EXECUTIVE SUMMARY

This Remedial Investigation (RI) Report has been prepared by the County Sanitation Districts of Los Angeles County (Sanitation Districts) as part of the Remedial Investigation/Feasibility Study (RI/FS) being conducted at the Palos Verdes Landfill (PVLF). The RI/FS is being conducted under the oversight of the Department of Toxic Substances Control (DTSC) of the State of California Environmental Protection Agency in accordance with an Enforceable Agreement signed by the Sanitation Districts and DTSC on March 31, 1988.

The purpose of the RI/FS is to first identify the nature and extent of contamination at and from the site and any associated health risks, and secondly, determine any appropriate remedial measures. The RI, documented in this report, defines the first, while the FS, reported separately, evaluates remedial measures.

In general, landfills share similar characteristics leading to expected interactions with the environment and remedial approaches. Microbial degradation of the organic content of the waste generates landfill gas. To the extent that the landfill gas is not controlled (i.e., collected and treated), it interacts with the environment due to airborne emissions of gases and vapors and contact of gases with ground water. Interaction with the environment also occurs when precipitation, irrigation, liquid wastes disposed of within the landfill, or liquid from other sources percolate through the landfilled mass to form leachate. Leachate can then enter local ground water systems.

Because landfills share similar characteristics, they lend themselves to remediation by similar technologies (U. S. EPA, 1991a). Containment has been identified as the most likely response action because landfills often pose a low-level threat rather than a principal threat due to the distribution of their contents (primarily municipal, and to a lesser extent, hazardous wastes) and because the volume and heterogeneity of the waste within a landfill will often make treatment impractical.

The PVLF is typical of a municipal/hazardous waste codisposal site. Topographically, the PVLF is located in the north-facing foothills of the Palos Verdes Peninsula in the south central section of Los Angeles County. The PVLF site, consisting of 291 acres, was operated by the

Sanitation Districts from 1957 until 1980 when the landfill reached its final design capacity. During its operation, the site accepted municipal, industrial, and hazardous wastes under permit from the appropriate regulatory bodies. The total volume of wastes disposed of at the PVLF was approximately 23.6 million tons, three to four percent of which was hazardous waste. The types of hazardous waste accepted were primarily liquid wastes originating from local oil industry operations, such as oily waste, hazardous tank bottoms, acid and alkaline wastes, brine, tetraethyl lead sludge, and solvents. Hazardous wastes were codisposed of in approximately the east-northeastern two-thirds portion of the PVLF located between Hawthorne and Crenshaw Boulevards; no areas were designated for hazardous material disposal only.

Since closure, portions of the site have been developed for recreational purposes. The South Coast Botanic Garden, owned by Los Angeles County (County) and operated by the County Department of Parks and Recreation, occupies 83 acres located south of Crenshaw Boulevard. Ernie Howlett Park, owned and operated by the City of Rolling Hills Estates, occupies 35 acres located northwest of Hawthorne Boulevard. The main site located between Hawthorne and Crenshaw Boulevards (portions of which received hazardous waste, as described above), consisting of 173 acres, is owned by the County and the Sanitation Districts and operated by the Sanitation Districts with limited access to the public. Under a joint powers agreement between these agencies, the main site will be transferred to the County for development and operation as open space. Possible future uses of the main site include continued use for equestrian stables and riding, development as a golf course, or use as a park.

The objective of the PVLF RI/FS is to gather information sufficient to support an informed risk management decision regarding the selection of a remedy, if necessary, which appears to be most appropriate for this site. The purpose of the remedial investigation is to thoroughly investigate any release or potential release of hazardous substances or contaminants to the air, surface water, soil, or ground water from the site. With this information, remedial alternatives to address any contamination found can be evaluated in the feasibility study.

A number of field investigations were undertaken as part of the remedial investigation conducted at and near the PVLF. These investigations focused on the potential pathways by which contaminants could leave the site--air, surface water and sediment, soils, and ground water. Over 2,000

environmental samples were collected and analyzed during the remedial investigation. The methodologies used for the sampling and analyses corresponded to generally accepted standards, including the use of Department of Health Services certified laboratories and EPA test methods. Work plans outlining the scope of work for all of the field investigations were submitted to and approved by DTSC prior to their implementation.

