



Appendix B

Memorandum: Moss Beach Ranch Background Zinc in Soil
Rancho Corral de Tierra, San Mateo County, California

19 October 2012

MEMORANDUM

To: Meghan Scanlon (Peninsula Open Space Trust)

From: Bruce Castle, P.G. (Erler & Kalinowski, Inc.)
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Subject: Moss Beach Ranch Background Zinc in Soil
Rancho Corral de Tierra, San Mateo County, California
(EKI B10014.01)

cc: Viktoriya Sirova (National Park Service)

Introduction

This memorandum presents an analysis of background zinc concentrations in soils at the Trailer Disposal and Former Debris Areas at Moss Beach Ranch, of the Rancho Corral de Tierra property located in San Mateo County, California (these areas are referred to as the “Site”). The objective of the project was to characterize naturally occurring, i.e., background, zinc concentrations through an analysis of Site soil data. The assumption inherent in this approach is that a set of spatially distributed Site soil samples will contain both zinc concentrations that reflect background conditions and zinc concentrations that reflect contamination overprinted on background conditions. The analysis described in this memorandum generally follows California EPA Department of Toxic Substances Control (“DTSC”) guidance for estimating background metals concentrations from ordinary Site data (“*Selecting Inorganic Constituents as Chemicals of Potential Concern at Risk Assessments at Hazardous Waste Sites and Permitted Facilities*” dated February 1997).

Based on the analysis presented in this memorandum, the background zinc concentration threshold is proposed to be 138 mg/kg.

Sample Selection

Zinc data are available for soil samples collected from the Site during two sampling events (Attachment A). Five soil samples were collected and analyzed for zinc in April 2011, as a part of a Phase II investigation at the Site (EKI, 2011). These samples included two surface multi-increment samples, and three discrete samples collected from the ground surface to 5 feet below ground surface (“ft bgs”). In February 2012, thirty-five additional soil samples were collected from the Site and analyzed for zinc, as part of a follow-up to the 2011 investigation (EKI, 2012). These samples ranged in depth from 0.5 ft bgs to 4.5 ft bgs. Zinc concentrations in these 40 samples ranged from 21.9 mg/kg to 1,130 mg/kg.

The Site is an operating horse ranch that has been minimally developed. It is known that some of the sampled soil was fill likely placed at the time of development of the area as a horse ranch; it is speculated that this fill may have been of local origins.

All samples were analyzed using the same low-detection limit analytical method, EPA Method 6020, which is less susceptible to positive interference problems than EPA Method 6010.

Outlier Identification

In accordance with the DTSC (2009) guidance, outliers were identified using the Fourth Spread technique. Based on the boxplot analysis (Figure 1), the four highest concentrations, i.e., 1,130 mg/kg, 239 mg/kg, 213 mg/kg and 185 mg/kg, were identified as outliers and removed from the dataset. The sample containing the next highest zinc concentration (145 mg/kg in sample TRE-1) also contained total petroleum hydrocarbons (“TPH”) in the diesel and motor oil ranges, indicative of contamination (i.e., 145 mg/kg and 223 mg/kg, respectively). In an abundance of caution, the TRE-1 zinc concentration was also removed from the dataset because it may have been associated with the petroleum impact. The resulting data set was therefore made up of samples with zinc concentrations less than 100 mg/kg. This approach provides a more conservative, lower background threshold concentration than would have been calculated strictly following the DTSC guidelines.

Population Analysis

The remaining data were plotted on a cumulative probability plot (Figure 2) using Minitab (version 16), which shows that these data fit a single population lognormal model (i.e., the p value shown on the plot is greater than 0.05). The 95th percentile of the fitted lognormal distribution is 110 mg/kg. Like all population distribution models, the model shown on Figure 2 is a statistical entity based on a limited amount of data. As such, it cannot capture the full range of concentrations that could be found were the sampling and analysis truly exhaustive. In particular, it is impossible to know the true maximum background zinc concentration; it can only be estimated. If it were possible to collect and analyze other, entirely independent sets of samples, the resulting estimates of the 95th percentile would likely all be different. Hence, fundamental uncertainty is associated with such an estimate. This fundamental uncertainty is addressed by associating a statistical tolerance interval with the distributional threshold selected to represent the upper end of background. A tolerance interval is a calculated range of values within which an individual measurement should fall when measuring a known value. In this instance, the tolerance interval being calculated is associated with the 95th percentile of the zinc background population distribution. A 95% upper tolerance level (“UTL”) on the 95th percentile functionally means that we are 95% confident that the given interval contains at least 95% of all future measurements we could make if we were attempting to determine the 95th percentile from many additional independent investigations. The 95% UTL is represented on Figure 2 by the curving line above the linear fitted population model.

Hence, the upper end of the lognormal model has following population parameters:

<u>Parameter</u>	<u>Zinc Concentration (mg/kg)</u>
95 th Percentile	110
95% UTL on the 95 th percentile	138

As a conservative measure, analytical data for samples with zinc concentrations between 110 mg/kg and 138 mg/kg will be reviewed to determine if other analytes (e.g., petroleum hydrocarbons) are present above cleanup goals. In such cases, the zinc may be representative of environmental impacts, not background conditions. As shown on Figure 2, the 95% UTL on the 95th percentile of the modeled background population, i.e., 138 mg/kg, is recommended as the background zinc concentration for the Site.

References

EKI, 2011. *Result of Sampling Investigations, Rancho Corral de Tierra, Montara, San Mateo County, California*, Erler & Kalinowski, Inc., 21 September 2011.

EKI, 2012. Draft Memorandum: Results of Additional Sampling at Trailer Disposal and Former Debris Areas, Moss Beach Ranch, Rancho Corral de Tierra, San Mateo County, California, dated 16 April 2012.

Attachments

Attachment A: Soil Sampling Results for Zinc

Attachment A
SUMMARY OF SOIL SAMPLE RESULTS FOR ZINC
Moss Beach Ranch
Rancho Corral de Tierra, Moss Beach, California

Sample ID	Sample Date	Sample Type	Sample Depth (fet bgs)	Zinc (mg/kg dry weight)
Trailer Disposal Area				
TRA-0.5	2/22/2012	Discrete	0.5	60.0
TRA-2	2/22/2012	Discrete	2	68.4
TRA-4.5	2/22/2012	Discrete	4.5	33.4
TRB-0.5	2/22/2012	Discrete	0.5	76.4
TRB-2	2/22/2012	Discrete	2	47.8
TRB-4	2/22/2012	Discrete	4	29.9
TRC-0.5	2/22/2012	Discrete	0.5	90.9
TRD-0.5	2/22/2012	Discrete	0.5	54.1
TRD-2	2/22/2012	Discrete	2	59.4
TRE-1	2/22/2012	Discrete	1	145
TRE-3	2/22/2012	Discrete	3	86.7
TRE-4	2/22/2012	Discrete	4	24.3
TRF-1	2/22/2012	Discrete	1	94.6
TRF-3	2/22/2012	Discrete	3	42.5
TRG-0.75	2/22/2012	Discrete	0.75	87.7
TRG-2	2/22/2012	Discrete	2	25.2
TRH-2	2/22/2012	Discrete	2	94.4
TRH-4.5	2/22/2012	Discrete	4.5	37.1
TRI-0.75	2/22/2012	Discrete	0.75	85.1
TRI-2	2/22/2012	Discrete	2	69.9
TRI-4	2/22/2012	Discrete	4	43.4
TRJ-1	2/22/2012	Discrete	1	239
TRJ-3.5	2/22/2012	Discrete	3.5	22.3
TRK-1	2/22/2012	Discrete	1	56.9
TRK-3	2/22/2012	Discrete	3	21.9
CREEK A	2/24/2012	Discrete	surface	60.8
CREEK B	2/24/2012	Discrete	surface	61.9
CREEK C	2/24/2012	Discrete	surface	88.8
CREEK D	2/24/2012	Discrete	surface	92.3
CREEK E	2/24/2012	Discrete	surface	61.7
MBSTR1-1.5	4/19/2011	Discrete	1.5	1,130
MBRTR1-5	4/19/2011	Discrete	5	44.7
MBRTRS	4/18/2011	MIS	surface	79.5
MBRSHS	4/19/2011	Discrete	surface	185
Former Debris Area				
FDA-2.5	2/23/2012	Discrete	2.5	37.8
FDG-2.5	2/23/2012	Discrete	2.5	36.7
FDH-2.5	2/23/2012	Discrete	2.5	29.4
FDI-2.5	2/23/2012	Discrete	2.5	55.8
FDM-2.5	2/23/2012	Discrete	2.5	44.3
MBR9S	4/18/2011	MIS	surface	213

Attachment A
SUMMARY OF SOIL SAMPLE RESULTS FOR ZINC
Moss Beach Ranch
Rancho Corral de Tierra, Moss Beach, California

Abbreviations:

ft bgs - Feet below ground surface
mg/kg - Milligrams per kilogram
MIS - Multi-Increment Sample

Notes:

(a) Zinc was analyzed using US EPA Method 3050B/6020A. Samples analyzed by K-Prime, Inc. of Santa Rosa, California.

Figure 1
Boxplot of Zinc in Soil

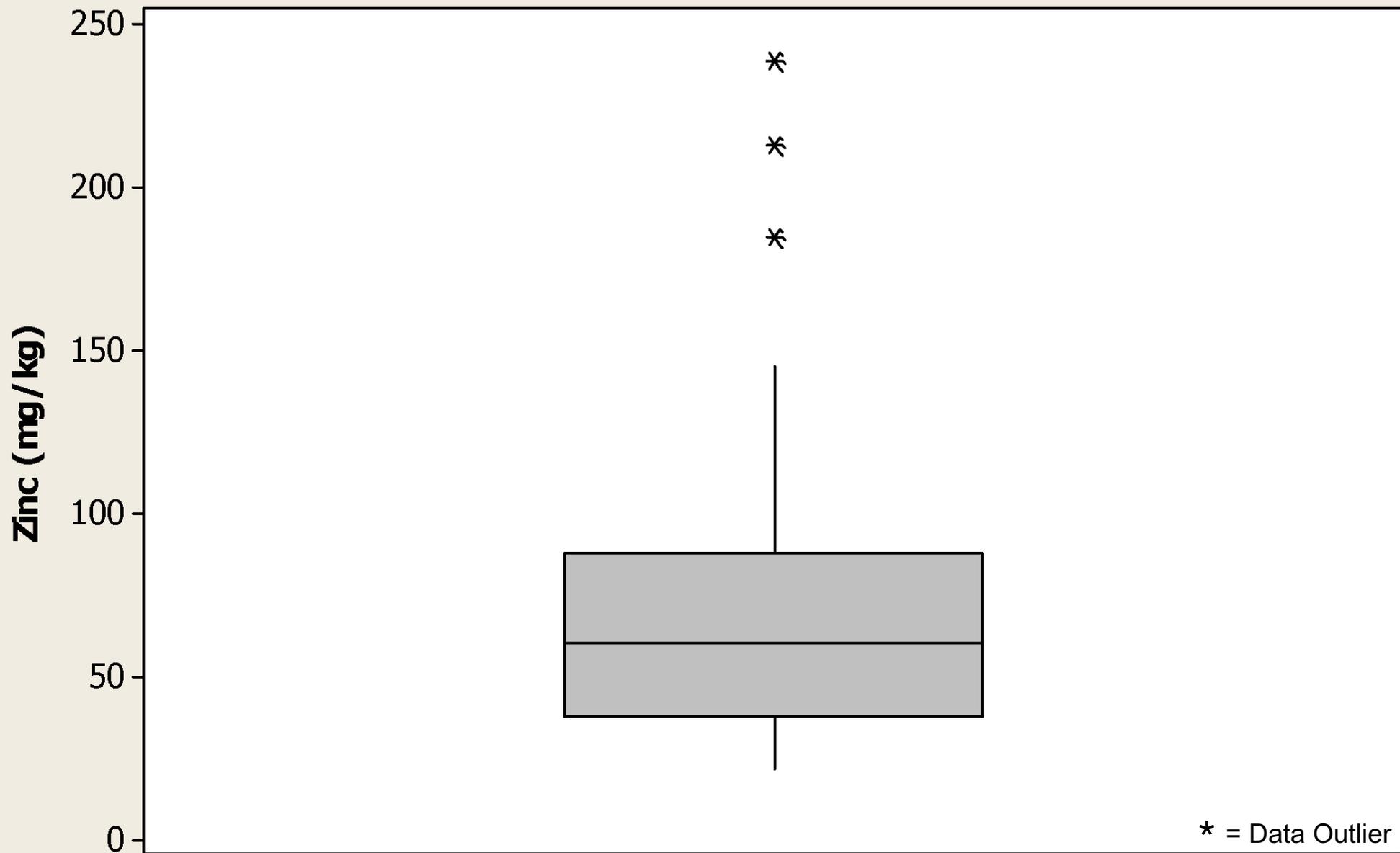
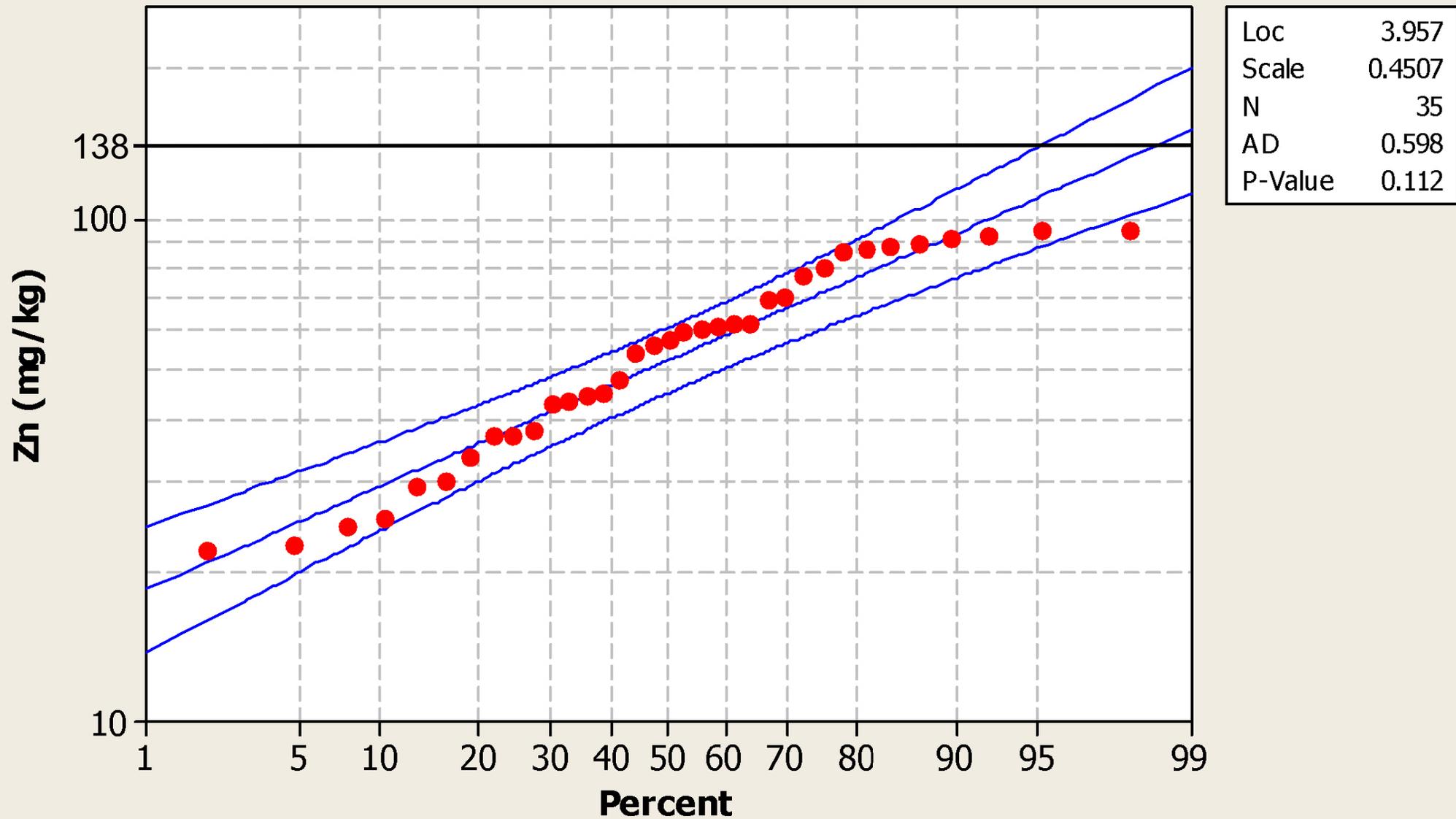


Figure 2
Probability Plot of Zinc in Soil
Lognormal - 95% CI





Appendix C

Tables from *Results of Sampling Investigations*

Rancho Corral de Tierra, Montara, San Mateo County, California

TABLE 1
SUMMARY OF APRIL 2011 SAMPLING EVENT
Rancho Corral de Tierra, San Mateo County

