

116375

LOCATION SKETCH

Well(s)	Project/No	NJ06403		Page	of	
Site Location	NSL-	SD-14-01	and an			
Observer	Bill	Delanay	н Настояние и полотории 		·	

(Locate all wells, borings, etc. with reference to three permanent reference points; tape all distances; clearly label all wells, roads, and permanent features)





LOCATION SKETCH

Well(s)Pr	roject/Na_NJD6403		Page(œ
Site Location	NSL-SD-15-01			
Observer	BILL DELANEY		•	
(Locate all wells, bo wells, roads, and po	rings, etc. with reference to three (ermanent features)	permanent reference p	oints; tape all distances;	clearly label all
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$\bigcup_{i=1}^{n}$		TREE X (MARE)		·
				BANK
		37.51		
	· · · · · · · · · · · · · · · · · · ·		SHORE	
				· · · · · · · · · · · · · · · · · · ·
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		Constant and the second s	an taon ang ang ang ang ang ang ang ang ang an	and and a second se
	Oft	ft.		
G&M Form 01 1-86	· · · · · · · · ·			AR208187



LOCATION SKETCH

Well(s)	Project/Na N.J.Z.E YO3	Pageof
Site Location _	HSL-SD-16-9	
Observer	Bill Delaney.	

(Locate all wells, borings, etc. with reference to three permanent reference points; tape all distances; clearly label all wells, roads, and permanent features)



ATTACHMENT F

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ROCK QUALITY DESIGNATION (RQD) SYNOPSIS

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ROCK QUALITY DESIGNATION (RQD) - DEERE (1986)

In order to provide a simple and direct means of indicating rock-mass properties, Deere (1986) developed the Rock Quality Designation (RQD). The RQD is based on a modified core recovery procedure which, in turn, is based indirectly on the number of fractures and the amount of softening or alternation in the rock mass as observed in the rock cores from the borehole. Core recovery is the ratio of the length of core recovered to the length drilled (i.e., no recovery = 0 and full recovery = 100). Instead of counting the fractures, an indirect measure is obtained by summing the total length of core recovered by counting only those pieces of hard and sound core which are 10 cm (4 in.) or greater in length and dividing that sum by the total length of that run.

RQD should not be applied to core less than 5.4 cm (2 in.) in diameter as a false RQD may be obtained because smaller cores can be frequently broken during the coring operation.

Care must be taken when removing the core from the core barrel. If a core is broken by handling or during drilling, the fresh broken pieces are fitted together and counted as one piece.

Some judgement is necessary in the case of thinly bedded sedimentary rocks and foliated metamorphic rocks. The method is not so exact in these cases as it is for igneous rock, thick bedded limestone, sandstones, etc. However, this procedure has been applied successfully even for shales, although it is necessary to log the core immediately upon removing them from the core barrel before air-slaking and cracking can occur.

This procedure obviously penalizes the rock where recovery is poor. This is appropriate because poor recovery usually reflects poor quality rock. However, poor drilling techniques and equipment can also cause poor recovery. It is for this reason, that proper equipment and procedure along with competent supervision of the drilling procedure are imperative.

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As simple as the procedure appears, it has been found that as an indicator of general ality of rock for engineering purposes, the numerical value of the RQD is more sensitive and consistent than gross percentage core recovery.

Below is a simple example of using RQD.

Modified Core Recovery as an Index of Rock Quality

	Core	Modified Core	Rock Quality	Description of
	Recovery	Recovery	Designation	Rock Quality
	(cm)	(cm)	(RQD)	· .
	25	25	0 - 25	very poor
	12	12	25 - 50	poor
	5	0	50 - 75	fair
	8	0	75 - 90	good
	8	0	90 - 100	excellent
)	8 10	0		
-	10	10		
	12	12		
	15	15		
	. 8	0		
	12	12 [·]	•	
	10	10		
	20	20		
	15	<u>15</u>		
	176 (cm	i) 132 (cm)		•
	185 cm - len	gth of run		
	Core Recove	r = 176/185 = 95	therefore,	RQD = 132 = 71 RQD is fair

In this case, the core barrel was advanced 185 cm with a total recovery of 176 cm. However, due to fractures, soft zones, etc., the modified recovery was 132 cm. This 'ranslates to RQD of 71, which can be used as a modifier in the geologic description of the ock, which in this case would be "Fair".

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ATTACHMENT G

REVISED TABLES FOR BASELINE RISK ASSESSMENT

AR208192

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	Pennsylvania.	
	all Township,	
	S Whiteh	
-	ity Landfill,	
	Novak Sanits	
	Air Samples,	
	o of VOCa in /	
	Occurrence	

Table 🗲

)				
	Freque	ucy.	Range of Detects	Total Range				
Constituent	Detects /	Total	Min - Max	Min - Max	Mcan	na.	EPC	Bkgd
							\sim	
Acetone	4/ 1	•	1.16-03 - 2.36-03	1.1E-03 - 2.3E-03	1.58-03	2.26-03	2:2E-03	1.3E-03 (1.8E-03)
Benzene	4/ 1	*	1.5E-03 - 5.6E-03	1.5E-03 - 5.6E-03	2,86-03	5.08-03	5.0B-03	1.98-03 (2.28-03)
2-Butanone	314	4	5.98-04 - 8.66-03	7.88-05 - 8.68-03	5.05-63	7.6E-03	7.6E-03	3.5E-03 (4.7E-03)
Carbon disulfide	11		4.46-04	1.5E-06 - 4.4E-04	1.fe.04 >	3.7E-04	3.7E-04	ND (< 7.08-06)
Carbon tetrachloride	41		5.2E-04 - 9.1E-04	5.2E-04 - 9.1E-04	6.5E-04	8.6E-04	8.68-04	5.3E-04 (5.8E-04)
Chloroform	11		3.18-04	2.08-06 - 3.18-04	l.1E-04	2.7E-04	2.7E-04	1.28-04 (1.88-04)
1,2-Dichloroethane	11		3.18-04	1.5E-06 - 3.1E-04	1.1B-04	2.7E-04	2.7E-04	ND (<1.28-04)
Ethylbenzene	11	4	1.68-03	1.5E-06 ~~1.6E-03	4.1E-04	1.48-03	1.48-03	2.88-04 (5.48-04)
Methylene chloride	. 41 .		9.2E-04 - 8.7E-03	9.2E-04 - 8.7E-09	4.0E-03	8.5E-03	8.5E-03	6.6E-04 (7.8E-04)
Tetrachloroethene	11	4	9.48-04	5.0E-b6 - 0:4E-04	>2.5E-04	7.96-04	7.98-04	1.8E-04 (3.5E-04)
Toluene	41 4	4	5.88-04 - 8.48-03	5.8E-04 - 8.4E-03~	2.68-03	7.28-03	7.28-03	2.6E-03 (3.9E-03)
1,1,1-Trichlonoethane	4/1	4	7.38-04 - 2.18-03	7.38-04 - 2.18-03	1.28-03	1.9E-03	1.98-03	1.1E-03 (1.5E-03)
Trichloroethene	. 21	4	5.3B-04 - 1.7B-03	3.5E-06 \- 1.7B-03	5.8B-04	1.5E-03	1.56-03	9.9E-05 (2.0E-04)
Vinyl acctato	11	4	3.38-04	1.5E-06 \ 3,5E-04	9.18-05	2.8E-04	2.88-04	ND (< 1.6E-04)
Xylenes (total)	11	4	1.68-02	7.08-06 -1.68-02	3.98-03	1.38-02	1.38-02	2.98-03 (5.88-03)
								•
				\sim				
Concentrations are giv	en in milligra	ms per ci	ibic metor.					
List includes all consti	tuents which	were dete	cted at least once.					•

All values used in the mean and UCL calculations, including proxy concentrations for non-detects. Arithmetic mean of the total number of samples, using proxy concentrations for non-detects. **Total range** Meen UCL

The arithmetic mean (and maxiplum detect), or ND (and the sample quantitation limit). Background samples are the two upwind samples taken 95 percent upper confidence limit (ond-tailed distribution) on the arithmetic mean. Exposure point concentration, minimum of the maximum detect and the UCL. Not detected. The sample quantitation limit is given in parentheses on the two sampling days (one each day). EPC Bkgd QZ

Page 1 of 2

Constituent	Standard or Criterion*
Inorganics	
Aluminum	0.05 - 0.2 ⁱ
Ammonia	
Barium	1.0
Beryllium	∧ 0.001° √
Cadmium	/ > 0.005*
Calcium	
Chloride	250
Chromium	0.05
Copper	1.3^j
Cyanide	0.2*
Fluoride	2.0
Iron	0.3 ⁱ
Lead	7 0.015 ^j
Magnesium \ V	•
Manganese \	0.05'
Mercury	0.002
Nickel	0.1
Nitrate (as nitrógen)	10
Potassium	•
Sodium	250
Sulfate	400/500°
Vanadium	-
Zinc	5° 5°
VOCs	
Actione	-
Benzene/	0.005°
Carbon disulfide	•
Chlorobenzene	U.1*
Unioroeinane	•
1,1-Dichloroethane	-
1,2-Dichloroenene (cistrans)	U.U//U.1

Table A-12.Potentially Applicable or Relevant and Appropriate Standards or Criteria for
Constituents Detected in Ground Water, Novak Sanitary Landfill, South Whitehall
Township, Pennsylvania.

Footnotes appear on page 2.

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Table A-12.

Potentially Applicable or Relevant and Appropriate Standards or Criteria for Constituents Detected in Ground Water, Novak Sanitary Landfill, South Whitehall Township, Pennsylvania.



Concentrations reported in milligrams per liter (mg/L).

- a Pennsylvania primary Maximum Contaminant Levels (MCLs), unless otherwise noted.
- b USEPA proposed primary MCL.
- c / USEPA final primary MCL, effective July 1992.
- d USEPA current primary MCL.
- e USEPA proposed primary MCL. The USEPA is requesting public comment on which values (400 mg/L or 500 mg/L) is preferable as a primary level.
- f USEPA final primary MCL for cis isomer (0.07 mg/L) and for trans isomer (0.1 mg/L).
- g Trihalomethanes include chloroform, bromodichloromethane, bromoform, and dibromochloromethane.
- h USEPA proposed primary MCL.
- i USEPA final secondary MCL.
- j USEPA action level based on treatment technique.

Table A-16. Reference Do: Concern, Nov	es (RfDs), Cance ak Sanitary Landf	r Slope Factors (CSFs), ill, South Whitehall Tov	, and USEPA Canc wnship, Pennsylvan	er Classifications for t	Page 1 of 4 he Constituents of
Constituent	Chronic RfD - Oral (mg/kg-day)	Chronic RfD - Inhalation (mg/kg-day)	CSF - Oral (mg/kg-day) ⁻¹	CSF - Injueletion (mg/kg-day) ⁻¹	USEPA Cancer Classification
Acetone	1.0E-01	NA	WN	NA	۵
Benzene	NA	NA	2.9B-02	2.98-02	×
Bromodichloromethane	2.08-02	NA	1.3B-01	NA	UR
2-Butanone	5.0E-02	9.0B-02	NA	NA	۵
Carbon disulfide	1.0E-01	2.9B-03	VN /	NA	NB
Carbon tetrachloride	7.0E-04	NA / N	10-86.1	1.38-01	B2
Chlorobenzene	2.0B-02	5.0E-03 / V	AN	NA	Ð
Chloroethane	2.0B-02	2.96+00 / /	NA	NA	NA
Chloroform	1.0E-02	NA /	6.1E-03	8.1B-02	B
Chloromethane	NA	NA (1.3B-02	6.3B-03	ບີ
Dibromochloromethane	2.08-02	NA /	8.4B-02	NA	8
1, 1-Dichloroethane	1.08-01	10E-01	NA	NA	ບ່
1,2-Dichloroethane	2.5B-01 <	< <u>v</u> v	9.1E-02	9.18-02	8
trans-1,2-Dichloroethene	2.0B-02	¥Z//	NA	NA	a 2
1,2-Dichloropropane	NA	AN	6.8 B-02	AN	19
trans-1, 3-Dichloropropene	3.08-04	× .7B-03	1.8E-01	1.38-01	8
Ethylbenzene Methylene chloride	1:08-01 6.08-02	2.9E-01 8.6E-01	NA 7.5E-03	NA 1.6B-03	D 28
	$\overline{\left(\begin{array}{c} \\ \end{array}\right) }$				
Pootnotes appear on page 4					

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4-Methyl-2-pentanone 5.08-02 2.08-02 NA NA NA NA NB Syrrence 5.08-02 0.08-02 NA NA NA NA Syrrence 5.08-02 0.08-02 NA NA NA NA Syrrence 1.08-02 NA NA NA NA NA Tolence 2.08-01 5.78-01 NA NA NA NA Tolence 2.08-03 5.78-01 NA NA NA NA Tolence 2.08-03 5.78-01 NA NA NA NA Tolence 2.08-03 5.78-03 NA NA NA NA Vinyl accrate 1.1.1-Trithhoroethane 2.08-03 5.78-02 8.208-03 8.2 Vinyl accrate 1.38-03 8.68-02 NA NA NA Vinyl accrate 1.38-03 8.68-02 NA NA Vinyl accrate 1.38-03 8.68-02 NA NA SemiLVOC3 0.08-01 NA NA NA SemiLVOC3 1.08-01 NA NA NA Bernotic acid 2.08-01 NA NA Birl/Dorotintenc 2.08-		Chronic tD - Oral ng/kg-day)	Chronic RfD - Inhalation (mg/kg-day)	CSF - Oral (mg/kg-day) ⁴	CSF - Inhalation (mg/kg-day) ⁻¹	USEPA Cancer Classification
Anterryrz-rpartantor 2,08-00 NA 3,08-00 NA 5,18-00 NA Sytrene 2,08-01 NA 5,18-00 NA NA NA Tertahlorocethene 1,08-02 3,08-01 NA NA NA Tollene 2,08-02 3,08-01 NA NA NA Trichlorocethene 2,08-03 3,08-01 NA NA NA Trichlorocethene 2,08-03 3,08-01 NA NA NA Trichlorocethene 1,11-Trichlorocethene 1,38-03 NA NA NA Vinyl acetate 11,11-200 8,68-07 NA NA NA Vinyl choride 1,38-03 8,138-00 NA NA NA Vinyl choride 1,38-03 8,68-07 NA NA NA Semi-LVOC3 NA 1,18-00 3,08-01 NA NA Vinyl choride 1,38-03 NA NA NA NA Semi-LVOC3 NA 1,18-00 3,08-01 NA Semi-LVOC3 NA NA NA NA Burylbenzylphthalate 2,08-01 NA NA NA Di-n-buryl phthalate 1,08-01 NA	A Mathin 9 antonoon 6		0 PA-PA		AN	NB
Tetrachloroethene 1.0B-02 NA 5.1B-02 1.8B-03 NA	4-Meinyi-z-penuanone 2	2.0B-01	NA	3.08-02	2.0B-03	B 2
Toluene 2.0B-01 5.7B-01 NA	Tetrachloroethene	1.08-02	NA	5.18-02	1.88-03	8
1,1,1-Thethiorocthane 9,08-02 3,08-01 7,48-03 NA 1,18-02 1,78-02 82 Trichlorocthane 7,48-03 NA 1,18-02 1,18-02 1,78-02 82 Vinyl actate 18+00 5,78-03 1,38-03 1,38-03 1,38-03 8,68-02 3,08-01 0 Vinyl actate 1,38-03 1,38-03 1,38-03 8,68-02 NA	Tolucne	2.0B-01	5.78-01	NA V	NA	ביב
Vinyl acctate IE+00 5.78-02 MA NA	1,1,1-Trichlorocthane	9.0B-02	3.012-01 NA	1.18-02	1.718-02	28
Vinyl chloride 1.3B-05° 1.3B-05° 1.3B-00° 3.0B-01 NA	Vinvl acetate	1B+00	5.7B-02/	AN	NA	٩
Xytenes (total)2.0B+008.6B-02NANANANASemi-VOCsBenzoic acid4.0B+00NANANANABenzoic acid4.0B+00NANANANANABitylbenzylphthalate2.0B-01NANANANANABitylbenzylphthalate2.0B-01NANANANANADi-n-butyl phthalate2.0B-01NANANANANADi-n-butyl phthalate2.0B-01NANANANANADi-n-butyl phthalate1.0B-01NANANANANADi-n-butyl phthalate0.0B-024.0B-02A.0B-02NANANANADi-thylphthalate8.0B-01NANANANANANADiethylphthalate5.0B-02NANANANANASCDiethylphthalate5.0B-02NANANANANASCDiethylphthalate5.0B-02NANANANANAC-PAHs (Benzofalpyreng)NANANANACC-PAHs (Benzofalpyreng)NANANANACC2.0B-02NANANANACC5.0B-02NANANANACC7.0A-03NANANANACC7.0A-03NANANANACC7.0A-03NAN	Vinyl chloride	1.3B-03 ^b	1.3E-03° / V	00+86.V	3.08-01	K
Semi-VOCs Benzoic acid bis(2-ethylhexyl)phthalate Burylbenzylphthalate Di-n-butyl phthalate 1,2-Dichlorobenzene 1,4-Dichlorobenzene Burylphenol 1,2-Dichlorobenzene A-Methylphthalate Dichtylphthalate Burylbenzene A-Methylphthalate Dichtylphthalate Burylphenol Burylbenzene Burylbenzene Burylbenzene Burylbenzene Burylphenol Burylbenzene Burylbenzene Burylbenzene Burylphenol Bury	Xylenes (total)	2.0B+00	8.68-02	N		A
Benzoic acid4.0B+00NANANANABenzoic acid4.0B+00NA1.4B-02NABerzoic acidbis(2-ethylhexyl)phthalate2.0B-01NANANABerzoicBurylbenzylphthalate2.0B-01NANANABerzoicDi-n-buryl phthalate2.0B-02A0.0B-02ABerzoicBerzoic1,2-DichlorobenzeneNANANANABerzoic1,2-DichlorobenzeneNANANANABerzoic1,4-DichlorobenzeneNA2.0B-022.4B-02NABerzoic1,4-DichlorobenzeneNANANANABerzoic1,4-DichlorobenzeneNANANANABerzoic1,4-DichlorobenzeneNANANANABerzoic1,4-DichlorobenzeneNANANANABerzoic1,4-DichlorobenzeneNANANANABerzoic1,4-DichlorobenzeneNANANANABerzoic1,4-DichlorobenzeneNANANANAC1,4-DichlorobenzeneNANANANAC1,4-DichlorobenzeneNANANANAC1,4-DichlorobenzeneNANANANAC1,4-DichlorobenzeneNANANANAC1,4-DichlorobenzeneNANANANAC1,4-DichlorobenzeneNANANANA						
bis(2-cthylhexyl)phthalate 2.0B-02 NA 1.4B-02 NA bis(2-cthylhexyl)phthalate 2.0B-02 NA 1.4B-02 NA D Di-n-butyl phthalate 2.0B-01 NA	Benzoic acid	4.0B+00 /	AN	NA	NA	
Butylbenzylphinalate 2.015-01 NA 1,2-Dichlorobenzene 9.015-02 4.015-01 2.415-02 NA NA NA SC C Jichlorobenzene NA 2.015-01 2.415-02 NA NA NA C C Dichtylphinalate 8.015-01 NA NA NA NA NA C C Herlitylphenol 5.015-02 NA NA NA C C C PAHs (Benzofalpyrene) NA NA 1.215+01 6.115+00 B2	bis(2-ethylhexyl)phthalate	2.08-02		1.4B-02 MA	NA	28 0
1,2-Dichlorobenzene 9.0E-02 4.0E-02 NA NA NA B2 1,4-Dichlorobenzene NA 2.0E-01 2.4E-02 NA B2 1,4-Dichlorobenzene NA 2.0E-01 2.4E-02 NA B2 Dichtylphthalate 8.0E-01 NA NA NA C 4-Methylphenol 5.0E-02 NA I.2E+01 6.1E+00 B2	Butylbenzylphthalate	10-50.2	NN	NA NA	NA	2
1,4-Dichlorobenzene NA 2.0E-01 2.4E-02 NA B2 Dichylphthalate 8.0E-01 NA NA C 4-Methylphenol 5.0E-00 NA NA NA C c-PAHs (Benzo[a]pyrene) NA NA 1.2E+01 6.1E+00 B2	1.2-Dichlorobenzene	9.08-02	4.0B-02	NA	NA	۵
Dicthylphthalate 8.0B-01 NA NA C 4-Methylphenol 5.0B-02 NA NA C c-PAHs (Benzo[a]pyrene) NA NA C c-PAHs (Benzo[a]pyrene) NA NA C S NA NA C NA NA C	1.4-Dichlorobenzene	NA	2.0E-01	2.4E-02	NA	83
4-Methylphenol 5.0B-02 NA NA INA INA C-PAHs (Benzo[a]pyrenc) NA 1.2E+01 6.1E+00 B2	Dicthylphthalate 8	8.0B-01	NA	NA	NA	υι
	4-Methylphenol	S.0B-02	V Z Z	NA 1.2E+01	6.1B+00	æ