The air investigations included meteorological monitoring, ambient air sampling, integrated surface gas monitoring and sampling, boundary probe monitoring and sampling, neighborhood meter box monitoring, surface flux chamber sampling, landfill gas sampling, and flare emissions monitoring. The surface water and sediment investigations included surface storm water and sediment runoff sampling, monitoring and sampling from the Hawthorne Boulevard storm drain, soil cover sampling, sampling of the lake and stream channel water and sediment from the South Coast Botanic Garden, water balance monitoring for the same water bodies, and a surface water hydrology study. The soil investigation consisted of subsurface soil/sediment sampling from areas both up-canyon and down-canyon of the PVLF. The ground water investigation included geologic, hydrogeologic, and ground water sampling programs. The geologic portion of this investigation included drilling and geologically and geophysically logging 44 borings upgradient and downgradient of the landfill. The hydrogeologic portion of this investigation included performing permeability testing. Ground water sampling was performed at 29 existing monitoring wells and at 21 monitoring wells installed as part of the RI.

In addition to the field investigations outlined above, the remedial investigation consisted of reduction and interpretation of all data and information generated and compiled throughout the duration of the investigation. The activities undertaken to achieve these goals included preparing contaminant contour maps; performing various types of statistical analyses; geologic modeling, hydrogeologic modeling, and contaminant transport modeling using suitable computer programs; and developing a baseline risk assessment.

As expected, landfill gas is generated by the PVLF. Additionally, ground water contamination was confirmed. Interactions of landfill gas with the environment, however, have been minimized through the installation and operation of a landfill gas collection system which includes a gas-to-energy facility to generate electrical power from the landfill gas. Containment of a portion of

the contaminated ground water has also been effected through the installation and operation of a subsurface barrier system. Major conclusions reached from the remedial investigation are listed below. These conclusions have been drawn from the data collected during the field investigations and the evaluation processes, described above, that were applied. The results of and conclusions from the baseline risk assessment, which are paramount to achieving the objective of making an informed risk management decision regarding the selection of a remedy most appropriate to the site, are then discussed.

- Collectively, emissions of landfill gas from the PVLF to the air have no appreciable impact on ambient air quality.

- No runoff water contamination consistent with known contaminant sources from the PVLF could be identified.

- No subsurface soil contamination that could be correlated with the PVLF was identified. Sporadic detections of chlorinated volatile organic compounds (VOCs) did not match those identified in ground water and may be the result of landfill gas migration or not related to the landfill at all.

- No areas of localized contamination were identified where immediate excavation or treatment of the material would significantly reduce the risk posed by the overall site.

- Two different areas of ground water contamination, or plumes, containing VOC levels above background levels, exist at the PVLF. One plume occurs near Hawthorne Boulevard (at the northern corner of the main site) and the other, consisting of two components occurs near Crenshaw Boulevard (at the eastern corner of the main site along Crenshaw Boulevard and at the eastern corner of the South Coast Botanic Garden along Rolling Hills Road). Both plumes extend off site. In addition to VOCs, the Hawthorne Boulevard plume contains levels of arsenic above background levels.

- There is limited interaction of VOC contamination between the environmental media analyzed (air, surface water and sediment, soil, and ground water).

The conclusions from the remedial investigations indicate that due to the existing landfill gas collection system and the soil cover on the landfill, there is considerable control over potential exposures to chemicals in or from the landfill. In keeping with the EPA/DTSC-recommended risk assessment guidelines, the following conclusions presented for the pathways that were found to be potentially complete can be drawn from the Baseline Risk Assessment:

- **Ground Water:** Under current operating conditions, there is no exposure to ground water. However, ground water downgradient of the site contains chemicals of potential concern at concentrations that are elevated above naturally-occurring background levels. Two plumes of contaminated ground water originating from the site appear to be moving approximately northeast towards the West Coast Basin.

  Under a future exposure scenario, use of this ground water by an off site resident was assumed to occur. Most of the excess cancer risk (approximately 95 percent) could be attributed to potential exposure to arsenic which was predicted by ground water modeling at concentrations some one-thousandth of the Maximum Contaminant Level (MCL). The MCL is the maximum amount of a chemical legally allowed in public drinking water supplies.

- **Soils:** All areas of the landfill containing hazardous wastes are covered by a cap of several feet of clean soil which is regularly inspected and maintained. Thus there is no exposure to chemicals of potential concern contained in the landfill. However, discrete areas of the landfill soil cover (restricted to maintenance access roads on the main site) contain concentrations of polynuclear aromatic hydrocarbons (PAHs) that appear to be above anthropogenic (man-made) background levels for surface soil but are within the range found in urban road dust. For the purposes of the risk assessment, exposure to these PAHs was assumed for the on site worker and the recreational visitor under both current and future scenarios.