Location	No. of Samples	Sample IDs	Decision Unit Description	Analyses (a)	Environmental Concern	Sampling Approach (b)
Former Horse Barn (behind Royal Palm Ave.)	2 Soil Samples	FHBS, FHBD	Former barn structure	Total Lead	Lead in soil from weathering of lead-based paint	Multi-increment soil samples, 1 from surface, 1 from 1 ft bgs
	2 Soil Samples	FHBCS, FHBCD	Former corral areas	Pesticides	Pesticides in soil	Multi-increment soil samples, 1 from surface, 1 from 1 ft bgs
	NOT SAMPLED: Insufficient surface water available	none	Un-named ephemeral surface water drainage	none	Contaminants in surface water runoff from former horse ranch operation	Insufficient water in drainage - no flow
Renegade Ranch	10 Samples of Building Materials	EKI1108-RR-PB01, 02, 03, 04, 05, 06, 07 EKI1108-RR-01A, -01B, -02A	Horse sheds and associated wood fencing	Total Lead (7 samples), Asbestos (3 samples)	Lead in paint, asbestos in building materials	Samples of suspected lead or asbestos-containing materials, e.g., paint, roofing, plasterboard
	8 Soil Samples + 1 Duplicate Soil Sample	RR1S, 2S, 3S, 4S, 4D, 5S, 6S, RRL, RR1S-DUP	Soil at base of horse barns and fences	Total Lead	Lead in soil from weathering of lead-based paint	Multi-increment soil samples, 7 from surface, 1 from 1 ft bgs
	2 Surface Water Samples	RR-U1, RR-D1	Un-named creek running through Renegade Ranch	E.coli & Enterococcus, Alkalinity, NO ₃ -N, NO ₂ -N, PO ₄ , TSS, BOD, Pesticides	Surface runoff from horse ranch operations	One upstream and one downstream surface water sample

TABLE 1
SUMMARY OF APRIL 2011 SAMPLING EVENT
 Rancho Corral de Tierra, San Mateo County

Location	No. of Samples	Sample IDs	Decision Unit Description	Analyses (a)	Environmental Concern	Sampling Approach (b)
Denniston Creek Valley	12 Samples of Building Materials (Eastern, Middle & Western Ruins)	EKI1108-DC-01A, -01B, -02A, -02B, -03A, -03B, -04A, -05A, -05B, -06A, -06B, -07A	Building materials from three clusters of ruins	Total Lead	Lead in paint, asbestos containing materials	Samples of suspected lead-based paint, and structure remnants for asbestos
	6 Soil Samples	DCVERS, DCVERD, DCVMRS, DCVMRD, DCVWRS, DCVWRD	Soil at base of structure ruins	Total Lead, Pesticides, Asbestos	Lead in soil from weathering of lead-based paint, pesticides from former agricultural use, asbestos from structure deterioration	Multi-increment soil samples, 3 from surface, 3 from 1 ft bgs Asbestos performed on surface soil samples only
	1 Soil Sample	DCVERDU	Eastern ruins debris disposal area	TPH, metals, pesticides	Contaminants in soil from disposed materials	Multi-increment surface soil sample
	1 Soil Sample + 1 Duplicate	DCVDUS, DCVDUS-DUP	Middle ruins debris disposal area	TPH, metals, pesticides	Contaminants in soil from disposed materials	Multi-increment surface soil samples
	3 Soil Samples (dredge spoils)	DREDGEL, DREDGEM, DREDGEU	Current dredge spoils disposal site	Metals, pesticides	Contaminants in dredge material	Multi-increment soil samples (targeting three distinct dredge material disposal events)
	2 Surface Water Samples	DCV-U1, -D1	Denniston Creek	E.coli & Enterococcus, Alkalinity, NO ₃ -N, NO ₂ -N, PO ₄ , TSS, BOD, Pesticides	Surface runoff or groundwater inflow to creek from agricultural lands	One upstream and one downstream surface water sample

TABLE 1
SUMMARY OF APRIL 2011 SAMPLING EVENT
 Rancho Corral de Tierra, San Mateo County

Location	No. of Samples	Sample IDs	Decision Unit Description	Analyses (a)	Environmental Concern	Sampling Approach (b)
Ocean View Ranch	18 Samples of Building Materials	EKI1108-OVF-PB01, -PB02, -PB03, -PB04, -PB05, -PB06, -PB07, -PB08, -PB09, -PB10, -PB11, EKII108-OVF-01A, -01B, -02A, -02B, -03A, -03B, -04A	Interior and exterior samples of mobile home, barn, club house, corral fences, sheds.	Total Lead (11 samples), Asbestos (7 samples)	Lead in paint, asbestos in building materials	Samples of suspected lead or asbestos-containing materials, e.g., paint, roofing, flooring
	6 Soil Samples	OVR1ES, OVR1ED, OVR1EL, OVR1WS; OVR2NS, OVR2SS	Soil at base of western fencerows	Total Lead	Lead in soil from weathering of lead-based paint	Multi-increment soil samples, 5 from surface, 1 from 1 ft bgs
	3 Soil Samples + 1 Duplicate Soil Sample	OVR3S, OVR4S, OVR4S-DUP, OVR5S	Soil at base of compound fences	Total Lead	Lead in soil from weathering of lead-based paint	Multi-increment surface soil samples
	5 Soil Samples	OVR6S, OVR6L, OVR7L, OVR8S, OVR8D	Soil at base of structures and at surface water runoff area off concrete	Total Lead	Lead in soil from weathering of lead-based paint	Multi-increment soil samples, 4 from surface, 1 from 1 ft bgs
	2 Soil Samples	OVR9S, OVR9D	Former possible corral area east of barn	Pesticides	Pesticides in soil	Multi-increment soil samples, 1 from surface, 1 from 1 ft bgs
	1 Soil Sample	OVRTA	Former trailer area debris	TPH, metals, pesticides	Household refuse	Multi-increment surface soil sample
	1 Soil Sample	OVR10S	Wash rack area	TPH, metals, pesticides	Potential chemicals in wash rinse water	Multi-increment surface soil sample
	3 Surface Water Samples	OVR-U1, -M1, -D1	Martini Creek	E.coli & Enterococcus, Alkalinity, NO ₃ -N, NO ₂ -N, PO ₄ , TSS, BOD, Pesticides	Surface runoff or groundwater inflow to creek from horse property and former trailer area	One upstream ("U") and one downstream ("D") surface water sample, one sample immediately downstream of former trailer area ("M")
	1 Supply-Well Sample	OVR-W1	Water supply well near existing mobile home	TPH, BTEX, pesticides	Contaminants in groundwater	1 groundwater sample

TABLE 1
SUMMARY OF APRIL 2011 SAMPLING EVENT
 Rancho Corral de Tierra, San Mateo County

Location	No. of Samples	Sample IDs	Decision Unit Description	Analyses (a)	Environmental Concern	Sampling Approach (b)
Ember Ridge Ranch	24 Samples of Building Materials	EKI1108-ERR-PB01, -PB02, -PB03, -PB04, -PB05, -PB06, -PB07, -PB08, -PB09, -PB10, -PB11, -PB12, -PB13, -PB14, -PB15, -PB16, -PB17, -PB18, -PB19, -PB20 EKI1108-ERR-01A, -02A, -03A, -04A	Interior and exterior samples of mobile home, horse shed, tool shed, tack house, fences, houses, barns, chicken coop, misc. structures.	Total Lead (20 samples), Asbestos (4 samples)	Lead in paint, asbestos in building materials	Samples of suspected lead or asbestos-containing materials, e.g., paint, roofing, flooring
	10 Soil Samples + 1 Duplicate Soil Sample	ERR1S, ERR2D, ERR2S, ERR2L, ERR3S, ERR4S, ERR5S, ERR5S-DUP, ERR7S, ERR8S, ERR12S	Soil at base of structures	Total Lead	Lead in soil from weathering of lead-based paint	Multi-increment soil samples, 10 from surface, 1 from 1 ft bgs
	1 Soil Sample	ERR10S	Soil at base of former structure and current wash rack area	TPH, metals, pesticides	Lead in soil from weathering of lead-based paint, Potential chemicals in wash rinse water	Multi-increment surface soil sample
	2 Soil Samples	ERR11S, ERR11D	Soil at base of former structure	Total Lead (2 Samples)	Lead in soil from weathering of lead-based paint	Multi-increment soil samples, 1 from surface, 1 from 1 ft bgs
	2 Soil Samples	ERRFF1, ERRFF2	Soil from former commercial flower fields	Pesticides	Pesticides in soil from former agricultural use	Multi-increment surface soil samples
	1 Soil Sample	ERRSM	Hummocky soil mound	Pesticides	Unknown contents that comprise mound	Multi-increment soil sample
	2 Surface Water Samples	ERR-U1, ERR-D1	San Vicente Creek	E.coli & Enterococcus, Alkalinity, NO ₃ -N, NO ₂ -N, PO ₄ , TSS, BOD, Pesticides	Surface runoff from horse property	2 surface water samples (one upstream, one downstream)
	1 Supply-Well Sample	ERR-W1	Water-supply well in well house near barn	TPH, BTEX, pesticides	Contaminants in groundwater	1 groundwater sample from well

TABLE 1
SUMMARY OF APRIL 2011 SAMPLING EVENT
 Rancho Corral de Tierra, San Mateo County

Location	No. of Samples	Sample IDs	Decision Unit Description	Analyses (a)	Environmental Concern	Sampling Approach (b)
Moss Beach Ranch	21 Samples of Building Materials	EKI1108-MB-PB01, -PB02, -PB03, -PB04, -PB05, -PB06, -PB07, -PB08, -PB09, -PB10, -PB11, -PB12, -PB13 EKI1108-MB-01A, -01B, -02A, -02B, -02C, -03A, -03B, -03C	Interior and exterior samples of trailer, bunk house, horse shed, misc. structures.	Total Lead (13 samples), Asbestos (8 samples)	Lead in paint, asbestos in building materials	Samples of suspected lead or asbestos-containing materials, e.g., paint, roofing, flooring
	6 Soil Samples + 1 Duplicate Soil Sample	MBR1S, MBR2S, MBR3S, MBR4S, MBR4S-DUP, MBR4D, MBR4L	Soil at base of older structures	Total Lead	Lead in soil from weathering of lead-based paint	Multi-increment soil samples, 6 from surface, 1 from 1 ft bgs
	6 Soil Samples	MBR5S, MBR6S, MBR7S, MBR8S, MBR9S	Soil at base of newer structures	Total Lead	Lead in soil from weathering of lead-based paint	Multi-increment surface soil samples
	3 Soil Samples	MBRTRS, MBRTR1-1.5, MBRTR1-5	Trailer disposal site - buried container with oily substance; household refuse	TPH, Metals, Pesticides (3 Samples) VOCs (2 Samples)	Potential for subsurface contamination and other buried debris	1 multi-increment surface soil sample; discrete soil samples from 1.5 ft bgs and 5 ft bgs
	1 Soil Sample	MBR9S	Former debris pile	TPH, metals, pesticides	Contaminants in soil from former debris pile	Multi-increment surface soil sample
	1 Soil Sample	MBRSHS	Mechanical Shed	TPH, metals, pesticides	Contaminants in soil due to chemical use or equipment maintenance	Discrete surface soil sample
	2 Surface Water Samples	MBR-M1, MBR-D1	San Vicente Creek	E.coli & Enterococcus, Alkalinity, NO ₃ -N, NO ₂ -N, PO ₄ , TSS, BOD, Pesticides	Surface runoff from horse ranch operations	2 surface water samples (one midstream, one downstream)
	1 Supply-Well Sample	MBR-W1	Water-supply well in pasture east of creek	TPH, BTEX, pesticides	Contaminants in groundwater	1 groundwater sample from well nearest main compound

TABLE 1
SUMMARY OF APRIL 2011 SAMPLING EVENT
Rancho Corral de Tierra, San Mateo County

Abbreviations:

TPH - Total Petroleum Hydrocarbons as diesel fuel and motor oil

NO³-N - Nitrogen as Nitrate

NO²-N - Nitrogen as Nitrite

PO⁴ - Ortho-Phosphate

TSS - Total Suspended Solids

BOD - Biological Oxygen Demand

Notes:

(a) See Tables 2 through 7 for description of analytical methods performed for these samples.

(b) Multi-Increment samples ("MIS") were collected, prepared, and analyzed in accordance with the *State of Hawai'i Department of Health Office of Hazard Evaluation and Emergency Response's Technical Guidance Manual for the Implementation of the Hawai'i State Contingency Plan*, Interim Final – November 12, 2009.

TABLE 2
SUMMARY OF SOIL SAMPLE ANALYTICAL RESULTS FOR METALS
 Rancho Corral de Tierra, Montara, California

Sample ID	Decision Unit Description	Sample Type (a)	Sample Date	Sample Depth (ft bgs)	Analytical Results (mg/kg dry weight) (b) (c)																
					Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Lead	Mercury	Molybdenum	Nickel	Selenium	Silver	Thallium	Vanadium	Zinc
Former Horse Barn																					
FHBS	Former Horse Barn	MIS	4/21/2011	surface	--	--	--	--	--	--	--	--	5.43	--	--	--	--	--	--	--	--
FHBD	Former Horse Barn	MIS	4/21/2011	1	--	--	--	--	--	--	--	--	4.68	--	--	--	--	--	--	--	--
Renegade Ranch																					
RR1S	Location 1 - soil at base of structures	MIS	4/20/2011	surface	--	--	--	--	--	--	--	--	8.94	--	--	--	--	--	--	--	--
RR1S-DUP			4/21/2011	surface	--	--	--	--	--	--	--	--	6.2	--	--	--	--	--	--	--	--
RR2S	Location 2 - soil at base of structures	MIS	4/20/2011	surface	--	--	--	--	--	--	--	--	4.29	--	--	--	--	--	--	--	--
RR3S	Location 3 - soil at base of structures	MIS	4/20/2011	surface	--	--	--	--	--	--	--	--	16.4	--	--	--	--	--	--	--	--
RR4S	Location 4 - soil at base of structures	MIS	4/20/2011	surface	--	--	--	--	--	--	--	--	9.87	--	--	--	--	--	--	--	--
RR4D	Location 4 - soil at base of structures	MIS	4/21/2011	1	--	--	--	--	--	--	--	--	7.37	--	--	--	--	--	--	--	--
RR5S	Location 5 - soil at base of structures	MIS	4/20/2011	surface	--	--	--	--	--	--	--	--	4.58	--	--	--	--	--	--	--	--
RR6S	Location 6 - soil at base of structures	MIS	4/20/2011	surface	--	--	--	--	--	--	--	--	10.4	--	--	--	--	--	--	--	--
RRL	Soil at base of structures (lateral)	MIS	4/21/2011	surface	--	--	--	--	--	--	--	--	4.94	--	--	--	--	--	--	--	--
<i>RWQCB ESL for Residential Shallow Soil (<3 meters) (d)</i>					<i>6.3</i>	<i>0.39</i>	<i>750</i>	<i>4</i>	<i>1.7</i>	<i>1,000</i>	<i>40</i>	<i>230</i>	<i>200(f)</i>	<i>1.3</i>	<i>40</i>	<i>150</i>	<i>10</i>	<i>20</i>	<i>1.3</i>	<i>16</i>	<i>600</i>
<i>Background Metals: Northern Santa Clara County (e)</i>					<i>na</i>	<i>0.5-20</i>	<i>1.7-490</i>	<i>0.25-3.2</i>	<i>0.4-14</i>	<i>9.5-170</i>	<i>0.92-29</i>	<i>4.6-67</i>	<i>3.4-54</i>	<i>0.02-1.3</i>	<i>0.26-14</i>	<i>6-145</i>	<i>0.12-4</i>	<i>0.3-4.8</i>	<i>0.2-3.8</i>	<i>0.79-120</i>	<i>7.8-120</i>

TABLE 2
SUMMARY OF SOIL SAMPLE ANALYTICAL RESULTS FOR METALS
 Rancho Corral de Tierra, Montara, California

