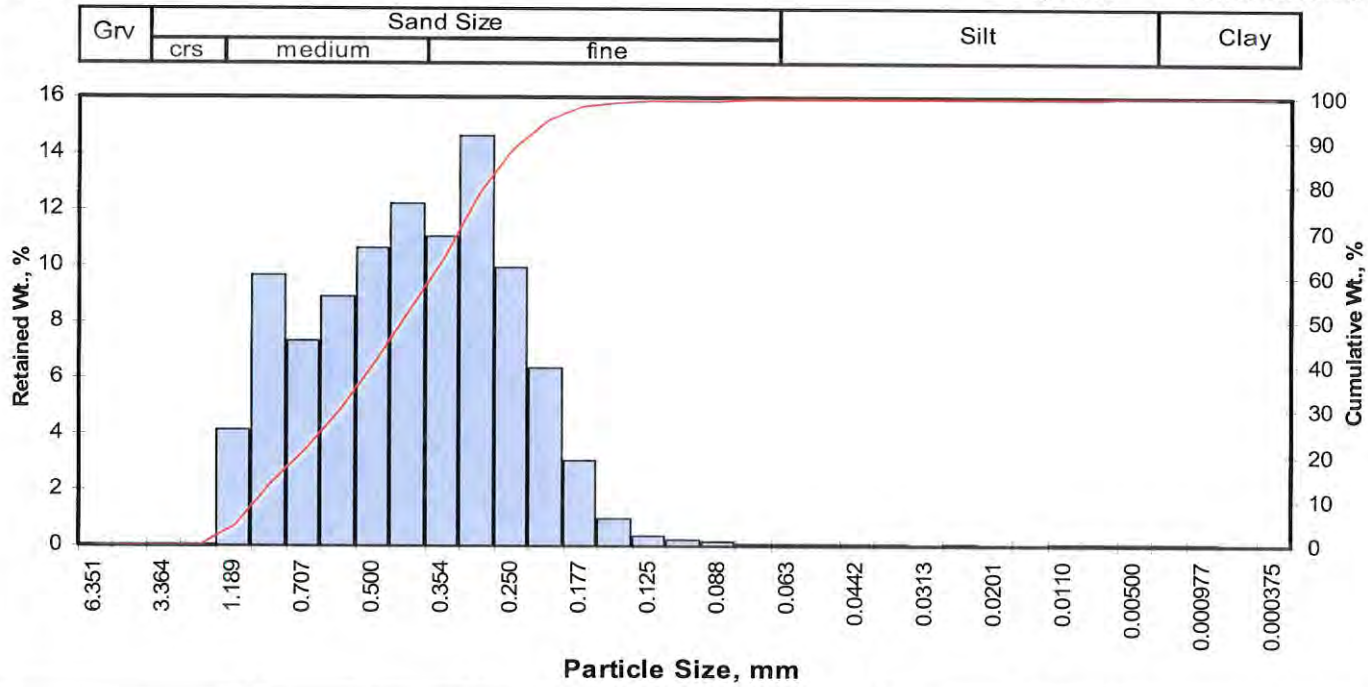
Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	14.00
Fine Sand	200	30.65
Silt	>0.005 mm	48.49
Clay	<0.005 mm	6.87
	Total	**100**

PTS Laboratories, Inc.

Particle Size Analysis - ASTM D4464M

Client: CH2M Hill
Project: Halaco Superfund Site
Project No: 41470

PTS File No: 41429
Sample ID: SD-LGF-007-A
Depth, ft: Surface Sediment



Opening Inches	Opening Millimeters	Phi of Screen	U.S. No.	Sample Weight, grams	Increment Weight, percent	Cumulative Weight, percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	4.11	4.11	4.11
0.0331	0.841	0.25	20	9.68	9.68	13.79
0.0278	0.707	0.50	25	7.33	7.33	21.12
0.0234	0.595	0.75	30	8.87	8.87	30.00
0.0197	0.500	1.00	35	10.60	10.60	40.60
0.0166	0.420	1.25	40	12.20	12.20	52.80
0.0139	0.354	1.50	45	11.00	11.00	63.80
0.0117	0.297	1.75	50	14.60	14.60	78.40
0.0098	0.250	2.00	60	9.93	9.93	88.34
0.0083	0.210	2.25	70	6.32	6.32	94.66
0.0070	0.177	2.50	80	3.00	3.00	97.66
0.0059	0.149	2.75	100	0.99	0.99	98.65
0.0049	0.125	3.00	120	0.33	0.33	98.98
0.0041	0.105	3.25	140	0.19	0.19	99.17
0.0035	0.088	3.50	170	0.15	0.15	99.32
0.0029	0.074	3.75	200	0.09	0.09	99.40
0.0025	0.063	4.00	230	0.05	0.05	99.45
0.0021	0.053	4.25	270	0.04	0.04	99.49
0.00174	0.0442	4.50	325	0.04	0.04	99.53
0.00146	0.0372	4.75	400	0.04	0.04	99.56
0.00123	0.0313	5.00	450	0.03	0.03	99.59
0.000986	0.0250	5.32	500	0.04	0.04	99.63
0.000790	0.0201	5.64	635	0.03	0.03	99.66
0.000615	0.0156	6.00		0.03	0.03	99.69
0.000435	0.0110	6.50		0.04	0.04	99.74
0.000308	0.00781	7.00		0.04	0.04	99.78
0.000197	0.00500	7.65		0.04	0.04	99.82
0.000077	0.00195	9.00		0.07	0.07	99.89
0.000038	0.000977	10.00		0.10	0.10	99.99
0.000019	0.000488	11.00		0.01	0.01	100.00
0.000015	0.000375	11.38		0.00	0.00	100.00
TOTALS				100.00	100.00	100.00

Cumulative Weight Percent greater than			
Weight percent	Phi Value	Particle Size Inches	Particle Size Millimeters
5	-0.20	0.0454	1.152
10	0.05	0.0379	0.963
16	0.33	0.0314	0.798
25	0.61	0.0258	0.656
40	0.99	0.0199	0.505
50	1.19	0.0172	0.437
60	1.41	0.0148	0.375
75	1.69	0.0122	0.310
84	1.89	0.0106	0.270
90	2.07	0.0094	0.239
95	2.28	0.0081	0.206

Measure	Trask	Inman	Folk-Ward
Median, phi	1.19	1.19	1.19
Median, in.	0.0172	0.0172	0.0172
Median, mm	0.437	0.437	0.437
Mean, phi	1.05	1.11	1.14
Mean, in.	0.0190	0.0183	0.0179
Mean, mm	0.483	0.464	0.455
Sorting	1.455	0.783	0.768
Skewness	1.030	-0.108	-0.117
Kurtosis	0.239	0.586	0.940
Grain Size Description (ASTM-USCS Scale)		Medium sand (based on Mean from Trask)	

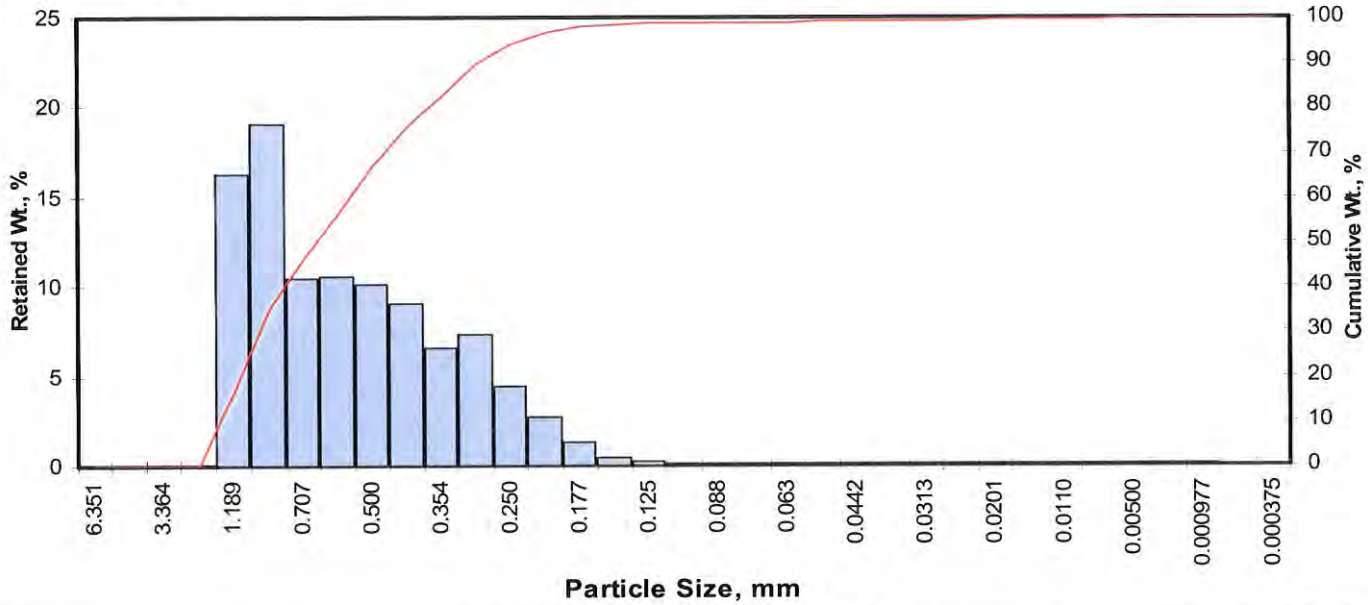
Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	52.80
Fine Sand	200	46.60
Silt	>0.005 mm	0.42
Clay	<0.005 mm	0.18
	Total	**100**

PTS Laboratories, Inc.

Particle Size Analysis - ASTM D4464M

Client:	CH2M Hill	**PTS File No:**	41429
Project:	Halaco Superfund Site	**Sample ID:**	SD-LGF-008-A
Project No:	41470	**Depth, ft:**	Surface Sediment

Grv	Sand Size			Silt	Clay
	crs	medium	fine		



Opening Inches	Opening Millimeters	Phi of Screen	U.S. No.	Sample Weight, grams	Increment Weight, percent	Cumulative Weight, percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	16.30	16.30	16.30
0.0331	0.841	0.25	20	19.10	19.11	35.41
0.0278	0.707	0.50	25	10.50	10.50	45.91
0.0234	0.595	0.75	30	10.60	10.60	56.52
0.0197	0.500	1.00	35	10.10	10.10	66.62
0.0166	0.420	1.25	40	9.04	9.04	75.66
0.0139	0.354	1.50	45	6.55	6.55	82.21
0.0117	0.297	1.75	50	7.31	7.31	89.52
0.0098	0.250	2.00	60	4.43	4.43	93.96
0.0083	0.210	2.25	70	2.68	2.68	96.64
0.0070	0.177	2.50	80	1.26	1.26	97.90
0.0059	0.149	2.75	100	0.47	0.47	98.37
0.0049	0.125	3.00	120	0.20	0.20	98.57
0.0041	0.105	3.25	140	0.12	0.12	98.69
0.0035	0.088	3.50	170	0.09	0.09	98.78
0.0029	0.074	3.75	200	0.07	0.07	98.85
0.0025	0.063	4.00	230	0.07	0.07	98.92
0.0021	0.053	4.25	270	0.06	0.06	98.98
0.00174	0.0442	4.50	325	0.06	0.06	99.04
0.00146	0.0372	4.75	400	0.07	0.07	99.11
0.00123	0.0313	5.00	450	0.07	0.07	99.18
0.000986	0.0250	5.32	500	0.09	0.09	99.27
0.000790	0.0201	5.64	635	0.09	0.09	99.36
0.000615	0.0156	6.00		0.10	0.10	99.46
0.000435	0.0110	6.50		0.12	0.12	99.58
0.000308	0.00781	7.00		0.11	0.11	99.69
0.000197	0.00500	7.65		0.10	0.10	99.79
0.000077	0.00195	9.00		0.11	0.11	99.90
0.000038	0.000977	10.00		0.09	0.09	99.99
0.000019	0.000488	11.00		0.01	0.01	100.00
0.000015	0.000375	11.38		0.00	0.00	100.00
TOTALS				**100.00**	**100.00**	**100.00**

Cumulative Weight Percent greater than			
Weight percent	Phi Value	Particle Size Inches	Particle Size Millimeters
5	-0.77	0.0671	1.705
10	-0.54	0.0572	1.454
16	-0.26	0.0473	1.201
25	-0.02	0.0400	1.016
40	0.36	0.0307	0.780
50	0.60	0.0260	0.661
60	0.84	0.0221	0.560
75	1.23	0.0168	0.426
84	1.56	0.0133	0.339
90	1.78	0.0115	0.292
95	2.10	0.0092	0.234

Measure	Trask	Inman	Folk-Ward
Median, phi	0.60	0.60	0.60
Median, in.	0.0260	0.0260	0.0260
Median, mm	0.661	0.661	0.661
Mean, phi	0.47	0.65	0.63
Mean, in.	0.0284	0.0251	0.0254
Mean, mm	0.721	0.638	0.646
Sorting	1.544	0.913	0.891
Skewness	0.994	0.057	0.052
Kurtosis	0.254	0.571	0.937
Grain Size Description (ASTM-USCS Scale)		Medium sand (based on Mean from Trask)	

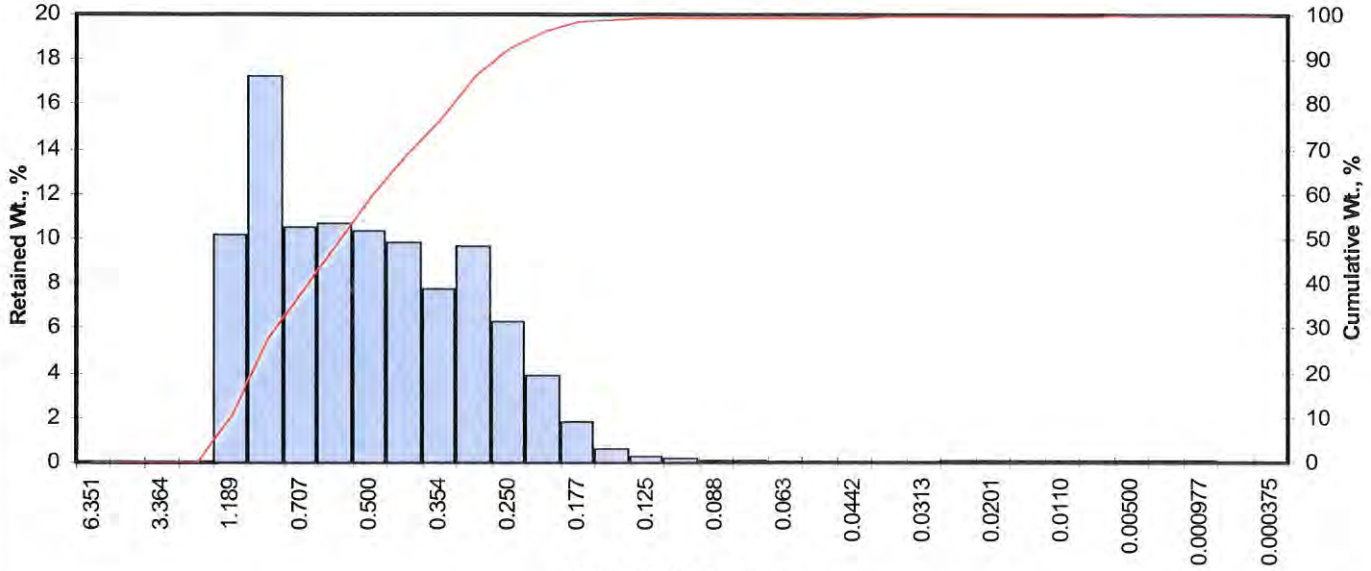
Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	75.66
Fine Sand	200	23.19
Silt	>0.005 mm	0.94
Clay	<0.005 mm	0.21
	Total	**100**

PTS Laboratories, Inc.

Particle Size Analysis - ASTM D4464M

Client:	CH2M Hill	**PTS File No:**	41429
Project:	Halaco Superfund Site	**Sample ID:**	SD-LGF-009-A
Project No:	41470	**Depth, ft:**	Surface Sediment

Grv	Sand Size			Silt	Clay
	crs	medium	fine		



Opening Inches	Opening Millimeters	Phi of Screen	U.S. No.	Sample Weight, grams	Increment Weight, percent	Cumulative Weight, percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	10.20	10.20	10.20
0.0331	0.841	0.25	20	17.20	17.20	27.41
0.0278	0.707	0.50	25	10.50	10.50	37.91
0.0234	0.595	0.75	30	10.70	10.70	48.61
0.0197	0.500	1.00	35	10.30	10.30	58.92
0.0166	0.420	1.25	40	9.80	9.80	68.72
0.0139	0.354	1.50	45	7.77	7.77	76.49
0.0117	0.297	1.75	50	9.63	9.63	86.12
0.0098	0.250	2.00	60	6.31	6.31	92.43
0.0083	0.210	2.25	70	3.90	3.90	96.33
0.0070	0.177	2.50	80	1.79	1.79	98.13
0.0059	0.149	2.75	100	0.59	0.59	98.72
0.0049	0.125	3.00	120	0.22	0.22	98.94
0.0041	0.105	3.25	140	0.14	0.14	99.08
0.0035	0.088	3.50	170	0.10	0.10	99.17
0.0029	0.074	3.75	200	0.06	0.06	99.23
0.0025	0.063	4.00	230	0.04	0.04	99.27
0.0021	0.053	4.25	270	0.04	0.04	99.31
0.00174	0.0442	4.50	325	0.04	0.04	99.35
0.00146	0.0372	4.75	400	0.04	0.04	99.39
0.00123	0.0313	5.00	450	0.04	0.04	99.43
0.000986	0.0250	5.32	500	0.05	0.05	99.48
0.000790	0.0201	5.64	635	0.05	0.05	99.54
0.000615	0.0156	6.00		0.06	0.06	99.60
0.000435	0.0110	6.50		0.08	0.08	99.68
0.000308	0.00781	7.00		0.08	0.08	99.75
0.000197	0.00500	7.65		0.07	0.07	99.83
0.000077	0.00195	9.00		0.08	0.08	99.91
0.000038	0.000977	10.00		0.08	0.08	99.99
0.000019	0.000488	11.00		0.01	0.01	100.00
0.000015	0.000375	11.38		0.00	0.00	100.00
TOTALS				100.00	100.00	100.00

Cumulative Weight Percent greater than			
Weight percent	Phi Value	Particle Size Inches	Particle Size Millimeters
5	-0.63	0.0610	1.550
10	-0.26	0.0473	1.202
16	-0.08	0.0417	1.058
25	0.18	0.0348	0.883
40	0.55	0.0269	0.684
50	0.78	0.0229	0.581
60	1.03	0.0193	0.491
75	1.45	0.0144	0.365
84	1.69	0.0122	0.309
90	1.90	0.0105	0.267
95	2.16	0.0088	0.223

Measure	Trask	Inman	Folk-Ward
Median, phi	0.78	0.78	0.78
Median, in.	0.0229	0.0229	0.0229
Median, mm	0.581	0.581	0.581
Mean, phi	0.68	0.81	0.80
Mean, in.	0.0246	0.0225	0.0226
Mean, mm	0.624	0.572	0.575
Sorting	1.554	0.888	0.868
Skewness	0.978	0.026	0.007
Kurtosis	0.277	0.574	0.901
Grain Size Description (ASTM-USCS Scale)		Medium sand (based on Mean from Trask)	

Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	68.72
Fine Sand	200	30.51
Silt	>0.005 mm	0.60
Clay	<0.005 mm	0.17
	Total	100

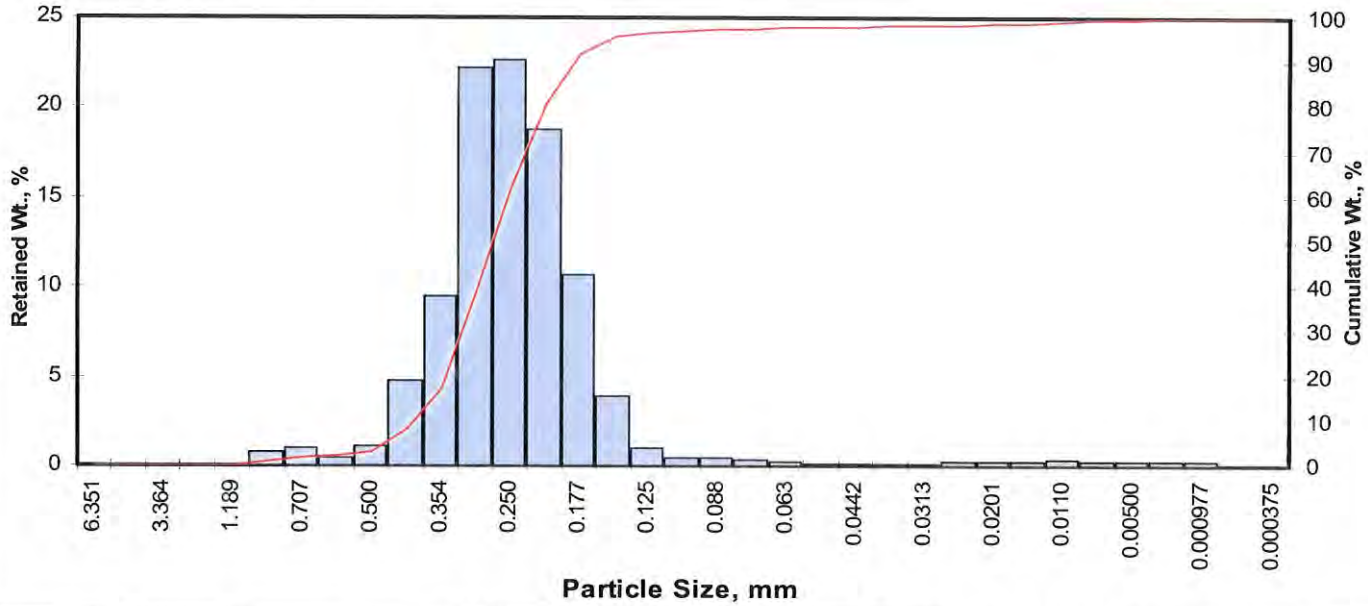
PTS Laboratories, Inc.

Particle Size Analysis - ASTM D4464M

Client: CH2M Hill
Project: Halaco Superfund Site
Project No: 41470

PTS File No: 41429
Sample ID: SD-LGF-010-A
Depth, ft: Surface Sediment

Grv	Sand Size			Silt	Clay
	crs	medium	fine		



Opening Inches	Opening Millimeters	Phi of Screen	U.S. No.	Sample Weight, grams	Increment Weight, percent	Cumulative Weight, percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	0.00	0.00	0.00
0.0331	0.841	0.25	20	0.71	0.71	0.71
0.0278	0.707	0.50	25	0.98	0.98	1.69
0.0234	0.595	0.75	30	0.43	0.43	2.12
0.0197	0.500	1.00	35	1.08	1.08	3.20
0.0166	0.420	1.25	40	4.79	4.79	8.00
0.0139	0.354	1.50	45	9.43	9.44	17.43
0.0117	0.297	1.75	50	22.20	22.22	39.65
0.0098	0.250	2.00	60	22.60	22.62	62.26
0.0083	0.210	2.25	70	18.70	18.71	80.98
0.0070	0.177	2.50	80	10.70	10.71	91.68
0.0059	0.149	2.75	100	3.83	3.83	95.52
0.0049	0.125	3.00	120	0.96	0.96	96.48
0.0041	0.105	3.25	140	0.40	0.40	96.88
0.0035	0.088	3.50	170	0.39	0.39	97.27
0.0029	0.074	3.75	200	0.31	0.31	97.58
0.0025	0.063	4.00	230	0.18	0.18	97.76
0.0021	0.053	4.25	270	0.12	0.12	97.88
0.00174	0.0442	4.50	325	0.13	0.13	98.01
0.00146	0.0372	4.75	400	0.13	0.13	98.14
0.00123	0.0313	5.00	450	0.13	0.13	98.27
0.000986	0.0250	5.32	500	0.17	0.17	98.44
0.000790	0.0201	5.64	635	0.19	0.19	98.63
0.000615	0.0156	6.00		0.22	0.22	98.85
0.000435	0.0110	6.50		0.29	0.29	99.14
0.000308	0.00781	7.00		0.24	0.24	99.38
0.000197	0.00500	7.65		0.21	0.21	99.59
0.000077	0.00195	9.00		0.21	0.21	99.80
0.000038	0.000977	10.00		0.18	0.18	99.98
0.000019	0.000488	11.00		0.02	0.02	100.00
0.000015	0.000375	11.38		0.00	0.00	100.00
TOTALS				**99.90**	**100.00**	**100.00**

Cumulative Weight Percent greater than			
Weight percent	Phi Value	Particle Size Inches	Particle Size Millimeters
5	1.09	0.0184	0.469
10	1.30	0.0160	0.405
16	1.46	0.0143	0.363
25	1.59	0.0131	0.333
40	1.75	0.0117	0.297
50	1.86	0.0108	0.275
60	1.97	0.0100	0.254
75	2.17	0.0087	0.222
84	2.32	0.0079	0.200
90	2.46	0.0072	0.182
95	2.72	0.0060	0.152

Measure	Trask	Inman	Folk-Ward
Median, phi	1.86	1.86	1.86
Median, in.	0.0108	0.0108	0.0108
Median, mm	0.275	0.275	0.275
Mean, phi	1.85	1.89	1.88
Mean, in.	0.0109	0.0106	0.0107
Mean, mm	0.278	0.270	0.271
Sorting	1.225	0.429	0.460
Skewness	0.991	0.063	0.056
Kurtosis	0.248	0.890	1.137
Grain Size Description (ASTM-USCS Scale)		Fine sand (based on Mean from Trask)	

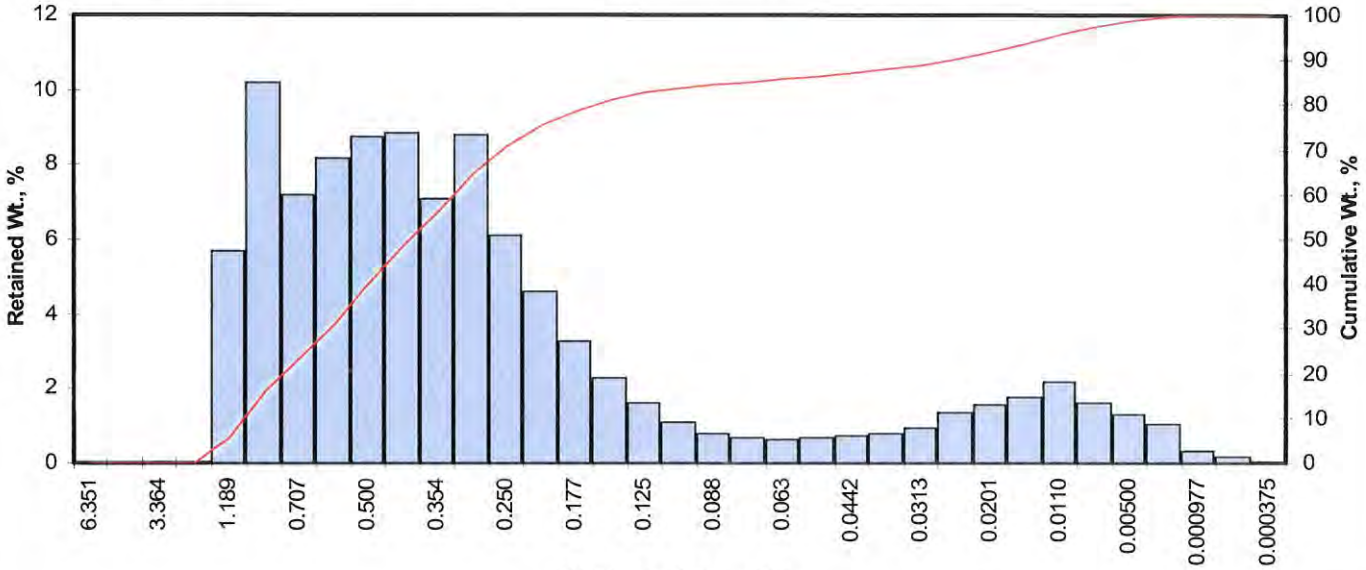
Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	8.00
Fine Sand	200	89.58
Silt	>0.005 mm	2.01
Clay	<0.005 mm	0.41
	Total	**100**

PTS Laboratories, Inc.

Particle Size Analysis - ASTM D4464M

Client:	CH2M Hill	**PTS File No:**	41429
Project:	Halaco Superfund Site	**Sample ID:**	SD-LGF-012-A
Project No:	41470	**Depth, ft:**	Surface Sediment

Grv	Sand Size			Silt	Clay
	crs	medium	fine		



Opening Inches	Opening Millimeters	Phi of Screen	U.S. No.	Sample Weight, grams	Increment Weight, percent	Cumulative Weight, percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	5.67	5.67	5.67
0.0331	0.841	0.25	20	10.20	10.20	15.87
0.0278	0.707	0.50	25	7.20	7.20	23.07
0.0234	0.595	0.75	30	8.15	8.15	31.22
0.0197	0.500	1.00	35	8.75	8.75	39.97
0.0166	0.420	1.25	40	8.82	8.82	48.79
0.0139	0.354	1.50	45	7.08	7.08	55.87
0.0117	0.297	1.75	50	8.78	8.78	64.65
0.0098	0.250	2.00	60	6.11	6.11	70.76
0.0083	0.210	2.25	70	4.61	4.61	75.37
0.0070	0.177	2.50	80	3.28	3.28	78.65
0.0059	0.149	2.75	100	2.29	2.29	80.94
0.0049	0.125	3.00	120	1.60	1.60	82.54
0.0041	0.105	3.25	140	1.09	1.09	83.64
0.0035	0.088	3.50	170	0.78	0.78	84.42
0.0029	0.074	3.75	200	0.65	0.65	85.07
0.0025	0.063	4.00	230	0.63	0.63	85.70
0.0021	0.053	4.25	270	0.65	0.65	86.35
0.00174	0.0442	4.50	325	0.70	0.70	87.05
0.00146	0.0372	4.75	400	0.79	0.79	87.84
0.00123	0.0313	5.00	450	0.91	0.91	88.75
0.000986	0.0250	5.32	500	1.37	1.37	90.12
0.000790	0.0201	5.64	635	1.57	1.57	91.69
0.000615	0.0156	6.00		1.77	1.77	93.46
0.000435	0.0110	6.50		2.15	2.15	95.61
0.000308	0.00781	7.00		1.60	1.60	97.21
0.000197	0.00500	7.65		1.29	1.29	98.50
0.000077	0.00195	9.00		1.03	1.03	99.53
0.000038	0.000977	10.00		0.31	0.31	99.84
0.000019	0.000488	11.00		0.15	0.15	99.99
0.000015	0.000375	11.38		0.01	0.01	100.00
TOTALS				100.00	100.00	100.00

Cumulative Weight Percent greater than			
Weight percent	Phi Value	Particle Size Inches	Particle Size Millimeters
5	-0.34	0.0498	1.265
10	-0.04	0.0404	1.027
16	0.25	0.0330	0.838
25	0.56	0.0267	0.679
40	1.00	0.0197	0.500
50	1.29	0.0161	0.408
60	1.62	0.0128	0.326
75	2.23	0.0084	0.213
84	3.37	0.0038	0.097
90	5.29	0.0010	0.026
95	6.36	0.0005	0.012

Measure	Trask	Inman	Folk-Ward
Median, phi	1.29	1.29	1.29
Median, in.	0.0161	0.0161	0.0161
Median, mm	0.408	0.408	0.408
Mean, phi	1.17	1.81	1.64
Mean, in.	0.0176	0.0112	0.0126
Mean, mm	0.446	0.285	0.321
Sorting	1.784	1.556	1.793
Skewness	0.932	0.333	0.423
Kurtosis	0.233	1.152	1.643
Grain Size Description (ASTM-USCS Scale)		Medium sand (based on Mean from Trask)	

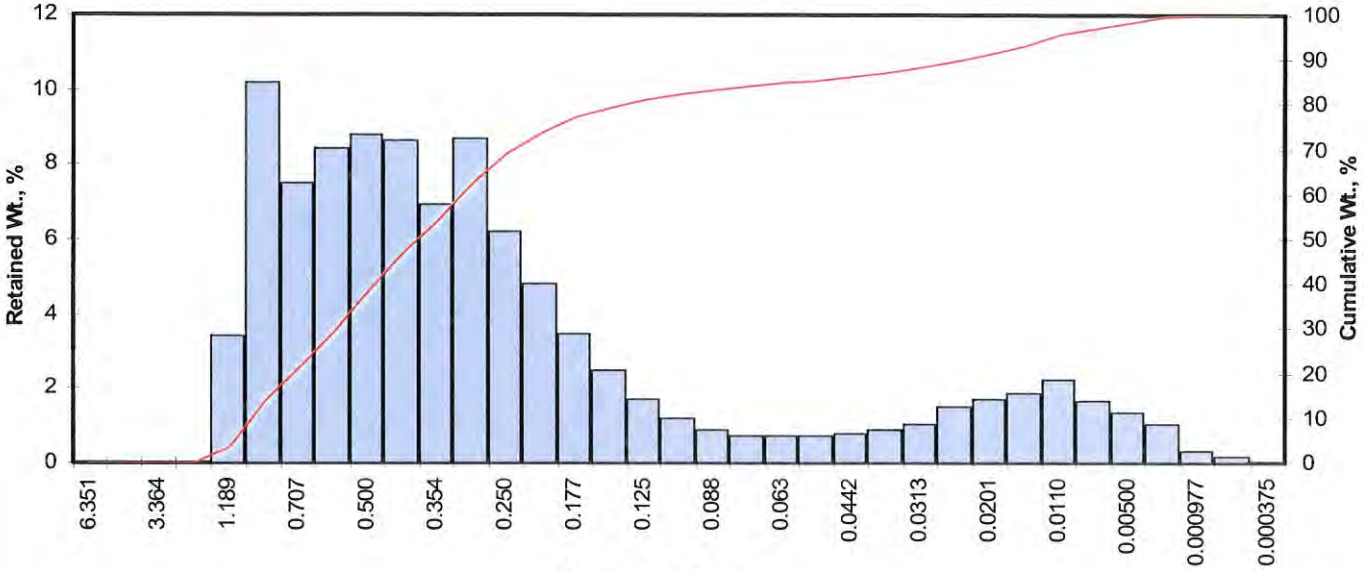
Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	48.79
Fine Sand	200	36.27
Silt	>0.005 mm	13.43
Clay	<0.005 mm	1.50
	Total	**100**

PTS Laboratories, Inc.

Particle Size Analysis - ASTM D4464M

Client:	CH2M Hill	**PTS File No:**	41429
Project:	Halaco Superfund Site	**Sample ID:**	SD-LGF-112-A
Project No:	41470	**Depth, ft:**	Surface Sediment

Grv	Sand Size			Silt	Clay
	crs	medium	fine		



Opening Inches	Opening Millimeters	Phi of Screen	U.S. No.	Sample Weight, grams	Increment Weight, percent	Cumulative Weight, percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	3.39	3.39	3.39
0.0331	0.841	0.25	20	10.20	10.20	13.59
0.0278	0.707	0.50	25	7.52	7.52	21.11
0.0234	0.595	0.75	30	8.41	8.41	29.52
0.0197	0.500	1.00	35	8.77	8.77	38.28
0.0166	0.420	1.25	40	8.65	8.65	46.93
0.0139	0.354	1.50	45	6.92	6.92	53.85
0.0117	0.297	1.75	50	8.71	8.71	62.56
0.0098	0.250	2.00	60	6.21	6.21	68.77
0.0083	0.210	2.25	70	4.79	4.79	73.56
0.0070	0.177	2.50	80	3.47	3.47	77.03
0.0059	0.149	2.75	100	2.46	2.46	79.49
0.0049	0.125	3.00	120	1.73	1.73	81.22
0.0041	0.105	3.25	140	1.19	1.19	82.41
0.0035	0.088	3.50	170	0.87	0.87	83.28
0.0029	0.074	3.75	200	0.74	0.74	84.02
0.0025	0.063	4.00	230	0.70	0.70	84.72
0.0021	0.053	4.25	270	0.72	0.72	85.44
0.00174	0.0442	4.50	325	0.79	0.79	86.23
0.00146	0.0372	4.75	400	0.90	0.90	87.13
0.00123	0.0313	5.00	450	1.03	1.03	88.16
0.000986	0.0250	5.32	500	1.52	1.52	89.68
0.000790	0.0201	5.64	635	1.70	1.70	91.38
0.000615	0.0156	6.00		1.87	1.87	93.25
0.000435	0.0110	6.50		2.24	2.24	95.49
0.000308	0.00781	7.00		1.64	1.64	97.13
0.000197	0.00500	7.65		1.32	1.32	98.45
0.000077	0.00195	9.00		1.06	1.06	99.51
0.000038	0.000977	10.00		0.32	0.32	99.83
0.000019	0.000488	11.00		0.16	0.16	99.99
0.000015	0.000375	11.38		0.02	0.01	100.00
TOTALS				**100.00**	**100.00**	**100.00**

Cumulative Weight Percent greater than			
Weight percent	Phi Value	Particle Size Inches	Particle Size Millimeters
5	-0.17	0.0443	1.126
10	0.07	0.0374	0.950
16	0.33	0.0313	0.795
25	0.62	0.0257	0.653
40	1.05	0.0190	0.483
50	1.36	0.0153	0.389
60	1.68	0.0123	0.313
75	2.35	0.0077	0.196
84	3.74	0.0029	0.075
90	5.38	0.0009	0.024
95	6.39	0.0005	0.012

Measure	Trask	Inman	Folk-Ward
Median, phi	1.36	1.36	1.36
Median, in.	0.0153	0.0153	0.0153
Median, mm	0.389	0.389	0.389
Mean, phi	1.24	2.04	1.81
Mean, in.	0.0167	0.0096	0.0112
Mean, mm	0.424	0.244	0.285
Sorting	1.826	1.707	1.848
Skewness	0.918	0.396	0.465
Kurtosis	0.247	0.922	1.547
Grain Size Description (ASTM-USCS Scale)		Fine sand (based on Mean from Trask)	

Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	46.93
Fine Sand	200	37.08
Silt	>0.005 mm	14.43
Clay	<0.005 mm	1.55
	Total	**100**

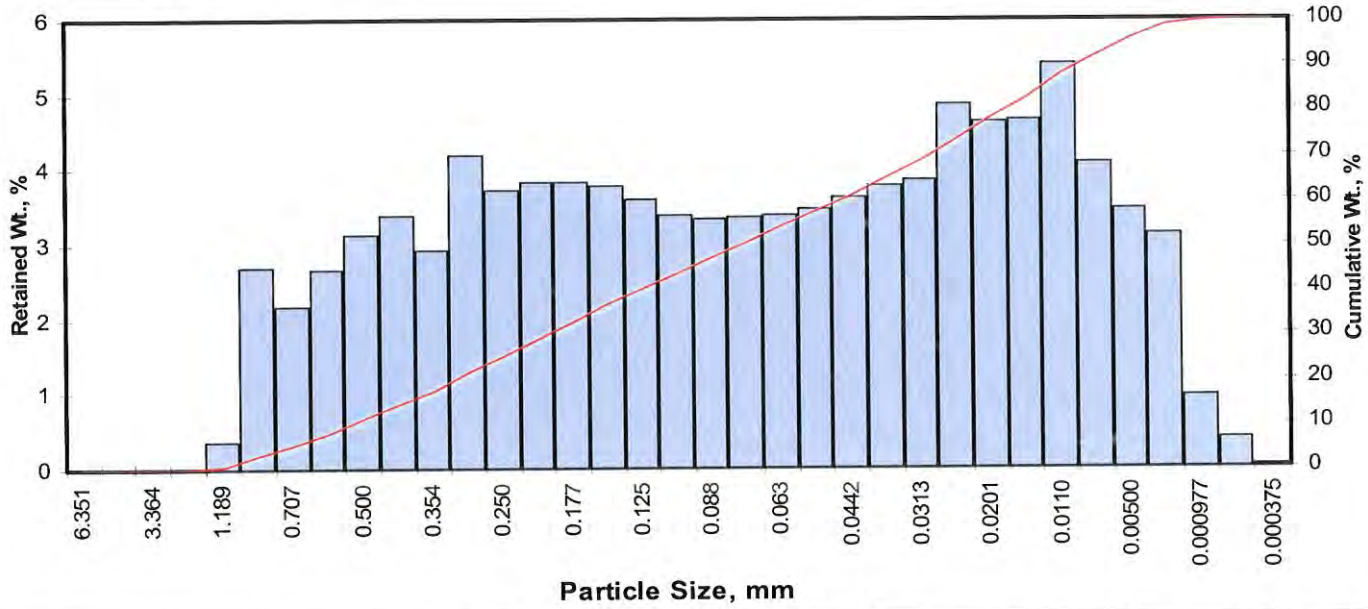
PTS Laboratories, Inc.

Particle Size Analysis - ASTM D4464M

Client: CH2M Hill
Project: Halaco Superfund Site
Project No: 41470

PTS File No: 41429
Sample ID: SD-LGM-001-A
Depth, ft: Surface Sediment

Grv	Sand Size			Silt	Clay
	crs	medium	fine		



Opening Inches	Opening Millimeters	Phi of Screen	U.S. No.	Sample Weight, grams	Increment Weight, percent	Cumulative Weight, percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	0.35	0.35	0.35
0.0331	0.841	0.25	20	2.68	2.68	3.03
0.0278	0.707	0.50	25	2.16	2.16	5.19
0.0234	0.595	0.75	30	2.67	2.67	7.86
0.0197	0.500	1.00	35	3.14	3.14	11.00
0.0166	0.420	1.25	40	3.38	3.38	14.38
0.0139	0.354	1.50	45	2.91	2.91	17.29
0.0117	0.297	1.75	50	4.18	4.18	21.47
0.0098	0.250	2.00	60	3.73	3.73	25.20
0.0083	0.210	2.25	70	3.82	3.82	29.02
0.0070	0.177	2.50	80	3.83	3.83	32.85
0.0059	0.149	2.75	100	3.77	3.77	36.61
0.0049	0.125	3.00	120	3.59	3.59	40.20
0.0041	0.105	3.25	140	3.40	3.40	43.60
0.0035	0.088	3.50	170	3.33	3.33	46.93
0.0029	0.074	3.75	200	3.35	3.35	50.28
0.0025	0.063	4.00	230	3.40	3.40	53.68
0.0021	0.053	4.25	270	3.46	3.46	57.14
0.00174	0.0442	4.50	325	3.63	3.63	60.77
0.00146	0.0372	4.75	400	3.78	3.78	64.55
0.00123	0.0313	5.00	450	3.86	3.86	68.41
0.000986	0.0250	5.32	500	4.86	4.86	73.27
0.000790	0.0201	5.64	635	4.62	4.62	77.89
0.000615	0.0156	6.00		4.65	4.65	82.54
0.000435	0.0110	6.50		5.40	5.40	87.94
0.000308	0.00781	7.00		4.08	4.08	92.02
0.000197	0.00500	7.65		3.47	3.47	95.49
0.000077	0.00195	9.00		3.13	3.13	98.62
0.000038	0.000977	10.00		0.95	0.95	99.57
0.000019	0.000488	11.00		0.40	0.40	99.97
0.000015	0.000375	11.38		0.04	0.03	100.00
TOTALS				100.00	100.00	100.00

Cumulative Weight Percent greater than			
Weight percent	Phi Value	Particle Size Inches	Particle Size Millimeters
5	0.48	0.0283	0.718
10	0.92	0.0208	0.528
16	1.39	0.0150	0.382
25	1.99	0.0099	0.252
40	2.99	0.0050	0.126
50	3.73	0.0030	0.075
60	4.45	0.0018	0.046
75	5.44	0.0009	0.023
84	6.14	0.0006	0.014
90	6.75	0.0004	0.009
95	7.55	0.0002	0.005

Measure	Trask	Inman	Folk-Ward
Median, phi	3.73	3.73	3.73
Median, in.	0.0030	0.0030	0.0030
Median, mm	0.075	0.075	0.075
Mean, phi	2.86	3.76	3.75
Mean, in.	0.0054	0.0029	0.0029
Mean, mm	0.138	0.074	0.074
Sorting	3.309	2.373	2.259
Skewness	1.011	0.014	0.048
Kurtosis	0.221	0.491	0.840
Grain Size Description (ASTM-USCS Scale)		Fine sand (based on Mean from Trask)	

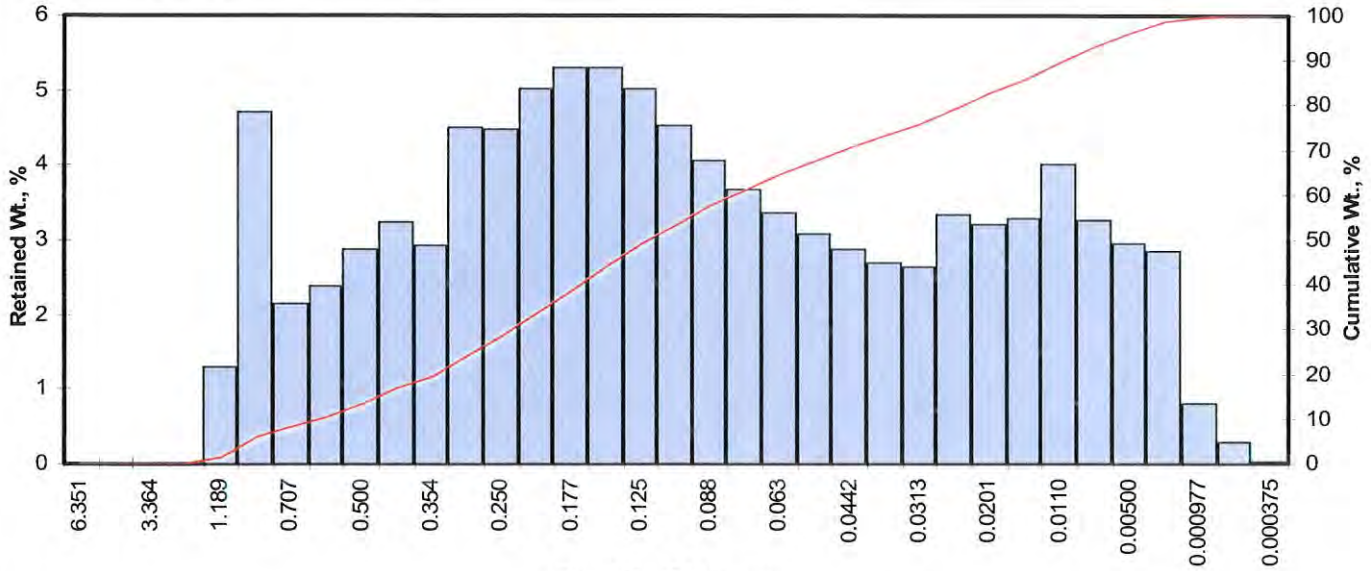
Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	14.38
Fine Sand	200	35.90
Silt	>0.005 mm	45.20
Clay	<0.005 mm	4.51
	Total	100

PTS Laboratories, Inc.