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Table A-16. Reference D Concern, No	oses (RfDs), Cance ovak Sanitary Landf	r Slope Factors (CSFs) ill, South Whitehall To), and USEPA Canc wnship, Pennsylvan	er Classifications for t	Page 3 of 4 the Constituents of
Constituent	Chronic RfD - Oral (mg/kg-day)	Chronic RfD - Inhalation (mg/kg-day)	CSF - Oral (mg/kg-day). ⁴	CSF - Inhalation (mg/kg-dåy) ⁻¹	USEPA Cancer Classification
t-PAHs (Naphthalenc)	4.0E-03	NA	VN.	NA	â
Inorganics Aluminum Ammonia	NA NA	NA 2.98-02	NN NN	NA NA	e e e
Antmony Arsenic Barium	4.06-04 3.06-04 7.08-02		1.88+00 NA	NA 1.5B+01 NA	er er
Beryllium Cadmium	5.0E-03 5.0E-04	NA NA	4.3B+00 NA	8.4 B+00 6.1 B+00	81 181 181
Chlonide Chromium (VI) Cohalt	NA 5.0E-03 NA	S.TE-OT	AN NA	4.18+01 NA	A NB NB
Copper Copper Cvanide. free	3.7B-02 2.0B-02	NN /	NA	AN NA	20
Fluoride, sol. Fluoride Lead	. 6.0B-02 NA	NA NA	NA NA	NA NA	NE B2
Manganese Mercury Nickel	3.08-04	 1.1E-04 8.6E-05 NA 	AN NA NA	NA NA 8.45-01	0 Q <
Pootnotes appear on page 4					

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Table A-16.	Reference Doses (RfDs), Cano Concern, Novak Sanitary Land	er Slope Factors (CSFs fill, South Whitehall To), and USEPA Can ownship, Pennsylva	cer Classifications for 1 nia.	Pag of 4 the Constituents of
Constituent	Chronic RfD - Oral (mg/kg-day)	Chronic R(D - Inhalation (mg/kg-day)	CSF - Oral (mg/kg-dày) ⁻¹	CSF - Inhalation (mg/kg-day) ⁻¹	USEPA Cancer Classification
Nitrate Selenium Silver Vanadiurh Zine	1.68+00 5.08-03 3.08-03 7.08-03 2.08-01	A A A A A A	V V V V V	A A A A A A A A A A A A A A A A A A A	E a a E a
cPAHs tPAHs References: NA NB UR	Carcinogenic PAHs: benzo(a)a dibenz(a,h)anthracene, and inder Total PAHs: cPAHs, plus acena and pyrene. The toxicity values were obtain Not available. This constituent has not been ev The USEPA is currently evaluation	anthracene, benzo(b)flu no(1,2,3-c,0)pyhene. phthene, anthracene, be ef from IRIS (1992) or altated by the USEPA ing this constituent for e	pranthene, benzo(k) enzo(g,h,i)perytene, USEPA (1991b). for evidence of hur vidence of human ca	fluoranthene, benzo(a) fluoranthene, naphthale nan carcinogenic poten rcinogenic potential. T	pyrene, chrysene, me, phenanthrene, tial. his does not imply
	Instrument is necessarily	a carcinogen.			
Pootnotes app	car on page 4				
	· · · · · · · · · · · · · · · · · · ·	•	•	GERAGHTY &	# MILLER. INC.

Constituents	С, (mg/ш [*])	PADER Air Toxic Guidelines (mg/mi)
A cotone	2 38 02	
Accione	2.2E-03 5 0E 03	255 00
	J.UE-0J 7 (E M	V1.25E-02
Corbon disulfide	7.05-03	
Carbon distinct	3.1E-04 9.6E-04	
	8.0E-04	
	2.75-04	/ / / ^{4.4E-03}
T,2-Dichloroenane	2.7E-04	$\langle \langle \cdot \rangle$
Einyloenzene	1.4E-03	
Meinylene chloride	8.3E-03	
1 etrachioroethene	7.95-04	V 1.7E-01
1,1,1-1 richloroeinane	1.2E-04	
Themeroemene Themeroemene	1.95-03	1.1E-02
Toluene		
Vinyl acetale	2.88-04	· ·
Xylenes (total)	1.3E+02	•
C, Concentrations report (from Table A-6)	ted are 95 percent upper	confidence limit on the arithmetic average

Table A-19.VOC Concentrations Detected at the Novak Sanitary Landfill and Comparison to
Pennsylvania Department of Environmental Regulation (PADER) Air Toxic
Guidelines.

GERAGHTY & MILLER, INC.

		Non-Ca	ancer Risk	0	neer Risk
onstituent	C	PGWExD	HQ	/ PGWExD	ELCR
003			·		:
cu zene	0.0010	2.78-05	VN		3.4E-07
romodichloromethane	0.00000	2.5E-05	1.2E-03	1.)4-05	1.48-06
arbon disulfide	0.00070	1.98-05	1.95-04	8.2E-06	NC
hlorobenzeno	0.00040	1.1E-05	2.2E-03	4.7B-06	NC
hloroform	0.014	3.88-04	3.8 B-02	1.68-04	1.08-06
ibromochloromethano	0.00050	1.48-05	< 6.8E-04 /	5.98-06	4.98-07
1-Dichloroethane	0.00040	1.18-05	1.1E-04	4.78-06	UN
2-Dichloroethene (total)	0.016	4.48-04	2.28-02	1.98-04	N
strachloroethene	0.0020	5.5B-05	S.SB-03	2.36-05	1.28-06
richloroethene	0.030	8.2E-04	1.1E-01	3.5E-04	3.9B-06
inyl chloride	0.0070	1,98-04	1.56-01	8.28-05	1.68-04
oreanics				•••• ••• •••	
	0.044	1.28-03		5.28-04	UN
	0.10	2.7E-03	3.98-02	1.28-03	UN
	0.0046	1/38-04	2.5E-01	5.48-05	N
hloride	610	1.7日不01	NA	7.28+00	NC
000er	0.017	4.7B-04	1.3E-02	2.08-04	NC
	0.10	3.88-03	6.4E-02	1.68-03	NC
	< 0.0063	√ 1.78-04	NA	7.48-05	NC
angancse	0.0052	1.4E-04	1.4E-03	6.18-05	NC
ercury	0.00080	2.28-05	7.36-02	9.48-06	NC
ickel	0.035	9.6E-04	4.8E-02	4.18-04	NC
itrate	0.60	1.68-02	1.08-02	7.08-03	NC
inc	0:030	8.2E-04	4.16-03	3.5B-04	NC
		Total	8.3E-01	Total	2B-04

<u>`</u>· .

Oral exposite dose from drinking water (mg/kg-dry). Oral exposite dose from drinking water (mg/kg-dry). Hazard quotient. The sum of the hazard quotients is the hazard index (HI). Excess lifetime cancer risk. POWEXD

Not applicable. HQ BLCR NA NC

Not carcinogenic by the oral route.

AR208201

Child Resident (Aged 0 to 6 Years), Novak Sanitary Landfill, South Whitehall Township, Pennsylvania.

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ELCR 2.36-07 5.6E-07 4.7B-07 **1.8E-06** .6E-07 5.4B-07 1.3E-05 8E-05 N N Ŋ NC N NNN N N N N N N N Ŋ Z **Cancer** Risk Constituent concediration in the on-site residential wells (mg/L). The lesser of the maximum detect and the 95 PEWEND 2.7E-06 8.8E-05 1.16-05 2.4B-04 **5.5B-04** 2.58-05 **3.3E+00** 4.4**B-06 3.3E-03** .9B,96 86-08 2.2E-06 2.2E-06 1.6E-04 **3.8E-05** 7.7E-04 7.7B-05 -9E-04 1.6E-04 9.3E-05 3.5E-05 2.8E-05 S.SBQG Total 5.1B-02 1.3B-02 Non-Cancer Risk HQ 1.3E,03 1.9E+00 8,9E-02, 2.6E-04 2.98-03 4.5E-04 Í.6E-Ó3⁄ 2.68-01 9.1E-02 5.98-01 2.98-02 1.5E-01 3.38-03 1.76-01 2.4E-02 9.6E-03 **3.4E-01** 1.1E-01 Y AN AN ٧ PGWEAD 6.4E\03 **3.8E-02** 5.1E-05 2.6E-05 1.0E-03 4.5B-04 1.1E-03 6.4E-05 5.8E-05 4.5B-05 2.6B-05 B.9E-04 3.2E-05 1.98-03 2.86-03 2.98-44 8.9E-03 4.08-04 3.38-04 2.2E-03 1.3E-04 3.9E+d1 .9E-03 Total 0.00050 0.0052 0.00080 0.00090 0.00070 0.00040 0.00040 0.0020 0.0046 0.0010 0.0063 0.035 0.014 0.016 0.030 0.0070 0.030 0.044 0.10 0.60 610 ž 0.017 Š 1,2-Dichloroethene (total) Dibromochloromethano Bromodichloromethane I, I-Dichloroethane Tetrachloroethene **Carbon disulfido** Trichloroethene Chlorobenzene Vinyl chloride Chloroform Constituent norganics Manganeso Aluminum Cadmium Barium Chloride Fluoride Mercury ouazuoł Copper Nitrate Nickel VOCS لمعما Zinc ₹

percent upper configtence limit is used.

Oral exposure dose from drinking water (mg/kg-day). POWExD

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Hazard quotient. The sum of the hazard quotients is the hazard index (HI).

Excess lifetime cancer risk. ELCR

Not applicable. ž

Not carcinogenic by the oral route. IJZ

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		Non-C	moer Risk		r Risk
Constituent	₹	DWBxD	Н	A QWExD	BLCR
OCs					
cnzene	Ð	AN	NAP	ANA	AN
Tilorobenzene		NAP	NAP 🔨	AN	AAP
thoroform	QN	AAP	NAP >	NAP	NAP
ibromochloromethane		NAP	NAP	NAP	NAP
,1-Dichloroethano	0.001	2.7E-05	<2.7E-04	/ 1.2B-05	VN
,2-Dichloroethene (total)	0.000	2.5E-05	1.26-03	1.1E-05	NC
.2-Dichloropropano	Q.	NAP	NÀR	VAP V	AN
fethylene chloride	QN	NAP	NAP	NAP	NAP
ctrachionoethene	0.001	2.78-05	2.7E-03 <	1.28-05	6.08-07
.1.1-Trichloroethane	0.003	8.2E-05	9.16-04	3.58-05	NC
richloroethene	0.0009	2/58-09	50-3E-03	1.18-05	1.28-07
(ytenes (total)	Ð	NAP V	ANY	NAP	NAP
Juminum	Q	NAP \	NAP	NAP	NAP
minonia	(Q	NAR /	NAP	NAP	NAP
nin	0.0372	1.0E-05	1.5E-02	4.48-04	VN
admium		NAP (NAP	NAP	NAP
thoride		00+96.1	VN	8.3E-01	VN
hromium		AVN	NAP	NAP	NAP
opper	0.0166	4.5E-04	1.2E-02	1.9E-04	NC
luoride	QN	V NAP	NAP	NAP	NAP
	0.0024 <	6.68-05	NA	2.88-05	VN
fanganese	0.0032	8.88-05	8.8E-04	3.88-05	NC
lickel	0193 (5.36-04	2.68-02	2.36-04	VN
litrate	3.6	9.98-02	6.2B-02	4.2E-02	VN
inc	o(2020)	7.68-04	3.88-03	3.38-04	NC
		Total	1.3E-01	Total	7E-07

AR208203

Table A-24a. Potable Ground-Water (NSL-RW-03) Exposure Doses and Risk Calculations for a Potential Current Off-Site Adult Resident, Novak Sanitary Landfill, South Whitehall Township, Pennsylyania.

	<
Ś	Maximum detected constituent concentration in off-site residential well NSL-RW-03 (mg/L). \checkmark
PGWEAD	Oral exposure dose from drinking water (mg/kg-day).
РЮ	Hazard quotient. The sum of the hazard quotients is the hazard index (HI).
ELCR	Excess lifetime cancer risk.
N A	Not applicable, toxicity factor (i.e., reference dose [RfD] or cancer slope factor [CSF]) not avaliable.
NAP	Not applicable, constituent not detected.
NC	Not carcinogenic by the anal route.
QN	Not detected.

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		Non-C	encer Risk	Cancer	r Risk
mstituent	ð	POWEXD	Н	DAEWDA	ELCR
50			~		
90:21:	Q	NAP	NAP	AVN	AVN
ilorobenzene	Ð	NAP	NAP	AM	AN
doroform	Ð	NAP	V dyn	NAP	AAP
bromochloromethane	Ð	NAP	, NAP,	NAP	AVN
1-Dichloroethane	ę	NAP	< NAP >	AN	AN
2-Dichloroethene (total)	Q	NAP	NAP	NAP	ANN
2-Dichlorononano	Ð	NAP	NAP	NAP	AN
ethylene chloride	0,0006	1.68-05	2.78-04	7.08-06	5.38-08
trachloroethene	ĝ	NAP	NAP	NAP	AN
1.1-Trichloroethane	£	AVA	NAP	NAP	NAP
ichloroethene	£	NAR	AAN	ANN	AN
rience (total)	ę	NAP/	AAN	NAP	NAP
uminum	1.28	3.5E/02	NA	1.58-02	VN
nonia nonia	(₽	NAR	NAP	NAP	AN
riun	0.0859	2.48-03	3.48-02	1.08-03	VN
dnium	0.0052	1.4B-04	2.88-01	6.1 B-05	NC
Iloride	/> v	00+88.1	NA	7.58-01	VN
tromium	// E	NAP	NAP	AN	AVN
hpper	0.011	3.28-04	8.7 B-0 3	1.46-04	NC
uoride	0.24	6.6E-03	1.18-01	2.88-03	VN
	0.0121 <	3.38-04	NA	1.48-04	VN
Inginese	0.0323	8.88-04	8.88-03	3.88-04	NC
chel	0.038	1.0E-03	5.28-02	4.58-04	VN
trate	3.5	9.6E-02	6.0E-02	4.1E-02	NN
) b.0467	1.38-03	6.48-03	5.5B-04	NC
				E	E

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AR208205

Footnotes appear on page 2.

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Table A-24b. Potable Ground-Water (NSL-RW-04) Exposure Doses and Risk Calculations for a Potential Current Off-Site Adult Resident, Novak Sanitary Landfill, South Whitehall Township, Pennsylvania.

5	Maximum detected constituent concentration in off-sito residential well NSL-RW-04 (mg/L).
PGWExD	Oral exposure dose from drinking water (mg/kg-day).
ЧQ	Hazard quoticnt. The sum of the hazard quotients is the hazard index (H1). $\langle \cdot \rangle$
ELCR	Ercess lifetime cancer risk.
N	Not applicable, toxicity factor (i.e., reference dose [RfD] or cancer slope factor [CSF]) not av
NAP	Not applicable, constituent not detected.
NC	Not carcinogenic by the oral route.
DN	Not detected.

<u>,</u> ...

not avaliable

AR208206

		Non-C	ancer Risk		- Risk
pnstituent	Ş	POWEND	дн	DWEND	ELCR
ŐČ			Ť		
snZene	ę	AAP	NAP	AVN	NAP
hlorobenzene	Q	NAP	NAP	AN	AVN
hloroform	QN	NAP	< dvn	NAP	NAP
ibromochloromethane	Q	NAP	VAR,	NAP	AAP
1-Dichloroethane	0.005	1.4E-05	<1.48-04 /	5.98-06	VN
2-Dichloroethene (total)	Q	NAP	AAN	NAP	NAP
2-Dichloropropane	Ð	NAP	NAP	NAP	NAP
ethylene chloride	ę	NAP	VAP	NAP	NAP
Arachloroethene	0.0002	5.5E-06	5.5B-04	2.36-06	1.28-07
1, 1-Trichloroethano	0.0006	1.66-05	1.85-04	7.08-06	NC
ichloroeth ene	Q	NAR	AAN	NAP	NAP
ylenes (total)	Ø	NAP/	ANN	NAP	NAP
)		
hminum	0.0538	1.58,03	NA	6.38-04	VN
	(£	NAR	NAP	ANN	ANN
tion	0.0504	1.4B-05	2.08-02	5.98-04	VN
dmium	0.0084	2.38-04	4.68-01	9.98-05	NC
loride	28	7.78-01	VN	3.38-01	۷N
romium		NAP	NAP	NAP	NAP
Typer	0.0143	3.98-04	1.16-02	1.78-04	NC
voride	0.2 /	5.5B-03	9.16-02	2.36-03	VN
	0.0036	9.9E-05	NN	4.28-05	۷N
anganese	0.0062	1.78-04	1.78-03	7.38-05	NC
ickel	Q.0249	6.8E-04	3.4E-02	2.98-04	VN
litrate	4.8	1.36-01	8.2E-02 ·	5.68-02	VN
	8620.9	8.28-04	4.1E-03	3.58-04	NC
		Table I	10 20 2	Tract	IR.M

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Footnotes appear on page 2.

AR208207

Maximum detected constituent concentration in off-site residential well NSL-RW-06 (mg/L). Novak Sanitary Landfill, South Whitehall Township, Pennsylvania.

