

Table 1
Potentially Complete Exposure Pathways Under Current Conditions
Zeneca Inc. Richmond Facility, Richmond, California

Type	Source Medium	Chemicals Groups Detected	Exposure Medium	Receptor Population	Exposure Route	On Site/ Off Site	Potentially Complete Exposure Pathways (Highlighted Rows Indicate Potential Exposure Pathways that are Currently Incomplete Due to Onsite Conditions)
Human Health	Soil	Metals, VOCs, SVOCs, PCBs, Organochlorine Pesticides, Proprietary Pesticides	Soil	Industrial/Commercial Worker	Ingestion, Dermal Contact	On site	Potential exposure to surficial soils and shallow soil.
				Maintenance/Utility Worker	Ingestion, Dermal Contact	On site	Potential exposure to soil during digging and trenching activities.
				Trespasser	Ingestion, Dermal Contact	On site	Potential exposure to surficial soil while on the site.
				Industrial/Commercial Worker and Recreational User	Ingestion, Dermal Contact	Off site	Potential exposure to surface soil on- and off-site
			Surficial soil: particulate (non-VOCs) Subsurface soil: volatiles (VOCs)	Industrial/Commercial Worker	Inhalation	On site	Potential exposure to volatile compounds or affected soil particles suspended in indoor and outdoor air.
				Maintenance/Utility Worker	Inhalation	On site	Potential exposure to volatile compounds or affected soil particles during site work, including excavation activities.
				Trespasser	Inhalation	On site	Potential exposure while on site to volatile compounds or affected soil particles suspended in air.
				Industrial/Commercial Worker and Recreational User	Inhalation	Off site	Potential exposure to surficial soil and sediments off-site
	Groundwater	Metals, VOCs, SVOCs, Organochlorine Pesticides, Proprietary Pesticides	Groundwater	Industrial/Commercial Worker	Ingestion, Dermal Contact	On site	Groundwater not used as potable water source on site.
				Maintenance/Utility Worker	Ingestion, Dermal Contact	On site	Potential exposure to groundwater during site work, including excavation activities.
				Trespasser	Ingestion, Dermal Contact	On site	Groundwater not used as potable water source on site.
			Volatiles from chemicals dissolved in groundwater (VOCs)	Industrial/Commercial Worker	Ingestion, Dermal Contact	Off site	Potentially affected groundwater off site is not used as potable water source off site.
				Industrial/Commercial Worker	Inhalation	On site	Potential exposure to volatile compounds migrating from groundwater to indoor and outdoor air.
				Maintenance/Utility Worker	Inhalation	On site	Potential exposure to volatile compounds migrating from groundwater during site work, including excavation activities.
			Trespasser	Inhalation	On site	Potential exposure to volatile compounds migrating from groundwater to outdoor air.	
			Industrial/Commercial Worker and Recreational User	Inhalation	Off site	Volatile chemicals from the site are not affecting off-site groundwater where receptors are present.	
Ecological Health	Soil	Metals, VOCs, SVOCs, PCBs, Organochlorine Pesticides, Proprietary Pesticides	Soil	Small mammals and birds	Ingestion of soil	On site	Potential exposure to surficial soils by small mammals and birds.
						Off site	Potential exposure to off-site affected soils (cinder material near the southwest portion of the site).
			Sediment and contaminated prey	Small mammals, birds, fish, and benthic invertebrates	Ingestion of sediment and contaminated prey	On site	Potential exposure to sediment and contaminated prey in the freshwater lagoons and Stege Marsh.
						Off site	Potential exposure to sediment and contaminated prey in outboard marsh and San Francisco Bay.
	Groundwater	Metals, VOCs, SVOCs, Organochlorine Pesticides, Proprietary Pesticides	Surface water and contaminated prey	Small mammals, birds, fish, and benthic invertebrates	Ingestion of surface water and contaminated prey	On site	Potential exposure to surface water and contaminated prey in Stege Marsh channels.
						Off site	Potential exposure to surface water and contaminated prey in San Francisco Bay.
	Sediment	Metals, VOCs, SVOCs, PCBs, Organochlorine Pesticides, Proprietary Pesticides	Sediment, surface water, and contaminated prey	Small mammals, birds, fish, and benthic invertebrates	Ingestion of sediment, surface water, and contaminated prey	On site	Potential exposure to sediment, surface water, and contaminated prey in the freshwater lagoons and Stege Marsh.
						Off site	Potential exposure to sediment, surface water, and contaminated prey in San Francisco Bay.

Notes:

Shading indicates an incomplete pathway. Unshaded pathways are considered complete (or potentially complete) under current conditions.

