
RTIN

MARCH 21, 2012

of individual RAOs in lieu of the more detailed remedial cleanup goals that will be available following completion of the revised risk assessments.

1.1 SUMMARY OF SITE RISKS

Remedial investigations for the Site have been completed and the human health and ecological risk assessments are being finalized. Based on the preliminary results of the risk assessments, the following areas were identified as showing cancer risks exceeding 1×10^{-6} or non-cancer hazard indices greater than 1 for human receptors, or hazard indices greater than 1 for ecological receptors based on a reproductive endpoint (Tetra Tech, 2011b):

Human Receptors

- Waste Discharge Area (WDA) – Cancer risks of 2×10^{-6} were identified for adult trespassers (reasonable maximum exposure scenario only) in the WDA. Risk is driven by elevated cadmium concentrations in soil sample POND3-0.5', collected at a depth of 0.5 foot below ground surface (bgs).
- Groundwater – Perchlorate, 1,4-dioxane, trichloroethene (TCE), 1,2-dichloroethane (1,2-DCA), 1,1-dichloroethene (1,1-DCE), methylene chloride, and 1,3,5-trinitrohexahydro-1,3,5-triazine (RDX) concentrations exceeded drinking water criteria in one or more groundwater samples.

Ecological Receptors

- Southern Test Bay Canyon (Area K) – Hazard indices greater than 1 were identified for small herbivorous mammals (Stephens' kangaroo rat [SKR]), herbivorous birds, and insectivorous birds in Southern Test Bay Canyon. Risk is driven by elevated perchlorate concentrations in shallow (0.5-1.5 feet bgs) soil.
- Waste Discharge Area – Hazard indices greater than 1 were identified for SKR, plants, and soil invertebrates in the WDA. Risk was driven by elevated lead and zinc concentrations at depths of 0.5 and 5 feet bgs in soil boring POND3-0.5.

2.0 DEVELOPMENT OF REMEDIAL ACTION OBJECTIVES

The development of RAOs is the first step in the development and screening of remedial alternatives. RAOs are general cleanup objectives that consider the site contaminants of concern, contaminated media,

potential exposure routes, receptors, and chemical/media-specific cleanup goals. The following sections present the proposed soil and groundwater RAOs developed for Laborde Canyon.

2.1 SOIL REMEDIAL ACTION OBJECTIVES

RAO S1 - Protect human receptors from exposure to Site chemicals of concern (COCs) in soil through ingestion, inhalation, and dermal contact at concentrations exceeding protective levels.

The Human Health and Ecological Risk Assessment (HHERA) found human health risks driven by cadmium concentrations in one shallow soil sample (Pond3-0.5') collected in the WDA. RAO S1 addresses potential exposures to cadmium in this area of the Site.

RAO S2 - Protect ecological receptors from exposure to Site COCs in soil through ingestion and food consumption (for mammals and birds) and direct uptake (for plants) at concentrations exceeding protective levels.

hydraulic conductivity values at Laborde Canyon are quite low, suggesting that well yields may not be sufficient to supply at least 200 gpd to a single well. The available hydraulic testing data were therefore

procedures for hazardous substances. Examples of action-specific ARARs include requirements applicable to landfill closure, wastewater discharge, hazardous waste disposal, and air emissions.

Preliminary lists of potential chemical-specific, location-specific, and action-specific ARARs and TBCs are included in Tables B-1, B-2, and B-3, respectively, in Attachment B. The identification of ARARs for remedial actions at the site is an ongoing iterative process, and the lists will be updated as appropriate during remedial action planning and implementation.

4.0

7.0 ACRONYMS AND ABBREVIATIONS

AGR	agricultural water supply beneficial use
ARARs	applicable or relevant and appropriate requirements
bgs	below ground surface

ATTACHMENT A
GROUNDWATER WELL YIELD ANALYSIS

Table A-1
Aquifer Test Data and Groundwater Well Yield Estimates
Laborde Canyon, Beaumont, California

	Falling Head	Rising Head	Mean					Confined	Unconfined
Slug Test Data (Tetra Tech, 2010; 2011a)									
TT-MW2-7	0.042	0.038	0.04	6	1.8	WT	6	-	10