- **Air:** The PVLF has an extensive gas collection system which is regularly monitored. The gas capture efficiency is estimated to be in excess of 98 percent. Ambient air sampling at the PVLF has not shown any statistically discernable impacts in downwind

air quality or in integrated surface gas testing at a height of approximately six inches above the landfill surface.

For the purposes of this risk assessment, gas collection efficiencies were estimated to range between 75 percent and 95 percent which is less than (or significantly less than) the estimated efficiency of 98 percent. It should be noted that for the principal contributor (some 70 percent) to excess cancer risk estimates, benzene, the upwind ambient air concentration was approximately ten times higher than releases modeled from the landfill.

Tables ES-1 and ES-2 summarize the total excess cancer risks across pathways by exposure scenario. The total risks were calculated by summing risks from all of the potential ground water, air, and soil pathway exposures. Three exposure scenarios--off site resident, on site worker, and recreational visitor--were evaluated for current and future risks. Both reasonable maximum exposure (RME) and Average exposure cases were evaluated. Typically, maximum or upper bound estimates of chemical exposure, exposure time, etc., were used in developing RME estimates. More site-specific average assumptions were used in the Average exposure cases. As noted in the paragraphs below, most of the risk for an exposure scenario is dominated by a single potential pathway.

Current Exposure Scenarios

Off Site Resident: Residents living near the site can be exposed to air releases of volatile compounds in landfill gas, and PAHs in dust from landfill maintenance roadways. More than 90 percent of the estimated excess cancer risk is from modeled landfill gas releases. The risks from landfill gas vary by a factor of five, depending on the landfill gas collection system capture efficiency assumed (75 percent or 95 percent). The overall range of excess cancer risks calculated for the off site resident is 1.4×10^{-6} (Average exposure case at 95 percent landfill gas collection efficiency) to 1.3×10^{-5} (RME case at 75 percent landfill gas collection efficiency). The risk is less than three per million (3.0×10^{-6}) for all scenarios with a 95 percent landfill gas collection efficiency.

On Site Worker: Maintenance workers at the PVLF can be exposed to volatile compounds and dust in air, and through direct contact with PAHs in the maintenance road soil on

TABLE ES-1

SUMMARY OF EXCESS CANCER RISKS BY EXPOSURE SCENARIO
FOR CURRENT LAND USE
PALOS VERDES LANDFILL - REMEDIAL INVESTIGATION REPORT

Pathway Scenario	RME	Average
Offsite Resident[1]		
Groundwater	Pathways Incomplete	Pathways Incomplete
Soil -		
Ingestion	Pathways Incomplete	Pathways Incomplete
Outdoor Dust Inhalation	2.0×10^{-7}	6.3×10^{-8}
Outdoor Vapor Inhalation[2]	2.7×10^{-6} (1.3×10^{-5})	1.3×10^{-6} (6.3×10^{-6})
Total Risk	**2.9×10^{-6} (1.3×10^{-5})**	**1.4×10^{-6} (6.4×10^{-6})**
Onsite Worker		
Groundwater	Pathways Incomplete	Pathways Incomplete
Soil -		
Ingestion	2.1×10^{-6}	5.4×10^{-7}
Dermal Contact	7.4×10^{-6}	1.6×10^{-6}
Outdoor Dust Inhalation	5.5×10^{-8}	1.5×10^{-8}
Outdoor Vapor Inhalation	1.1×10^{-6} (5.5×10^{-6})	4.4×10^{-7} (2.2×10^{-6})
Total Risk	**1.1×10^{-5} (1.5×10^{-5})**	**2.5×10^{-6} (4.3×10^{-6})**
Recreational Visitor		
Groundwater	Pathways Incomplete	Pathways Incomplete
Soil -		
Ingestion	5.7×10^{-6}	7.1×10^{-7}
Dermal Contact	4.8×10^{-6}	6.8×10^{-7}
Outdoor Dust Inhalation	4.7×10^{-8}	1.1×10^{-8}
Outdoor Vapor Inhalation	2.4×10^{-7} (1.2×10^{-6})	4.0×10^{-8} (2.1×10^{-7})
Total Risk	**1.1×10^{-5} (1.2×10^{-5})**	**1.4×10^{-6} (1.6×10^{-6})**

(1) Values based on nearest downwind location.
(2) Values represent landfill gas collection system achieving 95% (75%) efficiency.