Particle Size Analysis - ASTM D4464M

Client:	CH2M Hill	**PTS File No:**	41429
Project:	Halaco Superfund Site	**Sample ID:**	SD-LGM-003-A
Project No:	41470	**Depth, ft:**	Surface Sediment

Grv	Sand Size			Silt	Clay
	crs	medium	fine		



Opening Inches	Opening Millimeters	Phi of Screen	U.S. No.	Sample Weight, grams	Increment Weight, percent	Cumulative Weight, percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	1.30	1.30	1.30
0.0331	0.841	0.25	20	4.70	4.70	6.00
0.0278	0.707	0.50	25	2.14	2.14	8.14
0.0234	0.595	0.75	30	2.37	2.37	10.51
0.0197	0.500	1.00	35	2.87	2.87	13.38
0.0166	0.420	1.25	40	3.23	3.23	16.61
0.0139	0.354	1.50	45	2.91	2.91	19.52
0.0117	0.297	1.75	50	4.50	4.50	24.02
0.0098	0.250	2.00	60	4.48	4.48	28.50
0.0083	0.210	2.25	70	5.02	5.02	33.52
0.0070	0.177	2.50	80	5.30	5.30	38.82
0.0059	0.149	2.75	100	5.30	5.30	44.12
0.0049	0.125	3.00	120	5.01	5.01	49.13
0.0041	0.105	3.25	140	4.53	4.53	53.66
0.0035	0.088	3.50	170	4.05	4.05	57.71
0.0029	0.074	3.75	200	3.66	3.66	61.37
0.0025	0.063	4.00	230	3.35	3.35	64.72
0.0021	0.053	4.25	270	3.08	3.08	67.80
0.00174	0.0442	4.50	325	2.86	2.86	70.66
0.00146	0.0372	4.75	400	2.70	2.70	73.37
0.00123	0.0313	5.00	450	2.64	2.64	76.01
0.000986	0.0250	5.32	500	3.33	3.33	79.34
0.000790	0.0201	5.64	635	3.21	3.21	82.55
0.000615	0.0156	6.00		3.29	3.29	85.84
0.000435	0.0110	6.50		4.01	4.01	89.85
0.000308	0.00781	7.00		3.25	3.25	93.10
0.000197	0.00500	7.65		2.95	2.95	96.05
0.000077	0.00195	9.00		2.84	2.84	98.89
0.000038	0.000977	10.00		0.80	0.80	99.69
0.000019	0.000488	11.00		0.29	0.29	99.98
0.000015	0.000375	11.38		0.02	0.02	100.00
TOTALS				**100.00**	**100.00**	**100.00**

Cumulative Weight Percent greater than			
Weight percent	Phi Value	Particle Size Inches	Particle Size Millimeters
5	0.14	0.0356	0.905
10	0.70	0.0243	0.617
16	1.20	0.0171	0.434
25	1.80	0.0113	0.286
40	2.56	0.0067	0.170
50	3.05	0.0048	0.121
60	3.66	0.0031	0.079
75	4.90	0.0013	0.033
84	5.80	0.0007	0.018
90	6.52	0.0004	0.011
95	7.42	0.0002	0.006

Measure	Trask	Inman	Folk-Ward
Median, phi	3.05	3.05	3.05
Median, in.	0.0048	0.0048	0.0048
Median, mm	0.121	0.121	0.121
Mean, phi	2.65	3.50	3.35
Mean, in.	0.0063	0.0035	0.0039
Mean, mm	0.160	0.088	0.098
Sorting	2.928	2.298	2.251
Skewness	0.808	0.197	0.199
Kurtosis	0.209	0.582	0.961
Grain Size Description (ASTM-USCS Scale)		Fine sand (based on Mean from Trask)	

Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	16.61
Fine Sand	200	44.76
Silt	>0.005 mm	34.67
Clay	<0.005 mm	3.95
	Total	**100**

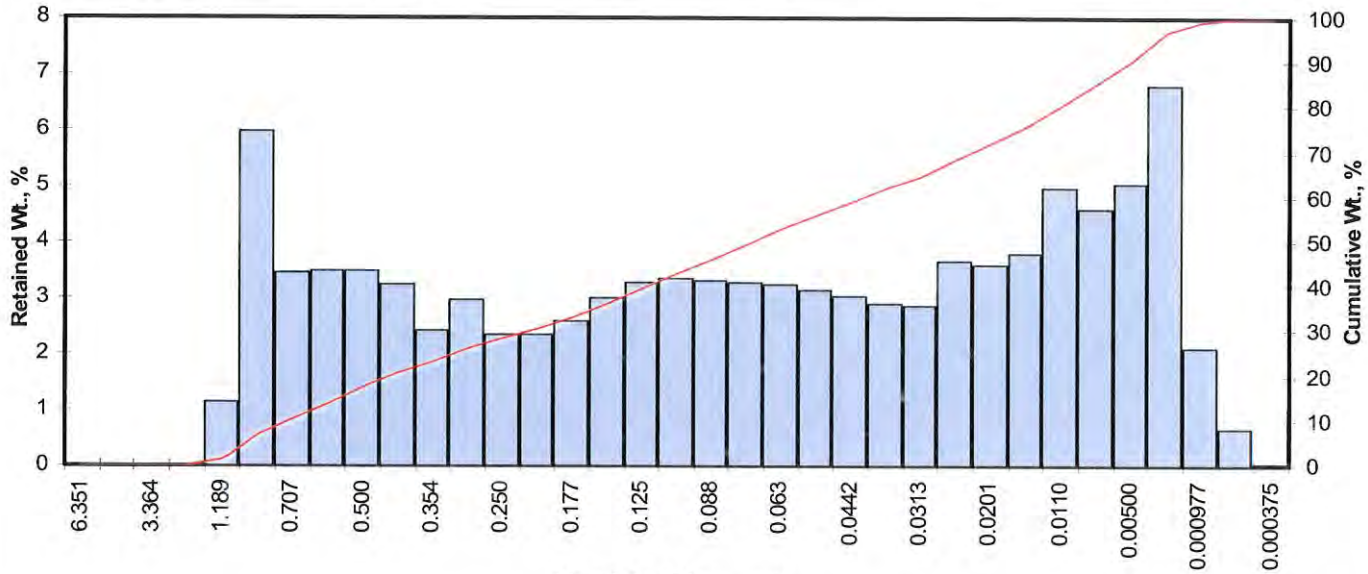
PTS Laboratories, Inc.

Particle Size Analysis - ASTM D4464M

Client: CH2M Hill
Project: Halaco Superfund Site
Project No: 41470

PTS File No: 41429
Sample ID: SD-NEL-007-A
Depth, ft: Surface Sediment

Grv	Sand Size			Silt	Clay
	crs	medium	fine		



Opening Inches	Opening Millimeters	Phi of Screen	U.S. No.	Sample Weight, grams	Increment Weight, percent	Cumulative Weight, percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	1.13	1.13	1.13
0.0331	0.841	0.25	20	5.95	5.95	7.08
0.0278	0.707	0.50	25	3.44	3.44	10.52
0.0234	0.595	0.75	30	3.47	3.47	13.99
0.0197	0.500	1.00	35	3.48	3.48	17.47
0.0166	0.420	1.25	40	3.25	3.25	20.72
0.0139	0.354	1.50	45	2.42	2.42	23.14
0.0117	0.297	1.75	50	2.95	2.95	26.09
0.0098	0.250	2.00	60	2.33	2.33	28.42
0.0083	0.210	2.25	70	2.36	2.36	30.78
0.0070	0.177	2.50	80	2.60	2.60	33.38
0.0059	0.149	2.75	100	3.01	3.01	36.39
0.0049	0.125	3.00	120	3.29	3.29	39.68
0.0041	0.105	3.25	140	3.34	3.34	43.02
0.0035	0.088	3.50	170	3.30	3.30	46.32
0.0029	0.074	3.75	200	3.27	3.27	49.59
0.0025	0.063	4.00	230	3.24	3.24	52.83
0.0021	0.053	4.25	270	3.14	3.14	55.97
0.00174	0.0442	4.50	325	3.02	3.02	58.99
0.00146	0.0372	4.75	400	2.91	2.91	61.90
0.00123	0.0313	5.00	450	2.87	2.87	64.77
0.000986	0.0250	5.32	500	3.65	3.65	68.42
0.000790	0.0201	5.64	635	3.59	3.59	72.01
0.000615	0.0156	6.00		3.79	3.79	75.80
0.000435	0.0110	6.50		4.95	4.95	80.75
0.000308	0.00781	7.00		4.59	4.59	85.34
0.000197	0.00500	7.65		5.04	5.04	90.38
0.000077	0.00195	9.00		6.79	6.79	97.17
0.000038	0.000977	10.00		2.12	2.12	99.29
0.000019	0.000488	11.00		0.66	0.66	99.95
0.000015	0.000375	11.38		0.05	0.05	100.00
TOTALS				**100.00**	**100.00**	**100.00**

Cumulative Weight Percent greater than			
Weight percent	Phi Value	Particle Size Inches	Particle Size Millimeters
5	0.08	0.0374	0.949
10	0.46	0.0286	0.726
16	0.89	0.0212	0.538
25	1.66	0.0125	0.317
40	3.02	0.0048	0.123
50	3.78	0.0029	0.073
60	4.59	0.0016	0.042
75	5.92	0.0006	0.016
84	6.85	0.0003	0.009
90	7.60	0.0002	0.005
95	8.57	0.0001	0.003

Measure	Trask	Inman	Folk-Ward
Median, phi	3.78	3.78	3.78
Median, in.	0.0029	0.0029	0.0029
Median, mm	0.073	0.073	0.073
Mean, phi	2.58	3.87	3.84
Mean, in.	0.0066	0.0027	0.0027
Mean, mm	0.167	0.068	0.070
Sorting	4.387	2.980	2.777
Skewness	0.994	0.031	0.079
Kurtosis	0.208	0.425	0.816
Grain Size Description (ASTM-USCS Scale)		Fine sand (based on Mean from Trask)	

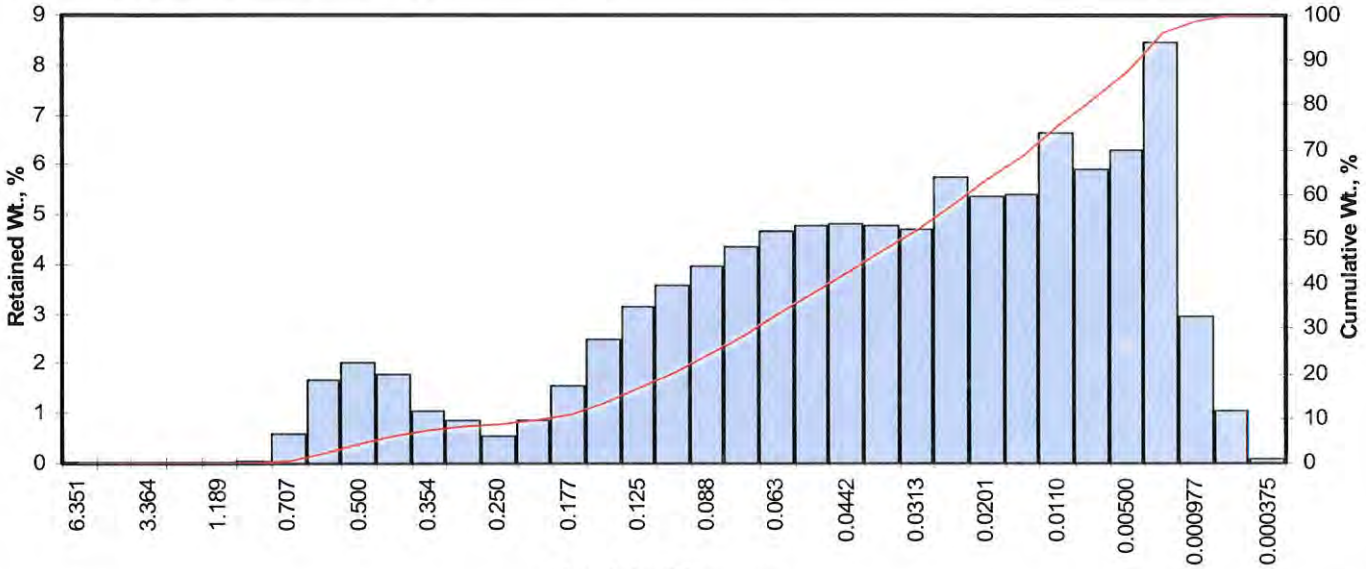
Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	20.72
Fine Sand	200	28.87
Silt	>0.005 mm	40.79
Clay	<0.005 mm	9.62
	Total	**100**

PTS Laboratories, Inc.

Particle Size Analysis - ASTM D4464M

Client:	CH2M Hill	**PTS File No:**	41429
Project:	Halaco Superfund Site	**Sample ID:**	SD-NEL-009-A
Project No:	41470	**Depth, ft:**	Surface Sediment

Grv	Sand Size			Silt	Clay
	crs	medium	fine		



Opening Inches	Opening Millimeters	Phi of Screen	U.S. No.	Sample Weight, grams	Increment Weight, percent	Cumulative Weight, percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	0.00	0.00	0.00
0.0331	0.841	0.25	20	0.04	0.04	0.04
0.0278	0.707	0.50	25	0.58	0.58	0.62
0.0234	0.595	0.75	30	1.67	1.67	2.29
0.0197	0.500	1.00	35	2.02	2.02	4.31
0.0166	0.420	1.25	40	1.79	1.79	6.10
0.0139	0.354	1.50	45	1.06	1.06	7.16
0.0117	0.297	1.75	50	0.85	0.85	8.01
0.0098	0.250	2.00	60	0.54	0.54	8.55
0.0083	0.210	2.25	70	0.84	0.84	9.39
0.0070	0.177	2.50	80	1.56	1.56	10.95
0.0059	0.149	2.75	100	2.49	2.49	13.44
0.0049	0.125	3.00	120	3.16	3.16	16.60
0.0041	0.105	3.25	140	3.58	3.58	20.18
0.0035	0.088	3.50	170	3.97	3.97	24.15
0.0029	0.074	3.75	200	4.36	4.36	28.51
0.0025	0.063	4.00	230	4.66	4.66	33.17
0.0021	0.053	4.25	270	4.78	4.78	37.95
0.00174	0.0442	4.50	325	4.82	4.82	42.77
0.00146	0.0372	4.75	400	4.77	4.77	47.54
0.00123	0.0313	5.00	450	4.68	4.68	52.22
0.000986	0.0250	5.32	500	5.73	5.73	57.95
0.000790	0.0201	5.64	635	5.34	5.34	63.29
0.000615	0.0156	6.00		5.38	5.38	68.66
0.000435	0.0110	6.50		6.65	6.65	75.31
0.000308	0.00781	7.00		5.89	5.89	81.20
0.000197	0.00500	7.65		6.29	6.29	87.49
0.000077	0.00195	9.00		8.44	8.44	95.93
0.000038	0.000977	10.00		2.93	2.93	98.86
0.000019	0.000488	11.00		1.05	1.05	99.91
0.000015	0.000375	11.38		0.09	0.09	100.00
TOTALS				100.00	100.00	100.00

Cumulative Weight Percent greater than			
Weight percent	Phi Value	Particle Size Inches	Particle Size Millimeters
5	1.10	0.0184	0.468
10	2.35	0.0077	0.196
16	2.95	0.0051	0.129
25	3.55	0.0034	0.085
40	4.36	0.0019	0.049
50	4.88	0.0013	0.034
60	5.44	0.0009	0.023
75	6.48	0.0004	0.011
84	7.29	0.0003	0.006
90	8.05	0.0001	0.004
95	8.85	0.0001	0.002

Measure	Trask	Inman	Folk-Ward
Median, phi	4.88	4.88	4.88
Median, in.	0.0013	0.0013	0.0013
Median, mm	0.034	0.034	0.034
Mean, phi	4.37	5.12	5.04
Mean, in.	0.0019	0.0011	0.0012
Mean, mm	0.048	0.029	0.030
Sorting	2.758	2.167	2.258
Skewness	0.913	0.110	0.067
Kurtosis	0.193	0.789	1.085
Grain Size Description (ASTM-USCS Scale)		Silt (based on Mean from Trask)	

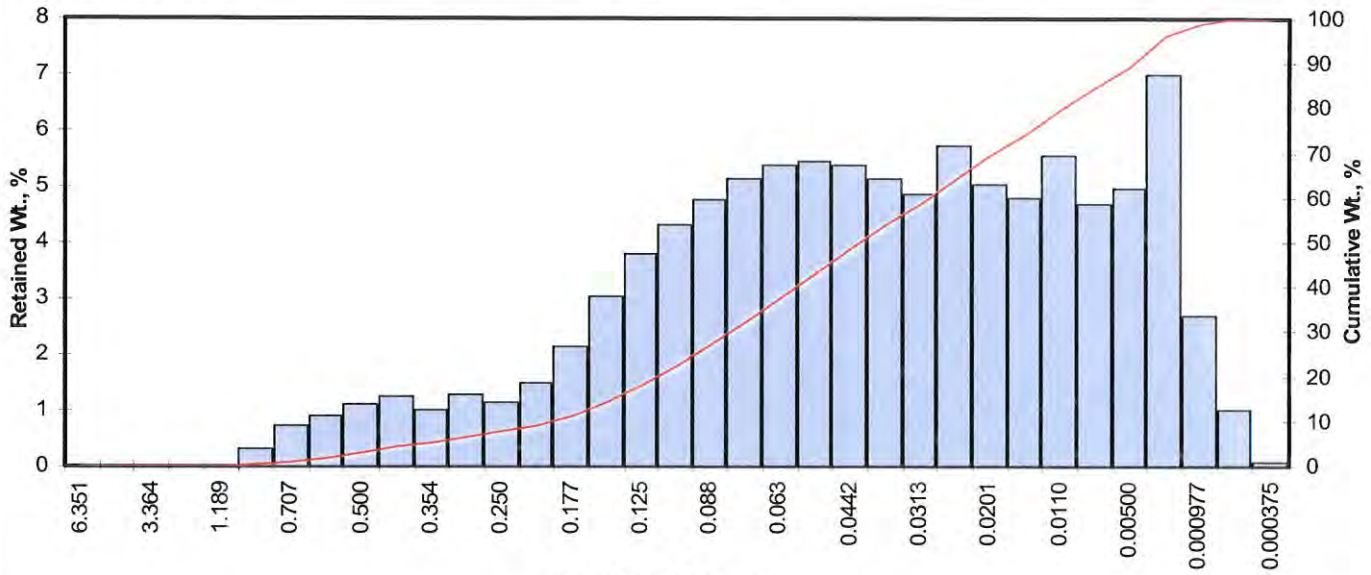
Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	6.10
Fine Sand	200	22.41
Silt	>0.005 mm	58.99
Clay	<0.005 mm	12.51
	Total	100

PTS Laboratories, Inc.

Particle Size Analysis - ASTM D4464M

Client:	CH2M Hill	**PTS File No:**	41429
Project:	Halaco Superfund Site	**Sample ID:**	SD-NEL-021-A
Project No:	41470	**Depth, ft:**	Surface Sediment

Grv	Sand Size			Silt	Clay
	crs	medium	fine		



Opening Inches	Opening Millimeters	Phi of Screen	U.S. No.	Sample Weight, grams	Increment Weight, percent	Cumulative Weight, percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	0.00	0.00	0.00
0.0331	0.841	0.25	20	0.31	0.31	0.31
0.0278	0.707	0.50	25	0.72	0.72	1.03
0.0234	0.595	0.75	30	0.91	0.91	1.94
0.0197	0.500	1.00	35	1.11	1.11	3.05
0.0166	0.420	1.25	40	1.24	1.24	4.29
0.0139	0.354	1.50	45	1.01	1.01	5.30
0.0117	0.297	1.75	50	1.28	1.28	6.58
0.0098	0.250	2.00	60	1.14	1.14	7.72
0.0083	0.210	2.25	70	1.48	1.48	9.20
0.0070	0.177	2.50	80	2.13	2.13	11.33
0.0059	0.149	2.75	100	3.02	3.02	14.35
0.0049	0.125	3.00	120	3.78	3.78	18.13
0.0041	0.105	3.25	140	4.32	4.32	22.44
0.0035	0.088	3.50	170	4.75	4.75	27.19
0.0029	0.074	3.75	200	5.13	5.13	32.32
0.0025	0.063	4.00	230	5.39	5.39	37.71
0.0021	0.053	4.25	270	5.44	5.44	43.15
0.00174	0.0442	4.50	325	5.37	5.37	48.52
0.00146	0.0372	4.75	400	5.15	5.15	53.67
0.00123	0.0313	5.00	450	4.86	4.86	58.53
0.000986	0.0250	5.32	500	5.71	5.71	64.24
0.000790	0.0201	5.64	635	5.04	5.04	69.27
0.000615	0.0156	6.00		4.79	4.79	74.06
0.000435	0.0110	6.50		5.54	5.54	79.60
0.000308	0.00781	7.00		4.68	4.68	84.28
0.000197	0.00500	7.65		4.95	4.95	89.23
0.000077	0.00195	9.00		7.01	7.01	96.24
0.000038	0.000977	10.00		2.68	2.68	98.92
0.000019	0.000488	11.00		1.00	1.00	99.92
0.000015	0.000375	11.38		0.08	0.08	100.00
TOTALS				100.00	100.00	100.00

Cumulative Weight Percent greater than			
Weight percent	Phi Value	Particle Size Inches	Particle Size Millimeters
5	1.43	0.0147	0.372
10	2.34	0.0078	0.197
16	2.86	0.0054	0.138
25	3.38	0.0038	0.096
40	4.11	0.0023	0.058
50	4.57	0.0017	0.042
60	5.08	0.0012	0.030
75	6.08	0.0006	0.015
84	6.97	0.0003	0.008
90	7.79	0.0002	0.005
95	8.76	0.0001	0.002

Measure	Trask	Inman	Folk-Ward
Median, phi	4.57	4.57	4.57
Median, in.	0.0017	0.0017	0.0017
Median, mm	0.042	0.042	0.042
Mean, phi	4.18	4.91	4.80
Mean, in.	0.0022	0.0013	0.0014
Mean, mm	0.055	0.033	0.036
Sorting	2.549	2.055	2.139
Skewness	0.893	0.167	0.154
Kurtosis	0.211	0.784	1.113
Grain Size Description (ASTM-USCS Scale)		Silt (based on Mean from Trask)	

Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	4.29
Fine Sand	200	28.03
Silt	>0.005 mm	56.91
Clay	<0.005 mm	10.77
	Total	100

41429

USEPA Contract Laboratory Program
Generic Chain of Custody

Reference Case 41470
Client No:
SDG No:
L

Date Shipped:	6/27/2011
Carrier Name:	FedEx
Airbill:	872962536557
Shipped to:	PTS Laboratories, Inc. 8100 Secura Way Santa Fe Springs CA 90670 (562) 347-2500

Chain of Custody Record

Relinquished By	(Date / Time)	Received By	(Date / Time)
1 [illegible]	6/27/11 1000	[illegible] PTS	6/28/11 1731
2			
3			
4			

Sampler Signature:

For Lab Use Only

Lab Contract No:
Unit Price:
Transfer To:
Lab Contract No:
Unit Price:

SAMPLE No.	MATRIX/ SAMPLER	CONC/ TYPE	ANALYSIS/ TURNAROUND	TAG No./ PRESERVATIVE/ Bottles	STATION LOCATION	SAMPLE COLLECT DATE/TIME		FOR LAB USE ONLY Sample Condition On Receipt
SD-DSA-001-A	Sediment/ CEM KAMALI	/G	GS/ATTER (21)	M6511 (1)	SD-DSA-001-A	S: 6/23/2011	14:00	
SD-DSA-003-A	Sediment/ CEM KAMALI	/G	GS/ATTER (21)	M6524 (1)	SD-DSA-003-A	S: 6/23/2011	13:35	
SD-DSA-006-A	Sediment/ CEM KAMALI	/G	GS/ATTER (21)	M6537 (1)	SD-DSA-006-A	S: 6/23/2011	13:16	
SD-LGF-001-A	Sediment/ CEM KAMALI	/G	GS/ATTER (21)	M6569 (1)	SD-LGF-001-A	S: 6/23/2011	11:25	
SD-LGF-003-A	Sediment/ CEM KAMALI	/G	GS/ATTER (21)	M6570 (1)	SD-LGF-003-A	S: 6/23/2011	12:00	
SD-LGF-007-A	Sediment/ EARL BYRON	/G	GS/ATTER (21)	M6564 (1)	SD-LGF-007-A	S: 6/23/2011	16:25	
SD-LGF-008-A	Sediment/ EARL BYRON	/G	GS/ATTER (21)	M6565 (1)	SD-LGF-008-A	S: 6/23/2011	16:35	
SD-LGF-009-A	Sediment/ EARL BYRON	/G	GS/ATTER (21)	M6566 (1)	SD-LGF-009-A	S: 6/23/2011	16:50	
SD-LGF-010-A	Sediment/ CEM KAMALI	/G	GS/ATTER (21)	M6567 (1)	SD-LGF-010-A	S: 6/23/2011	16:00	
SD-LGF-012-A	Sediment/ CEM KAMALI	/G	GS/ATTER (21)	M6568 (1)	SD-LGF-012-A	S: 6/23/2011	15:35	

Shipment for Case Complete?N	Sample(s) to be used for laboratory QC:	Additional Sampler Signature(s):	Cooler Temperature Upon Receipt: 33°F	Chain of Custody Seal Number: [illegible]
Analysis Key:	Concentration: L = Low, M = Low/Medium, H = High	Type/Designate: Composite = C, Grab = G		Custody Seal Intact? ✓ Shipment Iced? ✓

GS/ATTER = Grain Size, Atterburg

TR Number: 9-173516087-062511-0005

LABORATORY COPY

PR provides preliminary results. Requests for preliminary results will increase analytical costs.
Send Copy to: Sample Management Office, Attn: Heather Bauer, CSC, 15000 Conference Center Dr., Chantilly, VA 20151-3819; Phone 703/818-4200; Fax 703/818-4602

41429

USEPA Contract Laboratory Program
Generic Chain of Custody

Reference Case 41470
Client No:
SDG No:
L

Date Shipped:	6/27/2011
Carrier Name:	FedEx
Airbill:	872962536557
Shipped to:	PTS Laboratories, Inc. 8100 Secura Way Santa Fe Springs CA 90670 (562) 347-2500

Chain of Custody Record

Relinquished By	(Date / Time)	Received By	(Date / Time)
1 [illegible]	6/27/11 1000	[illegible] PTL	6/28/11 1731
2			
3			
4			

Sampler Signature:

For Lab Use Only

Lab Contract No:
Unit Price:
Transfer To:
Lab Contract No:
Unit Price:

SAMPLE No.	MATRIX/ SAMPLER	CONC/ TYPE	ANALYSIS/ TURNAROUND	TAG No./ PRESERVATIVE/ Bottles	STATION LOCATION	SAMPLE COLLECT DATE/TIME		FOR LAB USE ONLY Sample Condition On Receipt
SD-LGF-112-A	Sediment/ CEM KAMALI	/G	GS/ATTER (21)	M6581 (1)	SD-LGF-112-A	S: 6/23/2011	15:35	
SD-LGM-001-A	Sediment/ CEM KAMALI	/G	GS/ATTER (21)	M6571 (1)	SD-LGM-001-A	S: 6/23/2011	9:00	
SD-LGM-003-A	Sediment/ CEM KAMALI	/G	GS/ATTER (21)	M6572 (1)	SD-LGM-003-A	S: 6/23/2011	17:05	
SD-NEL-007-A	Sediment/ CEM KAMALI	/G	GS/ATTER (21)	M6550 (1)	SD-NEL-007-A	S: 6/23/2011	9:50	
SD-NEL-009-A	Sediment/ CEM KAMALI	/G	GS/ATTER (21)	M6563 (1)	SD-NEL-009-A	S: 6/23/2011	9:30	
SD-NEL-021-A	Sediment/ CEM KAMALI	/G	GS/ATTER (21)	M6498 (1)	SD-NEL-021-A	S: 6/23/2011	9:10	

Shipment for Case Complete?N	Sample(s) to be used for laboratory QC:	Additional Sampler Signature(s):	Cooler Temperature Upon Receipt: 33°F	Chain of Custody Seal Number:
Analysis Key:	Concentration: L = Low, M = Low/Medium, H = High	Type/Designate: Composite = C, Grab = G		Custody Seal Intact? ✓ Shipment Iced? ✓

GS/ATTER = Grain Size, Atterburg

TR Number: 9-173516087-062511-0005

LABORATORY COPY

PR provides preliminary results. Requests for preliminary results will increase analytical costs.
Send Copy to: Sample Management Office, Attn: Heather Bauer, CSC, 15000 Conference Center Dr., Chantilly, VA 20151-3819; Phone 703/818-4200; Fax 703/818-4602

Attachment A-4
Sediment Bioassay Laboratory Results

Nautilus Environmental

US Environmental Protection Agency Region 9

Halaco Superfund Site

Toxicity Testing Report

Sample Collection Date: June 2011

Report Submitted: September 2011

Prepared by:

Nautilus Environmental, LLC

4340 Vandever Avenue

San Diego, CA 92120

Prepared for:

US Environmental Protection Agency

Region 9

75 Hawthorne Street

San Francisco, CA 94105

California
4340 Vandever Avenue
San Diego, California 92120
858.587.7333
fax: 858.587.3961

Washington
5009 Pacific Highway East
Suite 2
Tacoma, Washington
98424
253.922.4296
fax:-253.922.5814

British Columbia
8664 Commerce Court
Burnaby, British Columbia
Canada V5A 4N7
604.420.8773
fax: 604.603.9381

nautilusenvironmental.com

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1.0 INTRODUCTION

Nautilus Environmental performed chronic toxicity tests on 15 sediment samples collected from the Halaco Superfund Site located in Oxnard, CA. This was performed as part of a remedial investigation (RI) conducted by the United States Environmental Protection Agency (EPA), Region 9. The area of concern is believed to be impacted by metals, dioxins, and furans. Samples were collected from both contaminated and uncontaminated locations. Testing was initiated at Nautilus on July 6 and 7, 2011. The samples were tested using the freshwater amphipod, *Hyalella azteca,* following protocol "*Methods for measuring the toxicity and bioaccumulation of sediment-associated contaminants with freshwater invertebrates"* (US EPA/600/R-99/064). The following report summarizes the results for the 42-day freshwater amphipod *Hyalella azteca* survival, growth and reproduction endpoints.

2.0 METHODS

2.1 Study Design and Sample Collection

The Statement of Work describes the testing protocols and how to proceed with testing. The sediment samples were tested in two batches; the first batch of eight samples was initiated on July 6, 2011 and second batch of eight samples was initiated on July 7, 2011. One sample was split and tested on both days (labeled as SD-LGF-012 and SD-LGF-112). Both of the amphipod tests contained concurrent negative controls, which consisted of fine beach sand thoroughly rinsed with deionized water prior to use and were considered the laboratory controls. All test site sediments from the Halaco Site were collected on June 23, 2011.

2.2 Sample Receipt and Preparation

Approximately 10-liters of sediment was collected for toxicity testing from each site, and delivered to the Nautilus laboratory in San Diego, CA. The sediment was transported and held in food-grade polyethylene plastic bags. Samples were bagged and shipped in coolers with wet ice. Samples were received at Nautilus on June 24, 2011. Sample identification and sampling time are detailed in Table 1. Chain of custody documentation for all samples is provided in Appendix F. The temperature of samples upon arrival ranged from 3.2 to 10.5 °Celcius (C). Upon arrival at Nautilus, samples were checked in and stored at 4°C. Prior to testing, the samples were thoroughly homogenized. A sub-sample of each sample was sieved through a 500-µm Nitex® mesh screen to remove native organisms and large debris that may interfere with the survival and recovery of test organisms.

Table 1. Sediment Collection Time

Site	Sample Collection Date & Time
SD-DSA-001-A[1]	6/23/11, 14:00
SD-DSA-003-A[2]	6/23/11, 13:35
SD-DSA-006-A[2]	6/23/11, 13:16
SD-LGF-001-A[1]	6/23/11, 11:25
SD-LGF-003-A[1]	6/23/11, 12:00
SD-LGF-007-A[1]	6/23/11, 16:25
SD-LGF-008-A[2]	6/23/11, 16:35
SD-LGF-009-A[1]	6/23/11, 16:50
SD-LGF-010-A[1]	6/23/11, 16:00
SD-LGF-012-A[1]	6/23/11, 15:35
SD-LGF-112-A[2]	6/23/11, 15:35
SD-LGM-001-A[2]	6/23/11, 09:00
SD-LGM-003-A[2]	6/23/11, 17:05
SD-NEL-007-A[1]	6/23/11, 09:50
SD-NEL-009-A[2]	6/23/11, 09:30
SD-NEL-021-A[2]	6/23/11, 09:10

[1] Samples tested on July 6, 2011
[2] Samples tested on July 7, 2011

2.3 Toxicity Test Methodology

Test methods and acceptability criteria are described in Table 2. *Hyalella* (7 – 8 days old) were exposed to test sediments for 42 days to determine the effects of sediment on survival, growth and reproduction following methods in EPA (2002). Test chambers consisted of 1-L glass jars fitted with the Zumwalt water renewal system. The test was conducted in an environmental chamber maintained at 23 ± 1°C under a 16hour (light): 8hour (dark) light cycle. The experimental design consisted of twelve replicate jars per treatment arranged in a

predetermined random order. Four of the test chambers were used for an intermediate endpoint consisting of survival and growth on Day 28, while the remaining eight replicates were used for determination of survival, growth and reproduction after a 42-day exposure. An additional replicate (surrogate) was included for each site as a test chamber used for daily water quality and ammonia measurements. Approximately 2 cm of sediment was placed in each chamber with 400-ml of activated carbon filtered soft water then added to each. Sediments were allowed to settle and the system was allowed to equilibrate for 24 hours prior to the addition of test organisms. Ten amphipods were randomly added to each test chamber after confirmation by two technicians that the correct number of test organisms was segregated and in healthy condition. A source of food was provided during the test period by adding 1 – 2 ml of a mixture of yeast, cerophyll, trout chow (YCT) per chamber daily. Twice daily, eighty percent of the overlying water was renewed to maintain water quality conditions. Temperature, DO, pH, and conductivity were monitored daily in the surrogate replicate test chamber for each site. Subsamples of interstitial porewater were collected prior to test initiation, and overlying water was collected from each surrogate at Days 0, 7, 14, 21, 28, 35, and 42 for analysis of total ammonia.

On Day 28 of the test period, sediment in each test chamber was gently sieved through a 0.5 mm screen, and the number of surviving amphipods recorded. Amphipods in four pre-selected test chambers of each treatment and control were sacrificed for determination of dry weight. Amphipods in the remaining eight test chambers of each treatment were placed into clean jars without sediment and activated carbon filtered soft water. A nitex screen was added as a clean substrate for the amphipods. At Day 35, the young produced in each test chamber were recorded and removed. At Day 42, the number of young produced was again recorded for each test chamber. The number of surviving adult amphipods remaining were recorded, their gender determined, and then placed in an oven at 60°C for determination of dry weight.

A positive control reference toxicant test using copper chloride was conducted concurrently to estimate the sensitivity of the test organisms in relation to those historically tested at Nautilus.

Table 2. Toxicity Test Methodology and QA/QC Requirements for Chronic Survival, Growth, and Reproduction test using *Hyalella azteca* Toxicity Test

Test organism	Freshwater Amphipod – *Hyalella azteca*
Test organism source	Aquatic Indicators
Test organism age at initiation	7 – 8 days
Test duration; endpoint	28 days (survival and growth); 42 days (survival, growth and reproduction)
Test solution renewal	Twice daily
Feeding	Days 1-19: daily YCT – 1.0 ml stock solution Days 20-End: daily YCT – 2.0 ml stock solution
Test temperature	23 ± 3°C test-wide mean, 25 ± 2°C instantaneous
Test chamber	1-L glass Zumwalt chambers
Sediment depth	2 cm
Overlying water volume	175 mL
Dilution water	Activated carbon filtered soft water
Test concentrations	Undiluted sediment
Number of organisms/chamber	10
Number of replicates	12
Photoperiod	16 hours light/8 hours dark
Aeration	None, unless DO drops below 2.5 mg/L
Test Protocol	EPA 600/R-99/064; EPA 2000
Test acceptability criteria	≥ 80 percent mean survival in controls
Reference toxicant	Copper chloride

2.4 Statistical Analyses

Experiment-wide data from the tests were analyzed using one-way analysis of variance (ANOVA) or Kruskal-Wallis analysis, dependent upon meeting statistical assumptions of parametric test. If experiment-wide statistical differences were noted, multiple comparison t-tests or Mann-Whitney tests then compared each endpoint of the test sediments against the lab control sediment. Prior to analyses, normality was evaluated with the D'Agostino & Pearson Omnibus test and homogeneity of variance was assessed with Bartlett's Test. When necessary to satisfy these assumptions, survival data (as a proportion) were arcsine square-root transformed prior to statistical analysis.

3.0 RESULTS

Summaries of toxicity test results are provided in Tables 3 and 4 and Figures 1 to 10, detailed results are provided in Appendices A and B. Water quality data are provided in Appendix C and reference toxicant data can be found in Appendix D. Summaries of statistical analyses can be found in Appendix E.

Tests found *Hyalella* 28- and 42-day survival was significantly reduced in eleven of the sixteen sites relative to the laboratory control. *Hyalella* growth was significantly reduced in four of the sixteen sites at 28-days and none of the sixteen sites at 42-days relative to the laboratory control. *Hyalella* reproduction was significant reduced in three of the sixteen sites relative to that in the laboratory control (Tables 3 through 6).

3.1 Round One

Mean 28-Day survival of *Hyalella* in the laboratory control sediment was 94.2 percent, meeting the EPA minimum acceptable control survival of 80 percent. Mean amphipod survival among the test sediments ranged from 19.2 to 90.0 percent (Table 3, Figure 1). A one-way ANOVA of this data found a significant difference among sites ($p<0.0001$). Multiple comparison t-tests found seven of the eight samples to have significantly reduced survival relative to the laboratory control (Table 3), with only Site SD-LGF-001-A not reduced significantly.

Mean 42-Day survival of *Hyalella* in the laboratory control sediment was 92.5 percent, meeting the EPA minimum acceptable control survival of 80 percent. Mean amphipod survival among the test sediments ranged from 10.0 to 92.5 percent (Table 3, Figure 2). A one-way ANOVA of this data found a significant difference among sites ($p<0.0001$). Multiple comparison t-tests

found six of the eight samples to be significantly reduced from the laboratory control (Table 3). Sites SD-LGF-001-A and SD-DSA-001-A were not significantly reduced.

Mean 28-Day growth of *Hyalella* in the laboratory control sediment was 0.23 mg/org. Mean amphipod growth in the test sediments ranged from 0.17 to 0.35 mg/org (Table 4, Figure 3). A one-way ANOVA of this data found a significant difference among sites (p=0.0002). Multiple comparison t-tests found four of the eight samples (SD-DSA-001-A, SD-LGF-001-A, SD-LGF-009-A, and SD-LGF-012-A) to be significantly different from laboratory control, however, only one site was significantly reduced from the control (SD-LGF-009-A)

Mean 42-Day growth of *Hyalella* in the laboratory control sediment was 0.27 mg/org. Mean amphipod growth in the test sediments ranged from 0.30 to 0.46 mg/org (Table 4, Figure 4). A Kruskal-Wallis analysis of this data found a significant difference among sites (p=0.0287), however the growth observed in all sites was higher than that observed in the laboratory control.

Reproduction in the laboratory control was 3.5 young per surviving female. Mean reproduction in the test sediments ranged from 0 to 4.9 young per surviving female (Table 4, Figure 5). A one-way ANOVA of this data found a significant difference among sites (p<0.0001). Multiple comparison t-tests found three of the eight samples (SD-LGF-009-A, SD-LGF-012-A, and SD-NEL-007-A) to be significantly reduced from laboratory control.

3.2 Round Two

Mean 28-Day survival of *Hyalella* in the laboratory control sediment was 86.7 percent, meeting the EPA minimum acceptable control survival of 80 percent. Mean amphipod survival among the test sediments ranged from 54.2 to 95.8 percent (Table 5, Figure 6). A one-way ANOVA of this data found a significant difference among sites (p<0.0001). Multiple comparison t-tests found four of the eight samples (SD-LGF-008-A, SD-LGF-112-A, SD-LGM-001-A, and SD-LGM-003-A) to be significantly reduced from the laboratory control (Table 5).

Mean 42-Day survival of *Hyalella* in the laboratory control sediment was 90.0 percent, meeting the EPA minimum acceptable control survival of 80 percent. Mean amphipod survival among the test sediments ranged from 56.3 to 95.0 percent (Table 5, Figure 7). A one-way ANOVA analysis of this data found a significant difference among sites (p<0.0001). Multiple comparison t-tests found five of the eight samples to be significantly reduced from the laboratory control

(Table 5). Sites SD-DSA-003-A, SD-DSA-006-A, and SD-NEL-009-A were not significantly reduced.