0.33264 14.8032

0.041967 0.036357

ATTACHMENT B
ARARS AND TBC CRITERIA

Table B-1
Potential Chemical-Specific ARARs and To Be Considered Criteria

Requirement, Standard, or Criterion	Citation	Description	ARAR or TBC Determination	Comments
State ARARs and TBCs				
California Safe Drinking Water Act (HSC §16270 et seq.)				
California Primary Drinking Water Standards (California MCLs)	22 CCR §64421 - 64444	Enforceable, chemical-specific drinking water standards. California MCLs that are more stringent than federal MCLs, or which apply to chemicals not addressed by federal MCLs, are considered to be potential ARARs.	Relevant and appropriate	Applicable at the tap for drinking water supply systems; relevant and appropriate for groundwater that has the potential to be used as drinking water.
California Secondary Drinking Water Standards (California Secondary MCLs)	22 CCR §64449	Chemical-specific standards for consumer acceptance of drinking water. Secondary MCLs are based on aesthetic criteria, and are therefore not risk-based.	To be considered	Secondary MCLs are based on aesthetic criteria, and are therefore not risk-based.
[redacted]	[redacted]	PHGs are drinking water contaminant levels developed by the California Environmental Protection Agency, Office of Environmental Health Hazard Assessment (OEHHA), which are protective of human health over a lifetime of exposure.	To be considered	PHGs are advisory only; public water systems are not required to comply with PHGs.
[redacted]	[redacted]	DWNLs are health-based advisory levels established by the OEHHA for contaminants in drinking water for which MCLs have not been established. Response levels are l(l)9.3(s)-252.8(a)-3.8(.4(4(a)(n)]t)-5.6-7.5(se))11.1(v)7.4T lvEnforceter fo-5.6(e)11.1re.8(t)-5.68.4(r)4.6(e)-7(e)11.1((t)-5	[redacted]	[redacted]

Table B-1

Table B-1
Potential Chemical-Specific ARARs and To Be Considered Criteria

Table B-2
Potential Location-Specific ARARs and To Be Considered Criteria

Requirement, Standard, or Criterion	Citation	Description	

Table B-3

Table B-3
Potential Action-Specific ARARs and To Be Considered Criteria

Table B-3
Potential Action-Specific ARARs and To Be Considered Criteria

Requirement, Standard, or Criterion	Citation	Description	ARAR or TBC Determination	Comments
Rule 1166 (Volatile Organic Compound Emissions from Decontamination of Soil)	SCAQMD Regulation XI (Source Specific Standards)	Requires control of VOC emissions from VOC-contaminated soils.	Potentially applicable	Applicable to actions involving soil excavation in areas with VOC contamination
Rule 1401 (New Source Review of Toxic Air Contaminants)	SCAQMD Regulation XIV (Toxics and other Non-Criteria Pollutants)	Establishes risk standards for permitting stationary sources.	Potentially applicable	Potentially applicable to actions involving certain onsite soil or groundwater treatment
California Occupational Safety and Health Act (CLC §6300 et seq.)				
Worker safety requirements	8 CCR Division 1, Chapter 4	Establishes Cal/OSHA standards for worker safety in California.	Applicable	Relevant portions of Cal/OSHA regulations are applicable to all actions at the site.
California Civil Code §1457 et seq. (Transfer of Obligations-5.6(s)15.8(i)-5.6(o)7.4(nc re f Q q n 427.08 390.71 0.48 -20.51 re f .6(s)15.8(i)-5.6(o)7.4(nc re f Q q n 427.0(70)1				

ATTACHMENT C
GENERAL RESPONSE ACTIONS AND REMEDIAL TECHNOLOGY SCREENING

Table C-1
Soil Remedial Technology Screening
Laborde Canyon, Beaumont, California

				Effectiveness in Handling Volume of Impacted Media	Impacts During Implementation	Reliability				
No Action	N/A	N/A	No action is taken for site contamination.	Low	Low	Low	High	Low	Retain	Baseline for comparison with other technologies.
		Land Use Covenants	Land use covenants are recorded with the County Assessor to restrict future land use.	High	Low	Medium	High	Low	Retain	Restrictions on onsite land use have already been recorded with County Assessor; may not be implementable for downgradient properties.
		Governmental Controls Property Owner Controls	Zoning, permitting, or other governmental restrictions are placed on a property to control future land use.	High	Low	Medium	Low	Low	Reject	Implementation dependent on current property owner.