Sample ID	Decision Unit Description	Sample Type (a)	Sample Date	Sample Depth (ft bgs)	Analytical Results (mg/kg dry weight) (b) (c)																
					Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Lead	Mercury	Molybdenum	Nickel	Selenium	Silver	Thallium	Vanadium	Zinc
Denniston Creek Valley																					
DCVERS	Eastern Ruins	MIS	4/21/2011	surface	--	--	--	--	--	--	--	--	46	--	--	--	--	--	--	--	--
DCVERD	Eastern Ruins	MIS	4/21/2011	1	--	--	--	--	--	--	--	--	12.2	--	--	--	--	--	--	--	--
DCVERDU	Eastern Ruins Disposal Area	MIS	4/21/2011	surface	0.358	3.47	105	0.146	ND (0.0832)	11	8.37	28.8	109	0.123	3.27	8.71	0.599	1.26	<0.0308	32.7	240
DCVMRS	Middle Ruins	MIS	4/18/2011	surface	--	--	--	--	--	--	--	--	150	--	--	--	--	--	--	--	--
DCVMRD	Middle Ruins	MIS	4/18/2011	1	--	--	--	--	--	--	--	--	71.7	--	--	--	--	--	--	--	--
DCVDUS	Middle Ruins	MIS	4/18/2011	surface	0.697	0.918	80.2	0.0903	ND (0.0795)	7.44	6.88	4.44	5.39	0.0342	0.172	2.21	<0.0884	0.924	<0.0295	31.9	42.8
DCVDUS-DUP	Disposal Area	MIS	4/18/2011	surface	0.379	1.08	68.7	0.0993	<0.0781	6.42	5.83	5.66	4.82	0.0938	0.159	1.58	0.175	0.471	<0.0289	27.1	36.7
DCVWRS	Western Ruins	MIS	4/18/2011	surface	--	--	--	--	--	--	--	--	71.4	--	--	--	--	--	--	--	--
DCVWRD	Western Ruins	MIS	4/18/2011	1	--	--	--	--	--	--	--	--	32.5	--	--	--	--	--	--	--	--
DREDGEL	Dredge Spoils - Lower	MIS	4/18/2011	0 - 2	0.474 J	0.608	51.2	<0.0675	<0.0786	8.81	6.52 J	9.65 J	2.51	0.0334	0.249	2.87	0.754	1.03	<0.0323	28.8	41.2
DREDGEM	Dredge Spoils - Middle	MIS	4/18/2011	0 - 2	0.777 J	0.453	77.2	<0.0679	<0.0877	13.4	9.88 J	6.14 J	3.78	0.0544	0.536	4.92	0.884	1.35	<0.0325	42.5	58.1
DREDGEU	Dredge Spoils - Upper	MIS	4/18/2011	0 - 2	0.644 J	1.63	83.1	<0.0678	<0.0876	14	10.6 J	26.1	4.28	0.0476	0.919	4.29	<0.0973	1.54	<0.0324	48	65.3
<i>RWQCB ESL for Residential Shallow Soil (<3 meters) (d)</i>					<i>6.3</i>	<i>0.39</i>	<i>750</i>	<i>4</i>	<i>1.7</i>	<i>1,000</i>	<i>40</i>	<i>230</i>	<i>200(f)</i>	<i>1.3</i>	<i>40</i>	<i>150</i>	<i>10</i>	<i>20</i>	<i>1.3</i>	<i>16</i>	<i>600</i>
<i>Background Metals: Northern Santa Clara County (e)</i>					<i>na</i>	<i>0.5-20</i>	<i>1.7-490</i>	<i>0.25-3.2</i>	<i>0.4-14</i>	<i>9.5-170</i>	<i>0.92-29</i>	<i>4.6-67</i>	<i>3.4-54</i>	<i>0.02-1.3</i>	<i>0.26-14</i>	<i>6-145</i>	<i>0.12-4</i>	<i>0.3-4.8</i>	<i>0.2-3.8</i>	<i>0.79-120</i>	<i>7.8-120</i>

TABLE 2
SUMMARY OF SOIL SAMPLE ANALYTICAL RESULTS FOR METALS
 Rancho Corral de Tierra, Montara, California

Sample ID	Decision Unit Description	Sample Type (a)	Sample Date	Sample Depth (ft bgs)	Analytical Results (mg/kg dry weight) (b) (c)																
					Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Lead	Mercury	Molybdenum	Nickel	Selenium	Silver	Thallium	Vanadium	Zinc
Ocean View Ranch																					
OVR1ES	Location 1 East - Soil at base of fences	MIS	4/20/2011	surface	--	--	--	--	--	--	--	--	20.6	--	--	--	--	--	--	--	--
OVR1ED	Location 1 East - Soil at base of fences	MIS	4/20/2011	1	--	--	--	--	--	--	--	--	34.5	--	--	--	--	--	--	--	--
OVR1EL	Location 1 East - Soil at base of fences (lateral)	MIS	4/20/2011	surface	--	--	--	--	--	--	--	--	26.3	--	--	--	--	--	--	--	--
OVR1WS	Location 1 West - Soil at base of fences	MIS	4/20/2011	surface	--	--	--	--	--	--	--	--	5.88	--	--	--	--	--	--	--	--
OVR2NS	Location 2 North - Soil at base of fences	MIS	4/20/2011	surface	--	--	--	--	--	--	--	--	15.1	--	--	--	--	--	--	--	--
OVR2SS	Location 2 South - Soil at base of fences	MIS	4/20/2011	surface	--	--	--	--	--	--	--	--	19.3	--	--	--	--	--	--	--	--
OVR3S	Location 3 - Soil at base of fences	MIS	4/20/2011	surface	--	--	--	--	--	--	--	--	12	--	--	--	--	--	--	--	--
OVR4S	Location 4 - Soil at base of fences	MIS	4/20/2011	surface	--	--	--	--	--	--	--	--	22.2	--	--	--	--	--	--	--	--
OVR4S-DUP	Location 4 - Soil at base of fences	MIS	4/20/2011	surface	--	--	--	--	--	--	--	--	33.3	--	--	--	--	--	--	--	--
OVR5S	Location 5 - Soil at base of fences	MIS	4/20/2011	surface	--	--	--	--	--	--	--	--	6.98	--	--	--	--	--	--	--	--
OVR6S	Location 6 - Soil at base of structures	MIS	4/20/2011	surface	--	--	--	--	--	--	--	--	8.61	--	--	--	--	--	--	--	--
OVR6L	Location 6 - Soil at base of structures (lateral)	MIS	4/20/2011	surface	--	--	--	--	--	--	--	--	3.61	--	--	--	--	--	--	--	--
OVR7L	Location 7 - Soil at base of structure (lateral)	MIS	4/20/2011	surface	--	--	--	--	--	--	--	--	25.9	--	--	--	--	--	--	--	--
OVR8S	Location 8 - Soil at base of structures	MIS	4/20/2011	surface	--	--	--	--	--	--	--	--	7.32	--	--	--	--	--	--	--	--
OVR8D	Location 8 - Soil at base of structures	MIS	4/20/2011	1	--	--	--	--	--	--	--	--	14.6	--	--	--	--	--	--	--	--

TABLE 2
SUMMARY OF SOIL SAMPLE ANALYTICAL RESULTS FOR METALS
 Rancho Corral de Tierra, Montara, California

OVR10S	Location 10 - Soil at Wash Rack Area	MIS	4/20/2011	surface	0.929	1.09	138	<0.0576	<0.0744	10.1	4.76	12.5	3.95	0.0912	0.056	8.73	0.265	0.553	<0.0276	19.7	106
OVRTA	Soil in Trailer Disposal Area	MIS	4/20/2011	surface	0.265	2.9	150	<0.0673	<0.0870	6.16	7.64	15.3	24.1	0.0328	1.18	4.96	0.151	1.54	<0.0322	32.8	156
<i>RWQCB ESL for Residential Shallow Soil (<3 meters) (d)</i>					<i>6.3</i>	<i>0.39</i>	<i>750</i>	<i>4</i>	<i>1.7</i>	<i>1,000</i>	<i>40</i>	<i>230</i>	<i>200(f)</i>	<i>1.3</i>	<i>40</i>	<i>150</i>	<i>10</i>	<i>20</i>	<i>1.3</i>	<i>16</i>	<i>600</i>
<i>Background Metals: Northern Santa Clara County (e)</i>					<i>na</i>	<i>0.5-20</i>	<i>1.7-490</i>	<i>0.25-3.2</i>	<i>0.4-14</i>	<i>9.5-170</i>	<i>0.92-29</i>	<i>4.6-67</i>	<i>3.4-54</i>	<i>0.02-1.3</i>	<i>0.26-14</i>	<i>6-145</i>	<i>0.12-4</i>	<i>0.3-4.8</i>	<i>0.2-3.8</i>	<i>0.79-120</i>	<i>7.8-120</i>

TABLE 2
SUMMARY OF SOIL SAMPLE ANALYTICAL RESULTS FOR METALS
 Rancho Corral de Tierra, Montara, California

Sample ID	Decision Unit Description	Sample Type (a)	Sample Date	Sample Depth (ft bgs)	Analytical Results (mg/kg dry weight) (b) (c)																	
					Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Lead	Mercury	Molybdenum	Nickel	Selenium	Silver	Thallium	Vanadium	Zinc	
Ember Ridge Ranch																						
ERR1S	Location 1 - Soil at base of structures	MIS	4/19/2011	surface	--	--	--	--	--	--	--	--	123	--	--	--	--	--	--	--	--	
ERR2D	Location 12 - Soil at base of structures	MIS	4/19/2011	1	--	--	--	--	--	--	--	--	18.4	--	--	--	--	--	--	--	--	
ERR2S	Location 2 - Soil at base of structures	MIS	4/19/2011	surface	--	--	--	--	--	--	--	--	40.1	--	--	--	--	--	--	--	--	
ERR2L	Location 2 - Soil at base of structures (lateral)	MIS	4/19/2011	surface	--	--	--	--	--	--	--	--	26.3	--	--	--	--	--	--	--	--	
ERR3S	Location 3 - Soil at base of structures	MIS	4/19/2011	surface	--	--	--	--	--	--	--	--	77	--	--	--	--	--	--	--	--	
ERR4S	Location 4 - Soil at base of	MIS	4/19/2011	surface	--	--	--	--	--	--	--	--	198	--	--	--	--	--	--	--	--	
ERR5S	Location 5 - Soil at base of	MIS	4/19/2011	surface	--	--	--	--	--	--	--	--	42.7	--	--	--	--	--	--	--	--	
ERR5S-DUP	Location 5 - Soil at base of	MIS	4/19/2011	surface	--	--	--	--	--	--	--	--	211	--	--	--	--	--	--	--	--	
ERR7S	Location 7 - Soil at base of structures	MIS	4/19/2011	surface	--	--	--	--	--	--	--	--	42.3	--	--	--	--	--	--	--	--	
ERR8S	Location 8 - Soil at base of structures	MIS	4/19/2011	surface	--	--	--	--	--	--	--	--	6.28	--	--	--	--	--	--	--	--	
ERR10S	Location 10 - Soil at base of Former	MIS	4/18/2011	surface	1.07	2.53	95.3	<0.0624	<0.0807	8.09	4.86	8.27	51.3	0.0622	0.606	5.69	0.409	1.07	<0.0299	21.2	58.6	
ERR11S	Location 11 - Soil at base of Former	MIS	4/19/2011	surface	--	--	--	--	--	--	--	--	28.4	--	--	--	--	--	--	--	--	
ERR11D	Location 11 - Soil at base of Former	MIS	4/19/2011	1	--	--	--	--	--	--	--	--	29.3	--	--	--	--	--	--	--	--	
ERR12S	Location 12 - Soil at base of structures	MIS	4/19/2011	surface	--	--	--	--	--	--	--	--	21.4	--	--	--	--	--	--	--	--	
<i>RWQCB ESL for Residential Shallow Soil (<3 meters) (d)</i>					<i>6.3</i>	<i>0.39</i>	<i>750</i>	<i>4</i>	<i>1.7</i>	<i>1,000</i>	<i>40</i>	<i>230</i>	<i>200(f)</i>	<i>1.3</i>	<i>40</i>	<i>150</i>	<i>10</i>	<i>20</i>	<i>1.3</i>	<i>16</i>	<i>600</i>	
<i>Background Metals: Northern Santa Clara County (e)</i>					<i>na</i>	<i>0.5-20</i>	<i>1.7-490</i>	<i>0.25-3.2</i>	<i>0.4-14</i>	<i>9.5-170</i>	<i>0.92-29</i>	<i>4.6-67</i>	<i>3.4-54</i>	<i>0.02-1.3</i>	<i>0.26-14</i>	<i>6-145</i>	<i>0.12-4</i>	<i>0.3-4.8</i>	<i>0.2-3.8</i>	<i>0.79-120</i>	<i>7.8-120</i>	

TABLE 2
SUMMARY OF SOIL SAMPLE ANALYTICAL RESULTS FOR METALS
 Rancho Corral de Tierra, Montara, California

Sample ID	Decision Unit Description	Sample Type (a)	Sample Date	Sample Depth (ft bgs)	Analytical Results (mg/kg dry weight) (b) (c)																
					Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Lead	Mercury	Molybdenum	Nickel	Selenium	Silver	Thallium	Vanadium	Zinc
Moss Beach Ranch																					
MBSTR1-1.5	Trailer Disposal	Discrete	4/19/2011	1.5	<0.34	4.7	89.1	0.39	0.52	8.5	6	26.4	24.5	0.076	11.2	7	0.59	<0.34	<0.34	25.3	1,130
MBRTR1-5	Trailer Disposal	Discrete	4/19/2011	5	<0.32	1.6	86.3	0.55	<0.32	7.3	5.7	3.7	4.6	<0.051	2.4	4.5	0.69	<0.32	<0.32	30	44.7
MBRTRS	Trailer Disposal Site - Shallow Fill	MIS	4/18/2011	surface	0.925	2.41	161	<0.0621	<0.0802	24.4	6.3	13.3	21	0.0605	0.489	18.6	0.556	0.623	<0.0297	34	79.5
MBRSHS	Mechanical Shed	Discrete	4/19/2011	surface	0.31	3.1	369	0.27	2	71.1	10.9	50.8	6.9	0.36	5.6	76.3	2.5	<0.26	<0.26	151	185
MBR1S	Location 1 - Soil at base of structures	MIS	4/19/2011	surface	--	--	--	--	--	--	--	--	39.7	--	--	--	--	--	--	--	--
MBR2S	Location 2 - Soil at base of structures	MIS	4/19/2011	surface	--	--	--	--	--	--	--	--	32.7	--	--	--	--	--	--	--	--
MBR3S	Location 3 - Soil at base of structures	MIS	4/19/2011	surface	--	--	--	--	--	--	--	--	20.3	--	--	--	--	--	--	--	--
MBR4S	Location 4 - Soil at base of	MIS	4/19/2011	surface	--	--	--	--	--	--	--	--	54.7	--	--	--	--	--	--	--	--
MBR4S-DUP		MIS	4/19/2011	surface	--	--	--	--	--	--	--	--	25.7	--	--	--	--	--	--	--	--
MBR4D	Location 4 - Soil at base of structures	MIS	4/19/2011	1	--	--	--	--	--	--	--	--	11	--	--	--	--	--	--	--	--
MBR4L	Location 4 - Soil at base of	MIS	4/19/2011	surface	--	--	--	--	--	--	--	--	7.78	--	--	--	--	--	--	--	--
MBR5S	Location 5 - Soil at base of structures	MIS	4/19/2011	surface	--	--	--	--	--	--	--	--	5.01	--	--	--	--	--	--	--	--
MBR6S	Location 6 - Soil at base of structures	MIS	4/19/2011	surface	--	--	--	--	--	--	--	--	13.4	--	--	--	--	--	--	--	--
MBR7S	Location 7 - Soil at base of structures	MIS	4/19/2011	surface	--	--	--	--	--	--	--	--	8.94	--	--	--	--	--	--	--	--
MBR8S	Location 8 - Soil at base of structures	MIS	4/19/2011	surface	--	--	--	--	--	--	--	--	9.45	--	--	--	--	--	--	--	--
MBR9S	Location 9 - Former Debris Pile	MIS	4/18/2011	surface	0.958	4.87	214	0.465	<0.0804	35	11	48.5	17	0.0956	0.507	40.9	0.711	1.11	<0.0298	40.6	213
<i>RWQCB ESL for Residential Shallow Soil (<3 meters) (d)</i>					<i>6.3</i>	<i>0.39</i>	<i>750</i>	<i>4</i>	<i>1.7</i>	<i>1,000</i>	<i>40</i>	<i>230</i>	<i>200(f)</i>	<i>1.3</i>	<i>40</i>	<i>150</i>	<i>10</i>	<i>20</i>	<i>1.3</i>	<i>16</i>	<i>600</i>
<i>Background Metals: Northern Santa Clara County (e)</i>					<i>na</i>	<i>0.5-20</i>	<i>1.7-490</i>	<i>0.25-3.2</i>	<i>0.4-14</i>	<i>9.5-170</i>	<i>0.92-29</i>	<i>4.6-67</i>	<i>3.4-54</i>	<i>0.02-1.3</i>	<i>0.26-14</i>	<i>6-145</i>	<i>0.12-4</i>	<i>0.3-4.8</i>	<i>0.2-3.8</i>	<i>0.79-120</i>	<i>7.8-120</i>

TABLE 2
SUMMARY OF SOIL SAMPLE ANALYTICAL RESULTS FOR METALS
Rancho Corral de Tierra, Montara, California

Abbreviations:

- "--" - not analyzed for this compound
<0.50 - Compound not detected at or above indicated laboratory detection limit
ft bgs - Feet below ground surface
J - Estimated value. Analyte detected at a level less than the Reporting Limit and greater than or equal to the Method Limit.
mg/kg - Milligrams per kilogram
na - Cleanup goal not available
MIS - Multi-Increment Sample

Notes:

- (a) Prior to analysis, all MIS samples were prepared in accordance with the State of Hawai'i Department of Health Office of Hazard Evaluation and Emergency Response's Technical Guidance Manual for the Implementation of the Hawai'i State Contingency Plan (2009 Edition), Laboratory Preparation of Multi-Increment Samples. All MIS samples were analyzed for metals using EPA Method 6010/7471 by TestAmerica Laboratories, Inc., Aiea, HI. Discrete samples were analyzed for metals using EPA Method 6020A/7471 by Accutest laboratories, San Jose, CA.
- (b) Analytical results reported on a dry-weight basis. Analytical results include estimated values that were detected at a level less than the reporting limit and greater than or equal to the method detection limit as shown in attached laboratory analytical reports.
- (c) Concentrations indicated in **bold** exceed the risk-based screening criteria.
- (d) RWQCB ESL - Table A-1, Shallow Soil Screening Levels (≤ 3 m bgs), Residential Land Use, Groundwater is a current or potential drinking water resource, from *Screening for Environmental Concerns at Sites with Contaminated Soil and Groundwater, Interim Final*, California Regional Water Quality Control Board, San Francisco Bay Region ("RWQCB"), November 2007 (revised May 2008).
- (e) Scott, C.M. 1995. Background Metal Concentrations in Soils in Northern Santa Clara County, California in: Recent Geological Studies in the San Francisco Bay Area, Pacific Section of the Society of Economic Paleontologists and Mineralogists, Volume 76. Barium, cobalt, molybdenum, and vanadium were not included in the background study by Scott (1995). Therefore, background levels from *Analysis of Background Distributions of Metals in the Soil at Lawrence Berkeley National Laboratory*, dated June 2002, revised April, 2009, are used.
- (f) The California Human Health Screening Level for lead is 80 mg/kg. This value is more current than the ESL of 200 mg/kg. However, EKI understands that the Presidio cleanup levels for lead of 400 mg/kg (not-to-exceed value) and 370 mg/kg (maximum value) are generally used within the Golden Gate National Recreation Area.