Mean 28-Day growth of *Hyalella* in the laboratory control sediment was 0.33 mg/org. Mean amphipod growth in the test sediments ranged from 0.20 to 0.45 mg/org (Table 6, Figure 8). A one-way ANOVA of this data found a significant difference among sites (p=0.0004). Multiple comparison t-tests found three of the eight samples (SD-DSA-0060A, SD-NEL-009-A and SD-NEL-021-A) to be significantly reduced from laboratory control (Table 6).

Mean 42-Day growth of *Hyalella* in the laboratory control sediment was 0.29 mg/org. Mean amphipod growth in the test sediments ranged from 0.24 to 0.49 mg/org (Table 6, Figure 9). A Kruskall-Wallis analysis of this data found a significant difference among sites (p=0.0073), however all but two samples (SD-DSA-003-A and SD-DSA-006-A) had a mean growth higher than that observed in the control. Multiple comparison Mann-Whitney tests found neither of these two samples to be significantly reduced from laboratory control.

Reproduction in the laboratory control was 5.5 young per surviving female. Mean reproduction in the test sediments ranged from 2.9 to 6.9 young per surviving female (Table 6, Figure 10). A one-way ANOVA analysis of this data found no significant difference among sites (p=0.3802).

Table 3. Summary of Mean Toxicity Results – Initiated July 6, 2011

Site	Survival % (28 day)	p value	Survival % (42 Day)	p value
Laboratory Control	94.2	NA	92.5	NA
SD-DSA-001-A	**84.2***	0.0171	86.3	0.0712
SD-LGF-001-A	90.0	0.3510	92.5	0.4225
SD-LGF-003-A	**84.2***	0.0295	**78.8***	0.0446
SD-LGF-007-A	**75.0***	0.0019	**67.5***	0.0003
SD-LGF-009-A	**19.2***	<0.0001	**10.0***	<0.0001
SD-LGF-010-A	**53.3***	<0.0001	**48.8***	<0.0001
SD-LGF-012-A	**53.3***	<0.0001	**55.0***	<0.0001
SD-NEL-007-A	**28.3***	<0.0001	**26.3***	<0.0001

NA = Not applicable
Bold asterisk values are significantly reduced from the laboratory control.

Table 4. Summary of Mean Toxicity Sub-lethal Results – Initiated July 6, 2011

Site	Growth mg/org. (28 Day)	p value	Growth mg/org. (42 Day)	p value	Reproduction neonates/female (42 Day)	p value
Laboratory Control	0.23	NA	0.27	NA	3.5	NA
SD-DSA-001-A	0.29	0.0317	0.34	NA	4.6	0.3227
SD-LGF-001-A	0.28	0.0358	0.30	NA	3.4	0.4796
SD-LGF-003-A	0.24	0.4586	0.31	NA	2.8	0.1393
SD-LGF-007-A	0.29	0.0518	0.36	NA	4.9	0.1911
SD-LGF-009-A	**0.18***	0.0229	0.42	NA	**0.0***	0.0020
SD-LGF-010-A	0.27	0.1725	0.34	NA	2.5	0.2209
SD-LGF-012-A	0.35	0.0247	0.46	NA	**1.0***	0.0023
SD-NEL-007-A	0.17	0.0537	0.32	NA	**0.0***	0.0008

NA = Not applicable
Note: Data are mean dry weight per surviving organism and mean number of young produced per surviving female.
Bold asterisk values are significantly reduced from the laboratory control.

Table 5. Summary of Toxicity Test – Initiated July 7, 2011

Site	Survival % (28 day)	p value	Survival % (42 Day)	p value
Laboratory Control	86.7	NA	90.0	NA
SD-DSA-003-A	95.8	0.0476	95.0	0.1508
SD-DSA-006-A	94.2	0.1154	88.8	0.2794
SD-LGF-008-A	**54.2***	0.0004	**56.3***	0.0006
SD-LGF-112-A	**67.5***	0.0059	**72.5***	0.0084
SD-LGM-001-A	**70.8***	0.0081	**63.8***	0.0009
SD-LGM-003-A	**62.5***	0.0012	**70.0***	0.0013
SD-NEL-009-A	85.0	0.4537	78.8	0.0633
SD-NEL-021-A	83.3	0.1834	**77.5***	0.0307

NA = Not applicable

Bold asterisk values are significantly reduced from the laboratory control.

Table 6. Summary of Toxicity Sub-lethal Test – Initiated July 7, 2011

Site	Growth mg/org. (28 Day)	p value	Growth mg /org. (42 Day)	p value	Reproduction neonates/female (42 Day)	p value
Laboratory Control	0.33	NA	0.29	NA	5.5	NA
SD-DSA-003-A	0.27	0.0737	0.24	NA	5.9	NA
SD-DSA-006-A	**0.25***	0.0457	0.26	NA	2.9	NA
SD-LGF-008-A	0.29	0.2495	0.48	NA	5.6	NA
SD-LGF-112-A	0.35	0.4042	0.41	NA	6.9	NA
SD-LGM-001-A	0.26	0.0565	0.49	NA	4.1	NA
SD-LGM-003-A	0.45	0.0331	0.39	NA	4.4	NA
SD-NEL-009-A	**0.22***	0.0134	0.33	NA	5.6	NA
SD-NEL-021-A	**0.21***	0.007	0.32	NA	4.9	NA

NA = Not applicable

Note: Data are mean dry weight per surviving organism and mean number of young produced per surviving female.

Bold asterisk values are significantly reduced from the laboratory control.

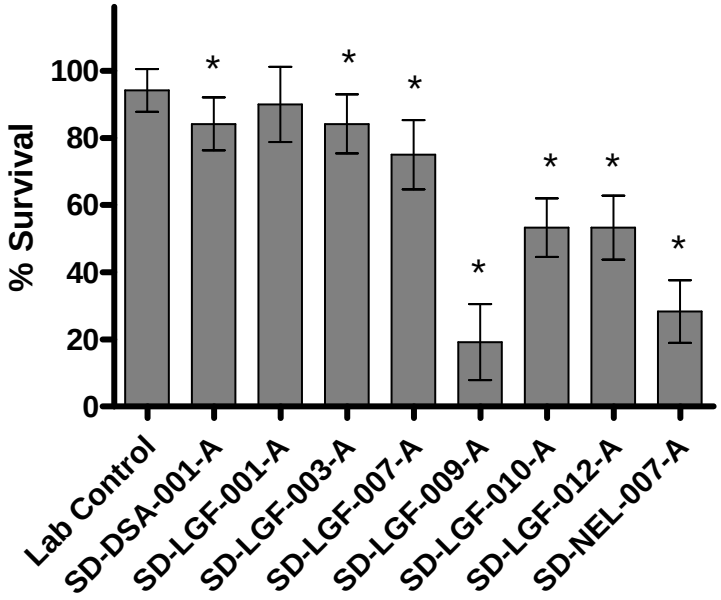

Figure 1. Survival of *Hyalella* at 28-days in Batch One toxicity test (mean percent survival ± 95% C.I.). Asterisks indicate statistically reduced survival compared to laboratory control.

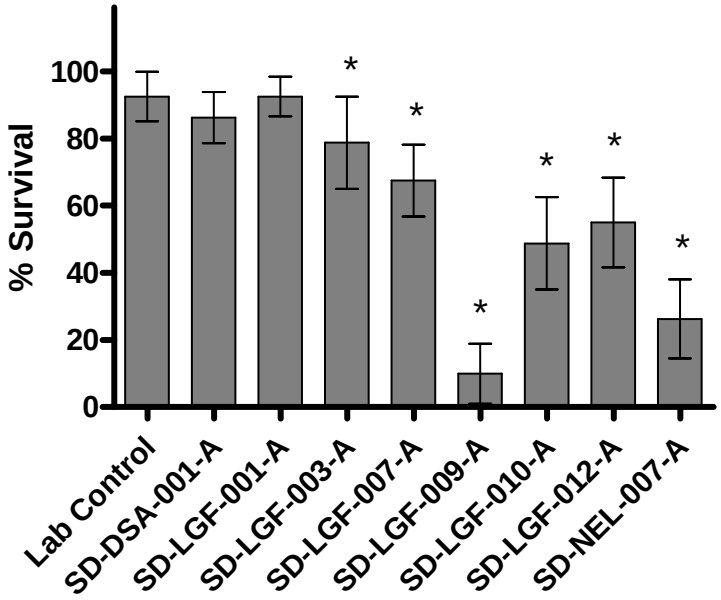

Figure 2. Survival of *Hyalella* at 42-days in Batch One toxicity test (mean percent survival ± 95% C.I.). Asterisks indicate statistically reduced growth compared to laboratory control.

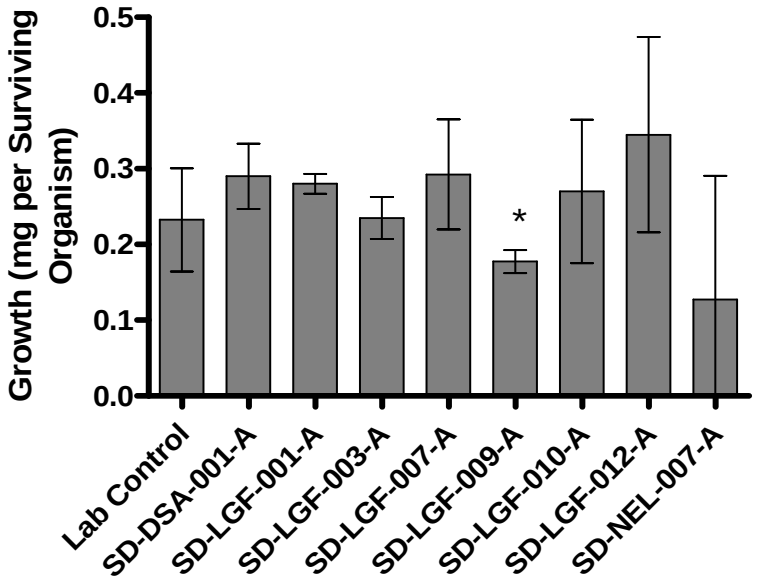

Figure 3. Growth of *Hyalella* at 28-days in Batch One toxicity test (mean growth per surviving organism ± 95% C.I.). Asterisks indicate statistically reduced growth compared to laboratory control.

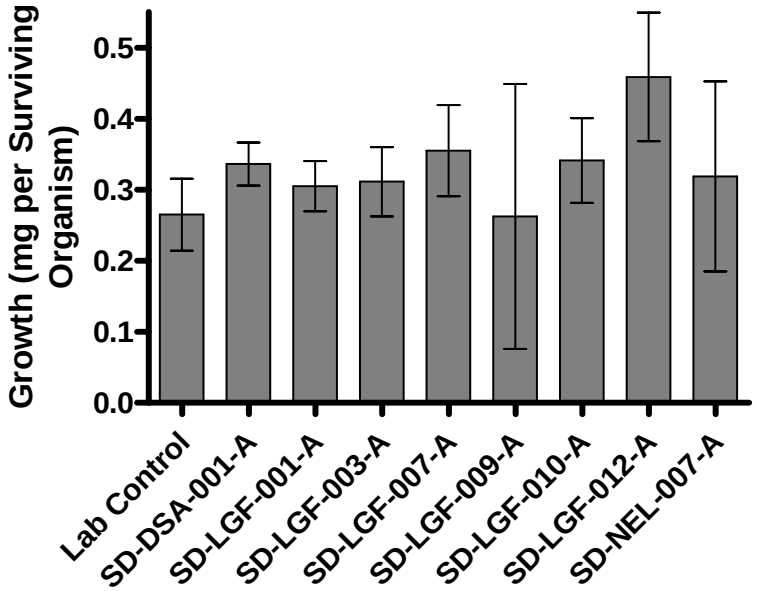

Figure 4. Growth of *Hyalella* at 42-days in Batch One toxicity test (mean growth per surviving organism ± 95% C.I.).

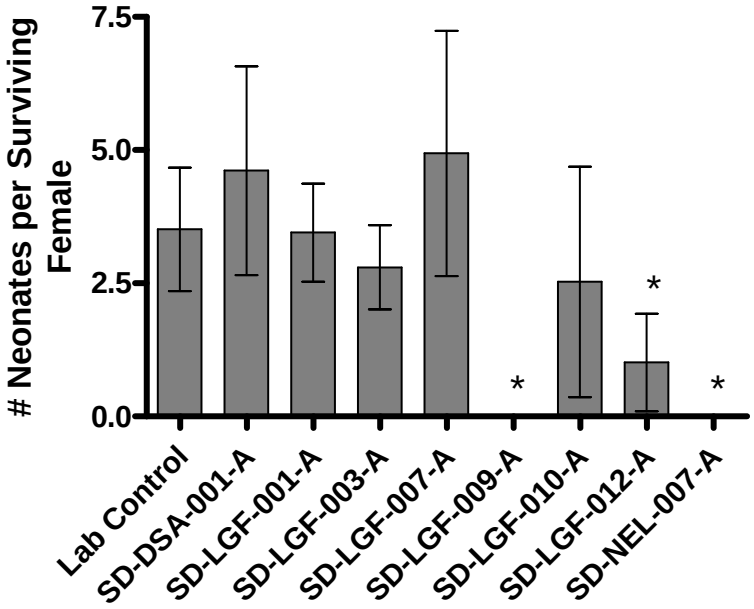

Figure 5. Reproduction of *Hyalella* at 42-days in Batch One toxicity test (mean number of young per surviving female ± 95% C.I.).

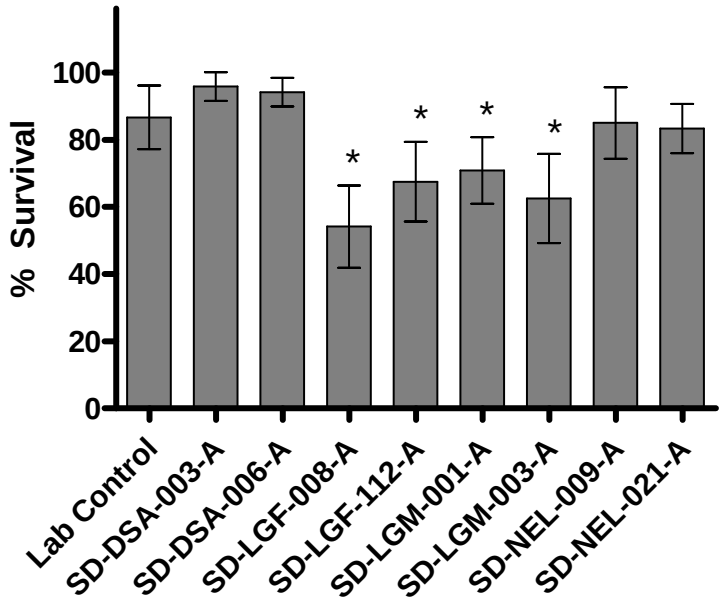

Figure 6. Survival of *Hyalella* at 28-days in Batch Two toxicity test (mean percent survival ± 95% C.I.). Asterisks indicate statistically reduced survival compared to laboratory control.

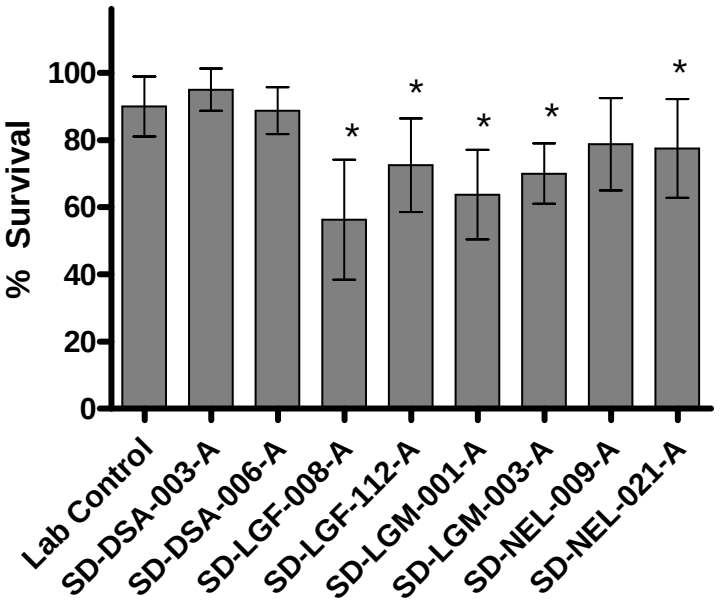

Figure 7. Survival of *Hyalella* at 42-days in Batch Two toxicity test (mean percent survival ± 95% C.I.). Asterisks indicate statistically reduced growth compared to laboratory control.

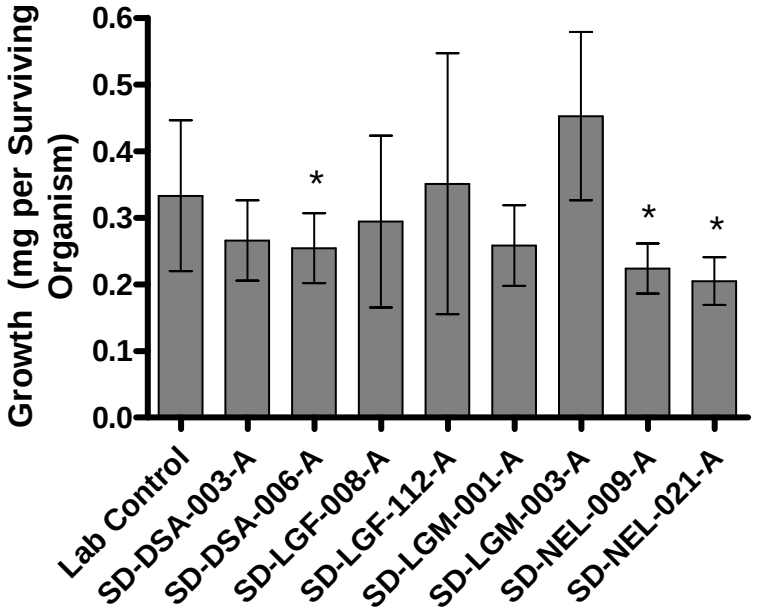

Figure 8. Growth of *Hyalella* at 28-days in Batch Two toxicity test (mean growth per surviving organism ± 95% C.I.). Asterisks indicate statistically reduced growth compared to laboratory control.

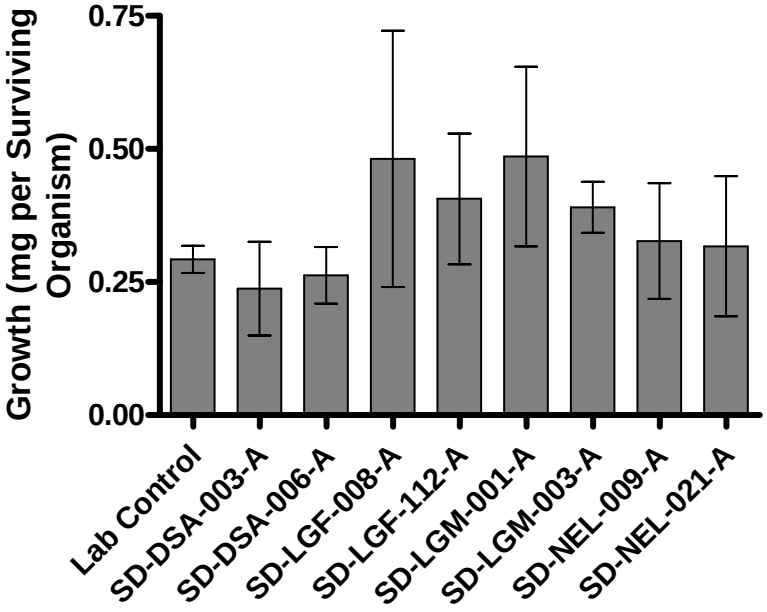

Figure 9. Growth of *Hyalella* at 42-days in Batch Two toxicity test (mean growth per surviving organism ± 95% C.I.).

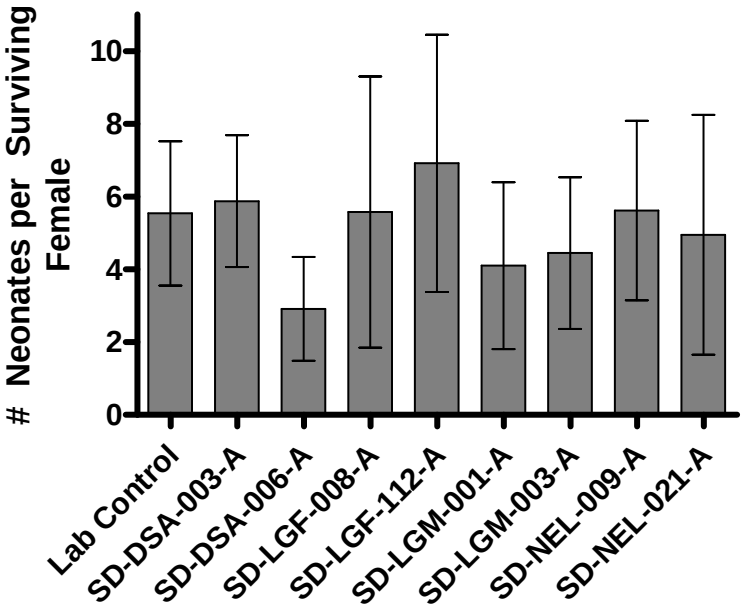

Figure 10. Reproduction of *Hyalella* at 42-days in Batch Two toxicity test (mean number of young per surviving female ± 95% C.I.).

4.0 QUALITY ASSURANCE / QUALITY CONTROL

All of the data presented have been thoroughly reviewed and are deemed acceptable for reporting in accordance with our internal QA/QC program and relevant protocols. All toxicity tests were initiated within sediment holding time requirements. Any deviations with respect to test conditions and acceptability criteria are summarized below. All were determined to be minor with no bearing on the data or its final interpretation.

4.1 Reference Toxicant Tests

Reference toxicant test results are provided in Appendix D. The median lethal effect (LC_{50}) concentration value for the reference toxicant tests was within ± 2 S.D. of internal control chart means.

4.2 Solid-Phase Toxicity Tests

Survival in the laboratory controls of the *Hyalella* test were 94.2 and 86.7 percent at the 28-day termination and 92.5 and 90.0 percent at the 42-day termination, meeting EPA's acceptability criterion of 80 percent.

4.3 Potential Confounding Factors

The influence of a potential confounding factor on test performance and interpretation is assessed and discussed below.

4.3.1 Ammonia

Total and un-ionized ammonia concentrations are summarized in Tables 7 and 8. Levels of total ammonia in the overlying water of all test sites were well below those reported to be toxic (30-60 mg/L) to *Hyalella azteca* (Kohn et al. 1994). LC_{50} values for *H. azteca* have been found to range between 20 and >200 mg/L, depending on pH and water hardness (Ankley et al. 1995). Although some porewater ammonia concentrations were above these levels, *Hyalella* are epibenthic organisms, residing on the surface of the sediment and are primarily exposed to overlying water. Thus, the toxicity observed in these samples would appear to be unrelated to ammonia concentrations.

Table 7. Total and Un-ionized Ammonia Concentrations in Sediment Porewater

Sites	Total Ammonia (mg/L)	Un-ionized Ammonia (mg/L)
SD-DSA-001-A	36.2	0.552
SD-DSA-003-A	7.6	0.095
SD-DSA-006-A	4.0	0.033
SD-LGF-001-A	52.5	1.005
SD-LGF-003-A	6.0	0.071
SD-LGF-007-A	1.8	0.050
SD-LGF-008-A	0.9	0.014
SD-LGF-009-A	2.6	0.082
SD-LGF-010-A	2.9	0.078
SD-LGF-012-A	16.3	0.144
SD-LGF-112-A	29.6	0.368
SD-LGM-001-A	58.8	0.508
SD-LGM-003-A	11.5	0.386
SD-NEL-007-A	4.1	0.092
SD-NEL-009-A	1.1	0.015
SD-NEL-021-A	36.2	0.552
Threshold Effect Levels		
	Ammonia NOEC (mg/L)	
Species	Total	
Hyalella azteca	30-60	

Table 8. Total and Un-ionized Ammonia Concentrations in Solid-Phase Toxicity Tests – Overlying Water

	Total Ammonia (mg/L)			Un-ionized Ammonia (mg/L)		
	Day 0	**Day 28**	**Day 42**	**Day 0**	**Day 28**	**Day 42**
Overlying water						
Laboratory Control 1	0.5	<0.5	<0.5	0.036	0.036	<0.051
Laboratory Control 2	<0.5	NM	<0.5	<0.048	NM	<0.045
SD-DSA-001-A	5.0	<0.5	<0.5	0.398	0.053	<0.048
SD-DSA-003-A	2.3	NM	<0.5	0.179	NM	<0.039
SD-DSA-006-A	1.2	NM	<0.5	0.088	NM	<0.044
SD-LGF-001-A	7.8	<0.5	<0.5	0.590	0.045	<0.050
SD-LGF-003-A	2.2	<0.5	<0.5	0.171	0.043	<0.048
SD-LGF-007-A	0.9	<0.5	<0.5	0.080	0.046	<0.053
SD-LGF-008-A	1.3	NM	<0.5	0.110	NM	<0.043
SD-LGF-009-A	0.5	0.7	<0.5	0.041	0.067	<0.036
SD-LGF-010-A	<0.5	<0.5	<0.5	<0.040	0.046	<0.048
SD-LGF-012-A	2.3	0.6	<0.5	0.175	0.064	<0.047
SD-LGF-112-A	1.8	NM	<0.5	0.150	NM	<0.043
SD-LGM-001-A	3.7	NM	<0.5	0.325	NM	<0.042
SD-LGM-003-A	7.1	NM	<0.5	0.476	NM	<0.037
SD-NEL-007-A	1.3	0.9	<0.5	0.094	0.089	<0.046
SD-NEL-009-A	1.3	NM	<0.5	0.092	NM	<0.037
SD-NEL-021-A	0.6	NM	<0.5	0.048	NM	<0.045

Threshold Effect Levels		
	Ammonia NOEC (mg/L)	
Species	Total	
Hyalella azteca	30-60	

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Appendix A

Summary of Toxicity Test Results

Batch One

Initiation Date: July 6, 2011

Appendix Table A-1. *Hyalella azteca* 28-day Survival

Site	Replicate	# Alive	% Survival	Mean % Survival	Site	Replicate	# Alive	% Survival	Mean % Survival
Laboratory Control	A	10	100	94.2	**SD-LGF-003-A**	A	8	80	**84.2***
	B	10	100			B	8	80	
	C	10	100			C	8	80	
	D	8	80			D	10	100	
	E	10	100			E	5	50	
	F	9	90			F	9	90	
	G	10	100			G	10	100	
	H	9	90			H	10	100	
	I	10	100			I	8	80	
	J	7	70			J	8	80	
	K	10	100			K	8	80	
	L	10	100			L	9	90	
SD-DSA-001-A	A	7	70	**84.2***	**SD-LGF-007-A**	A	7	70	**75.0***
	B	10	100			B	9	90	
	C	8	80			C	5	50	
	D	9	90			D	7	70	
	E	9	90			E	9	90	
	F	9	90			F	7	70	
	G	8	80			G	6	60	
	H	9	90			H	10	100	
	I	6	60			I	8	80	
	J	7	70			J	8	80	
	K	10	100			K	5	50	
	L	9	90			L	9	90	
SD-LGF-001-A	A	10	100	90.0	**SD-LGF-009-A**	A	1	10	**19.2***
	B	10	100			B	0	0	
	C	10	100			C	1	10	
	D	10	100			D	3	30	
	E	10	100			E	0	0	
	F	10	100			F	1	10	
	G	9	90			G	0	0	
	H	8	80			H	2	20	
	I	8	80			I	2	20	
	J	10	100			J	5	50	
	K	9	90			K	3	30	
	L	4	40			L	5	50	

Bold asterisk values are significantly reduced from Laboratory Control.

Appendix Table A-1 (cont.) *Hyalella azteca* 28-day Survival

Site	Replicate	# Alive	% Survival	Mean % Survival	Site	Replicate	# Alive	% Survival	Mean % Survival
SD-LGF-010-A	A	5	50	**53.3***	**SD-NEL-007-A**	A	3	30	**28.3***
	B	5	50			B	2	20	
	C	5	50			C	2	20	
	D	3	30			D	3	30	
	E	4	40			E	5	50	
	F	6	60			F	2	20	
	G	6	60			G	2	20	
	H	8	80			H	4	40	
	I	5	50			I	2	20	
	J	7	70			J	5	50	
	K	4	40			K	4	40	
	L	6	60			L	0	0	
SD-LGF-012-A	A	6	60	**53.3***					
	B	5	50						
	C	3	30						
	D	6	60						
	E	8	80						
	F	4	40						
	G	5	50						
	H	7	70						
	I	3	30						
	J	5	50						
	K	6	60						
	L	6	60						

Bold asterisk values are significantly reduced from Laboratory Control.

Appendix Table A-2. *Hyalella azteca* 28-day Growth

Site	Replicate	Total Rep. Wt. (mg)	Wt. per Org. (mg)	Mean Wt. per Org. (mg)
Laboratory Control	I	2.78	0.28	0.23
	J	1.78	0.25	
	K	2.23	0.22	
	L	1.81	0.18	
SD-DSA-001-A	I	1.79	0.30	0.29
	J	2.07	0.30	
	K	2.54	0.25	
	L	2.78	0.31	
SD-LGF-001-A	I	2.23	0.28	0.28
	J	2.83	0.28	
	K	2.46	0.27	
	L	1.15	0.29	
SD-LGF-003-A	I	1.88	0.23	0.24
	J	1.78	0.22	
	K	2.07	0.26	
	L	2.06	0.23	
SD-LGF-007-A	I	1.95	0.24	0.29
	J	2.15	0.27	
	K	1.69	0.34	
	L	2.88	0.32	
SD-LGF-009-A	I	0.34	0.17	**0.18***
	J	0.94	0.19	
	K	0.54	0.18	
	L	0.87	0.17	
SD-LGF-010-A	I	1.7	0.34	0.27
	J	2.01	0.29	
	K	0.81	0.20	
	L	1.51	0.25	
SD-LGF-012-A	I	0.96	0.32	0.35
	J	1.36	0.27	
	K	2.77	0.46	
	L	1.96	0.33	
SD-NEL-007-A	I	0.23	0.12	0.17
	J	0.68	0.14	
	K	0.99	0.25	
	L	2.78	0.28	

Bold asterisk values are significantly reduced from Laboratory Control.

Appendix Table A-3. *Hyalella azteca* 42-day Survival

Site	Replicate	# Alive	% Survival	Mean % Survival	Site	Replicate	# Alive	% Survival	Mean % Survival
Laboratory Control	A	9	90	92.5	**SD-LGF-009-A**	A	1	10	**10.0***
	B	10	100			B	0	0	
	C	10	100			C	1	10	
	D	8	80			D	3	30	
	E	10	100			E	0	0	
	F	8	80			F	1	10	
	G	9	90			G	0	0	
	H	10	100			H	2	20	
SD-DSA-001-A	A	7	70	86.3	**SD-LGF-010-A**	A	5	50	**48.8***
	B	10	100			B	5	50	
	C	8	80			C	5	50	
	D	9	90			D	2	20	
	E	9	90			E	4	40	
	F	9	90			F	5	50	
	G	8	80			G	5	50	
	H	9	90			H	8	80	
SD-LGF-001-A	A	9	90	92.5	**SD-LGF-012-A**	A	6	60	**55.0***
	B	10	100			B	5	50	
	C	10	100			C	3	30	
	D	9	90			D	6	60	
	E	9	90			E	8	80	
	F	10	100			F	4	40	
	G	9	90			G	5	50	
	H	8	80			H	7	70	
SD-LGF-003-A	A	7	70	**78.8***	**SD-NEL-007-A**	A	3	30	**26.3***
	B	8	80			B	2	20	
	C	8	80			C	1	10	
	D	10	100			D	3	30	
	E	5	50			E	5	50	
	F	8	80			F	2	20	
	G	7	70			G	1	10	
	H	10	100			H	4	40	
SD-LGF-007-A	A	7	70	**67.5***					
	B	8	80						
	C	5	50						
	D	7	70						
	E	6	60						
	F	6	60						
	G	6	60						
	H	9	90						

Bold asterisk values are significantly reduced from Laboratory Control.

Appendix Table A-4. *Hyalella azteca* 42-day Reproduction

Site	Replicate	# Neonates	# Females	Mean Neonates per Female	Site	Replicate	# Neonates	# Females	Mean Neonates per Female
Laboratory Control	A	23	5	3.5	**SD-LGF-009-A**	A	0	0	**0.0***
	B	24	7			B	a	0	
	C	23	6			C	0	1	
	D	22	4			D	0	1	
	E	5	3			E	a	0	
	F	3	1			F	0	1	
	G	13	8			G	a	0	
	H	27	6			H	0	1	
SD-DSA-001-A	A	39	4	4.6	**SD-LGF-010-A**	A	7	4	2.5
	B	25	6			B	0	1	
	C	11	3			C	19	3	
	D	19	6			D	1	2	
	E	27	8			E	0	2	
	F	12	4			F	16	3	
	G	25	4			G	4	3	
	H	10	3			H	25	5	
SD-LGF-001-A	A	8	2	3.4	**SD-LGF-012-A**	A	1	1	**1.0***
	B	20	5			B	0	2	
	C	9	5			C	0	1	
	D	22	5			D	7	3	
	E	20	5			E	10	5	
	F	22	5			F	0	1	
	G	10	6			G	1	3	
	H	13	4			H	5	2	
SD-LGF-003-A	A	12	6	2.8	**SD-NEL-007-A**	A	0	1	**0.0***
	B	22	6			B	0	0	
	C	8	2			C	0	1	
	D	19	6			D	0	1	
	E	9	3			E	0	4	
	F	13	4			F	0	0	
	G	7	5			G	0	0	
	H	7	4			H	0	3	
SD-LGF-007-A	A	20	5	4.9					
	B	8	6						
	C	11	3						
	D	7	1						
	E	13	2						
	F	27	3						
	G	26	4						
	H	9	6						

[a] Only replicates with surviving females are included in the mean neonates per female calculation.

Bold asterisk values are significantly reduced from Laboratory Control.

Appendix Table A-5. *Hyalella azteca* 42-day Growth

Site	Rep	Total Weight (mg)	Weight per Org. (mg)	Mean Weight per Org (mg)	Site	Rep	Total Weight (mg)	Weight per Org. (mg)	Mean Neonates per Female
Laboratory Control	A	2.71	0.30	0.26	**SD-LGF-009-A**	A	0.45	0.45	0.26
	B	2.81	0.28			B			
	C	2.4	0.24			C	0.33	0.33	
	D	2.06	0.26			D	1.41	0.47	
	E	2.33	0.23			E			
	F	2.92	0.37			F	0.48	0.48	
	G	1.42	0.16			G			
	H	2.81	0.28			H	0.73	0.37	
SD-DSA-001-A	A	1.91	0.27	0.34	**SD-LGF-010-A**	A	1.21	0.24	0.34
	B	3.58	0.36			B	1.59	0.32	
	C	2.61	0.33			C	2.08	0.42	
	D	3.01	0.33			D	0.66	0.33	
	E	2.7	0.30			E	1.27	0.32	
	F	3.28	0.36			F	1.59	0.32	
	G	2.95	0.37			G	2.36	0.47	
	H	3.31	0.37			H	2.48	0.31	
SD-LGF-001-A	A	3.21	0.36	0.30	**SD-LGF-012-A**	A	2.7	0.45	0.46
	B	2.54	0.25			B	2.04	0.41	
	C	2.51	0.25			C	2.05	0.68	
	D	2.84	0.32			D	2.81	0.47	
	E	2.53	0.28			E	2.42	0.30	
	F	3.4	0.34			F	2.02	0.50	
	G	2.68	0.30			G	2.32	0.46	
	H	2.69	0.34			H	2.79	0.40	
SD-LGF-003-A	A	1.93	0.28	0.31	**SD-NEL-007-A**	A	1.12	0.37	0.32
	B	2.72	0.34			B	0.97	0.49	
	C	3.41	0.43			C	0.36	0.36	
	D	2.81	0.28			D	1.56	0.52	
	E	1.64	0.33			E	1.68	0.34	
	F	2.52	0.32			F	0.32	0.16	
	G	1.76	0.25			G	0.04	0.04	
	H	2.57	0.26			H	1.09	0.27	
SD-LGF-007-A	A	2.1	0.30	0.35					
	B	2.33	0.29						
	C	1.77	0.35						
	D	3.26	0.47						
	E	2.81	0.47						
	F	1.79	0.30						
	G	2.22	0.37						
	H	2.6	0.29						

Bold asterisk values are significantly reduced from Laboratory Control.

Values missing are those with zero percent survival.

Appendix B

Summary of Toxicity Test Results

Batch Two

Initiation Date: July 7, 2011

Appendix Table B-1. *Hyalella azteca* 28-day Survival

Site	Replicate	# Alive	% Survival	Mean % Survival	Site	Replicate	# Alive	% Survival	Mean % Survival
Laboratory Control	A	10	100	86.7	**SD-LGF-008-A**	A	6	60	**54.2***
	B	10	100			B	7	70	
	C	9	90			C	8	80	
	D	10	100			D	6	60	
	E	9	90			E	9	90	
	F	10	100			F	3	30	
	G	9	90			G	4	40	
	H	9	90			H	3	30	
	I	7	70			I	5	50	
	J	8	80			J	6	60	
	K	5	50			K	4	40	
	L	8	80			L	4	40	
SD-DSA-003-A	A	10	100	95.8	**SD-LGF-112-A**	A	8	80	**67.5***
	B	10	100			B	8	80	
	C	9	90			C	5	50	
	D	10	100			D	8	80	
	E	10	100			E	9	90	
	F	8	80			F	6	60	
	G	10	100			G	8	80	
	H	10	100			H	9	90	
	I	9	90			I	6	60	
	J	10	100			J	6	60	
	K	9	90			K	3	30	
	L	10	100			L	5	50	
SD-DSA-006-A	A	9	90	94.2	**SD-LGM-001-A**	A	8	80	**70.8***
	B	10	100			B	5	50	
	C	9	90			C	6	60	
	D	9	90			D	4	40	
	E	10	100			E	7	70	
	F	9	90			F	7	70	
	G	10	100			G	9	90	
	H	9	90			H	7	70	
	I	10	100			I	9	90	
	J	10	100			J	7	70	
	K	8	80			K	7	70	
	L	10	100			L	9	90	

Bold asterisk values are significantly reduced from Laboratory Control.

Appendix Table B-1 (cont.) *Hyalella azteca* 28 day Survival

Site	Replicate	# Alive	% Survival	Mean % Survival	Site	Replicate	# Alive	% Survival	Mean % Survival
SD-LGM-003-A	A	7	70	**62.5***	**SD-NEL-021-A**	A	9	90	83.3
	B	7	70			B	9	90	
	C	7	70			C	7	70	
	D	8	80			D	8	80	
	E	8	80			E	9	90	
	F	5	50			F	9	90	
	G	8	80			G	7	70	
	H	8	80			H	9	90	
	I	6	60			I	10	100	
	J	6	60			J	9	90	
	K	4	40			K	8	80	
	L	1	10			L	6	60	
SD-NEL-009-A	A	6	60	85.0					
	B	8	80						
	C	5	50						
	D	10	100						
	E	8	80						
	F	10	100						
	G	9	90						
	H	8	80						
	I	8	80						
	J	10	100						
	K	10	100						
	L	10	100						

Bold asterisk values are significantly reduced from Laboratory Control.

Appendix Table B-2. *Hyalella azteca* 28-day Growth

Site	Replicate	Total Rep. Wt. (mg)	Wt. per Org. (mg)	Mean Wt. per Org. (mg)
Laboratory Control	I	1.85	0.26	0.33
	J	2.38	0.30	
	K	2.14	0.43	
	L	2.74	0.34	
SD-DSA-003-A	I	2.65	0.29	0.27
	J	2.37	0.24	
	K	2.07	0.23	
	L	3.03	0.30	
SD-DSA-006-A	I	2.2	0.22	**0.25***
	J	2.93	0.29	
	K	1.88	0.23	
	L	2.69	0.27	
SD-LGF-008-A	I	1.04	0.21	0.29
	J	2.41	0.40	
	K	1.19	0.30	
	L	1.08	0.27	
SD-LGF-112-A	I	2.36	0.39	0.35
	J	1.85	0.31	
	K	0.62	0.21	
	L	2.48	0.50	
SD-LGM-001-A	I	1.94	0.22	0.26
	J	1.73	0.25	
	K	2.15	0.31	
	L	2.37	0.26	
SD-LGM-003-A	I	2.35	0.39	0.45
	J	3.26	0.54	
	K	1.98	0.50	
	L	0.38	0.38	
SD-NEL-009-A	I	2	0.25	**0.22***
	J	2.03	0.20	
	K	2.05	0.21	
	L	2.37	0.24	
SD-NEL-021-A	I	2.17	0.22	**0.21***
	J	1.57	0.17	
	K	1.8	0.22	
	L	1.02	0.20	

Bold asterisk values are significantly reduced from Laboratory Control.

Appendix Table B-3. *Hyalella azteca* 42-day Survival

Site	Replicate	# Alive	% Survival	Mean % Survival	Site	Replicate	# Alive	% Survival	Mean % Survival
Laboratory Control	A	9	90	90.0	**SD-LGM-001-A**	A	7	70	**63.8***
	B	10	100			B	5	50	
	C	8	80			C	5	50	
	D	10	100			D	4	40	
	E	9	90			E	7	70	
	F	10	100			F	7	70	
	G	7	70			G	9	90	
	H	9	90			H	7	70	
SD-DSA-003-A	A	10	100	95.0	**SD-LGM-003-A**	A	6	60	**70.0***
	B	10	100			B	7	70	
	C	9	90			C	7	70	
	D	10	100			D	8	80	
	E	10	100			E	7	70	
	F	8	80			F	5	50	
	G	9	90			G	8	80	
	H	10	100			H	8	80	
SD-DSA-006-A	A	9	90	88.8	**SD-NEL-009-A**	A	6	60	78.8
	B	7	70			B	8	80	
	C	9	90			C	5	50	
	D	9	90			D	9	90	
	E	10	100			E	8	80	
	F	9	90			F	10	100	
	G	9	90			G	9	90	
	H	9	90			H	8	80	
SD-LGF-008-A	A	6	60	**56.3***	**SD-NEL-021-A**	A	9	90	**77.5***
	B	7	70			B	9	90	
	C	7	70			C	7	70	
	D	6	60			D	8	80	
	E	9	90			E	4	40	
	F	3	30			F	9	90	
	G	4	40			G	7	70	
	H	3	30			H	9	90	
SD-LGF-112-A	A	8	80	**72.5***					
	B	5	50						
	C	5	50						
	D	8	80						
	E	9	90						
	F	6	60						
	G	8	80						
	H	9	90						

Bold asterisk values are significantly reduced from Laboratory Control.