Table C-1
Soil Remedial Technology Screening
Laborde Canyon, Beaumont, California

General Response Action	Technology Type	Process Option	Description	Effectiveness (Primary)			Implement-ability	Relative Cost	Retain or Reject	Screening Comments
				Effectiveness in Handling Volume of Impacted Media	Impacts During Implemen-tation	Reliability				
	Vapor Control	Vapor Barrier	An impermeable membrane, with or without a venting system, is placed below the ground surface to reduce upward migration of volatiles.	Medium	Medium	Medium	Mediumium	LowLow	RejectRetain	Vapor control not anticipated to be necessary for protection of human and ecological receptors.
		Geomembrane Cap	A geomembrane is placed over impacted area or landfill to reduce leaching of contaminants by infiltrating water and prevent contact with contaminated soil or landfill waste.	High	Medium	High	High	Low	Retain	Implementablilty score assumes no permitting required by CIWMB or RWQCB.
		Earthen Cap	A clean compacted soil layer is placed over impacted area or landfill to prevent direct contact with contaminated soil or landfill waste.	High	Medium	High	High	Low	Retain	Implementablilty score assumes no permitting required by CIWMB or RWQCB.
		Landfill Cap	An engineered landfill cap is constructed over impacted area or landfill to reduce leaching of contaminants by infiltrating water and prevent contact with contaminated soil or landfill waste.	High	Medium	High	High	Low	Retain	Implementablilty score assumes no permitting required by CIWMB or RWQCB.
		Evapotranspiration Cap	An engineered evapotranspiration cap is constructed over impacted area or landfill to reduce leaching of contaminants by infiltrating water and prevent contact with contaminated soil or landfill waste.	High	Medium	High	High	Low	Retain	Implementablilty score assumes no permitting required by CIWMB or RWQCB.
	Grouting	Source Area Grouting	Conventional grout or chemical grout is injected into vadose zone and/or saturate source areas to reduce leaching of contaminants.	Low	Medium	Low	Low	High	Reject	Difficult to implement due to heterogeneous bedrock geology.
		Shallow Conventional Excavation	Shallow soils are retrieved to the surface with conventional construction equipment from unsloped, sloped or shored excavations.	High	Medium	High	High	Low	Retain	Most cost effective disposal options. Threatened species issues may impact schedule.

Table C-1
Soil Remedial Technology Screening
Laborde Canyon, Beaumont, California

General Response Action	Technology Type	Process Option	Description	Effectiveness (Primary)			Implement-ability	Relative Cost	Retain or Reject	Screening Comments
				Effectiveness in Handling Volume of Impacted Media	Impacts During Implemen-tation	Reliability				
		Water Flushing	Water is introduced into the vadose zone to transport soluble contaminants to the							

Table C-1
Soil Remedial Technology Screening
Laborde Canyon, Beaumont, California

General Response Action	Technology Type	Process Option	Description	Effectiveness (Primary)			Implement-ability	Relative Cost	Retain or Reject	Screening Comments
				Effectiveness in Handling Volume of Impacted Media	Impacts During Implemen-tation	Reliability				
		Chemical Oxidation	Strong oxidizing agents are mixed with excavated soil to convert contaminants to less toxic or non-toxic compounds. Oxidants include permanganate, persulfate, Fenton's reagent, etc.	Low	High	Low	Low	Moderate	Reject	Not effective for perchlorate; difficult to implement due to health and safety issues associated with reagents.
		Chemical Reduction	Reducing agents are mixed with excavated soil to convert contaminants to less toxic or non-toxic compounds. This technology excludes addition of electron donor (discussed under Ex Situ Biological Treatment).	Low	High	Low	Low	Moderate	Reject	Not effective for perchlorate; difficult to implement due to health and safety issues associated with reagents.
		Dehalogenation	Excavated soil is heated with a reagent (sodium bicarbonate or polyethylene glycolate)							

Table C-1
Soil Remedial Technology Screening
Laborde Canyon, Beaumont, California

General Response Action	Technology Type	Process Option	Description	Effectiveness (Primary)			Implement-ability	Relative Cost	Retain or Reject	Screening Comments
				Effectiveness in Handling Volume of Impacted Media	Impacts During Implemen-tation	Reliability				
Disposal	Offsite Disposal	Landfill	Excavated soil is transported offsite for treatment and/or disposal at an authorized facility.	High	Low	High	High	High	Retain	Permanently removes contaminants from site. Must be combined with excavation and transportation options.

Notes:
Shading indicates process option or technology screened out.

Scoring Notes (scores are listed in order from best to worst):

Effectiveness in handling volumes of impacted media
- High: Process option can readily handle both anticipated volumes of media and anticipated contaminant concentrations.
- Medium: Process option can readily handle either anticipated volumes of media or anticipated contaminant concentrations.
- Low: Process option can readily handle neither anticipated volumes of media nor anticipated contaminant concentrations.

Impacts during implementation
- Low: Implementation expected to have few temporary impacts.
- Medium: Implementation expected to have moderate temporary impacts.
- High: Implementation expected to have large temporary impacts or unmitigatable impacts.