TABLE 3
SUMMARY OF SOIL SAMPLE ANALYTICAL RESULTS FOR VOCs and TPH

Rancho Corral de Tierra, Montara, California

Sample ID	Decision Unit Description	Sample Type (a)	Sample Date	Sample Depth (ft bgs)	Analytical Results (mg/kg dry weight) (b) (c)									
					VOCs							TPH		
					1,2,4-Trimethylbenzene	1,3,5-Trimethylbenzene	Acetone	Naphthalene	n-Butylbenzene	Xylenes, Total	Other VOCs	TPH Diesel	TPH Motor Oil	
Denniston Creek Valley														
DCVERDU	Eastern Ruins Disposal	MIS	4/21/2011	surface	--	--	--	--	--	--	--	22.9	262	
DCVDUS	Middle Ruins Disposal	MIS	4/18/2011	surface	--	--	--	--	--	--	--	<19	147	
DCVDUS-DUP	Area	MIS	4/18/2011	surface	--	--	--	--	--	--	--	<20	122	
Ember Ridge Ranch														
ERR10S	Location 10 - Soil at base of Former	MIS	4/18/2011	surface	--	--	--	--	--	--	--	41	283	
Ocean View Ranch														
OVR10S	Location 10 - Soil at Wash Rack Area	MIS	4/20/2011	surface	--	--	--	--	--	--	--	47.8	277	
OVRTA	Soil in Trailer Disposal	MIS	4/20/2011	surface	--	--	--	--	--	--	--	22.7	256	
Moss Beach Ranch														
MBSTR1-1.5	Trailer Disposal Site	Discrete	4/19/2011	1.5	1.27	1.94	3.25	0.651	0.497	0.711	ND	42,500	60,300	
MBRTR1-5	Trailer Disposal Site	Discrete	4/19/2011	5	<0.0061	<0.0061	<0.12	<0.0061	<0.0061	<0.012	ND	<13	<26	
MBRTRS	Trailer Disposal Site - Shallow Fill	MIS	4/18/2011	surface	--	--	--	--	--	--	--	248	1,260	
MBRSHS	Mechanical Shed	Discrete	4/19/2011	surface	--	--	--	--	--	--	--	144	296	
MBR9S	Location 9 - Former Debris Pile	MIS	4/18/2011	surface	--	--	--	--	--	--	--	1,880	3,060	
RWQCB ESL for Residential Shallow Soil (<3 meters) (d)					na	na	0.5	1.3	na	2.3	na	83	370	

TABLE 3
SUMMARY OF SOIL SAMPLE ANALYTICAL RESULTS FOR VOCs and TPH

Rancho Corral de Tierra, Montara, California

Abbreviations:

"-" - not analyzed for this compound

<0.50 - Compound not detected at or above indicated laboratory detection limit

ft bgs - Feet below ground surface

mg/kg - Milligrams per kilogram

MIS - Multi-Increment Sample

na - Cleanup goal not available

TPH - Total Petroleum Hydrocarbons

VOC - Volatile Organic Compounds

C10-C28 - Carbon Range

Notes:

(a) Prior to analysis, all MIS samples were prepared in accordance with the State of Hawai'i Department of Health Office of Hazard Evaluation and Emergency Response's Technical Guidance Manual for the Implementation of the Hawai'i State Contingency Plan (2009 Edition), Laboratory Preparation of Multi-Increment Samples.

All MIS samples were analyzed for TPH using EPA Method 8015M with silica gel cleanup by TestAmerica Laboratories, Inc., Aiea, HI.

Discrete samples were analyzed for VOCs using EPA Method 8260B and TPH using EPA Method 8015M with silica gel cleanup by Accutest Laboratories, San Jose, CA.

(b) Analytical results reported on a dry-weight basis. Analytical results include estimated values that were detected at a level less than in attached laboratory analytical reports.

(c) Concentrations indicated in **bold** exceed one or more of the risk-based screening criteria.

(d) RWQCB ESL - Table A-1, Shallow Soil Screening Levels (≤ 3 m bgs), Residential Land Use, Groundwater is a current or potential drinking water resource, from *Screening for Environmental Concerns at Sites with Contaminated Soil and Groundwater, Interim Final*, California Regional Water Quality Control Board, San Francisco Bay Region ("RWQCB"), November 2007 (revised May 2008).

TABLE 4
SUMMARY OF SOIL SAMPLE ANALYTICAL RESULTS FOR PESTICIDES
 Rancho Corral de Tierra, Montara, California

Sample ID	Decision Unit Description	Sample Type (a)	Sample Date	Sample Depth (ft bgs)	Analytical Results (mg/kg dry weight) (b) (c)										
					Delta-BHC	Chlordane	DDD	DDE	DDT	Dieldrin	Endosulfan I	Endosulfan Sulfate	Endrin	Alpha-Chlordane	Gamma-Chlordane
Former Horse Barn															
FHBCS	Former Corral	MIS	4/20/2011	surface	<0.00369	<0.0305	<0.00369	<0.00369	<0.00369	<0.00369	<0.00369	<0.00369	<0.00369	<0.00369	<0.00369
FHBCD	Former Corral	MIS	4/20/2011	1	<0.00396	<0.0326	<0.00396	0.0124	0.00699 (f)	<0.00396	<0.00396	<0.00396	<0.00396	<0.00396	<0.00396
Denniston Creek Valley															
DCVERS	Eastern Ruins	MIS	4/21/2011	surface	<0.00407	<0.0335	0.0266	0.0497	0.00735	0.031	<0.00407	0.0116	<0.00407	0.00854 (f)	0.00545
DCVERD	Eastern Ruins	MIS	4/21/2011	1	<0.00391	<0.0323	<0.00391	0.0285	0.0359	0.00561	<0.00391	<0.00391	0.00499 (f)	<0.00391	<0.00391
DCVERDU	Eastern Ruins Disposal Area	MIS	4/21/2011	surface	<0.00401	<0.0331	<0.00401	0.00612	0.0161	<0.00401	<0.00401	<0.00401	<0.00401	<0.00401	<0.00401
DCVMRS	Middle Ruins	MIS	4/18/2011	surface	0.00495 (f)	0.0366	0.0212	0.0306	0.0377	<0.00396	<0.00396	<0.00396	<0.00396	0.00603 (f)	0.00399
DCVMRD	Middle Ruins	MIS	4/18/2011	1	<0.00399	<0.0329	0.00605	0.0254	0.0139	<0.00399	<0.00399	<0.00399	<0.00399	<0.00399	<0.00399
DCVDUS	Middle Ruins Disposal Area	MIS	4/18/2011	surface	0.0044 (f)	<0.033	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004
DCVDUS-DUP	Middle Ruins Disposal Area	MIS	4/18/2011	surface	<0.00396	<0.0327	<0.00396	<0.00396	<0.00396	<0.00396	<0.00396	<0.00396	<0.00396	<0.00396	<0.00396
DCVWRS	Western Ruins	MIS	4/18/2011	surface	0.00472 (f)	0.0796 (f)	0.0264 (f)	0.048	0.155	<0.00396	0.00766 (f)	<0.00396	0.0172 (f)	0.00832 (f)	<0.00396
DCVWRD	Western Ruins	MIS	4/18/2011	1	<0.00401	<0.0331	0.0155 (f)	0.0255	0.0831	0.00418	<0.00401	<0.00401	<0.00401	0.00668 (f)	<0.00401
DREDGEL	Dredge Spoils - Lower	MIS	4/18/2011	0 - 2	<0.00441	<0.0363	<0.00441	<0.00441	<0.00441	<0.00441	<0.00441	<0.00441	<0.00441	<0.00441	<0.00441
DREDGEM	Dredge Spoils - Middle	MIS	4/18/2011	0 - 2	<0.0042	<0.0346	<0.0042	<0.0042	<0.0042	<0.0042	<0.0042	<0.0042	<0.0042	<0.0042	<0.0042
DREDGEU	Dredge Spoils - Upper	MIS	4/18/2011	0 - 2	<0.00421	<0.0347	<0.00421	<0.00421	<0.00421	<0.00421	<0.00421	<0.00421	<0.00421	<0.00421	<0.00421
Ocean View Ranch															
OVR9S	Possible Former Corral	MIS	4/20/2011	surface	<0.00398	<0.0328	<0.00398	<0.00398	<0.00398	<0.00398	<0.00398	<0.00398	<0.00398	<0.00398	<0.00398
OVR9D	Possible Former Corral	MIS	4/20/2011	1	<0.00401	<0.0331	<0.00401	<0.00401	<0.00401	<0.00401	<0.00401	<0.00401	<0.00401	<0.00401	<0.00401
OVR10S	Location 10 - Soil at Wash Rack Area	MIS	4/20/2011	surface	<0.00381	0.0325 (f)	<0.00381	<0.00381	<0.00381	<0.00381	<0.00381	<0.00381	<0.00381	<0.00381	<0.00381
OVRTA	Soil in Trailer Disposal Area	MIS	4/20/2011	surface	<0.00409	<0.0337	<0.00409	<0.00409	<0.00409	<0.00409	<0.00409	<0.00409	<0.00409	<0.00409	<0.00409
RWQCB ESL for Residential Direct Exposure (d)					<i>na</i>	0.44	2.4	1.7	1.7	0.034	82	<i>na</i>	4.1	<i>na</i>	<i>na</i>
RWQCB ESL for Residential Shallow Soil (<3 meters) (e)					<i>na</i>	0.44	2.4	1.7	1.7	0.0023	<i>na</i>	<i>na</i>	0.00065	<i>na</i>	<i>na</i>

TABLE 4
SUMMARY OF SOIL SAMPLE ANALYTICAL RESULTS FOR PESTICIDES
 Rancho Corral de Tierra, Montara, California

Sample ID	Decision Unit Description	Sample Type (a)	Sample Date	Sample Depth (ft bgs)	Analytical Results (mg/kg dry weight) (b) (c)										
					Delta-BHC	Chlordane	DDD	DDE	DDT	Dieldrin	Endosulfan I	Endosulfan Sulfate	Endrin	Alpha-Chlordane	Gamma-Chlordane
Ember Ridge Ranch															
ERR10S	Location 10-Soil at base of Former Structure	MIS	4/18/2011	surface	<0.00408	<0.0336	<0.00408	<0.00408	<0.00408	<0.00408	<0.00408	<0.00408	<0.00408	<0.00408	<0.00408
ERRSM	Soil Mound	MIS	4/18/2011	surface	0.00548 (f)	0.0567	<0.00389	<0.00389	<0.00389	<0.00389	<0.00389	<0.00389	<0.00389	0.0183	0.00947
ERRFF1	Flower Field 1	MIS	4/19/2011	surface	0.015	<0.0336	0.00878	0.0404	<0.00407	<0.00407	<0.00407	<0.00407	<0.00407	<0.00407	<0.00407
ERRFF2	Flower Field 2	MIS	4/19/2011	surface	0.0198	<0.0333	0.00448	0.0184	<0.00404	<0.00404	<0.00404	<0.00404	<0.00404	<0.00404	<0.00404
Moss Beach Ranch															
MBSTR1-1.5	Trailer Disposal Site	Discrete	4/19/2011	1.5	<0.95	<27	<0.95	<0.81	<0.81	<0.81	<0.95	<2.2	<0.81	--	--
MBRTR1-5	Trailer Disposal Site	Discrete	4/19/2011	5	<0.0045	<0.13	<0.0045	<0.0038	<0.0038	<0.0038	<0.0045	<0.01	<0.0038	--	--
MBRTRS	Trailer Disposal Site - Shallow Fill	MIS	4/18/2011	surface	<0.00411	0.112 (f)	<0.00411	0.0049	0.00528 (f)	<0.00411	<0.00411	<0.00411	0.00511 (f)	0.0237	0.0106
MBRSHS	Mechanical Shed	Discrete	4/19/2011	surface	<0.037	<1	<0.037	<0.031	<0.031	<0.031	<0.037	<0.083	<0.031	--	--
MBR9S	Location 9 - Former	MIS	4/18/2011	surface	<0.00399	0.0503	<0.00399	<0.00399	0.00818 (f)	<0.00399	<0.00399	<0.00399	<0.00399	0.00475	<0.00399
RWQCB ESL for Residential Direct Exposure (d)					<i>na</i>	0.44	2.4	1.7	1.7	0.034	82	<i>na</i>	4.1	<i>na</i>	<i>na</i>
RWQCB ESL for Residential Shallow Soil (<3 meters) (e)					<i>na</i>	0.44	2.4	1.7	1.7	0.0023	<i>na</i>	<i>na</i>	0.00065	<i>na</i>	<i>na</i>

Abbreviations:

"--" - not analyzed for this compound

<0.004 - Compound not detected at or above indicated laboratory reporting limit. Values shown in *italics* indicate that the reporting limit exceeds the lesser of the two screening criteria shown at the bottom of the table.

ft bgs - Feet below ground surface

mg/kg - Milligrams per kilogram

na - Cleanup goal not available

MIS - Multi-Increment Sample

Notes:

(a) Prior to analysis, all MIS samples were prepared in accordance with the State of Hawai'i Department of Health Office of Hazard Evaluation and Emergency Response's Technical Guidance Manual for the Implementation of the Hawai'i State Contingency Plan (2009 Edition), Laboratory Preparation of Multi-Increment Samples.

All MIS samples were analyzed for pesticides using EPA Method 8081A by TestAmerica Laboratories, Inc., Aiea, HI.

Discrete samples were analyzed for pesticides using EPA Method 8081A by Accutest laboratories, San Jose, CA.

(b) Analytical results reported on a dry-weight basis.

(c) Reported sample concentrations indicated in **bold** exceed the lesser of the two applicable risk-based screening criteria.

(d) RWQCB ESL - Table K-1, Direct Exposure Soil Screening Levels, Residential Exposure Scenario, from Screening for Environmental Concerns at Sites with Contaminated Soil and Groundwater, *Interim Final*, California Regional Water Quality Control Board, San Francisco Bay Region ("RWQCB"), November 2007 (revised May 2008).

California Regional Water Quality Control Board, San Francisco Bay Region ("RWQCB"), November 2007 (revised May 2008).

(e) RWQCB ESL - Table A-1, Shallow Soil Screening Levels (≤3m bgs), Residential Land Use, Groundwater is a current or potential drinking water resource, from *Screening for Environmental Concerns at Sites with Contaminated Soil and Groundwater, Interim Final*, California Regional Water Quality Control Board, San Francisco Bay Region ("RWQCB"), November 2007 (revised May 2008).

(f) Laboratory reported that the relative percent difference between the primary and confirmatory analysis exceeded 40% and the lower value was reported by the laboratory.