Appendix Table B-4. *Hyalella azteca* 42-day Reproduction

Site	Replicate	# Neonates	# Females	Mean Neonates per Female	Site	Replicate	# Neonates	# Females	Mean Neonates per Female
Laboratory Control	A	11	4	5.9	**SD-LGM-001-A**	A	5	4	4.1
	B	40	6			B	0	1	
	C	46	6			C	16	3	
	D	17	4			D	13	2	
	E	22	6			E	4	3	
	F	23	8			F	32	5	
	G	37	5			G	45	7	
	H	35	4			H	28	5	
SD-DSA-003-A	A	40	5	2.9	**SD-LGM-003-A**	A	15	3	4.4
	B	45	6			B	17	3	
	C	21	8			C	20	4	
	D	30	5			D	21	4	
	E	33	6			E	13	3	
	F	24	4			F	0	1	
	G	12	4			G	50	6	
	H	42	5			H	8	4	
SD-DSA-006-A	A	20	6	5.6	**SD-NEL-009-A**	A	26	3	5.6
	B	15	4			B	18	5	
	C	9	5			C	21	2	
	D	11	5			D	30	7	
	E	8	5			E	26	6	
	F	16	5			F	12	4	
	G	4	4			G	16	6	
	H	45	7			H	39	5	
SD-LGF-008-A	A	1	4	6.9	**SD-NEL-021-A**	A	13	4	4.9
	B	18	6			B	6	6	
	C	25	4			C	3	6	
	D	12	5			D	28	4	
	E	12	5			E	12	1	
	F	17	2			F	26	4	
	G	23	3			G	29	4	
	H	28	2			H	8	4	
SD-LGF-112-A	A	2	3	4.1					
	B	14	1						
	C	33	3						
	D	10	2						
	E	48	7						
	F	26	3						
	G	19	5						
	H	31	6						

Appendix Table B-5. *Hyalella azteca* 42-day Growth

Site	Rep	Total Weight (mg)	Weight per Org. (mg)	Mean Weight per Org (mg)	Site	Rep	Total Weight (mg)	Weight per Org. (mg)	Mean Neonates per Female
Laboratory Control	A	2.61	0.29	0.29	SD-LGM-001-A	A	2.89	0.41	0.49
	B	2.89	0.29			B	3.11	0.62	
	C	1.92	0.24			C	2.4	0.48	
	D	2.70	0.27			D	3.49	0.87	
	E	2.88	0.32			E	2.75	0.39	
	F	3.27	0.33			F	3.61	0.52	
	G	2.28	0.33			G	1.57	0.17	
	H	2.51	0.28			H	2.92	0.42	
SD-DSA-003-A	A	2.17	0.22	0.24	SD-LGM-003-A	A	2.82	0.47	0.39
	B	3.25	0.33			B	3.17	0.45	
	C	1.29	0.14			C	2.69	0.38	
	D	1.71	0.17			D	2.35	0.29	
	E	1.18	0.12			E	2.96	0.42	
	F	3.45	0.43			F	1.77	0.35	
	G	1.80	0.20			G	2.89	0.36	
	H	2.97	0.30			H	3.08	0.38	
SD-DSA-006-A	A	3.29	0.37	0.26	SD-NEL-009-A	A	3.33	0.55	0.33
	B	2.10	0.30			B	2.6	0.33	
	C	2.78	0.31			C	2.43	0.49	
	D	1.74	0.19			D	1.43	0.16	
	E	2.56	0.26			E	2.12	0.27	
	F	1.58	0.18			F	2.99	0.30	
	G	2.50	0.28			G	2.34	0.26	
	H	2.03	0.23			H	2.15	0.27	
SD-LGF-008-A	A	1.23	0.21	0.48	SD-NEL-021-A	A	1.58	0.18	0.32
	B	2.04	0.29			B	2.43	0.27	
	C	0.91	0.13			C	1.69	0.24	
	D	3.34	0.56			D	2.55	0.32	
	E	3.04	0.34			E	2.71	0.68	
	F	2.38	0.79			F	3.13	0.35	
	G	2.42	0.60			G	2.18	0.31	
	H	2.80	0.93			H	1.76	0.20	
SD-LGF-112-A	A	3.35	0.42	0.41					
	B	3.39	0.68						
	C	2.54	0.51						
	D	2.97	0.37						
	E	2.85	0.32						
	F	2.21	0.37						
	G	1.36	0.17						
	H	3.77	0.42						

Bold asterisk values are significantly reduced from Laboratory Control.

Appendix C
Water Quality Raw Data

Batch One – *Hyalella azteca*

42-day Survival and Reproduction

Freshwater Sediment Bioassay

Client: EPA

Project ID: Halaco

Initiated by: SL

Initial No. Organisms: 10

Test Species: *Hyalella*

Start Date/Time: 7/6/2011 1600

End Date/Time: 8/17/2011 1130

Test No.: 1107-S0~~90~~ 82 - S0~~97~~ 87

Random Number	# of Adults	# of Neonates	10% QC Check of final counts	# of ♀
1	9	SL ~~11~~ 12		4
2	10	17		5
3	5	15		3
4	9	8	8	6
5	5	16		3
7	10	20		6
8	6	20		4
10	2	0		1
18	5	0		1
20	7	SL ~~6~~ 7	7	5
24	8	0		1
28	3	0		1
30	8	4	4	4
32	1	0		0
34	10	17		6
38	~~9~~ SL			
41	9 ~~11~~ SL	17		5
43	10	9	9	5
48	8	6		5
49	3	0		1
51	8	13		4
54	7	7		1
55	6	13	13	2
56	9	7		2
62	3	0		1
Tech Initials:	SL	SL	JF	SL

Random Number	# of Adults	# of Neonates	10% QC Check of final counts	# of ♀
64	5	0		2
69	5	0		4
73	~~4~~ SL	~~0~~ SL		
74	4	0		3
77	9	~~10~~ 11	11	6
78	6	7		3
82	1	0		1
84	4	0		1
94	9	14		5
96	10	11	11	6
99	5	9		3
100	7	2	2	2
102	10	20		6
105	2	0		2
106	9	13		5
113	9	9	9	6
122	4	0		2
127	0	0		
141	1	0		0
146	2	0		0
152	8	22		6
154	1	0		1
156	2	0		0
157	7	26		4
159	10	21	21	7
Tech Initials:	JP/SL	JP/SL	JF	SL

Initiation QC Check Initials:

Organism Counts CMJA Organism Count QC SL All Jars Initiated SL ~~Time Zero pans~~ Air/Lights SL

Comments:

QC Check: KL 9/12/11 Final Review:

42-day Survival and Reproduction

Freshwater Sediment Bioassay

KL

Client: EPA

Test Species: *Hyalella*

Project ID: Halaco

Start Date/Time: 7/6/2011 1600

Initiated by: SL

End Date/Time: 8/17/2011 1130

Initial No. Organisms: 10

Test No.: 1107-S0~~70~~82 KL - S0~~97~~89 KL

Random Number	# of Adults	# of Neonates	10% QC Check of final counts	# of ♀	Random Number	# of Adults	# of Neonates	10% QC Check of final counts	# of ♀
166	7	15		5	Surr LC	9	9		6
169	5	7	7	4	DSA-001A	10	12		4
176	1	0		1	LGF-001A	6	11	11	3
177	6	1		1	LGF-003A	5	18		4
179	6	19		3	LGF-007A	9	6		6
182	5	11		3	LGF-009A	0	0		
183	10	7		4	LGF-010A	5	7	7	3
185	10	6	6	5	LGF-012A	7	4		3
186	8	8		6	NEL-007A	1	0		0
189	9	8		8					
190	8	18		4					
194	5	1	1	3					
195	8	9		3					
196	9	22		8					
199	3	0		1					
200	8	7		2					
201	8	15		5					
203	8	17		4					
206	8	4	4	6					
208	10	4		3					
211	5	4	4	3					
214	9	~~9~~ 10		3					
Tech Initials:	JP	JP	JF	SL	Tech Initials:	JP	JP	JF	SL

Initiation QC Check Initials:

Organism Counts CM, JA **Organism Count QC** SL **All Jars Initiated** SL **Air/Lights ~~Time Zero pans~~** SL KL

Comments:

QC Check: KL 9/12/11 **Final Review:**

Nautilus Environmental, LLC. 4340 Vandever Avenue. San Diego, CA 92120.

Sediment Bioassay **28-day Organism Survival**

Client: EPA **Test Species:** *H. azteca*

Project ID: Halaco **Start Date/Time:** 7/6/2011 1600

Initiated by: SL **End Date/Time:** 8/3/2011 0945

Initial No. Organisms: 10 **Test No.:** 1107-S0980 - S0987

Random Number	Number Alive	10% QC Check of final counts	Random Number	Number Alive	10% QC Check of final counts
1	9		44	8	
2	10		48	8	
3	5 *		49	3	
4	9		51	9	
5	6		54	7	
7	9		55	9	
8	6		56	10	
10	2		59	7	
13	7	7	62	3	
16	6		64	5	
18	5		67	3	3
20	10		69	5	
24	9		70	8	8
28	3		71	7	
29	9		72	4	
30	8		73	0	
31	0		74	4	
32	1		77	9	
33	6		78	6	
34	10		79	8	
37	8		82	1	
38	0		84	4	
40	4	4	87	10	10
41	10		90	5	
43	10		94	10	
Tech Initials:	KL/SL/JR	KL	Tech Initials:	KL/SL/JR	KL

Initiation QC Check Initials:

Counts CM, JA **All Jars initiated** SL **Animals Burrowed** SL **Air** SL **Lights** SL

Comments: * Other organisms found in sediment (polychaete)

QC Check: KL 8/29/11 **Final Review:** SD 8/31/11

Nautilus Environmental. 5550 Morehouse Drive, Suite 150. San Diego, CA 92121.

Sediment Bioassay **28-day Organism Survival**

Client: EPA **Test Species:** *H. azteca*

Project ID: Halaco **Start Date/Time:** 7/6/2011 1600

Initiated by: SL **End Date/Time:** 8/3/2011 0945

Initial No. Organisms: 10 **Test No.:** 1107-S0~~90~~ 82 - S0~~97~~ 89

Random Number	Number Alive	10% QC Check of final counts	Random Number	Number Alive	10% QC Check of final counts
96	10		156	2	
98	5		157	7	
99	5*		159	10	
100	7		161	2	2
101	8	8	166	7	
102	10		167	5	
105	3		169	5	
106	10		171	8	8
109	5	5	175	10	10
113	10		176	1	
117	10		177	6	
118	10		179	7	
119	10		182	5	
122	4		183	10	
123	3		185	10	
127	0		186	8	
131	9	9	189	10	
135	2		190	8	
141	2		194	5	
143	9		195	8	
145	5		196	9	
146	2		197	6	6
151	4		199	3	
152	KL 7 8		200	8	
154	2		201	8	
Tech Initials:	KL/SL/JR	KL	Tech Initials:	KL/SL/JR	KL

Initiation QC Check Initials:

Counts CMJA **All Jars initiated** SL **Animals Burrowed** SL **Air** SL **Lights** SL

Comments: * 1 baby found

QC Check: KL 8/29/11 **Final Review:** SO 8/31/11

Nautilus Environmental. 5550 Morehouse Drive, Suite 150. San Diego, CA 92121.

Sediment Bioassay **28-day Organism Survival**

Client: EPA **Test Species:** *H. azteca*

Project ID: Halaco **Start Date/Time:** 7/6/2011 1600

Initiated by: SL **End Date/Time:** 8/3/2011 0945

Initial No. Organisms: 10 **Test No.:** 1107-5048 -5097

Random Number	Number Alive	10% QC Check of final counts	Random Number	Number Alive	10% QC Check of final counts
202	9				
203	8				
205	~~8~~ 6	6			
206	9				
208	10				
209	5	5			
211	6				
214	9				
LC Surv	9				
DSA-009A	10				
LGF-001A	10				
LGF-003A	5				
LGF-007A	9				
LGF-012A	9				
LGF-009A	0				
NEL 007A	1				
LGF-010A	5				
Tech Initials:	KL/SLJR	KL	Tech Initials:		

Initiation QC Check Initials:

Counts CMJA **All Jars initiated** SL **Animals Burrowed** SL **Air** SL **Lights** SL

Comments:

QC Check: KL 8/29/11 **Final Review:** BD 8/31/11

Freeshwater Sediment Bioassay

Reproduction
(35 d)

Client: EPA
Test Species: *Hyalella*
Project ID: Halaco
Start Date/Time: 7/6/2011 1600
Initiated by: SL
End Date/Time: 8/10/2011 0845
Initial No. Organisms: 10
Test No.: 1107-5090 -5097

Random Number	# of Neonates	10% QC Check of final counts	Random Number	# of Neonates	10% QC Check of final counts
1	0		64	0	
2	5		69	0	
3	4	4	73	—	
4	2		74	0	
5	0		77	8	8
7	7		78	0	
8	~~8~~ 6	6	82	0	
10	0		84	0	
18	0		94	8	8
20	0		96	8	
24	3	3	99	0	
28	0		100	3	3
30	9		102	5	
32	0		105	~~8~~ 1	
34	6		106	7	
38	~~0~~		113	0	
41	6	6	122	0	
43	11		127	—	
48	4		141	0	
49	0		146	0	
51	0		152	0	
54	0		154	0	
55	0		156	0	
56	1	1	157	13	13
62	0		159	3	
Tech Initials:	JR/KL	KL	Tech Initials:	JR/KL	KL

Initiation QC Check Initials:
Organism Counts MJA **Organism Count QC** SL **All Jars initiated** SL **Time Zero pans** Av/Light SL KL

Comments:

QC Check: KL 8/29/11 **Final Review:** SD 8/31/11

Nautilus Environmental, LLC. 4340 Vandever Avenue. San Diego, CA 92120.

Freeshwater Sediment Bioassay

Reproduction
(35 d)

Client: EPA
Project ID: Halaco
Initiated by: SL
Initial No. Organisms: 10

Test Species: *Hyalella*
Start Date/Time: 7/6/2011 1600
End Date/Time: 8/10/2011 0845
Test No.: 1107-5080 - 5097
82 89

Random Number	# of Neonates	10% QC Check of final counts
166	5	5
169	0	
176	0	
177	0	
179	8	
182	0	
183	0	
185	3	
186	4	4
189	5	
190	4	
194	0	
195	2	2
196	5	
199	0	
200	1	1
201	10	
203	8	
206	4	
208	1	
211	0	
214	0	
Tech Initials:	JR/KL	KL

Random Number	# of Neonates	10% QC Check of final counts
Surr LL	12	
PSA-001A	4	4
LGF-001A	9	
LGF-003A	2	
LGF-007A	4	
LGF-009A	0	
LGF-010A	3	3
LGF-012A	0	
NEL-007A	0	
Tech Initials:	JR/KL	KL

Initiation QC Check Initials:

Organism Counts CM, JA **Organism Count QC** SL **All Jars initiated** SL **Time ~~Zero~~ pans** Air/light SL KL

Comments:

QC Check: KL 8/29/11 **Final Review:** 80 8/31/11

Nautilus Environmental, LLC. 4340 Vandever Avenue. San Diego, CA 92120.

Sediment Bioassay

Test Organism Weights

Client: EPA

Project ID: Halaco

Test No.: 1107-S090 - S097

Test Species: *Hyalella azteca*

Start Date/Time: 7/6/11 1600

End Date/Time: 8/17/11 1130

Random No.	Pan Weight (mg)	Pan + Organism Weight (mg)
1	491.57	494.85
2	541.06	544.46
3	552.70	554.78
4	560.77	563.45
5	478.65	480.24
7	544.61	547.42
8	544.19	546.41
10	570.97	571.70
18	563.84	565.43
20	564.30	566.06
24	602.67	605.59
28	515.10	516.51
30	535.01	537.70
32	481.00	481.45
34	485.26	487.66
38		
41	551.05	553.76
43	558.72	561.26
48	550.96	553.38
49	570.34	572.39
51	564.05	566.57
54	580.53	583.79
55	547.05	549.86
56	578.83	582.04
62	440.23	441.79
64	487.96	490.00
69	503.40	505.08
73		
74	460.42	461.51
77	510.08	513.09
78	457.01	459.82
82	443.48	443.81
84	493.38	495.40
94	556.37	559.21
96	555.35	558.16
99	572.67	574.31
100	563.03	565.82
102	550.58	554.16
105	569.18	569.84
106	591.77	594.30
Tech Initials:	JP	KL
Date/Time:	9/6/11 1540	9/8/11 1300

QC Check: KL 9/12/11

Final Review:

Sediment Bioassay

Test Organism Weights

Client: EPA

Project ID: Halaco

Test No.: 1107-S090 - S097

Test Species: *Hyalella azteca*

Start Date/Time: 7/6/11 1600

End Date/Time: 8/17/11 1130

Random No.	Pan Weight (mg)	Pan + Organism Weight (mg)
113	550.61	553.21
122	566.77	568.04
127		
141	578.06	578.10
146	452.21	453.18
152	455.15	457.87
154	497.19	497.55
156	433.19	433.51
157	442.87	444.78
159	501.05	503.86
166	452.12	454.22
169	433.85	435.06
176	469.61	470.09
177	483.39	486.09
179	479.22	481.01
182	426.22	427.99
183	429.27	431.84
185	429.73	432.24
186	451.22	453.15
189	475.08	476.50
190	501.77	503.83
194	437.39	439.71
195	443.95	446.56
196	466.70	469.40
199	460.17	461.29
200	546.13	549.54
201	512.06	514.54
203	542.75	545.70
206	517.11	519.44
208	496.72	499.05
211	496.54	498.90
214	534.43	537.74
Surr LC	489.17	491.38
DSA-001A	461.13	464.33
LGF-001A	448.24	449.74
LGF-003A	443.65	445.39
LGF-007A	461.45	463.69
LGF-010A	450.7	452.58
LGF-012A	444.88	447.07
NEL-007A	473.76	473.91
Tech Initials:	JP	KL
Date/Time:	9/6/11 1400	9/7/11 1300

QC Check: KL 9/12/11

Final Review: _____

42-Day Freshwater Sediment Bioassay

Water Quality Measurements

Client: EPA

Project ID: Halaco

Site ID: Lab Control #1

Test Organism: *H. azteca*

Start Date/Time: 7/6/11 1600

End Date/Time: 8/17/11 ~~0945~~ 1130 KL

Day	Temp. (°C)	Dissolved O_2 (mg/L)	pH (units)	Conductivity (µmhos/cm)	Comments	Tech Initials
0	23.6	7.9	8.19	668	* Collect NH_3	AD
1	23.5	7.7	8.41	682		AD
2	22.8	8.1	8.36	688		JP
3	22.4	8.3	8.41	685		JF
4	22.2	8.2	8.18	674		KF
5	22.4	8.2	8.41	697		JG
6	22.1	8.3	8.26	740		AD
7	~~22.8~~ JP (A)	~~8.1~~ JP (A)	(A)	(A) ~~724~~ JP	* Collect NH_3	
8	22.8	8.1	8.34	724		JP
9	22.9	8.3	8.58	721		AD
10	23.1	7.8	8.44	693		SL
11	22.8	8.1	8.27	700		KF
12	23.5	7.7	8.31	731		JP
13	23.8	7.8	8.49	716		AD
14	22.6	8.1	8.30	715	* Collect NH_3	JP
15	22.8	8.4	8.33	716		AD
16	22.5	8.1	7.91	712		AD
17	22.3	8.3	8.21	711		AD
18	22.2	8.2	8.18	707		SL
19	22.6	8.1	8.35	727		JP
20	23.1	7.9	8.11	711		AD
21	23.0	8.0	8.24	713	* Collect NH_3	JP

QC Check: KL 8/29/11

Final Review: AD 8/31/11

Nautilus Environmental, LLC. 4340 Vandever Avenue. San Diego, CA 92120.

(A) Water quality readings not taken, technician error

42-Day Freshwater Sediment Bioassay

Water Quality Measurements

Client: EPA

Project ID: Halaco

Site ID: Lab Control #1

Test Organism: *H. azteca*

Start Date/Time: 7/6/11 1600

End Date/Time: 8/17/11 ~~0945~~ 1130 KL

Day	Temp. (°C)	Dissolved O_2 (mg/L)	pH (units)	Conductivity (µmhos/cm)	Comments	Tech Initials
22	22.4	8.4	8.35	712		AD
23	22.3	7.8	8.21	712		AD
24	23.0	8.6	8.29	705		AD
25	22.8	8.2	8.49	697		JG
26	22.7	7.6	8.40	698		JP
27	22.6	7.9	8.22	687		SW
28	22.0	8.0	8.24	679	Collect NH_3	SW
29	22.3	8.2	8.12	683		AD
30	22.8	7.8	8.12	674		AD
31	22.9	7.9	8.24	663		JF
32	22.5	7.7	8.23	679		SL
33	22.5	8.0	8.21	687		JP
34	22.6	8.3	8.32	698		SL
35	22.2	8.3	8.24	731	Collect NH_3	SD
36	22.3	8.1	8.46	718		AD
37	22.4	8.2	8.45	717		ES
38	22.1	8.3	8.32	688		AD
39	22.3	8.0	8.26	722		JF
40	22.6	7.8	8.29	716		JP
41	22.2	6.5	8.47	703		JG
42	22.3	8.3	8.40	720	Collect NH_3	AD

QC Check: KL 8/29/11

Final Review: 8/31/11

Nautilus Environmental, LLC. 4340 Vandever Avenue. San Diego, CA 92120.

42-Day Freshwater Sediment Bioassay

Water Quality Measurements

Client: EPA

Project ID: Halaco

Site ID: SD-DSA-001A

Test Organism: *H. azteca*

Start Date/Time: 7/6/11 1600

End Date/Time: 8/17/11 ~~0945~~ KL 1130

Day	Temp. (°C)	Dissolved O_2 (mg/L)	pH (units)	Conductivity (µmhos/cm)	Comments	Tech Initials
0	23.5	7.4	8.24	1819		AD
1	23.5	7.4	8.43	2130		AD
2	22.7	7.8	8.39	1482		JP
3	22.3	7.9	8.34	971		JF
4	22.2	8.0	8.28	833		KF
5	22.3	7.8	8.33	835		JG
6	22.0	8.0	8.32	777		AD
7	A	A	A	A		A
8	22.8	7.8	8.53	754		JP
9	22.9	8.0	8.84	744		AD
10	23.0	7.3	9.11	715		SL
11	22.7	7.4	8.94	707		KF
12	23.4	7.1	9.01	724		JP
13	23.8	7.8	9.05	729		AD
14	22.5	7.6	8.61	735		JP
15	22.7	8.0	8.44	752		AD
16	22.2	7.8	8.30	762		AD
17	22.3	7.2	8.10	762		AD
18	22.0	7.7	8.19	782		SL
19	22.5	7.4	8.35	761		JP
20	22.8	7.0	8.15	744		AD
21	22.8	6.9	8.21	749		JP

QC Check: KL 8/29/11

Final Review: SD 8/31/11

Nautilus Environmental, LLC. 4340 Vandever Avenue. San Diego, CA 92120.

A Water quality readings not taken, technician error

42-Day Freshwater Sediment Bioassay

Water Quality Measurements

Client: EPA

Project ID: Halaco

Site ID: SD-DSA-001A

Test Organism: *H. azteca*

Start Date/Time: 7/6/11 1600

End Date/Time: 8/17/11 ~~0943~~ 1130 KL

Day	Temp. (°C)	Dissolved O_2 (mg/L)	pH (units)	Conductivity (µmhos/cm)	Comments	Tech Initials
22	22.4	8.4	8.46	735		AD
23	22.0	7.6	8.36	738		AD
24	22.9	8.4	8.44	727		AD
25	22.6	8.0	8.58	723		JG
26	22.6	7.3	8.52	738		JP
27	22.4	7.6	8.33	709		JW
28	22.1	7.9	8.42	732		JW
29	JW ~~22.0~~ 22.1	8.3	JW ~~8.0~~ 8.16	680		AD
30	22.7	7.9	8.16	674		AD
31	22.7	8.0	8.26	662		JF
32	22.4	7.7	8.22	681		SL
33	22.3	8.1	8.23	685		JP
34	22.4	8.3	8.31	698		SL
35	22.0	8.4	8.23	701		SD
36	22.2	8.1	8.38	715		AD
37	22.3	8.2	8.43	715		ES
38	22.1	8.3	8.28	687		AD
39	22.1	8.0	8.24	723		JF
40	22.4	7.7	8.28	715		JP
41	22.1	6.7	8.40	694		JG
42	22.1	8.3	8.38	719		AD

QC Check: KL 8/29/11

Final Review: SD 8/31/11

Nautilus Environmental, LLC. 4340 Vandever Avenue. San Diego, CA 92120.

42-Day Freshwater Sediment Bioassay

Water Quality Measurements

Client: EPA

Project ID: Halaco

Site ID: SD-LGF-001A

Test Organism: *H. azteca*

Start Date/Time: 7/6/11 1600

End Date/Time: 8/17/11 ~~0445~~ 1130 IC

Day	Temp. (°C)	Dissolved O_2 (mg/L)	pH (units)	Conductivity (µmhos/cm)	Comments	Tech Initials
0	23.4	6.9	8.22	4420		AD
1	23.4	7.1	8.25	5730		AD
2	22.7	7.5	8.22	3810		JP
3	22.3	7.7	8.23	1984		JF
4	22.1	7.9	8.25	2090		KF
5	22.2	7.8	8.27	1813		JG
6	22.0	8.0	8.19	1155		AD
7	(A)	(A)	(A)	(A)		(A)
8	22.8	7.9	8.28	1036		JP
9	22.9	8.2	8.44	948		AD
10	23.0	7.7	8.39	992		SL
11	22.7	7.6	8.34	933		KF
12	23.4	7.6	8.32	847		JP
13	23.7	7.6	8.45	816		AD
14	22.3	7.8	8.32	783		JP
15	22.6	8.2	8.38	773		AD
16	22.1	8.0	8.27	755		AD
17	22.2	8.1	8.22	741		AD
18	22.0	8.1	8.24	716		SL
19	22.3	7.9	8.34	752		JP
20	22.7	7.7	8.11	735		AD
21	22.6	7.8	8.24	735		JP

QC Check: KL 8/29/11

Final Review: [illegible] 8/31/11

Nautilus Environmental, LLC. 4340 Vandever Avenue. San Diego, CA 92120.

(A) Water quality readings not taken, technician error.

42-Day Freshwater Sediment Bioassay

Water Quality Measurements

Client: EPA

Test Organism: *H. azteca*

Project ID: Halaco

Start Date/Time: 7/6/11 1600

Site ID: SD-LGF-001A

End Date/Time: 8/17/11 1130

Day	Temp. (°C)	Dissolved O_2 (mg/L)	pH (units)	Conductivity (µmhos/cm)	Comments	Tech Initials
22	22.0	8.5	8.34	743		AD
23	21.8 Q1	7.9	8.18	745		AD
24	22.1	8.5	8.38	727		AD
25	22.6	8.2	8.42	718		JG
26	22.3	7.5	8.38	720		JP
27	22.2	7.8	8.27	696		JW
28	22.0	7.5	8.35	708		JW
29	22.1	8.1	8.10	672		AD
30	22.5	8.0	8.14	670		AD
31	22.5	8.1	8.22	660		JF
32	22.2	7.7	8.21	678		SL
33	22.1	8.1	8.21	686		JP
34	22.2	8.4	8.32	699		SL
35	22.0	8.4	8.26	704		SO
36	22.1	8.0	8.34	715		AD
37	22.3	8.3	8.44	733		ES
38	22.0	8.4	8.31	686		AD
39	22.1	8.1	8.30	712		JF
40	22.3	8.0	8.30	714		JP
41	22.0	6.9	8.35	696		JG
42	22.1	8.4	8.39	718		AD

QC Check: KL 8/29/11

Final Review: 8/31/11

42-Day Freshwater Sediment Bioassay

Water Quality Measurements

Client: EPA

Project ID: Halaco

Site ID: SD-LGF-003A

Test Organism: *H. azteca*

Start Date/Time: 7/6/11 1600

End Date/Time: 8/17/11 1130

Day	Temp. (°C)	Dissolved O_2 (mg/L)	pH (units)	Conductivity (µmhos/cm)	Comments	Tech Initials
0	23.2	7.6	8.24	2740		AD
1	23.3	7.5	8.39	3400		AD
2	22.7	7.8	8.36	2340		JP
3	22.3	7.8	8.27	1357		JF
4	22.4	8.1	8.39	1366		KF
5	22.2	7.9	8.34	1306		JG
6	22.0	8.1	8.28	984		AD
7	A	A	A	A		A
8	22.7	8.0	8.40	909		JP
9	22.9	8.3	8.52	865		AD
10	23.0	7.8	8.54	928		SL
11	22.7	7.4	848	851		KF
12	23.4	7.5	8.41	845		JP
13	23.6	7.8	8.56	824		AD
14	22.3	7.9	8.40	793		JP
15	22.6	8.1	8.42	779		AD
16	22.0	8.1	8.33	766		AD
17	22.1	8.1	8.28	757		AD
18	21.7	8.0	8.28	786	Q1	SL
19	22.2	8.0	8.35	773		JP
20	22.6	7.6	8.15	750		AD
21	22.5	7.9	8.26	746		JP

QC Check: KL 8/29/11

Final Review: SO 8/31/11

Nautilus Environmental, LLC. 4340 Vandever Avenue. San Diego, CA 92120.

A Water quality readings not taken, technician error

42-Day Freshwater Sediment Bioassay

Water Quality Measurements

Client: EPA

Project ID: Halaco

Site ID: SD-LGF-003A

Test Organism: *H. azteca*

Start Date/Time: 7/6/11 1600

End Date/Time: 8/17/11 1130

Day	Temp. (°C)	Dissolved O_2 (mg/L)	pH (units)	Conductivity (µmhos/cm)	Comments	Tech Initials
22	22.0	8.5	8.36	747		AD
23	21.8 Q1	7.8	8.22	757		AD
24	22.8	8.3	8.29	728		AD
25	22.4	8.1	8.36	733		JG
26	22.3	7.4	8.40	728		JP
27	22.1	7.8	8.27	714		JW
28	22.0	7.8	8.33	739		JW
29	22.0	8.2	8.14	667		AD
30	22.5	7.9	8.14	668		AD
31	22.4	8.2	8.25	658		JF
32	22.1	8.0	8.22	677		SL
33	22.1	8.3	8.26	684		JP
34	JP ~~22.4~~ 22.1	8.4	8.36	701		SL
35	21.5 Q1	8.5	8.31	705	Q1	SD
36	22.1	8.1	8.35	715		AD
37	22.2	8.3	8.16	713		ES
38	22.0	8.5	8.34	687		AD
39	22.0	8.2	8.31	714		JF
40	22.3	7.9	8.27	715		JP
41	22.2	6.8	8.37	692		JG
42	22.1	8.4	8.37	716		AD

QC Check: KLB 8/29/11

Final Review: SD 8/31/11

Nautilus Environmental, LLC. 4340 Vandever Avenue. San Diego, CA 92120.

42-Day Freshwater Sediment Bioassay

Water Quality Measurements

Client: EPA

Project ID: Halaco

Site ID: SD-LGF-007A

Test Organism: *H. azteca*

Start Date/Time: 7/6/11 1600

End Date/Time: 8/17/11 1130

Day	Temp. (°C)	Dissolved O_2 (mg/L)	pH (units)	Conductivity (µmhos/cm)	Comments	Tech Initials
0	23.2	7.8	8.30	2120		AD
1	23.2	8.1	8.40	2420		AD
2	22.6	8.1	8.40	1607		JP
3	22.3	8.3	8.41	995		JF
4	22.2	8.3	8.48	914		KF
5	22.2	8.1	8.38	861		JG
6	22.0	8.4	8.32	7162		AD
7	A	A	A	A		A
8	22.7	8.2	8.41	736		JP
9	22.8	8.4	8.50	733		AD
10	23.0	7.9	8.49	713		SL
11	22.7	8.2	8.42	714		KF
12	23.4	7.9	8.41	723		JP
13	23.5	8.0	8.51	715		AD
14	22.3	8.2	8.36	693		JP
15	22.6	8.2	8.39	710		AD
16	22.0	8.3	8.28	740		AD
17	22.1	8.4	8.22	707		AD
18	21.6 Q1	8.3	8.24	705	Q1	SL
19	22.2	8.3	8.37	726		JP
20	22.7	8.0	8.14	726		AD
21	22.6	8.1	8.27	713		JP

QC Check: KLB 8/29/11

Final Review: SD 8/31/11

Nautilus Environmental, LLC. 4340 Vandever Avenue. San Diego, CA 92120.

A Water quality readings not taken, technician error

42-Day Freshwater Sediment Bioassay

Water Quality Measurements

Client: EPA

Project ID: Halaco

Site ID: SD-LGF-007A

Test Organism: *H. azteca*

Start Date/Time: 7/6/11 1600

End Date/Time: 8/17/11 1130

Day	Temp. (°C)	Dissolved O_2 (mg/L)	pH (units)	Conductivity (µmhos/cm)	Comments	Tech Initials
22	22.1	8.7	8.38	712		AD
23	21.9 Q1	8.2	8.25	713		AD
24	22.7	8.5	8.32	703		AD
25	22.5	8.4	8.48	698		JG
26	22.3	7.7	8.40	699		JP
27	22.2	8.2	8.29	680		JW
28	22.3 ~~21.8 Q1,SL~~	8.1	8.35	682		JW
29	22.1	8.4	8.19	675		AD
30	22.5	8.0	8.19	671		AD
31	22.4	8.2	8.24	661		JF
32	22.1	8.0	8.23	677		SL
33	22.1	8.3	8.29	686		JP
34	22.1	8.5	8.37	701		SL
35	21.10 Q1	8.5	8.34	707	Q1	SD
36	22.1	8.3	8.30	716		AD
37	22.2	8.3	8.17	742		ES
38	22.0	8.5	8.34	686		AD
39	22.0	8.2	8.33	725		JF
40	22.3	7.9	8.32	715		JP
41	22.2	6.8	8.39	696		JG
42	22.1	8.5	8.42	717		AD

QC Check: KL 8/29/11

Final Review: SD 8/31/11

Nautilus Environmental, LLC. 4340 Vandever Avenue. San Diego, CA 92120.

42-Day Freshwater Sediment Bioassay

Water Quality Measurements

Client: EPA

Project ID: Halaco

Site ID: SD-LGF-009A

Test Organism: *H. azteca*

Start Date/Time: 7/6/11 1600

End Date/Time: 8/17/11 1130

Day	Temp. (°C)	Dissolved O_2 (mg/L)	pH (units)	Conductivity (µmhos/cm)	Comments	Tech Initials
0	23.2	7.5	8.26	2310		AD
1	23.2	7.8	8.36	2640		AD
2	22.5	8.0	8.38	1800		JP
3	22.2	8.3	8.40	1081		JF
4	22.2	8.4	8.44	1007		KF
5	22.2	8.0	8.36	914		JG
6	22.0	8.1	8.25	805		AD
7	A	A	A	A		A
8	22.6	8.1	8.35	756		JP
9	22.8	8.4	8.46	742		AD
10	22.9	7.9	8.43	719		SL
11	22.7	7.9	8.36	708		KF
12	23.3	7.7	8.32	725		JP
13	23.5	8.0	8.49	717		AD
14	22.3	8.1	8.33	691		JP
15	22.6	8.3	8.36	710		AD
16	22.0	8.2	8.27	713		AD
17	22.1	8.3	8.22	718		AD
18	21.6 Q1	8.2	8.24	709	Q1	SL
19	22.2	8.0	8.25	729		JP
20	22.7	7.6	7.98	708		AD
21	22.6	7.2	8.23	720		JP

QC Check: KL 8/29/11

Final Review: BD 8/31/11

Nautilus Environmental, LLC. 4340 Vandever Avenue. San Diego, CA 92120.

A Water quality readings not taken, technician error

42-Day Freshwater Sediment Bioassay

Water Quality Measurements

Client: EPA

Project ID: Halaco

Site ID: SD-LGF-009A

Test Organism: *H. azteca*

Start Date/Time: 7/6/11 1600

End Date/Time: 8/17/11 1130

Day	Temp. (°C)	Dissolved O_2 (mg/L)	pH (units)	Conductivity (µmhos/cm)	Comments	Tech Initials
22	22.1	8.8	8.41	715		AD
23	22.0	8.0	8.25	715		AD
24	22.8	8.5	8.33	706		AD
25	22.5	8.1	8.40	704		JG
26	22.4	7.6	8.42	705		JP
27	22.1	7.9	8.31	687		JW
28	22.1 ~~21.9~~ Q1 SL	8.1	8.37	698		JW
29	22.1	8.3	8.17	668		AD
30	22.5	7.9	8.16	669		AD
31	22.5	8.2	8.22	658		JF
32	22.1	7.8	8.19	678		SL
33	22.1	8.2	8.22	686		JP
34	22.2	8.3	8.35	701		SL
35	21.4 Q1	8.5	8.31	704	Q1	SD
36	22.1	7.8	8.08	713		AD
37	22.2	8.1	8.41	732		ES
38	22.0	8.3	8.27	686		AD
39	22.1	8.0	8.27	723		JF
40	22.3	7.6	8.23	727		JP
41	22.2	6.2	8.19	699		JG
42	22.2	8.2	8.24	719		AD

QC Check: KL 8/29/11

Final Review: BD 8/31/11

Nautilus Environmental, LLC. 4340 Vandever Avenue. San Diego, CA 92120.

42-Day Freshwater Sediment Bioassay

Water Quality Measurements

Client: EPA

Project ID: Halaco

Site ID: SD-LGF-010A

Test Organism: *H. azteca*

Start Date/Time: 7/6/11 1600

End Date/Time: 8/17/11 1130

Day	Temp. (°C)	Dissolved O_2 (mg/L)	pH (units)	Conductivity (µmhos/cm)	Comments	Tech Initials
0	23.2	7.9	8.25	1667		AD
1	23.2	7.9	8.39	1812		AD
2	22.5	8.0	8.38	1291		JP
3	22.3	8.3	8.42	838		JF
4	22.3	8.2	8.47	768		KF
5	22.1	8.1	8.37	743		JG
6	22.0	8.3	8.28	734		AD
7	A	A	A	A		A
8	22.7	8.2	8.37	723		JP
9	22.8	8.4	8.46	720		AD
10	22.9	7.9	8.44	696		SL
11	22.6	8.1	8.38	696		KF
12	23.3	7.7	8.32	718		JP
13	23.6	8.0	8.48	712		AD
14	22.4	8.1	8.30	695		JP
15	22.6	8.4	8.35	714		AD
16	22.1	8.2	8.26	715		AD
17	22.1	8.3	8.22	714		AD
18	21.5 Q1	8.2	8.24	712	Q1	SL
19	22.3	8.1	8.31	733		JP
20	22.7	7.8	8.15	713		AD
21	22.6	7.9	8.30	719		JP

QC Check: KLO 8/29/11

Final Review: DD 8/31/11

Nautilus Environmental, LLC. 4340 Vandever Avenue. San Diego, CA 92120.

A Water quality readings not taken, technician error

42-Day Freshwater Sediment Bioassay

Water Quality Measurements

Client: ERA

Project ID: Halaco

Site ID: SD-LGF-010A

Test Organism: *H. azteca*

Start Date/Time: 7/6/11 1600

End Date/Time: 8/17/11 1130

Day	Temp. (°C)	Dissolved O_2 (mg/L)	pH (units)	Conductivity (µmhos/cm)	Comments	Tech Initials
22	22.1	8.6	8.39	718		AD
23	22.0	7.8	8.20	722		AD
24	22.7	8.5	8.27	715		AD
25	22.5	8.1	8.34	711		JG
26	22.4	7.4	8.38	712		JP
27	22.0	8.0	8.29	700		JW
28	22.1 ~~21.4~~ SL	7.9	8.35	706		JW
29	22.1	8.1	8.11	671		AD
30	22.5	7.9	8.10	671		AD
31	22.5	8.0	8.21	660		JF
32	22.1	7.8	8.16	679		SL
33	22.2	8.1	8.18	689		JP
34	22.2	8.3	8.31	701		SL
35	21.6 Q1	8.6	8.28	706	Q1	SD
36	22.2	8.2	8.23	715		AD
37	22.2	8.1	8.43	713		ES
38	22.0	8.2	8.29	687		AD
39	22.1	8.0	8.28	722		JF
40	22.4	7.8	8.25	~~73~~ JP 714		JP
41	22.2	6.8	8.33	689		JG
42	22.2	8.3	8.37	717		AD

QC Check: KL 8/29/11

Final Review: SD 8/31/11

Nautilus Environmental, LLC. 4340 Vandever Avenue. San Diego, CA 92120.

42-Day Freshwater Sediment Bioassay

Water Quality Measurements

Client: EPA

Project ID: Halaco

Site ID: SD-LGF-012A

Test Organism: *H. azteca*

Start Date/Time: 7/6/11 1600

End Date/Time: 8/17/11 1130

Day	Temp. (°C)	Dissolved O_2 (mg/L)	pH (units)	Conductivity (µmhos/cm)	Comments	Tech Initials
0	23.2	7.7	8.23	2520		AD
1	23.4	7.7	8.35	2860		AD
2	22.5	7.7	8.35	1976		JP
3	22.3	8.1	8.36	1086		JF
4	22.2	7.9	8.42	977		KF
5	22.1	7.7	8.30	871		JG
6	22.0	8.1	8.26	774		AD
7	A	A	A	A		A
8	22.7	8.0	8.37	745		JP
9	22.9	8.2	8.48	743		AD
10	22.9	7.8	8.56	723		SL
11	22.7	7.8	8.59	730		KF
12	23.4	7.4	8.64	752		JP
13	23.5	7.7	8.74	749		AD
14	22.3	7.8	8.55	727		JP
15	22.5	8.1	8.48	734		AD
16	22.0	7.9	8.34	745		AD
17	22.1	8.0	8.29	743		AD
18	21.5 Q1	8.0	8.31	775	Q1	SL
19	22.2	8.0	8.41	777		JP
20	22.7	7.6	8.22	759		AD
21	22.5	7.7	8.32	759		JP

QC Check: KL 8/29/11

Final Review: SD 8/31/11

Nautilus Environmental, LLC. 4340 Vandever Avenue. San Diego, CA 92120.

A Water quality readings not taken, technician error

42-Day Freshwater Sediment Bioassay

Water Quality Measurements

Client: EPA

Project ID: Halaco

Site ID: SD-LGF-012A

Test Organism: *H. azteca*

Start Date/Time: 7/6/11 1600

End Date/Time: 8/17/11 1130

Day	Temp. (°C)	Dissolved O_2 (mg/L)	pH (units)	Conductivity (µmhos/cm)	Comments	Tech Initials
22	22.1	8.4	8.41	757		AD
23	21.9 Q1	7.8	8.30	777		AD
24	22.1	8.4	8.33	762		AD
25	22.2	8.3	8.45	785		JG
26	22.4	7.5	8.45	744		JP
27	22.1	7.9	8.36	737		SW
28	22.0	8.0	8.43	764		SW
29	22.1	8.2	8.13	655		AD
30	22.5	7.9	8.13	664		AD
31	22.5	8.1	8.18	657		JF
32	22.1	7.9	8.17	679		SL
33	22.1	8.1	8.19	683		JP
34	22.1	8.4	8.32	697		SL
35	21.4 Q1	8.4	8.26	698	Q1	SD
36	22.2	8.1	8.24	715		AD
37	22.2	8.4	8.41	~~728~~ 713		ES
38	22.0	8.3	8.29	685		AD
39	22.1	8.1	8.30	724		JF
40	22.4	7.9	8.28	714		JP
41	22.3	6.9	8.37	698		JG
42	22.2	8.3	8.36	718		AD

QC Check: KLB 8/29/11

Final Review: SD 8/31/11

Nautilus Environmental, LLC. 4340 Vandever Avenue. San Diego, CA 92120.

42-Day Freshwater Sediment Bioassay

Water Quality Measurements

Client: EPA

Project ID: Halaco

Site ID: SD-NEL-007A

Test Organism: *H. azteca*

Start Date/Time: 7/6/11 1600

End Date/Time: 8/17/11 1130

Day	Temp. (°C)	Dissolved O_2 (mg/L)	pH (units)	Conductivity (µmhos/cm)	Comments	Tech Initials
0	23.3	7.8	8.20	2560		AD
1	23.5	7.7	8.23	2900		AD
2	22.5	7.9	8.27	2150		JP
3	22.3	8.2	8.33	1131		JF
4	22.2	7.9	8.43	1123		KF
5	22.1	8.1	8.34	1008		JG
6	22.0	8.3	8.28	851		AD
7	A	A	A	A		A
8	22.7	8.1	8.36	809		JP
9	22.8	8.4	8.44	800		AD
10	22.8	8.0	8.45	796		SL
11	22.6	8.0	8.46	791		KF
12	23.3	7.8	8.34	777		JP
13	23.5	8.0	8.48	768		AD
14	22.3	8.1	8.34	740		JP
15	22.6	8.4	8.37	744		AD
16	22.0	8.3	8.28	742		AD
17	22.1	8.2	8.23	737		AD
18	21.6 Q1	8.3	8.25	743	Q1	SL
19	22.2	8.2	8.28	744		JP
20	22.9	7.9	8.12	727		AD
21	22.5	8.0	8.22	728		JP

QC Check: KL 8/29/11

Final Review: SD 8/31/11

Nautilus Environmental, LLC. 4340 Vandever Avenue. San Diego, CA 92120.

