DRAFT

Appendix B

Selection of the Area for Remedial Action and Supporting Human Health Risk Assessment

The purposes of this appendix are (1) to describe the evaluation used to identify the area where remedial action is appropriate for soil (the Selected Area) at the Rolling Knolls Landfill Superfund Site located in the Township of Chatham, Morris County, New Jersey (the "Site") and (2) to evaluate the risk to human health associated with soil that is not located within the Selected Area. To evaluate risk to human health associated with the soil that are not located within the Selected Area, the Exposure Point Concentration (EPC) of polychlorinated biphenyls (PCBs) in soil, the primary risk driver, was calculated and compared to a calculated Risk-Based Concentration (RBC) based on the Rolling Knolls Landfill Superfund Site Baseline Human Health Risk Assessment Update (BHHRA Update) dated July 5, 2018 and included in this appendix as Attachment B-1. In addition to this risk-based approach, an Alternative Remediation Standard (ARS) for PCBs was developed in accordance with New Jersey Department of Environmental Protection (NJDEP) methods, as provided in Appendix A to the Feasibility Study Report. This evaluation demonstrates that remediating the Selected Area is protective of human health, and the EPC for PCBs in soil that is not located within the Selected Area is below both the applicable RBC and ARS.

BACKGROUND INFORMATION

Site Features

The Site is a former municipal landfill in use from the 1930s to 1968. It consists of approximately 140 acres of landfill, with an adjacent 30-acre area west of the landfill that has debris scattered on the surface, but no buried waste (known as the Surface Debris Area). The Site features are shown on Figure B-1. Most of the landfill and the Surface Debris Area are privately owned. Approximately 35 acres of the landfill are on the Great Swamp National Wildlife Refuge (GSNWR).

Current Uses

A small building known as the Hunt Club is located in the Surface Debris Area near the western boundary of the landfill; it is generally unoccupied but is used infrequently for

social gatherings. Two areas of the Site (Landscaper Areas 1 and 2) are leased to landscaping firms for the storage of trucks and equipment. The laydown area, a small area of the Site north of the landfill, is used by Chatham Disposal and South Orange Disposal for the storage of roll offs. A Shooting Range and Baseball Field, located north of the landfill boundary, are used infrequently for recreation; however, no waste materials have been observed at the Shooting Range or Baseball Field.

Previous Risk Assessments

The Baseline Human Health Risk Assessment[1] (BHHRA) prepared by CDM Federal Programs Corporation (CDM Smith) in June 2014 calculated individual constituent and cumulative reasonable maximum exposure (RME) and central tendency exposure (CTE) cancer and non-cancer risks for current and reasonably anticipated future exposure scenarios and receptors, including adolescent and adult trespassers. The individual constituent RME cancer risks were less than United States Environmental Protection Agency (USEPA) target values for the receptors evaluated. The individual constituent RME non-cancer risks were greater than the USEPA target value (hazard index, HI) of 1 for adolescent and adult trespassers only. The non-cancer health hazard drivers are primarily PCBs for these receptors. The July 2018 BHHRA Update (Attachment B-1) evaluated changes to the exposure frequency for trespassers as well as updated toxicity information. No changes to the conclusions of the June 2014 BHHRA resulted from this update.

Anticipated Future Use

There are operations currently being conducted on the landfill (the Hunt Club and two landscaper areas), but it is assumed that these activities will not continue beyond the completion of the soil remedial action at the Site. No future residential, industrial, commercial, recreational, or other use of the Site is anticipated.

IDENTIFICATION OF THE SELECTED AREA

The Selected Area was identified by evaluating the locations and concentrations of the soil samples collected from the Site. Review of the data identified a contiguous area of sample locations with soil concentrations of PCBs as the sum of total Aroclors above 10 milligrams

[1] An evaluation of ecological risk is included as Appendix C to the Feasibility Study Report.

per kilogram (mg/kg) (the Selected Area)[2]. The impact of remediating the Selected Area was then assessed by calculating the 95 percent upper confidence limit of the mean (95UCL) for PCBs (as the sum of Aroclors) in soil outside of this area using the USEPA's ProUCL version 5.1.002.

The Selected Area includes more locations with elevated PCB concentrations, when compared to other areas of the Site, that are in close proximity to one another. A remedial approach that addresses the Selected Area will provide Site-wide risk reduction to below USEPA's acceptable risk range and takes into account the reasonably anticipated future use, the location near the GSNWR and environmentally regulated areas, as well as the rural nature and limited access to the Site. Therefore, the Selected Area was identified to achieve overall risk reduction at the Site.

The location of the Selected Area is shown on Figure B-1. It is in the northern portion of the landfill and is approximately 25 acres in extent.

Because, as described below, the EPC calculated for PCBs in readily accessible (within two feet of the ground surface) soil outside the 25-acre Selected Area (3.5 mg/kg) is significantly lower than the calculated RBC (29 mg/kg) and below the applicable ARS (5 mg/kg), the Selected Area is conservative in its size and location.

DEVELOPMENT OF THE SITE-SPECIFIC RISK-BASED CONCENTRATION

An RBC was developed as a point of comparison for the results of the risk evaluation of soil outside the Selected Area (discussed below). The adolescent trespasser receptor was used as the basis to develop the RBC because it was the receptor with the highest potential health hazard. The RBC was calculated for PCBs, specifically non-dioxin-like PCBs, because it is the only analyte with a hazard index (HI) above 1.

[2] The RBC was originally calculated as 10 mg/kg based on the 2014 BHHRA, prior to the July 2018 BHHRA Update, which was used to calculate an RBC of 29 mg/kg. The Selected Area was not adjusted based on the RBC calculated herein.

Receptor: Adolescent Trespasser (Landfill)

	BHHRA Update's EPC (mg/kg)	Soil Combined Dermal, Ingestion, and Inhalation HI	Site-Specific RBC (mg/kg)
Non-dioxin-like PCBs	57	2	29

Notes:

1. The Site-specific RBC was calculated according to the following equation:

$$RBC = EPC \times \frac{Target\ HI\ (1)}{Analyte\ HI\ (2)}$$

2. The Site-specific RBC is rounded to two significant figures.

3. The EPC and Soil Combined Dermal, Ingestion, and Inhalation HI for Non-dioxin-like PCBs are from the July 2018 BHHRA Update (Attachment B-1).

EXPOSURE POINT CONCENTRATION OUTSIDE THE SELECTED AREA

To evaluate the residual risk to human health associated with the soil outside the Selected Area, the EPC for PCBs was calculated. PCBs were selected for this analysis because they are the primary risk driver and the only constituent with an individual constituent hazard index above 1. Because the PCB congener (non-dioxin-like PCBs) dataset was too small to support the evaluation of the risk to human health associated with the soil within two feet of ground surface outside the Selected Area, Aroclor data (for which there was greater data density) was used. Evaluating total PCBs as the sum of Aroclors instead of evaluating only non-dioxin-like PCBs is more conservative from a human health risk perspective.

USEPA's ProUCL version 5.1.002 was used to calculate the 95UCL as the EPC for PCBs (as the sum of Aroclors) for the shallow soil (0-2-foot depth interval) outside the Selected Area as this would be accessible to an adolescent trespasser. The EPC for PCBs remaining outside the Selected Area was calculated as 3.5 mg/kg, below the PCB RBC of 29 mg/kg as well as below the calculated PCB ARS of 5 mg/kg. The ProUCL input and output are included in Attachment B-2 to this appendix. The dataset used in the development of the

EPC excluded the soil samples shown in brown in Figure B-2. The rationale for exclusion is described in the previous discussion about identifying the Selected Area.

CONCLUSIONS

The EPC for PCBs in the soil outside the Selected Area is 3.5 mg/kg, which is well below the RBC of 29 mg/kg and below the ARS of 5 mg/kg. The extent of the Selected Area may be re-evaluated using the same methodology set forth herein, if the pre-design investigation generates additional relevant data.

Remediating the Selected Area is protective of the health of potential human receptors at the Site. However, to supplement the Selected Area and further reduce risk, those sample locations which contain PCB concentrations greater than three times the ARS of 5 mg/kg are designated Areas of Particular Concern (APCs; discussed in Section 5 of the Feasibility Study Report) and will be remediated. The locations of the APCs are included on Figure B-2.

This memorandum and its findings will be incorporated into the Feasibility Study Report for the Rolling Knolls Site.

REFERENCES

CDM Federal Programs Corporation, 2014. *Baseline Human Health Risk Assessment, Rolling Knolls Landfill Superfund Site, Chatham, New Jersey*. June.

Integral Consulting. 2016. *Baseline Ecological Risk Assessment*, Rolling Knolls Landfill Superfund Site. September.

USEPA, 2016. *ProUCL version 5.5.002*. June 20. https://www.epa.gov/land-research/proucl-software.

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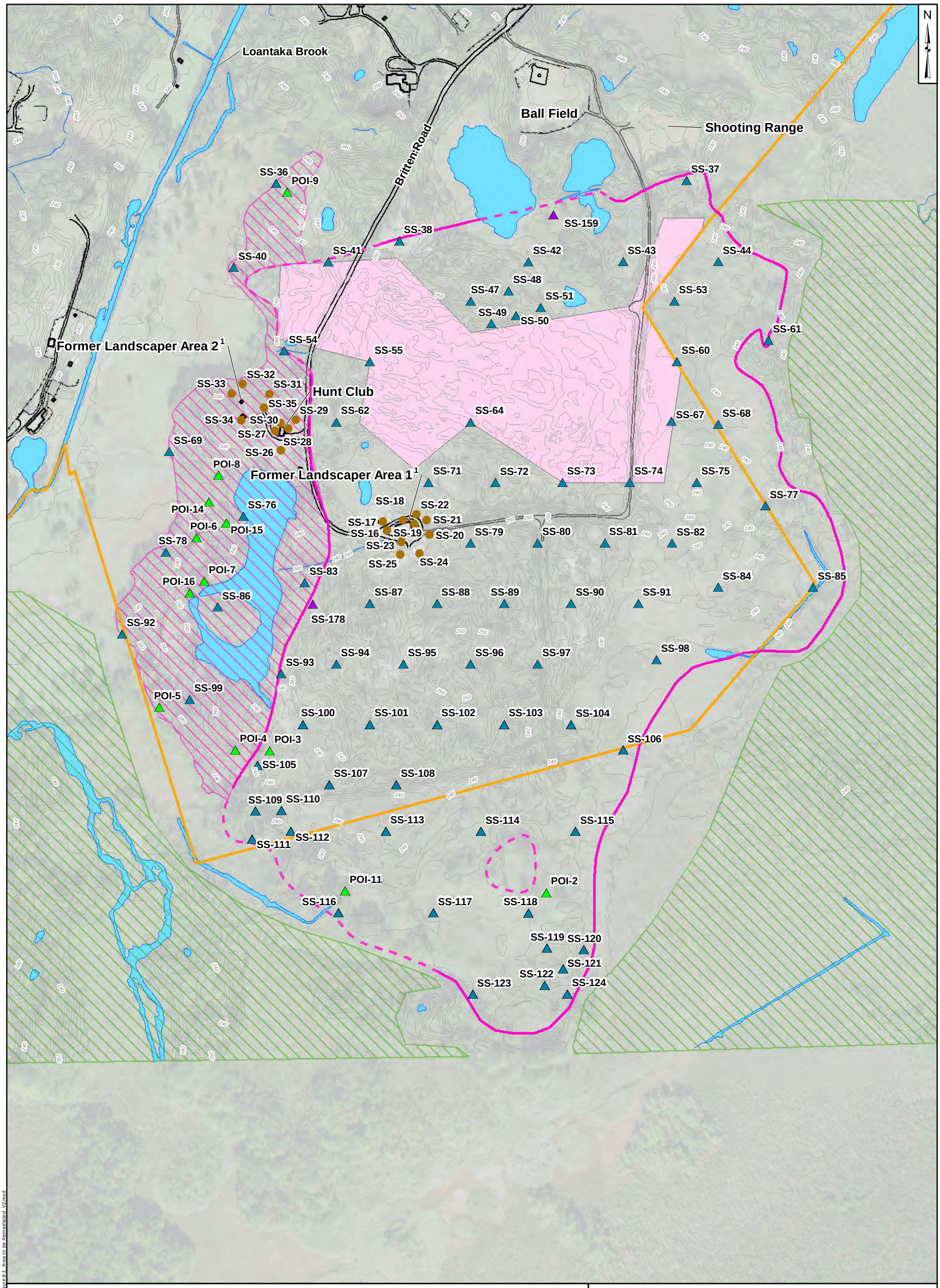
FIGURES



Note 1: These features to be removed from landfill area prior to completion of soil remedy.
Site Plan created from Arcadis CAD drawings received December 2015.
Aerial imagery accessed via ArcGIS Online and provided by the United States Department of Agriculture on 10 July 2018. Image is dated 31 July 2015.