TABLE ES-2

SUMMARY OF EXCESS CANCER RISKS BY EXPOSURE SCENARIO
FOR FUTURE LAND USE
PALOS VERDES LANDFILL - REMEDIAL INVESTIGATION REPORT

Pathway Scenario	RME	Average
Offsite Adult Resident		
Receptor Well 2 -		
Groundwater	3.3×10^{-5}	1.8×10^{-5}
Soil -		
Outdoor Dust Inhalation	1.0×10^{-8}	3.2×10^{-9}
Outdoor Vapor Inhalation[1]	1.3×10^{-7} (6.7×10^{-7})	6.0×10^{-8} (3.1×10^{-7})
Total Risk	**3.3×10^{-5} (3.4×10^{-5})**	**1.8×10^{-5} (1.8×10^{-5})**
Receptor Well 5 -		
Groundwater	1.8×10^{-5}	9.8×10^{-6}
Soil -		
Outdoor Dust Inhalation	2.0×10^{-8}	6.3×10^{-9}
Outdoor Vapor Inhalation	2.7×10^{-7} (1.3×10^{-6})	1.3×10^{-7} (6.3×10^{-7})
Total Risk	**1.8×10^{-5} (1.9×10^{-5})**	**9.8×10^{-6} (9.9×10^{-6})**
Onsite Worker		
Groundwater	Pathways Incomplete	Pathways Incomplete
Soil -		
Ingestion	2.1×10^{-6}	5.4×10^{-7}
Dermal Contact	7.4×10^{-6}	1.6×10^{-6}
Outdoor Dust Inhalation	5.5×10^{-8}	1.5×10^{-8}
Outdoor Vapor Inhalation	1.1×10^{-6} (5.5×10^{-6})	4.4×10^{-7} (2.2×10^{-6})
Total Risk	**1.1×10^{-5} (1.5×10^{-5})**	**2.5×10^{-6} (4.3×10^{-6})**
Recreational Visitor		
Groundwater	Pathways Incomplete	Pathways Incomplete
Soil -		
Ingestion	8.5×10^{-6}	7.1×10^{-7}
Dermal Contact	7.2×10^{-6}	6.8×10^{-7}
Dust Inhalation	7.0×10^{-8}	1.1×10^{-8}
Outdoor Vapor Inhalation	3.6×10^{-7} (1.8×10^{-6})	4.0×10^{-8} (2.1×10^{-7})
Total Risk	**1.6×10^{-5} (1.7×10^{-5})**	**1.4×10^{-6} (1.6×10^{-6})**

(1) Values represent landfill gas collection system achieving 95% (75%) efficiency.

the main site. Direct contact with roadway soil accounts for a large portion of the calculated excess cancer risk to workers; for the RME scenario more than 90 percent of the estimated risk is from direct contact with roadway soil based on a landfill gas collection efficiency of 95 percent. The range of calculated risks to workers is 2.5×10^{-6} (Average exposure case at 95 percent landfill gas collection efficiency) to 1.5×10^{-5} (RME case at 75 percent landfill gas collection efficiency).

Recreational Visitor: Visitors at the PVLF can potentially be exposed by the same pathways as workers, i.e., to volatile compounds and dust in the air, and through direct contact with roadway soils on the main site. The calculated excess cancer risk to visitors is in the range of 1.4×10^{-6} (Average exposure case at 95 percent landfill gas collection efficiency) to 1.2×10^{-5} (RME case at 75 percent landfill gas collection efficiency). Direct contact with roadway soil on the landfill during six years of early childhood accounts for a large portion of the estimated risk to visitors. For the RME scenario more than 95 percent of the estimated risk is from direct contact with roadway soil if the landfill gas collection efficiency is 95 percent; approximately 90 percent of the risk is from direct soil contact if the landfill gas collection efficiency is 75 percent.

