TABLE 2.8
Technology/Process Option Evaluation—Exposition Groundwater

General Response Action	Remedial Technologies	Process Options	Technical Implementability	Effectiveness	Cost	Comments
No Action	None	None	Good	Poor	None	Not protective of human health due to presence of elevated COPCs. Retained for comparison, per the NCP.
Institutional Actions	Access Restrictions	Deed Restrictions on Future Use of GW	Fair	Poor	Low	Does not meet RAOs, does not prevent migration to Exposition Aquifer. GW in perched zone not producible or potable water source.
	Monitored Natural Attenuation (MNA)	Monitoring	Good	Poor	Low	Retained. Potentially applicable in conjunction with other technologies. Not time feasible for "hot spots." MNA or monitoring in general is critical to the implementation of any alternative.
Containment	Vertical Engineered Barrier	Deep Soil Mixing	Exposition aquifer is deeper than 80 feet below ground surface; technology not suitable for deep contamination.			
		Permeable Reactive Barrier	Good	Good	Moderate	Retained. Effective primarily for the dechlorination of chlorinated ethenes; process would be slow to maintain objectives.
		Grout Curtain	Exposition aquifer is deeper than 80 feet below ground surface; technology not suitable for deep contamination.			
		Sealable Joint Sheet Piling	Exposition aquifer is deeper than 80 feet below ground surface; technology not suitable for deep contamination.			
		Slurry Walls	Exposition aquifer is deeper than 80 feet below ground surface; technology not suitable for deep contamination.			
	Horizontal Subsurface Barriers	Block Displacement	Exposition aquifer is deeper than 80 feet below ground surface; technology not suitable for deep contamination.			
		Grout Injection	Exposition aquifer is deeper than 80 feet below ground surface; technology not suitable for deep contamination.			
	Hydraulic Controls	Pumping Wells	Good	Good	Moderate	Retained. Contamination may migrate to deeper aquifers used for potable water; process would be slow to maintain objectives; drains and horizontal wells poor performance due to depth.
In-Situ Treatment	Physical	Air Sparging	Good	Fair to Good	Moderate	Potentially feasible in conjunction with SVE.

TABLE 2.8
Technology/Process Option Evaluation—Exposition Groundwater

General Response Action	Remedial Technologies	Process Options	Technical Implementability	Effectiveness	Cost	Comments
		Dual-Phase Extraction	Good	Demonstrated/ Good	Moderate	Retained. Potentially feasible technology. Would require pilot tests. Would need to be used in conjunction with submersible GW extraction pumps.
		Free Product Recovery	Not applicable - absence of product in the Exposition Zones.			
		In-Well Air Stripping	Good	Fair	High	Small radius of influence would require multitude of wells in order to be effective.
		Soil Flushing	Fair	Good	Moderate	Potentially applicable with SVE and groundwater pumping.
		Vapor Extraction	Good	Fair to Good	Moderate	Retained. Potentially feasible in conjunction with ex-situ treatment; not effective for reducing certain chlorinated COPCs by itself.
		Vertical Recirculation Wells	Good	Poor to Fair	Moderate	Effectiveness reduced due to fine-grained lithology above and below Exposition groundwater zones.
	Chemical	Oxidation/ Reduction	Good	Potential/ Good	Moderate	Retained. Treatability study required to determine effectiveness of oxidant delivery process
	Thermal	Electrical Resistance Heating	Good	Good	High	Retained. Short duration for "hot spot" treatment; high cost/energy requirement; must be used in conjunction with SVE or other collection system.
		Hot Water/Steam Flushing and Stripping	Good	Good	High	High cost; high energy requirement; must be used in conjunction with SVE or other collection system.
		Radio Frequency Heating	Good	Good	High	High cost; high energy requirement; must be used in conjunction with SVE or other collection system.
	Bioremediation	Aerobic	Good	Low	Low to Moderate	Retained. Effective primarily for petroleum, aromatic hydrocarbons and vinyl chloride; would need to be use in conjunction with anaerobic processes to degrade chlorinated ethenes.
		Anaerobic	Good	Moderate to Good	Low to Moderate	Retained. Effective primarily for the productive dechlorination of chlorinated ethenes; would need to be use in conjunction with aerobic processes to degrade vinyl chloride end product.

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Technology/Process Option Evaluation—Exposition Groundwater

General Response Action	Remedial Technologies	Process Options	Technical Implementability	Effectiveness	Cost	Comments
		Bioslurping	Fair	Demonstrated	Moderate	Potentially feasible; would need to be used in conjunction with submersible GW pumps.
		Biosparging	Fair	Low	Low to Moderate	Poor because it would impede the productive dechlorination of chlorinated ethenes.
		Co-metabolic treatment	Good	Fair	Moderate	Only certain COPCs are amenable to co-metabolic treatment; regulatory concerns exist over most substrates.
		Oxidation Enhancement w/ Air Sparging	Good	Fair	Moderate	Poor because it would impede the productive dechlorination of chlorinated ethenes.
		Oxidation Enhancement w/ Hydrogen Peroxide	Good	Good	Moderate	Could provide chemical oxidation of chlorinated ethenes; treatability study required.
Collection	Extraction and/or Drainage	Recovery Trench	Recovery trenches not practical due to depth of aquifer.			
		Pumping Wells	Good	Good	Moderate	Retained. Feasible only through the installation of wells.

Effectiveness is the ability to perform as part of a comprehensive alternative that can meet RAOs under conditions and limitations that exist at the site. Technical Implementability encompasses the applicability/feasibility of performing the process option under the regulatory, technical, and schedule constraints of the project. Cost is for comparative purposes only, relative to other processes/technologies that perform similar functions.

COPCs	Chemicals of Potential Concern	RAOs	Remedial Action Objectives
GW	Groundwater	SVE	Soil Vapor Extraction
NA	Not applicable	VOCs	Volatile Organic Contaminants
NCP	National Contingency Plan		