TABLE 5
SUMMARY OF ANALYTICAL RESULTS FOR SURFACE WATER SAMPLES
FOR E. COLI AND ENTEROCOCCUS SCREENING
 Rancho Corral de Tierra, Montara, California

Sample ID	Decision Unit Description	Sample Date	Matrix	Analytical Results (MPN/mL)	
				(a) (b)	
				E. coli	Enterococcus
DCV-U1	Denniston Creek Valley, Upstream	4/19/2011	Surface Water	<10	<10
DCV-D1	Denniston Creek Valley, Downstream	4/19/2011	Surface Water	<10	<10
ERR-U1	Ember Ridge Ranch, Upstream	4/19/2011	Surface Water	<10	<10
ERR-D1	Ember Ridge Ranch, Downstream	4/19/2011	Surface Water	<10	<10
MBR-M1	Moss Beach Ranch, Midstream	4/19/2011	Surface Water	<10	<10
MBR-D1	Moss Beach Ranch, Downstream	4/19/2011	Surface Water	10	<10
OVR-U1	Ocean View Ranch, Upstream	4/18/2011	Surface Water	<10	<10
OVR-M1	Ocean View Ranch, Midstream	4/18/2011	Surface Water	<10	<10
OVR-D1	Ocean View Ranch, Downstream	4/18/2011	Surface Water	<10	<10
RR-U1	Renegade Ranch, Upstream	4/18/2011	Surface Water	<10	<10
RR-D1	Renegade Ranch, Downstream	4/18/2011	Surface Water	20	<10
<i>U.S. EPA Bacteriological Criteria for Water Contact Recreation (c)</i>					
<i>Steady-state (all areas)</i>				<i>1.26</i>	<i>0.33</i>
<i>Maximum, designated beach:</i>				<i>2.35</i>	<i>0.61</i>
<i>Maximum, moderately-used area:</i>				<i>2.98</i>	<i>0.89</i>
<i>Maximum, lightly-used area:</i>				<i>4.06</i>	<i>1.08</i>
<i>Maximum, infrequently-used area:</i>				<i>5.76</i>	<i>1.51</i>

Abbreviations:

MPN/mL - Most probable number of colonies per milliliter

Notes:

- (a) Surface water samples were analyzed for E. coli and enterococcus using Method C420 (membrane filter method) by EMLab P&K, LLC in San Bruno, CA.
- (b) Concentrations indicated in **bold** exceed one or more of the applicable screening criteria.
- (c) Federal Register, Vol. 51, No. 45, Friday, March 7, 1986, pp. 8012-8016 and The Regional Water Quality Control Board's San Francisco Bay Basin (Region 2) Water Quality Control Plan (Basin Plan), dated 18 Jan 2007.

TABLE 6
SUMMARY OF ANALYTICAL RESULTS FOR SURFACE WATER SAMPLES
FOR GENERAL WATER CHEMISTRY PARAMETERS AND PESTICIDES

Rancho Corral de Tierra, Montara, California

Sample ID	Decision Unit Description	Sample Date	Field-Determined Parameters (a)			Selected Analytical Results (mg/L) (b) (c)						
			Temperature (deg C)	pH	Electrical Conductivity (uS/cm)	Alkalinity, Total as CaCO ₃	Nitrogen, Nitrate	Nitrogen, Nitrite	Phosphate, Ortho	Solids, Total Suspended	Biochemical Oxygen Demand	Organochlorine Pesticides (a)
DCV-U1	Denniston Creek Valley, Upstream	4/19/2011	12.8	7.63	174	56	0.12	<0.10	0.013	9	<5.0	ND
DCV-D1	Denniston Creek Valley, Downstream	4/19/2011	12.8	7.54	97	64	0.22	<0.10	0.019	30	<5.0	ND
ERR-U1	Ember Ridge Ranch, Upstream	4/19/2011	12.5	7.52	183	52	<0.10	<0.10	0.025	15	<5.0	ND
ERR-D1	Ember Ridge Ranch, Downstream	4/19/2011	12.5	7.50	194	52	0.14	<0.10	0.026	43	<5.0	ND
MBR-M1	Moss Beach Ranch, Midstream	4/19/2011	12.4	7.42	202	52	0.2	<0.10	0.021	45	<5.0	ND
MBR-D1	Moss Beach Ranch, Downstream	4/19/2011	12.7	7.67	201	52	0.19	<0.10	0.026	37	<5.0	ND
OVR-U1	Ocean View Ranch, Upstream	4/18/2011	12.9	7.69	186	46	0.23	<0.10	<0.010	21	<5.0	ND
OVR-M1	Ocean View Ranch, Midstream	4/18/2011	13.1	7.20	198	52	0.19	<0.10	<0.010	31	<5.0	ND
OVR-D1	Ocean View Ranch, Downstream	4/18/2011	13.0	7.76	213	54	0.27	<0.10	<0.010	11	<5.0	ND
RR-U1	Renegade Ranch, Upstream	4/18/2011	12.3	7.20	243	72	<0.10	<0.10	<0.010	19	<5.0	ND
RR-D1	Renegade Ranch, Downstream	4/18/2011	12.8	7.69	384	102	0.33	<0.10	0.16	126	<5.0	ND
Applicable Water Quality Goal for Beneficial Use (d):												
Basin Plan (Surface Waters) (e)			--	6.5-8.5	--	--	--	--	--	--	--	--
MUN (Primary & Secondary MCLs)			--	--	900	--	10	1	--	--	--	--
AGR (Agricultural Use)			--	4.5-8.3	200 - 3,000	--	5 (f)	5 (f)	--	--	--	--

TABLE 6
SUMMARY OF ANALYTICAL RESULTS FOR SURFACE WATER SAMPLES
FOR GENERAL WATER CHEMISTRY PARAMETERS AND PESTICIDES

Rancho Corral de Tierra, Montara, California

Abbreviations:

- mg/L - Milligrams per liter
- deg C - Degrees Celsius
- uS/cm - Microsiemens per centimeter
- <5.0 - Compound not detected at or above indicated laboratory detection limit

Notes:

- (a) Temperature, pH, and electrical conductivity were measured in the field using a calibrated meter during sample collection.
- (b) Surface water samples were analyzed for the following by Accutest Laboratories in San Jose, CA:
 - Total Alkalinity (as CaCO₃) using Standard Method 2320B
 - Nitrate and Nitrite Nitrogen using EPA Method 300.0
 - Ortho-phosphate using Standard Method 4500
 - Total Suspended Solids using Standard Method 2540D
 - Biochemical Oxygen Demand using Standard Method 5210B
 - Pesticides using EPA Method 8081A
- (c) Concentrations indicated in **bold** exceed one or more of the applicable screening criteria.
- (d) The Regional Water Quality Control Board's San Francisco Bay Basin (Region 2) Water Quality Control Plan (Basin Plan), dated 18 Jan 2007, lists San Vicente and Denniston Creeks as San Mateo Coastal Basin surface water bodies with existing and potential beneficial uses. The beneficial uses for these water bodies include AGR, MUN, COLD, MIGR, RAR, SPWN, WILD, REC1 and REC2. Denniston Creek also has WARM as a beneficial use.
- (e) Several of these parameters have narrative statements in the Basin Plan so that water quality is not adversely impacted with respect to the given parameter.
- (f) Sum of nitrate and nitrite as nitrogen.

TABLE 7
SUMMARY OF ANALYTICAL RESULTS FOR DOMESTIC WELL GROUNDWATER SAMPLES
BTEX COMPOUNDS AND PETROLEUM HYDROCARBONS

Rancho Corral de Tierra, Montara, California

Sample ID	Decision Unit Description	Sample Date	Matrix	Analytical Results (ug/L) (a)							
				Benzene	Toluene	Ethyl benzene	Xylenes (total)	TPH Gas (C6-C10)	TPH Diesel (C10-C28)	TPH Motor Oil (>C28-C40)	Organochlorine Pesticides (a)
ERR-W1	Ember Ridge Ranch, Domestic Well	4/19/2011	Groundwater	<0.30	<0.50	<0.30	<0.70	<25	<50	<100	ND
MBR-W1	Moss Beach Ranch, Domestic Well	4/18/2011	Groundwater	<0.30	<0.50	<0.30	<0.70	<25	<48	<95	ND
OVR-W1	Ocean View Ranch, Domestic Well	4/18/2011	Groundwater	<0.30	<0.50	<0.30	<0.70	<25	<48	<95	ND
RWQCB ESLs for Groundwater (current or potential drinking water source)(b)				1.0	40	30	20	100	100	100	--

Abbreviations:

- ug/L - Micrograms per liter
- <0.50 - Compound not detected at or above indicated laboratory detection limit
- TPH - Total Petroleum Hydrocarbons
- C10-C28 - Carbon Range

Notes:

- (a) Groundwater samples were analyzed for the following by Accutest Laboratories in San Jose, CA:
Benzene, toluene, ethyl benzene, xylenes, and TPH Gas using EPA Method 8260
TPH Diesel and TPH Motor Oil using EPA Method 8015M with silica gel cleanup
Pesticides using EPA Method 8081A
- (b) RWQCB ESL - Table F-1a, Groundwater Screening Levels, Groundwater is a current or potential drinking water source from *Screening for Environmental Concerns at Sites with Contaminated Soil and Groundwater, Interim Final*, California Regional Water Quality Control Board, San Francisco Bay Region ("RWQCB"), November 2007 (revised May 2008).



Appendix D

Memorandum: Opinion of Estimated Costs for Recognized Environmental and Disposal Liabilities Associated with Selected Areas at Rancho Corral de Tierra, Montara, California



21 September 2011

MEMORANDUM

To: Meghan Scanlon (POST)

From: Paul B. HOFFEY (EKI)
Michelle K. King, Ph.D. (EKI)
Jarad L. Champion, P.E. (EKI)

Subject: Opinion of Estimated Costs for Recognized
Environmental and Disposal Liabilities Associated with Selected Areas at
Rancho Corral de Tierra, Montara, California
(EKI B10014.00)

This memorandum transmits Erlor & Kalinowski, Inc.'s ("EKI's") opinion of estimated costs for recognized environmental and disposal liabilities for selected areas of property referred to as Rancho Corral de Tierra, Montara, California ("Site"). Historical land uses at the Site were primarily cattle ranching and agriculture, and current uses of the Site are primarily horse riding and boarding, recreational uses, and agriculture. In April 2011, on behalf of POST, EKI collected samples of soil, groundwater, and surface water as a preliminary screening assessment to identify potential environmental impacts to the Site. The analytical chemical results were preliminary compared to potentially applicable environmental screening levels that are typically used by the National Park Service ("NPS") to evaluate the presence of recognized environmental conditions.

EKI developed cost estimates for environmental and disposal liabilities ("EDLs") in general accordance with guidelines set by NPS. Other financial liabilities that are identified as being associated with the Site (e.g., lead and asbestos abatement of structures) are not included in this opinion of estimated costs. Due to uncertainty associated with the actual Site conditions and variances between future costs and historical costs for similar work, the costs presented in this memorandum are only a conceptual level opinion of costs and will be refined during the planning process.

BACKGROUND

Two areas were identified as having EDLs: (1) the trailer disposal area at Moss Beach Ranch, and (2) the former debris area at Moss Beach Ranch. (See Figure 1 for locations). EKI is currently preparing the results report for the sampling investigations. A summary of the results for the areas identified as having EDLs is presented below.

Soil at the trailer disposal area at Moss Beach Ranch (see Figure 2) is primarily impacted with petroleum hydrocarbons, with a separate oil phase visually observed during subsurface investigation; the pesticide endrin was detected in one sample at 0.0051 milligrams per kilogram ("mg/kg"), above the ESL of 0.00065 mg/kg. Zinc was



also detected in the oily soil at a concentration of 1130 mg/kg, above the ESL of 600 mg/kg. Petroleum-impacted soil was only detected in shallow soil (i.e., higher than 5 feet below ground surface) above the water table. Figure 2 shows the estimated extent of impacted soil; due to uncertainty associated with the extent of impact, an inner limit and an outer limit of the conceptual excavation area are presented.

Soil at the former debris area at Moss Beach Ranch (see Figure 3) is primarily impacted with petroleum hydrocarbons. The soil concentrations of total petroleum hydrocarbons, quantitated in the diesel range, (“TPH-diesel”) and TPH, quantitated in the motor oil range, (“TPH-motor oil”) were up to 1,880 mg/kg and 3,060 mg/kg, respectively, above the ESLs of 83 mg/kg and 370 mg/kg, respectively. Figure 3 shows the estimated extent of impacted soil; due to uncertainty associated with the extent of impact, an inner limit and an outer limit of the conceptual excavation area are presented.

In addition, three areas were previously identified as locations of concern due to potential impact to soil from asbestos-containing material originating from structure ruins remaining at the Site: (1) western ruins at Denniston Creek Valley, (2) middle ruins at Denniston Creek Valley, and (3) eastern ruins at Denniston Creek Valley (see Figure 4). Surface multi-increment soil samples collected within the ruins areas in April 2011 were analyzed for asbestos. Asbestos was not detected above the reporting limit of 0.25 percent; as such, these three areas are not identified as having EDLs and are thus not included in the cost estimate.

METHODOLOGY OF COST ESTIMATION

The cost estimate is based on available Site-specific information that is incorporated into engineering estimates for typical cleanup actions at similar sites. The engineering estimate is separated into line items, which are costs associated with independent activities that are likely necessary for the cleanup action.

Line items in the engineering estimate are based on data available from the following sources:

- R.S. Means *Heavy Construction Cost Data, 25th Annual Ed.*, 2011, which is an industry standard cost estimating reference, with costs adjusted to local price conditions;¹
- Vendors, such as waste disposal facilities and analytical laboratories; and
- Environmental professional judgment based on experiences with similar projects.

¹ To account for higher costs in the San Francisco Bay Area versus the nationwide average presented in R.S. Means, 18.4 percent was added to unit costs from R.S. Means in accordance with guidance in R.S. Means.



Numerous assumptions are incorporated into this cost estimation process, because of the uncertainties regarding the subsurface or other environmental conditions that exist at the Site. The backup documentation for the line item unit costs are maintained by EKI.

In addition, the overall cost estimate accounts for uncertainty associated with the scope of work by considering two scenarios for each impacted area: a small extent of excavation and a large extent of variation. The extents are considered reasonable based on available Site information and environmental professional judgment.

For this level of cost estimation, EKI has identified only the major project components and estimated quantities for each area or item. There are numerous miscellaneous items that have not been identified because detailed plans and specifications for the remediation have not yet been prepared or approved by regulatory agencies.

To factor in such costs for a preliminary but incomplete design, a contingency allowance is typically added to the estimated major construction and operation and maintenance costs. This contingency is a common practice at this stage of cost estimating and is intended to account for unknown – but expected – costs. These costs are anticipated, but not yet detailed, because of site-specific project components that will be added, or changes that may occur during remedial design. Such contingency costs should not be considered optional or adequate to cover scope uncertainties discussed below.

There also should be allowances for changes that occur after the final design is completed and approved by the agencies, and the construction contract is awarded. This contingency represents a reserve or allowance for minor adjustment in final quantities, pricing, component modifications, change orders, and/or claims during construction. Examples include changes during the work due to adverse weather, material or supply shortages, and changes in unit costs such as landfill disposal fees, fuel and labor costs, and transportation costs.

Therefore, to provide an allowance for these expected costs for changes that will occur during or after more detailed remedial design, a contingency of 30 percent was applied to all construction cost elements. Due to less uncertainty related to engineering services provided during the remediation process, a contingency of 20 percent was applied to all engineering cost elements.



SUMMARY OF COST ESTIMATION

The cost estimates of EDLs at the excavation areas are based on all activities related to environmental investigations and environmental cleanup. This estimate does not include the following: (1) removal of debris and structures (abandoned or inhabited) that are present at the excavation areas; (2) removal of trees and structures that may prevent Site access for heavy machinery and large trucks; (3) removal of potential sources of asbestos and lead that could instead be abated; and (4) restoration of structures that were removed for access purposes prior to Site cleanup.

EDL costs were developed separately for individual excavation areas. However, actual construction services are expected to be conducted concurrently; thus, some economies of scale may be achieved. A preliminary estimation of potential economies of scale by combining both the Trailer Disposal Area and Former Debris Area into one project is presented in Table 7.

Costs associated with engineering services include further Site investigation to better delineate excavation boundaries (e.g., lateral and vertical extents of excavation) prior to construction activities, preparation of plans and specs, selection of the construction contractor, coordination with disposal facilities, construction management, confirmation and disposal soil testing, and preparation of a completion report. The engineering costs assume there will not be environmental regulatory agency oversight of the remediation. The engineering costs would likely be higher with such oversight.

The table below presents the estimated EDL costs associate with the small extent and large extent scenarios for each excavation area.

Excavation Area	Estimated EDL Costs	
	<i>Small Extent Scenarios</i>	<i>Large Extent Scenarios</i>
Trailer Disposal Area (Moss Beach Ranch)	\$160,000	\$260,000
Former Debris Area (Moss Beach Ranch)	\$150,000	\$240,000
Subtotal Site-Wide EDL Costs	\$310,000	\$500,000
Deductions for Economies of Scale	(\$26,000)	(\$26,000)
Total Site-Wide EDL Costs	\$284,000	\$474,000



REFERENCES

R.S. Means, 2011. *Heavy Construction Cost Data, 25th Annual Edition*, 2011.