Reliability
- High: Process option is reliable and permanent for all contaminants.
- Medium: Process option is reliable and permanent for perchlorate, but not for 1,4-dioxane and/or VOCs.
- Low: Process option is not reliable for perchlorate/ not reliable for any site contaminants.

Implementability
- High: Simple and straightforward to construct; administrative approvals readily obtained.
- Medium: Construction feasible, but complicated by site-specific geology/hydrogeology; administrative approval moderately difficult to obtain.
- Low: Implementation severely impacted by site-specific geology/hydrogeology; administrative approvals difficult to obtain.

Cost
- Low: Cost low relative to other process options.
- Moderate: Cost moderate relative to other process options.
- High: Cost high relative to other process options.

Table C-2
Groundwater Remedial Technology Screening
Laborde Canyon, Beaumont, California

				Effectiveness in Handling Volumes of Impacted Media	Impacts During Implement-ation	Reliability				
No Action	N/A	N/A	No action is taken for site contamination.	Low	Low	Low	High	Low	Retain	Baseline for comparison with other technologies
	Sampling and Analysis	Groundwater Monitoring								

Table C-2
Groundwater Remedial Technology Screening
Laborde Canyon, Beaumont, California

General Response Action	Remedial Technology Type	Process Option	Process Option Description	Effectiveness (Primary)			Implement-ability	Relative Cost	Retain or Reject	Screening Comments
				Effectiveness in Handling Volumes of Impacted Media	Impacts During Implement-ation	Reliability				
		Biobarrier	Groundwater passively flows through a permeable barrier where electron donors, electron acceptors, and/or nutrients are added to promote biologic activity. Various configurations possible (trenches, funnel-and-gate, injection, etc.).	High	Low	Medium	High	Low	Retain	Effective for perchlorate and chlorinated solvents; not effective for 1,4-dioxane.
		Zero-Valent Iron Barrier	Groundwater passively flows through a permeable barrier containing ZVI, which promotes destruction of chlorinated compounds. Various configurations possible (trenches, funnel-and-gate, etc.).	High	Medium	Low	Medium	Moderate	Reject	Effective for chlorinated solvents, not effective for perchlorate or 1,4-dioxane; trench implementation not straightforward.
		Metal-Enhanced Reduction Barrier	Groundwater passively flows through a permeable barrier containing basic oxygen furnace slag. Various configurations possible (trenches, funnel-and-gate, etc.).	High	Medium	Low	Medium	Moderate	Reject	Not effective for site contaminants; trench implementation not straightforward..
		pH Control Barrier	Groundwater passively flows through a permeable barrier containing limestone to adjust pH. Various configurations possible (trenches, funnel-and-gate, etc.).	High	Medium	Low	Medium	Moderate	Reject	Not effective for site contaminants; trench implementation not straightforward..
		Redox Barrier	Groundwater passively flows through a permeable barrier containing calcium polysulfide, sodium dithionite, or other reducing agents. Various configurations possible (trenches, funnel-and-gate, injection, etc.).	High	Low	Low	Medium	Moderate	Reject	Effective for chlorinated solvents; not effective for perchlorate or 1,4-dioxane.
		Sorptive Barrier	Groundwater passively flows through a permeable barrier containing sorptive material (GAC, zeolite, ion exchange resin, apatite, etc.) to remove contaminants. Various configurations possible (trenches, funnel-and-gate, injection, etc.).	High	Medium	Low	Medium	High	Reject	Not effective for site contaminants; trench implementation not straightforward..
		Source Area Grouting	Grout or chemical grout is injected into the saturated zone through closely-spaced injection points to reduce groundwater flux through a submerged source area.							

Table C-2
Groundwater Remedial Technology Screening
Laborde Canyon, Beaumont, California

General Response Action	Remedial Technology Type	Process Option	Process Option Description	Effectiveness (Primary)			Implement-ability	Relative Cost	Retain or Reject	Screening Comments
				Effectiveness in Handling Volumes of Impacted Media	Impacts During Implement-ation	Reliability				
	In Situ Physical Treatment	In-Well Air Stripping	Air is injected into a dual-screen well, causing water to be drawn in through the lower screen and forced out of the upper screen. VOCs are removed from the water by air stripping action in well.	Low	Low	Low	Low	Moderate	Reject	Difficult to implement due to heterogeneous bedrock geology; not effective for perchlorate or 1,4-dioxane.
		Steam Injection	Steam is injected into the saturated zone to heat and increase the volatility of contaminants in the saturated zone. Contaminants are recovered with recovery wells or from the vadose zone by vapor extraction.							