400 200 0 400 Feet

Legend

Locations of Soil Samples Used to Calculate Exposure Point Concentration

- Soil Sample Location Near Areas of Current Human Use (First Phase of RI)
- Soil Sample Location At Point of Interest (First Phase of RI)
- Other Soil Sample Location (First Phase of RI)
- Soil Sample Location (Second Phase of RI)

- Selected Area
- Edge of landfilled wastes (dashed where approximate)
- Great Swamp National Wildlife Refuge property boundary
- Areas where surface water flow does not exhibit typical bed and bank morphology
- Waste and debris observed on ground surface but not observed or anticipated below ground surface
- Open water

Selected Area to be Remediated

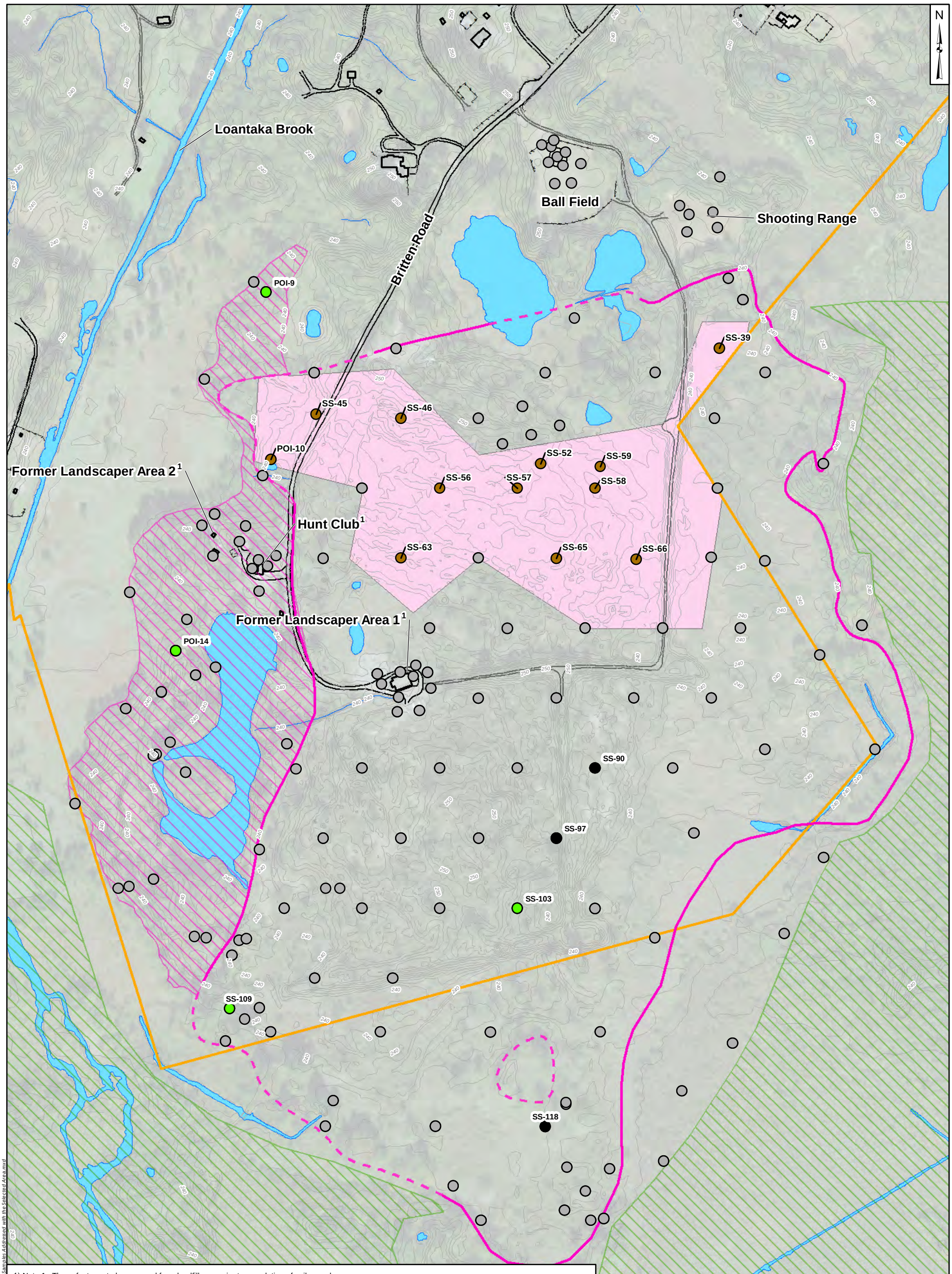
ROLLING KNOLLS LANDFILL SUPERFUND SITE
CHATHAM, NEW JERSEY

Geosyntec consultants

Princeton, NJ | July 2018

Figure **B-1**

P:\GIS\GISprojects\JR0149 - Rolling Knolls Columbia_MD_20180427\Report 1\FS Figure B-1 Area to be Remediated_V2.mxd



1) Note 1: These features to be removed from landfill area prior to completion of soil remedy.
2) PCBs = Polychlorinated Biphenyls
3) Soil samples located on the edge of the Selected Area are shown in gray and were included in the ProUCL dataset used to calculate the Exposure Point Concentration (EPC) for PCBs. While remediation of these samples is not required to meet the EPC, these samples will be included in the remediation as a conservative measure.
4) Site Plan created from Arcadis CAD drawings received December 2015.

400 200 0 400 Feet

Legend

- Soil Samples Excluded from EPC Dataset
- Areas of Particular Concern - PCBs
- Areas of Particular Concern - Other Constituents
- Other Soil Samples
- Selected Area
- Edge of landfilled wastes (dashed where approximate)
- Great Swamp National Wildlife Refuge property boundary
- Areas where surface water flow does not exhibit typical bed and bank morphology
- Waste and debris observed on ground surface but not observed or anticipated below ground surface
- Open water

Soil Samples Addressed with the Selected Area

ROLLING KNOLLS LANDFILL SUPERFUND SITE
CHATHAM, NEW JERSEY

Geosyntec consultants

Princeton, NJ | July 2018

Figure **B-2**

P:\GIS\GISprojects\JR0149 - Rolling Knolls Columbia MD_20180427\Report 1\FS Figure B-2 Soil Samples Addressed with the Selected Area.mxd

ATTACHMENT B-1
JULY 2018 BHHRA UPDATE

U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION II
Emergency and Remedial Response Division
290 Broadway, 18th Floor
New York, New York 10007-1866

MEMORANDUM

TO: Betsy Donovan
Supinderjit Kaur

FROM: Michael Sivak

DATE: July 5, 2018

RE: Rolling Knolls Landfill Superfund Site Baseline Human Health Risk Assessment Update

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The purpose of this memorandum is to update components of the Baseline Human Health Risk Assessment (BHHRA) that was conducted for the Rolling Knolls Landfill Superfund site. The BHHRA was completed by CDM Smith for EPA in June 2014. This report was developed using exposure information identified at the time to represent reasonable maximum exposure (RME) scenarios that reflected both current and potential future uses of the site, as well as incorporate current toxicological information on the contaminants of potential concern. This memorandum specifically addresses three components of the BHHRA: (1) exposure frequency, (2) toxicity information and (3) lead.

During the development of the BHHRA, toxicity information was identified following EPA's hierarchy of sources, including IRIS, NCEA, and appropriate Tier 3 values. Additionally, an exposure frequency of 143 days/year for the adolescent and adult trespasser was selected to represent the RME scenario. The value of 143 day/year accounts for exposure 5 times/week during the 13 weeks of summer and 3 times/week during the 26 weeks of spring and fall. The BHHRA used this toxicity information and these exposure frequencies to estimate risk to the adolescent and adult trespasser to the landfill, and concluded that the noncancer hazard index for the adolescent trespasser was 5, while the noncancer hazard index for the adult trespasser was 4. Both of these hazard estimates exceed EPA's acceptable level of less than or equal to 1. Cancer risks for these populations were below or within EPA's acceptable level of 1×10^{-6} to 1×10^{-4}.

Discussions about the potential for exposure to trespassers throughout the landfill area were initiated during the development of the Feasibility Study (FS), after the BHHRA was approved by EPA. These discussions focused on the limited accessibility to the landfill, the lack of established trails and walking paths, and the dense vegetation that is common throughout the landfill area. During the effort to develop Alternate Remediation Standards (ARS) that would be used to assess cleanup alternatives in the FS, the exposure frequency of trespassers to the landfill was reevaluated, with these characteristics of the site in mind. After careful consideration of these factors, EPA concluded that the exposure frequency of 143 days/years likely overestimated the RME scenario and identified a value of 84 days/year as an exposure frequency that more accurately represented the RME scenario. This value, which was selected as part of the process to develop ARS for the site, is based on the following:

- When school is out for the summer months (June, July and August), exposure would occur 3 days per week;

- During the spring (April and May) and fall (September, October and November), exposure would occur 2 days per week;
- For those months when the average high temperatures are less than 50 degrees (January, February, March and December), exposure would not occur.

These exposures are presented in the following table:

Month	# Days per Month	Weekly Exposure Frequency (days/week)	Monthly Exposure Frequency (days/month)
April	30	2	9
May	31	2	9
June	30	3	13
July	31	3	13
August	31	3	13
September	30	2	9
October	31	2	9
November	30	2	9
		Total Exposure Frequency (days/year)	84

During the development of the ARS, toxicity values were also re-examined. Toxicity information for all contaminants of potential concern (COPCs) that were quantitatively evaluated in the BHHRA was verified to ensure that the ARS were developed using up-to-date information. This review identified that toxicity information for several COPCs had been updated since the 2014 BHHRA was approved. Specifically, the toxicity information for polycyclic aromatic hydrocarbons (PAHs), as well as a few other COPCs, had been updated in IRIS and from other sources. The following table shows the updated toxicity information used to develop the ARS:

Chemical	RfD (mg/kg-day)	Absorbed RfD (mg/kg-day)	SF $(mg/kg\text{-}day)^{-1}$	Absorbed SF $(mg/kg\text{-}day)^{-1}$	Source
Benzo(a)pyrene	3E-04	3E-04	1E+00	1E+00	IRIS
Benzo(a)anthracene	NA	NA	1E-01	1E-01	USEPA
Benzo(b)fluoranthene	NA	NA	1E-01	1E-01	USEPA
Benzo(k)fluoranthene	NA	NA	1E-02	1E-02	USEPA
Chrysene	NA	NA	1E-03	1E-03	USEPA
Dibenz(a,h)anthracene	NA	NA	1E00	1E00	USEPA
Indeno(1,2,3-cd)pyrene	NA	NA	1E-01	1E-01	USEPA
PCB TEQ	NA	NA	1.3E+05	1.3E+05	CalEPA
2,3,7,8-TCDD	NA	NA	1.3E+05	1.3E+05	CalEPA
4,4'-DDT	3E-05	3E-05	NC	NC	PPRTV-S

NA: No toxicity value is available.
NC: No change from the BHHRA.
PPRTV-S: Provisional Peer Reviewed Toxicity Value - Screening

Since the exposure frequency for the adolescent and adult trespassers was revised to 84 days/year from 143 days/year and toxicity information was updated for certain COPCs, the noncancer hazards for these were recalculated to assess if the hazards remained above EPA's acceptable level. The noncancer

hazard index for the adolescent trespasser was estimated to be 3, while the value for the adult trespasser was estimated to be 2. Both of these values still exceed EPA's acceptable level.

Finally, lead concentrations at the site were reevaluated. In 2016, EPA released a directive focusing on lead. In OLEM Directive 9200.2-167, "Updated Scientific Considerations for Lead in Soil Cleanups", blood lead levels less than 10 ug/dl were identified as associated with health concerns. In response to this directive, Region 2 developed a policy to evaluate how lead is assessed at sites. One outcome of this updated approach is to review data to identify if any soil sample results exceed 200 mg/kg. This is a change from the approach used in the 2014 BHHRA, which used a value of 400 mg/kg to identify areas that require further review. Lead was identified as requiring further action during the 2014 BHHRA, and this remains a valid conclusion after the review using the revised screening level of 200 mg/kg.