Not applicable, toxicity factor (i.e., reference dose [RfD] or cancer slope factor [CSF]) not avaliable Hazard quotient. The sum of the hazard quotients is the hazard index (HI). Oral exposure dose from drinking water (mg/kg-day). Not applicable, constituent not detected. Not carcinogenic by the oral routo. Excess lifetime cancer risk. Not detected. PGWExD ELCR NAP Я 3 ٧N N S

Constituent Cw YOCs 0.003 Benzene 0.003 Benzene 0.003 Chlorobenzene 0.003 Chlorobenzene 0.015 Chlorobenzene 0.015 Chlorobenzene 0.015 Chlorobenzene 0.015 Chlorobenzene 0.015 Chlorobenzene 0.015 Chlorocthane 0.001 1,1-Dichlorocthane 0.001 1,2-Dichloroptome ND 1,2-Dichlorocthane 0.001 1,2-Dichlorocthane 0.002 Nethylene chloride ND Tetrachlorocthane ND 1,1,1-Trichlorocthane ND 1,1,1-Trichlorocthane ND 1,1,1-Trichlorocthane ND Xylenes (total) ND Xylenes (total) ND Inorganisa 0.0009	POWExD 8.28-05 4.18-04 NAP NAP NAP NAP NAP NAP NAP NAP NAP NAP	HQ NAP NAP NAP NAP NAP NAP NAP NAP	RGWEAD A.S.E. 05 I.S.E. 05 NAP NAP NAP NAP NAP NAP NAP NAP	ELCR 1.08-06 NAP NAP NAP NAP NAP NAP NAP NAP
VOCs Benzene Chlorobenzene Chlorobenzene Chlorobenzene Chlorobenzene Chlorochane 1,1-Dichloroethane 1,2-Dichloroethane 1,2-Dichloroethane 1,2-Dichloroethane 1,2-Dichloroethane Methylene chloride Tetrachloroethane ND 1,1,1-Trichloroethane ND 1,1,1-Trichloroethane ND 1,1,1-Trichloroethane ND 1,1,1-Trichloroethane ND 1,1,1-Trichloroethane ND 1,1,1-Trichloroethane ND 1,1,1-Trichloroethane ND 1,1,1-Trichloroethane ND 1,1,1-Trichloroethane ND 1,1,1-Trichloroethane ND 1,1,1,1-Trichloroethane ND 1,1,1,1-Trichloroethane ND 1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,	8.28-05 4.18-04 NAP NAP NAP NAP NAP NAP NAP NAP	2.16-02 NAP NAP NAP NAP NAP NAP	1.88-04 NAP NAP NAP 1.28-05 NAP NAP NAP NAP	1.08-06 NC NAP NAP NAP NAP NAP NAP NAP
Benzene 0.003 Chlorobenzene 0.015 Chlorobenzene 0.015 Chlorobenzene 0.015 Chlorochloromethane 0.001 Dibromochloromethane ND 1,1-Dichloroethane 0.001 1,2-Dichloropropane 0.001 1,2-Dichloropropane 0.002 Methylene chloride ND Tetrachloroethane ND 1,1,1-Trichloroethane ND Xylenes (total) ND Trichloroethane 0.0009 Xylenes (total) ND Ahminan 0.0501	8.28-05 4.18-04 NAP NAP S.58-05 NAP NAP NAP NAP	2.16-02 NAP NAP NAP NAP NAP NAP NAP	3.58-05 NAP NAP NAP 1.28-05 NAP NAP NAP NAP	1.08-06 NAP NAP NAP NAP NAP NAP NAP
Chlorobenzene 0.015 Chloroform ND Dibromochloromethano ND 1,1-Dichloroethane (otal) ND 1,2-Dichloroethane (otal) ND 1,2-Dichloropropano 0.001 Nethylene chloride ND Tetrachloroethane ND 1,1,1-Trichloroethane ND 1,1,1-Trichloroethane ND Xylenes (total) ND Alminum 0.000	4.18-04 NAP NAP NAP S.58-05 NAP NAP NAP NAP NAP	2.16-02 NAP NAP NAP NAP NAP NAP	1.86-04 NAP NAP NAP NAP NAP NAP	NC NAP NAP NAP NAP NAP NAP
Chloroform ND Dibromochloromethane ND 1,1-Dichloroethane ND 1,2-Dichloroethane (total) ND 1,2-Dichloropropane 0.001 1,2-Dichloropropane 0.002 Methylene chloride ND Tetrachloroethane ND 1,1,1-Trichloroethane ND 1,1,1-Trichloroethane ND 1,1,1-Trichloroethane 0.000 Xylenes (total) ND Ahminam 0.0501 Ammonia 3.3	NAP NAP 2.78-05 NAP NAP NAP NAP	NAP NAP NAP NAP NAP NAP	NAP NAP NAP NAP NAP NAP NAP	NAP NAP NAP NAP NAP NAP NAP
Dibromochloromethane ND 1, 1-Dichloroethane (total) ND 1, 2-Dichloroethane (total) ND 1, 2-Dichloropropane (total) ND 1, 2-Dichloroethane 0.000 Methylene chloride ND Tetrachloroethane ND 1, 1, 1-Trichloroethane ND 1, 1, 1-Trichloroethane 0.000 Xylenes (total) ND Ammonia 0.0501 Ammonia 3.3	NAP 2.78-05 NAP NAP NAP NAP NAP	NAP NAP NAP NAP NAP NAP	NAP 1.26-05 NAP 2.36-05 NAP NAP NAP	NAP NA NAP NAP NAP NAP
1, 1-Dichloroethane 0.001 1, 2-Dichloroethane (total) 1, 2-Dichloropropane 0.002 1, 2-Dichloropropane 0.002 Methylene chloride ND Tetrachloroethane ND 1, 1, 1-Trichloroethane ND Trichloroethane 0.0009 Xylenes (total) ND Alminum 0.0501	2.78-05 NAP S.58-05 NAP NAP NAP NAP	2.76.04 NAP NAP NAP NAP NAP	1.28-05 NAP NAP NAP NAP	NA NAP 1.65-06 NAP NAP
1.2-Dichloroctherne (total)ND1.2-Dichloropropane0.002Methylene chlorideNDTetrachloroctheneND1,1,1-TrichloroethaneNDTrichloroethane0.0009Xylenes (total)NDAhminan0.0501	NAP S.SE-OS NAP NAP NAP NAP	AAN AAN AAN AAN AAN	NAP 2.3E-05 NAP NAP NAP	NAP 1.68-06 NAP NAP
1.2-Dichloropropane 0.002 Methylene chloride ND Tetrachlorocthene ND 1,1,1-Trichloroethane ND Trichloroethane ND Xylenes (total) ND Xylenes 0.0009 Alaminan 0.0501	5.58-05 NAP NAP YAP YAP	NAP NAP NAP NAP	2.3E-05 NAP NAP NAP	1.6E-06 NAP NAP
Methylene chloride ND Tetrachloroethene ND 1,1,1-Trichloroethane ND Trichloroethane 0.0009 Xylenes (total) ND Xylenes (total) 2.000 Alminum 0.0501 Ammonia 3.3	NAP NAP MAP YAP	AAP AAP AAN	NAP NAP NAP	nap Nap
Tetrachloroethene ND 1,1,1-Trichloroethane ND Trichloroethene 0.0009 Xylenes (total) ND ND Alminam 0.0501 Alminam 3.3	den AAA AAA	NAP NAP	NAP NAP	NAP
I, I, I-Trichloroethane ND Trichloroethane 0.0009 Xylenes (total) ND Kylenes (total) ND Alaminam 0.0501 Annonia 3.3	AAP 2.58-052	NAP	NAP	
Trichloroethene 0.0009 Xylenes (total) ND Inorganics 0.0501 Aluminum 3.3	1.58-DS			NAP
Xylenes (total) ND <u>Inorganics</u> 0.0501 Atuminum 3.3	< >dvn	338-03	1.18-05	1.28-07
Inorganics Aluminum Armmonia 3.3		ANN	NAP	NAP
Aleminem 0.0501				
Amnonia 3.3 C.	1.48-03	NN	5.9B-04	VN
	9.0B/07	٧N	3.98-02	NA
Barium 0.197	5.4B-Ú3	7.7E-02	2.3E-03	VN
Cadmium 0.0008 ~ C	2.7B-04	5.4E-01	1.28-04	NC
Chloride 70 </td <td>V1-9E+00</td> <td>VN</td> <td>8.25-01</td> <td>VN</td>	V1-9E+00	VN	8.25-01	VN
Chromium NP // /	AN	NAP	NAP	NAP
Copper 0.0291	8.08-04	2.28-02	3.46-04	NC
Fluoride ND / /	NAP	NAP	NAP	NAP
Lead 0.0032 <	8.88-05	NA	3.88-05	VN
Manganese 0.243	6.7E-03	6.7 B-02	2.98-03	NC
Nickel D.0314	8.6E-04	4.38-02	3.78-04	NA
Nitrate / / / 0.065	1.88-03	1.1E-03	7.68-04	NA
Zinc 0.0305	8.48-04	4.2E-03	3.68-04	NC
	Total	7.7E-01	Total	3E-06

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GERAGHTY & MILLER, INC.

ICMI, JULL Novak Sunitary Landfill, South Whitehall Township, Pennsylvania.

Not applicable, toxicity factor (i.e., reference dose [RfD] or cancer slope factor (CSF]) not avaliable. Maximum detected constituent concentration in off-site residential well NSL-RW-07 (mg/L). Hazard quotient. The sum of the hazard quotients is the hazard index (Hl). Oral exposure dose from drinking water (mg/kg-day). Not applicable, constituent not detected. Not carcinogenic by the oral route. Excess lifetime cancor risk. POWEAD ELCR **NAP** дH ۲N NC 5

Not detected.

QN

Constituent VOCs			meer Risk		Ris t	
VOCs	Š	POWEAD	HQ	POWERD	BLCR	
Benzeno	QN	NAP	NAP	AVN	NAP	
Chlowbenzene	Q	NAP	NAP	NAP	NAP	
Chloroform	QN	NAP	NAR >	NAP .	NAP	
Dibromochloromethano	QN	NAP	X JAP	NAP	NAP	
1.1-Dichloroethano	Q	NAP	< NAP<	NAP	NAP	
1.2-Dichloroethene (total)	QZ	NAP	> dvn	NAP	NAP	
1.2-Dichlomoronane	QN	NAP	NÀP	NAP	NAP	
Methylene chloride	QN	NAP	NAP	NAP	AAN	
Tetrachlomethene	QN	ANN	NAP <	NAP	AAP	
1.1.Trichlomethane	Q	AVA	NAP	NAP	NAP	
Trichlomethene	QN	NAP	AN	NAP	NAP	
Xvience (total)	2	VAP	NAP	NAP	NAP	
			: : : :			
Inorganics	0.0410	/ m/ai i	NA	4.98-04	VN	
	(}	NAN V	NAP	NAP	NAP	
	0.0441	1.28-03	1.76-02	5.2B-04	VN	
	C RN	l nap	NAP	NAP	AN	• •
Chloride		8.85-01	NA	3.88-01	VN	
Chromiten	// ez	NAP	NAP	NAP	NAP	
Conner	0.0124	3.48-04	9.2E-03	1.5E-04	NC	
Fluoride	0.12	> 3.3E-03	5.5E-02	1.46-03	VN	
Lend	0.0154	4.28-04	NA	1.85-04	VN	
Manganese	60003	9.0E-05	9.0E-04	3.98-05	NC	
Nickel	0.0243	6.7E-04	3.3E-02	2.96-04	VN	
Nitrate	2.6	7.18-02	4.58-02	3.18-02	VN	
Zine	0.0513	1.4E-03	7.0E-03	6.0E-04	NC	
		Total	1.7E-01	Total	NCP	

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GERAGHTY & MILLER, INC.

Page 2 of 2

Adult Resident,	
at Off-Site	
ential Ourre	
ns for a Pot	
k Calculatio	•
and Ris	•
Doses	
Exposure	
-RW-09)	
ater (NSI	
M-pan	•
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bla	
Pota	
Table A-24e.	

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Novak Sanitary Landfill, South Whitehall Township, Pennsylvania.

5	Maximum detected constituent concentration in off-site residential well NSL-RW-09 (mg/L).
QWExD	Oral exposure dose from drinking water (mg/kg-day).
Ą	Hazard quoticat. The sum of the hazard quoticats is the hazard index (HI). \langle
BLCR	Excess lifetime cancer risk.
47	Not applicable, toxicity factor (i.e., reference dose [RfD] or cancer slope factor [CSF]) not avaliable.
VAP	Not applicable, constituent not detected.
ÿ	Not carcinogenic by the oral route.
ZCP	No potential carcinogens detected in this well.
27	Not detected

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GERAGHTY & MILLERY C.

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Page 1 of 2	
•	rent Off-Site Adult Resident,
•	lations for a Potential Cur
	ses kisk Calcu p. Pennsylvania.
•	.W-10) Exposure Do 1 Whitehall Townshi
	Potable Ground-Water (NSL-R Novak Sanitary Landfill, South
	iable A-24f.

		Non-C	moer Risk	Cancer	Risk
Constituent	Š	POWEND	ЪН	GWEND	BLCR
VOCs					
Benzene	QN	NAP	NAP	NAP	NAP
Chlorobenzene	Q	NAP	NAP	MAP	NAP
Chloroform	Q	NAP	VAP >	NAP	NAP
Dibromochloromethane	QN	NAP	NAP /	NAP	NAP
1,1-Dichloroethane	ą	NAP	< NAP >	NAP	NAP .
1,2-Dichloroethene (total)	Ð	NAP	VAP	NAP	NAP
1.2-Dichloropropane	Ð	NAP	NAP	NAP	NAP
Methylene chloride	Q	NAP	NAP	NAP	NAP
Tetrachloroethene	Ð	NAP) AAP	NAP	AAP
1,1,1-Trichloroethane	ą	AAP	NAP	NAP	NAP
Trichlonethene	Ð	INAR	ANN	NAP	NAP
Xylenes (total)	R	APP .	NAP	NAP	NAP
)		
Aluminum	0.0497	1.48-03	NA	5.8E-04	NN
Amonia	(£	VAN -	NAP	NAP	AN
Barium	0.0616	1.78-05	2.4E-02	7.28-04	NA
Cadmium	0.0041	1.16-04	2.2E-01	4.88-05	NC
Chloride	∕× <> />	9.6E-01	NA	4.16-01	NA
Chromium	0.0102	2.8B-04	5.68-02	1.28-04	NC
Copper	0.0184	5.0B-04	1.4E-02	2.28-04	NC
Fluoride	0 .1	2.7E-03	4.68-02	1.28-03	NA
(0.0044	1.2E-04	NA	5.28-05	NA
Manganeso	0.0034	9.3E-05	9.35-04	4.08-05	NC
Nickel	0.0222	6.1E-04	3.0E-02	2.68-04	NA
Nitrate	7.1	1.98-01	1.28-01	8.3B-02 ·	VN
Zinc	0.0732	2.08-03	1.08-02	8.6E-04	NC
		Total	5.3E.01	Total	NCP
Footnotes appear on page 2.					

Page 2 of 2

al Current Off-Site Adult Resident,	
k Calculations for a Potenti	
und-Water (NSL-RW-10) Exposure Doces and Rish	and I and fill Courth Whitehall Toumahin Descended
Table A-24f. Potable Grov	Manul Conit.

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Novak Sanitary Landfill, South Whitehall Township, Pennsylvania.

Ś	Maximum detected constituent concentration in off-site residential well NSL-RW-10 (mg/L).
PGWExD	Oral exposure dose from drinking water (mg/kg-day).
Н	Hazard quoticut. The sum of the hazard quotients is the hazard index (HI). \langle
ELCR	Excess lifetime cancer risk.
NA NA	Not applicable, toxicity factor (i.e., reference dose [RfD] or cancer slope factor [CSF]) not avaliat
NAP	Not applicable, constituent not detected.
NC .	Not carcinogenic by the oral route.
NCP	No potential carcinogens detected in this well.
QN	Not detected.

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		Non-C	ancer Risk	Cancer	Risk
onstituent	Cw.	POWEAD	Н	POWERD	ELCR
OC					
-uzene	QN	NAP	NAP	AAA	NAP
hlorobenzene	QN	NAP .	NAP	MAP	NAP
hloroform	0.0002	5.5E-06	5.5E-04	2.3E-06	1.4E-08
ibromochloromethane	Q	NAP	VAP /	NAP	NAP
1-Dichloroethane	QN	NAP	< NAP	NAP	NAP
2-Dichloroethene (total)		NAP	AAP	NAP	NAP
2-Dichloropropane	QN	NAP	NAP	NAP	NAP
ethylene chloride	QN	NAP	NAP	NAP	NAP
strachloroethene	Q	NAP	NAP	NAP	NAP
1,1-Trichloroethane	QN	AAM	/ NAP	NAP	NAP
ichloroethene	QN	NAR	ANA	NAP	NAP
vienes (total)	0.0002	S.SE-ON	2.7E-06	2.38-06	NC
oreanics				· · ·	
uminum	QN	NAP >	NAP	NAP	NAP
nmonia		AN	NAP	NAP	NAP
rium	QN	NAP	NAP	NAP	NAP
dmium	(an	NAP	NAP	NAP	NAP
loride	~> ay	AAP 🗸	NAP	NAP	NAP
hromium	// Oz	AN	NAP	NAP	NAP
opper		VAP	NAP	NAP	NAP
voride		NAP	NAP	NAP	NAP
par	> ₽ (NAP	NAP	NAP	NAP
anganese	QN /	NAP	NAP	NAP	ANN
ickel	QN/	NAP	NAP	NAP	NAP
itrate	DN (NAP	NAP	NAP	NAP
		NAP	NAP	NAP	NAP
		Tabel	E 60	Tatel	av at

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P--- 1 of 2

Page 2 of 2 **GERAGHTY & MILLER VIC** Table A-24g. Potable Ground-Water (NSL-RW-12) Exposure Doses and Risk Calculations for a Potential Current Off-Site Adult Resident, Maximum detected constituent concentration in off-site residential well NSL-RW-12 (mg/L). Hazard quotient. The sum of the hazard quotients is the hazard index (HI). Novak Sanitary Landfill, South Whitehall Township, Pennsylvania. Oral exposure dose from drinking water (mg/kg-day). . Not applicable, constituent not detected. Not carcinogenic by the oral route. Excess lifetime cancer risk. Not detected. PGWExD ELCR NAP ŊЧ 5 х g

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Table A-24h. Potable Ground-Water (NSL-RW-17) Exposure Doses A Risk Calculations for a Potential Current Off-Site Adult Resident,

Novak Sanitary Landfill, South Whitehall Township, Pennsylvania.

				\langle	
		Non-C	encer Risk	Cancer	r Risk
Constituent	Cw	PGWExD	δн	PGWExD	ELCR
VOCs					
Benzene	QN	NAP	NAP	ANN	NAP
Chlorobenzene	Q	AAP	NAP	NAP	NAP
Chloroform	QN	NAP	VAP >	NAP	NAP
Dibromochloromethane	0.002	5.5E-05	tye-og	2.3E-05	2.08-06
1, 1-Dichloroethane	0.0004	1.1E-05	(1.1E-04	4.7E-06	NA
1,2-Dichloroethene (total)	0.0008	2.2E-05	hie-os	9.4E-06	NC
1.2-Dichloropropane	Ð	NAP	JAN .	NAP	NAP
Methylene chloride	Q	NAP	NAP	NAP	NAP
Tetrachloroethene	0.0003	8.2E-06	8.2E-04 <	3.58-06	1.8E-07
1,1,1-Trichloroethane	Q	AAP	NAP	NAP	NAP
Trichloroethene	Q	NAR	ANN	NAP	NAP
Xylenes (total)	Ð	NAP/	ANN	NAP	NAP
Inorvanics					
Aluminum	Ð	NAP /	NAP	NAP	NAP
Ammonia		NAR	NAP	NAP	NAP
Barium	QN	NAP	NAP	NAP	NAP
Cadmium		NAP	NAP	NAP	NAP
Chloride		AAP /	NAP	NAP	NAP
Chromium	// dy	VAP V	NAP	NAP	NAP
Copper		VAP	NAP	NAP	NAP
Fluoride		NAP	NAP	NAP	NAP
Lead		NAP	NAP	NAP	NAP
Manganese	DN /	NAP	NAP	NAP	NAP
Nickel	DN	NAP	NAP	NAP	NAP
Nitrate	DN	NAP	NAP	NAP	NAP
Zinc	QN	NAP	NAP	NAP	NAP
		- Total	4.8E-03	Total	2E-06
Footnotes appear on page 2.					