ATTACHMENTS

Tables

Table 1: Summary of Total Estimated Costs for Excavation Scenarios at the Moss Beach Ranch

Table 2: Excavation Surface Area and Volume Calculations for Excavation Scenarios

Table 3: Preliminary Estimated Capital Costs, Trailer Disposal Area (Moss Beach Ranch), Excavation Scenario: Small Extent

Table 4: Preliminary Estimated Capital Costs, Trailer Disposal Area (Moss Beach Ranch), Excavation Scenario: Large Extent

Table 5: Preliminary Estimated Capital Costs, Former Debris Area (Moss Beach Ranch), Excavation Scenario: Small Extent

Table 6: Preliminary Estimated Capital Costs, Former Debris Area (Moss Beach Ranch), Excavation Scenario: Large Extent

Table 7: Preliminary Estimated Economies of Scale for Capital Costs for a Combined Project of the Trailer Disposal Area (Moss Beach Ranch) and Former Debris Area (Moss Beach Ranch)

Figures

Figure 1: Moss Beach Ranch Soil Excavation Areas

Figure 2: Moss Beach Ranch Trailer Disposal Area

Figure 3: Moss Beach Ranch Former Debris Area

Figure 4: Denniston Creek Valley Structure Ruins Sites

TABLE 1
Summary of Total Estimated Costs for Excavation Scenarios at the Moss Beach Ranch

Rancho Corral de Tierra, Montara, California

Excavation Area (a)	Location (b)	Estimated EDL Costs (c)						Comments
		Small Extent Scenarios (d)			Large Extent Scenarios (d)			
		Construction	Engineering (e)	Total	Construction	Engineering (e)	Total	
Trailer Disposal Area	Moss Beach Ranch	\$45,000	\$111,000	\$160,000	\$113,000	\$146,000	\$260,000	See Tables 3 and 4
Former Debris Area	Moss Beach Ranch	\$44,000	\$108,000	\$150,000	\$109,000	\$133,000	\$240,000	See Tables 5 and 6
Subtotal Site-Wide EDL Costs		\$89,000	\$219,000	\$310,000	\$222,000	\$279,000	\$500,000	
Deductions for Economies of Scale (f)		(\$3,000)	(\$23,000)	(\$26,000)	(\$3,000)	(\$23,000)	(\$26,000)	See Table 7
Total Site-Wide EDL Costs		\$86,000	\$196,000	\$284,000	\$219,000	\$256,000	\$474,000	

Abbreviations:

EDL = environmental and disposal liability

Notes:

- (a) Excavation areas are based on the results of a preliminary soil screening survey performed by EKI in April 2011, and the results of an asbestos survey performed by Acumen Industrial Hygiene, Inc.
- (b) See attached Figures 1 through 4 for locations.
- (c) Environmental and disposal liability costs are based on all activities related to environmental investigations and environmental cleanup. This estimate does not include the following: (1) removal of debris and structures (abandoned or inhabited) that are present at the excavation areas; (2) removal of trees and structures that may prevent Site access for heavy machinery and large trucks; (3) removal of potential sources of asbestos and lead that could instead be abated; and (4) restoration of structures that were removed for access purposes prior to Site cleanup. Environmental and disposal liability costs were developed separately for individual excavation areas. However, actual construction services are expected to be conducted concurrently; thus, some economies of scale may be achieved (Table 7).
- (d) The small extent of excavation and the large extent of excavation were developed to present reasonable lower bounds and reasonable upper bounds on potential environmental and disposal liability costs. The soil investigations by EKI were designed as a screening survey and were not intended to provide complete characterization of the extent of chemicals in the subsurface. The assumed final dimensions of the excavation boundaries, and the resulting quantities of excavated soil, are shown in Table 2.
- (e) Engineering costs include both engineering costs and administrative costs. Costs associated with engineering services include further Site investigation to better delineate excavation boundaries (e.g., lateral and vertical extents of excavation) prior to construction activities, preparation of plans and specs, selection of the construction contractor, coordination with disposal facilities, construction management, confirmation and disposal soil testing, and preparation of a completion report. The engineering costs assume there will not be environmental regulatory agency oversight of the remediation. The engineering costs would likely be higher with such oversight.
- (f) Economies of scale may be achieved by combining the Trailer Disposal Area and Former Debris Area into one project. Estimates of the economies of scale are presented in Table 7.

TABLE 2
Excavation Surface Area and Volume Calculations for Excavation Scenarios

Rancho Corral de Tierra, Montara, California

Excavation Area	Chemicals of Potential Concern	Extent of Excavation (a)	Assumed Length (b) (LF)	Assumed Width (b) (LF)	Assumed Depth (b) (LF)	Excavated Volume (c) (CF)	Excavated Volume (d) (BCY)	Excavated Weight (e) (ton)
Trailer Disposal Area (Moss Beach Ranch)	TPH, Zinc, and Pesticides	Small	40	20	4.0	3,200	120	190
		Large	100	40	3.2 (f)	12,800	470	730
Former Debris Area (Moss Beach Ranch)	TPH	Small	60	40	1.0	2,400	90	140
		Large	120	80	1.0	9,600	360	560

Abbreviations:

BCY = bank cubic yard

CF = cubic feet

CY = cubic yard

LF = linear feet

TPH = total petroleum hydrocarbons

Notes:

- (a) The small extent of excavation and the large extent of excavation were developed to present reasonable lower bounds and reasonable upper bounds on potential environmental and disposal liability costs. The soil investigations by EKI were designed as a screening survey and were not intended to provide complete characterization of the extent of chemicals in the subsurface.
- (b) The assumed dimensions of the excavation boundaries are based on environmental professional judgment of historical Site land uses and the preliminary results of the soil screening survey conducted by EKI in April 2011. However, the lateral and vertical extent of these areas have not been defined based on chemical data or physical observations (e.g., backhoe exploration).
- (c) The excavated volume for the scenario is calculated by multiplying the assumed length by the width by the depth.
- (d) The excavated volume presented in units of bank cubic yards (i.e., the volume of soil in place, not as stockpiled loose material) is by dividing the volume in units of cubic feet by a factor of 27 cubic feet per cubic yard.
- (e) The weight of excavated soils is calculated by multiplying the volume in bank cubic yards by a factor of 1.5 tons per cubic yard.
- (f) The excavation at the Trailer Disposal Area (Moss Beach Ranch) under the large extent excavation scenario is assumed to be approximately 4 feet deep in the proximity of the former buried drum (an area assumed to have length 40 feet and width 20 feet) and to be approximately 3 feet deep in other locations. These assumptions result in an average depth of approximately 3.2 feet under the large excavation scenario.

TABLE 3
Preliminary Estimated Capital Costs
Trailer Disposal Area (Moss Beach Ranch)
Excavation Scenario: Small Extent
Rancho Corral de Tierra, Montara, California

Task Description	Estimated Environmental and Disposal Liability Costs (a)				
	Unit	Quantity (b)	Unit Cost (c)	Line Cost (d)	Subtotal
Construction Costs for Material and Labor					
Mobilization and demobilization	LS	1	\$4,000	\$ 4,000	
Site preparation	LS	1	\$3,900	\$ 3,900	
Shallow excavation and truck loading (120 BCY)	day	1	\$4,000	\$ 4,000	
Soil transportation and disposal (e)	ton	190	\$50	\$ 9,500	
Import soil, fill, compact, and revegetate (f)	ton	190	\$40	\$ 7,600	
Material and Labor Subtotal					\$ 29,000
Contractor Markups					
Contractor general conditions and overhead and profit (g)	%	17	\$29,000	\$ 4,900	
Contractor bonding and insurance (h)	%	2	\$33,900	\$ 700	
Contingency (i)	%	30	\$34,600	\$ 10,400	
Contractor Markups Subtotal					\$ 16,000
Subtotal Estimated Construction Costs					\$ 45,000
Engineering Services (j)					
Site investigation for remedial design (k)	LS	1	\$24,000	\$ 24,000	
Perform general planning activities	LS	1	\$10,000	\$ 10,000	
Prepare remedial design plans and specs (l)	LS	1	\$15,000	\$ 15,000	
Coordinate with waste management facilities	LS	1	\$5,000	\$ 5,000	
Bid, award, and negotiate construction contract	LS	1	\$5,000	\$ 5,000	
Meetings with project team	LS	1	\$5,000	\$ 5,000	
Construction management (m)	%	15	\$45,000	\$ 6,800	
Soil sample collection and analysis (n)	LS	1	\$10,000	\$ 10,000	
Prepare completion report	LS	1	\$10,000	\$ 10,000	
Contingency (o)	%	20	\$90,800	\$ 18,200	
Subtotal Engineering Services Costs					\$ 109,000
Subtotal Administrative Services Costs (p)					\$ 2,000
Total Estimated Environmental and Disposal Liability Costs for the Trailer Disposal Area at Moss Beach Ranch with a Small Extent of Excavation Boundaries					\$ 160,000

TABLE 3
Preliminary Estimated Capital Costs
Trailer Disposal Area (Moss Beach Ranch)
Excavation Scenario: Small Extent
Rancho Corral de Tierra, Montara, California

Abbreviations:

BCY = bank cubic yard

EDL = environmental and disposal liability

LS = lump sum

Notes:

- (a) Environmental and disposal liability costs are based on all activities related to environmental investigations and environmental cleanup. This estimate does not include the following: (1) removal of debris and structures (abandoned or inhabited) that are present at the excavation areas; (2) removal of trees and structures that may prevent Site access for heavy machinery and large trucks; (3) removal of potential sources of asbestos and lead that could instead be abated; and (4) restoration of structures that were removed for access purposes prior to Site cleanup. Environmental and disposal liability costs were developed separately for individual excavation areas. However, actual construction services are expected to be conducted concurrently; thus, some economies of scale may be achieved. Totals may not sum exactly due to rounding. Line costs are rounded to the nearest hundreds, subtotals to the nearest thousands, and the total to the nearest ten thousands.
- (b) The quantities of materials are based on the size of the excavation, the weight of excavated soil and imported fill, and typical percentages for similar construction projects. The assumed final dimensions of the excavation boundaries, and the resulting quantities of excavated soil, are shown in Table 2.
- (c) Unit costs were developed based on:
- (1) standard construction costs, as listed in R.S. Means 2011, for construction crews and equipment with environmental professional knowledge about typical rates of progress,
 - (2) vendor estimates of waste disposal and analytical services, and
 - (3) environmental professional knowledge of typical engineering services for similar sites.
- (d) The line cost for each identified item is calculated by multiplying the quantity by the unit cost.
- (e) Transportation and disposal costs are based on a preliminary opinion of Waste Management that the excavated soil can be disposed at the Kirby Canyon Landfill in San Jose, California as a non-hazardous waste that can be used for alternate daily cover at a cost of \$20 per ton. This unit cost includes the transportation of excavated soil, which is assumed to be loaded directly into trucks without stockpiling. Disposal costs and taxes will be higher if the soil is characterized as hazardous waste.
- (f) The costs associated with importing soil, filling, compacting, and revegetating assume that compaction testing is not performed.
- (g) The costs associated with the contractor's general conditions and overhead and profit are calculated as a percentage of the material and labor subtotal. The selected percentage is considered typical for construction projects of this size and type of work.
- (h) The costs associated with bonding and insurance for the contractor are calculated as a percentage of the sum of material and labor, general conditions, and overhead and profit.
- (i) The contingency for the contractor is calculated as a percentage of the sum of material and labor, general conditions, overhead and profit, and bonding and insurance. The selected percentage is considered typical for the type of the work and uncertainties existing due to limited information available for the Site conditions that is necessary for a more detailed cost estimate.
- (j) Engineering services are developed based on typical practices for similar sites. The following assumptions were made for purposes of this cost estimate:
- (1) No environmental regulatory oversight is included during remediation processes; and
 - (2) Remediation occurs after transfer to National Park Service. Therefore, external permitting costs (e.g. San Mateo County Public Works Department and San Mateo County Division of Environmental Health) are not included.
- (k) A Site investigation to better delineate the extent of excavation is assumed to be appropriate, in order that more accurate remedial design plans and specifications can be provided to contractors for bidding. The following assumptions are made in estimating a unit cost:
- (1) Soil samples are collected using a backhoe crew and a sampling crew (two days);
 - (2) Approximately 15 to 20 soil samples are collected and analyzed for total petroleum hydrocarbons and zinc to delineate the excavation boundaries;
 - (3) Approximately two composite disposal characterization soil samples are collected and analyzed for total petroleum hydrocarbons, benzene, toluene, ethylbenzene, xylenes, organochlorine pesticides, metals, and asbestos in order to obtain approval to directly transport and dispose excavated soil to the disposal facility.
 - (4) Additional field activities include locating utilities and surveying sample locations; and
 - (5) A summary memorandum is prepared to facilitate the preparation of remedial design plans and specifications.

TABLE 3
Preliminary Estimated Capital Costs
Trailer Disposal Area (Moss Beach Ranch)
Excavation Scenario: Small Extent
Rancho Corral de Tierra, Montara, California

Notes (continued):

- (l) The costs associated with the preparation of remedial plans and specifications to be provided to the contractor during bidding are assumed to be prepared in conjunction with at least one of the other remediation areas.
projects of this size and type of work.
- (m) The costs associated with engineering construction management are calculated as a percentage of the subtotal estimated construction costs. The selected percentage is considered typical for construction projects of this size and type of work.
- (n) Soil sample collection and analysis is necessary during construction to confirm that the excavation of contaminated soil is complete. The following assumptions are made in estimating a unit cost:
 - (1) Soil samples are collected using an additional sampling crew working concurrently with the excavation crew;
 - (2) Soil samples are collected from the excavation perimeter approximately every 20 linear feet;
 - (3) Soil samples are collected from the excavation bottom approximately every 400 square feet;
 - (4) Soil samples are analyzed for asbestos with a rushed (24-hour) turn-around-time; and
 - (5) Confirmation samples are assumed to have a 50% failure rate with sample collection occurring in a separate day.
- (o) The contingency for engineering services is calculated as a percentage of the sum of all other engineering services costs . The selected percentage is considered typical for the type of the work and uncertainties existing due to limited information available for the Site conditions that is necessary for a more detailed cost estimate.
- (p) The costs associated with administrative services is assumed to be one percent of the sum of the subtotal construction costs and subtotal engineering costs.

TABLE 4
Preliminary Estimated Capital Costs
Trailer Disposal Area (Moss Beach Ranch)
Excavation Scenario: Large Extent
Rancho Corral de Tierra, Montara, California

Task Description	Estimated Environmental and Disposal Liability Costs (a)				
	Unit	Quantity (b)	Unit Cost (c)	Line Cost (d)	Subtotal
Construction Costs for Material and Labor					
Mobilization and demobilization	LS	1	\$4,000	\$ 4,000	
Site preparation	LS	1	\$6,600	\$ 6,600	
Shallow excavation and truck loading (470 BCY)	day	1	\$4,000	\$ 4,000	
Soil transportation and disposal (e)	ton	730	\$50	\$ 36,500	
Import soil, fill, compact, and revegetate (f)	ton	730	\$30	\$ 21,900	
Material and Labor Subtotal					\$ 73,000
Contractor Markups					
Contractor general conditions and overhead and profit (g)	%	17	\$73,000	\$ 12,400	
Contractor bonding and insurance (h)	%	2	\$85,400	\$ 1,700	
Contingency (i)	%	30	\$87,100	\$ 26,100	
Contractor Markups Subtotal					\$ 40,000
Subtotal Estimated Construction Costs					\$ 113,000
Engineering Services (j)					
Site investigation for remedial design (k)	LS	1	\$24,000	\$ 24,000	
Perform general planning activities	LS	1	\$10,000	\$ 10,000	
Prepare remedial design plans and specs (l)	LS	1	\$15,000	\$ 15,000	
Coordinate with waste management facilities	LS	1	\$5,000	\$ 5,000	
Bid, award, and negotiate construction contract	LS	1	\$5,000	\$ 5,000	
Meetings with project team	LS	1	\$5,000	\$ 5,000	
Construction management (m)	%	15	\$113,000	\$ 17,000	
Soil sample collection and analysis (n)	LS	1	\$28,000	\$ 28,000	
Prepare completion report	LS	1	\$10,000	\$ 10,000	
Contingency (o)	%	20	\$119,000	\$ 23,800	
Subtotal Engineering Services Costs					\$ 143,000
Subtotal Administrative Services Costs (p)					\$ 3,000
Total Estimated Environmental and Disposal Liability Costs for the Trailer Disposal Area at Moss Beach Ranch with a Large Extent of Excavation Boundaries					\$ 260,000

TABLE 4
Preliminary Estimated Capital Costs
Trailer Disposal Area (Moss Beach Ranch)
Excavation Scenario: Large Extent
Rancho Corral de Tierra, Montara, California

Abbreviations:

BCY = bank cubic yard

EDL = environmental and disposal liability

LS = lump sum

Notes:

- (a) Environmental and disposal liability costs are based on all activities related to environmental investigations and environmental cleanup. This estimate does not include the following: (1) removal of debris and structures (abandoned or inhabited) that are present at the excavation areas; (2) removal of trees and structures that may prevent Site access for heavy machinery and large trucks; (3) removal of potential sources of asbestos and lead that could instead be abated; and (4) restoration of structures that were removed for access purposes prior to Site cleanup. Environmental and disposal liability costs were developed separately for individual excavation areas. However, actual construction services are expected to be conducted concurrently; thus, some economies of scale may be achieved. Totals may not sum exactly due to rounding. Line costs are rounded to the nearest hundreds, subtotals to the nearest thousands, and the total to the nearest ten thousands.
- (b) The quantities of materials are based on the size of the excavation, the weight of excavated soil and imported fill, and typical percentages for similar construction projects. The assumed final dimensions of the excavation boundaries, and the resulting quantities of excavated soil, are shown in Table 2.
- (c) Unit costs were developed based on:
- (1) standard construction costs, as listed in R.S. Means 2011, for construction crews and equipment with environmental professional knowledge about typical rates of progress,
 - (2) vendor estimates of waste disposal and analytical services, and
 - (3) environmental professional knowledge of typical engineering services for similar sites.
- (d) The line cost for each identified item is calculated by multiplying the quantity by the unit cost.
- (e) Transportation and disposal costs are based on a preliminary opinion of Waste Management that the excavated soil can be disposed at the Kirby Canyon Landfill in San Jose, California as a non-hazardous waste that can be used for alternate daily cover at a cost of \$20 per ton. This unit cost includes the transportation of excavated soil, which is assumed to be loaded directly into trucks without stockpiling. Disposal costs and taxes will be higher if the soil is characterized as hazardous waste.
- (f) The costs associated with importing soil, filling, compacting, and revegetating assume that compaction testing is not performed.
- (g) The costs associated with the contractor's general conditions and overhead and profit are calculated as a percentage of the material and labor subtotal. The selected percentage is considered typical for construction projects of this size and type of work.
- (h) The costs associated with bonding and insurance for the contractor are calculated as a percentage of the sum of material and labor, general conditions, and overhead and profit.
- (i) The contingency for the contractor is calculated as a percentage of the sum of material and labor, general conditions, overhead and profit, and bonding and insurance. The selected percentage is considered typical for the type of the work and uncertainties existing due to limited information available for the Site conditions that is necessary for a more detailed cost estimate.
- (j) Engineering services are developed based on typical practices for similar sites. The following assumptions were made for purposes of this cost estimate:
- (1) No environmental regulatory oversight is included during remediation processes; and
 - (2) Remediation occurs after transfer to National Park Service. Therefore, external permitting costs (e.g. San Mateo County Public Works Department and San Mateo County Division of Environmental Health) are not included.
- (k) A Site investigation to better delineate the extent of excavation is assumed to be appropriate, in order that more accurate remedial design plans and specifications can be provided to contractors for bidding. The following assumptions are made in estimating a unit cost:
- (1) Soil samples are collected using a backhoe crew and a sampling crew (three days);
 - (2) Approximately 15 to 20 soil samples are collected and analyzed for total petroleum hydrocarbons and zinc to delineate the excavation boundaries;
 - (3) Approximately two composite disposal characterization soil samples are collected and analyzed for total petroleum hydrocarbons, benzene, toluene, ethylbenzene, xylenes, organochlorine pesticides, metals, and asbestos in order to obtain approval to directly transport and dispose excavated soil to the disposal facility.
 - (4) Additional field activities include locating utilities and surveying sample locations; and
 - (5) A summary memorandum is prepared to facilitate the preparation of remedial design plans and specifications.