In summary, this memorandum reviewed three components of the 2014 BHHRA. This review, which included updates to exposure frequency, toxicity information, and lead, concluded that the results of the 2014 BHHRA remain valid, that actionable risk is present at the Rolling Knolls Landfill Superfund Site.

/MAS

TABLE 7.7.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

ROLLING KNOLLS LANDFILL SUPERFUND SITE

Scenario Timeframe:	Current/Future
Receptor Population:	Trespasser
Receptor Age:	Adolescent (1)

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	Landfill	Ingestion	**Volatile Organic Compounds**												
				Benzene	1.2E+00	mg/kg	9.9E-08	mg/kg-day	5.5E-02	$(mg/kg\text{-}day)^{-1}$	5.4E-09	5.8E-07	mg/kg-day	4.0E-03	mg/kg-day	1.4E-04
				Chloroform	1.2E+02	mg/kg	9.8E-06	mg/kg-day	3.1E-02	$(mg/kg\text{-}day)^{-1}$	3.0E-07	5.7E-05	mg/kg-day	1.0E-02	mg/kg-day	5.7E-03
				Trichloroethene	4.1E-02	mg/kg	See Calculations in Appendix G				2.1E-10	1.9E-08	mg/kg-day	5.0E-04	mg/kg-day	3.9E-05
				Total xylenes	7.3E+03	mg/kg	6.0E-04	mg/kg-day	NA	NA	NA	3.5E-03	mg/kg-day	2.0E-01	mg/kg-day	1.7E-02
				Semi-Volatile Organic Compounds												
				Benzo(a)anthracene	5.1E+00	mg/kg	See Calculations in Appendix G				1.1E-07	2.5E-06	mg/kg-day	NA	NA	NA
				Benzo(a)pyrene	4.5E+00	mg/kg	See Calculations in Appendix G				9.9E-07	2.2E-06	mg/kg-day	3.0E-04	mg/kg-day	7.2E-03
				Benzo(b)fluoranthene	5.0E+00	mg/kg	See Calculations in Appendix G				1.1E-07	2.4E-06	mg/kg-day	NA	NA	NA
				Benzo(k)fluoranthene	4.1E+00	mg/kg	See Calculations in Appendix G				9.0E-09	2.0E-06	mg/kg-day	NA	NA	NA
				Bis(2-ethyl hexyl) phthalate	1.3E+01	mg/kg	1.0E-06	mg/kg-day	1.4E-02	$(mg/kg\text{-}day)^{-1}$	1.5E-08	6.1E-06	mg/kg-day	2.0E-02	mg/kg-day	3.0E-04
				Chrysene	5.4E+00	mg/kg	See Calculations in Appendix G				1.2E-09	2.6E-06	mg/kg-day	NA	NA	NA
				Dibenz(a,h)anthracene	5.3E-01	mg/kg	See Calculations in Appendix G				1.2E-07	2.6E-07	mg/kg-day	NA	NA	NA
				Indeno(1,2,3-cd)pyrene	1.1E+00	mg/kg	See Calculations in Appendix G				2.5E-08	5.4E-07	mg/kg-day	NA	NA	NA
				Pesticides												
				Aldrin	1.2E-02	mg/kg	9.5E-10	mg/kg-day	1.7E+01	$(mg/kg\text{-}day)^{-1}$	1.6E-08	5.6E-09	mg/kg-day	3.0E-05	mg/kg-day	1.9E-04
				alpha-BHC	1.1E-02	mg/kg	9.3E-10	mg/kg-day	6.3E+00	$(mg/kg\text{-}day)^{-1}$	5.9E-09	5.4E-09	mg/kg-day	8.0E-03	mg/kg-day	6.8E-07
				alpha-Chlordane	1.8E-01	mg/kg	1.5E-08	mg/kg-day	3.5E-01	$(mg/kg\text{-}day)^{-1}$	5.2E-09	8.6E-08	mg/kg-day	5.0E-04	mg/kg-day	1.7E-04
				gamma-Chlordane	2.1E-01	mg/kg	1.7E-08	mg/kg-day	3.5E-01	$(mg/kg\text{-}day)^{-1}$	6.1E-09	1.0E-07	mg/kg-day	5.0E-04	mg/kg-day	2.0E-04
				Dieldrin	4.6E-02	mg/kg	3.8E-09	mg/kg-day	1.6E+01	$(mg/kg\text{-}day)^{-1}$	6.1E-08	2.2E-08	mg/kg-day	5.0E-05	mg/kg-day	4.4E-04
				Heptachlor	3.9E-02	mg/kg	3.2E-09	mg/kg-day	4.5E+00	$(mg/kg\text{-}day)^{-1}$	1.5E-08	1.9E-08	mg/kg-day	5.0E-04	mg/kg-day	3.8E-05
				Heptachlor epoxide	2.5E-02	mg/kg	2.0E-09	mg/kg-day	9.1E+00	$(mg/kg\text{-}day)^{-1}$	1.8E-08	1.2E-08	mg/kg-day	1.3E-05	mg/kg-day	9.1E-04
				Polychlorinated Biphenyls												
				Total Non-DL PCBs Congeners	5.7E+01	mg/kg	4.7E-06	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	9.4E-06	2.8E-05	mg/kg-day	2.0E-05	mg/kg-day	1.4E+00
				PCB TEQ	4.2E-04	mg/kg	3.5E-11	mg/kg-day	1.3E+05	$(mg/kg\text{-}day)^{-1}$	4.5E-06	2.0E-10	mg/kg-day	7.0E-10	mg/kg-day	2.9E-01
				Dioxin/Furans												
				Dioxin TEQ	4.9E-04	mg/kg	4.0E-11	mg/kg-day	1.6E+05	$(mg/kg\text{-}day)^{-1}$	6.3E-06	2.3E-10	mg/kg-day	7.0E-10	mg/kg-day	3.4E-01
				Inorganics												
				Aluminum	1.4E+04	mg/kg	1.1E-03	mg/kg-day	NA	NA	NA	6.5E-03	mg/kg-day	1.0E+00	mg/kg-day	6.5E-03
				Antimony	1.2E+02	mg/kg	9.8E-06	mg/kg-day	NA	NA	NA	5.7E-05	mg/kg-day	4.0E-04	mg/kg-day	1.4E-01
				Arsenic	2.6E+01	mg/kg	1.3E-06	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	1.9E-06	7.5E-06	mg/kg-day	3.0E-04	mg/kg-day	2.5E-02
				Barium	5.3E+02	mg/kg	4.4E-05	mg/kg-day	NA	NA	NA	2.5E-04	mg/kg-day	2.0E-01	mg/kg-day	1.3E-03
				Cadmium	1.4E+01	mg/kg	1.1E-06	mg/kg-day	NA	NA	NA	6.6E-06	mg/kg-day	1.0E-03	mg/kg-day	6.6E-03
				Chromium, Total	2.9E+02	mg/kg	2.4E-05	mg/kg-day	NA	NA	NA	1.4E-04	mg/kg-day	1.5E+00	mg/kg-day	9.2E-05
				Cobalt	1.3E+01	mg/kg	1.0E-06	mg/kg-day	NA	NA	NA	6.1E-06	mg/kg-day	3.0E-04	mg/kg-day	2.0E-02
				Copper	3.1E+03	mg/kg	2.5E-04	mg/kg-day	NA	NA	NA	1.5E-03	mg/kg-day	4.0E-02	mg/kg-day	3.7E-02
				Cyanide	1.5E+01	mg/kg	1.3E-06	mg/kg-day	NA	NA	NA	7.4E-06	mg/kg-day	6.0E-04	mg/kg-day	1.2E-02
				Iron	1.3E+05	mg/kg	1.0E-02	mg/kg-day	NA	NA	NA	6.1E-02	mg/kg-day	7.0E-01	mg/kg-day	8.7E-02

TABLE 7.7.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

ROLLING KNOLLS LANDFILL SUPERFUND SITE

Scenario Timeframe:	Current/Future
Receptor Population:	Trespasser
Receptor Age:	Adolescent (1)

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	Landfill	Ingestion	Manganese	1.2E+03	mg/kg	9.7E-05	mg/kg-day	NA	NA	NA	5.6E-04	mg/kg-day	2.4E-02	mg/kg-day	2.3E-02
(cont.)	(cont.)	(cont.)	(cont.)	Mercury	1.0E+01	mg/kg	8.2E-07	mg/kg-day	NA	NA	NA	4.8E-06	mg/kg-day	3.0E-04	mg/kg-day	1.6E-02
				Nickel	1.5E+02	mg/kg	1.3E-05	mg/kg-day	NA	NA	NA	7.4E-05	mg/kg-day	2.0E-02	mg/kg-day	3.7E-03
				Silver	1.0E+01	mg/kg	8.5E-07	mg/kg-day	NA	NA	NA	4.9E-06	mg/kg-day	5.0E-03	mg/kg-day	9.9E-04
				Thallium	9.7E-01	mg/kg	7.9E-08	mg/kg-day	NA	NA	NA	4.6E-07	mg/kg-day	1.0E-05	mg/kg-day	4.6E-02
				Vanadium	3.1E+02	mg/kg	2.5E-05	mg/kg-day	NA	NA	NA	1.5E-04	mg/kg-day	5.0E-03	mg/kg-day	2.9E-02
				Zinc	5.2E+03	mg/kg	4.3E-04	mg/kg-day	NA	NA	NA	2.5E-03	mg/kg-day	3.0E-01	mg/kg-day	8.3E-03
			Exp. Route Total								2.4E-05					2.5E+00
Soil	Surface Soil	Landfill	Dermal	**Volatile Organic Compounds**												
				Benzene	1.2E+00	mg/kg	NA	NA	5.5E-02	$(mg/kg\text{-}day)^{-1}$	NA	NA	NA	4.0E-03	mg/kg-day	NA
				Chloroform	1.2E+02	mg/kg	NA	NA	3.1E-02	$(mg/kg\text{-}day)^{-1}$	NA	NA	NA	1.0E-02	mg/kg-day	NA
				Trichloroethene	4.1E-02	mg/kg	See Calculations in Appendix G				8.2E-11	NA	NA	5.0E-04	mg/kg-day	NA
				Total xylenes	7.3E+03	mg/kg	NA	NA	NA	NA	NA	NA	NA	2.0E-01	mg/kg-day	NA
				Semi-Volatile Organic Compounds												
				Benzo(a)anthracene	5.1E+00	mg/kg	See Calculations in Appendix G				4.5E-08	9.8E-07	mg/kg-day	NA	NA	NA
				Benzo(a)pyrene	4.5E+00	mg/kg	See Calculations in Appendix G				3.9E-07	8.6E-07	mg/kg-day	3.0E-04	mg/kg-day	2.9E-03
				Benzo(b)fluoranthene	5.0E+00	mg/kg	See Calculations in Appendix G				4.3E-08	9.5E-07	mg/kg-day	NA	NA	NA
				Benzo(k)fluoranthene	4.1E+00	mg/kg	See Calculations in Appendix G				3.6E-09	7.8E-07	mg/kg-day	NA	NA	NA
				Bis(2-ethyl hexyl) phthalate	1.3E+01	mg/kg	3.2E-07	mg/kg-day	1.4E-02	$(mg/kg\text{-}day)^{-1}$	4.5E-09	1.9E-06	mg/kg-day	2.0E-02	mg/kg-day	9.3E-05
				Chrysene	5.4E+00	mg/kg	See Calculations in Appendix G				4.7E-10	1.0E-06	mg/kg-day	NA	NA	NA
				Dibenz(a,h)anthracene	5.3E-01	mg/kg	See Calculations in Appendix G				4.7E-08	1.0E-07	mg/kg-day	NA	NA	NA
				Indeno(1,2,3-cd)pyrene	1.1E+00	mg/kg	See Calculations in Appendix G				9.8E-09	2.1E-07	mg/kg-day	NA	NA	NA
				Pesticides												
				Aldrin	1.2E-02	mg/kg	2.9E-10	mg/kg-day	1.7E+01	$(mg/kg\text{-}day)^{-1}$	5.0E-09	1.7E-09	mg/kg-day	3.0E-05	mg/kg-day	5.7E-05
				alpha-BHC	1.1E-02	mg/kg	2.8E-10	mg/kg-day	6.3E+00	$(mg/kg\text{-}day)^{-1}$	1.8E-09	1.7E-09	mg/kg-day	8.0E-03	mg/kg-day	2.1E-07
				alpha-Chlordane	1.8E-01	mg/kg	1.8E-09	mg/kg-day	3.5E-01	$(mg/kg\text{-}day)^{-1}$	6.3E-10	1.1E-08	mg/kg-day	5.0E-04	mg/kg-day	2.1E-05
				gamma-Chlordane	2.1E-01	mg/kg	2.1E-09	mg/kg-day	3.5E-01	$(mg/kg\text{-}day)^{-1}$	7.5E-10	1.2E-08	mg/kg-day	5.0E-04	mg/kg-day	2.5E-05
				Dieldrin	4.6E-02	mg/kg	1.2E-09	mg/kg-day	1.6E+01	$(mg/kg\text{-}day)^{-1}$	1.9E-08	6.8E-09	mg/kg-day	5.0E-05	mg/kg-day	1.4E-04
				Heptachlor	3.9E-02	mg/kg	9.9E-10	mg/kg-day	4.5E+00	$(mg/kg\text{-}day)^{-1}$	4.5E-09	5.8E-09	mg/kg-day	5.0E-04	mg/kg-day	1.2E-05
				Heptachlor epoxide	2.5E-02	mg/kg	6.2E-10	mg/kg-day	9.1E+00	$(mg/kg\text{-}day)^{-1}$	5.7E-09	3.6E-09	mg/kg-day	1.3E-05	mg/kg-day	2.8E-04
				Polychlorinated Biphenyls												
				Total Non-DL PCBs Congeners	5.7E+01	mg/kg	2.0E-06	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	4.0E-06	1.2E-05	mg/kg-day	2.0E-05	mg/kg-day	5.9E-01
				PCB TEQ	4.2E-04	mg/kg	1.5E-11	mg/kg-day	1.3E+05	$(mg/kg\text{-}day)^{-1}$	1.9E-06	8.6E-11	mg/kg-day	7.0E-10	mg/kg-day	1.2E-01
				Dioxin/Furans												
				Dioxin TEQ	4.9E-04	mg/kg	3.7E-12	mg/kg-day	1.6E+05	$(mg/kg\text{-}day)^{-1}$	5.8E-07	2.2E-11	mg/kg-day	7.0E-10	mg/kg-day	3.1E-02