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Maximum detected constituent concentration in off-site residential well NSL-RW-17 (mg/L). Novak Sanitary Landfill, South Whitehall Township, Pennsylvania.

Not applicable, toxicity factor (i.e., reference dose [RfD] or cancer slope factor [CSF]) not avaliabl Hazard quotient. The sum of the hazard quotients is the hazard index (HI). Oral exposure dose from drinking water (mg/kg-day). Not applicable, constituent not detected. Excess lifetime cancer risk. PGWExD ELCR NAP Ъ ₹ NA

Not carcinogenic by the oral route.

NC Not carcinogeni ND Not detected.

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		Non-Ca	ncer Risk	Cancer	r Risk
Constituent	Q	PGWExD	ЪH	ROWEAD	ELCR
003					
enzene	QN	NAP	NAP	ANN	NAP
hlorobenzeno	QN	NAP	NAP	divid	NAP
hloroform	Ð	NAP	VAP >	NAP	NAP
ibromochloromethane	QN	NAP	VAP /	NAP	NAP
, 1-Dichloroethane	0.001	6.4E-05	< 6.4E-04	5.5E-06	NA
.2-Dichloroethene (total)	0.000	5.8E-05	2.98-03	4.98-06	NC
.2-Dichloropropane	QN	NAP	NAP	NAP	NAP
lethylene chloride	QN	NAP	NÀR	NAP	NAP
etrachloroethene	0.001	6.4 B-05	6.4E-03	5.5E-06	2.8E-07
,1,1-Trichloroethane	0.003	A0-36-1	2.1E-03	1.6E-05	NC
richloroethene	6000.0	(5.813-05	7.88-03	4.98-06	5.4B-08
ylenes (total)	B	/ NAV	NAP	NAP	NAP
nreanics			>		
luminum	QN	NAP	NAP	NAP	NAP
mmonia		ANN	NAP	NAP	NAP
arium	ZZE0.0	2.4É-03	3.4E-02	2.08-04	VN
admium		NAP	NAP	NAP	AAN
hloride		4.5E+00	N A	3.96-01	NA
hromium		AAP	NAP	NAP	NAP
opper	0.0166	1.1E-03	2.9E-02	9.1E-05	NC
luoride		NAP	NAP	NAP	NAP
(0.0024 <	1.5E-04	NA	1.35-05	NN
fanganese	0.0032	2.0E-04	2.0E-03	1.88-05	NC
lickel	0.0193	1.2E-03	6.28-02	1.1E-04	NA
litrate	3.6	2.3E-01	1.46-01	2.08-02	VN
inc	0.0279	1.8E-03	8.9E-03	1.56-04	NC
		Total	3.0E-01	Total	3E-07

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sr (i.e., reference dose [RfD] or cancer slope factor [CSF]) not av	Not applicable, toxicity factor (47
\leq	Excess lifetime cancer risk.	ELCR
f the hazard quotients is the hazard index (HI).	Hazard quotient. The sum of th	βH
aking water (mg/kg-day).	Oral exposure dose from drinki	PGWExD .
at concentration in off-site residential well NSL-RW-03 (mg/L).	Maximum detected constituent (5

liablo,

- Not applicable, constituent not detected. Not carcinogenic by the oral route. Not detected.
- NAP NC ND

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		Non-Can	cer Risk	Cancer	r Risk
Constituent	ہ ک	PGWExD	НQ	PGWEAD	ELCR
VOCs					
Benzene	QN	NAP	NAP	AVN	NAP
Chlorobenzene	QN	NAP	NAB	NAP	NAP
Chloroform	QN	NAP	AAP	NAP	NAP
Dibromochloromethane	Q	NAP	AVN	NAP	NAP
1,1-Dichloroethane	QZ	NAP	$\langle NAP \rangle$	NAP	NAP
1,2-Dichloroethene (total)	Q	NAP	> AAN /	NAP	NAP
1,2-Dichloropropane	QN	NAP	AAM	NAP	NAP
Methyl ene chloride	0.006	3.8E-05	6.4E204	3.3E-06	2.5E-08
Tetrachloroethene	e e Z	NAP	NAP <	NAP	NAP
1,1,1-Trichloroethane	A A	AAP	NAP	NAP	NAP
Trichloroethene	Q	ANN >	AAP /	NAP	NAP
Xylenes (total)	£	NAP /	NAP	NAP	NAP
Inorganics	•				
Aluminum	1.28	8\2B-02	NA	7.0E-03	NA
Ammonia	(₽	AP	NAP	NAP	NAP
Barium	0.0859	5.5E-03	7.88-02	4.78-04	NA
Cadmium	0,0052	3.3E-04	6.6E-01	2.86-05	NC
Chloride	() 8	4.1E+00	VN	3.5E-01	NA
Chromium		NAP	NAP	NAP	NAP
Copper	0.0417	7.5E-04	2.0E-02	6.4 B-05	NC
Fluoride	0.24	1.5E-02	2.6E-01	1.38-03	NA
Lead	0.0121	7.7E-04	NA	6.6 B-05	VN
Manganeso	0.0323	2.1E-03	2.1E-02	1.85-04	NC
Nickel	0.038	2.4E-03	1.2E-01	2.1E-04	NA
Nitrate	3.5	2.2E-01	1.4E-01	1.9E-02	NA
Zinc	0.0467	3.0E-03	1.5E-02	· 2.6E-04	NC
		Total	1.3E+00	Total	2E-08

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- Table A-25b. Potable Ground-Water (NSL-RW-04) Exposure Doses and Risk Calculations for a Potential Current Off-Site Child Resident (Aged 0 to 6 Years), Novak Sanitary Landfill, South Whitehall Township, Pennsylvania.
- able, Not applicable, toxicity factor (i.e., reference dose [RfD] or cancer slope factor [CSF]) not ava Maximum detected constituent concentration in off-site residential well NSL-RW-04 (mg/L/). Hazard quotient. The sum of the hazard quotients is the hazard index (HI). Oral exposure dose from drinking water (mg/kg-day). Not applicable, constituent not detected. Not carcinogenic by the oral route. Excess lifetime cancer risk. PGWExD ELCR N NAP ND NAP βН ₹

Not detected.

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		Non-Ca	mcer Risk	Cance	r Risk
Constituent	Cw	PGWExD	θн	D AMBAD	ELCR
(OCs			ř		
enzene	QN	NAP	NAP	NAP	NAP
hlorobenzene	Q	NAP	NAP	MAP	NAP
hloroform	QN	NAP	VAP >	NAP	NAP
ibromochloromethane	QN	NAP	NAP /	NAP	AVN
.1-Dichloroethane	0.0005	3.2E-05	< 3.2B-04 /	2.78-06	VN
.2-Dichloroethene (total)	Q	NAP	AAP	NAP	NAP
2-Dichloropropane	QN	NAP	NAP /	NAP	NAP
fethylene chloride	QN	NAP	NAR	NAP	NAP
etrachloroethene	0.0002	1.3E-05	1.3E-03	1.1E-06	5.6E-08
, 1, 1-Trichloroethane	0.0006	3.8E-05	4.3E-04	3.3E-06	NC
richloroethene	Q	AWN)	VAP	NAP	NAP
ylenes (total)	Q	/ NAP	NAP	NAP	NAP
iorganics	- -		20 		
luminum	0.0538	3.48-03	NA	2.98-04	NA
mmonia	Q Q	AN	NAP	NAP	NAP
arium	0.0504	3.2É-03	4.68-02	2.88-04	VN
admium	0,0084	5.4E-04	1.1E+00	4.68-05	NC
hloride	< 28 </td <td>/ 1.8E+00</td> <td>NA</td> <td>1.58-01</td> <td>VN</td>	/ 1.8E+00	NA	1.58-01	VN
hromium	QN	NAP	NAP	NAP	NAP
opper	0.0143	< 9.1E-04	2.5E-02	7.88-05	NC
luoride	0.2	1.3E-02	2.1E-01	1.1E-03	VN
cad	0.0036 <	2.38-04	NA	2.08-05	VN
langancso	0.0062	4.08-04	4.0E-03	3.4E-05	NC
ickel	0.0249	1.6E-03	8.0E-02	1.4E-04	VV
itrate	4.8	3.1E-01	1.9 B-01	2.68-02	VN
inc	0.0298	1.9E-03	9.58-03	1.6E-04	NC
				T	

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able A-25c. Sw GWExD IQ iLCR VA	Potable Ground-Water (NSL-RW-06) Exposure Doses and Risk Calculations for a Potential Current Off-Site Child Resident (Aged 0 to 6 Years), Novak Sanitary Landfill, South Whitehall Township, Pennsylvania. Maximum detected constituent concentration in off-site residential well NSL-RW-06 (mg/L). Oral exposure dose from drinking water (mg/kg-day). Hazard quotient. The sum of the hazard quotients is the hazard index (HI). Excess lifetime cancer risk. Not applicable, toxicity factor (i.e., reference dose [RtD] or cancer slope factor [CSF]) not available.
A S B	No applicable, consultants in or deceed. No accimisation by the oral roue. No decoded.
	CIERAGHTY & MILLET INC.

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		Non-Ca	meer Risk	\sim	ancer Risk
Constituent	Cw .	PGWEXD	δн	DATENDA	BLCR
VOCs			Ĭ		
Benzone	0.003	1.98-04	NA	1.68,05	4.8E-07
Chlorobenzene	0.015	9.6E-04	4.88-02	8.2E-05	NC
Chloroform	QN	NAP	VAP >	NAP	NAP
Dibromochloromethano	QN	NAP	NAP /	NAP	NAP
1, 1-Dichloroethane	0.001	6.4E-05	< 6.4户04 ∕	5.5E-06	NA
1,2-Dichlorocthene (total)	QN	NAP	> dvn	NAP	NAP
1,2-Dichloropropane	0.002	1.35-04	NA N	1.1E-05	7.58-07
Methylene chloride	ND ND	NAP	NAR	NAP	NAP
letrachloroethene	QN	JAR	NAP	NAP	NAP
1,1,1-Trichloroethane	Q	NAP	NAP	NAP	NAP
Frichloroethene	0.0009	< 5.813-05	2.88-03	4.98-06	5.46-08
Kylenes (total)	Ð	VARV /	NAP	NAP	NAP
Inorganics)		
Aluminum	0.0501	3,28-03	NA	2.7E-04	NA
Ammonia	3.3	2. \B-01	NA	1.88-02	NA
3arium	0.197	1.3É-02	1.8E-01	1.1E-03	NA
Cadmium	0,0098	6.3E-04	1.3E+00	5.4E-05	NC
Chloride	< ~>~~ >	4.5E+00	V N	3.85-01	NA
Chromium	- CIN	AP	NAP	NAP	NAP
Copper	0.0291	1.9E-03	5.0E-02	1.68-04	NC
Tuoride	A D	NAP	NAP	NAP	NAP
Lead	0.0032 <	2.08-04	NA	1.8E-05	NA
Manganese	0.243	1.6E-02	1.6E-01	1.3E-03	NC
Vickel	0.0314	2.0E-03	1.0E-01	1.78-04	NA
Vitrate	0.065	4.28-03	2.6E-03	3.68-04	VN
Zinc /	0.0305	1.9E-03	9.7E-03	1.7E-04	NC
		Total	1_88.4.00	Total	18-06

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CW PGWExD HQ ELCR NA NA NC ND	Maximum detected constituent concentration in off-site residential well NSL-RW-07 (mg/L). Oral exposure dose from drinking water (mg/kg-day). Hazard quotient. The sum of the hazard quotients is the hazard index (H1). Excess lifetime cancer risk. Not applicable, toxicity factor (i.e., reference dose [RfD] or cancer slope factor [CSF]) not avaliable. Not applicable, constituent not detected. Not carcinogenic by the oral route. Not detected.

		Non-Ca	ncer Rist	Cancer	r Risk
Constituent	<u>ک</u>	PGWErD	Н	DVEND	ELCR
Ű			×		
ch 2cno	Ð	NAP	NAP	NAM	NAP
hlorobenzene	AD	NAP	NAP	AAP	NAP
lowform	Q	NAP	VAP	NAP	NAP
bromochloromethano	Q	NAP	NAP	NAP	NAP
1-Dichloroethane	QN	NAP	< NAF <	NAP	NAP
2-Dichloroethene (total)	QN	NAP	NAP <	NAP	NAP
2-Dichloropropane	QN	NAP	NAP	NAP	NAP
ethylene chloride	, DN	NAP	NAR	NAP	NAP
trachloroethene	Ð	MAP	NAP	NAP	NAP
1,1-Trichlonoethano	QN	NAP	NAP	NAP	NAP
ichloroethene	Q	LEAN /	VAP VAP	NAP	NAP
rienes (total)	Ð	V NAP V	NAP	NAP	NAP
nranics					
uminum	0.0419	2/7E-03	NA	2.3E-04	NA
nmonia	(g	NAP	NAP	NAP	NAP
uin .	0.04/1	2.8É-03	4.0E-02	2.48-04	VN
dmium		NAP	AN	NAP	NC
loride		2.0E+00	NA	1.85-01	NA
nomium	an	AN	NAP	NAP	AAP
pper	0.0124	7.98-04	2.1E-02	6.8 E-05	NC
noride	0.12	7.7E-03	1.3E-01	6.68-04	VN
Pe	0.0154	9.8E-04	NA	8.4E-05	VN
angancso	6600.0	2.16-04	2.18-03	1.8E-05	NC
ckel	0.0243	1.68-03	7.8E-02	1.38-04	VN
trate	2.6	1.78-01	1.0E-01	1.4E-02	VN
> /	0.0513	3.3E-03	1.6E-02	2.88-04	NC

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Table A-25e. Potable Ground-Water (NSL-RW-09) Exposure Doses and Risk Calculations for a Potential Current Off-Site Child Resident (Aged 0 to 6 Years), Novak Sanitary Landfill, South Whitehall Township, Pennsylvania.

Maximum detected constituent concentration in off-site residential well NSL-RW-09 (mg/L). Hazard quotient. The sum of the hazard quotients is the hazard index (HI). Oral exposure dose from drinking water (mg/kg-day). POWExD ΡЮ ₹

oldei Not applicable, toxicity factor (i.e., reference dose [RfD] or cancer slope factor [CSF]) not aval Excess lifetime cancer risk. ELCR

Not applicable, constituent not detected.

Not carcinogenic by the oral route.

No potential carcinogens detected in this well.

Not detected.

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		Non-Ca	uncer Risk		r Risk
Constituent	Cw	PGWExD	ЪН	PGWEXD	BLCR
/0Cs					
lenzene	QN	NAP	NAP	NAP	NAP
hlorobenzene	QN	NAP	NAP	AAP	NAP
hloroform	Q	NAP	VAP >	NAP	NAP
) ibromochloromethane	Q	NAP	VAP V	NAP	NAP
.1-Dichloroethane	QN	NAP	< van >	NAP	NAP
,2-Dichloroethene (total)	QN	NÀP	> ANN /	NAP	NAP
,2-Dichloropropane	Q	NAP	AAP /	NAP	NAP
Aethylene chloride	Q	NAP	NAR	NAP	NAP
etrach loroethene		JAK	NAP	NAP	NAP
1.1.1-Trichloroethane	QX	NAP	NAP	NAP	NAP
Crichloroethene	QN	ANN /	AAN 🗸	NAP	NAP
(ylenes (total)	æ	< NAP >	NAP	NAP	NAP
norganics					
Numinum	0.0497	3/2E-03	NA	2.7E-04	NA
Ammonia		ANN	NAP	NAP	NAP
larium	0.0616	3.96-03	5.6B-02	3.4E-04	NA
admium	0,0041	2.6E-04	5.28-01	2.2E-05	NC
Chloride	< 35 </td <td>2.2E+00</td> <td>NA</td> <td>1.98-01</td> <td>VN</td>	2.2E+00	NA	1.98-01	VN
Chromium	0102	6.5E-04	1.3E-01	· 5.6E-05	NC
Copper	0.0184	1.2E-03	3.2E-02	1.0E-04	NC
luoride	0.1	6.4E-03	1.1E-01	S.SE-04	VN
(0.0044 <	2.86-04	NA	2.4E-05	NN .
Manganese	0.0034	2.2E-04	2.2E-03	1.98-05	NC
vickel	0.0222	1.4E-03	7.1E-02	1.2E-04	NA
Vitrate	7.1	4.5E-01	2.8E-01	3.9E-02	VN
Line /	0.0732	4.7E-03	2.3E-02	4.0E-04	NC
		Total	1 28400	Total	AJN

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5	Maximum detected constituent concentration in off-site residential well NSL-RW-10 (mg/L/, /
PGWExD	Oral exposure dose from drinking water (mg/kg-day).
Ю	Hazard quotient. The sum of the hazard quotients is the hazard index (HI).
ELCR	Excess lifetime cancer risk.
N A	Not applicable, toxicity factor (i.e., reference dose [RfD] or cancer slope factor [CSF]) not available,
NAP	Not applicable, constituent not detected.
NC	Not carcinogenic by the oral route.
NCP	No potential carcinogens detected in this well.
QN	Not detected.

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	•	Non-Cai	ncer Risk	Ca	icer Risk
Constituent	Cw	PGWExD	Ρ	FGWEAD	ELCR
VOCs					
Benzene	QN	NAP	NAP	NAP	NAP
Chlowbenzene	QN	NAP	AAP	MAP	AAP
Chloroform	0.0002	1.3E-05	1,3f5-03	1.1E-06	6.7B-09
Dibromochloromethano	QN	NAP	NAP	NAP	NAP
1, 1-Dichloroethane	QN	NAP	 AVN V 	NAP	NAP
1,2-Dichloroethene (total)	Q	NAP	ANN /	NAP	NAP
1,2-Dichloropropane	Q	NAP	NAP	NAP	NAP
Methylene chloride	Q	NAP	NAIN	NAP	NAP
Tetrachloroethene	QN	NAP	NAP	NAP	NAP
1,1,1-Trichloroethane	Q	NAP	NAP	NAP	NAP
Trichloroethene	Q	/ NRP	ANN	NAP	NAP
Xylenes (total)	0.0002	< solac.1	6.4E-06	1.1E-06	NC
Increanise			· · · · · · · · · · · · · · · · · · ·		
Aluminum	QN	NAP /	NAP	NAP	NAP
Ammonia		NAP	NAP	NAP	NAP
Barium	DIN	NAP	NAP	NAP	NAP
Cadmium		NAP	NAP	NAP	NAP
Chloride		> NAP	AAP	NAP	ANN
Chromium		NAP	NAP	NAP	NAP
Copper) Æ	NAP	NAP	NAP	NAP
Fluoride		NAP	NAP	NAP	AN
(> QN	AAP	NAP	NAP	NAP
Manganese	DN	NAP	NAP	NAP	NAP
Nickel	DN	NAP	NAP	NAP	NAP
Nitrate <	AD AD	NAP	NAP	NAP	NAP
Zinc		NAP	NAP	NAP	NAP
		1-1-1	W 46 1	Tetal	

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Table A-25g.	Potable Ground-Water (NSL-RW-12) Exposure Doses and Risk Calculations for a Potential Current Off-Site Child Resident (Aged 0 to 6 Years), Novak Sanitary Landfill, South Whitehall Township, Pennsylvania.
₹	Maximum detected constituent concentration in off-site residential well NSL-RW-12 (mg/f).
PGWExD	Oral exposure dose from drinking water (mg/kg-day).
р	Hazard quotient. The sum of the hazard quotients is the hazard index (HI).
ELCR	Excess lifetime cancer risk.
NAP	Not applicable, constituent not detected.
NC	Not carcinogenic by the oral route.
ND	Not detected.