Future Exposure Scenarios

Future Off Site Resident: Under a future exposure scenario, use of ground water by an off site resident was assumed to occur. The nearest potential locations for a productive water supply well are approximately 300 feet from the landfill. Two locations for potentially productive water supply wells, Receptor Well 2 and Receptor Well 5, were evaluated for risks. Receptor Well 2 is a *hypothetical* well placed as close as technically feasible to the PVLF; Receptor Well 5 is a currently existing well used for industrial purposes only. In addition, future residents at a potential well location could be exposed to volatile compounds and dust from the landfill. Total excess cancer risks to the future resident using ground water are estimated to be in the range of 9.8×10^{-6} (Average exposure case at Receptor Well 5 and 95 percent landfill gas collection efficiency) to 3.4×10^{-5} (RME case at Receptor Well 2 and 75 percent landfill gas collection efficiency). Approximately 95 percent of this excess cancer risk is attributed to potential exposure to arsenic, which was predicted by ground water modeling at concentrations some one-thousandth of the MCL. As noted before, the MCL is the legally allowable maximum in public drinking water supplies.

Future On Site Worker: Potential exposures and excess cancer risks to maintenance workers at the landfill are expected to remain the same in the future.

Future Recreational Visitor: Increased recreational use of the main site is likely, since development plans for the site are being considered which include continued equestrian use, a golf course, a park, or other open space alternative. Calculated excess cancer risks for the future recreational visitor are in the range of 1.4×10^{-6} (Average exposure case at 95 percent landfill gas collection efficiency) to 1.7×10^{-5} (RME case at 75 percent landfill gas collection efficiency). Direct contact with roadway soil accounts for more than 90 percent of this excess cancer risk.

Potential non-cancer health risks were evaluated by calculating the average daily intake over one year. The average daily intake for each compound was compared to the reference dose published by EPA, which is an exposure level that is considered unlikely to cause adverse health effects. Therefore, as long as the average daily intake is less than the reference dose, or the ratio of the average daily intake divided by the reference dose is less than one (unity), adverse health effects are not expected to occur. Moreover, to account for potential additive effects from simultaneous exposure to more than one compound, a hazard index was calculated by adding the ratio of the average daily intake to the reference dose for all compounds. If the hazard index calculated in this way does not exceed unity, then the risk of non-carcinogenic effects of a mixture of chemicals is generally low.

The hazard indices calculated for the PVLF were less than unity for all cases. In fact, non-carcinogenic risks were less than 0.1 for all receptors except for the off site resident, for whom it ranged between 0.02 and 0.46 for the current RME case, and between 0.082 and 0.29 for the future RME case. These values indicate a low probability of adverse non-carcinogenic effects. The non-carcinogenic risks are presented in Tables ES-3 and ES-4.

An environmental evaluation was performed to qualitatively characterize the potential for adverse effects to ecological receptors, including horses. This evaluation indicated that exposures to ecological receptors are expected to be minimal.

In summary, landfill gas and ground water contamination have been identified as potential sources of impacts to the environment from the PVLF. However, the waste is currently contained through such measures as operation of the existing landfill gas and ground water control systems. Based on the risks estimated for the pathways identified as complete, the potential exposures and estimated risks do not appear to exceed DTSC threshold levels. However, since the waste will remain in place, and the risk estimates are based on steady state assumptions, continued maintenance and operation of the landfill gas control and ground water monitoring and barrier systems is required to ensure that estimated risks will not be exceeded in the future. Additional containment would provide increased confidence that future risks will not exceed the baseline estimates, particularly with respect to the ground water pathway since future off site ground water migration represents a release that cannot be predicted with certainty. The Feasibility Study will examine containment alternatives in greater detail.

TABLE ES-3

SUMMARY OF NONCARCINOGENIC EFFECTS BY EXPOSURE SCENARIO FOR CURRENT LAND USE
PALOS VERDES LANDFILL - REMEDIAL INVESTIGATION REPORT

Pathway Scenario	RME	Average
Offsite Resident		
Adult		
Groundwater	Pathways Incomplete	Pathways Incomplete
Soil -		
Ingestion	Pathways Incomplete	Pathways Incomplete
Outdoor Dust Inhalation	<0.001	<0.001
Outdoor Vapor Inhalation[1]	0.02 (0.10)	0.01 (0.07)
Total	**0.02 (0.10)**	**0.01 (0.07)**
Child		
Groundwater	Pathways Incomplete	Pathways Incomplete
Soil -		
Ingestion	Pathways Incomplete	Pathways Incomplete
Outdoor Dust Inhalation	<0.001	<0.001
Outdoor Vapor Inhalation	0.09 (0.46)	0.06 (0.30)
Total	**0.09 (0.46)**	**0.06 (0.30)**
Onsite Worker		
Groundwater	Pathways Incomplete	Pathways Incomplete
Soil -		
Ingestion	<0.001	<0.001
Dermal Contact	<0.001	<0.001
Outdoor Dust Inhalation	<0.001	<0.001
Outdoor Vapor Inhalation	0.02 (0.09)	0.02 (0.09)
Total	**0.02 (0.09)**	**0.02 (0.09)**