A Water quality readings not taken, technician error

42-Day Freshwater Sediment Bioassay

Water Quality Measurements

Client: EPA

Project ID: Halaco

Site ID: SD-NEL-007A

Test Organism: *H. azteca*

Start Date/Time: 7/6/11 1600

End Date/Time: 8/17/11 1130

Day	Temp. (°C)	Dissolved O_2 (mg/L)	pH (units)	Conductivity (µmhos/cm)	Comments	Tech Initials
22	22.1	8.6	8.32	738		AD
23	21.9 Q1	8.0	8.20	745		AD
24	22.5	8.4	8.28	733		AD
25	22.4	8.2	8.37	724		JG
26	22.5	7.6	8.39	725		JP
27	22.2	8.0	8.33	703		JW
28	22.0	6.2	8.39	716 ~~766~~ JW		JW
29	22.2	8.3	8.18	668		AD
30	22.5	7.9	8.14	669		AD
31	22.7	7.3	8.07	659		JF
32	22.3	7.1	8.11	677		SL
33	22.2	8.2	8.22	687		JP
34	22.3	7.5	8.15	728		SL
35	21.7 Q1	6.2	8.02	701	Fixed airline Q1	SD
36	22.0	8.2	8.24	714		AD
37	22.2	8.2	8.42	713		ES
38	22.0	8.3	8.29	687		AD
39	22.2	8.0	8.32	725		JF
40	22.4	7.8	8.27	715		JP
41	22.3	6.8	8.31	701		JG
42	22.2	8.3	8.35	717		AD

QC Check: KLB 8/29/11

Final Review: SD 8/31/11

Nautilus Environmental, LLC. 4340 Vandever Avenue. San Diego, CA 92120.

Batch Two – *Hyalella azteca*

Sediment Bioassay **~~14~~ 28-day Organism Survival**

Client: EPA Halaco **Test Species:** *H. azteca*

Project ID: Halaco **Start Date/Time:** 7/7/2011 1530

Initiated by: ~~SL~~ KL SL **End Date/Time:** 8/4/2011 1000

Initial No. Organisms: 50 ~~20~~ 10 **Test No.:** 1107-5090 – 5097

Random Number	Number Alive	10% QC Check of final counts	Random Number	Number Alive	10% QC Check of final counts
6	SL 7	7	58	9	
9	9		60	9	9
11	10		61	9	
12	9	9	63	6	
14	4		65	8	
15	3	3	66	6	6
17	10		68	7	7
19	9		75	6	6
21	10		76	5	5
22	10		80	8	
23	7		81	3	
25	8		83	9	
26	10		85	9	
27	9	9	86	9	9
35	4		88	9	
36	5		89	8	
39	7		91	10	
42	8		92	5	
45	9		93	8	8
46	9		95	10	10
47	6	6	97	9	
50	10	10	103	10	
52	8		104	6	
53	6		107	~~8~~ 6	6
57	8		108	4	4
Tech Initials:	KL/SL/SD	JP	Tech Initials:	KL/SL/SD	JP

Initiation QC Check Initials:

Counts SL (M,)A **All Jars initiated** SL **Animals Burrowed** SL **Air** SL **Lights** SL

Comments:

QC Check: KL 8/29/11 **Final Review:** DO 8/31/11

Sediment Bioassay

28 +14 ~~28~~-day Organism Survival KL

Client: EPA Halaco

Test Species: *H. azteca*

Project ID: Halaco

Start Date/Time: 7/7/2011 1530

Initiated by: SL

End Date/Time: 8/4/2011 1000

Initial No. Organisms: ~~20~~ 10 KL

Test No.: 1107-S090-S097

Random Number	Number Alive	10% QC Check of final counts	Random Number	Number Alive	10% QC Check of final counts
110	8		148	8	8
111	10		149	7	7
112	7		150	10	10
114	7		153	7	
115	6	6	155	10	
116	4	4	158	1	1
120	7		160	10	
121	10	10	162	~~10~~ 9 KL	
124	8	8	163	10	
125	9		164	7	
126	6		165	9	9
128	10	10	168	4	4
129	8		170	6	6
130	10		172	8	8
132	9		173	5	
133	8		174	7	
134	8		178	10	
136	6		180	9	
137	9		181	5	
138	9		184	5	5
139	10	10	187	6	
140	10		188	9	
142	9		191	9	
144	8		192	5	5
147	9		193	8	
Tech Initials:	KL/SL/SD	JP	Tech Initials:	KL/SL/SD	JP

Initiation QC Check Initials:

Counts CMJA **All Jars initiated** SL **Animals Burrowed** SL **Air** SL **Lights** SL

Comments:

QC Check: KL 8/29/11 **Final Review:** SD 8/31/11

Sediment Bioassay

~~28~~ 28 -day Organism Survival

KL

Client: EPA Halaco

Project ID: Halaco

Initiated by: SL

Initial No. Organisms: 10 ~~20~~ KL

Test Species: *H. azteca*

Start Date/Time: 7/7/2011 1530

End Date/Time: 8/4/2011 1000

Test No.: 1107-3090-S097

Random Number	Number Alive	10% QC Check of final counts	Random Number	Number Alive	10% QC Check of final counts
204	7				
207	10				
210	8				
212	10	10			
213	10	10			
215	3				
216	8	8			
198	10	10			
LC	10				
LGM-003A	9				
NEL-009A	7				
LGF-112A	7				
DSA-003A	9				
NEL-021A	10				
LGM-001A	6				
LGF-008A	4				
DSA-006M	9				
Tech Initials:	KL/SL/SD	SP	Tech Initials:		

Initiation QC Check Initials:

Counts CM, JA All Jars initiated SL Animals Burrowed SL Air SL Lights SL

Comments:

QC Check: KL 8/29/11 Final Review: SD 8/31/11

35-day Reproduction

Freshwater Sediment Bioassay

Client: EPA

Test Species: *Hyalella*

Project ID: Halaco

Start Date/Time: 7/7/2011 1530

Initiated by: SL

End Date/Time: 8/11/2011 1100

Initial No. Organisms: 10

Test No.: 1107-S090-S097

Random Number	# of Neonates	10% QC Check of final counts	Random Number	# of Neonates	10% QC Check of final counts
9	0		83	12	
11	13		85	7	
14	8		88	11	
17	10		89	5	5
19	7	7	91	8	
21	26		92	14	
22	7		97	10	
23	4		103	0	
25	0		104	19	
26	4		110	14	
35	7		111	15	
36	0		112	6	
39	3	3	114	10	10
42	8		120	0	
45	2		125	18	
46	5		126	6	
52	6		129	7	
53	13		130	16	
57	2		132	11	
58	JR ~~18~~ 19		133	1	
61	JR ~~8~~ 9	9	134	13	
63	1		136	1	
65	13		137	0	
80	5		138	15	15
81	6		140	16	
Tech Initials:	JR/JP		Tech Initials:	JP	

Initiation QC Check Initials:

Organism Counts CMJA Organism Count QC SL All Jars Initiated SL ~~Time Zero pans~~ Air/Lights SL KL

Comments:

QC Check: KL 8/29/11 Final Review: SO 8/31/11

35-day Reproduction

Freshwater Sediment Bioassay

Client: EPA

Test Species: *Hyalella*

Project ID: Halaco

Start Date/Time: 7/7/2011 1530

Initiated by: SL

End Date/Time: 8/11/2011 1100

Initial No. Organisms: 10

Test No.: 1107-5090-5097

Random Number	# of Neonates	10% QC Check of final counts	Random Number	# of Neonates	10% QC Check of final counts
142	3		SHPI LCH2	8	
144	0		SHPI LGM003A	15	
147	10		LGM001A	8	8
153	0		NEL021A	21	
155	6		NEL009A	0	
160	2		LGF008A	0	
162	7	7	LGF112A	3	
163	7		DSA003A	20	
164	7		DSA006A	2	
173	0				
174	5				
178	14				
180	2				
181	8				
187	0				
188	3				
191	3	3			
193	5				
204	11				
207	0				
210	10				
215	5				
Tech Initials:	JP		Tech Initials:	JP	

Initiation QC Check Initials:

Organism Counts CM,JA Organism Count QC SL All Jars initiated SL ~~Time Zero pans~~ Air/lights SL

Comments:

QC Check: KL 8/29/11 Final Review: DO 8/31/11

42-day Survival and Reproduction

Freshwater Sediment Bioassay

Client: EPA

Test Species: *Hyalella*

Project ID: Halaco

Start Date/Time: 7/7/2011 1530

Initiated by: SL

End Date/Time: 8/18/2011 0945

Initial No. Organisms: 10

Test No.: 1107-5090-5097

Random Number	# of Adults	# of Neonates	10% QC Check of final counts	# of ♀	Random Number	# of Adults	# of Neonates	10% QC Check of final counts	# of ♀
9	9	16		6	83	8	34		6
11	10	29		5	85	4	5		1
14	4	15		3	88	9	9		6
17	10	7	7	4	89	8	13		5
19	9	5		5	91	7	7	7	4
21	10	19		6	92	5	7		2
22	10	16		8	97	9	38		7
23	7	13	13	3	103	9	4		4
25	7	5		4	104	8	31		6
26	~~5~~ 10	4		5	110	8	14	14	4
35	~~8~~ 4	~~8~~ 6		2	111	10	15	15	5
36	~~7~~ 5	~~8~~ 0		1	112	~~7~~ 7	~~22~~ 14		4
39	~~8~~ 7	~~1~~ 0		6	114	4	22		5
42	8	11		5	120	7	18		6
45	9	7	7	5	125	9	27		7
46	9	16		8	126	6	20		3
52	8	4		2	129	8	32		5
53	6	13	13	3	130	~~7~~ 10	24	24	6
57	8	6		4	132	9	15		4
58	7	18		5	133	8	1		3
61	9	4		4	134	8	8		4
63	6	11		5	136	6	0		4
65	8	13		6	137	9	6	6	6
80	5	9	9	1	138	9	30		7
81	3	11		2	140	10	24		5
Tech Initials:	SL	SL	JW	SL	Tech Initials:	SL/JP	SL/JP	JW	SL

Initiation QC Check Initials:

Organism Counts (M)A **Organism Count QC** SL **All Jars initiated** SL **~~Time Zero pans~~** Air/Lights KL SL

Comments:

QC Check: KL 8/29/11

Final Review: SD 8/31/11

Nautilus Environmental, LLC. 4340 Vandever Avenue. San Diego, CA 92120.

42-day Survival and Reproduction

Freshwater Sediment Bioassay

KL

Client: EPA **Test Species:** *Hyalella*

Project ID: Halaco **Start Date/Time:** 7/7/2011 1530

Initiated by: SL **End Date/Time:** 8/18/2011 0945

Initial No. Organisms: 10 **Test No.:** 1107-5090-5097

Random Number	# of Adults	# of Neonates	10% QC Check of final counts	# of ♀	Random Number	# of Adults	# of Neonates	10% QC Check of final counts	# of ♀
142	9	5		4	LC #2 Surr	10	12	12	5
144	7	13	13	3	DSA-003A	10	50		9
147	9	25		4	DSA-006A	8	4		3
153	7	4		3	LGF-008A	4	0		4
155	9	24		7	LGF-112A	7	34		5
180	9	10	10	4	LGM-001A	6	21		5
162	9	9		5	LGM-003A	8	37		7
163	9	4		4	NEL-009A	7	0		0
164	6	8		3	NEL-021A	9	39		7
173	5	0		1					
174	7	23		5					
178	10	19	19	6					
180	9	9		5					
161	5	25		3					
167	5	16		3					
188	9	28		6					
191	9	19	19	6					
193	7	20		4					
204	7	18		4					
207	10	12		4					
210	8	14	14	4					
215	8	23		2					
Tech Initials:	JP	JP	JW	SL	Tech Initials:	JP	JP	JW	SL

Initiation QC Check Initials:

Organism Counts CM,JA **Organism Count QC** SL **All Jars Initiated** SL **~~Time Zero pans~~** Air/lights KL SL

Comments:

QC Check: KL 8/29/11 **Final Review:** 8/31/11

Nautilus Environmental, LLC. 4340 Vandever Avenue. San Diego, CA 92120.

2-Day Freshwater Sediment Bioassay — Water Quality Measurements

Client: EPA
Project ID: Halaco
Site ID: Lab Control #2

Test Organism: *H. azteca*
Start Date/Time: 7/7/11 1530
End Date/Time: 8/18/11 ~~1000~~ 0945 SD

Day	Temp. (°C)	Dissolved O_2 (mg/L)	pH (units)	Conductivity (µmhos/cm)	Comments	Tech Initials
0	23.7	7.7	8.32	619	* Collect NH_3	SL
1	23.8	7.8	8.35	627		JP
2	22.6	8.0	8.38	660		JF
3	22.9	7.7	8.43	646		KF
4	22.4	7.9	8.33	684		JG
5	22.3	AD ~~8.6~~ 8.1	8.50	719		AD
6	22.2	8.2	8.31	724		AD
7	23.4	8.0	8.33	719	* Collect NH_3	JP
8	23.5	8.2	8.46	718		AD
9	23.7	7.8	8.42	695		SL
10	KF ~~22.~~ 23.2	7.4	8.36	677		KF
11	24.2 Q1	7.4	8.34	717		JP
12	24.2 Q1	7.8	8.43	709		AD
13	22.8	7.9	8.30	693		JP
14	22.9	8.4	8.35	710	* Collect NH_3	AD
15	22.3	8.0	8.26	711		AD
16	22.8	8.0	8.27	708		AD
17	22.2	8.1	8.25	705		SL
18	23.0	7.6	8.27	722		JP
19	23.5	7.8	8.11	710		AD
20	23.3	7.8	8.22	715		JP
21	23.2	8.3	8.32	715	* Collect NH_3	AD

QC Check: KL 8/26/11
Final Review: SD 8/31/11

Nautilus Environmental, LLC. 4340 Vandever Avenue. San Diego, CA 92120.

42-Day Freshwater Sediment Bioassay

Water Quality Measurements

Client: EPA

Project ID: Halaco

Site ID: Lab Control #2

Test Organism: *H. azteca*

Start Date/Time: 7/7/11 1530

End Date/Time: 8/18/11 ~~1000~~ 0945

Day	Temp. (°C)	Dissolved O_2 (mg/L)	pH (units)	Conductivity (µmhos/cm)	Comments	Tech Initials
22	23.1	7.7	8.20	716		AD
23	23.4	8.6	8.29	707		AD
24	23.1	8.2	8.43	698		VG
25	23.2	7.5	8.40	699		JP
26	23.1	7.9	8.30	680		JW
27	22.8	8.1	8.16	680		JW
28	22.9	8.1	8.21	690	Collect NH_3	AD
29	23.1	8.2	8.23	666		AD
30	23.1	8.1	8.30	658		JF
31	22.7	8.0	8.28	677		SL
32	22.7	8.1	8.26	687		JP
33	22.9	8.2	8.36	700		SL
34	22.9	8.2	8.23	703		SD
35	23.0	8.1	8.20	727	Collect NH_3	JP
36	23.1	8.2	8.51	716		RS
37	22.7	8.3	8.39	687		AD
38	22.9	8.0	8.35	723		JF
39	23.1	7.8	8.32	716		JP
40	22.8	6.8	8.34	693		JG
41	23.4	8.2	8.39	711		AD
42	22.0	8.5	8.35	712	Collect NH_3	

QC Check: KL 8/26/11

Final Review: SD 8/31/11

Nautilus Environmental, LLC. 4340 Vandever Avenue. San Diego, CA 92120.

42-Day Freshwater Sediment Bioassay

Water Quality Measurements

Client: EPA

Project ID: Halaco

Site ID: SD-DSA-003A

Test Organism: *H. azteca*

Start Date/Time: 7/7/11 1530

End Date/Time: 8/18/11 ~~1000~~ 0945 BD

Day	Temp. (°C)	Dissolved O_2 (mg/L)	pH (units)	Conductivity (µmhos/cm)	Comments	Tech Initials
0	22.6	7.5	8.26	2080		SL
1	22.9	7.1	8.21	2480		JP
2	22.1	7.8	8.33	1446		JF
3	22.2	7.8	8.35	1292		KF
4	22.0	7.8	8.31	1136		JB
5	22.0	AD ~~6.10~~ 8.0	8.42	893		AD
6	21.8 Q1	7.9	8.23	873	Q1	AD
7	22.7	7.4	8.19	822		JP
8	23.0	8.1	8.41	804		AD
9	23.1	7.6	8.43	809		SL
10	23.2	7.7 JP	8.31	785		KF
11	23.4	7.86	8.35	777		JP
12	23.3	7.8	8.37	739		AD
13	22.2	~~8.4~~ JP 7.7	8.34	729		JP
14	22.6	8.2	8.41	740		AD
15	21.9 Q1	7.9	8.33	746		AD
16	22.3	8.0	8.39	731		AD
17	21.7 Q1	8.0	8.42	741	Q1	SL
18	22.5	7.2	8.23	737		JP
19	22.8	7.7	8.24	744		AD
20	22.5	7.8	8.41	737		JP
21	22.8	8.2	8.49	727		AD

QC Check: KL 8/26/11

Final Review: BD 8/31/11

Nautilus Environmental, LLC. 4340 Vandever Avenue. San Diego, CA 92120.

42-Day Freshwater Sediment Bioassay

Water Quality Measurements

Client: EPA

Project ID: Halaco

Site ID: SD-DSA-003A

Test Organism: *H. azteca*

Start Date/Time: 7/7/11 1530

End Date/Time: 8/18/11 ~~1000~~ 0945

Day	Temp. (°C)	Dissolved O_2 (mg/L)	pH (units)	Conductivity (µmhos/cm)	Comments	Tech Initials
22	22.5	7.8	8.23	727		AD
23	22.8	8.3	8.48	727		AD
24	22.6	8.2	8.46	724		JG
25	22.7	7.4	8.54	729		JP
26	22.4	8.0	8.43	704		JW
27	22.3	8.2	8.44	717		JW
28	22.4	8.0	8.35	728		AD
29	22.8	7.9	8.16	6060		AD
30	23.1	8.0	8.22	658		JF
31	22.7	7.6	8.17	678		SL
32	22.8	7.8	8.18	691		JP
33	22.8	8.2	8.35	693		SL
34	23.1	6.3	8.03	710		SD
35	23.2	7.2	8.03	712		JP
36	22.8	8.2	8.42	720		ES
37	22.7	8.3	8.33	688		AD
38	23.0	7.9	8.29	724		JF
39	23.2	7.6	8.26	716		JP
40	22.9	6.6	8.31	692		JG
41	23.5	8.0	8.33	719		AD
42	22.1	8.2	8.28	714		AD

QC Check: KL 8/26/11

Final Review: SD 8/31/11

Nautilus Environmental, LLC. 4340 Vandever Avenue. San Diego, CA 92120.

42-Day Freshwater Sediment Bioassay

Water Quality Measurements

Client: EPA

Project ID: Halaco

Site ID: SD-DSA-006A

Test Organism: *H. azteca*

Start Date/Time: 7/7/11 1530

End Date/Time: 8/18/11 ~~1000~~ 0945

Day	Temp. (°C)	Dissolved O_2 (mg/L)	pH (units)	Conductivity (µmhos/cm)	Comments	Tech Initials
0	22.6	7.7	8.23	1526		SL
1	22.9	7.7	JP ~~8.8~~ 8.14	1793		JP
2	22.0	7.9	8.30	1281		JF
3	22.2	8.0	8.38	1136		KF
4	22.0	8.0	8.34	1092		JG
5	21.8 Q1	6.5	8.42	904		AD
6	21.7 Q1	8.0	8.27	849		AD
7	22.7	7.8	8.22	785		JP
8	22.9	8.3	8.38	770		AD
9	23.1	7.7	8.42	741		SL
10	22.7	7.8	8.32	739		KF
11	23.3	7.5	8.30	744		JP
12	23.0	8.0	8.39	739		AD
13	22.1	7.9	8.29	718		JP
14	22.4	7.9	8.23	732		AD
15	21.6 Q1	8.0	8.22	731		AD
16	22.1	7.8	8.22	734		AD
17	21.6 Q1	8.2	8.27	737	Q1	SL
18	22.4	8.0	8.26	738		JP
19	22.8	8.0	8.16	725		AD
20	22.7	7.6	8.24	732		JP
21	22.7	8.3	8.35	730		AD

QC Check: KL 8/26/11

Final Review: 8/31/11

Nautilus Environmental, LLC. 4340 Vandever Avenue. San Diego, CA 92120.

42-Day Freshwater Sediment Bioassay

Water Quality Measurements

Client: EPA

Project ID: Halaco

Site ID: SD-DSA-006A

Test Organism: *H. azteca*

Start Date/Time: 7/7/11 1530

End Date/Time: 8/18/11 0945

Day	Temp. (°C)	Dissolved O_2 (mg/L)	pH (units)	Conductivity (µmhos/cm)	Comments	Tech Initials
22	22.4	7.8	8.44	738		AD
23	22.7	8.4	8.39	726		AD
24	22.4	8.2	8.43	728		VG
25	22.4	7.5	8.47	723		JP
26	22.1	6.1	8.43	706		JW
27	22.0	6.0	8.37	705		JW
28	22.1	8.1	8.33	722		AD
29	22.9	8.0	8.18	6646		AD
30	23.2	7.4	8.14	660		JF
31	22.9	7.6	8.20	679		SL
32	22.9	7.8	8.18	689		JP
33	23.0	8.2	8.35	702		SL
34	23.0	8.0	8.26	699		SD
35	23.0	5.6	7.80	716		JP
36	23.4	8.0	8.41	712		ES
37	23.0	8.2	8.34	687		AD
38	23.2	7.8	8.27	715		JF
39	23.4	7.6	8.31	717		JP
40	23.2	6.3	8.33	692		JG
41	23.5	7.8	8.33	712		AD
42	22.0	8.3	8.34	715		AD

QC Check: KL 8/26/11

Final Review: SD 8/31/11

Nautilus Environmental, LLC. 4340 Vandever Avenue. San Diego, CA 92120.

42-Day Freshwater Sediment Bioassay

Water Quality Measurements

Client: EPA

Project ID: Halaco

Site ID: SD-LGF-008A

Test Organism: *H. azteca*

Start Date/Time: 7/7/11 1530

End Date/Time: 8/18/11 ~~1000~~ 0945 SD

Day	Temp. (°C)	Dissolved O_2 (mg/L)	pH (units)	Conductivity (µmhos/cm)	Comments	Tech Initials
0	22.5	7.9	8.30	1960		SL
1	22.7	7.8	8.33	2530		JP
2	JF ~~21.8~~ 22.0	8.1	8.37	1622		JF
3	22.1	8.1	8.43	1493		KF
4	22.0	8.1	8.37	1193		JP
5	21.5 Q1	8.2	8.47	947		AD
6	21.4 Q1	8.2	8.31	862		AD
7	22.5	8.1	8.30	784		JP
8	22.7	8.4	8.42	775		AD
9	23.1	6.5	8.31	739		SL
10	22.9	7.9	8.34	737		KF
11	23.1	7.2	8.30	737		JP
12	22.9	8.0	8.39	740		AD
13	21.8 Q1	8.1	8.30	707		JP
14	22.3	8.3	8.34	720		AD
15	21.4 Q1	7.8	8.21	724		AD
16	21.8 Q1	7.7	8.18	734		AD
17	21.3 Q1	8.2	8.27	730	Q1	SL
18	22.2	8.2	8.26	728		JP
19	22.4	7.9	8.15	714		AD
20	22.3	8.0	8.24	721		JP
21	22.4	8.5	8.33	721		AD

QC Check: KL 8/26/11

Final Review: SD 8/31/11

Nautilus Environmental, LLC. 4340 Vandever Avenue. San Diego, CA 92120.

42-Day Freshwater Sediment Bioassay

Water Quality Measurements

Client: EPA

Project ID: Halaco

Site ID: SD-LGF-008A

Test Organism: *H. azteca*

Start Date/Time: 7/7/11 1530

End Date/Time: 8/18/11 ~~1000~~ 0945 SD

Day	Temp. (°C)	Dissolved O_2 (mg/L)	pH (units)	Conductivity (µmhos/cm)	Comments	Tech Initials
22	22.2	7.8	8.30	735		AD
23	22.6	8.6	8.31	713		AD
24	22.2	8.4	8.35	726		JG
25	22.4	7.5	8.40	706		JP
26	22.3	7.8	8.37	690		JW
27	22.1	7.9	8.35	689		JW
28	22.1	8.4	8.39	702		AD
29	23.0	7.8	8.14	6604		AD
30	23.1	7.2	8.07	659		JF
31	22.7	7.5	8.18	678		SL
32	22.7	7.7	8.16	687		JP
33	22.9	8.2	8.34	703		SL
34	22.9	8.1	8.22	705		SD
35	22.7	5.9	7.82	712		JP
36	23.0	8.1	8.42	718		ES
37	23.0	8.2	8.35	6860		AD
38	23.0	7.9	8.32	715		JF
39	23.4	7.7	8.29	716		JP
40	22.9	6.6	8.33	696		JG
41	23.4	8.0	8.37	719		AD
42	22.0	8.4	8.33	714		

QC Check: VL 8/26/11

Final Review: SD 8/31/11

Nautilus Environmental, LLC. 4340 Vandever Avenue. San Diego, CA 92120.

42-Day Freshwater Sediment Bioassay

Water Quality Measurements

Client: EPA

Project ID: Halaco

Site ID: SD-LGF-112A

Test Organism: *H. azteca*

Start Date/Time: 7/7/11 1530

End Date/Time: 8/18/11 ~~1000~~ 0945 SD

Day	Temp. (°C)	Dissolved O_2 (mg/L)	pH (units)	Conductivity (µmhos/cm)	Comments	Tech Initials
0	23.9	7.2	8.25	2310		SL
1	23.9	6.3	8.23	3000		JP
2	22.1	7.2	8.28	1832		JF
3	22.1	7.3	8.37	1690		KF
4	22.5	7.3	8.26	1099		JG
5	22.4	7.3	8.27	862		AD
6	22.2	7.2	8.21	820		AD
7	23.3	7.2	8.21	765		JP
8	23.4	7.7	8.37	748		AD
9	23.6	7.1	8.36	733		SL
10	23.3	7.4	8.35	739		KF
11	23.9	6.7	8.30	742		JP
12	24.2 Q1	7.1	8.43	732		AD
13	22.6	7.4	8.34	717		JP
14	23.0	7.8	8.37	724		AD
15	22.3	7.4	8.29	733		AD
16	22.7	7.5	8.32	730		AD
17	22.2	7.5	8.43	737		SL
18	22.8	7.1	8.41	734		JP
19	23.3	7.1	8.26	730		AD
20	23.1	7.3	8.46	728		JP
21	23.0	7.8	8.38	727		AD

QC Check: KL 8/26/11

Final Review: SD 8/31/11

Nautilus Environmental, LLC. 4340 Vandever Avenue. San Diego, CA 92120.

42-Day Freshwater Sediment Bioassay

Water Quality Measurements

Client: EPA

Project ID: Halaco

Site ID: SD-LGF-112A

Test Organism: *H. azteca*

Start Date/Time: 7/7/11 1530

End Date/Time: 8/18/11 ~~1000~~ 0945

Day	Temp. (°C)	Dissolved O_2 (mg/L)	pH (units)	Conductivity (µmhos/cm)	Comments	Tech Initials
22	22.7	7.2	8.54	726		AD
23	23.4	7.7	8.40	728		AD
24	22.8	7.9	8.56	721		JG
25	22.8	7.1	8.58	720		JP
26	22.7	7.7	8.36	705		JW
27	22.7	7.8	8.47	725		JW
28	22.7	7.8	8.37	738		AD
29	22.7	8.1	8.20	664		AD
30	22.7	7.8	8.18	656		JF
31	22.5	7.8	8.23	676		SL
32	22.5	8.2	8.23	687		JP
33	22.7	8.3	8.38	706		SL
34	22.5	8.1	8.05	706		SD
35	22.7	5.4	7.76	716		JP
36	22.6	8.2	8.45	718		ES
37	22.3	8.4	8.32	687		AD
38	22.6	8.0	8.33	725		JF
39	22.8	7.8	8.31	716		JP
40	22.7	6.2	8.36	704		JG
41	22.9	8.2	8.37	720		AD
42	22.0	8.5	8.33	713		AD

QC Check: KL 8/26/11

Final Review: SD 8/31/11

Nautilus Environmental, LLC. 4340 Vandever Avenue. San Diego, CA 92120.

42-Day Freshwater Sediment Bioassay

Water Quality Measurements

Client: EPA

Project ID: Hulaco

Site ID: SD-LGM-001A

Test Organism: *H. azteca*

Start Date/Time: 7/7/11 1530

End Date/Time: 8/18/11 ~~1000~~ 0945

Day	Temp. (°C)	Dissolved O_2 (mg/L)	pH (units)	Conductivity (µmhos/cm)	Comments	Tech Initials
0	22.5	7.8	8.32	3560		SL
1	22.5	7.8	8.38	3120		JP
2	JP ~~21.8~~ 22.1	8.0	8.37	1959		JF
3	22.6	6.8	8.36	1504		KF
4	21.8 Q1	7.8	8.39	1333		JG
5	21.4 Q1	8.1	8.46	1033		AD
6	21.4 Q1	8.1	8.32	936		AD
7	22.6	7.9	8.34	834		JP
8	22.6	8.3	8.53	815		AD
9	22.8	7.3	8.68	800		SL
10	22.7	7.8	8.65	773		KF
11	23.0	7.5	8.71	774		JP
12	23.1	7.8	8.48	769		AD
13	21.7 Q1	7.9	8.59	748		JP
14	22.1	8.3	8.52	751		AD
15	21.4 Q1	6.7	8.23	766		AD
16	21.8 Q1	8.0	8.43	777		AD
17	21.2 Q1	8.2	8.35	777	Q1	SL
18	22.0	7.5	8.44	778		JP
19	22.3	7.8	8.30	759		AD
20	22.2	8.0	8.41	753		JP
21	22.3	8.6	8.46	744		AD

QC Check: KL 8/26/11

Final Review: SO 8/31/11

Nautilus Environmental, LLC. 4340 Vandever Avenue. San Diego, CA 92120.

42-Day Freshwater Sediment Bioassay

Water Quality Measurements

Client: EPA

Project ID: Halaco

Site ID: SD-LGM-001A

Test Organism: *H. azteca*

Start Date/Time: 7/7/11 1530

End Date/Time: 8/18/11 ~~1000~~ 0945 SD

Day	Temp. (°C)	Dissolved O_2 (mg/L)	pH (units)	Conductivity (µmhos/cm)	Comments	Tech Initials
22	22.0	6.9	8.43	754		AD
23	22.4	8.4	8.49	746		AD
24	22.1	8.2	8.47	736		VG
25	22.3	7.4	8.49	730		JP
26	22.2	7.9	8.42	703		JW
27	22.0	8.0	8.41	728		JW
28	22.1	8.2	8.37	739		AD
29	22.7	8.0	8.19	666		AD
30	22.8	7.2	8.13	659		JF
31	22.4	7.8	8.19	678		SL
32	22.5	8.1	8.23	689		JP
33	22.6	8.4	8.38	701		SL
34	22.4	8.3	8.26	704		SD
35	22.8	5.7	7.78	714		JP
36	22.7	8.2	8.46	713		ES
37	22.9	8.3	8.40	688		AD
38	22.5	8.0	8.32	713		JF
39	22.8	7.8	8.28	714		JP
40	22.7	6.8	8.32	689		VG
41	22.8	8.2	8.36	716		AD
42	22.0	8.4	8.32	713		AD

QC Check: KL 8/26/11

Final Review: SD 8/31/11

Nautilus Environmental, LLC. 4340 Vandever Avenue. San Diego, CA 92120.

42-Day Freshwater Sediment Bioassay

Water Quality Measurements

Client: EPA

Project ID: Halaco

Site ID: SD-LGM-003A

Test Organism: *H. azteca*

Start Date/Time: 7/7/11 1530

End Date/Time: 8/18/11 ~~1000~~ 0945

Day	Temp. (°C)	Dissolved O_2 (mg/L)	pH (units)	Conductivity (µmhos/cm)	Comments	Tech Initials
0	23.5	7.2	8.16	2290		SL
1	23.7	7.2	8.28	2710		JP
2	22.7	7.4	8.30	1681		JF
3	22.7	7.8	8.34	1440		KF
4	22.9	7.0	8.22	1131		VG
5	22.5	7.5	8.31	871		AD
6	22.4	7.6	8.23	818		AD
7	23.4	7.3	8.29	789		JP
8	23.7	7.6	8.67	781		AD
9	24.0	7.0	8.97	786		SL
10	23.7	7.0	8.95	782		KF
11	24.1 Q1	7.0	8.88	778		JP
12	24.4 Q1	7.2	8.83	775		AD
13	22.8	7.2	8.69	757		JP
14	23.0	7.7	8.62	764		AD
15	22.4	7.5	8.48	768		AD
16	22.9	7.6	8.35	761		AD
17	22.3	7.6	8.27	807		SL
18	23.1	7.6	8.25	802		JP
19	23.5	7.4	8.16	778		AD
20	23.4	7.5	8.24	775		JP
21	22.9	8.2	8.34	761		AD

QC Check: KL 8/26/11

Final Review: SD 8/31/11

Nautilus Environmental, LLC. 4340 Vandever Avenue. San Diego, CA 92120.

42-Day Freshwater Sediment Bioassay

Water Quality Measurements

Client: EPA

Project ID: Halaco

Site ID: SD-LGM-003A

Test Organism: *H. azteca*

Start Date/Time: 7/7/11 1530

End Date/Time: 8/18/11 ~~1000~~ 0945 SD

Day	Temp. (°C)	Dissolved O_2 (mg/L)	pH (units)	Conductivity (µmhos/cm)	Comments	Tech Initials
22	23.0	7.4	8.27	774		AD
23	23.5	7.9	8.36	759		AD
24	23.2	8.1	8.51	744		JG
25	23.3	7.3	8.52	752		JP
26	23.2	7.8	8.31	719		SW
27	22.9	7.5	8.44	725		SW
28	23.2	7.8	8.37	742		AD
29	22.5	8.2	8.24	666		AD
30	22.5	8.1	8.27	657		JP
31	22.2	8.2	8.27	677		SL
32	22.3	8.4	8.29	687		JP
33	22.4	8.4	8.39	700		SL
34	22.2	8.5	8.31	702		SD
35	22.8 JP 8	6.2 JP 5.5	7.88 JP 7.75	714		JP
36	22.7	8.1	8.44	720		ES
37	22.4	8.0	8.28	691		AD
38	22.5	8.0	8.29	726		JF
39	22.7	7.7	8.25	718		JP
40	22.5	6.6	8.28	698		VG
41	22.8	8.0	8.28	721		AD
42	22.0	8.2	8.25	716		AD

QC Check: KL 8/26/11

Final Review: SD 8/31/11

Nautilus Environmental, LLC. 4340 Vandever Avenue. San Diego, CA 92120.

42-Day Freshwater Sediment Bioassay

Water Quality Measurements

Client: EPA

Project ID: HalaCO

Site ID: SD-NEL-009A

Test Organism: *H. azteca*

Start Date/Time: 7/7/11 1530

End Date/Time: 8/18/11 ~~1000~~ 0945 SD

Day	Temp. (°C)	Dissolved O_2 (mg/L)	pH (units)	Conductivity (µmhos/cm)	Comments	Tech Initials
0	23.7	6.5	8.18	1716		SL
1	23.9	6.4	8.16	1987		JP
2	22.2	7.3	8.35	1162		JF
3	22.5	7.5	8.44	1112		KF
4	22.4	7.7	8.32	967		JG
5	22.5	7.1	8.39	853		AD
6	22.2	7.0	8.14	873		AD
7	23.3	7.1	8.20	805		JP
8	23.5	7.4	8.37	789		AD
9	23.8	7.7	8.41	743		SL
10	23.4	7.7	8.47	754		KF
11	23.9	JP ~~7~~ 6.7	8.29	761		JP
12	24.2 QN	7.0	8.36	748		AD
13	22.5	7.~~6~~ JP 3	8.26	723		JP
14	23.0	7.4	8.27	725		AD
15	22.2	7.2	8.20	740		AD
16	22.6	7.2	8.18	733		AD
17	22.2	7.3	8.20	734		SL
18	22.7	6.7	8.12	731		JP
19	23.2	7.0	8.01 JP	724		AD
20	23.0	7.3	8.~~46~~ JP 19	72~~8~~ JP 5		JP
21	22.9	7.8	8.29	723		AD

QC Check: KL 8/26/11

Final Review: SD 8/31/11

Nautilus Environmental, LLC. 4340 Vandever Avenue. San Diego, CA 92120.

42-Day Freshwater Sediment Bioassay

Water Quality Measurements

Client: EPA

Project ID: Halaco

Site ID: SD-NEL-009A

Test Organism: *H. azteca*

Start Date/Time: 7/7/11 1530

End Date/Time: 8/18/11 ~~1000~~ 0945 B

Day	Temp. (°C)	Dissolved O_2 (mg/L)	pH (units)	Conductivity (µmhos/cm)	Comments	Tech Initials
22	22.8	7.3	8.15	726		AD
23	23.3	7.7	8.25	717		AD
24	22.8	8.1	8.42	726		JG
25	22.8	7.2	8.35	719		JP
26	22.9	7.7	8.21	695		JW
27	22.6	7.9	8.38	696		JW
28	22.7	8.2	8.31	707		AD
29	22.6	7.9	8.15	664		AD
30	22.5	7.4	8.06	657		JF
31	22.3	7.7	8.17	676		SL
32	22.2	8.2	8.20	686		JP
33	22.4	8.4	8.36	701		SL
34	22.1	8.3	8.29	704		JD
35	22.7	6.2	7.83	714		JP
36	22.5	8.3	8.43	717		ES
37	22.3	7.9	8.32	688		AD
38	22.2	8.0	8.31	724		JF
39	22.6	7.7	8.31	714		JP
40	22.2	6.8	8.33	707		JG
41	22.8	8.2	8.31	718		AD
42	22.0	8.4	8.25	712		AD

QC Check: KL 8/26/11

Final Review: SD 8/31/11

Nautilus Environmental, LLC. 4340 Vandever Avenue. San Diego, CA 92120.

42-Day Freshwater Sediment Bioassay

Water Quality Measurements

Client: EPA

Project ID: Halaco

Site ID: SD-NEL-021A

Test Organism: *H. azteca*

Start Date/Time: 7/7/11 1530

End Date/Time: 8/18/11 ~~1000~~ 0945 TS

Day	Temp. (°C)	Dissolved O_2 (mg/L)	pH (units)	Conductivity (µmhos/cm)	Comments	Tech Initials
0	22.8	7.6	8.27	1054		SL
1	22.9	7.4	8.26	1374		JP
2	22.2	7.7	8.34	1017		JF
3	22.2	7.9	8.34	943		KF
4	22.0	7.7	8.34	864		JG
5	21.9 Q1	AD ~~6.4~~ 7.8	8.45	786		AD
6	21.8 Q1	7.8	8.29	770		AD
7	22.8	7.8	8.28	743		JP
8	22.9	8.0	8.41	741		AD
9	23.4	7.5	8.42	715		SL
10	23.3	7.6	8.35	715		KF
11	23.5	7.2	8.31	732		JP
12	23.8	7.7	8.40	714		AD
13	22.3	8.2	8.26	705		JP
14	22.7	8.0	8.33	723		AD
15	22.6	8.0	8.24	727		AD
16	22.3	8.1	8.27	725		AD
17	21.6 Q1	8.2	8.25	730	Q1	SL
18	22.4	7.8	8.25	738		JP
19	23.0	7.8	8.13	724		AD
20	22.6	7.9	8.20	724		JP
21	22.8	8.6	8.34	723		AD

QC Check: KL 8/26/11

Final Review: BD 8/31/11

Nautilus Environmental, LLC. 4340 Vandever Avenue. San Diego, CA 92120.

42-Day Freshwater Sediment Bioassay

Water Quality Measurements

Client: EPA

Project ID: Hayaco

Site ID: SD-NEL-021A

Test Organism: *H. azteca*

Start Date/Time: 7/7/11 1530

End Date/Time: 8/18/11 ~~1000~~ 0945 SD

Day	Temp. (°C)	Dissolved O_2 (mg/L)	pH (units)	Conductivity (µmhos/cm)	Comments	Tech Initials
22	22.5	7.9	8.22	726		AO
23	22.8	8.5	8.32	719		AO
24	22.5	7.6	8.26	723		JG
25	22.7	7.2	8.33	709		JP
26	22.5	7.7	8.28	691		JW
27	22.4	7.8	8.29	690		JW
28	22.4	7.8	8.16	702		AO
29	22.8	8.2	8.25	6666		AO
30	22.9	7.7	8.11	659		JF
31	22.5	8.0	8.25	677		SL
32	22.5	8.2	8.28	685		JP
33	22.7	8.2	8.37	702		SL
34	22.7	8.1	8.31	723		SD
35	22.8	8.3	8.25	710		JP
36	22.8	8.2	8.46	717		ES
37	22.4	8.4	8.41	688		AO
38	22.7	8.0	8.38	724		JF
39	22.8	7.8	8.34	715		JP
40	22.7	6.7	8.35	699		JG
41	23.0	8.3	8.41	720		AO
42	22.0	8.6	8.35	744		AO

QC Check: KL 8/26/11

Final Review: SD 8/31/11

Nautilus Environmental, LLC. 4340 Vandever Avenue. San Diego, CA 92120.