TABLE 7.7.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
ROLLING KNOLLS LANDFILL SUPERFUND SITE

Scenario Timeframe:	Current/Future
Receptor Population:	Trespasser
Receptor Age:	Adolescent (1)

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	Landfill	Dermal	**Inorganics**												
(cont.)	(cont.)	(cont.)	(cont.)	Aluminum	1.4E+04	mg/kg	NA	NA	NA	NA	NA	NA	NA	1.0E+00	mg/kg-day	NA
				Antimony	1.2E+02	mg/kg	NA	NA	NA	NA	NA	NA	NA	6.0E-05	mg/kg-day	NA
				Arsenic	2.6E+01	mg/kg	2.0E-07	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	2.9E-07	1.1E-06	mg/kg-day	3.0E-04	mg/kg-day	3.8E-03
				Barium	5.3E+02	mg/kg	NA	NA	NA	NA	NA	NA	NA	1.4E-02	mg/kg-day	NA
				Cadmium	1.4E+01	mg/kg	3.5E-09	mg/kg-day	NA	NA	NA	2.0E-08	mg/kg-day	2.5E-05	mg/kg-day	8.1E-04
				Chromium, Total	2.9E+02	mg/kg	NA	NA	NA	NA	NA	NA	NA	2.0E-02	mg/kg-day	NA
				Cobalt	1.3E+01	mg/kg	NA	NA	NA	NA	NA	NA	NA	3.0E-04	mg/kg-day	NA
				Copper	3.1E+03	mg/kg	NA	NA	NA	NA	NA	NA	NA	4.0E-02	mg/kg-day	NA
				Cyanide	1.5E+01	mg/kg	NA	NA	NA	NA	NA	NA	NA	6.0E-04	mg/kg-day	NA
				Iron	1.3E+05	mg/kg	NA	NA	NA	NA	NA	NA	NA	7.0E-01	mg/kg-day	NA
				Manganese	1.2E+03	mg/kg	NA	NA	NA	NA	NA	NA	NA	2.4E-02	mg/kg-day	NA
				Mercury	1.0E+01	mg/kg	NA	NA	NA	NA	NA	NA	NA	2.1E-05	mg/kg-day	NA
				Nickel	1.5E+02	mg/kg	NA	NA	NA	NA	NA	NA	NA	8.0E-04	mg/kg-day	NA
				Silver	1.0E+01	mg/kg	NA	NA	NA	NA	NA	NA	NA	2.0E-04	mg/kg-day	NA
				Thallium	9.7E-01	mg/kg	NA	NA	NA	NA	NA	NA	NA	1.0E-05	mg/kg-day	NA
				Vanadium	3.1E+02	mg/kg	NA	NA	NA	NA	NA	NA	NA	5.0E-03	mg/kg-day	NA
				Zinc	5.2E+03	mg/kg	NA	NA	NA	NA	NA	NA	NA	3.0E-01	mg/kg-day	NA
			Exp. Route Total								7.4E-06					7.5E-01
Soil	Surface Soil	Landfill	Inhalation	**Volatile Organic Compounds**												
				Benzene	1.2E+00	mg/kg	7.8E-04	$\mu g/m^3$	7.8E-06	$(\mu g/m^3)^{-1}$	6.1E-09	4.6E-03	$\mu g/m^3$	3.0E+01	$\mu g/m^3$	1.5E-04
				Chloroform	1.2E+02	mg/kg	1.2E-01	$\mu g/m^3$	2.3E-05	$(\mu g/m^3)^{-1}$	2.8E-06	7.2E-01	$\mu g/m^3$	9.8E+01	$\mu g/m^3$	7.3E-03
				Trichloroethene	4.1E-02	mg/kg	See Calculations in Appendix G				8.1E-09	2.8E-04	$\mu g/m^3$	2.0E+00	$\mu g/m^3$	1.4E-04
				Total xylenes	7.3E+03	mg/kg	2.8E+00	$\mu g/m^3$	NA	NA	NA	1.6E+01	$\mu g/m^3$	1.0E+02	$\mu g/m^3$	1.6E-01
				Semi-Volatile Organic Compounds												
				Benzo(a)anthracene	5.1E+00	mg/kg	See Calculations in Appendix G				7.6E-12	2.1E-07	$\mu g/m^3$	NA	NA	NA
				Benzo(a)pyrene	4.5E+00	mg/kg	See Calculations in Appendix G				6.8E-11	1.8E-07	$\mu g/m^3$	2.0E-03	µg/m3	9.2E-05
				Benzo(b)fluoranthene	5.0E+00	mg/kg	See Calculations in Appendix G				7.5E-12	2.0E-07	$\mu g/m^3$	NA	NA	NA
				Benzo(k)fluoranthene	4.1E+00	mg/kg	See Calculations in Appendix G				6.2E-13	1.7E-07	$\mu g/m^3$	NA	NA	NA
				Bis(2-ethyl hexyl) phthalate	1.3E+01	mg/kg	8.9E-08	$\mu g/m^3$	2.4E-06	$(\mu g/m^3)^{-1}$	2.1E-13	5.2E-07	$\mu g/m^3$	NA	NA	NA
				Chrysene	5.4E+00	mg/kg	See Calculations in Appendix G				8.1E-14	2.2E-07	$\mu g/m^3$	NA	NA	NA
				Dibenz(a,h)anthracene	5.3E-01	mg/kg	See Calculations in Appendix G				8.1E-12	2.2E-08	$\mu g/m^3$	NA	NA	NA
				Indeno(1,2,3-cd)pyrene	1.1E+00	mg/kg	See Calculations in Appendix G				2.1E-12	4.6E-08	$\mu g/m^3$	NA	NA	NA
				Pesticides												
				Aldrin	1.2E-02	mg/kg	8.1E-11	$\mu g/m^3$	4.9E-03	$(\mu g/m^3)^{-1}$	4.0E-13	4.8E-10	$\mu g/m^3$	NA	NA	NA
				alpha-BHC	1.1E-02	mg/kg	7.9E-11	$\mu g/m^3$	1.8E-03	$(\mu g/m^3)^{-1}$	1.4E-13	4.6E-10	$\mu g/m^3$	NA	NA	NA
				alpha-Chlordane	1.8E-01	mg/kg	1.3E-09	$\mu g/m^3$	1.0E-04	$(\mu g/m^3)^{-1}$	1.3E-13	7.4E-09	$\mu g/m^3$	7.0E-01	$\mu g/m^3$	1.1E-08
				gamma-Chlordane	2.1E-01	mg/kg	1.5E-09	$\mu g/m^3$	1.0E-04	$(\mu g/m^3)^{-1}$	1.5E-13	8.7E-09	$\mu g/m^3$	7.0E-01	$\mu g/m^3$	1.2E-08
				Dieldrin	4.6E-02	mg/kg	3.2E-10	$\mu g/m^3$	4.6E-03	$(\mu g/m^3)^{-1}$	1.5E-12	1.9E-09	$\mu g/m^3$	NA	NA	NA
				Heptachlor	3.9E-02	mg/kg	2.8E-10	$\mu g/m^3$	1.3E-03	$(\mu g/m^3)^{-1}$	3.6E-13	1.6E-09	$\mu g/m^3$	NA	NA	NA
				Heptachlor epoxide	2.5E-02	mg/kg	1.7E-10	$\mu g/m^3$	2.6E-03	$(\mu g/m^3)^{-1}$	4.5E-13	1.0E-09	$\mu g/m^3$	NA	NA	NA

TABLE 7.7.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

ROLLING KNOLLS LANDFILL SUPERFUND SITE

Scenario Timeframe:	Current/Future
Receptor Population:	Trespasser
Receptor Age:	Adolescent (1)

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	Landfill	Inhalation	**Polychlorinated Biphenyls**												
				Total Non-DL PCBs Congeners	5.7E+01	mg/kg	4.0E-07	µg/m^3	5.7E-04	(µg/m^3)$^{-1}$	2.3E-10	2.4E-06	µg/m^3	NA	NA	NA
				PCB TEQ	4.2E-04	mg/kg	2.9E-12	µg/m^3	3.8E+01	(µg/m^3)$^{-1}$	1.1E-10	1.7E-11	µg/m^3	4.0E-05	µg/m^3	4.3E-07
				Dioxin/Furans												
				Dioxin TEQ	4.9E-04	mg/kg	3.4E-12	µg/m^3	3.8E+01	(µg/m^3)$^{-1}$	1.3E-10	2.0E-11	µg/m^3	4.0E-05	µg/m^3	5.0E-07
				Inorganics												
				Aluminum	1.4E+04	mg/kg	9.6E-05	µg/m^3	NA	NA	NA	5.6E-04	µg/m^3	5.0E+00	µg/m^3	1.1E-04
				Antimony	1.2E+02	mg/kg	8.4E-07	µg/m^3	NA	NA	NA	4.9E-06	µg/m^3	NA	NA	NA
				Arsenic	2.6E+01	mg/kg	1.8E-07	µg/m^3	4.3E-03	(µg/m^3)$^{-1}$	7.8E-10	1.1E-06	µg/m^3	1.5E-02	µg/m^3	7.1E-05
				Barium	5.3E+02	mg/kg	3.7E-06	µg/m^3	NA	NA	NA	2.2E-05	µg/m^3	5.0E-01	µg/m^3	4.3E-05
				Cadmium	1.4E+01	mg/kg	9.7E-08	µg/m^3	1.8E-03	(µg/m^3)$^{-1}$	1.7E-10	5.7E-07	µg/m^3	1.0E-02	µg/m^3	5.7E-05
				Chromium, Total	2.9E+02	mg/kg	2.0E-06	µg/m^3	NA	NA	NA	1.2E-05	µg/m^3	NA	NA	NA
				Cobalt	1.3E+01	mg/kg	8.9E-08	µg/m^3	9.0E-03	(µg/m^3)$^{-1}$	8.0E-10	5.2E-07	µg/m^3	6.0E-03	µg/m^3	8.7E-05
				Copper	3.1E+03	mg/kg	2.2E-05	µg/m^3	NA	NA	NA	1.3E-04	µg/m^3	NA	NA	NA
				Cyanide	1.5E+01	mg/kg	1.1E-07	µg/m^3	NA	NA	NA	6.3E-07	µg/m^3	NA	NA	NA
				Iron	1.3E+05	mg/kg	9.0E-04	µg/m^3	NA	NA	NA	5.2E-03	µg/m^3	NA	NA	NA
				Manganese	1.2E+03	mg/kg	8.3E-06	µg/m^3	NA	NA	NA	4.8E-05	µg/m^3	5.0E-02	µg/m^3	9.6E-04
				Mercury	1.0E+01	mg/kg	7.0E-08	µg/m^3	NA	NA	NA	4.1E-07	µg/m^3	3.0E-01	µg/m^3	1.4E-06
				Nickel	1.5E+02	mg/kg	1.1E-06	µg/m^3	2.6E-04	(µg/m^3)$^{-1}$	2.8E-10	6.3E-06	µg/m^3	9.0E-02	µg/m^3	7.0E-05
				Silver	1.0E+01	mg/kg	7.2E-08	µg/m^3	NA	NA	NA	4.2E-07	µg/m^3	NA	NA	NA
				Thallium	9.7E-01	mg/kg	6.8E-09	µg/m^3	NA	NA	NA	4.0E-08	µg/m^3	NA	NA	NA
				Vanadium	3.1E+02	mg/kg	2.1E-06	µg/m^3	NA	NA	NA	1.3E-05	µg/m^3	1.0E-01	µg/m^3	1.3E-04
				Zinc	5.2E+03	mg/kg	3.7E-05	µg/m^3	NA	NA	NA	2.1E-04	µg/m^3	NA	NA	NA
			Exp. Route Total								2.8E-06					1.7E-01
		Exposure Point Total									3.4E-05					3.4E+00
	Exposure Medium Total										3.4E-05					3.4E+00
Medium Total											3.4E-05					3.4E+00
Surface Water	Surface Water	Ponds	Dermal	**Volatile Organic Compounds**												
				Benzene	3.3E-01	µg/L	2.4E-09	mg/kg-day	5.5E-02	(mg/kg-day)$^{-1}$	1.3E-10	1.4E-08	mg/kg-day	4.0E-03	mg/kg-day	3.5E-06
				cis-1,2-Dichloroethene	6.9E+00	µg/L	NA	NA	NA	NA	NA	NA	NA	2.0E-03	mg/kg-day	NA
				1,4-Dioxane	4.5E+00	µg/L	7.8E-10	mg/kg-day	1.0E-01	(mg/kg-day)$^{-1}$	7.8E-11	4.5E-09	mg/kg-day	3.0E-02	mg/kg-day	1.5E-07
				Trichloroethene	2.0E+00	µg/L	See Calculations in Appendix G				5.3E-09	8.0E-08	mg/kg-day	5.0E-04	mg/kg-day	1.6E-04
				Vinyl Chloride	1.9E-01	µg/L	See Calculations in Appendix G				1.6E-07	3.0E-09	mg/kg-day	3.0E-03	mg/kg-day	1.0E-06
				Semi-Volatile Organic Compounds												
				Dibenz(a,h)anthracene	1.8E-02	µg/L	See Calculations in Appendix G				6.1E-08	1.3E-07	mg/kg-day	NA	NA	NA