PCBs = polychlorinated biphenyls

SVOCs = semivolatile organic compounds

VOCs = volatile organic compounds

**Table 2
Remedial Actions in the Upland Portion of the Site to Eliminate or Mitigate Potentially Complete Exposure Pathways
Zeneca Inc. Richmond Facility, Richmond, California**

Type	Source Medium	Chemicals Groups Detected	Exposure Medium	Receptor Population	Exposure Route	On Site/ Off Site	Potentially Complete Migration/Exposure Pathway	Remedial Action to Eliminate or Mitigate Complete and Potentially Complete Exposure Pathways		
Human Health	Soil	Metals, VOCs, SVOCs, PCBs, Organochlorine Pesticides, Proprietary Pesticides	Soil	Industrial/Commercial Worker	Ingestion, Dermal Contact	On site	Potential exposure to surficial soils and shallow soil	Exposure pathways will be incomplete following localized soil excavation, and installation of a site cap and clean corridors. See Section 6.0 in the Text for details on site cap, clean corridors, and soil excavations.		
				Maintenance/Utility Worker	Ingestion, Dermal Contact	On site	Potential exposure to soil during digging and trenching activities			
				Trespasser	Ingestion, Dermal Contact	On site	Potential exposure to surficial soil while on the site			
				Industrial/Commercial Worker and Recreational User	Ingestion, Dermal Contact	Off site	Potential exposure to surficial soil on- and off-site			
	Surficial soil: particulate (non-VOCs) Subsurface soil: volatiles (VOCs)		Industrial/Commercial Worker	Inhalation	On site	Potential exposure to volatile compounds and affected soil particles entrained in indoor and outdoor air	Exposure pathways will be incomplete following implementation of the proposed remedial plan. Chemical concentrations in soil will be reduced to SSTLs, which are calculated for volatile compounds in soil to evaluate locations with unacceptable potential risk to human receptors from inhalation of volatiles. SSTLs will be developed for on-site workers and will be more protective than necessary for the off-site worker and trespasser scenario because of the limited exposure duration of these scenarios. The site cap and clean corridors will prevent potential direct exposure to affected soil. See Section 6.0 in the Text for details on the soil excavations, site cap, and clean corridors.			
			Maintenance/Utility Worker	Inhalation	On site	Potential exposure to volatile compounds and affected soil during site work, including excavation activities				
			Trespasser	Inhalation	On site	Potential exposure to volatile compounds and affected soil particles entrained in air while on site				
	Industrial/Commercial Worker and Recreational User		Inhalation	Off site	Potential exposure to volatile compounds and affected soil particles entrained in air					
	Groundwater		Metals, VOCs, SVOCs, Organochlorine Pesticides, Proprietary Pesticides	Groundwater	Maintenance/Utility Worker	Ingestion, Dermal Contact		On site	Potential exposure to groundwater during site work, including excavation activities	Site work will be restricted to above the groundwater table unless the workers are properly protected by engineering controls or personnel protective equipment.
					Volatiles from chemicals dissolved in groundwater (VOCs)	Industrial/Commercial Worker		Inhalation	On site	Potential exposure to volatile compounds transported from groundwater to indoor and outdoor air
Maintenance/Utility Worker		Inhalation				On site	Potential exposure to volatile compounds dispersed from groundwater during site work, including excavation activities			
Trespasser	Inhalation	On site	Potential exposure to volatile compounds transported from the groundwater to outdoor air.							
Ecological Health	Soil	Metals, VOCs, SVOCs, PCBs, Organochlorine Pesticides, Proprietary Pesticides	Soil	Small mammals and birds	Ingestion of soil	On site	Potential exposure to surficial soils	Exposure pathway to soil contamination will be incomplete after the implementation of the site cap. See Section 6.0 in the Text for details on the site cap.		
						Off site	Potential exposure to off-site affected soils (cinder material near the southwest portion of the site)			
			Sediment and contaminated prey	Small mammals, birds, fish, and benthic invertebrates	Ingestion of sediment and contaminated prey	On site	Potential exposure to sediment and contaminated prey in the freshwater lagoons and Stege Marsh		Potential exposure to sediment in Stege Marsh and freshwater lagoons will be mitigated by the restoration of the freshwater lagoon and Stege Marsh. The remedial conceptual plan for Stege Marsh will be presented in a forthcoming, separate document.	
						Off site	Potential exposure to sediment and contaminated prey in outboard marsh and San Francisco Bay			
	Groundwater		Metals, VOCs, SVOCs, Organochlorine Pesticides, Proprietary Pesticides	Surface water and contaminated prey	Small mammals, birds, fish, and benthic invertebrates	Ingestion surface water and contaminated prey	On site	Potential exposure to surface water and contaminated prey in Stege Marsh channels	Potential exposure to surface water in Stege Marsh and San Francisco Bay will be mitigated by source reduction through soil neutralization, implementation of a reactive barrier, and removal preferential groundwater pathways by abandoning utilities and wells. The remedial conceptual plan for Stege Marsh will be presented in a forthcoming, separate document	
							Off site	Potential exposure to surface water and contaminated prey in San Francisco Bay		
	Sediment		Metals, VOCs, SVOCs, PCBs, Organochlorine Pesticides, Proprietary Pesticides	Sediment, surface water, and contaminated prey	Small mammals, birds, fish, and benthic invertebrates	Ingestion of sediment, surface water, and contaminated prey	On site	Potential exposure to sediment, surface water, and contaminated prey in the freshwater lagoons and Stege Marsh	Potential exposure to sediment in Stege Marsh and freshwater lagoons will be mitigated by the restoration of the freshwater lagoons and Stege Marsh. The remedial conceptual plan for Stege Marsh will be presented in a forthcoming, separate document	
							Off site	Potential Exposure to sediment, surface water, and contaminated prey in San Francisco Bay		

Notes:
Shading indicates a potentially complete pathway
PCBs = polychlorinated biphenyls
SSTL = site-specific target level
SVOCs = semivolatiles organic compounds
VOCs = volatile organic compounds