/

~~28-Day Marine~~ Sediment Bioassay
12-DAY FRESHWATER

Feeding

Client: EPA **Test Species:** *H. azteca*

Project ID: Halaco **Start Date/Time:** 7/6/2011 1600 / 7/7/11 1535

Site ID: All sites - Batch 1 and 2 **End Date/Time:** 8/17/11 1130 / 8/18/11 0945

Date	Test Day	Time	Amount of Food per Container	Comments	Tech Initials
7/6/2011	0	—	~~Last YTC~~		—
7/7/2011	1	0830	1mL YTC		AD
7/8/2011	2	0820	1mL YTC		AD
7/9/2011	3	1000	1mL YTC		JW
7/10/2011	4	1200	1mL YTC		KF
7/11/2011	5	1000	1mL YTC	ALL AIRLINES GOOD, NO EXCESS FOOD	JG/AD
7/12/2011	6	0820 ~~1000~~	1mL YTC		JF
7/13/2011	7	0830	1mL YTC		JP
7/14/2011	8	0900	1mL YTC		JP
7/15/2011	9	0830	1mL YTC		JP
7/16/2011	10	0930	1mL YTC		JF
7/17/2011	11	0845	1mL YTC		JG
7/18/2011	12	0820	1mL YTC		JG
7/19/2011	13	1500	1mL YTC		Cm
7/20/2011	14	0945	1mL YTC		SL
7/21/2011	15	0825	1mL YTC		JA
7/22/2011	16	1100	1mL YTC		JA
7/23/2011	17	1000	1mL YTC		AD
7/24/2011	18	1100	1mL YTC		SL
7/25/2011	19	1030	2mL YTC		[illegible]
7/26/2011	20	0945	2mL YTC		JG
7/27/2011	21	1000	2mL YTC		JG/JA

Comments: See project spec sheet for feeding regime

QC Check: KL 8/29/11 **Final Review:** SO 8/31/11

42-Day Freshwater
~~28-Day~~ Marine Sediment Bioassay
KL

Feeding

Client: EPA **Test Species:** *H. azteca*

Project ID: Halaco **Start Date/Time:** 7/6/2011 1600 / 7/7/11 1535

Site ID: All sites - Batch 1 + Batch 2 **End Date/Time:** 8/17/11 1130 / 8/18/11 0945

Date	Test Day	Time	Amount of Food per Container	Comments	Tech Initials
7/28/2011	22	1030	2ml YTC		ES
7/29/2011	23	1200	2ml YTC		ES
7/30/2011	24	1105	2ml YTC		JG
7/31/2011	25	1125	2mL YTC		SL
8/1/2011	26	1215	2 mL YTC		JP
8/2/2011	27	1000	2ml YTC		AD
8/3/2011	28	1135	2mL YTC		JP
8/4/2011	29	1530	2mL YTC		JP
8/5/2011	30	1000	2mL YTC		JP
8/6/2011	31	1335	2mL YTC		JF/AD
8/7/2011	32	SL 1030-1045	2mL YTC		SL
8/8/2011	33	1100	2ml YTC		VS
8/9/2011	34	1255	2ml YTC		JP
8/10/2011	35	1040	2mL YTC		JP
8/11/2011	36	1000	2mL YTC		EJ
8/12/2011	37	1145	2mL YTC		JP
8/13/2011	38	1200	2ml YTC		AD
8/14/2011	39	1340	2ml YTC		JP
8/15/2011	40	0915	2mL YTC		KF
8/16/2011	41	0925	2ml YTC		JP
8/17/2011	42	1035	2 mL YTC	Batch #2 only	SL

Comments: See project spec sheet for feeding regime

QC Check: KL 8/29/11 **Final Review:** 8/31/11

42-Day Freshwater Sediment Bioassay

Initial Water Quality Measurements

Client: EPA

Project ID: Halaco

Site ID: Renewal WQ - All sites

Test Organism: *H. azteca*

Start Date/Time: 7/6/11 1600 / 7/7/11 1535

End Date/Time: 8/17/11 1130 / 8/18/11 0945

Day	Temp. (°C)	Dissolved O_2 (mg/L)	pH (units)	Conductivity (umhos/cm)	Comments	Tech Initials
7/6/2011	—	—	—	—		—
7/7/2011	22.8	7.9	8.56	642		AD
7/8/2011	23.9	7.4	8.56	687		JP
7/9/2011	23.5	7.4	8.53	667		JF
7/10/2011	23.3	7.0	8.48	672		KF
7/11/2011	23.4	7.8	8.43	705		JG
7/12/2011	23.2	6.3	8.57	721		JF
7/13/2011	23.1	8.2	8.42	720		AD
7/14/2011	23.1	8.3	8.42	716		JP
7/15/2011	23.1	7.0	8.58	747		AD
7/16/2011	23.1	8.3	8.48	685		SL
7/17/2011	22.9	8.3	8.23	714		KF
7/18/2011	23.5	7.6	8.45	717		JA
7/19/2011	24.0	8.0	8.50	767		AD
7/20/2011	23.7	8.1	8.33	679		SL
7/21/2011	23.7	8.4	8.31	705		JA
7/22/2011	23.3	8.4	8.27	715		JA
7/23/2011	23.0	8.4	8.38	696		AD
7/24/2011	22.7	8.3	8.21	706		SL
7/25/2011	22.6	8.2	8.45	722		JP
7/26/2011	22.0	8.7	8.38	716		AD
7/27/2011	23.3	8.4	8.40	707		JA

Comments: Initial water quality measurements (renewal water; soft H2O)

QC Check: KL 8/29/11

Final Review: 8/31/11

42-Day Freshwater Sediment Bioassay

Initial Water Quality Measurements

Client: EPA

Project ID: Halaco

Site ID: Renewal WQ - All sites

Test Organism: *H. azteca*

Start Date/Time: 7/6/11 1600 / 7/7/11 1535

End Date/Time: 8/10/11 ~~0945~~ 1130 VL / 8/18/11 0945

Day	Temp. (°C)	Dissolved O_2 (mg/L)	pH (units)	Conductivity (umhos/cm)	Comments	Tech Initials
7/28/2011	23.0	8.5	8.35	720		ES
7/29/2011	23.0	8.3	8.30	708		AD
7/30/2011	23.8	8.2	8.32	689		JG
7/31/2011	23.6	6.9	8.25	699	AIRSTONE NOT LEFT ON OVERNIGHT	JG
8/1/2011	23.5	7.6	8.44	691		JP
8/2/2011	23.5	8.4	8.24	697		AD
8/3/2011	23.3	8.4	8.29	674		JF
8/4/2011	23.0	8.1	8.21	697		ES
8/5/2011	23.7	7.6	8.24	629		JP
8/6/2011	23.7	8.0	8.24	665		JF
8/7/2011	23.7	8.0	8.23	683		SL
8/8/2011	23.4	8.4	8.24	697		JP
8/9/2011	22.6	6.9	8.41	699		SL
8/10/2011	23.1	8.6	8.33	700		SD
8/11/2011	22.7	8.2	8.19	728		~~SA~~ ES
8/12/2011	23.4	8.4	8.53	713		ES
8/13/2011	22.6	8.2	8.36	684		JF
8/14/2011	22.7	8.4	8.32	716		JF
8/15/2011	23.2	8.1	8.43	708		JP
8/16/2011	23.1	8.3	8.36	720		CM
8/17/2011	23.0	8.4	8.39	704		~~AD~~
8/18/2011	—	—	—	—		—

Comments: Initial water quality measurements (renewal water; soft H2O)

QC Check: VL 8/29/11

Final Review: SD 8/31/11

EPA - Halaco
Hyallela 42-day
Test Date: 7/6/11

Site	Rep	Rand #	Site	Rep	Rand #
	A	169		A	133
SD-LGF-010A	B	18	SD-LGF-112A	B	80
	C	3		C	181
	D	105		D	52
	E	122		E	97
	F	5		F	126
	G	211		G	42
	H	201		H	188
	I	209		I	47
	J	13		J	75
	K	151		K	15
	L	33		L	184
	A	177		A	25
SD-LGF-012A	B	64	SD-LGM-001A	B	36
	C	49		C	187
	D	78		D	35
	E	48		E	153
	F	84		F	114
	G	194		G	138
	H	100		H	174
	I	123		I	165
	J	145		J	149
	K	197		K	68
	L	205		L	27

EPA - Halaco
Hyallela 42-day
Test Date: 7/6/11

Site	Rep	Rand #	Site	Rep	Rand #
Control 1	A	41	Control 2	A	163
	B	159		B	130
	C	34		C	83
	D	190		D	17
	E	208		E	191
	F	24		F	22
	G	189		G	58
	H	7		H	147
	I	87		I	6
	J	71		J	172
	K	175		K	192
	L	118		L	216

EPA - Halaco
Hyallela 42-day
Test Date: 7/6/11

Site	Rep	Rand #	Site	Rep	Rand #
	A	157		A	88
SD-DSA-001A	B	102	SD-DSA-006A	B	91
	C	195		C	45
	D	77		D	180
	E	196		E	26
	F	1		F	162
	G	203		G	103
	H	214		H	125
	I	16		I	50
	J	59		J	95
	K	119		K	93
	L	131		L	121
	A	140		A	56
SD-DSA-003A	B	21	SD-LGF-001A	B	43
	C	46		C	185
	D	111		D	94
	E	178		E	106
	F	210		F	2
	G	160		G	4
	H	11		H	30
	I	86		I	44
	J	212		J	117
	K	60		K	29
	L	139		L	40

EPA - Halaco
Hyallela 42-day
Test Date: 7/6/11

Site	Rep	Rand #	Site	Rep	Rand #
	A	186		A	136
SD-LGF-003A	B	152	SD-LGF-008A	B	120
	C	200		C	193
	D	96		D	63
	E	99		E	19
	F	51		F	81
	G	20		G	14
	H	183		H	215
	I	79		I	76
	J	70		J	115
	K	171		K	108
	L	143		L	116
	A	166		A	32
SD-LGF-007A	B	206	SD-LGF-009A	B	73
	C	182		C	82
	D	54		D	28
	E	55		E	38
	F	179		F	176
	G	8		G	127
	H	113		H	10
	I	37		I	135
	J	101		J	98
	K	167		K	67
	L	202		L	109

EPA - Halaco
Hyallela 42-day
Test Date: 7/6/11

Site	Rep	Rand #	Site	Rep	Rand #
	A	164		A	53
SD-LGM-003A	B	23	SD-NEL-009A	B	89
	C	112		C	92
	D	134		D	155
	E	144		E	65
	F	173		F	207
	G	104		G	9
	H	57		H	129
	I	66		I	148
	J	170		J	198
	K	168		K	128
	L	158		L	150
	A	199		A	61
SD-NEL-007A	B	146	SD-NEL-021A	B	137
	C	154		C	39
	D	62		D	110
	E	69		E	85
	F	156		F	132
	G	141		G	204
	H	74		H	142
	I	161		I	213
	J	90		J	12
	K	72		K	124
	L	31		L	107

Total Ammonia Analysis
Freshwater

Pore Water

Client ID: EPA - Halaco
Project ID: Halaco
Test Type: 42-day *Hyalella*

DI Blank: 0.0

Analyst: SL
Analysis Date: 7/7/11

Sample ID	Nautilus ID	Sample Date	Test Day	pH (units)	Sal (ppt) (µS/cm Conductivity)	Nitrogen (mg/L)	Ammonia (mg/L) N x 1.22
Blank Spike (10 mg/L NH_3)		NA	NA	NA	NA	8.8	10.7
SD-DSA-001A	1	7/6/11	pw	7.52	16760	29.7	36.2
SD-DSA-003A	2		pw	7.43	8970	6.2	7.6
SD-DSA-006A	3		pw	7.25	9250	3.3	4.0
SD-LGF-001A	4		pw	7.64	25000	43.0	52.5
SD-LGF-003A	5		pw	7.41	15920	4.9	6.0
SD-LGF-007A	6		pw	7.80	22100	1.5	1.8
SD-LGF-008A	7		pw	7.55	19630	0.7	0.9
SD-LGF-009A	8		pw	7.85	18930	2.1	2.6
SD-LGF-010A	9		pw	7.77	14660	2.4	2.9
SD-LGF-012A	10		pw	7.29	20400	13.4	16.3
Spike Check (10 mg/L NH_3)		NA	NA			8.7	10.6
SD-LGM-001A	11	7/6/11	pw	7.44	17360	24.3	29.6
SD-LGM-003A	12	7/6/11	pw	7.28	16860	48.2	58.8
SD-NEL-007A	13		pw	7.87	14370	9.4	11.5
SD-NEL-009A	14		pw	7.69	9090	3.4	4.1
SD-NEL-021A	15		pw	7.47	9000	0.9	1.1
Sample Duplicate[a]						0.9	1.1
Sample Duplicate + Spike[a]						10.3	12.6
Spike Check (10 mg/L NH_3)		NA	NA				

Relative Percent Difference (RPD) = $\frac{\text{sample (mg/L) - sample duplicate (mg/L)}}{\text{average ammonia (mg/L)}}$ x 100

Percent Recovery = $\frac{\text{spiked sample (mg/L) - sample (mg/L)}}{\text{spike conc'n (mg/L)}}$ x 100

QC Sample I.D.	NH_3	Sample Dup	Measured Spike	Nominal Spike Conc'n	RPD	% Recovery
Blank	0.0	NA	10.7	10	NA	107
15	1.1	1.1	12.6	10	0	~~107~~ 115

KL

Comments:

Notes: [a]Unless otherwise noted, the last sample listed on the datasheet is used for duplicate and duplicate + spike QC check.

Method Detection Limit = 0.5 mg/L

QC Check: KL 9/12/11

Final Review: SD 9/19/11

Total Ammonia Analysis
Freshwater

Overlying Water

Client ID: EPA - Halaco
Project ID: Halaco
Test Type: 42-day Hyalella

DI Blank: 0.0

Analyst: ES
Analysis Date: 7/8/11

Sample ID	Nautilus ID	Sample Date	Test Day	Nitrogen (mg/L)	N x 1.22 Ammonia (mg/L)
Blank Spike (10 mg/L NH_3)		NA	NA	8.9	10.9
Control 1	16	7/6/11	0	0.4	0.5
Control 2	17	7/7/11	0	0.1	0.1
SD-DSA-001A	18	7/6/11	0	4.1	5.0
SD-DSA-003A	19	7/7/11	0	1.9	2.3
SD-DSA-006A	20	7/7/11	0	1.0	1.2
SD-LGF-001A	21	7/6/11	0	6.4	7.8
SD-LGF-003A	22	7/6/11	0	1.8	2.2
SD-LGF-007A	23	7/6/11	0	0.7	0.9
SD-LGF-008A	24	7/7/11	0	1.1	1.3
SD-LGF-009A	25	7/6/11	0	0.4	0.5
Spike Check (10 mg/L NH_3)		NA	NA	9.0	11.0
SD-LGF-010A	26	7/6/11	0	0.1	0.1
SD-LGF-012A	27	7/6/11	0	1.9	2.3
SD-LGF-112A	28	7/7/11	0	1.5	1.8
SD-LGM-001A	29	7/7/11	0	3.0	3.7
SD-LGM-003A	30	7/7/11	0	5.8	7.1
SD-NEL-007A	31	7/6/11	0	1.1	1.3
SD-NEL-009A	32	7/7/11	0	1.1	1.3
SD-NEL-021A	33	7/7/11	0	0.5	0.61
Sample Duplicate[a]	33			0.5	0.61
Sample Duplicate + Spike[a]	33			9.4	11.5
Spike Check (10 mg/L NH_3)		NA	NA		

$$\text{Relative Percent Difference (RPD)} = \frac{\text{sample (mg/L) - sample duplicate (mg/L)}}{\text{average ammonia (mg/L)}} \times 100$$

$$\text{Percent Recovery} = \frac{\text{spiked sample (mg/L) - sample (mg/L)}}{\text{spike conc'n (mg/L)}} \times 100$$

QC Sample I.D.	NH_3	Sample Dup	Measured Spike Conc'n	Nominal Spike Conc'n	RPD	% Recovery
Blank	~~0.0~~ 0.0	NA	10.9	10	NA	109
#33 (QC)	0.61	0.61	11.5	10	0	109

Comments:

Notes: [a]Unless otherwise noted, the last sample listed on the datasheet is used for duplicate and duplicate + spike QC check.

Method Detection Limit = 0.5 mg/L

QC Check: KL 9/12/11

Final Review: 9/19/11

Total Ammonia Analysis
Freshwater

Overlying Water

Client ID: EPA - Halaco
Project ID: HalaCO
Test Type: 42-day Hyalella

DI Blank: 0.0

Analyst: KL
Analysis Date: 9/8/11

Sample ID	Nautilus ID	Sample Date	Test Day	Nitrogen (mg/L)	N x 1.22 Ammonia (mg/L)
Blank Spike (10 mg/L NH_3)		NA	NA	8.8	10.7
Control 1	34	7/15/11	7	0.0	0.0
Control 2	35		7	0.4	0.5
SD-DSA-001A	36		7	0.4	0.5
SD-DSA-003A	37		7	0.5	0.6
SD-DSA-006A	38		7	0.0	0.0
SD-LGF-001A	39		7	0.4	0.5
SD-LGF-003A	40		7	0.4	0.5
SD-LGF-007A	41		7	0.5	0.6
SD-LGF-008A	42		7	0.5	0.6
SD-LGF-009A	43		7	0.2	0.2
Spike Check (10 mg/L NH_3)		NA	NA	8.8	10.7
SD-LGF-010A	44	7/15/11	7	0.4	0.5
SD-LGF-012A	45		7	1.9	2.3
SD-LGF-112A	46		7	0.6	0.7
SD-LGM-001A	47		7	0.1	0.1
SD-LGM-003A	48		7	0.6	0.7
SD-NEL-007A	49		7	0.1	0.1
SD-NEL-009A	50		7	0.5	0.6
SD-NEL-021A	51		7	0.4	0.5
Sample Duplicate[a]				0.3	0.4
Sample Duplicate + Spike[a]				9.4	11.5
Spike Check (10 mg/L NH_3)		NA	NA		

$$\text{Relative Percent Difference (RPD)} = \frac{\text{sample (mg/L) - sample duplicate (mg/L)}}{\text{average ammonia (mg/L)}} \times 100$$

$$\text{Percent Recovery} = \frac{\text{spiked sample (mg/L) - sample (mg/L)}}{\text{spike conc'n (mg/L)}} \times 100$$

QC Sample I.D.	NH_3	Sample Dup	Measured Spike Conc'n	Nominal Spike Conc'n	RPD	% Recovery
Blank	0.0	NA	10.7	10	NA	107
(QC) #51	0.5	0.4	11.5	10	22	110

Comments:

Notes: [a]Unless otherwise noted, the last sample listed on the datasheet is used for duplicate and duplicate + spike QC check.

Method Detection Limit = 0.5 mg/L

QC Check: KL 9/~~22~~ 12/11

Final Review: 9/19/11

Total Ammonia Analysis
Freshwater

Overlying Water

Client ID: EPA-Halaco
Project ID: HalaCO
Test Type: 42-day Hyalella

DI Blank: 0.0

Analyst: KL
Analysis Date: 9/8/11

Sample ID	Nautilus ID	Sample Date	Test Day	Nitrogen (mg/L)	Ammonia (mg/L) N x 1.22
Blank Spike (10 mg/L NH_3)		NA	NA	8.7	10.6
Control 1	52	7/20/11	14	0.0	0.0
Control 2	53	7/21/11	14	0.1	0.1
SD-DSA-001A	54	7/20/11	14	0.4	0.5
SD-DSA-003A	55	7/21/11	14	0.3	0.4
SD-DSA-006A	56	7/21/11	14	0.4	0.5
SD-LGF-001A	57	7/20/11	14	0.2	0.2
SD-LGF-003A	58	7/20/11	14	0.0	0.0
SD-LGF-007A	59	7/20/11	14	0.5	0.6
SD-LGF-008A	60	7/21/11	14	0.4	0.5
SD-LGF-009A	61	7/20/11	14	0.3	0.4
Spike Check (10 mg/L NH_3)		NA	NA	8.7	10.6
SD-LGF-010A	62	7/20/11	14	0.7	0.9
SD-LGF-012A	63	7/20/11	14	0.6	0.7
SD-LGF-112A	64	7/21/11	14	0.4	0.5
SD-LGM-001A	65	7/21/11	14	0.3	0.4
SD-LGM-003A	66	7/21/11	14	0.0	0.0
SD-NEL-007A	67	7/20/11	14	0.0	0.0
SD-NEL-009A	68	7/21/11	14	0.4	0.5
SD-NEL-021A	69	7/21/11	14	0.4	0.5
Sample Duplicate[a]				0.3	0.4
Sample Duplicate + Spike[a]				9.5	11.6
Spike Check (10 mg/L NH_3)		NA	NA		

$$\text{Relative Percent Difference (RPD)} = \frac{\text{sample (mg/L) - sample duplicate (mg/L)}}{\text{average ammonia (mg/L)}} \times 100$$

$$\text{Percent Recovery} = \frac{\text{spiked sample (mg/L) - sample (mg/L)}}{\text{spike conc'n (mg/L)}} \times 100$$

QC Sample I.D.	NH_3	Sample Dup	Measured Spike Conc'n	Nominal Spike Conc'n	RPD	% Recovery
Blank	0.0	NA	10.6	10	NA	106
(QC) #69	0.5	0.4	11.6	10	22	111

Comments:

Notes: [a]Unless otherwise noted, the last sample listed on the datasheet is used for duplicate and duplicate + spike QC check.

Method Detection Limit = 0.5 mg/L

QC Check: KL 9/12/11

Final Review: SO 9/19/11

Total Ammonia Analysis
Freshwater

Overlying Water

Client ID: EPA-Halaco
Project ID: Halaco
Test Type: 42-day Hyalella

DI Blank: 0.0

Analyst: KL
Analysis Date: 9/7/11

Sample ID	Nautilus ID	Sample Date	Test Day	Nitrogen (mg/L)	N x 1.22 Ammonia (mg/L)
Blank Spike (10 mg/L NH_3)		NA	NA	8.1	9.9
Control 1	70	7/27/11	21	0.2	0.2
Control 2	71	7/28/11	21	0.1	0.1
SD-DSA-001A	72	7/27/11	21	0.0	0.0
SD-DSA-003A	73	7/28/11	21	0.0	0.0
SD-DSA-006A	74	7/28/11	21	0.0	0.0
SD-LGF-001A	75	7/27/11	21	0.1	0.1
SD-LGF-003A	76	7/27/11	21	0.2	0.2
SD-LGF-007A	77	7/27/11	21	0.1	0.1
SD-LGF-008A	78	7/28/11	21	0.3	0.4
SD-LGF-009A	79	7/27/11	21	0.3	0.4
Spike Check (10 mg/L NH_3)		NA	NA	8.1	9.9
SD-LGF-010A	80	7/27/11	21	0.0	0.0
SD-LGF-012A	81	7/27/11	21	0.2	0.2
SD-LGF-112A	82	7/28/11	21	0.0	0.0
SD-LGM-001A	83	7/28/11	21	0.2	0.2
SD-LGM-003A	84	7/28/11	21	0.1	0.1
SD-NEL-007A	85	7/27/11	21	0.0	0.0
SD-NEL-009A	86	7/28/11	21	0.1	0.1
SD-NEL-021A	87	7/28/11	21	0.2	0.2
Sample Duplicate[a]					
Sample Duplicate + Spike[a]				0.2	0.2
Spike Check (10 mg/L NH_3)		NA	NA	8.6	10.5

$$\text{Relative Percent Difference (RPD)} = \frac{\text{sample (mg/L)} - \text{sample duplicate (mg/L)}}{\text{average ammonia (mg/L)}} \times 100$$

$$\text{Percent Recovery} = \frac{\text{spiked sample (mg/L)} - \text{sample (mg/L)}}{\text{spike conc'n (mg/L)}} \times 100$$

QC Sample I.D.	NH_3	Sample Dup	Measured Spike Conc'n	Nominal Spike Conc'n	RPD	% Recovery
Blank	0.0	NA	9.9	10	NA	99
(QC) #87	0.2	0.2	10.5	10	0	103

Comments:

Notes: [a]Unless otherwise noted, the last sample listed on the datasheet is used for duplicate and duplicate + spike QC check.

Method Detection Limit = 0.5 mg/L

QC Check: KL 9/12/11

Final Review: SDG 9/19/11

Total Ammonia Analysis
Freshwater

Overlying Water

Client ID: EPA - Halaco
Project ID: Halaco
Test Type: 42-day Hyalella

DI Blank: 0.0

Analyst: KL
Analysis Date: 9/7/11

Sample ID	Nautilus ID	Sample Date	Test Day	Nitrogen (mg/L)	Ammonia (mg/L) N x 1.22
Blank Spike (10 mg/L NH_3)		NA	NA	8.7	10.6
Control 1	88	8/3/11	28	0.3	0.4
Control 2	89	8/4/11	28	NM	NM
SD-DSA-001A	90	8/3/11	28	0.2	0.2
SD-DSA-003A	91	8/4/11	28	NM	NM
SD-DSA-006A	92	↓	28	NM	NM
SD-LGF-001A	93	8/3/11	28	0.0	0.0
SD-LGF-003A	94	↓	28	0.3	0.4
SD-LGF-007A	95	↓	28	0.3	0.4
SD-LGF-008A	96	8/4/11	28	NM	NM
SD-LGF-009A	97	8/3/11	28	0.6	0.7
Spike Check (10 mg/L NH_3)		NA	NA	8.7	10.6
SD-LGF-010A	98	8/3/11	28	0.1	0.1
SD-LGF-012A	99	↓	28	0.5	0.6
SD-LGF-112A	100	8/4/11	28	NM	NM
SD-LGM-001A	101	↓	28	NM	NM
SD-LGM-003A	102	↓	28	NM	NM
SD-NEL-007A	103	8/3/11	28	0.7	0.9
SD-NEL-009A	104	8/4/11	28	NM	NM
SD-NEL-021A	105	↓	28	~~0.8~~ KL NM	NM
Sample Duplicate[a]				0.8	~~1.0~~ 1.0
Sample Duplicate + Spike[a]				9.3	11.3
Spike Check (10 mg/L NH_3)		NA	NA		

Relative Percent Difference (RPD) = $\frac{\text{sample (mg/L) - sample duplicate (mg/L)}}{\text{average ammonia (mg/L)}}$ x 100

Percent Recovery = $\frac{\text{spiked sample (mg/L) - sample (mg/L)}}{\text{spike conc'n (mg/L)}}$ x 100

QC Sample I.D.	NH_3	Sample Dup	Measured Spike Conc'n	Nominal Spike Conc'n	RPD	% Recovery
Blank	0.0	NA	10.6	10	NA	106
(QC) # 103	0.9	1.0	11.3	10	10.5	104

Comments:

Notes: [a]Unless otherwise noted, the last sample listed on the datasheet is used for duplicate and duplicate + spike QC check.

Method Detection Limit = 0.5 mg/L

QC Check: KL 9/12/11

Final Review: 9/12/11

Total Ammonia Analysis
Freshwater

Overlying Water

Client ID: EPA Halaco
Project ID: Halaco
Test Type: 42-day Hyalella

DI Blank: 0.0

Analyst: SL
Analysis Date: 9/13/11

Sample ID	Nautilus ID	Sample Date	Test Day	Nitrogen (mg/L)	Ammonia (mg/L) N x 1.22
Blank Spike (10 mg/L NH_3)		NA	NA	7.9	9.6
Control 1	106	8/10/11	35	0.0	0.0
Control 2	107	8/11/11	35	0.0	0.0
SD-DSA-001A	108	8/10/11	35	0.0	0.0
SD-DSA-003A	109	8/11/11	35	0.0	0.0
SD-DSA-006A	110	↓	35	0.0	0.0
SD-LGF-001A	111	8/10/11	35	0.0	0.0
SD-LGF-003A	112	↓	35	0.0	0.0
SD-LGF-007A	113	↓	35	0.0	0.0
SD-LGF-008A	114	8/11/11	35	0.0	0.0
SD-LGF-009A	115	8/10/11	35	0.0	0.0
Spike Check (10 mg/L NH_3)		NA	NA	7.8	9.5
SD-LGF-010A	116	8/10/11	35	0.0	0.0
SD-LGF-012A	117	↓	35	0.0	0.0
SD-LGF-112A	118	8/11/11	35	0.0	0.0
SD-LGM-001A	119	↓	35	0.0	0.0
SD-LGM-003A	120	↓	35	0.0	0.0
SD-NEL-007A	121	8/10/11	35	0.0	0.0
SD-NEL-009A	122	8/11/11	35	0.0	0.0
SD-NEL-021A	123	↓	35	0.0	0.0
Sample Duplicate[a]	123			0.0	0.0
Sample Duplicate + Spike[a]	123			7.5	9.2
Spike Check (10 mg/L NH_3)		NA	NA		

Relative Percent Difference (RPD) = $\frac{\text{sample (mg/L) - sample duplicate (mg/L)}}{\text{average ammonia (mg/L)}} \times 100$

Percent Recovery = $\frac{\text{spiked sample (mg/L) - sample (mg/L)}}{\text{spike conc'n (mg/L)}} \times 100$

QC Sample I.D.	NH_3	Sample Dup	Measured Spike Conc'n	Nominal Spike Conc'n	RPD	% Recovery
Blank	0.0	NA	9.6	10	NA	96
123	0.0	0.0	9.2	10	0.0	92

Comments:

Notes: [a]Unless otherwise noted, the last sample listed on the datasheet is used for duplicate and duplicate + spike QC check.

Method Detection Limit = 0.5 mg/L

QC Check: KL 9/13/11

Final Review: SD 9/19/11

Total Ammonia Analysis
Freshwater

Overlying Water

Client ID: EPA - Halaco
Project ID: Halaco
Test Type: 42-day Hyalella

DI Blank: 0.0

Analyst: SL
Analysis Date: 9/13/11

Sample ID	Nautilus ID	Sample Date	Test Day	Nitrogen (mg/L)	N x 1.22 Ammonia (mg/L)
Blank Spike (10 mg/L NH_3)		NA	NA	7.6	9.3
Control 1	124	8/17/11	42	0.0	0.0
Control 2	125	8/18/11	42	0.0	0.0
SD-DSA-001A	126	8/17/11	42	0.2	0.2
SD-DSA-003A	127	8/18/11	42	0.2	0.2
SD-DSA-006A	128	↓	42	0.1	0.1
SD-LGF-001A	129	8/17/11	42	0.0	0.0
SD-LGF-003A	130	↓	42	0.0	0.0
SD-LGF-007A	131	↓	42	0.0	0.0
SD-LGF-008A	132	8/18/11	42	0.1	0.1
SD-LGF-009A	133	8/17/11	42	0.0	0.0
Spike Check (10 mg/L NH_3)		NA	NA	7.6	9.3
SD-LGF-010A	134	8/17/11	42	0.0	0.0
SD-LGF-012A	135	↓	42	0.0	0.0
SD-LGF-112A	136	8/18/11	42	0.0	0.0
SD-LGM-001A	137	↓	42	0.0	0.0
SD-LGM-003A	138	↓	42	0.1	0.1
SD-NEL-007A	139	8/17/11	42	0.0	0.0
SD-NEL-009A	140	8/18/11	42	0.3	0.4
SD-NEL-021A	141	↓	42	0.0	0.0
Sample Duplicate[a]	141			0.0	0.0
Sample Duplicate + Spike[a]	141			7.8	9.5
Spike Check (10 mg/L NH_3)		NA	NA		

$$\text{Relative Percent Difference (RPD)} = \frac{\text{sample (mg/L) - sample duplicate (mg/L)}}{\text{average ammonia (mg/L)}} \times 100$$

$$\text{Percent Recovery} = \frac{\text{spiked sample (mg/L) - sample (mg/L)}}{\text{spike conc'n (mg/L)}} \times 100$$

QC Sample I.D.	NH_3	Sample Dup	Measured Spike Conc'n	Nominal Spike Conc'n	RPD	% Recovery
Blank	0.0	NA	9.3	10	NA	93
141	0.0	0.0	9.5	10	0.0	95

Comments:

Notes: [a]Unless otherwise noted, the last sample listed on the datasheet is used for duplicate and duplicate + spike QC check.

Method Detection Limit = 0.5 mg/L

QC Check: KL 9/13/11

Final Review: 9/19/11

Appendix D
Reference Toxicant Data

CETIS Summary Report

Report Date: 22 Jul-11 10:07 (p 1 of 1)
Test Code: 110707hara | 08-2762-0049

Acute Amphipod Survival Test — Nautilus Environmental (CA)

Batch ID:	03-6809-2919	Test Type:	Survival (96h)	Analyst:	QAST Soft
Start Date:	07 Jul-11 15:30	Protocol:	EPA/600/R-99/064 (2000)	Diluent:	NC Gulligan Filtered Water
Ending Date:	11 Jul-11 16:05	Species:	Hyalella azteca	Brine:	Not Applicable
Duration:	4d 1h	Source:	Aquatic Indicators	Age:	8 d

Sample ID:	08-4501-0462	Code:	110707hara	Client:	Internal
Sample Date:	07 Jul-11	Material:	Copper chloride	Project:	
Receive Date:	07 Jul-11	Source:	Reference Toxicant		
Sample Age:	16h	Station:	Copper Chloride		

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
14-5176-1295	96h Survival Rate	<100	100	N/A	17.5%		Steel Many-One Rank Test

Point Estimate Summary

Analysis ID	Endpoint	Level	µg/L	95% LCL	95% UCL	TU	Method
09-8345-9953	96h Survival Rate	EC50	255.1	181.1	359.4		Trimmed Spearman-Kärber

96h Survival Rate Summary

Conc-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Lab Control	4	0.95	0.9284	0.9716	0.9	1	0.02887	0.05774	6.08%	0.0%
100		4	0.675	0.6563	0.6937	0.6	0.7	0.025	0.05	7.41%	28.95%
200		4	0.55	0.4785	0.6215	0.4	0.8	0.09574	0.1915	34.82%	42.11%
400		4	0.375	0.2922	0.4578	0.1	0.6	0.1109	0.2217	59.13%	60.53%
800		4	0.05	0.02844	0.07156	0	0.1	0.02887	0.05774	115.5%	94.74%
1600		4	0	0	0	0	0	0	0		100.0%

96h Survival Rate Detail

Conc-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Lab Control	1	0.9	0.9	1
100		0.6	0.7	0.7	0.7
200		0.4	0.4	0.8	0.6
400		0.1	0.5	0.3	0.6
800		0.1	0.1	0	0
1600		0	0	0	0

CETIS Analytical Report

Report Date: 22 Jul-11 10:06 (p 1 of 2)
Test Code: 110707hara | 08-2762-0049

Acute Amphipod Survival Test — **Nautilus Environmental (CA)**

Analysis ID:	14-5176-1295	**Endpoint:**	96h Survival Rate	**CETIS Version:**	CETISv1.8.0
Analyzed:	22 Jul-11 10:06	**Analysis:**	Nonparametric-Control vs Treatments	**Official Results:**	Yes

Data Transform	Zeta	Alt Hyp	MC Trials	NOEL	LOEL	TOEL	TU	PMSD
Angular (Corrected)	0	C > T	Not Run	<100	100	N/A		17.5%

Steel Many-One Rank Test

Control	vs	Conc-µg/L	Test Stat	Critical	DF	Ties	P-Value	Decision(α:5%)
Lab Control		100*	10	10	6	0	0.0417	Significant Effect
		200*	10	10	6	0	0.0417	Significant Effect
		400*	10	10	6	0	0.0417	Significant Effect
		800*	10	10	6	0	0.0417	Significant Effect
		1600*	10	10	6	0	0.0417	Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Control Trend	15	2		0.8261	Non-significant Trend in Controls

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	3.979769	0.7959538	5	38.75	<0.0001	Significant Effect
Error	0.3696932	0.02053851	18			
Total	4.349462	0.8164923	23			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Mod Levene Equality of Variance	4.374	4.248	0.0088	Unequal Variances
Distribution	Shapiro-Wilk W Normality	0.9569	0.884	0.3786	Normal Distribution

96h Survival Rate Summary

Conc-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Lab Control	4	0.95	0.928	0.972	0.9	1	0.02887	0.05773	6.08%	0.0%
100		4	0.675	0.656	0.694	0.6	0.7	0.025	0.05	7.41%	28.95%
200		4	0.55	0.4772	0.6228	0.4	0.8	0.09574	0.1915	34.82%	42.11%
400		4	0.375	0.2907	0.4593	0.1	0.6	0.1109	0.2217	59.13%	60.53%
800		4	0.05	0.02804	0.07196	0	0.1	0.02887	0.05774	115.5%	94.74%
1600		4	0	0	0	0	0	0	0		100.0%

Angular (Corrected) Transformed Summary

Conc-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Lab Control	4	1.331	1.295	1.366	1.249	1.412	0.04705	0.09409	7.07%	0.0%
100		4	0.9649	0.9449	0.9849	0.8861	0.9912	0.02627	0.05254	5.45%	27.48%
200		4	0.8407	0.764	0.9173	0.6847	1.107	0.1007	0.2014	23.96%	36.82%
400		4	0.6432	0.5484	0.7381	0.3218	0.8861	0.1247	0.2494	38.77%	51.66%
800		4	0.2403	0.2045	0.2761	0.1588	0.3218	0.04705	0.09409	39.16%	81.94%
1600		4	0.1588	0.1588	0.1588	0.1588	0.1588	0	0	0.0%	88.07%

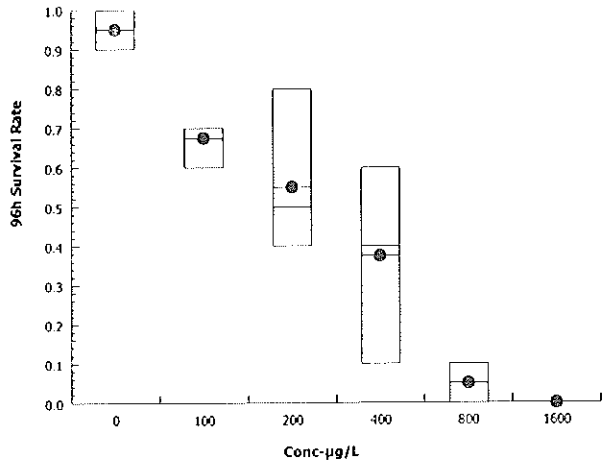
Acute Amphipod Survival Test — **Nautilus Environmental (CA)**

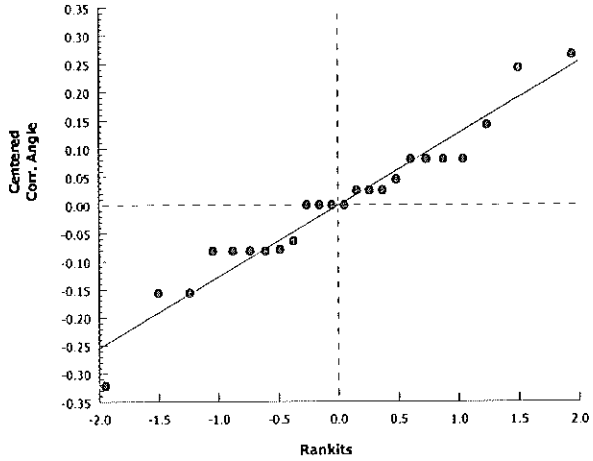
Analysis ID:	14-5176-1295	**Endpoint:**	96h Survival Rate	**CETIS Version:**	CETISv1.8.0
Analyzed:	22 Jul-11 10:06	**Analysis:**	Nonparametric-Control vs Treatments	**Official Results:**	Yes

96h Survival Rate Detail

Conc-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Lab Control	1	0.9	0.9	1
100		0.6	0.7	0.7	0.7
200		0.4	0.4	0.8	0.6
400		0.1	0.5	0.3	0.6
800		0.1	0.1	0	0
1600		0	0	0	0

Graphics





CETIS Analytical Report

Report Date: 22 Jul-11 10:07 (p 1 of 1)
Test Code: 110707hara | 08-2762-0049

Acute Amphipod Survival Test — **Nautilus Environmental (CA)**

Analysis ID:	09-8345-9953	**Endpoint:**	96h Survival Rate	**CETIS Version:**	CETISv1.8.0
Analyzed:	22 Jul-11 10:06	**Analysis:**	Trimmed Spearman-Kärber	**Official Results:**	Yes

Trimmed Spearman-Kärber Estimates

Threshold Option	Threshold	Trim	Mu	Sigma	EC50	95% LCL	95% UCL
Control Threshold	0.05	28.95%	2.407	0.07442	255.1	181.1	359.4

Residual Analysis

Attribute	Method	Test Stat	Critical	P-Value	Decision(α:5%)
Control Trend	Mann-Kendall Trend	2		0.8261	Non-significant Trend in Controls

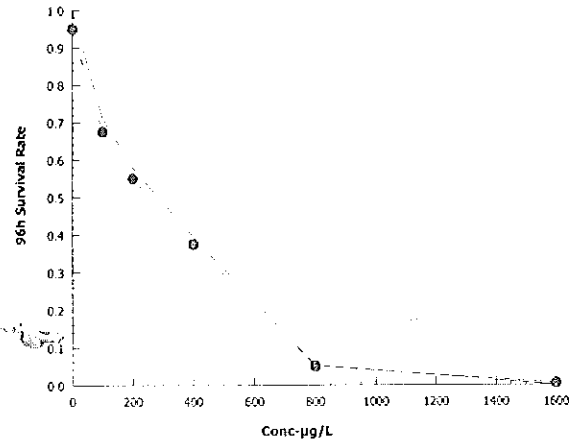
96h Survival Rate Summary

			Calculated Variate(A/B)								
Conc-µg/L	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Lab Control	4	0.95	0.9	1	0.02887	0.05773	6.08%	0.0%	38	40
100		4	0.675	0.6	0.7	0.025	0.05	7.41%	28.95%	27	40
200		4	0.55	0.4	0.8	0.09574	0.1915	34.82%	42.11%	22	40
400		4	0.375	0.1	0.6	0.1109	0.2217	59.13%	60.53%	15	40
800		4	0.05	0	0.1	0.02887	0.05774	115.5%	94.74%	2	40
1600		4	0	0	0	0	0		100.0%	0	40

96h Survival Rate Detail

Conc-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Lab Control	1	0.9	0.9	1
100		0.6	0.7	0.7	0.7
200		0.4	0.4	0.8	0.6
400		0.1	0.5	0.3	0.6
800		0.1	0.1	0	0
1600		0	0	0	0

Graphics

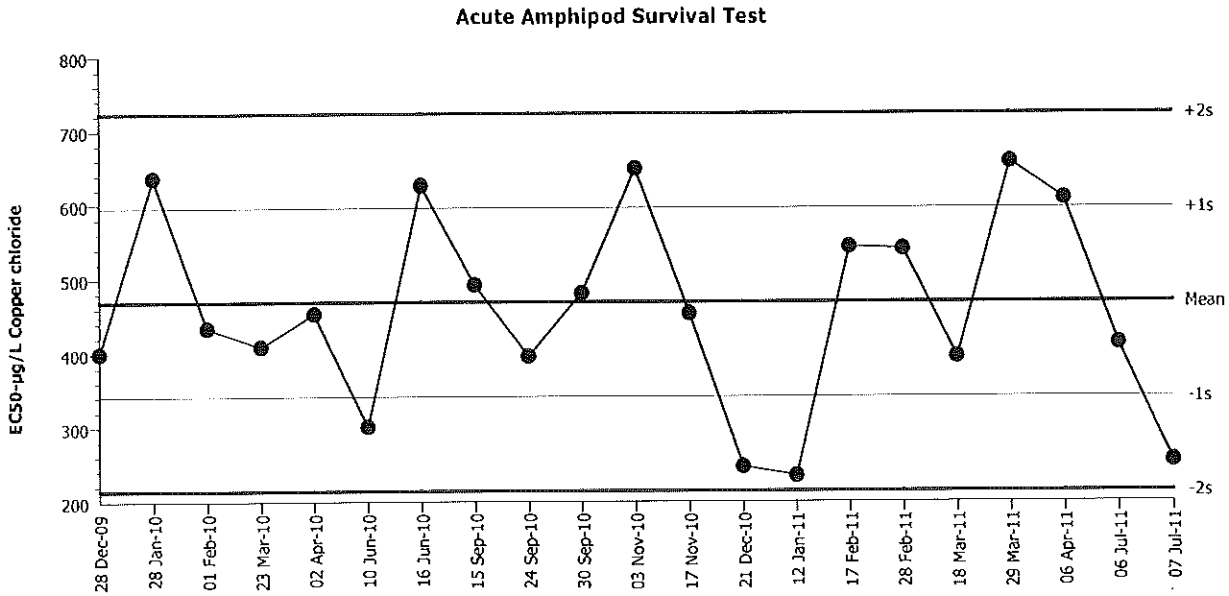


CETIS QC Plot

Report Date: 27 Jul-11 15:52 (1 of 1)

Acute Amphipod Survival Test — **Nautilus Environmental (CA)**

Test Type:	Survival (96h)	**Organism:**	Hyalella azteca (Freshwater Amphip	**Material:**	Copper chloride
Protocol:	EPA/600/R-99/064 (2000)	**Endpoint:**	96h Survival Rate	**Source:**	Reference Toxicant-REF



Mean:	468.8	**Count:**	20	**-1s Warning Limit:**	341.5	**-2s Action Limit:**	214.2
Sigma:	127.3	**CV:**	27.20%	**+1s Warning Limit:**	596.1	**+2s Action Limit:**	723.4

Quality Control Data

Point	Year	Month	Day	OC Data	Delta	Sigma	Warning	Action	Test ID	Analysis ID
1	2009	Dec	28	400	-68.8	-0.5405			09-0316-7408	10-5096-4147
2	2010	Jan	28	636.8	168	1.32	(+)		21-4129-6318	04-5823-8253
3		Feb	1	434.4	-34.39	-0.2702			15-1931-8855	02-7802-2364
4		Mar	23	409.2	-59.59	-0.4681			05-7044-7027	19-2362-8865
5		Apr	2	453.5	-15.34	-0.1205			16-0967-3856	06-7492-6267
6		Jun	10	301.1	-167.7	-1.317	(-)		06-3466-4676	18-2625-0051
7			16	626.6	157.8	1.24	(+)		16-8137-7670	09-8655-2602
8		Sep	15	492.2	23.4	0.1838			12-9126-0381	02-9991-2328
9			24	396.2	-72.63	-0.5706			12-7563-8736	03-4964-6365
10			30	481.4	12.6	0.09899			09-5408-6960	09-0004-3489
11		Nov	3	649	180.2	1.416	(+)		12-2914-9289	01-5932-9493
12			17	453.9	-14.91	-0.1171			12-1027-7171	00-8795-3072
13		Dec	21	247.2	-221.6	-1.741	(-)		12-4801-0040	01-8314-6610
14	2011	Jan	12	234.7	-234.1	-1.839	(-)		07-3913-3837	19-1431-8293
15		Feb	17	543.6	74.8	0.5876			15-3856-4503	01-4207-6488
16			28	540.8	71.98	0.5654			02-7942-8354	16-0930-8669
17		Mar	18	395.6	-73.25	-0.5754			15-2809-4237	06-4509-2239
18			29	657.8	189	1.485	(+)		17-1000-3812	00-8621-8416
19		Apr	6	608.6	139.8	1.098	(+)		14-7496-8292	10-5346-2451
20		Jul	6	413.2	-55.59	-0.4367			20-7126-9218	19-7702-0123
21			7	255.1	-213.7	-1.679	(-)		08-2762-0049	09-8345-9953