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Constituent	į	Non-Cat Dours-D	icer Risk un	Cancer bourte-D	- Risk Er Co
Constitutent	Ċ	LUWEXD	ווא	LYNEXD	BLUCK
vocs			-		
Benzene	QZ	AAP	NAP	AVN	NAP
Chlorobenzene	QN	NAP	NAP	AXP	NAP
Chloroform	Q	NAP	< dyn	NAP	NAP
Dibromochloromethane	0.002	1.35-04	6.4E,03	1.1E-05	9.28-07
1, 1-Dichloroethane	0.0004	2.6E-05	< 2.6E-04 /	2.2E-06	NA
1,2-Dichloroethene (total)	0.0008	5.1E-05	2.6E-03	4.4E-06	NC
1,2-Dichloropropane	QN	NAP	NAP	NAP	NAP
Methylene chloride	QN	NAP	AN	NAP	NAP
Tetrachloroethene	0.0003	1.95-05	1.9E-03	1.68-06	8.4E-08
1,1,1-Trichloroethane	QN	ANA	NAP	NAP	NAP
Trichloroethene	2	NAP /	ANN	NAP	NAP
Xylenes (total)	Ø	/NAR/	NAP	NAP	NAP
Inorganics					
Aluminum	QN	NAP /	NAP	NAP	NAP
Ammonia		ANN	NAP	NAP	NAP
Barium	DN	NAF	NAP	NAP	NAP
Cadmium		NAP	NAP	NAP	NAP
Chloride		> NAP	NAP	AAP	NAP
Chromium		NAP	AP	NAP	NAP
Copper) A	NAP	NAP	NAP	NAP
Fluoride		NAP	NAP	NAP	NAP
Lead		NAP	NAP	NAP	NAP
Manganeso	DN	NAP	NAP	NAP	NAP
Nickel	DN	NAP	NAP	NAP	NAP
Nitrate	QN	NAP	NAP	NAP	NAP
Zinc	DN	NAP	NAP	NAP	NAP
		Total	1.1E-02	Total	18-06
Footnotes appear on page 2.					

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Maximum detected constituent concentration in off-site residential well NSL-RW-17 (mg/L). Oral exposure dose from drinking water (mg/kg-day).	Hazard quotient. The sum of the hazard quotients is the hazard index (HI). Excess lifetime cancer risk.	Not applicable, toxicity factor (i.e., reference dose [RfD] or cancer slope factor [CSF]) not available. Not applicable, constituent not detected.	Not carcinogenic by the oral route.	Not detected.
Maximum (Oral exposi	Hazard quo Excess lifed	Not applica Not applica	Not carcine	Not detecte
Cw PGWExD	HQ ELCR	NA NAP	NC	Q

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Table A-26. Potable Ground-Water (Pheasant Hill Well) Exposure aces and Risk Calculations for a Potential Current Adult Resident, Novak Sanitary Landfill, South Whitehall Township, Pennsylvania.

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			Non-Cane	ter Risk	Can	teer Risk
Constituent		ð	PWEXD	Н	DVEXD	ELCR
Inorganics						
Aluminum	•	0.041	1.1E-03	AN S	4.88-04	NC
Chloride Conner		0.011	3.8E-01 3.0E-04	8.112-03	1.96-01	U U N
Lead		0.010	2.7E-04	/VN	< I.2E-04	NC
Nickel		0.024	6.6E-04	3.3E-02	2.85-04	NC
Nitrate 7inc		12 0.051	3.3E-01 1.4E-03	2.18-01 7.06-03	1.4E-01 6.0F-04	NC
			Total	2.58-01	Total	NCP
		an she an	4	/		
	Constituent concen	and a fee fee fee gradement	Hill well (mg/L).	The lesser of the n	maximum detect and the	4.
PGWExD	95 percent upper ci Oral exposure dose	onfidence limit is used o from drinking water ((mg/kg-day).			
НQ	Hazard quotient.	The sum of the Mazard	quotients is the Maz	ard index (HI).		
NA	lot applicable.			- - -		
NCP	Not carcinogenic u No potential carcin	iy use oral routed in this	well.			
		>				
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GERAGHTY & MILLEY ELCR NCP <u>v</u>vvvv Ŋ N N U Z Table A-27. Potable Ground-Water (Pheasant Hill Well) Exposure Doses and Risk Calculations for a Potential Current Child **Cancer Risk** Constituent concentration in the Pheasant Hill well (mg/L). \The lesser of the maximum detect and the 95 Resident (Aged 0 to 6 Years), Novak Sanitary Landfill, South Whitehall Township, Pennsylvanfa. CWEAD 7.7E-02 5.5E-05 1.3E-04 6.0E-05 2.8E-04 2.3E-04 6.6E-02 Total: Hazard quotient. The sum of the <u>bazard</u> quotients is the hazard index (HI). 1.9E-02 7.7E-02 1.6E-02 5.9E-0P 4.8E-01 ٩v **QH** x z Non-Cancer Risk Oral exposure dose from drinkipg water (mg/kg-day). PCWEXD 6.4E-04 1.5E-03 2.6E-03 8.9E-01 7.0E-04 3.3E-03 7.7E-01 **Total:** No potential carcinogens detected in this well. percent upper confidence limit is used Not carcinogenic by the oral route. 0.011 0.010 0.024 0.041 12 0.051 3 4 Excess lifetime cancer risk Not applicable. Constituent Inorganics Aluminum PGWExD Chloride Copper Nitrate Nickel ELCR Lead Zinc NC NC ۸N Å 3

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-			Non-Cane	er Risk		er Risk
Sonstituent	Cw		GWExD	Ъ	PGWEXD	ELCR
, OCs						
oluene	0.0022		6.0E-05	3.0E-04	2.68-05	NC
norganics				\langle		·
Auminum	4.2		1.28-01	> VN	4.9E-02	NC
arium	0.055		1.5E-03	2.26-02	6.5E-04	NC
eryllium	0.0018	-	4.9E-05	9.9E-03	2.1E-05	9.1E-05
admium	0.0084		2.3E-04	4.6E-01	9.9E-05	NC
alcium	37		.0E+00	NA	4.3E-01	NC
Thloride	5.0		1.4E-01	VN/	5.9E-02	NC
homium	0.012		3.38-04	6.6902	1.4E-04	UN N
opper	0.035		9.6E-04 /	~26B-02	4.1E-04	UN
yanido	0.019		5.2E/04	2.68-02	2.2E-04	NC
luoride	0.19		5.2E-03	8.7E-02	2.2E-03	NC
EQ.	11	(4.7E-0	0.0E+00	2.06-01	NC
ead	0.010		2.7E-04	NA	1.2E-04	NC
Iagnesium	1	 (4.7E-01	NA	2.08-01	NC
langanese	0.57	/	1.6E-02	1.6E-01	6.7E-03	NC
lickel	0:030	\ }	8.2E-04	4.1E-02	3.5E-04	NC
litrate	150.0	\ / /	1.4E-03	8.7E-04	6.0E-04	NC
otassium	5.0	^ /	1.4E-01	NA	5.9E-02	NC
odium	= (>	3.0E-01	NA	1.3E-01	NC
ulfate	٥٥		2.7E-01	NA	1.26-01	UN NC
'anadium	0.024	-	7.4E-04	1.18-01	3.2E-04	NC
inc	0.051	ĺ	1.4E-03	7.0E-03	6.0E-04	NC
		L	Total	1.0E+00	Total	9E-05

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Page 2 of 2	able Ground-Water (On-Site Monitor Wells at Cluster 1) Exposure Doses and Risk Calculations for a Future Hypothetical ult Resident, Novak Sanitary Landfill, South Whitehall Township, Pennsylvania.	astituent concentration in the on-site monitor wells NSL-MW-10 and NSL-MW-11 (mg/L). The lesser of the maximum detect and 95 percent upper confidence limit is used.	I exposure dose from drinking water (mg/kg-day). card quotient. The sum of the hazard quotients is the hazard index (HI).	cess lifetime cancer risk.	t carcinogenic by the oral route.			CERAGHTY & MILLEY W
	Potable Gro Adult Resid	Constituent the 95 perce	Oral exposi Hazard quo	Excess lifet Not applica	Not carcino			
	Table A-28a.	Š	PGWEAD HQ	ELCR	2 Z			

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		Non-Can	eer Risk	Cance	r Risk
Constituent	Cw	PGWExD	НQ	PGWEND	ELCR
VOCs				\leq	
Carbon disulfide	0.0010	2.7E-05	2.7B-04	1.28.05	NC
Chlorobenzene	0.0020	5.5B-05	2.76-03 >	2.38-05	NC
1,1-Dichloroethane	0.0020	5.5E-05	5.5E-04	2.38-05	NC
1,2-Dichloroethene (total)	0.0030	8.2E-05	4.1E-03	> 3.5E-05	NC
Tolucue	0.0096	2.66-04	1.3É-03	1.1E-04	NC
Vinyl chloride	0.0060	1.6E-04	1.3E-DI	7.0E-05	1.3E-04
Inorranics					
Aluminum	0.14	3.8E-03	NA <	1.6E-03	NC
Ammonia	1.4	3.88-02	VN /	1.68-02	NC
Barium	0.060	1.615403	2.36-02	7.08-04	NC
Catcium of the second s	82	2.3E400 V	YNX	1.08+00	NC
Chloride	24	6.6E-di	NA	2.88-01	NC
Copper	0.011	3.0E-04	8.1E-03	1.38-04	NC
Fluoride	0.71	1.9E-02	> 3.2E-01	8.3E-03	NC
lron	2.7	7.4E-02 /	NA	3.26-02	NC
Lead	0.010	2.7E-04	VN	1.26-04	NC
Magnesium	42 /) /1.2E+00	VN	4.95-01	NC
Manganese	0.20	528-03	5.5E-02	2.3E-03	NC
Nickel	0.027	7.46-04	3.7E-02	3.2E-04	NC
Nitrate	0.15	4.1E-03	2.6E-03	1.8E-03	NC
Potassium	5.6	1.5E-01	NA	6.68-02	NC
Sodium	É	4.7E-01	NA	2.08-01	NC
Sulfate	62	1.7E+00	NA	7.38-01	NC
Vanadium	0100	4.4E-04	6.3E-02	1.95-04	NC
Zinc	0.040	1.1E-03	5.5E-03	4.78-04	NC
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Footnotes appear on page 2.

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Table A-28b.	Potable Ground-Water (On-Site Monitor Wells at Cluster 2) Exposure Doses and Risk Calculations for a Future Hypothetical Adult Resident, Novak Sanitary Landfill, South Whitehall Township, Pennsylvania.	Page 2 of
5	Constituent concentration in the on-site monitor wells NSL-MW-2A, and NSL-MW-9 (mg/L). The lesser of the maximum detect and the 95 mercent unner confidence limit is used.	
PGWExD HQ	Oral exposure dose from drinking water (mg/kg-day). Hazard quotient. The sum of the hazard quotients is the hazard index (HI).	
ELCR NA	Excess lifetime cancer risk. Not applicable.	
NC	Not carcinogenic by the oral route.	

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		Non-Can	teer Risk		r Risk
Constituent	ð	PGWEXD	дн	POWERD	ELCR
VOCs					
Acetone	0.011	3.08-04	3.0E-03	1.38.04	NC
Benzene	0.0040	1.1E-04	VN VN	4.7E-05	1.48-06
Chlorobenzene	0.024	6.6E-04	3.3E-02	2.86-04	NC
1,1-Dichloroethane	0.0086	2.4E-04	2.48-03 </td <td>> 1.0E-04</td> <td>NC</td>	> 1.0E-04	NC
1,2-Dichloroethene (total)	0.0042	1.2E-04	5.8B-03	4.9E-05	NC
1,2-Dichloropropane	0.0020	5.5E-05	NA /	2.3E-05	1.68-06
trans-1,3-Dichloropropene	0.0020	5.5E-05	1.85-01	> 2.3E-05	4.25-06
Ethylbenzene	0.0040	1.18-04	1.1E-03 <	4.7E-05	NC
4-Methyl-2-pentanone	0.0050	1.48-04	2.7E-03	5.9E-05	NC
Tetrachloroethene	0.0010	2.78-05	278-03	1.26-05	6.08-07
Tolucue	0.029	V 10/26.1	4.0B/03	3.46-04	NC
Trichloroethene	0.0020	s.se-bs V	C1-46-03	2.36-05	2.68-07
Xylenes (total)	0.012	3.3E-04	1.6E-04	1.46-04	NC
Semi-VOCs		· · · · · · · · · · · · · · · · · · ·			
Bis(2-ethylhexyl)phthalate	0.0020	5.5E-05 V	2.76-03	2.3E-05	3.3E-07
Di-n-butyl phthalate	0.0040	1.1E-04	1.1E-03	4.7E-05	NC
1,2-Dichlorobenzene	0.0055		1.7E-03	6.5E-05	NC
1,4-Dichlorobenzene	0.013	2.6E-04	VN	1.5E-04	3.78-06
(-PAHs	0.0030	8.2E-05	2.16-02	•	•
Inorganics	(>			
Ammonia	3 99	7.1E+00	NA	3.16+00	NC
Chloride	88	2.46+00	NA	1.0E+00	NC
Fluoride	0.46	1.36-02	2.1E-01	5.48-03	NC
Sulfate		3.3E-01	NA	1.48-01	NC
· · ·		Total	4.8E-01	Total	1E-05
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			Non-Can	ter Risk	Cance	er Rick
Constituent	Š	1	PGWExD	НQ	FGWEAD	ELCR
VOCs	- -					
Acetone	0.0020		5.5B-05	5.5E-04 >	2.36-05	NC
Benzene	0.0060	۰.	1.68-04	NA /	7.0E-05	2.08-06
Chloroethane	0.034	-	9.3E-04	4.7B-02	4.0E-04	NC
1, 1-Dichloroethane	0.16		4.4E-03	4.4E-02	1.98-03	NC
1,2-Dichloroethene (total)	0.12		3.3E-03	1.68-01	1.4E-03	NC
1,2-Dichloropropane	0.011		3.05-04		1.3E-04	8.88-06
Ethylbenzene	0.0010		2.7E-05	2.78-04	1.2E-05	NC
4-Methyl-2-pentanone	0.0040		1.16-04	2.28-03	4.7E-05	NC
Styrene	0.0010		2.78-05	1.46-04	1.2E-05	3.58-07
Tetrachloroethene	0.0039	11.	1.15-04	1.18,00	4.66-05	2.38-06
Tolucne	0.050	•	1.48-03 /	∕6,8Ê-03	5.9E-04	NC
1,1,1-Trichloroethane	0.0096		2.65-04	2.98-03	1.1E-04	NC
Trichloroethene	0.055		1.58-03	2.0E-01	6.5E-04	7.18-06
Vinyl chloride	0.008	(2.7E-04	2.1E-01	1.2E-04	2.28-04
Xylenes (total)	0.0044	\langle	1.28-04/	6.0E-05	5.2E-05	NC
Semi-VOCs		\ \ \				
Diethylphthalato	0.0030		8.2E-05	1.0E-04	3.5E-05	NC
4-Methylphenol	0.050	\sum_{i}	1.4E-03	2.78-02	5.98-04	NC
Inoreanics		>				
Ammonia	12	>	7.48-02	NA	3.28-02	NC
Chloride) 30)		8.2E-01	NA	3.5E-01	NC
Fluoride	0.83		2.3E-02	3.8E-01	9.7E-03	NC
Sulfate	46		1.3E+00	NA	5.4E-01	NC
		L_	Total	1.1E+00	Total	2E-04
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Table A-28d.	Potable Ground-Water (On-Site Monitor Wells at Cluster 4) Exposure Doses and Risk Calculations for a Future Hypothetical Adult Resident, Novak Sanitary Landfill, South Whitehall Township, Pennsylvania.
Š	Constituent concentration in the on-site monitor wells NSL-MW-6 and NSL-MW-8 (mg/L). The lesser of the maximum detect and the 05 nervent unner confidence limit is used

S€	Constituent concentration in the on-site monitor wells NSL-MW-6 and NSL-MW-8 (mg/L). The lesser of the maximum
	and the 95 percent upper confidence limit is used.
PGWExD	Oral exposure dose from drinking water (mg/kg-day).
Ы	Hazard quotient. The sum of the hazard quotients is the hazard index (HI).
ELCR	Excess lifetime cancer risk.
NA	Not applicable.
NC	Not carcinogenic by the oral route.