TABLE 7.7.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
ROLLING KNOLLS LANDFILL SUPERFUND SITE

Scenario Timeframe:	Current/Future
Receptor Population:	Trespasser
Receptor Age:	Adolescent (1)

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Water	Surface Water	Ponds	Dermal	**Inorganics**												
(cont.)	(cont.)	(cont.)	(cont.)	Arsenic	1.7E+00	µg/L	7.0E-10	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	1.1E-09	4.1E-09	mg/kg-day	3.0E-04	mg/kg-day	1.4E-05
				Chromium, Total	1.5E+00	µg/L	6.2E-10	mg/kg-day	NA	NA	NA	3.6E-09	mg/kg-day	2.0E-02	mg/kg-day	1.9E-07
				Cobalt	1.2E+00	µg/L	4.8E-10	mg/kg-day	NA	NA	NA	2.8E-09	mg/kg-day	3.0E-04	mg/kg-day	9.4E-06
				Iron	7.8E+03	ug/L	NA	NA	NA	NA	NA	NA	NA	7.0E-01	mg/kg-day	NA
				Manganese	3.2E+02	µg/L	1.3E-07	mg/kg-day	NA	NA	NA	7.8E-07	mg/kg-day	2.4E-02	mg/kg-day	3.2E-05
			Exp. Route Total								2.3E-07					2.2E-04
		Exposure Point Total									2.3E-07					2.2E-04
	Exposure Medium Total										2.3E-07					2.2E-04
Medium Total											2.3E-07					2.2E-04
Sediment	Sediment	Ponds	Dermal	**Semi-Volatile Organic Compounds**												
				Benzo(a)anthracene	7.3E-01	mg/kg	See Calculations in Appendix G				2.8E-10	6.2E-09	mg/kg-day	NA	NA	NA
				Benzo(a)pyrene	1.1E+00	mg/kg	See Calculations in Appendix G				4.2E-09	9.1E-09	mg/kg-day	3.0E-04	mg/kg-day	3.0E-05
				Benzo(b)fluoranthene	1.2E+00	mg/kg	See Calculations in Appendix G				4.7E-10	1.0E-08	mg/kg-day	NA	NA	NA
				Benzo(k)fluoranthene	5.0E-01	mg/kg	See Calculations in Appendix G				1.9E-11	4.2E-09	mg/kg-day	NA	NA	NA
				Chrysene	8.5E-01	mg/kg	See Calculations in Appendix G				3.3E-12	7.2E-09	mg/kg-day	NA	NA	NA
				Dibenz(a,h)anthracene	9.2E-02	mg/kg	See Calculations in Appendix G				3.6E-10	7.8E-10	mg/kg-day	NA	NA	NA
				Indeno(1,2,3-cd)pyrene	6.6E-01	mg/kg	See Calculations in Appendix G				2.5E-10	5.6E-09	mg/kg-day	NA	NA	NA
				Polychlorinated Biphenyls												
				Total PCBs (sum of Aroclors)	2.2E-01	mg/kg	3.5E-10	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	6.9E-10	2.0E-09	mg/kg-day	2.0E-05	mg/kg-day	1.0E-04
				Inorganics												
				Aluminum	3.6E+04	mg/kg	NA	mg/kg-day	NA	NA	NA	NA	mg/kg-day	1.0E+00	mg/kg-day	NA
				Arsenic	2.2E+01	mg/kg	7.3E-09	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	1.1E-08	4.2E-08	mg/kg-day	3.0E-04	mg/kg-day	1.4E-04
				Cadmium	5.3E+00	mg/kg	5.9E-11	mg/kg-day	NA	NA	NA	3.4E-10	mg/kg-day	2.5E-05	mg/kg-day	1.4E-05
				Chromium, Total	6.1E+01	mg/kg	NA	mg/kg-day	NA	NA	NA	NA	mg/kg-day	2.0E-02	mg/kg-day	NA
				Cobalt	3.2E+01	mg/kg	NA	mg/kg-day	NA	NA	NA	NA	mg/kg-day	3.0E-04	mg/kg-day	NA
				Copper	2.6E+02	mg/kg	NA	mg/kg-day	NA	NA	NA	NA	mg/kg-day	4.0E-02	mg/kg-day	NA
				Iron	1.2E+05	mg/kg	NA	mg/kg-day	NA	NA	NA	NA	mg/kg-day	7.0E-01	mg/kg-day	NA
				Manganese	2.2E+03	mg/kg	NA	mg/kg-day	NA	NA	NA	NA	mg/kg-day	2.4E-02	mg/kg-day	NA
				Mercury	1.6E+00	mg/kg	NA	mg/kg-day	NA	NA	NA	NA	mg/kg-day	2.1E-05	mg/kg-day	NA
				Silver	4.2E+01	mg/kg	NA	mg/kg-day	NA	NA	NA	NA	mg/kg-day	2.0E-04	mg/kg-day	NA
				Vanadium	1.6E+02	mg/kg	NA	mg/kg-day	NA	NA	NA	NA	mg/kg-day	5.0E-03	mg/kg-day	NA
				Zinc	2.0E+03	mg/kg	NA	mg/kg-day	NA	NA	NA	NA	mg/kg-day	3.0E-01	mg/kg-day	NA
			Exp. Route Total								1.7E-08					2.9E-04
		Exposure Point Total									1.7E-08					2.9E-04
	Exposure Medium Total										1.7E-08					2.9E-04
Medium Total											1.7E-08					2.9E-04
Total of Receptor Risks/Hazards Across All Media										Total of Receptor Risks Across All Media	3.4E-05			Total of Receptor Hazards Across All Media		3.4E+00

Note: (1) Adolescent trespasser is a person 6 to 17 years of age.

TABLE 7.7.CTE
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
CENTRAL TENDENCY EXPOSURE
ROLLING KNOLLS LANDFILL SUPERFUND SITE

Scenario Timeframe:	Current/Future
Receptor Population:	Trespasser
Receptor Age:	Adolescent (1)

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	Landfill	Ingestion	**Volatile Organic Compounds**												
				Benzene	1.2E+00	mg/kg	3.1E-08	mg/kg-day	5.5E-02	$(mg/kg\text{-}day)^{-1}$	1.7E-09	1.8E-07	mg/kg-day	4.0E-03	mg/kg-day	4.5E-05
				Chloroform	1.2E+02	mg/kg	3.0E-06	mg/kg-day	3.1E-02	$(mg/kg\text{-}day)^{-1}$	9.4E-08	1.8E-05	mg/kg-day	1.0E-02	mg/kg-day	1.8E-03
				Trichloroethene	4.1E-02	mg/kg	See Calculations in Appendix G				1.3E-10	6.0E-09	mg/kg-day	5.0E-04	mg/kg-day	1.2E-05
				Total xylenes	7.3E+03	mg/kg	1.9E-04	mg/kg-day	NA	NA	NA	1.1E-03	mg/kg-day	2.0E-01	mg/kg-day	5.4E-03
				Semi-Volatile Organic Compounds												
				Benzo(a)anthracene	5.1E+00	mg/kg	See Calculations in Appendix G				7.0E-08	7.6E-07	mg/kg-day	NA	NA	NA
				Benzo(a)pyrene	4.5E+00	mg/kg	See Calculations in Appendix G				6.1E-07	6.7E-07	mg/kg-day	3.0E-04	mg/kg-day	2.2E-03
				Benzo(b)fluoranthene	5.0E+00	mg/kg	See Calculations in Appendix G				6.8E-08	7.4E-07	mg/kg-day	NA	NA	NA
				Benzo(k)fluoranthene	4.1E+00	mg/kg	See Calculations in Appendix G				5.6E-09	6.1E-07	mg/kg-day	NA	NA	NA
				Bis(2-ethyl hexyl) phthalate	1.3E+01	mg/kg	3.2E-07	mg/kg-day	1.4E-02	$(mg/kg\text{-}day)^{-1}$	4.5E-09	1.9E-06	mg/kg-day	2.0E-02	mg/kg-day	9.4E-05
				Chrysene	5.4E+00	mg/kg	See Calculations in Appendix G				7.4E-10	8.1E-07	mg/kg-day	NA	NA	NA
				Dibenz(a,h)anthracene	5.3E-01	mg/kg	See Calculations in Appendix G				7.2E-08	7.9E-08	mg/kg-day	NA	NA	NA
				Indeno(1,2,3-cd)pyrene	1.1E+00	mg/kg	See Calculations in Appendix G				1.5E-08	1.7E-07	mg/kg-day	NA	NA	NA
				Pesticides												
				Aldrin	1.2E-02	mg/kg	3.0E-10	mg/kg-day	1.7E+01	$(mg/kg\text{-}day)^{-1}$	5.0E-09	1.7E-09	mg/kg-day	3.0E-05	mg/kg-day	5.7E-05
				alpha-BHC	1.1E-02	mg/kg	2.9E-10	mg/kg-day	6.3E+00	$(mg/kg\text{-}day)^{-1}$	1.8E-09	1.7E-09	mg/kg-day	8.0E-03	mg/kg-day	2.1E-07
				alpha-Chlordane	1.8E-01	mg/kg	4.6E-09	mg/kg-day	3.5E-01	$(mg/kg\text{-}day)^{-1}$	1.6E-09	2.7E-08	mg/kg-day	5.0E-04	mg/kg-day	5.3E-05
				gamma-Chlordane	2.1E-01	mg/kg	5.4E-09	mg/kg-day	3.5E-01	$(mg/kg\text{-}day)^{-1}$	1.9E-09	3.1E-08	mg/kg-day	5.0E-04	mg/kg-day	6.3E-05
				Dieldrin	4.6E-02	mg/kg	1.2E-09	mg/kg-day	1.6E+01	$(mg/kg\text{-}day)^{-1}$	1.9E-08	6.8E-09	mg/kg-day	5.0E-05	mg/kg-day	1.4E-04
				Heptachlor	3.9E-02	mg/kg	1.0E-09	mg/kg-day	4.5E+00	$(mg/kg\text{-}day)^{-1}$	4.5E-09	5.8E-09	mg/kg-day	5.0E-04	mg/kg-day	1.2E-05
				Heptachlor epoxide	2.5E-02	mg/kg	6.3E-10	mg/kg-day	9.1E+00	$(mg/kg\text{-}day)^{-1}$	5.7E-09	3.7E-09	mg/kg-day	1.3E-05	mg/kg-day	2.8E-04
				Polychlorinated Biphenyls												
				Total Non-DL PCBs Congeners	5.7E+01	mg/kg	1.5E-06	mg/kg-day	1.0E+00	$(mg/kg\text{-}day)^{-1}$	1.5E-06	8.5E-06	mg/kg-day	2.0E-05	mg/kg-day	4.3E-01
				PCB TEQ	4.2E-04	mg/kg	1.1E-11	mg/kg-day	1.3E+05	$(mg/kg\text{-}day)^{-1}$	1.4E-06	6.2E-11	mg/kg-day	7.0E-10	mg/kg-day	8.9E-02
				Dioxin/Furans												
				Dioxin TEQ	4.9E-04	mg/kg	1.2E-11	mg/kg-day	1.6E+05	$(mg/kg\text{-}day)^{-1}$	1.9E-06	7.3E-11	mg/kg-day	7.0E-10	mg/kg-day	1.0E-01
				Inorganics												
				Aluminum	1.4E+04	mg/kg	3.5E-04	mg/kg-day	NA	NA	NA	2.0E-03	mg/kg-day	1.0E+00	mg/kg-day	2.0E-03
				Antimony	1.2E+02	mg/kg	3.0E-06	mg/kg-day	NA	NA	NA	1.8E-05	mg/kg-day	4.0E-04	mg/kg-day	4.4E-02
				Arsenic	2.6E+01	mg/kg	4.0E-07	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	5.9E-07	2.3E-06	mg/kg-day	3.0E-04	mg/kg-day	7.7E-03
				Barium	5.3E+02	mg/kg	1.4E-05	mg/kg-day	NA	NA	NA	7.9E-05	mg/kg-day	2.0E-01	mg/kg-day	3.9E-04
				Cadmium	1.4E+01	mg/kg	3.5E-07	mg/kg-day	NA	NA	NA	2.1E-06	mg/kg-day	1.0E-03	mg/kg-day	2.1E-03
				Chromium, Total	2.9E+02	mg/kg	7.3E-06	mg/kg-day	NA	NA	NA	4.3E-05	mg/kg-day	1.5E+00	mg/kg-day	2.8E-05
				Cobalt	1.3E+01	mg/kg	3.2E-07	mg/kg-day	NA	NA	NA	1.9E-06	mg/kg-day	3.0E-04	mg/kg-day	6.3E-03
				Copper	3.1E+03	mg/kg	7.8E-05	mg/kg-day	NA	NA	NA	4.5E-04	mg/kg-day	4.0E-02	mg/kg-day	1.1E-02
				Cyanide	1.5E+01	mg/kg	3.9E-07	mg/kg-day	NA	NA	NA	2.3E-06	mg/kg-day	6.0E-04	mg/kg-day	3.8E-03