Freshwater Acute Bioassay
Static-Renewal Conditions

Water Quality Measurements
& Test Organism Survival

Client: Internal
Sample ID: $CuCl_2$
Test No.: 110707hara

Test Species: *H. azteca*
Start Date/Time: 7/7/2011 1530
End Date/Time: 7/11/2011 1605

	Tech Initials				
	0	24	48	72	96
Counts:	JG				JG
Readings:	SL	JP	JF	KF	JG
Dilutions made by:	SL				
High conc. made (µg/L):	1600				
Vol. Cu stock added (mL):	68				
Final Volume (mL):	4000				

Cu stock concentration (µg/L): 94,700

Concentration µg/L	Rep	Number of Live Organisms		Conductivity (µmhos/cm)					Temperature (°C)					Dissolved Oxygen (mg/L)					pH (units)				
		0	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96
Lab Control	A	10	10	675	679	681	664	680	23.7	23.7	23.3	23.3	23.1	6.0	7.3	6.4	6.8	7.1	8.49	8.48	8.29	8.29	8.32
	B	10	9																				
	C	10	9																				
	D	10	10																				
100	A	10	6	675	679	685	667	682	23.7	24.0	23.4	23.5	23.2	6.3	7.3	7.8	6.7	7.1	8.50	8.48	8.45	8.36	8.31
	B	10	7																				
	C	10	7																				
	D	10	7																				
200	A	10	4	675	680	680	666	688	23.7	24.1	23.4	23.5	23.3	6.1	7.3	7.8	6.6	6.8	8.51	8.48	8.47	8.36	8.29
	B	10	4																				
	C	10	8																				
	D	10	6																				
400	A	10	1	674	680	685	665	684	23.7	24.1	23.4	23.5	23.3	6.3	7.3	7.9	6.9	6.6	8.49	8.47	8.46	8.43	8.27
	B	10	5																				
	C	10	3																				
	D	10	6																				
800	A	10	1	672	679	679	664	683	23.7	24.1	23.4	23.6	23.3	6.3	7.4	7.9	7.3	7.7	8.45	8.43	8.45	8.48	8.37
	B	10	1																				
	C	10	0																				
	D	10	0																				
1600	A	10	0	667	613	674	659	676	23.6	24.0	23.4	23.6	23.2	6.3	7.3	7.9	7.6	7.7	8.38	8.39	8.42	8.50	8.44
	B	10	0																				
	C	10	0																				
	D	10	0																				

Initial Counts QC'd by: SL

Animal Source/Date Received: Aquatic Indicators, 7/7/11

Age at Initiation: 8d

Comments: Organisms fed prior to initiation, circle one ((y) / n)

QC Check: KL 7/22/11

Final Review: AC 7/25/11

Appendix E

Summary of Statistical Analyses

Batch One – *Hyalella azteca*

Appendix Table E-1. Analysis of 28-day Survival
Batch One, Initiation Date: 7/6/11

Parameter	Value	Data Set-B	Data Set-C
Table Analyzed			
Transform of Transform of Transform of Round 1 28-d survival			
One-way analysis of variance			
P value	P<0.0001		
P value summary	***		
Are means signif. different? (P < 0.05)	Yes		
Number of groups	9		
F	32.47		
R squared	0.7241		
Bartlett's test for equal variances			
Bartlett's statistic (corrected)	12.78		
P value	0.1198		
P value summary	ns		
Do the variances differ signif. (P < 0.05)	No		
ANOVA Table	SS	df	MS
Treatment (between columns)	7.400	8	0.9249
Residual (within columns)	2.820	99	0.02848
Total	10.22	107	

	Lab Control	SD-DSA-001-A	SD-LGF-001-A	SD-LGF-003-A	SD-LGF-007-A	SD-LGF-009-A	SD-LGF-010-A	SD-LGF-012-A	SD-NEL-007-A
Number of values	12	12	12	12	12	12	12	12	12
Minimum	0.8806	0.8022	0.6415	0.7236	0.7236	0.0	0.5520	0.5520	0.0
25% Percentile	1.058	0.9218	1.011	0.9630	0.8414	0.1582	0.6825	0.6825	0.4487
Median	1.253	1.058	1.253	0.9630	0.9218	0.3826	0.7236	0.7629	0.5004
75% Percentile	1.253	1.058	1.253	1.156	1.058	0.5520	0.8022	0.8022	0.6415
Maximum	1.253	1.253	1.253	1.253	1.253	0.7236	0.9630	0.9630	0.7236
Mean	1.166	1.024	1.121	1.031	0.9371	0.3665	0.7483	0.7474	0.5065
Std. Deviation	0.1372	0.1378	0.1931	0.1573	0.1550	0.2607	0.1112	0.1227	0.1926
Std. Error	0.03959	0.03977	0.05575	0.04540	0.04474	0.07527	0.03211	0.03541	0.05560
Lower 95% CI of mean	1.078	0.9364	0.9987	0.9316	0.8386	0.2008	0.6776	0.6694	0.3841
Upper 95% CI of mean	1.253	1.111	1.244	1.131	1.036	0.5322	0.8190	0.8253	0.6289
D'Agostino & Pearson omnibus normality test									
K2	3.570	0.2400	8.349	0.1453	0.5771	0.9209	0.3250	0.09505	11.25
P value	0.1678	0.8869	0.0154	0.9299	0.7494	0.6310	0.8500	0.9536	0.0036
Passed normality test (alpha=0.05)?	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	No
P value summary	ns	ns	*	ns	ns	ns	ns	ns	**
Sum	13.99	12.29	13.46	12.38	11.24	4.398	8.979	8.969	6.078

Appendix Table E-1cont. Analysis of 28-day Survival
Batch One, Initiation Date: 7/6/11

Parameter	Value
Table Analyzed	Transform of Transform of Transform of Round 1 28-d survival
Column A	Lab Control
vs	vs
Column B	SD-DSA-001-A
Unpaired t test	
P value	0.0097
P value summary	**
Are means signif. different? (P < 0.05)	Yes
One- or two-tailed P value?	One-tailed
t, df	t=2.524 df=22
How big is the difference?	
Mean ± SEM of column A	1.166 ± 0.03959 N=12
Mean ± SEM of column B	1.024 ± 0.03977 N=12
Difference between means	0.1416 ± 0.05612
95% confidence interval	0.02524 to 0.2580
R squared	0.2245
F test to compare variances	
F,DFn, Dfd	1.009, 11, 11
P value	0.9883
P value summary	ns
Are variances significantly different?	No

Parameter	Value
Table Analyzed	Transform of Transform of Transform of Round 1 28-d survival
Column A	Lab Control
vs	vs
Column C	SD-LGF-001-A
Unpaired t test	
P value	0.2627
P value summary	ns
Are means signif. different? (P < 0.05)	No
One- or two-tailed P value?	One-tailed
t, df	t=0.6452 df=22
How big is the difference?	
Mean ± SEM of column A	1.166 ± 0.03959 N=12
Mean ± SEM of column C	1.121 ± 0.05575 N=12
Difference between means	0.04412 ± 0.06838
95% confidence interval	-0.09771 to 0.1859
R squared	0.01857
F test to compare variances	
F,DFn, Dfd	1.983, 11, 11
P value	0.2716
P value summary	ns
Are variances significantly different?	No

Appendix Table E-1cont. Analysis of 28-day Survival
Batch One, Initiation Date: 7/6/11

Parameter	Value
Table Analyzed	Transform of Transform of Transform of Round 1 28-d survival
Column A	Lab Control
vs	vs
Column D	SD-LGF-003-A
Unpaired t test	
P value	0.0183
P value summary	*
Are means signif. different? (P < 0.05)	Yes
One- or two-tailed P value?	One-tailed
t, df	t=2.226 df=22
How big is the difference?	
Mean ± SEM of column A	1.166 ± 0.03959 N=12
Mean ± SEM of column D	1.031 ± 0.04540 N=12
Difference between means	0.1341 ± 0.06024
95% confidence interval	0.009131 to 0.2590
R squared	0.1838
F test to compare variances	
F,DFn, Dfd	1.315, 11, 11
P value	0.6580
P value summary	ns
Are variances significantly different?	No

Parameter	Value
Table Analyzed	Transform of Transform of Transform of Round 1 28-d survival
Column A	Lab Control
vs	vs
Column E	SD-LGF-007-A
Unpaired t test	
P value	0.0005
P value summary	***
Are means signif. different? (P < 0.05)	Yes
One- or two-tailed P value?	One-tailed
t, df	t=3.824 df=22
How big is the difference?	
Mean ± SEM of column A	1.166 ± 0.03959 N=12
Mean ± SEM of column E	0.9371 ± 0.04474 N=12
Difference between means	0.2285 ± 0.05975
95% confidence interval	0.1045 to 0.3524
R squared	0.3993
F test to compare variances	
F,DFn, Dfd	1.277, 11, 11
P value	0.6921
P value summary	ns
Are variances significantly different?	No

Appendix Table E-1. Analysis of 28-day Survival
Batch One, Initiation Date: 7/6/11

Parameter	Value
Table Analyzed	Transform of Transform of Transform of Round 1 28-d survival
Column A	Lab Control
vs	vs
Column F	SD-LGF-009-A
Unpaired t test	
P value	P<0.0001
P value summary	***
Are means signif. different? (P < 0.05)	Yes
One- or two-tailed P value?	One-tailed
t, df	t=9.395 df=22
How big is the difference?	
Mean ± SEM of column A	1.166 ± 0.03959 N=12
Mean ± SEM of column F	0.3665 ± 0.07527 N=12
Difference between means	0.7990 ± 0.08505
95% confidence interval	0.6226 to 0.9754
R squared	0.8005
F test to compare variances	
F,DFn, Dfd	3.614, 11, 11
P value	0.0435
P value summary	*
Are variances significantly different?	Yes

Parameter	Value
Table Analyzed	Transform of Transform of Transform of Round 1 28-d survival
Column A	Lab Control
vs	vs
Column G	SD-LGF-010-A
Unpaired t test	
P value	P<0.0001
P value summary	***
Are means signif. different? (P < 0.05)	Yes
One- or two-tailed P value?	One-tailed
t, df	t=8.185 df=22
How big is the difference?	
Mean ± SEM of column A	1.166 ± 0.03959 N=12
Mean ± SEM of column G	0.7483 ± 0.03211 N=12
Difference between means	0.4172 ± 0.05098
95% confidence interval	0.3115 to 0.5230
R squared	0.7528
F test to compare variances	
F,DFn, Dfd	1.521, 11, 11
P value	0.4983
P value summary	ns
Are variances significantly different?	No

Appendix Table E-1. Analysis of 28-day Survival
Batch One, Initiation Date: 7/6/11

Parameter	Value
Table Analyzed	Transform of Transform of Transform of Round 1 28-d survival
Column A	Lab Control
vs	vs
Column H	SD-LGF-012-A
Unpaired t test	
P value	P<0.0001
P value summary	***
Are means signif. different? (P < 0.05)	Yes
One- or two-tailed P value?	One-tailed
t, df	t=7.872 df=22
How big is the difference?	
Mean ± SEM of column A	1.166 ± 0.03959 N=12
Mean ± SEM of column H	0.7474 ± 0.03541 N=12
Difference between means	0.4182 ± 0.05312
95% confidence interval	0.3080 to 0.5283
R squared	0.7380
F test to compare variances	
F,DFn, Dfd	1.250, 11, 11
P value	0.7174
P value summary	ns
Are variances significantly different?	No

Parameter	Value
Table Analyzed	Transform of Transform of Transform of Round 1 28-d survival
Column A	Lab Control
vs	vs
Column I	SD-NEL-007-A
Unpaired t test	
P value	P<0.0001
P value summary	***
Are means signif. different? (P < 0.05)	Yes
One- or two-tailed P value?	One-tailed
t, df	t=9.655 df=22
How big is the difference?	
Mean ± SEM of column A	1.166 ± 0.03959 N=12
Mean ± SEM of column I	0.5065 ± 0.05560 N=12
Difference between means	0.6591 ± 0.06826
95% confidence interval	0.5175 to 0.8006
R squared	0.8091
F test to compare variances	
F,DFn, Dfd	1.972, 11, 11
P value	0.2754
P value summary	ns
Are variances significantly different?	No

Appendix Table E-2. Analysis of 28-day Growth
Batch One, Initiation Date: 7/6/11

Parameter	Value	Data Set-B	Data Set-C
Table Analyzed			
Round 1 28-d growth			
One-way analysis of variance			
P value	0.0002		
P value summary	***		
Are means signif. different? (P < 0.05)	Yes		
Number of groups	9		
F	6.045		
R squared	0.6417		
ANOVA Table	SS	df	MS
Treatment (between columns)	0.1381	8	0.01726
Residual (within columns)	0.0771	27	0.002856
Total	0.2152	35	

	Lab Control	SD-DSA-001-A	SD-LGF-001-A	SD-LGF-003-A	SD-LGF-007-A	SD-LGF-009-A	SD-LGF-010-A	SD-LGF-012-A	SD-NEL-007-A
Number of values	4	4	4	4	4	4	4	4	4
Minimum	0.1800	0.2500	0.2700	0.2200	0.2400	0.1700	0.2000	0.2700	0.0
25% Percentile	0.2000	0.2750	0.2750	0.2250	0.2550	0.1700	0.2250	0.2950	0.0600
Median	0.2350	0.3000	0.2800	0.2300	0.2950	0.1750	0.2700	0.3250	0.1300
75% Percentile	0.2650	0.3050	0.2850	0.2450	0.3300	0.1850	0.3150	0.3950	0.1950
Maximum	0.2800	0.3100	0.2900	0.2600	0.3400	0.1900	0.3400	0.4600	0.2500
Mean	0.2325	0.2900	0.2800	0.2350	0.2925	0.1775	0.2700	0.3450	0.1275
Std. Deviation	0.04272	0.02708	0.008165	0.01732	0.04573	0.009574	0.05944	0.08103	0.1024
Std. Error	0.02136	0.01354	0.004082	0.008660	0.02287	0.004787	0.02972	0.04052	0.05121
Lower 95% CI of mean	0.1645	0.2469	0.2670	0.2074	0.2197	0.1623	0.1754	0.2161	-0.03549
Upper 95% CI of mean	0.3005	0.3331	0.2930	0.2626	0.3653	0.1927	0.3646	0.4739	0.2905
D'Agostino & Pearson omnibus normality test									
K2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
P value	0.0500	0.0500	0.0500	0.0500	0.0500	0.0500	0.0500	0.0500	0.0500
Passed normality test (alpha=0.05)?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
P value summary	*	*	*	*	*	*	*	*	*
Sum	0.9300	1.160	1.120	0.9400	1.170	0.7100	1.080	1.380	0.5100

Appendix Table E-2cont. Analysis of 28-day Growth
Batch One, Initiation Date: 7/6/11

Parameter	Value
Table Analyzed	Round 1 28-d growth
Column A	Lab Control
vs	vs
Column B	SD-DSA-001-A
Unpaired t test	
P value	0.0317
P value summary	*
Are means signif. different? (P < 0.05)	Yes
One- or two-tailed P value?	One-tailed
t, df	t=2.274 df=6
How big is the difference?	
Mean ± SEM of column A	0.2325 ± 0.02136 N=4
Mean ± SEM of column B	0.2900 ± 0.01354 N=4
Difference between means	-0.05750 ± 0.02529
95% confidence interval	-0.1194 to 0.004385
R squared	0.4628
F test to compare variances	
F,DFn, Dfd	2.489, 3, 3
P value	0.4737
P value summary	ns
Are variances significantly different?	No

Parameter	Value
Table Analyzed	Round 1 28-d growth
Column A	Lab Control
vs	vs
Column C	SD-LGF-001-A
Unpaired t test	
P value	0.0358
P value summary	*
Are means signif. different? (P < 0.05)	Yes
One- or two-tailed P value?	One-tailed
t, df	t=2.184 df=6
How big is the difference?	
Mean ± SEM of column A	0.2325 ± 0.02136 N=4
Mean ± SEM of column C	0.2800 ± 0.004082 N=4
Difference between means	-0.0475 ± 0.02175
95% confidence interval	-0.1007 to 0.005714
R squared	0.4429
F test to compare variances	
F,DFn, Dfd	27.38, 3, 3
P value	0.0222
P value summary	*
Are variances significantly different?	Yes

Appendix Table E-2cont. Analysis of 28-day Growth
Batch One, Initiation Date: 7/6/11

Parameter	Value
Table Analyzed	Round 1 28-d growth
Column A	Lab Control
vs	vs
Column D	SD-LGF-003-A
Unpaired t test	
P value	0.4586
P value summary	ns
Are means signif. different? (P < 0.05)	No
One- or two-tailed P value?	One-tailed
t, df	t=0.1085 df=6
How big is the difference?	
Mean ± SEM of column A	0.2325 ± 0.02136 N=4
Mean ± SEM of column D	0.2350 ± 0.008660 N=4
Difference between means	-0.002500 ± 0.02305
95% confidence interval	-0.05890 to 0.05390
R squared	0.001957
F test to compare variances	
F,DFn, Dfd	6.083, 3, 3
P value	0.1723
P value summary	ns
Are variances significantly different?	No

Parameter	Value
Table Analyzed	Round 1 28-d growth
Column A	Lab Control
vs	vs
Column E	SD-LGF-007-A
Unpaired t test	
P value	0.0518
P value summary	ns
Are means signif. different? (P < 0.05)	No
One- or two-tailed P value?	One-tailed
t, df	t=1.917 df=6
How big is the difference?	
Mean ± SEM of column A	0.2325 ± 0.02136 N=4
Mean ± SEM of column E	0.2925 ± 0.02287 N=4
Difference between means	-0.06000 ± 0.03129
95% confidence interval	-0.1366 to 0.01657
R squared	0.3799
F test to compare variances	
F,DFn, Dfd	1.146, 3, 3
P value	0.9134
P value summary	ns
Are variances significantly different?	No

Appendix Table E-2cont. Analysis of 28-day Growth
Batch One, Initiation Date: 7/6/11

Parameter	Value
Table Analyzed	Round 1 28-d growth
Column A	Lab Control
vs	vs
Column F	SD-LGF-009-A
Unpaired t test	
P value	0.0229
P value summary	*
Are means signif. different? (P < 0.05)	Yes
One- or two-tailed P value?	One-tailed
t, df	t=2.513 df=6
How big is the difference?	
Mean ± SEM of column A	0.2325 ± 0.02136 N=4
Mean ± SEM of column F	0.1775 ± 0.004787 N=4
Difference between means	0.05500 ± 0.02189
95% confidence interval	0.001435 to 0.1086
R squared	0.5127
F test to compare variances	
F,DFn, Dfd	19.91, 3, 3
P value	0.0350
P value summary	*
Are variances significantly different?	Yes

Parameter	Value
Table Analyzed	Round 1 28-d growth
Column A	Lab Control
vs	vs
Column G	SD-LGF-010-A
Unpaired t test	
P value	0.1725
P value summary	ns
Are means signif. different? (P < 0.05)	No
One- or two-tailed P value?	One-tailed
t, df	t=1.025 df=6
How big is the difference?	
Mean ± SEM of column A	0.2325 ± 0.02136 N=4
Mean ± SEM of column G	0.2700 ± 0.02972 N=4
Difference between means	-0.03750 ± 0.03660
95% confidence interval	-0.1271 to 0.05206
R squared	0.1489
F test to compare variances	
F,DFn, Dfd	1.936, 3, 3
P value	0.6011
P value summary	ns
Are variances significantly different?	No

Appendix Table E-2cont. Analysis of 28-day Growth
Batch One, Initiation Date: 7/6/11

Parameter	Value
Table Analyzed	Round 1 28-d growth
Column A	Lab Control
vs	vs
Column H	SD-LGF-012-A
Unpaired t test	
P value	0.0247
P value summary	*
Are means signif. different? (P < 0.05)	Yes
One- or two-tailed P value?	One-tailed
t, df	t=2.456 df=6
How big is the difference?	
Mean ± SEM of column A	0.2325 ± 0.02136 N=4
Mean ± SEM of column H	0.3450 ± 0.04052 N=4
Difference between means	-0.1125 ± 0.04580
95% confidence interval	-0.2246 to -0.0004200
R squared	0.5014
F test to compare variances	
F,DFn, Dfd	3.598, 3, 3
P value	0.3209
P value summary	ns
Are variances significantly different?	No

Parameter	Value
Table Analyzed	Round 1 28-d growth
Column A	Lab Control
vs	vs
Column I	SD-NEL-007-A
Unpaired t test	
P value	0.0537
P value summary	ns
Are means signif. different? (P < 0.05)	No
One- or two-tailed P value?	One-tailed
t, df	t=1.892 df=6
How big is the difference?	
Mean ± SEM of column A	0.2325 ± 0.02136 N=4
Mean ± SEM of column I	0.1275 ± 0.05121 N=4
Difference between means	0.1050 ± 0.05549
95% confidence interval	-0.03078 to 0.2408
R squared	0.3737
F test to compare variances	
F,DFn, Dfd	5.749, 3, 3
P value	0.1848
P value summary	ns
Are variances significantly different?	No

Appendix Table E-3. Analysis of 42-day Survival
Batch One, Initiation Date: 7/6/11

Parameter	Value	Data Set-B	Data Set-C
Table Analyzed			
Transform of Transform of Transform of Round 1 42-d survival			
One-way analysis of variance			
P value	P<0.0001		
P value summary	***		
Are means signif. different? (P < 0.05)	Yes		
Number of groups	9		
F	33.16		
R squared	0.8081		
Bartlett's test for equal variances			
Bartlett's statistic (corrected)	6.510		
P value	0.5903		
P value summary	ns		
Do the variances differ signif. (P < 0.05)	No		
ANOVA Table	SS	df	MS
Treatment (between columns)	5.706	8	0.7133
Residual (within columns)	1.355	63	0.02151
Total	7.061	71	

	Lab Control	SD-DSA-001-A	SD-LGF-001-A	SD-LGF-003-A	SD-LGF-007-A	SD-LGF-009-A	SD-LGF-010-A	SD-LGF-012-A	SD-NEL-007-A
Number of values	8	8	8	8	8	8	8	8	8
Minimum	0.9630	0.8806	0.9630	0.7236	0.7236	0.0	0.4487	0.5520	0.3165
25% Percentile	1.011	0.9630	1.058	0.8806	0.8022	0.0	0.6825	0.6825	0.3826
Median	1.156	1.058	1.058	0.9630	0.8414	0.3165	0.7236	0.7629	0.5004
75% Percentile	1.253	1.058	1.253	1.108	0.9218	0.3826	0.7236	0.8414	0.5967
Maximum	1.253	1.253	1.253	1.253	1.058	0.5520	0.9630	0.9630	0.7236
Mean	1.132	1.037	1.119	0.9850	0.8641	0.2438	0.7089	0.7611	0.4999
Std. Deviation	0.1346	0.1096	0.1154	0.1835	0.1064	0.2175	0.1403	0.1305	0.1454
Std. Error	0.04761	0.03873	0.04081	0.06486	0.03761	0.07690	0.04962	0.04614	0.05141
Lower 95% CI of mean	1.019	0.9450	1.023	0.8317	0.7751	0.06194	0.5916	0.6520	0.3784
Upper 95% CI of mean	1.245	1.128	1.216	1.138	0.9530	0.4256	0.8262	0.8702	0.6215
D'Agostino & Pearson omnibus normality test									
K2	4.257	2.819	2.240	0.5882	1.198	1.586	2.874	0.01192	0.3297
P value	0.1190	0.2443	0.3263	0.7452	0.5495	0.4525	0.2376	0.9941	0.8480
Passed normality test (alpha=0.05)?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
P value summary	ns	ns	ns	ns	ns	ns	ns	ns	ns
Sum	9.056	8.293	8.956	7.880	6.912	1.950	5.671	6.089	4.000

Appendix Table E-3cont. Analysis of 42-day Survival
Batch One, Initiation Date: 7/6/11

Parameter	Value
Table Analyzed	Transform of Transform of Transform of Round 1 42-d survival
Column A	Lab Control
vs	vs
Column B	SD-DSA-001-A
Unpaired t test	
P value	0.0712
P value summary	ns
Are means signif. different? (P < 0.05)	No
One- or two-tailed P value?	One-tailed
t, df	t=1.554 df=14
How big is the difference?	
Mean ± SEM of column A	1.132 ± 0.04761 N=8
Mean ± SEM of column B	1.037 ± 0.03873 N=8
Difference between means	0.09537 ± 0.06137
95% confidence interval	-0.03627 to 0.2270
R squared	0.1471
F test to compare variances	
F,DFn, Dfd	1.510, 7, 7
P value	0.5998
P value summary	ns
Are variances significantly different?	No

Parameter	Value
Table Analyzed	Transform of Transform of Transform of Round 1 42-d survival
Column A	Lab Control
vs	vs
Column C	SD-LGF-001-A
Unpaired t test	
P value	0.4225
P value summary	ns
Are means signif. different? (P < 0.05)	No
One- or two-tailed P value?	One-tailed
t, df	t=0.1991 df=14
How big is the difference?	
Mean ± SEM of column A	1.132 ± 0.04761 N=8
Mean ± SEM of column C	1.119 ± 0.04081 N=8
Difference between means	0.01249 ± 0.06270
95% confidence interval	-0.1220 to 0.1470
R squared	0.002825
F test to compare variances	
F,DFn, Dfd	1.361, 7, 7
P value	0.6946
P value summary	ns
Are variances significantly different?	No

Appendix Table E-3cont. Analysis of 42-day Survival
Batch One, Initiation Date: 7/6/11

Parameter	Value
Table Analyzed	Transform of Transform of Transform of Round 1 42-d survival
Column A	Lab Control
vs	vs
Column D	SD-LGF-003-A
Unpaired t test	
P value	0.0446
P value summary	*
Are means signif. different? (P < 0.05)	Yes
One- or two-tailed P value?	One-tailed
t, df	t=1.826 df=14
How big is the difference?	
Mean ± SEM of column A	1.132 ± 0.04761 N=8
Mean ± SEM of column D	0.9850 ± 0.06486 N=8
Difference between means	0.1469 ± 0.08046
95% confidence interval	-0.02566 to 0.3195
R squared	0.1924
F test to compare variances	
F,DFn, Dfd	1.856, 7, 7
P value	0.4332
P value summary	ns
Are variances significantly different?	No

Parameter	Value
Table Analyzed	Transform of Transform of Transform of Round 1 42-d survival
Column A	Lab Control
vs	vs
Column E	SD-LGF-007-A
Unpaired t test	
P value	0.0003
P value summary	***
Are means signif. different? (P < 0.05)	Yes
One- or two-tailed P value?	One-tailed
t, df	t=4.415 df=14
How big is the difference?	
Mean ± SEM of column A	1.132 ± 0.04761 N=8
Mean ± SEM of column E	0.8641 ± 0.03761 N=8
Difference between means	0.2679 ± 0.06067
95% confidence interval	0.1377 to 0.3980
R squared	0.5820
F test to compare variances	
F,DFn, Dfd	1.602, 7, 7
P value	0.5493
P value summary	ns
Are variances significantly different?	No

Appendix Table E-3cont. Analysis of 42-day Survival
Batch One, Initiation Date: 7/6/11

Parameter	Value
Table Analyzed	Transform of Transform of Transform of Round 1 42-d survival
Column A	Lab Control
vs	vs
Column F	SD-LGF-009-A
Unpaired t test	
P value	P<0.0001
P value summary	***
Are means signif. different? (P < 0.05)	Yes
One- or two-tailed P value?	One-tailed
t, df	t=9.820 df=14
How big is the difference?	
Mean ± SEM of column A	1.132 ± 0.04761 N=8
Mean ± SEM of column F	0.2438 ± 0.07690 N=8
Difference between means	0.8882 ± 0.09044
95% confidence interval	0.6942 to 1.082
R squared	0.8732
F test to compare variances	
F,DFn, Dfd	2.609, 7, 7
P value	0.2290
P value summary	ns
Are variances significantly different?	No

Parameter	Value
Table Analyzed	Transform of Transform of Transform of Round 1 42-d survival
Column A	Lab Control
vs	vs
Column G	SD-LGF-010-A
Unpaired t test	
P value	P<0.0001
P value summary	***
Are means signif. different? (P < 0.05)	Yes
One- or two-tailed P value?	One-tailed
t, df	t=6.152 df=14
How big is the difference?	
Mean ± SEM of column A	1.132 ± 0.04761 N=8
Mean ± SEM of column G	0.7089 ± 0.04962 N=8
Difference between means	0.4230 ± 0.06876
95% confidence interval	0.2756 to 0.5705
R squared	0.7300
F test to compare variances	
F,DFn, Dfd	1.086, 7, 7
P value	0.9159
P value summary	ns
Are variances significantly different?	No

Appendix Table E-3cont. Analysis of 42-day Survival
Batch One, Initiation Date: 7/6/11

Parameter	Value
Table Analyzed	Transform of Transform of Transform of Round 1 42-d survival
Column A	Lab Control
vs	vs
Column H	SD-LGF-012-A
Unpaired t test	
P value	P<0.0001
P value summary	***
Are means signif. different? (P < 0.05)	Yes
One- or two-tailed P value?	One-tailed
t, df	t=5.594 df=14
How big is the difference?	
Mean ± SEM of column A	1.132 ± 0.04761 N=8
Mean ± SEM of column H	0.7611 ± 0.04614 N=8
Difference between means	0.3709 ± 0.06630
95% confidence interval	0.2287 to 0.5131
R squared	0.6909
F test to compare variances	
F,DFn, Dfd	1.064, 7, 7
P value	0.9366
P value summary	ns
Are variances significantly different?	No

Parameter	Value
Table Analyzed	Transform of Transform of Transform of Round 1 42-d survival
Column A	Lab Control
vs	vs
Column I	SD-NEL-007-A
Unpaired t test	
P value	P<0.0001
P value summary	***
Are means signif. different? (P < 0.05)	Yes
One- or two-tailed P value?	One-tailed
t, df	t=9.020 df=14
How big is the difference?	
Mean ± SEM of column A	1.132 ± 0.04761 N=8
Mean ± SEM of column I	0.4999 ± 0.05141 N=8
Difference between means	0.6320 ± 0.07007
95% confidence interval	0.4817 to 0.7823
R squared	0.8532
F test to compare variances	
F,DFn, Dfd	1.166, 7, 7
P value	0.8443
P value summary	ns
Are variances significantly different?	No

Appendix Table E-4. Analysis of 42-day Growth
Batch One, Initiation Date: 7/6/11

Parameter	Value
Table Analyzed	
Round 1 42-d growth	
Kruskal-Wallis test	
P value	0.0287
Exact or approximate P value?	Gaussian Approximation
P value summary	*
Do the medians vary signif. (P < 0.05)	Yes
Number of groups	9
Kruskal-Wallis statistic	17.14

Parameter	Value
Bartlett's test for equal variances	
Bartlett's statistic (corrected)	39.99
P value	P<0.0001
P value summary	***
Do the variances differ signif. (P < 0.05)	Yes

	Lab Control	SD-DSA-001-A	SD-LGF-001-A	SD-LGF-003-A	SD-LGF-007-A	SD-LGF-009-A	SD-LGF-010-A	SD-LGF-012-A	SD-NEL-007-A
Number of values	8	8	8	8	8	8	8	8	8
Minimum	0.1600	0.2700	0.2500	0.2500	0.2900	0.0	0.2400	0.3000	0.0400
25% Percentile	0.2350	0.3150	0.2650	0.2700	0.2950	0.0	0.3150	0.4050	0.2150
Median	0.2700	0.3450	0.3100	0.3000	0.3250	0.3500	0.3200	0.4550	0.3500
75% Percentile	0.2900	0.3650	0.3400	0.3350	0.4200	0.4600	0.3750	0.4850	0.4300
Maximum	0.3700	0.3700	0.3600	0.4300	0.4700	0.4800	0.4700	0.6800	0.5200
Mean	0.2650	0.3363	0.3050	0.3113	0.3550	0.2625	0.3413	0.4588	0.3188
Std. Deviation	0.06047	0.03623	0.04209	0.05817	0.07672	0.2231	0.07120	0.1082	0.1603
Std. Error	0.02138	0.01281	0.01488	0.02057	0.02712	0.07887	0.02517	0.03824	0.05668
Lower 95% CI of mean	0.2144	0.3060	0.2698	0.2626	0.2909	0.07600	0.2817	0.3683	0.1847
Upper 95% CI of mean	0.3156	0.3665	0.3402	0.3599	0.4191	0.4490	0.4008	0.5492	0.4528
D'Agostino & Pearson omnibus normality test									
K2	1.068	1.607	1.445	4.175	1.794	4.175	1.564	4.471	0.6017
P value	0.5863	0.4477	0.4854	0.1240	0.4079	0.1240	0.4576	0.1070	0.7402
Passed normality test (alpha=0.05)?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
P value summary	ns	ns	ns	ns	ns	ns	ns	ns	ns
Sum	2.120	2.690	2.440	2.490	2.840	2.100	2.730	3.670	2.550

Appendix Table E-4cont. Analysis of 42-day Growth
Batch One, Initiation Date: 7/6/11

Parameter	Value
Table Analyzed	Round 1 42-d growth
Column A	Lab Control
vs	vs
Column B	SD-DSA-001-A
Mann Whitney test	
P value	0.0103
Exact or approximate P value?	Gaussian Approximation
P value summary	*
Are medians signif. different? (P < 0.05)	Yes
One- or two-tailed P value?	One-tailed
Sum of ranks in column A,B	46.50 , 89.50
Mann-Whitney U	10.50

Parameter	Value
Table Analyzed	Round 1 42-d growth
Column A	Lab Control
vs	vs
Column C	SD-LGF-001-A
Mann Whitney test	
P value	0.0803
Exact or approximate P value?	Gaussian Approximation
P value summary	ns
Are medians signif. different? (P < 0.05)	No
One- or two-tailed P value?	One-tailed
Sum of ranks in column A,C	54.50 , 81.50
Mann-Whitney U	18.50

Parameter	Value
Table Analyzed	Round 1 42-d growth
Column A	Lab Control
vs	vs
Column D	SD-LGF-003-A
Mann Whitney test	
P value	0.0803
Exact or approximate P value?	Gaussian Approximation
P value summary	ns
Are medians signif. different? (P < 0.05)	No
One- or two-tailed P value?	One-tailed
Sum of ranks in column A,D	54.50 , 81.50
Mann-Whitney U	18.50

Appendix Table E-4cont. Analysis of 42-day Growth
Batch One, Initiation Date: 7/6/11

Parameter	Value
Table Analyzed	Round 1 42-d growth
Column A	Lab Control
vs	vs
Column E	SD-LGF-007-A
Mann Whitney test	
P value	0.0052
Exact or approximate P value?	Gaussian Approximation
P value summary	**
Are medians signif. different? (P < 0.05)	Yes
One- or two-tailed P value?	One-tailed
Sum of ranks in column A,E	44.50 , 91.50
Mann-Whitney U	8.500

Parameter	Value
Table Analyzed	Round 1 42-d growth
Column A	Lab Control
vs	vs
Column F	SD-LGF-009-A
Mann Whitney test	
P value	0.2527
Exact or approximate P value?	Gaussian Approximation
P value summary	ns
Are medians signif. different? (P < 0.05)	No
One- or two-tailed P value?	One-tailed
Sum of ranks in column A,F	61.50 , 74.50
Mann-Whitney U	25.50

Parameter	Value
Table Analyzed	Round 1 42-d growth
Column A	Lab Control
vs	vs
Column G	SD-LGF-010-A
Mann Whitney test	
P value	0.0103
Exact or approximate P value?	Gaussian Approximation
P value summary	*
Are medians signif. different? (P < 0.05)	Yes
One- or two-tailed P value?	One-tailed
Sum of ranks in column A,G	46.50 , 89.50
Mann-Whitney U	10.50

Appendix Table E-4cont. Analysis of 42-day Growth
Batch One, Initiation Date: 7/6/11

Parameter	Value
Table Analyzed	Round 1 42-d growth
Column A	Lab Control
vs	vs
Column H	SD-LGF-012-A
Mann Whitney test	
P value	0.0002
Exact or approximate P value?	Gaussian Approximation
P value summary	***
Are medians signif. different? (P < 0.05)	Yes
One- or two-tailed P value?	One-tailed
Sum of ranks in column A,H	37.50 , 98.50
Mann-Whitney U	1.500

Parameter	Value
Table Analyzed	Round 1 42-d growth
Column A	Lab Control
vs	vs
Column I	SD-NEL-007-A
Mann Whitney test	
P value	0.1641
Exact or approximate P value?	Gaussian Approximation
P value summary	ns
Are medians signif. different? (P < 0.05)	No
One- or two-tailed P value?	One-tailed
Sum of ranks in column A,I	58 , 78
Mann-Whitney U	22.00

Appendix Table E-5. Analysis of 42-day Reproduction
Batch One, Initiation Date: 7/6/11

Parameter	Value
Table Analyzed	
Round 1 reproduction	
Kruskal-Wallis test	
P value	P<0.0001
Exact or approximate P value?	Gaussian Approximation
P value summary	***
Do the medians vary signif. (P < 0.05)	Yes
Number of groups	9
Kruskal-Wallis statistic	33.08

	Lab Control	SD-DSA-001-A	SD-LGF-001-A	SD-LGF-003-A	SD-LGF-007-A	SD-LGF-009-A	SD-LGF-010-A	SD-LGF-012-A	SD-NEL-007-A
Number of values	8	8	8	8	8	4	8	8	5
Minimum	1.600	3.000	1.700	1.400	1.300	0.0	0.0	0.0	0.0
25% Percentile	2.350	3.250	2.550	1.900	2.600	0.0	0.2500	0.0	0.0
Median	3.600	3.550	4.000	3.100	5.250	0.0	1.550	0.6500	0.0
75% Percentile	4.550	5.250	4.200	3.500	6.750	5.000e-010	5.150	2.150	5.000e-008
Maximum	5.500	9.800	4.400	4.000	9.000	1.000e-009	6.300	2.500	1.000e-007
Mean	3.513	4.613	3.450	2.800	4.938	2.500e-010	2.525	1.013	2.000e-008
Std. Deviation	1.384	2.347	1.103	0.9487	2.754	5.000e-010	2.590	1.097	4.472e-008
Std. Error	0.4893	0.8297	0.3901	0.3354	0.9738	2.500e-010	0.9157	0.3880	2.000e-008
Lower 95% CI of mean	2.355	2.651	2.528	2.007	2.635	-5.456e-010	0.3597	0.09511	-3.553e-008
Upper 95% CI of mean	4.670	6.574	4.372	3.593	7.240	1.046e-009	4.690	1.930	7.553e-008
D'Agostino & Pearson omnibus normality test									
K2	0.4355	10.36	2.167	1.476	0.6956	0.0	2.838	3.564	0.0
P value	0.8043	0.0056	0.3384	0.4781	0.7062	0.0500	0.2419	0.1683	0.0500
Passed normality test (alpha=0.05)?	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
P value summary	ns	**	ns	ns	ns	*	ns	ns	*
Sum	28.10	36.90	27.60	22.40	39.50	1.000e-009	20.20	8.100	1.000e-007

Appendix Table E-5. Analysis of 42-day Reproduction
Batch One, Initiation Date: 7/6/11

Parameter	Value
Table Analyzed	Round 1 reproduction
Column A	Lab Control
vs	vs
Column D	SD-LGF-003-A
Unpaired t test	
P value	0.1248
P value summary	ns
Are means signif. different? (P < 0.05)	No
One- or two-tailed P value?	One-tailed
t, df	t=1.201 df=14
How big is the difference?	
Mean ± SEM of column A	3.513 ± 0.4893 N=8
Mean ± SEM of column D	2.800 ± 0.3354 N=8
Difference between means	0.7125 ± 0.5932
95% confidence interval	-0.5600 to 1.985
R squared	0.09341
F test to compare variances	
F,DFn, Dfd	2.128, 7, 7
P value	0.3403
P value summary	ns
Are variances significantly different?	No

Parameter	Value
Table Analyzed	Round 1 reproduction
Column A	Lab Control
vs	vs
Column E	SD-LGF-007-A
Unpaired t test	
P value	0.1060
P value summary	ns
Are means signif. different? (P < 0.05)	No
One- or two-tailed P value?	One-tailed
t, df	t=1.308 df=14
How big is the difference?	
Mean ± SEM of column A	3.513 ± 0.4893 N=8
Mean ± SEM of column E	4.938 ± 0.9738 N=8
Difference between means	-1.425 ± 1.090
95% confidence interval	-3.763 to 0.9126
R squared	0.1088
F test to compare variances	
F,DFn, Dfd	3.960, 7, 7
P value	0.0898
P value summary	ns
Are variances significantly different?	No

Appendix Table E-5. Analysis of 42-day Reproduction
Batch One, Initiation Date: 7/6/11

Parameter	Value
Table Analyzed	Round 1 reproduction
Column A	Lab Control
vs	vs
Column B	SD-DSA-001-A
Unpaired t test	
P value	0.1363
P value summary	ns
Are means signif. different? (P < 0.05)	No
One- or two-tailed P value?	One-tailed
t, df	t=1.142 df=14
How big is the difference?	
Mean ± SEM of column A	3.513 ± 0.4893 N=8
Mean ± SEM of column B	4.613 ± 0.8297 N=8
Difference between means	-1.100 ± 0.9632
95% confidence interval	-3.166 to 0.9661
R squared	0.08522
F test to compare variances	
F,DFn, Dfd	2.875, 7, 7
P value	0.1869
P value summary	ns
Are variances significantly different?	No

Parameter	Value
Table Analyzed	Round 1 reproduction
Column A	Lab Control
vs	vs
Column C	SD-LGF-001-A
Unpaired t test	
P value	0.4609
P value summary	ns
Are means signif. different? (P < 0.05)	No
One- or two-tailed P value?	One-tailed
t, df	t=0.09988 df=14
How big is the difference?	
Mean ± SEM of column A	3.513 ± 0.4893 N=8
Mean ± SEM of column C	3.450 ± 0.3901 N=8
Difference between means	0.0625 ± 0.6258
95% confidence interval	-1.280 to 1.405
R squared	0.0007120
F test to compare variances	
F,DFn, Dfd	1.574, 7, 7
P value	0.5642
P value summary	ns
Are variances significantly different?	No

Appendix Table E-5. Analysis of 42-day Reproduction
Batch One, Initiation Date: 7/6/11

Parameter	Value
Table Analyzed	Round 1 reproduction
Column A	Lab Control
vs	vs
Column F	SD-LGF-009-A
Unpaired t test	
P value	0.0003
P value summary	***
Are means signif. different? (P < 0.05)	Yes
One- or two-tailed P value?	One-tailed
t, df	t=4.953 df=10
How big is the difference?	
Mean ± SEM of column A	3.513 ± 0.4893 N=8
Mean ± SEM of column F	0.00000000025 ± 0.00000000025 N=4
Difference between means	3.513 ± 0.7091
95% confidence interval	1.933 to 5.092
R squared	0.7105
F test to compare variances	
F,DFn, Dfd	7662000000000000000, 7, 3
P value	P<0.0001
P value summary	***
Are variances significantly different?	Yes