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		Non-	Cancer Risk		Cancer Ri	sk
Constituent	£	PGWEXD	НQ	K)	PGWEAD	ELCR
VOCs	•			>		
Toluene	0.0022	1.4E-04	7.0E-04	\sim	1.28-05	NC
norganics	• •			\langle		
Aluminum	4.2	2.7E-01	NAN		2.38-02	NC
Barium	0.055	3.5 B-03	5.0E-02	/	3.0E-04	NC
Beryllium	0.0018	1.26-04	2.36-02	\sim	9.9E-06	4.2E-05
Cadmium	0.0084	5.4E-04	1.1E+00	>	4.6E-05	NC
Calcium	LE	2.48+00	VV /		2.08-01	NC
Chloride	5.0	3.2E-01	AN		2.7E-02	NC
Chromium	0.012	7.78-04	V 1.58-01		6.68-05	Ŋ
copper	ccn.n	Z.28-03	20-20-20		1.96-04	NC
Cyanide	0.019	1.28-03	< 6.1E-02		1.08-04	NC
luorido	0.19	1.26-02	2.08-01		1.08-03	NC
LOI	11	1.1E+00	0.0E+00		9.3E-02	NC
cad	0.010	6.4E-04	AN .		5.5E-05	NC
Magnesium	50		AA 2 66 01		9.3E-02 2 17 02	
viauganceo Viabel			10-30°C		0-11-C	NC.
Vitrate	0.051	3.38-03	2.0E-03		2.8E-04	NC NC
otassium	5.0	✓ 3.2E-01	NN		2.7E-02	NC
Sodium	7	7.08-01	NA		6.0 B-02	NC
Sulfate	6.6	6.3E-01	NA		5.4 B-02	NC
Vanadium	0,027	1.7E-03	2.5E-01		1.58-04	NC
Zinc		3.38-03	1.6E-02	Į	2.8E-04	NC
		Total	2.4E+00		Total	ARANS

hetical	num detect and				Y& MILLER (C.
n-Site Monitor Wells at Cluster 1) Exposure Doses and Risk Calculations for a Future Hypothe • 6 Years), Novak Sanitary Landfill, South Whitehall Township, Pennsylvania.	in the on-site monitor wells NSL-MW-10 and NSL-MW-11 (mg/L). The Jesser of the maximu	drinking water (mg/kg-day). a of the hazard quotients is the hazard index (HI).			GERAGHTY
Potable Ground-Water (C Child Resident (Aged 0 t	Constituent concentration	ue ya percent upper con Oral exposure dose from Hazard quotient. The su	Excess lifetime cancer ris Not applicable.	Not carcinogenic by the	
Table A-29a.	ş	PGWExD HQ	ELCR	2 Z	

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		Non-Can	teer Risk	Cancer	r Risk
Constituent	Cw	PGWExD	НQ	PCAVEND	BLCR
0Cs				\langle	
arbon disulfide	0.0010	6.48-05	6.4E-04	5.5B.06	NC
hlorobenzene	0.0020	1.38-04	6.46-03	1.1E-05	NC
, 1-Dichloroethme	0.0020	1.38-04	1.3E-03	1.16-05	NC
2-Dichloroethene (total)	0.0030	1.98-04	9.6E,03	1.68-05	NC
olucne	0.0096	6.16-04	3.1E-03	S.3B-05	NC
inyl chloride	0.0060	3.8E-04	3.0E-01	3.3E-05	6.2 B-0 5
organics					
luminum	0.14	8.9E-03	> VA	7.7B-04	NC
mmonia	1.4	8.9E-02	AN	7.78-03	NC
kriem .	0.060	3.8E/03	> S.SEVD	3.38-04	NC
alcium	88	5.4E+bo	XN	4.7B-01	NC
hloride	24	1.58+00	VA VA	1.38-01	NC
opper	0.011	7.08-04	1.98-02	6.0E-05	NC NC
opuon	17.0	4.215-02	10-907	3.98-03	S
5	2.7	1.7E-01 V	AN AN	1.5E-02	
					202
agnesium			NA 22 22	2.38-01	NC
anganese Letet		20-21-1	1.35-01 • 45 M	1.15-03	
itate	0.15	0-11-1 0-19-10	6.0E-03	8.2E-04	
tassium	5.6	3.6E-01	VN	3.16-02	NC
dium	É	1.1E+00	NA	9.3E-02	NC
ifato	0 0	4.0E+00	NA	3.4E-01	NC
anadium	0016	1.08-03	1.5E-01	8.85-05	NC
inc	0.040	2.6E-03	1.3E-02	2.26-04	NC
•		Total	1 CR+00	Total	SP.05

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Page 2 of 2	Tangang sa	ULLER C.
Water (On-Site Monitor Wells at Cluster 2) Exposure Doses and Risk Calculations for a Future Hypothetical Aged 0 to 6 Years), Novak Sanitary Landfill, South Whitehall Township, Pennsylvania.	astration in the on-tile motilor wella NSL-MW-2A, and NSL-MW-9 (mg/L). The lessfring the auditing water (mg/kg-dusy): as from drinking water (mg/kg-dusy): The sum of the hazard quotients is the hazard index (H). Earlier risk. c by the oral rout.	GERAGHTY 2 N
Potable Ground Child Resident	Constituent con the 95 percent t Oral exposure of Hazard quotien Excess lifetime Not applicable. Not carcinogen	
Tablo A-29b.	PGWEAD HQ ELCR NA NC	
		AR208248

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		Non-Cai	ncer Risk	Cancer R	isk
Constituent	Cw	PGWEXD	Н	PGWEAD	ELCR
VOCs			~	<u> </u>	
Acetone	0.011	7.08-04	7.0E-03	6.0E-05	NC
Benzene	0.0040	2.6E-04	< vn	2.2E-VS	6.4B-07
Chlorobenzene	0.024	1.5E-03	7.7E-02 / >	1.36-04	NC
1,1-Dichloroethane	0.0086	5.5E-04	5.5E-05	4.76-05	NC
1,2-Dichlorocthene (total)	0.0042	2.76-04	1.35-02	2.36-05	NC
1,2-Dichloropropane	0.0020	1.3E-04	V VN	1.1E-05	7.5E-07
rans-1,3-Dichloropropene	0.0020	1.3E-04	4.3E-01	1.1E-05	2.05-06
Sthylbenzene	0.0040	2.68-04	2.68-03	2.2E-05	NC
L-Methyl-2-pentanone	0.0050	3.26-04	6.4E-03	2.78-05	NC
Tetrachloroethene	0.0010	6.4E-05	6.4E-03	5.5 B-06	2.8E-07
Colucne	0.029	1.96/03	60-3E-09	1.66-04	NC
l richloroethene	0.0020	1.38-04 /	N.7B62	1.18-05	1.26-07
(ylenes (total)	0.012	7.7E-04	3.8E-04	6.6E-05	NC
cmi-VOCe	•				
lis(2-ethylhexyl)phthalate	0.0020	1.3B-04	6.4E-03	1.16-05	1.5B-07
Di-n-butyl phthalate	0.0040	2.6E-04	2.6E-03	2.2E-05	NC
"2-Dichlorobenzene	0.0055	✓ 3.5E-04	3.9E-03	3.0E-05	NC
.4-Dichlorobenzene	0.013	NO-BAE-OM	NA	7.1E-05	1.7E-06
-PAHs	0.0030	1.95-04	4.8E-02	•	•
Inorganics		\rightarrow			·
Ammonia	200	V 1.7E+01	NA	1.4E+00	NC
Chloride	88	5.6E+00	NA	4.88-01	NC
iluoride	Q.46	2.98-02	4.9E-01	2.5E-03	NC
Sulfate	12	7.7E-01	VV	6.6E-02	NC
	\ /	Total	1.1E+00	Total	6E-06

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Page 2 uf 2	par					-			
Potable Ground-Water (On-Site Monitor Wells at Cluster 3) Exposure Doses and Risk Calculations for a Future Hypothetical Child Resident (Aged 0 to 6 Years), Novak Sanitary Landfill, South Whitehall Township, Pennsylvania.	Constituent concentration in the on-site monitor wells NSL-MW-7 and NSL-MW-1C (mg/L). The lesser of the maximum detect the 95 percent upper confidence limit is used.	Oral exposure dose from drinking water (mg/kg-day). Hazard quotient. The sum of the hazard quotients is the hazard index (HI).	Excess lifetime cancer risk.	Not appreciate by the oral route.					C GERAGHTY & MI
Table A-29c.	ર્ટ	PGWExD HO	ELCR	C N					\bigcirc

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	•	Non-Can	tter Risk		r Risk
Constituent	C.ª	PGWExD	НQ	PGWEAD	ELCR
VOCs					
Acetone	0.0020	1.36-04	1.3E-03	1.15-05	NC
Benzene	0.0060	3.8E-04	V VN	3.3E-05	9.5E-07
Chloroethane	0.034	2.26-03	1.1E-01 </td <td>1.98-04</td> <td>NC</td>	1.98-04	NC
1, 1-Dichloroethane	0.16	1.06-02	1.08.01	8.8E-04	NC
1,2-Dichloroethene (total)	0.12	7.7E-03	3.85-01	6.68-04	NC
1,2-Dichloropropane	0.011	7.0E-04	VN /	6.0E-05	4.1E-06
Ethylbenzene	0.0010	6.4E-05	6.4E-04	5.5 B-06	NC
4-Methyl-2-pentanone	0.0040	2.66-04	5.1E-03	2.28-05	NC
Styrene	0.0010	6.4E-05	9.2E-04	5.5E-06	1.68-07
Tetrachloroethene	0.0039	2.5B/04	2.58-02	2.18-05	1.18-06
Tolueno	0.050	3.2E-03 <	14.02-02	2.7B-04	NC
1,1,1-Trichloroethane	9600.0	6.1E-04	6.8E-03	5.3B-05	NC
Trichleroethene	0.055	3.5B-03	4.88-01	3.08-04	3.3B-06
Vinyl chloride	0.0098) 6.3E-04 /	4.8E-01	5.48-05	1.0E-04
Xylenes (total)	0.0044	2.8E-04 V	1.46-04	2.48-05	NC
Semi-VOCs	-				
Diethylphthalato	0:0030	LOB-04	2.46-04	1.68-05	NC
4-Methylphenol	0.050	3.2E-03	6.4E-02	2.76-04	NC
Invreanics		$\hat{}$			
Ammonia	77	1.7E-01	VN	1.58-02	NC
Chloride	30	1.9E+00	NA	1.68-01	NC
Fluoride	< 0,83 /	5.3E-02	8.8E-01	4.5E-03	NC
Sulfate .	46	2.98+00	NA	2.5E-01	NC
		Total	2.6E+00	Total	1E-04

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Page 2 of										
	Potable Ground-Water (On-Site Monitor Wells at Cluster 4) Exposure Doses and Risk Calculations for a Future Hypothetical Child Resident (Aged 0 to 6 Years), Novak Sanitary Landfill, South Whitehall Township, Pennsylvania.	Constituent concentration in the on-site monitor wells NSL-MW-6 and NSL-MW-8 (mg/L). The lesser of the maximum detect and the 95 percent unner confidence limit is used	Oral exposure dose from drinking water (mg/kg-day). Hazard quotient. The sum of the hazard cuotients is the hazard index /HD	Excess lifetime cancer risk.	Not carcinogenic by the oral route.					
	Table A-29d.	Š	PGWExD HO	ELCR	NC		· ·			

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Table A-30. Equations and Example Calculation For Inhalation Exposure to Volatile Organic Compounds in Shower Water (ShExD), Novak Sanitary Landfill, South Whitehall Township, Pennsylvania.

The overall mass transfer coefficient (K1) for each volatile organic compound (VOC) of interest is based on the twofilm boundary theory:

(1)
$$K_{L} = (1/k_{i} + RT/Hk_{j})^{-1}$$

where

K	=	overall mass transfer coefficient (cm/hr),
H		Henry's Law Constant (atm-m ³ /mol-K),
RT	**	2.404 x 10 ² atm-m ³ /mole (gas constant of 8.206 x 10 ⁵ atm-m ³ /mol-K times absolute temperature of 293 K).
k,	E	gas-film mass transfer coefficient (cm/hr),
	~	$(3,000 \text{ cm/hr}) \ge [(18 \text{ g/mol})/(\text{molecular weight}, g/mol)]^{1/2}$, and
k _i	e	liquid-film mass transfer coefficient (cm/hr),
	~	(20 cm/hr) x [(44 g/mol)/(molecular weight, g/mol)] ^{2/2} .

Kt is adjusted to the shower water temperature, T, by the following semi-empirical equation:

(2)
$$K_{ul} = K_{l} (T_{l} \mu_{v} / T_{u} \mu_{l})^{4.5}$$

where:

K	E	adjusted overall mass transfer coefficient (cm/hr),
T ₁	E	calibration water temperature of K _L (293 K),
T,	=	shower water temperature (318/K),
μ ₁	=	water viscosity at T_1 (1 centipolse), and
μ,	=	water viscosity at T. (0.596 centipoise).

shower droplet after a time t, (C,,,) is obtained from a mass balance. The concentration then leaving

(3)
$$C_{ud} = C_{ud} (1 - exp[-K_{ud} t_{ud}))$$

where:



concentration leaving shower droplet after time t ($\mu g/L$), shower water concentration (µg/L), shower droplet diameter (1 mm), and shower droplet drop time (2 sec).

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The generation of VOC over time in the shower room is calculated as:

$$(4) \bigvee S = C_{nd}(FR)/(SV)$$

where:

S	\$	indoor VOC generation rate (µg/m ³ -min),
FR	=	shower water flow rate (10 L/min), and
SV	22	shower room air volume (6 m ³).

Table A-30. Equations and Example Calculation For Inhalation Exposure to Volatile Organic Compounds in Shower Water (ShExD). Novak Sanitary Landfill, South Whitehall Township, Pennsylvania.

Given an initial indoor VOC generation rate, S, a differential equation to describe the rate of change in the indoor VOC air concentration (C₁) can be established:

D,

$$dC_{s}/dt = -RC_{s} + S$$

where:

C₁ = indoor VOC air concentration (
$$\mu g/m^2$$
), and
R = air exchange rate (0.016/min).

Integration yields an estimation of the indoor air VOC concentration at time t $(C_s(t))$:

and

(6)
$$C_{s}(t_{1}) = (S/R) (1 - exp[-R(t_{1})])$$
 for $t_{1} \leq D_{s}$

(7)
$$C_{s}(t_{2}) = (S/R) (exp[RD_{1}] - 1) exp[-R(t_{2})] \text{ for } t_{2} > 0$$

where:

The inhalation exposure per shower can be calculated fromy

 $Einh = [(BR)/(BW) (10^{4})$

where:

Einh = inhalation exposure per shower (mg/kg/shower), BR = breathing rate (Lymin), BW = body weight (kg), and

This equation can be solved as:

(9

$$\underbrace{\text{Einh}}_{\text{Einh}} = \{(BR) (S)/[(BW) (R) (10^{\circ})]\} [D_{o} - 1/R + \exp(-RD_{o})/R]\}$$

for inhalation exposure for shower duration, and

(10)
$$Einh2 = \{(BR) (S)/[(BW) (R) (10^{\circ})] \{D_{e} + exp(-RD_{e})/R - exp[R(D_{e} - D_{e})]/R\}$$

i) dt

for inhalation exposure for total time in the bathroom.

The average daily inhalation exposure dose due to showering (ShExD) is calculated assuming an exposure frequency of 350 showers/year averaged over the exposure period (assumed residency of 30 years) for non-cancer effects or the average lifespan (70 years) for cancer effects.

(11) ShExD = (Einh2) (EF)(ED)/(AP)

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Table A	30.	Equati Showe	ions and Example Calculation For Inhalation Exposure to Volatile Organic Compounds in ar Water (ShExD), Novak Sanitary Landfill, South Whitehall Township, Pennsylvania.
where:			
	ShExD	æ	average inhalation exposure dose per day due to showering (mg/kg/day).
	EF	æ	exposure frequency = 350 showers/year.
	ED	8 2	exposure duration = 30 years.
	AP	-	averaging period (ED x 365 days/year for non-cancer effects /10 years x 365 days/year for cancer effects).
ShExD	Sample (Calcula	tion for Benzene in On-Site Monitor Wells at Cluster 3:
	(1)	K _L	$= [1 + 0.02404 \text{ stm} - \text{m}^3/\text{mol}]^4 $ [15.02 cm/hr (0.0055 stm - m^3/\text{mol}) (1440 cm/hr)]
			= 14.36 cm/hr
	(2)	K _{eL}	= $(14.36 \text{ cm/hr}) \times [(293K) (0.596 \text{ centipoise})]^{43}$ [(318K) (1 centipoise)]
			= 19.4 cm/hr
	(3)	C _{wi}	= $(4.0 \ \mu g/L) \ge \frac{12 - EXP [(-19.4 \ cm/hr)(2 \ s)/(60 \ x \ 1mm)]}{2}$
			= 1.90 μg/L
	(4)	S	$= (1.90 \mu g/L) (10 L/min)$

3.1 µg/m³-min

(10) Einh2

[15 min + EXP[(-0.016/min)(20 min)] - EXP[(0.016/min)(15 min-20 min)] 0.016/min 0.016/min

X

0.0000761 mg/kg/shower

(10 L/min) (3.17 µg/m³-min)

70 kg) (0.016/min) (1,000,000)

(1) For cancer effects:

> ShExD (0.0000761 mg/kg/shower)(350 showers/year)(30 years) (365 days/year)(70 years) ί.

3.1E-05 mg/kg/day z

For non-cancer effects:

ShExD (0.0000761 mg/kg/shower)(350 showers/year)(30 years) (365 days/year)(30 years)

> 7.3E-05 mg/kg/day =

> > 、 .*·

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Table A-31.	Shower Exposure Doses and C Whitehall Township, Pennsylv	Calculations, Poten vania.	tial Current On-S	ite Residential Well, l	Novak Sanitary Landfill,	South
			Non-Cancer	Risk	Cance	r Risk
Constituent	Cw	ß	ExD	НQ	(Drays	ELCR
VOCs						
Benzene	0.0010	1.6	3E-05	V V VN	7.8E-06	2.3E-07
Bromodichloromet	hane 0.00090	6.6	5E-06	NA	2.8E-06	NC
Carbon disulfide	0.00070	1.3	3E-05	4.5E-03	5.6E-06	NC
Chlorobenzene	0.00040	6.3	3E-06	1.3E-03	2.7E-06	NC
Chloroform	0.014	2.1	IE-04	NA	9.2E-05	7.4E-06
Dibromochloromet	hane 0.00050	6.3	15-06	NA	2.7E-06	NC
1,1-Dichloroethans	a 0.00040	6.1	713-06	6.7E-05	2.9E-06	NC
1,2-Dichloroethene	s (total) 0.016	2.7	nefot < >>	NA	1.2E-04	NC
Tetrachloroethene	0.0020	2.7	re-ds <	NA	1.1E-05	2.1E-08
Trichloroethene	0.030	4.6	SE-04	NA	2.0E-04	3.3E-06
Vinyl chloride	0.0070	(4E-04	1.1E-01	6.1E-05	1.8E-05
			otal	1.1E-01	Total	3E-05
Ċ					30 - Pr F	
C.	Constituent concentration in u	ne on-sue resudent	al well (mg/L).	ine lesser of the maxi	q ce au nus iosiau mum	orcan
ShFrD	Inhalation ermoure dose from	chowering (mo/ko	-chower)			
CH	Hazard anothert The sum of	the hazard motion	ts is the hazard in	der (HD		
ELCR	Excess lifetime cancer risk.					
NA	Not applicable.					
NC	Not carcinogenic by the Inhala	ation route.				
	>					

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Table A-32a. Shower Exposure Doses and Risk Calculations, Potential Current Off-Site Residential Well NSL-RW-03, Novak

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		it township, I chinaly it		$\langle \rangle$		
•		Non-Ca	meer Risk	Cancor	Risk	
Constituent	Cw	ShExD	НQ	ShExD	BLCR	
VOCs						-
Benzeno	Ð	NAP	< dvn	AAP <	NAP	
Chlorobenzene	Ð	NAP	NAP	V NAP	NAP	
Chloroform	Ð	NAP	NAP	ANP	NAP	
Dibromochlorome	thane ND	NAP	> ANN	AN	NAP	
1,1-Dichloroethan	e 0.001	1.7E-05	1.7E-04	< 7.3E-06	NC	
1,2-Dichloroethen	e	1.5E-05	VN	6.6E-06	NC	
1,2-Dichloropropi	MO ND	NAP	NAP	NAP	NAP	
Methylene chlorid	le ND	ANN	NAP	VAP	NAP	
Tetrachloroethene	0.001	1.4E-05	VN/	5.9B-06	1.1E-08	1
1,1,1-Trichloroet	htte 0.003	4.6E-05 V	() 1:5E'OF	2.0E-05	NC	
Trichloroethene	0.0009	1.4E-05	AN~ >	5.9E-06	1.08-07	1
Xylenes (total)	Ŋ	NAP /	NAP	NAP	NAP	
	•	Total	3.2E-04	Total	1E-07	
N N N	aximum detected constituent	meentration in off-site	residential well NSL-F	XW-03 (me/L).		
shexD Inl	halation exposure dose from sh	owering (mg/kg-showe	t).			
НО На	izard quotient. The sum of the	thezard quotients is the	hazard index (HI).			
ELCR Ex	tcess lifetime cancer risk					
NA Nc	ot applicable, toxicity factor (i.	e., htermoe dose [RfD)] or cancer slope facte	or [CSF]) not avaliable.		
NAP Nc	ot applicable, constituent not d	stoctod.				
NC	ot carcinggente by the oral rout	>.				
ND ND	of detorlod.					

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Not detocled.