TABLE 7.7.CTE
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
CENTRAL TENDENCY EXPOSURE
ROLLING KNOLLS LANDFILL SUPERFUND SITE

Scenario Timeframe:	Current/Future
Receptor Population:	Trespasser
Receptor Age:	Adolescent (1)

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	Landfill	Ingestion	Iron	1.3E+05	mg/kg	3.2E-03	mg/kg-day	NA	NA	NA	1.9E-02	mg/kg-day	7.0E-01	mg/kg-day	2.7E-02
(cont.)	(cont.)	(cont.)	(cont.)	Manganese	1.2E+03	mg/kg	3.0E-05	mg/kg-day	NA	NA	NA	1.7E-04	mg/kg-day	2.4E-02	mg/kg-day	7.3E-03
				Mercury	1.0E+01	mg/kg	2.5E-07	mg/kg-day	NA	NA	NA	1.5E-06	mg/kg-day	3.0E-04	mg/kg-day	5.0E-03
				Nickel	1.5E+02	mg/kg	3.9E-06	mg/kg-day	NA	NA	NA	2.3E-05	mg/kg-day	2.0E-02	mg/kg-day	1.1E-03
				Silver	1.0E+01	mg/kg	2.6E-07	mg/kg-day	NA	NA	NA	1.5E-06	mg/kg-day	5.0E-03	mg/kg-day	3.1E-04
				Thallium	9.7E-01	mg/kg	2.5E-08	mg/kg-day	NA	NA	NA	1.4E-07	mg/kg-day	1.0E-05	mg/kg-day	1.4E-02
				Vanadium	3.1E+02	mg/kg	7.8E-06	mg/kg-day	NA	NA	NA	4.5E-05	mg/kg-day	5.0E-03	mg/kg-day	9.1E-03
				Zinc	5.2E+03	mg/kg	1.3E-04	mg/kg-day	NA	NA	NA	7.7E-04	mg/kg-day	3.0E-01	mg/kg-day	2.6E-03
			Exp. Route Total								6.4E-06					7.7E-01
Soil	Surface Soil	Landfill	Dermal	**Volatile Organic Compounds**												
				Benzene	1.2E+00	mg/kg	NA	NA	5.5E-02	$(mg/kg\text{-}day)^{-1}$	NA	NA	NA	4.0E-03	mg/kg-day	NA
				Chloroform	1.2E+02	mg/kg	NA	NA	3.1E-02	$(mg/kg\text{-}day)^{-1}$	NA	NA	NA	1.0E-02	mg/kg-day	NA
				Trichloroethene	4.1E-02	mg/kg	See Calculations in Appendix G				7.2E-12	NA	NA	5.0E-04	mg/kg-day	NA
				Total xylenes	7.3E+03	mg/kg	NA	NA	NA	NA	NA	NA	NA	2.0E-01	mg/kg-day	NA
				Semi-Volatile Organic Compounds												
				Benzo(a)anthracene	5.1E+00	mg/kg	See Calculations in Appendix G				4.0E-09	8.7E-08	mg/kg-day	NA	NA	NA
				Benzo(a)pyrene	4.5E+00	mg/kg	See Calculations in Appendix G				3.5E-08	7.6E-08	mg/kg-day	3.0E-04	mg/kg-day	2.5E-04
				Benzo(b)fluoranthene	5.0E+00	mg/kg	See Calculations in Appendix G				3.8E-09	8.4E-08	mg/kg-day	NA	NA	NA
				Benzo(k)fluoranthene	4.1E+00	mg/kg	See Calculations in Appendix G				3.2E-10	6.9E-08	mg/kg-day	NA	NA	NA
				Bis(2-ethyl hexyl) phthalate	1.3E+01	mg/kg	2.8E-08	mg/kg-day	1.4E-02	$(mg/kg\text{-}day)^{-1}$	3.9E-10	1.6E-07	mg/kg-day	2.0E-02	mg/kg-day	8.2E-06
				Chrysene	5.4E+00	mg/kg	See Calculations in Appendix G				4.2E-11	9.2E-08	mg/kg-day	NA	NA	NA
				Dibenz(a,h)anthracene	5.3E-01	mg/kg	See Calculations in Appendix G				4.1E-09	9.0E-09	mg/kg-day	NA	NA	NA
				Indeno(1,2,3-cd)pyrene	1.1E+00	mg/kg	See Calculations in Appendix G				8.6E-10	1.9E-08	mg/kg-day	NA	NA	NA
				Pesticides												
				Aldrin	1.2E-02	mg/kg	2.6E-11	mg/kg-day	1.7E+01	$(mg/kg\text{-}day)^{-1}$	4.4E-10	1.5E-10	mg/kg-day	3.0E-05	mg/kg-day	5.0E-06
				alpha-BHC	1.1E-02	mg/kg	2.5E-11	mg/kg-day	6.3E+00	$(mg/kg\text{-}day)^{-1}$	1.6E-10	1.5E-10	mg/kg-day	8.0E-03	mg/kg-day	1.8E-08
				alpha-Chlordane	1.8E-01	mg/kg	1.6E-10	mg/kg-day	3.5E-01	$(mg/kg\text{-}day)^{-1}$	5.6E-11	9.3E-10	mg/kg-day	5.0E-04	mg/kg-day	1.9E-06
				gamma-Chlordane	2.1E-01	mg/kg	1.9E-10	mg/kg-day	3.5E-01	$(mg/kg\text{-}day)^{-1}$	6.6E-11	1.1E-09	mg/kg-day	5.0E-04	mg/kg-day	2.2E-06
				Dieldrin	4.6E-02	mg/kg	1.0E-10	mg/kg-day	1.6E+01	$(mg/kg\text{-}day)^{-1}$	1.6E-09	6.0E-10	mg/kg-day	5.0E-05	mg/kg-day	1.2E-05
				Heptachlor	3.9E-02	mg/kg	8.8E-11	mg/kg-day	4.5E+00	$(mg/kg\text{-}day)^{-1}$	3.9E-10	5.1E-10	mg/kg-day	5.0E-04	mg/kg-day	1.0E-06
				Heptachlor epoxide	2.5E-02	mg/kg	5.5E-11	mg/kg-day	9.1E+00	$(mg/kg\text{-}day)^{-1}$	5.0E-10	3.2E-10	mg/kg-day	1.3E-05	mg/kg-day	2.5E-05
				Polychlorinated Biphenyls												
				Total Non-DL PCBs Congeners	5.7E+01	mg/kg	1.8E-07	mg/kg-day	1.0E+00	$(mg/kg\text{-}day)^{-1}$	1.8E-07	1.0E-06	mg/kg-day	2.0E-05	mg/kg-day	5.2E-02
				PCB TEQ	4.2E-04	mg/kg	1.3E-12	mg/kg-day	1.3E+05	$(mg/kg\text{-}day)^{-1}$	1.7E-07	7.6E-12	mg/kg-day	7.0E-10	mg/kg-day	1.1E-02

TABLE 7.7.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURE

ROLLING KNOLLS LANDFILL SUPERFUND SITE

Scenario Timeframe:	Current/Future
Receptor Population:	Trespasser
Receptor Age:	Adolescent (1)