Parameter	Value
Table Analyzed	Round 1 reproduction
Column A	Lab Control
vs	vs
Column G	SD-LGF-010-A
Unpaired t test	
P value	0.1788
P value summary	ns
Are means signif. different? (P < 0.05)	No
One- or two-tailed P value?	One-tailed
t, df	t=0.9511 df=14
How big is the difference?	
Mean ± SEM of column A	3.513 ± 0.4893 N=8
Mean ± SEM of column G	2.525 ± 0.9157 N=8
Difference between means	0.9875 ± 1.038
95% confidence interval	-1.240 to 3.215
R squared	0.06070
F test to compare variances	
F,DFn, Dfd	3.502, 7, 7
P value	0.1203
P value summary	ns
Are variances significantly different?	No

Appendix Table E-5. Analysis of 42-day Reproduction
Batch One, Initiation Date: 7/6/11

Parameter	Value
Table Analyzed	Round 1 reproduction
Column A	Lab Control
vs	vs
Column H	SD-LGF-012-A
Unpaired t test	
P value	0.0007
P value summary	***
Are means signif. different? (P < 0.05)	Yes
One- or two-tailed P value?	One-tailed
t, df	t=4.003 df=14
How big is the difference?	
Mean ± SEM of column A	3.513 ± 0.4893 N=8
Mean ± SEM of column H	1.013 ± 0.3880 N=8
Difference between means	2.500 ± 0.6245
95% confidence interval	1.161 to 3.839
R squared	0.5338
F test to compare variances	
F,DFn, Dfd	1.591, 7, 7
P value	0.5551
P value summary	ns
Are variances significantly different?	No

Parameter	Value
Table Analyzed	Round 1 reproduction
Column A	Lab Control
vs	vs
Column I	SD-NEL-007-A
Unpaired t test	
P value	P<0.0001
P value summary	***
Are means signif. different? (P < 0.05)	Yes
One- or two-tailed P value?	One-tailed
t, df	t=5.581 df=11
How big is the difference?	
Mean ± SEM of column A	3.513 ± 0.4893 N=8
Mean ± SEM of column I	0.00000002 ± 0.00000002 N=5
Difference between means	3.513 ± 0.6294
95% confidence interval	2.127 to 4.898
R squared	0.7390
F test to compare variances	
F,DFn, Dfd	957800000000000, 7, 4
P value	P<0.0001
P value summary	***
Are variances significantly different?	Yes

Batch Two – *Hyalella azteca*

Appendix Table E-6. Statistical Analysis of 28-day Survival
Batch Two, Initiation Date: 7/7/11

Parameter	Value	Data Set-B	Data Set-C
Table Analyzed			
Transform of Transform of Transform of Round 2 28-d survival			
One-way analysis of variance			
P value	P<0.0001		
P value summary	***		
Are means signif. different? (P < 0.05)	Yes		
Number of groups	9		
F	11.87		
R squared	0.4897		
Bartlett's test for equal variances			
Bartlett's statistic (corrected)	7.607		
P value	0.4728		
P value summary	ns		
Do the variances differ signif. (P < 0.05)	No		
ANOVA Table	SS	df	MS
Treatment (between columns)	2.174	8	0.2717
Residual (within columns)	2.265	99	0.02288
Total	4.439	107	

	Lab Control	SD-DSA-003-A	SD-DSA-006-A	SD-LGF-008-A	SD-LGF-112-A	SD-LGM-001-A	SD-LGM-003-A	SD-NEL-009-A	SD-NEL-021-A
Number of values	12	12	12	12	12	12	12	12	12
Minimum	0.7236	0.9630	0.9630	0.5520	0.5520	0.6415	0.3165	0.7236	0.8022
25% Percentile	0.9630	1.058	1.058	0.6415	0.7629	0.8414	0.7629	0.9630	0.9218
Median	1.058	1.253	1.156	0.7629	0.8826	0.8806	0.8806	1.011	1.058
75% Percentile	1.253	1.253	1.253	0.8414	0.9630	1.011	0.9630	1.253	1.058
Maximum	1.253	1.253	1.253	1.058	1.058	1.058	0.9630	1.253	1.253
Mean	1.065	1.180	1.148	0.7550	0.8645	0.8923	0.8150	1.059	1.008
Std. Deviation	0.1688	0.1106	0.1133	0.1595	0.1546	0.1306	0.1878	0.1917	0.1184
Std. Error	0.04873	0.03193	0.03270	0.04603	0.04462	0.03771	0.05420	0.05533	0.03418
Lower 95% CI of mean	0.9574	1.110	1.076	0.6537	0.7663	0.8093	0.6957	0.9368	0.9324
Upper 95% CI of mean	1.172	1.251	1.220	0.8563	0.9627	0.9753	0.9343	1.180	1.083
D'Agostino & Pearson omnibus normality test									
K2	0.6178	2.878	6.063	0.6952	0.7906	0.3423	13.32	1.530	0.7314
P value	0.7342	0.2372	0.0483	0.7064	0.6735	0.8427	0.0013	0.4654	0.6937
Passed normality test (alpha=0.05)?	Yes	Yes	No	Yes	Yes	Yes	No	Yes	Yes
P value summary	ns	ns	*	ns	ns	ns	**	ns	ns
Sum	12.78	14.16	13.77	9.060	10.37	10.71	9.780	12.70	12.09

Appendix Table E-6cont. Statistical Analysis of 28-day Survival
Batch Two, Initiation Date: 7/7/11

Parameter	Value
Table Analyzed	Transform of Transform of Transform of Round 2 28-d survival
Column A	Lab Control
vs	vs
Column B	SD-DSA-003-A
Unpaired t test	
P value	0.0299
P value summary	*
Are means signif. different? (P < 0.05)	Yes
One- or two-tailed P value?	One-tailed
t, df	t=1.985 df=22
How big is the difference?	
Mean ± SEM of column A	1.065 ± 0.04873 N=12
Mean ± SEM of column B	1.180 ± 0.03193 N=12
Difference between means	-0.1157 ± 0.05826
95% confidence interval	-0.2365 to 0.005170
R squared	0.1519
F test to compare variances	
F,DFn, Dfd	2.328, 11, 11
P value	0.1767
P value summary	ns
Are variances significantly different?	No

Parameter	Value
Table Analyzed	Transform of Transform of Transform of Round 2 28-d survival
Column A	Lab Control
vs	vs
Column C	SD-DSA-006-A
Unpaired t test	
P value	0.0853
P value summary	ns
Are means signif. different? (P < 0.05)	No
One- or two-tailed P value?	One-tailed
t, df	t=1.417 df=22
How big is the difference?	
Mean ± SEM of column A	1.065 ± 0.04873 N=12
Mean ± SEM of column C	1.148 ± 0.03270 N=12
Difference between means	-0.08314 ± 0.05868
95% confidence interval	-0.2048 to 0.03856
R squared	0.08362
F test to compare variances	
F,DFn, Dfd	2.221, 11, 11
P value	0.2014
P value summary	ns
Are variances significantly different?	No

Appendix Table E-6cont. Statistical Analysis of 28-day Survival
Batch Two, Initiation Date: 7/7/11

Parameter	Value
Table Analyzed	Transform of Transform of Transform of Round 2 28-d survival
Column A	Lab Control
vs	vs
Column D	SD-LGF-008-A
Unpaired t test	
P value	P<0.0001
P value summary	***
Are means signif. different? (P < 0.05)	Yes
One- or two-tailed P value?	One-tailed
t, df	t=4.619 df=22
How big is the difference?	
Mean ± SEM of column A	1.065 ± 0.04873 N=12
Mean ± SEM of column D	0.7550 ± 0.04603 N=12
Difference between means	0.3096 ± 0.06703
95% confidence interval	0.1706 to 0.4487
R squared	0.4924
F test to compare variances	
F,DFn, Dfd	1.121, 11, 11
P value	0.8535
P value summary	ns
Are variances significantly different?	No

Parameter	Value
Table Analyzed	Transform of Transform of Transform of Round 2 28-d survival
Column A	Lab Control
vs	vs
Column E	SD-LGF-112-A
Unpaired t test	
P value	0.0031
P value summary	**
Are means signif. different? (P < 0.05)	Yes
One- or two-tailed P value?	One-tailed
t, df	t=3.030 df=22
How big is the difference?	
Mean ± SEM of column A	1.065 ± 0.04873 N=12
Mean ± SEM of column E	0.8645 ± 0.04462 N=12
Difference between means	0.2002 ± 0.06607
95% confidence interval	0.06314 to 0.3372
R squared	0.2944
F test to compare variances	
F,DFn, Dfd	1.193, 11, 11
P value	0.7755
P value summary	ns
Are variances significantly different?	No

Appendix Table E-6cont. Statistical Analysis of 28-day Survival
Batch Two, Initiation Date: 7/7/11

Parameter	Value
Table Analyzed	Transform of Transform of Transform of Round 2 28-d survival
Column A	Lab Control
vs	vs
Column F	SD-LGM-001-A
Unpaired t test	
P value	0.0052
P value summary	**
Are means signif. different? (P < 0.05)	Yes
One- or two-tailed P value?	One-tailed
t, df	t=2.797 df=22
How big is the difference?	
Mean ± SEM of column A	1.065 ± 0.04873 N=12
Mean ± SEM of column F	0.8923 ± 0.03771 N=12
Difference between means	0.1724 ± 0.06162
95% confidence interval	0.04458 to 0.3002
R squared	0.2624
F test to compare variances	
F,DFn, Dfd	1.670, 11, 11
P value	0.4085
P value summary	ns
Are variances significantly different?	No

Parameter	Value
Table Analyzed	Transform of Transform of Transform of Round 2 28-d survival
Column A	Lab Control
vs	vs
Column G	SD-LGM-003-A
Unpaired t test	
P value	0.0012
P value summary	**
Are means signif. different? (P < 0.05)	Yes
One- or two-tailed P value?	One-tailed
t, df	t=3.426 df=22
How big is the difference?	
Mean ± SEM of column A	1.065 ± 0.04873 N=12
Mean ± SEM of column G	0.8150 ± 0.05420 N=12
Difference between means	0.2497 ± 0.07288
95% confidence interval	0.09856 to 0.4009
R squared	0.3479
F test to compare variances	
F,DFn, Dfd	1.237, 11, 11
P value	0.7303
P value summary	ns
Are variances significantly different?	No

Appendix Table E-6cont. Statistical Analysis of 28-day Survival
Batch Two, Initiation Date: 7/7/11

Parameter	Value
Table Analyzed	Transform of Transform of Transform of Round 2 28-d survival
Column A	Lab Control
vs	vs
Column H	SD-NEL-009-A
Unpaired t test	
P value	0.4672
P value summary	ns
Are means signif. different? (P < 0.05)	No
One- or two-tailed P value?	One-tailed
t, df	t=0.08332 df=22
How big is the difference?	
Mean ± SEM of column A	1.065 ± 0.04873 N=12
Mean ± SEM of column H	1.059 ± 0.05533 N=12
Difference between means	0.006143 ± 0.07373
95% confidence interval	-0.1468 to 0.1591
R squared	0.0003155
F test to compare variances	
F,DFn, Dfd	1.289, 11, 11
P value	0.6807
P value summary	ns
Are variances significantly different?	No

Parameter	Value
Table Analyzed	Transform of Transform of Transform of Round 2 28-d survival
Column A	Lab Control
vs	vs
Column I	SD-NEL-021-A
Unpaired t test	
P value	0.1742
P value summary	ns
Are means signif. different? (P < 0.05)	No
One- or two-tailed P value?	One-tailed
t, df	t=0.9582 df=22
How big is the difference?	
Mean ± SEM of column A	1.065 ± 0.04873 N=12
Mean ± SEM of column I	1.008 ± 0.03418 N=12
Difference between means	0.05703 ± 0.05952
95% confidence interval	-0.06641 to 0.1805
R squared	0.04007
F test to compare variances	
F,DFn, Dfd	2.033, 11, 11
P value	0.2549
P value summary	ns
Are variances significantly different?	No

Appendix Table E.7. Statistical Analysis of 28-day Growth
Batch Two, Initiation Date: 7/7/11

Parameter	Value	Data Set-B	Data Set-C
Table Analyzed			
Round 2 28-d growth			
One-way analysis of variance			
P value	0.0004		
P value summary	***		
Are means signif. different? (P < 0.05)	Yes		
Number of groups	9		
F	5.487		
R squared	0.6191		
ANOVA Table	SS	df	MS
Treatment (between columns)	0.1855	8	0.02319
Residual (within columns)	0.1141	27	0.004227
Total	0.2997	35	

	Lab Control	SD-DSA-003-A	SD-DSA-006-A	SD-LGF-008-A	SD-LGF-112-A	SD-LGM-001-A	SD-LGM-003-A	SD-NEL-009-A	SD-NEL-021-A
Number of values	4	4	4	4	4	4	4	4	4
Minimum	0.2640	0.2300	0.2200	0.2080	0.2070	0.2160	0.3800	0.2030	0.1740
25% Percentile	0.2805	0.2335	0.2275	0.2390	0.2575	0.2315	0.3860	0.2040	0.1890
Median	0.3200	0.2655	0.2520	0.2835	0.3505	0.2550	0.4435	0.2210	0.2105
75% Percentile	0.3855	0.2985	0.2810	0.3495	0.4445	0.2850	0.5190	0.2435	0.2210
Maximum	0.4280	0.3030	0.2930	0.4020	0.4960	0.3070	0.5430	0.2500	0.2250
Mean	0.3330	0.2660	0.2543	0.2943	0.3510	0.2583	0.4525	0.2238	0.2050
Std. Deviation	0.07114	0.03782	0.03298	0.08092	0.1230	0.03791	0.07940	0.02343	0.02241
Std. Error	0.03557	0.01891	0.01649	0.04046	0.06149	0.01895	0.03970	0.01171	0.01120
Lower 95% CI of mean	0.2198	0.2058	0.2018	0.1655	0.1553	0.1979	0.3262	0.1865	0.1693
Upper 95% CI of mean	0.4462	0.3262	0.3067	0.4230	0.5467	0.3186	0.5788	0.2610	0.2407
D'Agostino & Pearson omnibus normality test									
K2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
P value	0.0500	0.0500	0.0500	0.0500	0.0500	0.0500	0.0500	0.0500	0.0500
Passed normality test (alpha=0.05)?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
P value summary	*	*	*	*	*	*	*	*	*
Sum	1.332	1.064	1.017	1.177	1.404	1.033	1.810	0.8950	0.8200

Appendix Table E-7cont. Statistical Analysis of 28-day Growth
Batch Two, Initiation Date: 7/7/11

Parameter	Value
Table Analyzed	Round 2 28-d growth
Column A	Lab Control
vs	vs
Column B	SD-DSA-003-A
Unpaired t test	
P value	0.0737
P value summary	ns
Are means signif. different? (P < 0.05)	No
One- or two-tailed P value?	One-tailed
t, df	t=1.663 df=6
How big is the difference?	
Mean ± SEM of column A	0.3330 ± 0.03557 N=4
Mean ± SEM of column B	0.2660 ± 0.01891 N=4
Difference between means	0.0670 ± 0.04028
95% confidence interval	-0.03157 to 0.1656
R squared	0.3156
F test to compare variances	
F,DFn, Dfd	3.539, 3, 3
P value	0.3269
P value summary	ns
Are variances significantly different?	No

Parameter	Value
Table Analyzed	Round 2 28-d growth
Column A	Lab Control
vs	vs
Column C	SD-DSA-006-A
Unpaired t test	
P value	0.0457
P value summary	*
Are means signif. different? (P < 0.05)	Yes
One- or two-tailed P value?	One-tailed
t, df	t=2.009 df=6
How big is the difference?	
Mean ± SEM of column A	0.3330 ± 0.03557 N=4
Mean ± SEM of column C	0.2543 ± 0.01649 N=4
Difference between means	0.07875 ± 0.03921
95% confidence interval	-0.01719 to 0.1747
R squared	0.4021
F test to compare variances	
F,DFn, Dfd	4.653, 3, 3
P value	0.2387
P value summary	ns
Are variances significantly different?	No

Appendix Table E-7. Statistical Analysis of 28-day Growth
Batch Two, Initiation Date: 7/7/11

Parameter	Value
Table Analyzed	Round 2 28-d growth
Column A	Lab Control
vs	vs
Column D	SD-LGF-008-A
Unpaired t test	
P value	0.2495
P value summary	ns
Are means signif. different? (P < 0.05)	No
One- or two-tailed P value?	One-tailed
t, df	t=0.7193 df=6
How big is the difference?	
Mean ± SEM of column A	0.3330 ± 0.03557 N=4
Mean ± SEM of column D	0.2943 ± 0.04046 N=4
Difference between means	0.03875 ± 0.05387
95% confidence interval	-0.09308 to 0.1706
R squared	0.07938
F test to compare variances	
F,DFn, Dfd	1.294, 3, 3
P value	0.8373
P value summary	ns
Are variances significantly different?	No

Parameter	Value
Table Analyzed	Round 2 28-d growth
Column A	Lab Control
vs	vs
Column E	SD-LGF-112-A
Unpaired t test	
P value	0.4042
P value summary	ns
Are means signif. different? (P < 0.05)	No
One- or two-tailed P value?	One-tailed
t, df	t=0.2534 df=6
How big is the difference?	
Mean ± SEM of column A	0.3330 ± 0.03557 N=4
Mean ± SEM of column E	0.3510 ± 0.06149 N=4
Difference between means	-0.01800 ± 0.07104
95% confidence interval	-0.1918 to 0.1558
R squared	0.01059
F test to compare variances	
F,DFn, Dfd	2.989, 3, 3
P value	0.3926
P value summary	ns
Are variances significantly different?	No

Appendix Table E-7cont. Statistical Analysis of 28-day Growth
Batch 2, Initiation Date: 7/7/11

Parameter	Value
Table Analyzed	Round 2 28-d growth
Column A	Lab Control
vs	vs
Column F	SD-LGM-001-A
Unpaired t test	
P value	0.0565
P value summary	ns
Are means signif. different? (P < 0.05)	No
One- or two-tailed P value?	One-tailed
t, df	t=1.855 df=6
How big is the difference?	
Mean ± SEM of column A	0.3330 ± 0.03557 N=4
Mean ± SEM of column F	0.2583 ± 0.01895 N=4
Difference between means	0.07475 ± 0.04030
95% confidence interval	-0.02387 to 0.1734
R squared	0.3644
F test to compare variances	
F,DFn, Dfd	3.522, 3, 3
P value	0.3287
P value summary	ns
Are variances significantly different?	No

Parameter	Value
Table Analyzed	Round 2 28-d growth
Column A	Lab Control
vs	vs
Column G	SD-LGM-003-A
Unpaired t test	
P value	0.0331
P value summary	*
Are means signif. different? (P < 0.05)	Yes
One- or two-tailed P value?	One-tailed
t, df	t=2.242 df=6
How big is the difference?	
Mean ± SEM of column A	0.3330 ± 0.03557 N=4
Mean ± SEM of column G	0.4525 ± 0.03970 N=4
Difference between means	-0.1195 ± 0.05330
95% confidence interval	-0.2499 to 0.01093
R squared	0.4558
F test to compare variances	
F,DFn, Dfd	1.246, 3, 3
P value	0.8609
P value summary	ns
Are variances significantly different?	No

Appendix Table E-7cont. Statistical Analysis of 28-day Growth
Batch Two, Initiation Date: 7/7/11

Parameter	Value
Table Analyzed	Round 2 28-d growth
Column A	Lab Control
vs	vs
Column H	SD-NEL-009-A
Unpaired t test	
P value	0.0134
P value summary	*
Are means signif. different? (P < 0.05)	Yes
One- or two-tailed P value?	One-tailed
t, df	t=2.917 df=6
How big is the difference?	
Mean ± SEM of column A	0.3330 ± 0.03557 N=4
Mean ± SEM of column H	0.2238 ± 0.01171 N=4
Difference between means	0.1093 ± 0.03745
95% confidence interval	0.01761 to 0.2009
R squared	0.5865
F test to compare variances	
F,DFn, Dfd	9.219, 3, 3
P value	0.1008
P value summary	ns
Are variances significantly different?	No

Parameter	Value
Table Analyzed	Round 2 28-d growth
Column A	Lab Control
vs	vs
Column I	SD-NEL-021-A
Unpaired t test	
P value	0.0070
P value summary	**
Are means signif. different? (P < 0.05)	Yes
One- or two-tailed P value?	One-tailed
t, df	t=3.432 df=6
How big is the difference?	
Mean ± SEM of column A	0.3330 ± 0.03557 N=4
Mean ± SEM of column I	0.2050 ± 0.01120 N=4
Difference between means	0.1280 ± 0.03729
95% confidence interval	0.03675 to 0.2193
R squared	0.6626
F test to compare variances	
F,DFn, Dfd	10.08, 3, 3
P value	0.0895
P value summary	ns
Are variances significantly different?	No

Appendix Table E-8. Statistical Analysis of 42-day Survival
Batch Two, Initiation Date: 7/7/11

Parameter	Value	Data Set-B	Data Set-C
Table Analyzed			
Transform of Transform of Transform of Round 2 42-d survival			
One-way analysis of variance			
P value	P<0.0001		
P value summary	***		
Are means signif. different? (P < 0.05)	Yes		
Number of groups	9		
F	7.122		
R squared	0.4749		
Bartlett's test for equal variances			
Bartlett's statistic (corrected)	5.135		
P value	0.7430		
P value summary	ns		
Do the variances differ signif. (P < 0.05)	No		
ANOVA Table	SS	df	MS
Treatment (between columns)	1.065	8	0.1331
Residual (within columns)	1.177	63	0.01869
Total	2.242	71	

	Lab Control	SD-DSA-003-A	SD-DSA-006-A	SD-LGF-008-A	SD-LGF-112-A	SD-LGM-001-A	SD-LGM-003-A	SD-NEL-009-A	SD-NEL-021-A
Number of values	8	8	8	8	8	8	8	8	8
Minimum	0.8806	0.9630	0.8806	0.5520	0.7236	0.6415	0.7236	0.7236	0.6415
25% Percentile	1.011	1.058	1.058	0.5967	0.7629	0.7236	0.8414	0.8826	0.8806
Median	1.058	1.253	1.058	0.8022	0.9630	0.8806	0.8806	0.9630	1.011
75% Percentile	1.253	1.253	1.058	0.8806	1.011	0.8806	0.9630	1.058	1.058
Maximum	1.253	1.253	1.253	1.058	1.058	1.058	0.9630	1.253	1.058
Mean	1.097	1.168	1.060	0.7711	0.9068	0.8336	0.8820	0.9730	0.9498
Std. Deviation	0.1427	0.1210	0.09970	0.1777	0.1380	0.1311	0.08547	0.1625	0.1473
Std. Error	0.05047	0.04279	0.03525	0.06284	0.04880	0.04636	0.03022	0.05744	0.05207
Lower 95% CI of mean	0.9779	1.067	0.9770	0.6226	0.7914	0.7240	0.8106	0.8372	0.8267
Upper 95% CI of mean	1.217	1.269	1.144	0.9197	1.022	0.9433	0.9535	1.109	1.073
D'Agostino & Pearson omnibus normality test									
K2	0.9353	2.049	3.938	0.2161	1.992	0.07854	1.519	0.2913	5.747
P value	0.6265	0.3589	0.1396	0.8976	0.3694	0.9615	0.4679	0.8645	0.0565
Passed normality test (alpha=0.05)?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
P value summary	ns	ns	ns	ns	ns	ns	ns	ns	ns
Sum	8.778	9.346	8.483	6.169	7.255	6.669	7.056	7.784	7.598

Appendix Table E-8cont. Statistical Analysis of 42-day Survival
Batch Two, Initiation Date: 7/7/11

Parameter	Value
Table Analyzed	Transform of Transform of Transform of Round 2 42-d survival
Column A	Lab Control
vs	vs
Column B	SD-DSA-003-A
Unpaired t test	
P value	0.1508
P value summary	ns
Are means signif. different? (P < 0.05)	No
One- or two-tailed P value?	One-tailed
t, df	t=1.073 df=14
How big is the difference?	
Mean ± SEM of column A	1.097 ± 0.05047 N=8
Mean ± SEM of column B	1.168 ± 0.04279 N=8
Difference between means	-0.07098 ± 0.06617
95% confidence interval	-0.2129 to 0.07095
R squared	0.07596
F test to compare variances	
F,DFn, Dfd	1.391, 7, 7
P value	0.6743
P value summary	ns
Are variances significantly different?	No

Parameter	Value
Table Analyzed	Transform of Transform of Transform of Round 2 42-d survival
Column A	Lab Control
vs	vs
Column C	SD-DSA-006-A
Unpaired t test	
P value	0.2794
P value summary	ns
Are means signif. different? (P < 0.05)	No
One- or two-tailed P value?	One-tailed
t, df	t=0.5990 df=14
How big is the difference?	
Mean ± SEM of column A	1.097 ± 0.05047 N=8
Mean ± SEM of column C	1.060 ± 0.03525 N=8
Difference between means	0.03688 ± 0.06156
95% confidence interval	-0.09517 to 0.1689
R squared	0.02499
F test to compare variances	
F,DFn, Dfd	2.050, 7, 7
P value	0.3644
P value summary	ns
Are variances significantly different?	No

Appendix Table E-8cont. Statistical Analysis of 42-day Survival
Batch Two, Initiation Date: 7/7/11

Parameter	Value
Table Analyzed	Transform of Transform of Transform of Round 2 42-d survival
Column A	Lab Control
vs	vs
Column D	SD-LGF-008-A
Unpaired t test	
P value	0.0006
P value summary	***
Are means signif. different? (P < 0.05)	Yes
One- or two-tailed P value?	One-tailed
t, df	t=4.046 df=14
How big is the difference?	
Mean ± SEM of column A	1.097 ± 0.05047 N=8
Mean ± SEM of column D	0.7711 ± 0.06284 N=8
Difference between means	0.3261 ± 0.08060
95% confidence interval	0.1532 to 0.4990
R squared	0.5390
F test to compare variances	
F,DFn, Dfd	1.550, 7, 7
P value	0.5771
P value summary	ns
Are variances significantly different?	No

Parameter	Value
Table Analyzed	Transform of Transform of Transform of Round 2 42-d survival
Column A	Lab Control
vs	vs
Column E	SD-LGF-112-A
Unpaired t test	
P value	0.0084
P value summary	**
Are means signif. different? (P < 0.05)	Yes
One- or two-tailed P value?	One-tailed
t, df	t=2.712 df=14
How big is the difference?	
Mean ± SEM of column A	1.097 ± 0.05047 N=8
Mean ± SEM of column E	0.9068 ± 0.04880 N=8
Difference between means	0.1904 ± 0.07020
95% confidence interval	0.03984 to 0.3410
R squared	0.3445
F test to compare variances	
F,DFn, Dfd	1.069, 7, 7
P value	0.9317
P value summary	ns
Are variances significantly different?	No

Appendix Table E-8. Statistical Analysis of 42-day Survival
Batch Two, Initiation Date: 7/7/11

Parameter	Value
Table Analyzed	Transform of Transform of Transform of Round 2 42-d survival
Column A	Lab Control
vs	vs
Column F	SD-LGM-001-A
Unpaired t test	
P value	0.0009
P value summary	***
Are means signif. different? (P < 0.05)	Yes
One- or two-tailed P value?	One-tailed
t, df	t=3.847 df=14
How big is the difference?	
Mean ± SEM of column A	1.097 ± 0.05047 N=8
Mean ± SEM of column F	0.8336 ± 0.04636 N=8
Difference between means	0.2636 ± 0.06853
95% confidence interval	0.1166 to 0.4106
R squared	0.5138
F test to compare variances	
F,DFn, Dfd	1.185, 7, 7
P value	0.8286
P value summary	ns
Are variances significantly different?	No

Parameter	Value
Table Analyzed	Transform of Transform of Transform of Round 2 42-d survival
Column A	Lab Control
vs	vs
Column G	SD-LGM-003-A
Unpaired t test	
P value	0.0013
P value summary	**
Are means signif. different? (P < 0.05)	Yes
One- or two-tailed P value?	One-tailed
t, df	t=3.659 df=14
How big is the difference?	
Mean ± SEM of column A	1.097 ± 0.05047 N=8
Mean ± SEM of column G	0.8820 ± 0.03022 N=8
Difference between means	0.2152 ± 0.05882
95% confidence interval	0.08904 to 0.3414
R squared	0.4888
F test to compare variances	
F,DFn, Dfd	2.789, 7, 7
P value	0.1993
P value summary	ns
Are variances significantly different?	No

Appendix Table E-8 Statistical Analysis of 42-day Survival
Batch Two, Initiation Date: 7/7/11

Parameter	Value
Table Analyzed	Transform of Transform of Transform of Round 2 42-d survival
Column A	Lab Control
vs	vs
Column H	SD-NEL-009-A
Unpaired t test	
P value	0.0633
P value summary	ns
Are means signif. different? (P < 0.05)	No
One- or two-tailed P value?	One-tailed
t, df	t=1.624 df=14
How big is the difference?	
Mean ± SEM of column A	1.097 ± 0.05047 N=8
Mean ± SEM of column H	0.9730 ± 0.05744 N=8
Difference between means	0.1242 ± 0.07646
95% confidence interval	-0.03980 to 0.2882
R squared	0.1586
F test to compare variances	
F,DFn, Dfd	1.295, 7, 7
P value	0.7414
P value summary	ns
Are variances significantly different?	No

Parameter	Value
Table Analyzed	Transform of Transform of Transform of Round 2 42-d survival
Column A	Lab Control
vs	vs
Column I	SD-NEL-021-A
Unpaired t test	
P value	0.0307
P value summary	*
Are means signif. different? (P < 0.05)	Yes
One- or two-tailed P value?	One-tailed
t, df	t=2.034 df=14
How big is the difference?	
Mean ± SEM of column A	1.097 ± 0.05047 N=8
Mean ± SEM of column I	0.9498 ± 0.05207 N=8
Difference between means	0.1475 ± 0.07251
95% confidence interval	-0.008074 to 0.3030
R squared	0.2280
F test to compare variances	
F,DFn, Dfd	1.064, 7, 7
P value	0.9366
P value summary	ns
Are variances significantly different?	No

Appendix Table E-10. Statistical Analysis of 42-day Reproduction
Batch Two, Initiation Date: 7/7/11

Parameter	Value	Data Set-B	Data Set-C
Table Analyzed			
Round 2 reproduction			
One-way analysis of variance			
P value	0.3802		
P value summary	ns		
Are means signif. different? (P < 0.05)	No		
Number of groups	9		
F	1.093		
R squared	0.1218		
Bartlett's test for equal variances			
Bartlett's statistic (corrected)	11.00		
P value	0.2016		
P value summary	ns		
Do the variances differ signif. (P < 0.05)	No		
ANOVA Table	SS	df	MS
Treatment (between columns)	86.36	8	10.80
Residual (within columns)	622.4	63	9.880
Total	708.8	71	

	Lab Control	SD-DSA-003-A	SD-DSA-006-A	SD-LGF-008-A	SD-LGF-112-A	SD-LGM-001-A	SD-LGM-003-A	SD-NEL-009-A	SD-NEL-021-A
Number of values	8	8	8	8	8	8	8	8	8
Minimum	2.800	2.600	1.000	0.3000	0.7000	0.0	0.0	2.700	0.5000
25% Percentile	3.300	4.250	1.700	2.400	4.400	1.300	3.150	3.300	1.500
Median	5.500	6.000	2.700	4.650	6.050	5.450	5.000	4.300	4.900
75% Percentile	7.550	7.750	3.550	8.100	9.850	6.400	5.500	8.250	7.150
Maximum	8.800	8.400	6.400	14.00	14.00	6.500	8.300	10.50	12.00
Mean	5.538	5.875	2.913	5.575	6.913	4.100	4.450	5.613	4.950
Std. Deviation	2.375	2.161	1.703	4.459	4.226	2.739	2.494	2.952	3.940
Std. Error	0.8398	0.7641	0.6022	1.577	1.494	0.9684	0.8818	1.044	1.393
Lower 95% CI of mean	3.552	4.068	1.488	1.847	3.379	1.810	2.365	3.144	1.656
Upper 95% CI of mean	7.523	7.682	4.337	9.303	10.45	6.390	6.535	8.081	8.244
D'Agostino & Pearson omnibus normality test									
K2	3.072	0.8865	4.338	1.580	0.2586	3.081	1.036	1.658	0.6756
P value	0.2152	0.6419	0.1143	0.4539	0.8787	0.2143	0.5959	0.4365	0.7134
Passed normality test (alpha=0.05)?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
P value summary	ns	ns	ns	ns	ns	ns	ns	ns	ns
Sum	44.30	47.00	23.30	44.60	55.30	32.80	35.60	44.90	39.60

Appendix Table E.97. Statistical Analysis of 42-day Growth
Batch Two, Initiation Date: 7/7/11

Parameter	Value
Table Analyzed	
Round 2 42-d growth	
Kruskal-Wallis test	
P value	0.0073
Exact or approximate P value?	Gaussian Approximation
P value summary	**
Do the medians vary signif. (P < 0.05)	Yes
Number of groups	9
Kruskal-Wallis statistic	20.96

	Lab Control	SD-DSA-003-A	SD-DSA-006-A	SD-LGF-008-A	SD-LGF-112-A	SD-LGM-001-A	SD-LGM-003-A	SD-NEL-009-A	SD-NEL-021-A
Number of values	8	8	8	8	8	8	8	8	8
Minimum	0.2400	0.1180	0.1760	0.1300	0.1700	0.1740	0.2940	0.1590	0.1760
25% Percentile	0.2745	0.1570	0.2095	0.2480	0.3425	0.4030	0.3575	0.2625	0.2185
Median	0.2895	0.2085	0.2670	0.4475	0.3950	0.4485	0.3845	0.2840	0.2905
75% Percentile	0.3230	0.3110	0.3045	0.6990	0.4635	0.5690	0.4380	0.4055	0.3335
Maximum	0.3270	0.4310	0.3660	0.9330	0.6780	0.8730	0.4700	0.5550	0.6780
Mean	0.2926	0.2378	0.2630	0.4815	0.4063	0.4860	0.3905	0.3273	0.3174
Std. Deviation	0.03055	0.1056	0.05348	0.2875	0.1469	0.2019	0.05716	0.1298	0.1576
Std. Error	0.01080	0.03734	0.02244	0.1017	0.05193	0.07137	0.02021	0.04590	0.05571
Lower 95% CI of mean	0.2671	0.1494	0.2099	0.2411	0.2835	0.3172	0.3427	0.2187	0.1856
Upper 95% CI of mean	0.3182	0.3261	0.3161	0.7219	0.5290	0.6548	0.4383	0.4358	0.4491
D'Agostino & Pearson omnibus normality test									
K2	0.3512	1.280	0.1340	0.9466	1.533	2.271	0.07041	1.514	12.75
P value	0.8390	0.5273	0.9352	0.6230	0.4646	0.3212	0.9654	0.4690	0.0017
Passed normality test (alpha=0.05)?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
P value summary	ns	ns	ns	ns	ns	ns	ns	ns	**
Sum	2.341	1.902	2.104	3.852	3.250	3.888	3.124	2.618	2.539

Parameter	Value
Table Analyzed	Round 2 42-d growth
Column A	Lab Control
vs	vs
Column B	SD-DSA-003-A
Mann Whitney test	
P value	0.0974
Exact or approximate P value?	Exact
P value summary	ns
Are medians signif. different? (P < 0.05)	No
One- or two-tailed P value?	One-tailed
Sum of ranks in column A,B	81 , 55
Mann-Whitney U	19.00

Appendix F
Chain of Custody Documentation
Sample Check In

USEPA Contract Laboratory Program
Generic Chain of Custody

Reference Case 41470
Client No.
SDG No.

Date Shipped	6/24/2011
Carrier Name	FedEx
Airbill #	8729[illegible]8570
Shipped to	Nautilus Environmental 4340 Vandever Ave. San Diego, CA 92[illegible] (858) 587-7333

Chain of Custody Record

Relinquished By	(Date / Time)	Received By	(Date / Time)
[illegible]	6/24/11 1100	[illegible]	6/24/11 11:00
[illegible]	6/24/11 1535	[illegible]	6/24/11 15:35
[illegible]	6/24/11 16:50	[illegible]	6/24/11 16:55

Sampler Signature

For Lab Use Only
Lab Contract No.
Unit Price
Transfer To
Lab Contract No.
Unit Price

SAMPLE No.	MATRIX SAMPLER	CONC TYPE	ANALYSIS TURNAROUND	Pkg No. PRESERVATIVE Bottles	STATION LOCATION	SAMPLE COLLECT DATE TIME	FOR LAB USE ONLY Sample Condition Upon Receipt
[illegible]	Sediment CEM KAMAL	[illegible]	[illegible]	[illegible]	SD-DSA-001-A	[illegible] 6/23/2011	5.8°C Good condition, single bag
[illegible]	Sediment CEM KAMAL	[illegible]	[illegible]	[illegible]	SD-DSA-002-A	[illegible] 6/23/2011	5.5°C Good condition, single bag
[illegible]	Sediment CEM KAMAL	[illegible]	[illegible]	[illegible]	SD-DSA-003-A	[illegible] 6/23/2011	6.2°C Good Condition, single bag
[illegible]	Sediment CEM KAMAL	[illegible]	[illegible]	[illegible]	SD-DSA-004-A	[illegible] 6/23/2011	6.1°C Good Condition, single bag
[illegible]	Sediment CEM KAMAL	[illegible]	[illegible]	[illegible]	SD-DSA-005-A	[illegible] 6/23/2011	3.2°C Good condition double bagged
[illegible]	Sediment EARL BYRON	[illegible]	[illegible]	[illegible]	SD-DSA-006-A	[illegible] 6/23/2011	6.2°C Good condition, double bagged
[illegible]	Sediment EARL BYRON	[illegible]	[illegible]	[illegible]	SD-DSA-007-A	[illegible] 6/23/2011	6.2°C Good Condition, double bagged
[illegible]	Sediment EARL BYRON	[illegible]	[illegible]	[illegible]	SD-DSA-008-A	[illegible] 6/23/2011	9.0°C Good Condition, double bagged
[illegible]	Sediment CEM KAMAL	[illegible]	[illegible]	[illegible]	SD-DSA-009-A	[illegible] 6/23/2011	6.9°C Good condition, double bagged
[illegible]	Sediment CEM KAMAL	[illegible]	[illegible]	[illegible]	SD-DSA-010-A	[illegible] 6/23/2011	9.8°C Good condition, double bagged

Shipment for Case Complete Y/N	Sample(s) to be used for laboratory QC	Additional Sampler Signature(s)	Cooler Temperature Upon Receipt	Chain of Custody Seal Number

Analysis Key: Concentration: L - Low, M - Medium, H - High; Type/Designate: Composite - C, Grab - G
Chlorine: P - Pass

Custody Seal Intact? Y/N | Shipment Intact? Y/N

TR Number: 9-173516087-062411-0001

PP provides preliminary results. Requests for preliminary results will increase analytical costs.
Send Copy to: Sample Management Office, Attn: Heather Rauch, CSC, 14500 Conference Center Dr., Chantilly, VA 20151-3816, Phone: 703-818-1056, Fax: [illegible]

USEPA Contract Laboratory Program
Generic Chain of Custody

Reference Case 41470
Client No.:
SDG No.:
L

Date Shipped:	6/24/2011
Carrier Name:	FedEx
Airbill:	9720625[illegible]6575
Shipped to:	Nautilus Environmental 4340 Vardever Ave. San Diego CA 92120 (858) 587-7333

Chain of Custody Record

Relinquished By	(Date / Time)	Received By	(Date / Time)
1 [illegible]	6/24/11 1100	[illegible]	6/24/11 11:00
2 [illegible]	6/24/11 1535	[illegible]	6/24/11 15:35
3 [illegible]	6/24/11 16:50	[illegible]	6/24/11 16:55
4			

Sampler Signature:

For Lab Use Only
Lab Contract No.:
Unit Price:
Transfer To:
Lab Contract No.:
Unit Price:

SAMPLE No.	MATRIX/ SAMPLER	CONC/ TYPE	ANALYSIS/ TURNAROUND	TAG No./ PRESERVATIVE/ Bottles	STATION LOCATION	SAMPLE COLLECT DATE/TIME		FOR LAB USE ONLY Sample Condition On Receipt
SD-LCR-113-A	Sediment/ CEM KAMALI	G	Toxicity (21)	M6879[illegible]	SD-LCR-113-A	S 6/23/2011	15:35	
SD-LGM-001-A	Sediment/ CEM KAMALI	G	Toxicity (21)	M6472[illegible]	SD-LGM-001-A	S 6/23/2011	9:00	9.7°C Good condition, double bagged
SD-LGM-003-A	Sediment/ CEM KAMALI	G	Toxicity (21)	M6484[illegible]	SD-LGM-003-A	S 6/23/2011	17:05	9.0°C Good condition, double bagged
SD-NEL-007-A	Sediment/ CEM KAMALI	G	Toxicity (21)	M6548[illegible]	SD-NEL-007-A	S 6/23/2011	9:50	5.5°C Good condition, single bagged
SD-NEL-009-A	Sediment/ CEM KAMALI	G	Toxicity (21)	M6587[illegible]	SD-NEL-009-A	S 6/23/2011	9:30	10.5°C Good condition, single bagged
SD-NEL-021-A	Sediment/ CEM KAMALI	G	Toxicity (21)	M6496[illegible]	SD-NEL-021-A	S 6/23/2011	9:10	7.8°C Good condition, single bagged

Shipment for Case Complete?N	Sample(s) to be used for laboratory QC	Additional Sampler Signature(s):	Cooler Temperature Upon Receipt:	Chain of Custody Seal Number:
Analysis Key Toxicity = Toxicity	Concentration: L = Low M = Low/Medium H = High	Type/Designate: Composite = C, Grab = G		Custody Seal Intact? ___ Shipment Iced? ___

TR Number: 9-173516087-062411-0001

FR provides preliminary results. Requests for preliminary results will increase analytical costs.
Send Copy To: Sample Management Office, Attn: Heather Rane, CSC, 15000 Conference Center Dr., Chantilly, VA 20151-3819, Phone 703/818-4200, Fax [illegible]

Nautilus Environmental
4340 Vandever Avenue
San Diego, CA 92120

Sediment Sample
Check-In Information

Client: EPA

Log-in Nos.: 11-3057 to 3072

Project: Halaco

Test Type(s): 42-d freshwater amphipod

Sample ID	Collection Date & Time	Receipt Date & Time	Receipt Temp. (°C)	No. Containers	Container Type	Approx. Total Volume Received (L)	Sample Description	Tech Intials
SD-DSA-001-A	6/23/11 1400	6/24/11 1655	5.8	2	plastic bags	10	sediment	SL/PA
SD-DSA-003A	1335		5.5					
SD-DSA-006-A	1316		6.2					
SD-LGF-001-A	1125		6.1					
SD-LGF-003-A	1200		3.2					
SD-LGF-007-A	1625		6.2					
SD-LGF-008-A	1635		6.2					
SD-LGF-009-A	1650		8.0					
SD-LGF-010-A	1600		6.9					
SD-LGF-012-A	1535		9.0					
SD-LGF-112-A	1535		9.0					
SD-LGM-001-A	0900		9.7					

Samples Shipped Via: Fed ex

Sub-samples for additional chemistry: Ammonia

COC Present? (Y) N

Sieving Required? (Y) N

Screen Size: 0.5 mm

Comments:

QC Check: KL 8/29/11

Final Review: SO 8/31/11

Nautilus Environmental
4340 Vandever Avenue
San Diego, CA 92120

Sediment Sample
Check-In Information

Client: EPA

Log-in Nos.: 11-3057 to 3072

Project: Halaco

Test Type(s): 42-d freshwater amphipod

Sample ID	Collection Date & Time	Receipt Date & Time	Receipt Temp. (°C)	No. Containers	Container Type	Approx. Total Volume Received (L)	Sample Description	Tech Intials
SD-LGM-003-A	6/23/11 1705	6/24/11 1655	9.0	2	plastic bags	10	Sediment	SL/PA
SD-NEL-007-A	0950		5.5					
SD-NEL-009-A	0930		10.5					
SD-NEL-021-A	0910		7.8					

Samples Shipped Via: Fed ex

Sub-samples for additional chemistry: Ammonia

COC Present? (Y) N

Sieving Required? (Y) N

Screen Size: 0.5mm

Comments:

QC Check: KL 8/29/11

Final Review : SO 8/31/11