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-RW-04,	/
Well NSL	
Residential	
at Off-Site	
Potential Curre	ennsylvania.
Calculations,	Township, Po
s and Risk (h Whitehall
posure Dose	undfill, South
Shower Ex	Sanitary L
Table A-32b.	

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		Non-Ca	ncer Risk	Cancer R	tisk
Constituent	Š	ShExD	НQ	ShEkD	BLCR
VOCs			2 -		
Benzene	Ð	NAP	<pre>NAP</pre>) AAP	NAP
Chlorobenzene	QN	NAP	VAP V	NAP	NAP
Chloroform	QN	NAP	NAP	VAP	NAP
Dibromochloromethane	QN	NAP) NAP	AN	NAP
1, 1-Dichloroethane	QN	NAP	VAP <	NAP	NAP
1,2-Dichloroethene	QN	NAP	NAP	NAP	NAP
1,2-Dichloropropano	QN	NAP	NAP	AN	NAP
Methylene chloride	0.0006	1.1E-05 >	1.2E-05	4.5E-06	7.2E-09
Tetrachloroethene	QN	NAP	AAN	NAP	NAP
1,1,1-Trichloroethane	QN	ANAP A	NAP.	NAP	NAP .
Trichloroethene	QN	NAP /	ANN	NAP	NAP
Xylenes (total)	ND	NAP \	NAP	NAP	NAP
		Total) 1.2E-05	Total	7E-09

• •

ex (III). researce quouceus. I no sum of the flazard Excess lifetime cancer risk Not applicable, constituent not detected. Not detected. NAP NAP ND

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Shower Exposure Doses and Risk Calculations, Potential Current Off-Site Residential Well NSL-RW-06, Novak Sanitary Landfill, South Whitehall Township, Pennsylvania. Table A-32c.

		Non-Car	wer Risk	Centos	er Risk
Constituent	Cw	ShExD	НQ	ShEkD	ELCR
voca					
Benzene	ą	NAP	VAP <	NAP	NAP
Chlorobenzene	Q.	NAP	NAP /	NAP	NAP
Chloroform	Q	NAP	NAP /	NAP	NAP
Dibromochloromethane	QN	NAP	NAP	NAP	NAP
1,1-Dichloroethane	0.0005	8.SE-06	8.5E-03	3.68-06	NC
1,2-Dichloroethene	Q	NAP	NAP	VAP VAP	NAP
1,2-Dichloropropane	Q	NAP	NAP	NAP	NAP
Methylene chloride	QN	NAP N	NAP	NAP	NAP
Tetrachloroethene	. 0.0002	2.7B-06	VN/	1.2E-06	2.16-09
1,1,1-Trichloroethane	0.0006	P.28-06	<> 3.18-05	4.08-06	
Trichloroethene	Ð	VAP/ V	ABA	NAP	NAP
Xylenes (total)	Ð	NAP V	AN	NAP	NAP
		Total	1.2E-04	Total	2E-09
Cw Maximum de	tected constituent conce	ntration in off-site r	sidential well NSL-R	W-06 (mg/L).	
ShExD Inhalation exi	posure dose from showe	ring (mg/xg-shower	,	, ,	
HO Hazard miniti	ant The sum of the Has	ard annihilts is the	hered index (HD)		

nh nizzeu

Excess lifetime cancer risk ELCR

erence dose [RfD] or cancer slope factor [CSF]) not avaliable. Not applicable, constituent not detected Not applicable, toxicity factor (i.e., rb) NAP VN

Not carcinggenic by the oral route. N N

Not detected.

RW-07, N	
Mell NSL-I	<
Residential	
at Off-Site]	
Potential Currer	ennsvlvania.
ixposure Doses and Risk Calculations,	Landfill. South Whitehall Townshin. I
Shower E	Sanitary I
Table A-32d.	

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Table A-32d. Shower Exp Sanitary Lar	osure Doses and Risk adfill, South Whitehall	Calculations, Poten Township, Pennsyl	lial Current Off-Site I Ivania.	kesidential	Well NSL-RW-0	7, Novak	
		Non-	Cancer Risk		Cancer	Rick	1
Constituent	Š	ShExD	дн		ShExD	ELCR	1
vocs							1
Benzeno	0.003	5.6E-05	NA	<	2.4E-05 <	6.9E-07	
Chlorobenzene	0.015	2.4E-04	4.8E-02	\sim	1.0E-04	NC	
Chloroform	QN	NAP	NAP	\langle	NAP	NAP	
Dibromochloromethane	QN	NAP	NAP	$\overline{\}$	NAP	NAP	
1, 1-Dichloroethane	0.001	1.7E-05	1.7E-04	\checkmark	7.3E-06	NC	
1,2-Dichloroethene	QN	NAP	NAP	/	NAP	NAP	
1,2-Dichloropropane	0.002	3.2E-05	NA		1.4E-05	NA	
Methylene chloride	QN	NAP	AN	>	NAP	NAP	
Tetrachloroethene	QN	NAP	dvn'		NAP	NAP	
1,1,1-Trichloroethane	QN	NAP	7. NAP		NAP	NAP	
Trichloroethene	0.0009	1.4E-05	VNV		5.9E-06	1.0E-07	
Xylenes (total)	QN	NAP V	NXP		NAP	NAP	
		Total	4.8E-02	U	Total	8E-07	
Cw Maximum d	letected constituent con	centrațion in off-sit	o residential well NSI	-RW-07 (mg/L).		1
ShExD Inhalation e	xposure do so from sho	wering (mg/kg-sho	ver).				
HQ Hazard quol	tient. The suprior of the l	yzard quotients is (he hazard index (HI).				
ELCR Excess lifeti	ime cancer risk	\ /					

• .-

Not applicable, toxicity factor (i.e., reference dose [RfD] or cancer slope factor [CSF]) not avaliable. Not applicable, constituent not detector: NAP NC ND

Not carcinoganie by the oral route. Not detected.

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Table A-32e. Shower Exposure Doses and Risk Calculations, Potential Current Off-Site Residential Well NSL-RW-12, Novak Sanitary Landfill, South Whitehall Township, Pennsylvania.

		Non-C	meer Risk	Cancer	Risk	1
Constituent	Cw	ShExD	Н	ShBtD	BLCR	
VOCs						1
Benzene		NAP	< ANN	NAP <	NAP	
Chlorobenzene	QN	NAP	NAP	VAP VAP	NAP	
Chloroform	0.0002	3.18-06	NA	1.3E-06	1.1E-07	
Dibromochloromethane	QN	NAP	dvn	NAP	NAP	
1,1-Dichloroethano	Q	NAP	AAP	VAP	NAP	
1,2-Dichloroethene		NAP	NAP	NAP	NAP	
1,2-Dichloropropane	Q	NAP	NAP	NAP	NAP	
Methylene chloride	QN	NAP >	NAP	NAP	NAP	
Tetrachloroethene	B	NAP	ANA	NAP	NAP	÷
1,1,1-Trichloroethano	Q	NAP()	ANN /	NAP	NAP	r.
Trichlorocthene	Q	NAP /	VNAP	NAP	NAP	1
Xylenes (total)	0.0002	3.38-06	3.9E-05	1.4E-06	NC	
		Total	3.9E-05	Total	1E-07	
Cw Maximum de	tected constituent concer	tration in off-site	residential well NSI_R	W-12 (me/1).	•	
ShExD Inhalation ex	posure dose from shower	ink (me/ke-showe	m).			
HQ Hazard quoti	ient. The sum of the haz	and quotients is the	o hazard index (HI).			
ELCR Excess lifetin	mo cancor risks		•			
NA Not applicabl	le, toxicity factor (i.e., n	bference dose [Rf])] or cancer slope facto	r [CSF]) not avaliable.		
NAP Not applicabl	le, constituent not detects	~ ,				
NC Not carcingg	cute by the onal route.					
ND Not detected.	/	•				

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IL-RW-17, Novak	
ole A-32f. Shower Exposure Doses and Risk Calculations, Potential Current Off-Site Residential Well NSI Sanitary Landfill, South Whitehall Township, Pennsylvania.	
T.	l

Sanitary	Landhil, South Whitehall	Township, Pennsylva	ole.	$\langle \rangle$	
		Non-Ca	ncer Risk	Sup	cer Risk
Constituent	Cw	ShExD	НQ	CRAEND	ELCR
VOCs					
Benzene	QN	NAP	AAP	NAP	NAP
Chlorobenzene	QN	NAP	NAP	NAP VAP	NAP
Chloroform	QN	NAP	NAP	AN VAP	NAP
Dibromochloromethane	0.002	2.6E-05	NA	1.1E-05	NA
1,1-Dichloroethane	0.0004	6.8 B-0 6	6.8E-05	2.9E-06	NC
1,2-Dichloroethene	0.0008	1.4E-05	NA	5.9E-06	NC
1,2-Dichloroprop ane	QN	NAP	NA	ANN	NAP
Methylene chloride	QN	ANN	9 7	NAP	NAP
Tetrachloroethene	0.0003	4.1E-06	AN	1.8E-06	3.2E-09
1,1,1-Trichloroethane	QN	NAP/		NAP	NAP
Trichloroethene	QN	NAP /	NN	NAP	NAP
Xylenes (total)	ŊŊ	NAP	dn >	NAP	NAP
		Total) 6.8E-05	Total	3E-09
Cw Maximu	m detected constituent cor	centration in off-site r	esidential well NSL-F	(W-17 (mg/L).	
ShExD Inhalatio	n exposure dose from sho	Wering (mg/kg-shower	Ċ.	,)	
HQ Hazard G	quotient. The sum of the	pazard quotizate is the	hazard index (HI).		
ELCR Excess li	ifetime cancer risk.	\rangle			

• • •

Not applicable, toxicity factor N.e., reference dose [RfD] or cancer slope factor [CSF]) not avaliable.

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Not applicable, constituent not detected NA NCP NCP

Not carcinogenic by the oral route. No potential carcinogens detected in this well. Not detected.

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		Non-Can	ter Effects		Cen	er Rick
Constituent	Cw	ShExD	Н	\sim	ShexD	ELCR
VOCs						
t olu cho	0.002	3.58-05	6.1E-05		1.5E-05	NC
		Total	6.1E-05		Total	NC
Č.	Constituent concentration in the on-s	tite monitor wells NSL-	MW-10 and NSL-W	(IN-11 (mg/L).	The lesser of the m	ximum detect and
hexD	the 95 percent upper confidence limi Inhalation exposure dose from show	it is used. cring (mg/kg-shower).			· · ·	
ç LCR	Hazard quotient. The sum of the ha Excess lifetime cancer risk.	zard quotients is the haz	and index (HI).			
ic.	Not carcinogenic by the inhalation re	oute.		e e e e e e e e e e e e e e e e e e e		т.
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		Non-Can	cer Effects		Cance	r Risk
Constituent	Cw	ShExD	Юн	$\left \right\rangle$	ShExD	ELCR
VOCs				<	>.	
Carbon disulfide	0.0010	1.9E-05	6.5E-03	\sim	8.0E-06	NC
Chlorobenzene	0.0020	3.2E-05	6.3E-03		1.4E-05	NC
1, 1-Dichloroethane	0.002	3.4E-05	3.4E-04		1.4E-05	NC
1,2-Dichloroethene (total)	0.003	5.1E-05	NA		2.2E-05	NC
Toluene	0.010	1.7E-04	2.96-04	· ^	7.1E-05	NC
Vinyl chloride	0.0060	1.26-04	9.3E-02	>	5.2E-05	1.6E-05
		Total	1.1E-01		Total	2E-05
		-			-	-
CW Constituent c	concentration in the on-site at unner confidence limit i	s monitor wells NSL s used.	MW-PA and NSL-MV	V-9 (mg/L). The	lesser of the maxid	mum detect and
ShExD Inhalation ex	posure dose from showeri	ne (melkg-shower).				
HQ Hazard quotiv ELCR Excess lifetim	ent. The sum of the hazar ne cancer risk.	rd quoticats is the haz	ard index (HI).			
NA Not applicabl	е.	\searrow			·	
NC Not carcinoge	enic by the inhalation rout	ei				
			-			
-		-		-	_	-
_			-	-	-	-
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		Ŭ			GERAGHTY	r ∂×niller(_
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Table A-33b. Shower Exposure Doses and Calculations, Future Hypothetical On-Site Resident (On-Site Monitor Wells at Cluster 2), Novak Sanitary