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	Landfill	Dermal	**Dioxin/Furans**												
(cont.)	(cont.)	(cont.)	(cont.)	Dioxin TEQ	4.9E-04	mg/kg	3.3E-13	mg/kg-day	1.6E+05	$(mg/kg\text{-}day)^{-1}$	5.1E-08	1.9E-12	mg/kg-day	7.0E-10	mg/kg-day	2.7E-03
				Inorganics												
				Aluminum	1.4E+04	mg/kg	NA	NA	NA	NA	NA	NA	NA	1.0E+00	mg/kg-day	NA
				Antimony	1.2E+02	mg/kg	NA	NA	NA	NA	NA	NA	NA	4.0E-04	mg/kg-day	NA
				Arsenic	2.6E+01	mg/kg	1.7E-08	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	2.6E-08	1.0E-07	mg/kg-day	3.0E-04	mg/kg-day	3.4E-04
				Barium	5.3E+02	mg/kg	NA	NA	NA	NA	NA	NA	NA	2.0E-01	mg/kg-day	NA
				Cadmium	1.4E+01	mg/kg	1.8E-10	mg/kg-day	NA	NA	NA	1.8E-09	mg/kg-day	2.5E-05	mg/kg-day	7.2E-05
				Chromium, Total	2.9E+02	mg/kg	NA	NA	NA	NA	NA	NA	NA	2.0E-02	mg/kg-day	NA
				Cobalt	1.3E+01	mg/kg	NA	NA	NA	NA	NA	NA	NA	3.0E-04	mg/kg-day	NA
				Copper	3.1E+03	mg/kg	NA	NA	NA	NA	NA	NA	NA	4.0E-02	mg/kg-day	NA
				Cyanide	1.5E+01	mg/kg	NA	NA	NA	NA	NA	NA	NA	6.0E-04	mg/kg-day	NA
				Iron	1.3E+05	mg/kg	NA	NA	NA	NA	NA	NA	NA	7.0E-01	mg/kg-day	NA
				Manganese	1.2E+03	mg/kg	NA	NA	NA	NA	NA	NA	NA	2.4E-02	mg/kg-day	NA
				Mercury	1.0E+01	mg/kg	NA	NA	NA	NA	NA	NA	NA	3.0E-04	mg/kg-day	NA
				Nickel	1.5E+02	mg/kg	NA	NA	NA	NA	NA	NA	NA	2.0E-02	mg/kg-day	NA
				Silver	1.0E+01	mg/kg	NA	NA	NA	NA	NA	NA	NA	5.0E-03	mg/kg-day	NA
				Thallium	9.7E-01	mg/kg	NA	NA	NA	NA	NA	NA	NA	1.0E-05	mg/kg-day	NA
				Vanadium	3.1E+02	mg/kg	NA	NA	NA	NA	NA	NA	NA	5.0E-03	mg/kg-day	NA
				Zinc	5.2E+03	mg/kg	NA	NA	NA	NA	NA	NA	NA	3.0E-01	mg/kg-day	NA
			Exp. Route Total								4.8E-07					6.7E-02
Soil	Surface Soil	Landfill	Inhalation	**Volatile Organic Compounds**												
				Benzene	1.2E+00	mg/kg	4.8E-04	$\mu g/m^3$	7.8E-06	$(\mu g/m^3)^{-1}$	3.8E-09	2.8E-03	$\mu g/m^3$	3.0E+01	$\mu g/m^3$	9.4E-05
				Chloroform	1.2E+02	mg/kg	7.6E-02	$\mu g/m^3$	2.3E-05	$(\mu g/m^3)^{-1}$	1.8E-06	4.4E-01	$\mu g/m^3$	9.8E+01	$\mu g/m^3$	4.5E-03
				Trichloroethene	4.1E-02	mg/kg	See Calculations in Appendix G				5.0E-09	1.7E-04	$\mu g/m^3$	2.0E+00	$\mu g/m^3$	8.5E-05
				Total xylenes	7.3E+03	mg/kg	1.7E+00	$\mu g/m^3$	NA	NA	NA	1.0E+01	$\mu g/m^3$	1.0E+02	$\mu g/m^3$	1.0E-01
				Semi-Volatile Organic Compounds												
				Benzo(a)anthracene	5.1E+00	mg/kg	See Calculations in Appendix G				2.8E-12	1.3E-07	$\mu g/m^3$	NA	NA	NA
				Benzo(a)pyrene	4.5E+00	mg/kg	See Calculations in Appendix G				2.5E-11	1.1E-07	$\mu g/m^3$	2.0E-03	µg/m3	5.7E-05
				Benzo(b)fluoranthene	5.0E+00	mg/kg	See Calculations in Appendix G				2.7E-12	1.3E-07	$\mu g/m^3$	NA	NA	NA
				Benzo(k)fluoranthene	4.1E+00	mg/kg	See Calculations in Appendix G				2.2E-13	1.0E-07	$\mu g/m^3$	NA	NA	NA
				Bis(2-ethyl hexyl) phthalate	1.3E+01	mg/kg	5.5E-08	$\mu g/m^3$	2.4E-06	$(\mu g/m^3)^{-1}$	1.3E-13	3.2E-07	$\mu g/m^3$	NA	NA	NA
				Chrysene	5.4E+00	mg/kg	See Calculations in Appendix G				2.9E-14	1.4E-07	$\mu g/m^3$	NA	NA	NA
				Dibenz(a,h)anthracene	5.3E-01	mg/kg	See Calculations in Appendix G				2.9E-12	1.4E-08	$\mu g/m^3$	NA	NA	NA
				Indeno(1,2,3-cd)pyrene	1.1E+00	mg/kg	See Calculations in Appendix G				7.8E-13	2.8E-08	$\mu g/m^3$	NA	NA	NA

TABLE 7.7.CTE
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
CENTRAL TENDENCY EXPOSURE
ROLLING KNOLLS LANDFILL SUPERFUND SITE

Scenario Timeframe:	Current/Future
Receptor Population:	Trespasser
Receptor Age:	Adolescent (1)

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	Landfill	Inhalation	**Pesticides**												
(cont.)	(cont.)	(cont.)	(cont.)	Aldrin	1.2E-02	mg/kg	5.0E-11	µg/m^3	4.9E-03	(µg/m^3)$^{-1}$	2.5E-13	2.9E-10	µg/m^3	NA	NA	NA
				alpha-BHC	1.1E-02	mg/kg	4.9E-11	µg/m^3	1.8E-03	(µg/m^3)$^{-1}$	8.8E-14	2.9E-10	µg/m^3	NA	NA	NA
				alpha-Chlordane	1.8E-01	mg/kg	7.8E-10	µg/m^3	1.0E-04	(µg/m^3)$^{-1}$	7.8E-14	4.6E-09	µg/m^3	7.0E-01	µg/m^3	6.5E-09
				gamma-Chlordane	2.1E-01	mg/kg	9.2E-10	µg/m^3	1.0E-04	(µg/m^3)$^{-1}$	9.2E-14	5.4E-09	µg/m^3	7.0E-01	µg/m^3	7.7E-09
				Dieldrin	4.6E-02	mg/kg	2.0E-10	µg/m^3	4.6E-03	(µg/m^3)$^{-1}$	9.2E-13	1.2E-09	µg/m^3	NA	NA	NA
				Heptachlor	3.9E-02	mg/kg	1.7E-10	µg/m^3	1.3E-03	(µg/m^3)$^{-1}$	2.2E-13	1.0E-09	µg/m^3	NA	NA	NA
				Heptachlor epoxide	2.5E-02	mg/kg	1.1E-10	µg/m^3	2.6E-03	(µg/m^3)$^{-1}$	2.8E-13	6.3E-10	µg/m^3	NA	NA	NA
				Polychlorinated Biphenyls												
				Total Non-DL PCBs Congeners	5.7E+01	mg/kg	2.5E-07	µg/m^3	2.9E-04	(µg/m^3)$^{-1}$	7.1E-11	1.5E-06	µg/m^3	NA	NA	NA
				PCB TEQ	4.2E-04	mg/kg	1.8E-12	µg/m^3	3.8E+01	(µg/m^3)$^{-1}$	6.9E-11	1.1E-11	µg/m^3	4.0E-05	µg/m^3	2.7E-07
				Dioxin/Furans												
				Dioxin TEQ	4.9E-04	mg/kg	2.1E-12	µg/m^3	3.8E+01	(µg/m^3)$^{-1}$	8.1E-11	1.2E-11	µg/m^3	4.0E-05	µg/m^3	3.1E-07
				Inorganics												
				Aluminum	1.4E+04	mg/kg	5.9E-05	µg/m^3	NA	NA	NA	3.5E-04	µg/m^3	5.0E+00	µg/m^3	6.9E-05
				Antimony	1.2E+02	mg/kg	5.2E-07	µg/m^3	NA	NA	NA	3.0E-06	µg/m^3	NA	NA	NA
				Arsenic	2.6E+01	mg/kg	1.1E-07	µg/m^3	4.3E-03	(µg/m^3)$^{-1}$	4.8E-10	6.6E-07	µg/m^3	1.5E-02	µg/m^3	4.4E-05
				Barium	5.3E+02	mg/kg	2.3E-06	µg/m^3	NA	NA	NA	1.3E-05	µg/m^3	5.0E-01	µg/m^3	2.7E-05
				Cadmium	1.4E+01	mg/kg	6.0E-08	µg/m^3	1.8E-03	(µg/m^3)$^{-1}$	1.1E-10	3.5E-07	µg/m^3	1.0E-02	µg/m^3	3.5E-05
				Chromium, Total	2.9E+02	mg/kg	1.2E-06	µg/m^3	NA	NA	NA	7.3E-06	µg/m^3	NA	NA	NA
				Cobalt	1.3E+01	mg/kg	5.5E-08	µg/m^3	9.0E-03	(µg/m^3)$^{-1}$	5.0E-10	3.2E-07	µg/m^3	6.0E-03	µg/m^3	5.4E-05
				Copper	3.1E+03	mg/kg	1.3E-05	µg/m^3	NA	NA	NA	7.8E-05	µg/m^3	NA	NA	NA
				Cyanide	1.5E+01	mg/kg	6.7E-08	µg/m^3	NA	NA	NA	3.9E-07	µg/m^3	NA	NA	NA
				Iron	1.3E+05	mg/kg	5.5E-04	µg/m^3	NA	NA	NA	3.2E-03	µg/m^3	NA	NA	NA
				Manganese	1.2E+03	mg/kg	5.1E-06	µg/m^3	NA	NA	NA	3.0E-05	µg/m^3	5.0E-02	µg/m^3	6.0E-04
				Mercury	1.0E+01	mg/kg	4.4E-08	µg/m^3	NA	NA	NA	2.5E-07	µg/m^3	3.0E-01	µg/m^3	8.5E-07
				Nickel	1.5E+02	mg/kg	6.7E-07	µg/m^3	2.6E-04	(µg/m^3)$^{-1}$	1.7E-10	3.9E-06	µg/m^3	9.0E-02	µg/m^3	4.4E-05
				Silver	1.0E+01	mg/kg	4.5E-08	µg/m^3	NA	NA	NA	2.6E-07	µg/m^3	NA	NA	NA
				Thallium	9.7E-01	mg/kg	4.2E-09	µg/m^3	NA	NA	NA	2.4E-08	µg/m^3	NA	NA	NA
				Vanadium	3.1E+02	mg/kg	1.3E-06	µg/m^3	NA	NA	NA	7.7E-06	µg/m^3	1.0E-01	µg/m^3	7.7E-05
				Zinc	5.2E+03	mg/kg	2.3E-05	µg/m^3	NA	NA	NA	1.3E-04	µg/m^3	3.0E-01	µg/m^3	4.4E-04
			Exp. Route Total								1.8E-06					1.1E-01
		Exposure Point Total									8.6E-06					9.5E-01
	Exposure Medium Total										8.6E-06					9.5E-01
Medium Total											8.6E-06					9.5E-01

TABLE 7.7.CTE
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
CENTRAL TENDENCY EXPOSURE
ROLLING KNOLLS LANDFILL SUPERFUND SITE

Scenario Timeframe:	Current/Future
Receptor Population:	Trespasser
Receptor Age:	Adolescent (1)