Table C-2
Groundwater Remedial Technology Screening
Laborde Canyon, Beaumont, California

General Response Action	Remedial Technology Type	Process Option	Process Option Description	Effectiveness (Primary)			Implement-ability	Relative Cost	Retain or Reject	Screening Comments
				Effectiveness in Handling Volumes of Impacted Media	Impacts During Implement-ation	Reliability				
	Ex Situ Chemical Treatment	Batch Chemical Oxidation	Groundwater is batch treated in storage tanks by addition of strong oxidants which convert contaminants to less toxic or non-toxic compounds.	Medium	Medium	Medium	Medium	Moderate	Reject	Applicable for treatment of liquid residuals; however, no treatment options that produce liquid residuals are retained.
		Bioreactor	Contaminated water is brought into contact with an attached or suspended biological system to destroy contaminants.	High	Low	Medium	High	Low	Retain	Effective for perchlorate and chlorinated solvents; must be combined with other process options to treat all contaminants.
		Batch Biotreatment	Groundwater is batch treated in storage tanks by addition of amendments (electron donor, nutrients, etc) to promote biologic activity.	Medium	Medium	Medium	Medium	Moderate	Reject	Applicable for treatment of liquid residuals; however, no treatment options that produce liquid residuals are retained.
		Constructed Wetlands	Contaminants are treated using natural biologic and geochemical processes in an artificial wetland ecosystem.	High	Low	Medium	Low	Moderate	Reject	Surface application of impacted water may attract ecological receptors and create new ecological exposure pathways; may require permitting from several State and Federal agencies; may require large effort to properly maintain.
		Air Stripping/ Air Diffusing	Volatile organics are removed from groundwater by increasing the surface area e to air.	High	Low	High	High	Low	Retain	Effective for VOCs; must be combined with other process options to treat all contaminants.
		Distillation	Contaminants are removed from groundwater by distillation.	Low	Medium	Low	Medium	High	Reject	Not effective for mixture of organic and inorganic contaminants found at site; not implementable for low concentrations of organic contaminants.
		Reverse Osmosis	Contaminants are removed from groundwater by reverse osmosis.	Medium	Medium	Medium	Medium	High	Reject	Very high equipment and energy costs; waste stream containing concentrated contaminants still requires treatment or disposal.
		Membrane Pervaporation	Extracted groundwater is heated, and contaminants are removed by diffusion through a membrane, where they are collected and condensed as a liquid.	Low	Medium	Low	Medium	High	Reject	Not effective for mixture of organic and inorganic contaminants found at site; not implementable for low concentrations of organic contaminants.
		Evaporation	Volume of extracted groundwater or treatment residual is reduced by evaporation.	Medium	Low	High	Low	Low	Reject	Effective for reducing volume of liquid treatment residuals; however, no treatment options that produce liquid residuals are retained.
		Extraction	Groundwater is extracted from vertiire l.6(o)7.4(r)4.6(s)-2525.6(g)7tt ec	Volume o67.0(Vu)-7.5ad inct						

Table C-2
Groundwater Remedial Technology Screening
Laborde Canyon, Beaumont, California

General Response Action	Remedial Technology Type	Process Option	Process Option Description	Effectiveness (Primary)			Implement-ability	Relative Cost	Retain or Reject	Screening Comments
				Effectiveness in Handling Volumes of Impacted Media	Impacts During Implement-ation	Reliability				
		Reinjection	Treated groundwater is disposed onsite by reinjection into contaminated aquifer.	High	Low	High	Medium	Low	Retain	Will require UIC and WDR permits.
		Deep Well Injection	Treated or untreated groundwater is disposed onsite by deep well injection.	Low	Medium	High	Low	High	Reject	Not implementable due to low hydraulic conductivity of deep San Timoteo formation.
		Sewer Discharge	Treated or untreated groundwater is disposed to the sanitary sewer.	Medium	Low	High	Low	High	Reject	No sewer connection at or in vicinty of site.
		Surface Discharge	Treated groundwater is disposed to the surface water drainage channel.	High	Low	High	Medium	Low	Retain	Will require NPDES permit.
		Infiltration	Treated groundwater is disposed by infiltration outside of the drainage channel.	High	Low	High	Medium	Low	Retain	Will require UIC and WDR permits.
		Offsite Treatment	Extracted groundwater or treatment residual is transported offsite to an authorized facility for treatment.	Low	Low	High	Low	High	Reject	Effective low treatment capacity; however, no treatment options that produce liquid residuals are retained.
		Offsite Disposal	Extracted groundwater or treatment residual is transported offsite to an authorized facility for							