TABLE 4
Preliminary Estimated Capital Costs
Trailer Disposal Area (Moss Beach Ranch)
Excavation Scenario: Large Extent
Rancho Corral de Tierra, Montara, California

Notes (continued):

- (l) The costs associated with the preparation of remedial plans and specifications to be provided to the contractor during bidding are assumed to be prepared in conjunction with at least one of the other remediation areas.
projects of this size and type of work.
- (m) The costs associated with engineering construction management are calculated as a percentage of the subtotal estimated construction costs. The selected percentage is considered typical for construction projects of this size and type of work.
- (n) Soil sample collection and analysis is necessary during construction to confirm that the excavation of contaminated soil is complete. The following assumptions are made in estimating a unit cost:
 - (1) Soil samples are collected using an additional sampling crew working concurrently with the excavation crew;
 - (2) Soil samples are collected from the excavation perimeter approximately every 20 linear feet;
 - (3) Soil samples are collected from the excavation bottom approximately every 400 square feet;
 - (4) Soil samples are analyzed for asbestos with a rushed (24-hour) turn-around-time; and
 - (5) Confirmation samples are assumed to have a 50% failure rate with sample collection occurring in a separate day.
- (o) The contingency for engineering services is calculated as a percentage of the sum of all other engineering services costs . The selected percentage is considered typical for the type of the work and uncertainties existing due to limited information available for the Site conditions that is necessary for a more detailed cost estimate.
- (p) The costs associated with administrative services is assumed to be one percent of the sum of the subtotal construction costs and subtotal engineering costs.

TABLE 5
Preliminary Estimated Capital Costs
Former Debris Area (Moss Beach Ranch)
Excavation Scenario: Small Extent
Rancho Corral de Tierra, Montara, California

Task Description	Estimated Environmental and Disposal Liability Costs (a)				
	Unit	Quantity (b)	Unit Cost (c)	Line Cost (d)	Subtotal
Construction Costs for Material and Labor					
Mobilization and demobilization	LS	1	\$4,000	\$ 4,000	
Site preparation	LS	1	\$5,300	\$ 5,300	
Shallow excavation and truck loading (90 BCY)	day	1	\$4,000	\$ 4,000	
Soil transportation and disposal (e)	ton	140	\$50	\$ 7,000	
Import soil, fill, compact, and revegetate (f)	ton	140	\$55	\$ 7,700	
Material and Labor Subtotal					\$ 28,000
Contractor Markups					
Contractor general conditions and overhead and profit (g)	%	17	\$28,000	\$ 4,800	
Contractor bonding and insurance (h)	%	2	\$32,800	\$ 700	
Contingency (i)	%	30	\$33,500	\$ 10,100	
Contractor Markups Subtotal					\$ 16,000
Subtotal Estimated Construction Costs					\$ 44,000
Engineering Services (j)					
Site investigation for remedial design (k)	LS	1	\$24,000	\$ 24,000	
Perform general planning activities	LS	1	\$10,000	\$ 10,000	
Prepare remedial design plans and specs (l)	LS	1	\$15,000	\$ 15,000	
Coordinate with waste management facilities	LS	1	\$5,000	\$ 5,000	
Bid, award, and negotiate construction contract	LS	1	\$5,000	\$ 5,000	
Meetings with project team	LS	1	\$5,000	\$ 5,000	
Construction management (m)	%	15	\$44,000	\$ 6,600	
Soil sample collection and analysis (n)	LS	1	\$8,000	\$ 8,000	
Prepare completion report	LS	1	\$10,000	\$ 10,000	
Contingency (o)	%	20	\$88,600	\$ 17,700	
Subtotal Engineering Services Costs					\$ 106,000
Subtotal Administrative Services Costs (p)					\$ 2,000
Total Estimated Environmental and Disposal Liability Costs for the Former Debris Area at Moss Beach Ranch with a Small Extent of Excavation Boundaries					\$ 150,000

TABLE 5
Preliminary Estimated Capital Costs
Former Debris Area (Moss Beach Ranch)
Excavation Scenario: Small Extent
Rancho Corral de Tierra, Montara, California

Abbreviations:

BCY = bank cubic yard

EDL = environmental and disposal liability

LS = lump sum

Notes:

- (a) Environmental and disposal liability costs are based on all activities related to environmental investigations and environmental cleanup. This estimate does not include the following: (1) removal of debris and structures (abandoned or inhabited) that are present at the excavation areas; (2) removal of trees and structures that may prevent Site access for heavy machinery and large trucks; (3) removal of potential sources of asbestos and lead that could instead be abated; and (4) restoration of structures that were removed for access purposes prior to Site cleanup. Environmental and disposal liability costs were developed separately for individual excavation areas. However, actual construction services are expected to be conducted concurrently; thus, some economies of scale may be achieved. Totals may not sum exactly due to rounding. Line costs are rounded to the nearest hundreds, subtotals to the nearest thousands, and the total to the nearest ten thousands.
- (b) The quantities of materials are based on the size of the excavation, the weight of excavated soil and imported fill, and typical percentages for similar construction projects. The assumed final dimensions of the excavation boundaries, and the resulting quantities of excavated soil, are shown in Table 2.
- (c) Unit costs were developed based on:
- (1) standard construction costs, as listed in R.S. Means 2011, for construction crews and equipment with environmental professional knowledge about typical rates of progress,
 - (2) vendor estimates of waste disposal and analytical services, and
 - (3) environmental professional knowledge of typical engineering services for similar sites.
- (d) The line cost for each identified item is calculated by multiplying the quantity by the unit cost.
- (e) Transportation and disposal costs are based on a preliminary opinion of Waste Management that the excavated soil can be disposed at the Kirby Canyon Landfill in San Jose, California as a non-hazardous waste that can be used for alternate daily cover at a cost of \$20 per ton. This unit cost includes the transportation of excavated soil, which is assumed to be loaded directly into trucks without stockpiling. Disposal costs and taxes will be higher if the soil is characterized as hazardous waste.
- (f) The costs associated with importing soil, filling, compacting, and revegetating assume that compaction testing is not performed.
- (g) The costs associated with the contractor's general conditions and overhead and profit are calculated as a percentage of the material and labor subtotal. The selected percentage is considered typical for construction projects of this size and type of work.
- (h) The costs associated with bonding and insurance for the contractor are calculated as a percentage of the sum of material and labor, general conditions, and overhead and profit.
- (i) The contingency for the contractor is calculated as a percentage of the sum of material and labor, general conditions, overhead and profit, and bonding and insurance. The selected percentage is considered typical for the type of the work and uncertainties existing due to limited information available for the Site conditions that is necessary for a more detailed cost estimate.
- (j) Engineering services are developed based on typical practices for similar sites. The following assumptions were made for purposes of this cost estimate:
- (1) No environmental regulatory oversight is included during remediation processes; and
 - (2) Remediation occurs after transfer to National Park Service. Therefore, external permitting costs (e.g. San Mateo County Public Works Department and San Mateo County Division of Environmental Health) are not included.
- (k) A Site investigation to better delineate the extent of excavation is assumed to be appropriate, in order that more accurate remedial design plans and specifications can be provided to contractors for bidding. The following assumptions are made in estimating a unit cost:
- (1) Soil samples are collected using a backhoe crew and a sampling crew (two days);
 - (2) Approximately 15 to 20 soil samples are collected and analyzed for total petroleum hydrocarbons to delineate the excavation boundaries;
 - (3) Approximately two composite disposal characterization soil samples are collected and analyzed for total petroleum hydrocarbons, benzene, toluene, ethylbenzene, xylenes, organochlorine pesticides, metals, and asbestos in order to obtain approval to directly transport and dispose excavated soil to the disposal facility.
 - (4) Additional field activities include locating utilities and surveying sample locations; and
 - (5) A summary memorandum is prepared to facilitate the preparation of remedial design plans and specifications.

TABLE 5
Preliminary Estimated Capital Costs
Former Debris Area (Moss Beach Ranch)
Excavation Scenario: Small Extent
Rancho Corral de Tierra, Montara, California

Notes (continued):

- (l) The costs associated with the preparation of remedial plans and specifications to be provided to the contractor during bidding are assumed to be prepared in conjunction with at least one of the other remediation areas.
projects of this size and type of work.
- (m) The costs associated with engineering construction management are calculated as a percentage of the subtotal estimated construction costs. The selected percentage is considered typical for construction projects of this size and type of work.
- (n) Soil sample collection and analysis is necessary during construction to confirm that the excavation of contaminated soil is complete. The following assumptions are made in estimating a unit cost:
 - (1) Soil samples are collected using an additional sampling crew working concurrently with the excavation crew;
 - (2) Soil samples are collected from the excavation perimeter approximately every 20 linear feet;
 - (3) Soil samples are collected from the excavation bottom approximately every 400 square feet;
 - (4) Soil samples are analyzed for asbestos with a rushed (24-hour) turn-around-time; and
 - (5) Confirmation samples are assumed to have a 50% failure rate with sample collection occurring in a separate day.
- (o) The contingency for engineering services is calculated as a percentage of the sum of all other engineering services costs . The selected percentage is considered typical for the type of the work and uncertainties existing due to limited information available for the Site conditions that is necessary for a more detailed cost estimate.
- (p) The costs associated with administrative services is assumed to be one percent of the sum of the subtotal construction costs and subtotal engineering costs.

TABLE 6
Preliminary Estimated Capital Costs
Former Debris Area (Moss Beach Ranch)
Excavation Scenario: Large Extent
Rancho Corral de Tierra, Montara, California

Task Description	Estimated Environmental and Disposal Liability Costs (a)				
	Unit	Quantity (b)	Unit Cost (c)	Line Cost (d)	Subtotal
Construction Costs for Material and Labor					
Mobilization and demobilization	LS	1	\$4,000	\$ 4,000	
Site preparation	LS	1	\$8,600	\$ 8,600	
Shallow excavation and truck loading (360 BCY)	day	1	\$4,000	\$ 4,000	
Soil transportation and disposal (e)	ton	560	\$50	\$ 28,000	
Import soil, fill, compact, and revegetate (f)	ton	560	\$45	\$ 25,200	
Material and Labor Subtotal					\$ 70,000
Contractor Markups					
Contractor general conditions and overhead and profit (g)	%	17	\$70,000	\$ 11,900	
Contractor bonding and insurance (h)	%	2	\$81,900	\$ 1,600	
Contingency (i)	%	30	\$83,500	\$ 25,100	
Contractor Markups Subtotal					\$ 39,000
Subtotal Estimated Construction Costs					\$ 109,000
Engineering Services (j)					
Site investigation for remedial design (k)	LS	1	\$24,000	\$ 24,000	
Perform general planning activities	LS	1	\$10,000	\$ 10,000	
Prepare remedial design plans and specs (l)	LS	1	\$15,000	\$ 15,000	
Coordinate with waste management facilities	LS	1	\$5,000	\$ 5,000	
Bid, award, and negotiate construction contract	LS	1	\$5,000	\$ 5,000	
Meetings with project team	LS	1	\$5,000	\$ 5,000	
Construction management (m)	%	15	\$109,000	\$ 16,400	
Soil sample collection and analysis (n)	LS	1	\$18,000	\$ 18,000	
Prepare completion report	LS	1	\$10,000	\$ 10,000	
Contingency (o)	%	20	\$108,400	\$ 21,700	
Subtotal Engineering Services Costs					\$ 130,000
Subtotal Administrative Services Costs (p)					\$ 3,000
Total Estimated Environmental and Disposal Liability Costs for the Former Debris Area at Moss Beach Ranch with a Large Extent of Excavation Boundaries					\$ 240,000

TABLE 6
Preliminary Estimated Capital Costs
Former Debris Area (Moss Beach Ranch)
Excavation Scenario: Large Extent
Rancho Corral de Tierra, Montara, California

Abbreviations:

BCY = bank cubic yard

EDL = environmental and disposal liability

LS = lump sum

Notes:

- (a) Environmental and disposal liability costs are based on all activities related to environmental investigations and environmental cleanup. This estimate does not include the following: (1) removal of debris and structures (abandoned or inhabited) that are present at the excavation areas; (2) removal of trees and structures that may prevent Site access for heavy machinery and large trucks; (3) removal of potential sources of asbestos and lead that could instead be abated; and (4) restoration of structures that were removed for access purposes prior to Site cleanup. Environmental and disposal liability costs were developed separately for individual excavation areas. However, actual construction services are expected to be conducted concurrently; thus, some economies of scale may be achieved. Totals may not sum exactly due to rounding. Line costs are rounded to the nearest hundreds, subtotals to the nearest thousands, and the total to the nearest ten thousands.
- (b) The quantities of materials are based on the size of the excavation, the weight of excavated soil and imported fill, and typical percentages for similar construction projects. The assumed final dimensions of the excavation boundaries, and the resulting quantities of excavated soil, are shown in Table 2.
- (c) Unit costs were developed based on:
- (1) standard construction costs, as listed in R.S. Means 2011, for construction crews and equipment with environmental professional knowledge about typical rates of progress,
 - (2) vendor estimates of waste disposal and analytical services, and
 - (3) environmental professional knowledge of typical engineering services for similar sites.
- (d) The line cost for each identified item is calculated by multiplying the quantity by the unit cost.
- (e) Transportation and disposal costs are based on a preliminary opinion of Waste Management that the excavated soil can be disposed at the Kirby Canyon Landfill in San Jose, California as a non-hazardous waste that can be used for alternate daily cover at a cost of \$20 per ton. This unit cost includes the transportation of excavated soil, which is assumed to be loaded directly into trucks without stockpiling. Disposal costs and taxes will be higher if the soil is characterized as hazardous waste.
- (f) The costs associated with importing soil, filling, compacting, and revegetating assume that compaction testing is not performed.
- (g) The costs associated with the contractor's general conditions and overhead and profit are calculated as a percentage of the material and labor subtotal. The selected percentage is considered typical for construction projects of this size and type of work.
- (h) The costs associated with bonding and insurance for the contractor are calculated as a percentage of the sum of material and labor, general conditions, and overhead and profit.
- (i) The contingency for the contractor is calculated as a percentage of the sum of material and labor, general conditions, overhead and profit, and bonding and insurance. The selected percentage is considered typical for the type of the work and uncertainties existing due to limited information available for the Site conditions that is necessary for a more detailed cost estimate.
- (j) Engineering services are developed based on typical practices for similar sites. The following assumptions were made for purposes of this cost estimate:
- (1) No environmental regulatory oversight is included during remediation processes; and
 - (2) Remediation occurs after transfer to National Park Service. Therefore, external permitting costs (e.g. San Mateo County Public Works Department and San Mateo County Division of Environmental Health) are not included.
- (k) A Site investigation to better delineate the extent of excavation is assumed to be appropriate, in order that more accurate remedial design plans and specifications can be provided to contractors for bidding. The following assumptions are made in estimating a unit cost:
- (1) Soil samples are collected using a backhoe crew and a sampling crew (three days);
 - (2) Approximately 15 to 20 soil samples are collected and analyzed for total petroleum hydrocarbons to delineate the excavation boundaries;
 - (3) Approximately two composite disposal characterization soil samples are collected and analyzed for total petroleum hydrocarbons, benzene, toluene, ethylbenzene, xylenes, organochlorine pesticides, metals, and asbestos in order to obtain approval to directly transport and dispose excavated soil to the disposal facility.
 - (4) Additional field activities include locating utilities and surveying sample locations; and
 - (5) A summary memorandum is prepared to facilitate the preparation of remedial design plans and specifications.