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Water	Surface Water	Ponds	Dermal	**Volatile Organic Compounds**												
				Benzene	3.3E-01	µg/L	2.4E-09	mg/kg-day	5.5E-02	$(mg/kg\text{-}day)^{-1}$	1.3E-10	1.4E-08	mg/kg-day	4.0E-03	mg/kg-day	3.5E-06
				cis-1,2-Dichloroethene	6.9E+00	µg/L	NA	NA	NA	NA	NA	NA	NA	2.0E-03	mg/kg-day	NA
				1,4-Dioxane	4.5E+00	µg/L	7.8E-10	mg/kg-day	1.0E-01	$(mg/kg\text{-}day)^{-1}$	7.8E-11	4.5E-09	mg/kg-day	3.0E-02	mg/kg-day	1.5E-07
				Trichloroethene	2.0E+00	µg/L	See Calculations in Appendix G				5.3E-09	8.0E-08	mg/kg-day	5.0E-04	mg/kg-day	1.6E-04
				Vinyl chloride	1.9E-01	µg/L	See Calculations in Appendix G				1.6E-07	3.0E-09	mg/kg-day	3.0E-03	mg/kg-day	1.0E-06
				Semi-Volatile Organic Compounds												
				Dibenz(a,h)anthracene	1.8E-02	µg/L	See Calculations in Appendix G				6.1E-08	1.3E-07	mg/kg-day	NA	NA	NA
				Inorganics												
				Arsenic	1.7E+00	µg/L	7.0E-10	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	1.1E-09	4.1E-09	mg/kg-day	3.0E-04	mg/kg-day	1.4E-05
				Chromium, Total	1.5E+00	µg/L	6.2E-10	mg/kg-day	NA	NA	NA	3.6E-09	mg/kg-day	2.0E-02	mg/kg-day	1.9E-07
				Cobalt	1.2E+00	µg/L	4.8E-10	mg/kg-day	NA	NA	NA	2.8E-09	mg/kg-day	3.0E-04	mg/kg-day	9.4E-06
				Iron	7.8E+03	ug/L	NA	NA	NA	NA	NA	NA	NA	7.0E-01	mg/kg-day	NA
				Manganese	3.2E+02	µg/L	1.3E-07	mg/kg-day	NA	NA	NA	7.8E-07	mg/kg-day	2.4E-02	mg/kg-day	3.2E-05
			Exp. Route Total								2.3E-07					2.2E-04
		Exposure Point Total									2.3E-07					2.2E-04
	Exposure Medium Total										2.3E-07					2.2E-04
Medium Total											2.3E-07					2.2E-04
Sediment	Sediment	Ponds	Dermal	**Semi-Volatile Organic Compounds**												
				Benzo(a)anthracene	7.3E-01	mg/kg	See Calculations in Appendix G				4.0E-11	8.8E-10	mg/kg-day	NA	NA	NA
				Benzo(a)pyrene	1.1E+00	mg/kg	See Calculations in Appendix G				5.9E-10	1.3E-09	mg/kg-day	3.0E-04	mg/kg-day	4.3E-06
				Benzo(b)fluoranthene	1.2E+00	mg/kg	See Calculations in Appendix G				6.7E-11	1.5E-09	mg/kg-day	NA	NA	NA
				Benzo(k)fluoranthene	5.0E-01	mg/kg	See Calculations in Appendix G				2.7E-12	6.0E-10	mg/kg-day	NA	NA	NA
				Chrysene	8.5E-01	mg/kg	See Calculations in Appendix G				4.7E-13	1.0E-09	mg/kg-day	NA	NA	NA
				Dibenz(a,h)anthracene	9.2E-02	mg/kg	See Calculations in Appendix G				5.1E-11	1.1E-10	mg/kg-day	NA	NA	NA
				Indeno(1,2,3-cd)pyrene	6.6E-01	mg/kg	See Calculations in Appendix G				3.6E-11	8.0E-10	mg/kg-day	NA	NA	NA
				Polychlorinated Biphenyls												
				Total PCBs (sum of Aroclors)	2.2E-01	mg/kg	4.9E-11	mg/kg-day	1.0E+00	$(mg/kg\text{-}day)^{-1}$	4.9E-11	2.9E-10	mg/kg-day	2.0E-05	mg/kg-day	1.4E-05
				Inorganics												
				Aluminum	3.6E+04	mg/kg	NA	NA	NA	NA	NA	NA	NA	1.0E+00	mg/kg-day	NA
				Arsenic	2.2E+01	mg/kg	1.0E-09	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	1.6E-09	6.1E-09	mg/kg-day	3.0E-04	mg/kg-day	2.0E-05
				Cadmium	5.3E+00	mg/kg	8.4E-12	mg/kg-day	NA	NA	NA	4.9E-11	mg/kg-day	2.5E-05	mg/kg-day	2.0E-06
				Chromium, Total	6.1E+01	mg/kg	NA	NA	NA	NA	NA	NA	NA	2.0E-02	mg/kg-day	NA
				Cobalt	3.2E+01	mg/kg	NA	NA	NA	NA	NA	NA	NA	3.0E-04	mg/kg-day	NA
				Copper	2.6E+02	mg/kg	NA	NA	NA	NA	NA	NA	NA	4.0E-02	mg/kg-day	NA
				Iron	1.2E+05	mg/kg	NA	NA	NA	NA	NA	NA	NA	7.0E-01	mg/kg-day	NA
				Manganese	2.2E+03	mg/kg	NA	NA	NA	NA	NA	NA	NA	2.4E-02	mg/kg-day	NA
				Mercury	1.6E+00	mg/kg	NA	NA	NA	NA	NA	NA	NA	2.1E-05	mg/kg-day	NA
				Silver	4.2E+01	mg/kg	NA	NA	NA	NA	NA	NA	NA	2.0E-04	mg/kg-day	NA
				Vanadium	1.6E+02	mg/kg	NA	NA	NA	NA	NA	NA	NA	5.0E-03	mg/kg-day	NA
				Zinc	2.0E+03	mg/kg	NA	NA	NA	NA	NA	NA	NA	3.0E-01	mg/kg-day	NA
			Exp. Route Total								2.4E-09					4.1E-05
		Exposure Point Total									2.4E-09					4.1E-05
	Exposure Medium Total										2.4E-09					4.1E-05
Medium Total											2.4E-09					4.1E-05
Total of Receptor Risks/Hazards Across All Media										Total of Receptor Risks Across All Media	8.8E-06			Total of Receptor Hazards Across All Media		9.5E-01

Note: (1) Adolescent trespasser is a person 6 to 17 years of age.

ATTACHMENT B-2
PROUCL INPUT AND OUTPUT

	Aroclors	D_Aroclors
POI-11	0.05	0
POI-14	0.04	1
POI-15	0.03	0
POI-16	0.03	0
POI-2	2.18	1
POI-3	0.64	1
POI-4	0.89	0
POI-5	0.06	0
POI-6	0.16	1
POI-7	0.04	0
POI-8	0.11	1
POI-9	1.97	1
SS-100	4.06	1
SS-101	7.3	1
SS-102	4.22	1
SS-103	5.55	1
SS-104	5.57	1
SS-105	9.31	1
SS-106	0.86	1
SS-107	0.32	1
SS-108	0.48	1
SS-109	0.09	1
SS-110	1.28	1
SS-111	0.64	1
SS-112	0.03	1
SS-113	2.29	1
SS-114	1.17	1
SS-115	0.78	1
SS-116	0.04	0
SS-117	2.66	1
SS-118	23	1
SS-119	2.3	1
SS-120	3.4	1
SS-121	8.6	1
SS-122	1.28	1
SS-123	3.15	1
SS-124	1.48	1
SS-159	0.01	1
SS-16	0.04	0
SS-17	0.11	1
SS-178	0.04	0
SS-18	0.04	1
SS-19	2.8	1
SS-20	0.04	0
SS-21	0.73	1
SS-22	0.71	1

SS-23	0.43	1
SS-24	4.7	1
SS-25	0.03	0
SS-26	0.03	0
SS-27	0.03	0
SS-28	0.03	0
SS-29	0.03	0
SS-30	0.03	0
SS-31	0.03	0
SS-32	0.03	0
SS-33	0.03	0
SS-34	0.03	0
SS-35	0.03	0
SS-36	2.06	1
SS-37	0.04	1
SS-38	0.03	1
SS-40	1.56	1
SS-41	0.04	0
SS-42	1.84	1
SS-43	0.19	1
SS-44	1.83	1
SS-47	5.35	1
SS-48	4.4	1
SS-49	5.6	1
SS-50	3.4	1
SS-51	5.45	1
SS-53	10.9	1
SS-54	0.03	1
SS-55	3.54	1
SS-60	6	1
SS-61	0.05	0
SS-62	0.14	1
SS-64	3.99	1
SS-67	1.32	1
SS-68	4.99	1
SS-69	0.07	0
SS-71	1.1	1
SS-72	7.07	1
SS-73	4.49	1
SS-74	0.21	1
SS-75	4.17	1
SS-76	0.04	0
SS-77	2.16	1
SS-78	0.04	0
SS-79	4	1
SS-80	0.4	1
SS-81	7.8	1

SS-82	3.1	1
SS-83	0.03	0
SS-84	10.6	1
SS-85	3.74	1
SS-86	0.06	0
SS-87	8.7	1
SS-88	7.29	1
SS-89	0.28	1
SS-90	29	1
SS-91	4.58	1
SS-92	0.11	0
SS-93	0.02	1
SS-94	5.03	1
SS-95	2.46	1
SS-96	2	1
SS-97	15.7	1
SS-98	7.51	1
SS-99	0.08	1

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.17/10/2018 1:35:32 PM
From File	aroclors - outside cap.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Aroclors

General Statistics

Total Number of Observations	111	Number of Distinct Observations	78
Number of Detects	82	Number of Non-Detects	29
Number of Distinct Detects	74	Number of Distinct Non-Detects	7
Minimum Detect	0.01	Minimum Non-Detect	0.03
Maximum Detect	29	Maximum Non-Detect	0.89
Variance Detects	22.46	Percent Non-Detects	26.13%
Mean Detects	3.641	SD Detects	4.74
Median Detects	2.235	CV Detects	1.302
Skewness Detects	3.045	Kurtosis Detects	12.36
Mean of Logged Detects	0.291	SD of Logged Detects	1.829

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.704	**Normal GOF Test on Detected Observations Only**
5% Shapiro Wilk P Value	0	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.222	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.098	Detected Data Not Normal at 5% Significance Level

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	2.696	KM Standard Error of Mean	0.415
KM SD	4.35	95% KM (BCA) UCL	3.417
95% KM (t) UCL	3.385	95% KM (Percentile Bootstrap) UCL	3.401
95% KM (z) UCL	3.379	95% KM Bootstrap t UCL	3.612
90% KM Chebyshev UCL	3.942	95% KM Chebyshev UCL	4.506
97.5% KM Chebyshev UCL	5.29	99% KM Chebyshev UCL	6.829

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.58	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.807	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.0697	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.104	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	0.615	k star (bias corrected MLE)	0.6
Theta hat (MLE)	5.923	Theta star (bias corrected MLE)	6.064
nu hat (MLE)	100.8	nu star (bias corrected)	98.48
Mean (detects)	3.641		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

56	This is especially true when the sample size is small.											
57	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
58					Minimum	0.01				Mean	2.693	
59					Maximum	29				Median	0.86	
60					SD	4.371				CV	1.623	
61					k hat (MLE)	0.341				k star (bias corrected MLE)	0.338	
62					Theta hat (MLE)	7.891				Theta star (bias corrected MLE)	7.966	
63					nu hat (MLE)	75.76				nu star (bias corrected)	75.04	
64					Adjusted Level of Significance (β)	0.0478						
65					Approximate Chi Square Value (75.04, α)	56.09				Adjusted Chi Square Value (75.04, β)	55.88	
66					95% Gamma Approximate UCL (use when n>=50)	3.602				95% Gamma Adjusted UCL (use when n<50)	3.616	
67												
68	**Estimates of Gamma Parameters using KM Estimates**											
69					Mean (KM)	2.696				SD (KM)	4.35	
70					Variance (KM)	18.92				SE of Mean (KM)	0.415	
71					k hat (KM)	0.384				k star (KM)	0.38	
72					nu hat (KM)	85.25				nu star (KM)	84.28	
73					theta hat (KM)	7.019				theta star (KM)	7.1	
74					80% gamma percentile (KM)	4.322				90% gamma percentile (KM)	7.683	
75					95% gamma percentile (KM)	11.4				99% gamma percentile (KM)	20.81	
76												
77	**Gamma Kaplan-Meier (KM) Statistics**											
78					Approximate Chi Square Value (84.28, α)	64.12				Adjusted Chi Square Value (84.28, β)	63.89	
79					95% Gamma Approximate KM-UCL (use when n>=50)	3.543				95% Gamma Adjusted KM-UCL (use when n<50)	3.556	
80												
81	**Lognormal GOF Test on Detected Observations Only**											
82					Shapiro Wilk Approximate Test Statistic	0.904				**Shapiro Wilk GOF Test**		
83					5% Shapiro Wilk P Value	1.1159E-6				Detected Data Not Lognormal at 5% Significance Level		
84					Lilliefors Test Statistic	0.153				**Lilliefors GOF Test**		
85					5% Lilliefors Critical Value	0.098				Detected Data Not Lognormal at 5% Significance Level		
86	**Detected Data Not Lognormal at 5% Significance Level**											
87												
88	**Lognormal ROS Statistics Using Imputed Non-Detects**											
89					Mean in Original Scale	2.704				Mean in Log Scale	-0.635	
90					SD in Original Scale	4.365				SD in Log Scale	2.26	
91					95% t UCL (assumes normality of ROS data)	3.391				95% Percentile Bootstrap UCL	3.396	
92					95% BCA Bootstrap UCL	3.536				95% Bootstrap t UCL	3.642	
93					95% H-UCL (Log ROS)	14.95						
94												
95	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**											
96					KM Mean (logged)	-0.866				KM Geo Mean	0.421	
97					KM SD (logged)	2.51				95% Critical H Value (KM-Log)	3.963	
98					KM Standard Error of Mean (logged)	0.248				95% H-UCL (KM -Log)	25.37	
99					KM SD (logged)	2.51				95% Critical H Value (KM-Log)	3.963	
100					KM Standard Error of Mean (logged)	0.248						
101												
102	**DL/2 Statistics**											
103	**DL/2 Normal**									**DL/2 Log-Transformed**		
104					Mean in Original Scale	2.699				Mean in Log Scale	-0.79	
105					SD in Original Scale	4.368				SD in Log Scale	2.431	
106					95% t UCL (Assumes normality)	3.387				95% H-Stat UCL	21.34	
107	**DL/2 is not a recommended method, provided for comparisons and historical reasons**											
108												
109	**Nonparametric Distribution Free UCL Statistics**											
110	**Detected Data appear Gamma Distributed at 5% Significance Level**											

	A	B	C	D	E	F	G	H	I	J	K	L
111												
112	**Suggested UCL to Use**											
113					95% KM Approximate Gamma UCL	3.543						
114												
115	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
116	Recommendations are based upon data size, data distribution, and skewness.											
117	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
118	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
119												