TABLE ES-3 (CONTINUED)

SUMMARY OF NONCARCINOGENIC EFFECTS BY EXPOSURE SCENARIO
FOR CURRENT LAND USE
PALOS VERDES LANDFILL - REMEDIAL INVESTIGATION REPORT

Pathway Scenario	RME	Average
Recreational Visitor		
Groundwater	Pathways Incomplete	Pathways Incomplete
Adult		
Soil -		
Ingestion	<0.001	<0.001
Dermal Contact	<0.001	<0.001
Outdoor Dust Inhalation	<0.001	<0.001
Outdoor Vapor Inhalation	0.002 (0.009)	<0.001 (0.002)
Total	**0.002 (0.009)**	**<0.001 (0.002)**
Child		
Soil		
Ingestion	<0.001	<0.001
Dermal Contact	<0.001	<0.001
Outdoor Dust Inhalation	<0.001	<0.001
Outdoor Vapor Inhalation	0.008 (0.04)	0.002 (0.01)
Total	**0.008 (0.04)**	**0.002 (0.01)**

(1) Values represent landfill gas collection system achieving 95% (75%) efficiency.

TABLE ES-4

SUMMARY OF NONCARCINOGENIC EFFECTS BY EXPOSURE SCENARIO FOR FUTURE LAND USE
PALOS VERDES LANDFILL - REMEDIAL INVESTIGATION REPORT

Pathway Scenario	RME	Average
Offsite Adult Resident		
Receptor Well 2 -		
Groundwater	0.12	0.082
Soil -		
Outdoor Dust Inhalation	<0.001	<0.001
Outdoor Vapor Inhalation[1]	0.001 (0.005)	<0.001 (0.004)
Total	**0.12 (0.12)**	**0.082 (0.086)**
Receptor Well 5 -		
Groundwater	0.08	0.056
Soil -		
Outdoor Dust Inhalation	<0.001	<0.001
Outdoor Vapor Inhalation	0.002 (0.01)	0.001 (0.007)
Total	**0.082 (0.09)**	**0.057 (0.063)**
Offsite Child Resident		
Receptor Well 2 -		
Groundwater	0.27	0.27
Soil -		
Outdoor Dust Inhalation	<0.001	<0.001
Outdoor Vapor Inhalation	0.005 (0.02)	0.003 (0.02)
Total	**0.28 (0.29)**	**0.28 (0.29)**
Receptor Well 5 -		
Groundwater	0.19	0.19
Soil -		
Outdoor Dust Inhalation	<0.001	<0.001
Outdoor Vapor Inhalation	0.009 (0.05)	0.006 (0.03)
Total	**0.20 (0.24)**	0.19 (0.22)

TABLE ES-4 (CONTINUED)

SUMMARY OF NONCARCINOGENIC EFFECTS BY EXPOSURE SCENARIO FOR FUTURE LAND USE
PALOS VERDES LANDFILL - REMEDIAL INVESTIGATION REPORT

Pathway Scenario	RME	Average
Onsite Worker		
Groundwater	Pathways Incomplete	Pathways Incomplete
Soil -		
Ingestion	<0.001	<0.001
Dermal Contact	<0.001	<0.001
Outdoor Dust Inhalation	<0.001	<0.001
Outdoor Vapor Inhalation	0.02 (0.09)	0.02 (0.09)
Total	**0.02 (0.09)**	**0.02 (0.09)**
Recreational Visitor		
Adult		
Soil -		
Ingestion	<0.001	<0.001
Dermal Contact	<0.001	<0.001
Outdoor Dust Inhalation	<0.001	<0.001
Outdoor Vapor Inhalation	0.003 (0.01)	<0.001 (0.002)
Total	**0.003 (0.01)**	**<0.001 (0.002)**
Child		
Soil -		
Ingestion	<0.001	<0.001
Dermal Contact	<0.001	<0.001
Outdoor Dust Inhalation	<0.001	<0.001
Outdoor Vapor Inhalation	0.01 (0.06)	0.002 (0.10)
Total	**0.01 (0.06)**	**0.002 (0.10)**

(1) Values represent landfill gas collection system achieving 95% (75%) efficiency.