TABLE 6
Preliminary Estimated Capital Costs
Former Debris Area (Moss Beach Ranch)
Excavation Scenario: Large Extent
Rancho Corral de Tierra, Montara, California

Notes (continued):

- (l) The costs associated with the preparation of remedial plans and specifications to be provided to the contractor during bidding are assumed to be prepared in conjunction with at least one of the other remediation areas.
projects of this size and type of work.
- (m) The costs associated with engineering construction management are calculated as a percentage of the subtotal estimated construction costs. The selected percentage is considered typical for construction projects of this size and type of work.
- (n) Soil sample collection and analysis is necessary during construction to confirm that the excavation of contaminated soil is complete. The following assumptions are made in estimating a unit cost:
 - (1) Soil samples are collected using an additional sampling crew working concurrently with the excavation crew;
 - (2) Soil samples are collected from the excavation perimeter approximately every 20 linear feet;
 - (3) Soil samples are collected from the excavation bottom approximately every 400 square feet;
 - (4) Soil samples are analyzed for asbestos with a rushed (24-hour) turn-around-time; and
 - (5) Confirmation samples are assumed to have a 50% failure rate with sample collection occurring in a separate day.
- (o) The contingency for engineering services is calculated as a percentage of the sum of all other engineering services costs . The selected percentage is considered typical for the type of the work and uncertainties existing due to limited information available for the Site conditions that is necessary for a more detailed cost estimate.
- (p) The costs associated with administrative services is assumed to be one percent of the sum of the subtotal construction costs and subtotal engineering costs.

TABLE 7
Preliminary Estimated Economies of Scale for Capital Costs for a Combined Project of the
Trailer Disposal Area (Moss Beach Ranch) and Former Debris Area (Moss Beach Ranch)

Rancho Corral de Tierra, Montara, California

Task Description (a)	Estimated Environmental and Disposal Liability Costs (b)			
	Trailer Disposal Area Only Line Cost (c)	Former Debris Area Only Line Cost (d)	Combined Project Line Cost (e)	Deduction for Economies of Scale (f)
Construction Costs for Material and Labor				
Mobilization and demobilization	\$ 4,000	\$ 4,000	\$ 6,000	
Site preparation	(g)	(g)	(g)	
Shallow excavation and truck loading	(g)	(g)	(g)	
Soil transportation and disposal	(g)	(g)	(g)	
Import soil, fill, compact, and revegetate	(g)	(g)	(g)	
Material and Labor Subtotal				\$ (2,000)
Contractor Markups				
Contractor general conditions and overhead and profit (h)	\$ 700	\$ 700	\$ 1,000	
Contractor bonding and insurance (i)	\$ 100	\$ 100	\$ 100	
Contingency (j)	\$ 1,400	\$ 1,400	\$ 2,100	
Contractor Markups Subtotal				\$ (1,200)
Subtotal Estimated Economies of Scale for Construction Costs				\$ (3,000)
Engineering Services				
Site investigation for remedial design	(g)	(g)	(g)	
Perform general planning activities	\$ 10,000	\$ 10,000	\$ 15,000	
Prepare remedial design plans and specs	(g)	(g)	(g)	
Coordinate with waste management facilities	\$ 5,000	\$ 5,000	\$ 5,000	
Bid, award, and negotiate construction contract	\$ 5,000	\$ 5,000	\$ 5,000	
Meetings with project team	\$ 5,000	\$ 5,000	\$ 6,000	
Construction management (k)	\$ 330	\$ 330	\$ 480	
Soil sample collection and analysis	(g)	(g)	(g)	
Prepare completion report	(g)	(g)	(g)	
Contingency (l)	\$ 5,100	\$ 5,100	\$ 6,300	
Subtotal Estimated Economies of Scale for Engineering Services Costs				\$ (23,000)
Subtotal Economies of Scale for Administrative Services Costs (m)				\$ (260)
Total Estimated Economies of Scale for Environmental Disposal and Liability Costs For Simultaneously Remediating the Trailer Disposal Area at Moss Beach Ranch and the Former Debris Area at Moss Beach Ranch				\$ (26,000)

TABLE 7
**Preliminary Estimated Economies of Scale for Capital Costs for a Combined Project of the
Trailer Disposal Area (Moss Beach Ranch) and Former Debris Area (Moss Beach Ranch)**

Rancho Corral de Tierra, Montara, California

Abbreviations:

BCY = bank cubic yard

EDL = environmental and disposal liability

LS = lump sum

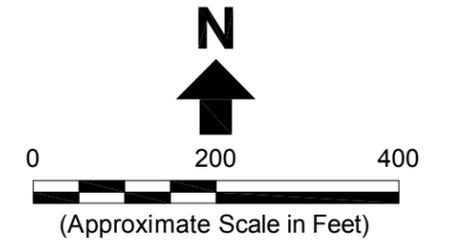
Notes:

- (a) Detailed descriptions of the tasks are provided in the notes provided with Tables 3, 4, 5, and 6.
- (b) Environmental and disposal liability costs are based on all activities related to environmental investigations and environmental cleanup. This estimate does not include the following: (1) removal of debris and structures (abandoned or inhabited) that are present at the excavation areas; (2) removal of trees and structures that may prevent Site access for heavy machinery and large trucks; (3) removal of potential sources of asbestos and lead that could instead be abated; and (4) restoration of structures that were removed for access purposes prior to Site cleanup. Totals may not sum exactly due to rounding. Line costs are rounded to the nearest hundreds, subtotals to the nearest thousands, and the total to the nearest thousand.
- (c) The line costs for tasks for the Trailer Disposal Area (Moss Beach Ranch) that may have achievable economies of scale are presented in Tables 3 and 4.
- (d) The line costs for tasks for the Former Debris Area (Moss Beach Ranch) that may have achievable economies of scale are presented in Tables 5 and 6.
- (e) The line cost for a combined project (consisting of both the Trailer Disposal Area and the Former Debris Area) are developed similarly to the methodology used and described in more detail in Tables 3, 4, 5, and 6.
- (f) The estimated deduction for the economies of scale is calculated by subtracting the subtotals of line costs for the Trailer Disposal Area only and the Former Debris Area only from the subtotal of the Combined Project line costs.
- (g) Line costs for tasks that are unlikely to achieve significant economies of scale are not presented in this Table 7.
- (h) The costs associated with the contractor's general conditions and overhead and profit are calculated as a percentage of the material and labor subtotal. The selected percentage (17%) is considered typical for construction projects of this size and type of work.
- (i) The costs associated with bonding and insurance for the contractor are calculated as a percentage (2%) of the sum of material and labor, general conditions, and overhead and profit.
- (j) The contingency for the contractor is calculated as a percentage of the sum of material and labor, general conditions, overhead and profit, and bonding and insurance. The selected percentage (30%) is considered typical for the type of the work and uncertainties existing due to limited information available for the Site conditions that is necessary for a more detailed cost estimate.
- (k) The costs associated with engineering construction management are calculated as a percentage of the subtotal estimated construction costs. The selected percentage (15%) is considered typical for construction projects of this size and type of work.
- (l) The contingency for engineering services is calculated as a percentage of the sum of all other engineering services costs. The selected percentage (20%) is considered typical for the type of the work and uncertainties existing due to limited information available for the Site conditions that is necessary for a more detailed cost estimate.
- (m) The costs associated with administrative services is assumed to be one percent of the sum of the subtotal construction costs and subtotal engineering costs.

Trailer Disposal Area
(See Figure 2)

Former Debris Area
(See Figure 3)

San Vicente Creek



Legend:

 Creek (approximate)

Notes:

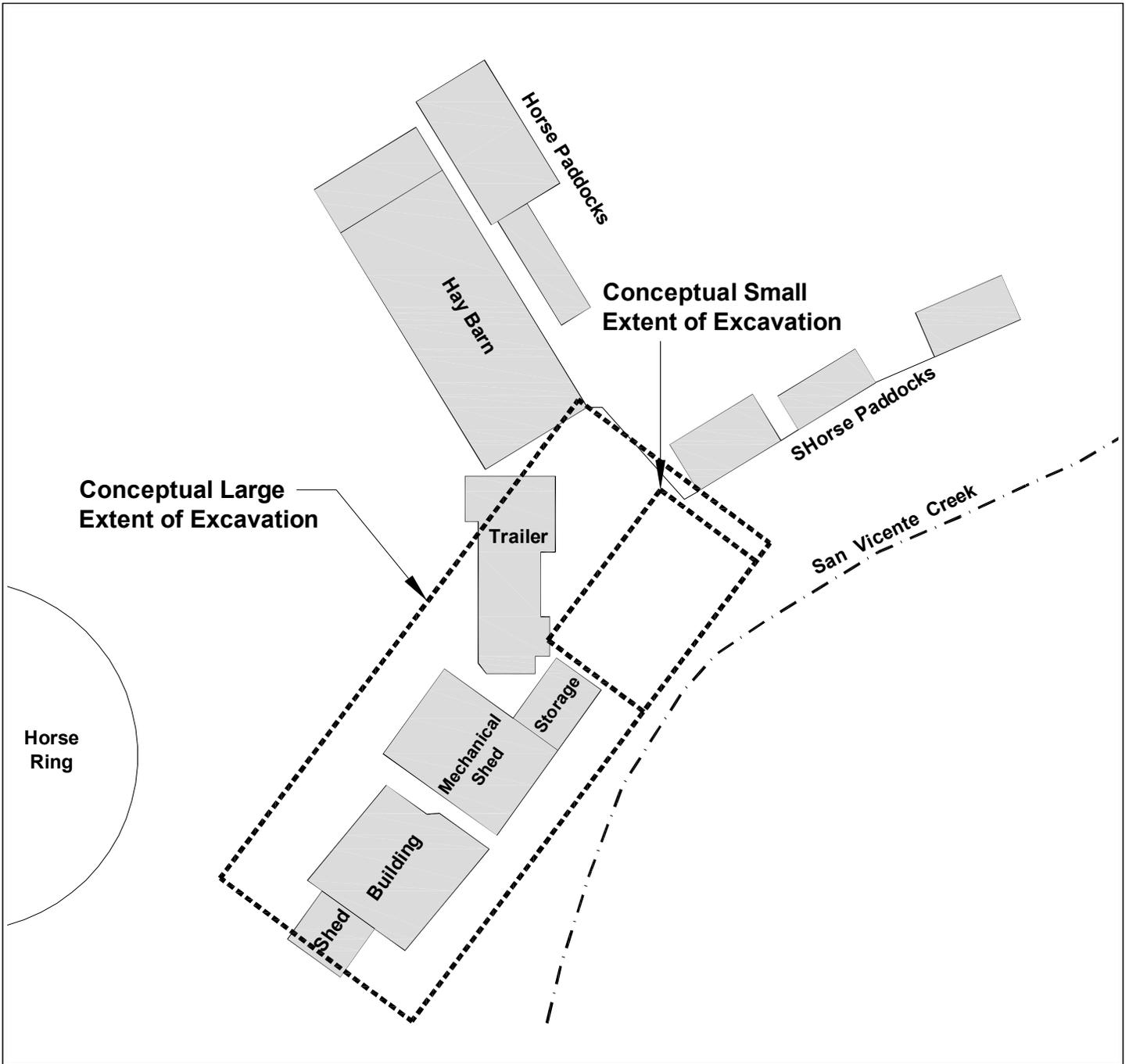
- 1. All locations are approximate.
- 2. Basemap source: Google Earth Pro, date of imagery 1 October 2009.

**Erler &
Kalinowski, Inc.**

Moss Beach Ranch
Soil Excavation Areas

Rancho Corral de Tierra
Montara, CA
September 2011
EKI B10014.00

Figure 1



Legend:

-  Creek/Drainage (approximate)
-  Conceptual Extent of Soil Excavation

Notes:

1. All locations are approximate.



(Approximate Scale in Feet)

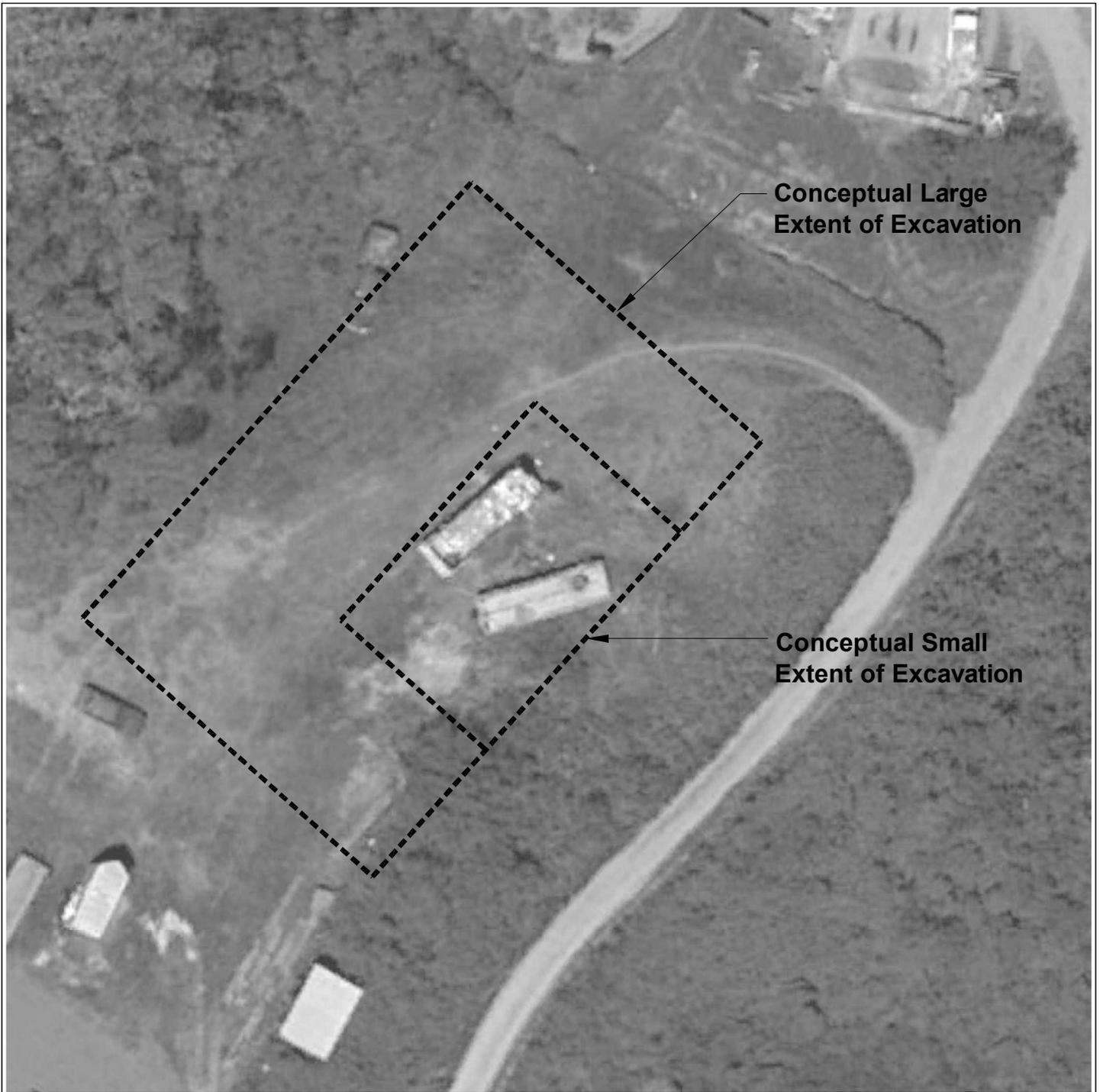
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Moss Beach Ranch
Trailer Disposal Area

Rancho Corral de Tierra
Montara, CA

September 2011
EKI B10014.00

Figure 2



Legend:



Conceptual Extent of Soil Excavation

Notes:

1. All locations are approximate.
2. Basemap source: Google Earth Pro, date of imagery June 2011.



(Approximate Scale in Feet)

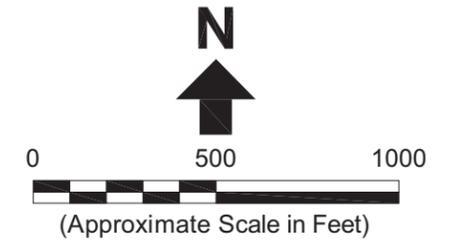
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Moss Beach Ranch
Former Debris Area

Rancho Corral de Tierra
Montara, CA

September 2011
EKI B10014.00

Figure 3



Legend:

 Creek (approximate)

Notes:

- 1. All locations are approximate.
- 2. Basemap source: Google Earth Pro, date of imagery 1 October 2009.

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Denniston Creek Valley
Structure Ruins Sites

Rancho Corral de Tierra
Montara, CA
September 2011
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Figure 4