Constituent Cn Shizob HQ Shizob HQ Shizob HQ Shizob HC VOC3 Actions 0.0110 4.35-05 NA 1.95-05 NC Actions 0.0010 4.35-05 NA 1.95-05 NC Actions 0.0010 4.35-05 7.65-07 NC 9.18-07 Actions 0.0004 7.38-05 3.18-05 NC 9.18-07 NC Actions 0.0004 7.18-05 NA 1.18-05 NC NC Actions 0.0004 7.18-05 NA 1.18-05 NC NC Actions 0.0000 3.18-05 NA 1.18-05 NC NC Actions 0.0000 0.0000 3.18-05 3.18-05 NC NC Actions 0.0000 1.18-05 3.18-05 NC NC NC Actions 0.0000 1.18-05 3.18-05 NC NC NC Actions <t< th=""><th></th><th></th><th>Non-Cam</th><th>ber Effects</th><th>Cane</th><th>er Risk</th><th></th></t<>			Non-Cam	ber Effects	Cane	er Risk	
VCG VCG <th>Constituent</th> <th>Ċ</th> <th>ShExD</th> <th>ОН</th> <th>ShExD</th> <th>ELCR</th> <th>1</th>	Constituent	Ċ	ShExD	ОН	ShExD	ELCR	1
Actions 0.0110 4.38-05 N.A 1.98-05 N.C Banzens 0.004 7.38-05 N/A 1.98-05 9.18-07 Banzens 0.004 7.38-05 N/A 1.98-05 9.18-07 Banzens 0.004 7.38-05 N/A 1.46-04 0.01 L1-Dichlorosthans 0.004 7.18-05 N/A 1.36-05 N/C L1-Dichlorosthans 0.000 1.48-04 7.18-05 N/A 1.36-05 N/C L2-Dichlorosthans 0.000 5.56-05 3.18-05 3.18-05 N/C 1.48-06 N/C L2-Dichlorosthans 0.0000 5.56-05 2.38-06 N/C 1.48-05 N/C L2-Dichlorosthans 0.0000 6.46-06 3.18-05 2.18-06 N/C Methyl 2-pentamons 0.0000 6.46-06 3.18-05 2.18-06 N/C Trichlorosthans 0.0001 1.38-05 2.18-06 2.18-06 N/C Software 0.0002 0.022 2.08-0	VOCs						
Benzene 0.004 7.3B-05 NA 3.1B-05 9.1B-07 Chlorobenzene 0.0240 3.8E-04 7.6E-07 7.6E-07 NA 3.1B-05 9.1B-07 L1-Dichlororethene 0.0004 7.1E-05 NA 3.1B-05 NC 1.2-Dichlororethene 0.0004 7.1E-05 NA 1.1B-05 NC 1.4E-05 NC 1.4E-	Acetone	0.0110	4.3E-05	VA >	1.9E-05	NC	
Chlorobenzene 0.0240 3.85-04 7.65-04 1.65-04 NC 1.1-Dichlororethane 0.004 7.18-05 NA 1.18-06 NC 1.2-Dichlororethane 0.004 7.18-05 NA 1.18-06 NC 1.2-Dichlororethane 0.003 3.18-05 NA 1.18-06 NC 1.2-Dichlororethane 0.0020 3.18-05 NA 1.18-06 NC 1.2-Dichlororethane 0.0020 3.18-05 NA 1.18-06 NC 1.12-Dichlororethane 0.0020 3.18-05 NA 1.18-05 NC Interchlororethane 0.0020 5.556-05 1.18-05 NC NC Interchlororethane 0.0020 5.45-05 2.38-04 2.78-06 NC Interchlororethane 0.0020 5.07-04 2.78-04 2.78-06 NC Interchlororethane 0.0020 5.07-04 2.78-04 2.78-06 NC Interchlororethane 0.0020 0.0120 2.08-04 2.78-04 NC	Benzene	0.004	7.3E-05	NA	3.1E-05	9.1E-07	
1,1-Dichloroethare 0.009 1,4E-04 (4E-03 6.2E-05 NC 1,2-Dichloroethare 0.004 1,1E-05 NA 3,1E-05 NC 1,2-Dichloroethare 0.003 3,1E-05 NA 1,3E-06 NC 1,2-Dichloroethare 0.0030 3,1E-05 5,1E-05 NC NC 1,2-Dichloroethare 0.0030 3,1E-05 5,1E-06 NC 1,2-Dichloroethare 0.0040 6,6E-05 3,1E-06 1,4E-05 NC 1,1-1,2-peritamone 0.0010 5,3E-06 1,4E-05 NC NC 1,1-1,2-peritamone 0.0010 5,3E-06 1,4E-06 NC NC 1,1-1,2-peritamone 0.0010 1,1E-05 NA 3,1E-06 1,0E-06 2,2E-06 NC 1,1-1,1-1 0.0120 2,0E-04 8,4E-06 NC NC NC Noneethere 0.0020 3,1E-05 3,1E-05 2,1E-06 1,0E-05 2,2E-04 Noneethere 0.0020 1,1E-05 3,1E-06 1,1E-05 NC 1,1E-05 NC Sini-bloroethere 0.0020 1,1E-05 3,1E-06 1,1E-05 3,1E-06 NC Sini-bloroethere 0.0020 1,1E-05 3,1E-	Chlorobenzeno	0.0240	3.8E-04	7,68-04	1.6E-04	NC	
1.2-Dickloncerthere (notal) 0.004 7.1E-05 NA 3.1E-05 NA 1.2-Dickloncerthere (notal) 0.004 3.1E-05 NA 1.3E-05 NC rans-1.3-Dickloncerthere 0.0000 3.1E-05 NA 1.3E-05 NC Ethylbenzene 0.0000 3.1E-05 5.5E-03 5.5E-03 1.4E-05 NC Ethylbenzene 0.0000 6.6E-05 5.5E-03 2.3E-05 5.7E-06 NC Ethylbenzene 0.0010 1.3E-05 3.2E-04 2.7E-06 NC Ethylbenzene 0.0010 1.3E-05 3.2E-04 2.7E-06 NC Ethylbenzene 0.0010 1.3E-05 3.1E-05 NC 2.7E-06 NC Ethylbenzene 0.0010 1.3E-05 3.1E-05 3.1E-05 NC Ethiltoroethere 0.0010 1.3E-05 3.1E-05 NC Common containe 0.0020 3.1E-05 3.1E-05 NC Friethoroethere 0.00120 2.0E-04 2.3E-04 NC Sylenes (total) 0.0120 2.0E-04 2.3E-04 NC Sylenes (total) 0.0120 2.0E-04 2.3E-04 NC Stickloworethere 0.0020 0.0020 0.002	I, 1-Dichloroethane	0.009	1.46-04	Í.4E-03	6.2E-05	NC	
1,2-Dickloropropane 0.0020 3.1E-05 NA 1.3E-05 NC mans-1,3-Dickloropropane 0.0020 3.2E-05 5.5E-03 1.4E-05 1.8E-06 Eitylbenzene 0.0020 3.2E-05 5.5E-03 1.4E-05 1.8E-06 Eitylbenzene 0.0020 3.2E-05 5.3E-03 1.4E-05 NC Eitylbenzene 0.0020 3.2E-05 5.3E-03 1.4E-05 NC Erneklioropropene 0.0020 1.3E-05 3.2E-03 2.8E-06 NC Erneklioropropene 0.0020 1.3E-05 3.2E-03 2.8E-06 NC Erneklioropropene 0.0020 1.3E-05 NA 1.3E-05 NC Erneklioropropene 0.0020 3.1E-05 NA 1.3E-05 NC Kylenes (total) 0.0120 2.0E-04 2.3E-03 NC NC Kylenes (total) 0.0120 2.0E-04 2.3E-03 NC NC Stillenes (total) 0.0120 9.7E-07 NA 1.3E-05 NC Bis(2-ethylberyl)phthalae 0.0020 9.7E-07 NA 4.2E-07 NC Dist-total 0.0130 1.1E-05 NA 1.4E-05 NC J.2.Dichlororbenzene 0.00	1,2-Dichloroethene (total)	0.004	7.1E-05	ý Vy	3.16-05	NC	
Inst-1.3-Dichloropropens 0.0020 3.2E-05 5.5E-03 1.4E-05 1.8E-06 Eiltylbenzene 0.0040 6.6E-05 2.3E-04 2.3E-05 8.8E-06 NC Eiltylbenzene 0.0030 6.6E-05 3.2E-05 2.3E-05 2.7E-05 NC Ernschloropropens 0.0030 6.4E-06 3.2E-05 2.7E-06 NC Trichloroptiene 0.0020 5.0F-04 8.8E-04 2.7E-06 NC Trichloroptiene 0.0020 5.0F-04 8.8E-04 2.7E-06 NC Viewes 0.0020 5.0F-04 8.8E-04 2.7E-07 NC Stichonoptiene 0.0020 2.0E-04 2.3E-05 NC Kylenes (rotal) 0.0120 2.0E-04 2.3E-07 NC Semi-VOCs 0.0020 9.7E-07 NA 2.4E-05 NC Semi-VOCs 0.0030 1.1E-05 NA 4.2E-07 NC Dist-04 1.9E-04 2.3E-05 NC 1.4E-05 NC Dis	1,2-Dichloropropane	0.0020	3.1E-05	VA Y	1.3E-05	NC	
Eilylbenzene 0.0040 6.65-05 2.38-06 NC -Methyl-2-pentarona 0.0030 6.45-06 3.28-06 NC Tertechlorocthene 0.0030 6.45-06 3.28-06 NC Technorocthene 0.0010 1.38-05 NC 2.78-06 NC Trichlorocthene 0.002 3.18-05 3.18-05 NC 2.78-06 NC Trichlorocthene 0.002 3.18-05 NA 2.78-06 NC Kylenes (total) 0.0120 2.06-04 8.68-05 NC Kylenes (total) 0.0120 2.06-04 2.38-05 NC Kylenes (total) 0.0120 2.06-04 2.38-05 NC Kylenes (total) 0.0120 2.06-04 2.38-05 NC Semi-VOC5 0.0020 9.75-07 2.06-05 NC NC Semi-VOC5 0.0020 9.75-07 NA 4.48-05 NC Distributionbenzere 0.0030 1.16-05 1.96-05 3.38-05 NC	irans-1,3-Dichloropropene	0.0020	3.2E-05	5.5E-03 <	1.4E-05	1.85-06	
Heiliyi-2-pentanona 0.0050 6,45/06 3.26/04 2.78/06 NC Frinchlonoethene 0.0010 1.38/05 NA 5.78/06 1.06-08 Frichlonoethene 0.002 5.08/04 6.45/06 3.26/04 5.78/06 1.06-08 Frichlonoethene 0.002 3.18/05 NA 5.78/06 1.06-08 Frichlonoethene 0.0120 2.06-04 2.36/05 3.18/05 NA Kylemes (total) 0.0120 2.016-04 2.36/05 3.18/05 NC Semi-VOCs 0.0020 9.76-07 NA 1.38/05 NC Bis(2-ethylhexyl)phthalate 0.0020 9.76-07 NA 4.26-07 NC Bis(2-ethylhexyl)phthalate 0.0030 9.76-07 NA 4.26-07 NC Li -butylphthalate 0.0030 1.16-05 NA 4.66-06 NC Li -Dichlorobenzene 0.0130 1.96-04 9.36-04 NC L/4-Dic NC Li -Dichlorobenzene 0.0130 1.96-04 <td< td=""><td>Ethylbenzene</td><td>0.0040</td><td>6.6E-05</td><td>2.36-04</td><td>2.8E-05</td><td>NC</td><td></td></td<>	Ethylbenzene	0.0040	6.6E-05	2.36-04	2.8E-05	NC	
Tetrachloroethene 0.0010 1.3p.05 MA 5.7p.06 1.0p.08 Tohnene 0.002 5.0pr.04 8.8p.04 2.2p.04 NC Trichloroethene 0.002 5.0pr.04 8.8p.04 2.2p.04 NC Trichloroethene 0.002 5.0pr.04 8.8p.04 2.2p.04 NC Kylenes (total) 0.0120 2.0pr.04 2.3p.03 8.4p.05 NC Semi-VOCa 0.0020 9.7pr.07 NA 4.2p.03 8.4p.05 NC Semi-VOCa 0.0120 2.0pr.04 2.3p.03 8.4p.05 NC NC Semi-VOCa 0.0020 9.7pr.07 NA 4.2p.07 NC Semi-VOCa 0.0020 9.7pr.07 NA 4.2p.07 NC Di-n-butylphthalate 0.0020 9.7pr.07 NA 4.2p.07 NC 1.4-Dicklorobenzene 0.0030 1.9pr.03 NA 4.2pr.07 NC 1.4-Dicklorobenzene 0.0030 1.9pr.03 NA 1.4pr.05 NC<	4-Methyl-2- pentanone	0.0050	6.46-06	3.28-04	2.76-06	NC	
Tolhene 0.029 5.018-04 & 88E-04 2.28-04 NC Trichlonrechene 0.002 3.1E/05 NA 1.3E-05 2.2E-04 NC Kylenes (total) 0.0120 2.0E-04 2.3E-03 8.4E-05 NC Kylenes (total) 0.0120 2.0E-04 2.3E-03 8.4E-05 NC Semi-VOCa 0.0120 2.0E-04 2.3E-03 8.4E-05 NC Semi-VOCa 0.0120 9.7E-07 NA 4.2E-07 NC Di-n-butylphthalate 0.0030 9.7E-07 NA 4.2E-07 NC J2-Dichlorobenizene 0.0030 1.1E-05 NA 4.6E-06 NC 1,4-Dichlorobenizene 0.0030 1.9E-04 9.3E-04 8.0E-05 NC 1,4-Dichlorobenizene 0.0030 3.3E-05 NA 1.4E-05 NC 1,4-Dichlorobenizene 0.0030 3.3E-04 9.0E-05 NC NC PAHs 0.0030 3.3E-05 NA 1.4E-05 NC NC	Tetrachloroethene	0.0010	Constr.1	A A	5.7B-06	1.05-08	
Trichlorocthene 0.002 3.18/05 NA 1.38-05 2.28-07 Kylenes (total) 0.0120 2.06-04 2.316-03 8.48-05 NC Semi-VOC3 0.0120 2.06-04 2.316-03 8.48-05 NC Semi-VOC3 0.0120 9.78-07 NA 4.28-07 NC Di-n-butylphthalate 0.0040 1.18-05 NA 4.66-06 NC 1,2-Dichlorobenzene 0.00130 1.98-03 3.38-04 8.06-05 NC 1,4-Dichlorobenzene 0.00130 1.99-03 3.38-04 8.06-05 NC 1,4-Dichlorobenzene 0.0030 3.38-04 8.06-05 NC NC 1,4-Dichlorobenzene 0.0030 3.38-04 8.06-05 NC NC 1,A-Dichlorobenzene 0.0030 3.38-05 NA 1.46-05 NC 1,PAHs 0.0030 3.38-04 9.08-02 NC NC	Toluene ·	0.029	5.0H-04 <	8.88-04	2.28-04	SC	
Kylenes (total) 0.0120 2.0E-dq 2.3E-03 8.4E-05 NC Semi-VOCs 0.0020 9.7E-01 NA 4.2E-07 NC Bis(2-cthylheate 0.0030 1.1E-05 NA 4.6E-05 NC Di-n-butylphthalate 0.0030 1.1E-05 NA 4.6E-06 NC 1.2-Dichlorobenzene 0.0030 1.9E-04 9.3E-05 NC 4.6E-05 NC 1.4-Dichlorobenzene 0.0030 3.3E-05 NA 1.4E-05 NC PAHs 0.0030 3.3E-05 NA 1.4E-05 NC	Trichloroethene	0.002	3.1E/05	NA	1.38-05	2.26-07	
Semi-VOCs Semi-VOCs 9.7E-01 NA 4.2E-01 NC Di-n-butylphthalate 0.0040 1.1E-05 NA 4.6E-06 NC Ji-n-butylphthalate 0.0040 1.1E-05 NA 4.6E-06 NC Ji-n-butylphthalate 0.0030 1.1E-05 NA 4.6E-06 NC Ji-1-butylphthalate 0.0030 1.9E-04 9.3E-04 8.0E-05 NC Ji-1-butylphthalate 0.0030 1.9E-04 9.3E-04 8.0E-05 NC J-Dichlorobenzene 0.0030 3.3E-05 NA 1.4E-05 NC PAHs 0.0030 3.3E-05 NA 1.4E-05 NC	Kyl enes (total)	0.0120	2.05-04	2.35-03	8.4E-05	NC	
Bis(2-ethylhexyl)phthalate 0.0020 9.7E-07 NA 4.2E-07 NC Di-n-butylphthalate 0.0040 1.1E-05 NA 4.6E-06 NC Di-n-butylphthalate 0.0040 1.1E-05 NA 4.6E-06 NC 1,2-Dichlorobenizene 0.0030 1.9E-04 9.3E-03 3.3E-05 NC 1,4-Dichlorobenizene 0.0030 3.3E-05 NA 1.4E-05 NC 1,4-Dichlorobenizene 0.0030 3.3E-05 NA 1.4E-05 NC PAHs 0.0030 1.9E-04 9.3E-06 Total 9.0E-02 1.4E-05 NC	Cerni-VOCe						
Di-n-butylphthalate 0.0040 1.1E-05 NA 4.6E-06 NC 1,2-Dichlorobenizene 0.0030 1.9E-04 9.3E-04 8.0E-05 NC 1,4-Dichlorobenizene 0.0130 1.9E-04 9.3E-04 8.0E-05 NC 1,4-Dichlorobenizene 0.0030 3.3E-05 NA 1.4E-05 NC -PAHs 0.0030 3.3E-05 NA 1.4E-05 NC -PAHs 0.0030 3.3E-05 NA 1.4E-05 NC	Bis(2-ethylhexyl)phthalate	0.0020) 9.7E-07	٧N	4.2B-07	SC	
1,2-Dichlorobenzene 0.0055 1.6E-05 1.9E-03 3.3E-05 NC 1,4-Dichlorobenzene 0.0130 1.9E-04 9.3E-04 8.0E-05 NC 1,4-Dichlorobenzene 0.0030 3.3E-05 NA 1.4E-05 NC PAHs 0.0030 3.3E-05 NA 1.4E-05 NC PAHs 0.0030 3.3E-05 NA 1.4E-05 NC	Di-n-butylphthalate	0.0040) / I.IE-05	NA	4.6E-06	NC	
I,4-Dichlorobenzene 0.0130 I.9E-04 9.3E-04 8.0E-05 NC I-PAHs 0.0030 3.3E-05 NA I.4E-05 NC Total 9.0E-02 Total 3E-06 3E-06	1,2-Dichlorobenzene	0.0055	A.6E-05	1.95-03	3.3E-05	NC	
I-PAHs 0.0030 3.3E-05 NA I.4E-05 NC Total 9.0E-02 Total 3E-06	1,4-Dichlorobenzene	0.0130	1.96-04	9.3E-04	8.0E-05	NC	
Total 9.0E.02 Total 3E.06	I-PAHs	0:0030	3.3E-05	VN	1.4E-05	NC	
			<. Total	9.0E-02	Total	3E-06	

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Shower Exposure Doses and Calculations, Future Hypothetical On-Site Resident (On-Site Monitor Wells at Cluster 3), Novak Sanitary Landfill, South Whitehall Township, Pennsylvania. Table A-33c.



Constituent VOCs		Non-Canc	zer Effects	Cano	er Risk
VOCs	C	ShExD	DH	ShExD	ELCR
Acctone	0.0020	7.9E-06	NA	3.46-06	NC
Benzene	0.0060	1.1E-04	NA /	4.7E-05	1.4E-06
Chloroethane	0.034	6.7E-04	2.3E-04	2.96-04	NC
1,1-Dichloroethane	0.160	2.78-03	2.7E-02	1.26-03	NC
1,2-Dichloroethene (total)	0.120	2.0E-03	V V	8.7E-04	NC
1.2-Dichloropropane	0.0110	1.7E-04	V / VN	7.38-05	NC
Ethylbenzene	0.0010	1.7E-05	5.7E-05	7.1E-06	NC
4-Methyl-2-pentanone	0.0040	5.1E-06	2.5E-04	2.2E-06	NC
Styreno	0.0010	1.66-05	NA /	6.8E-06	1.4E-08
Tetrachloroethene	0.0039	5.2E-05/>	AN	2.2E-05	4.0E-08
Tolucno	0.050	8.7B-04	1.5E-03	3.7E-04	NC
1,1,1-Trichloroethane	0.0096	1.5E-04 <	4.9E-04	6.3E-05	NC
Trichloroethene	0.055	8.4E-04	NA	3.6E-04	6.1E-06
Vinyl chloride	8600'0	2.0E-04	1.5E-01	8.5E-05	2.5E-05
Xylenes (total)	0.0044	7.2E-05	8.4E-04	3.1E-05	NC
Semi-VOCs					• .
Diethylphthalate	0.0030	1.6E-07	NA	6.7E-08	NC
4-Methylph en ol	0:020	3.58-06	NA	1.5E-06	Ŋ
	>	Total	1.8E-01	Total	3E-05

Footnotes appear on page 2.

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	Landfill, South Whitehall Township, Pennsylvania.
	Constituent concentration in the on-site monitor wells NSL-MW-6 and NSL-MW-8 (mg/L). The lesser of the maximum detect and the 95 percent upper confidence limit is used.
ДX	Inhalation exposure dose from showering (mg/kg-shower).
a U	Hazard quotient. The sum of the hazard quotients is the hazard index (HI). Excess lifetime cancer risk.
	Not applicable.
	Not carcinogenic by the inhalation route.

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Table A-35.	Soil Exposure Dose Township, Pennsyl ¹	es and Risk Calce vania	slations for a Potenti	al Current Child	Trespasser, Nova	k Sanitary Landf	II, South Whitehall	
			No	n-Cancer Risk			Cancer Risk	
Constituent		U ප	SExDod	SExDip	Н	SExDod	SExDip	ELCR
Inorganics								
Aluminum	° 1	200	4.9E-02	8.88-07	NA	6.3E-03	1.16-07	NC
Arsenic		18	9.5E-06	2.6E-09	3.25-02	1.2E-06	3.3E-10	2.28-06
Barium	•	46	8.7E-05	6.5E-09	1.36-03	1.16-05	8.48-10	NC
Cadmium		13	3.8E-05	1.8E-09	7.7E-02	4.9E-06	2.46-10	1.4E-09
Chromium		14	4.88-05	2.0E-09	1.3E-02	6.1E-06	2.68-10	1.0E-08
Cobalt		16	1.4E-05	2.3E-09	NA	1.8E-06	2.96-10	NC
Copper		14	8.7E-06	2.05-09	2.36-04	1.1E-06	2.6B-10	NC
Lead		2	4.4E-05	1.3B-08 7	NA	5.6B-06	1.7E-09	NC
Manganeso	7	000	6.8E-04	2.8E ⁰⁸	NNB-03	8.7E-05	3.66-09	NC
Nickel		28	9.5E-05	4.0E-09	4.8E-03	1.2E-05	5.1E-10	4.3E-10
Selenium	0	.99	5.2E-07	1.4E-10	1.06-04	6.7E-08	1.88-11	NC
Vanadium		23	3.6E-04	3.3E-09	5.1E-02	4.6E-05	4.2E-10	NC
Zinc		80	4.3E.04	1.1E-08 V	2.2E-03	5.5E-05	1.5E-09	NC
				Total	1.9E-01		Total	2E-06
రి	Constituent concent	tration in the soil	i (mg/kg). The less	fr of the maximu	m detect and the 9	5 percent upper	confidence limit is used.	
SExDod	Soil exposure dose	from incidental i	ingestion and derinal	contact (mg/kg-	day).			
SExDip	Soil exposure dose	from inhalation (of particulates (mg/k	g-day).				
ŎH.	Hazard quotient. T	The sum of the he	izard quotients is the	hazard index (H	Ð.			
ELCR	Excess lifetime cany	oer risk.						

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Not applicable. Not carcinogenic.

V N N

Table A-36.	Soil Exposure Doses and Risk Township, Pennsylvania.	Calculations for a Fu	ture Hypothetical /	dult Resident, Nova	k Sanitary Land	fill, South Whit	chall
			Non-Cancer Risk			Cancer Risk	
Constituent	Cs	SExDod	SExDip	N	SExBod	SExDip	ELCR
Inorganics				Ś			
Aluminum	6,200	1.9E-01	1.6E-05	ŊĂ	6.5E-02	5.5E-06	NC
Arsenic	18	3.6E-05	4.7E-08	IK2E-01	1.2E-05	1.6E-08	2.3E-05
Barium	46	3.3E-04	1.2E-07	5.9B-03 <	1.1E-04	4.1E-08	Ŋ
Cadmium	13	1.5E-04	3.4E-08	2.96-01	5.0E-05	1.2E-08	7.0E-08
Chromium	14	1.8E-04	3.6E-08	1.0E-01	6.3E-05	1.2E-08	5.1E-07
Cobalt	16	5.3E-05	4.15-08	NA V	1.8E-05	1.4E-08	NC
Copper	14	3.3E-05	3.6E-08	8.9E-04	1.1E-05	1.2E-08	NC
Lead	92	1.7E-04	p.4E-09	V N	5.7E-05	8.2E-08	NC
Manganese	200	2.6E-03	s/2E-dv	3,1E-02	8.9E-04	1.8E-07	NC
Nickel	28	3.7E-04	7.46-08	Ĭ.8E-02	1.3E-04	2.5E-08	2.1E-08
Selenium	0.99	2.0E-06	2.6E-09	4.0E-04	6.8E-07	8.8E-10	NC
Vanadium.	23	1.4E-03	6.08-08	2.0E-01	4.7E-04	2.0E-08	NC
Zinc	80	1.7E-03	2.1E-01	8.3E-03	5.7E-04	7.1E-08	NC
			Total	7.8E-01		Total	2E-05
	-						
Cs SExDod	Constituent concentration in the Soil exposure dose from incided	s soil (mg/kg) The stal ingestion and des	Aesser of the maxim mal contact (mg/kj	mm detect and the 95 z-day).	percent upper o	onfidence limit	is used.
SExDip HO	Soil exposure dose from inhalat Harard minitant The sum of the	ion of particulates (n to hazard austiants is	ng/kg-day). e the herend index /	AIN .			
ELCR NA NC	Excess lifetime cancer risk. Not applicable. Not carcinogenic.						

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Table A-37.	Soil Exposure Whitehall Tow	Doses and mship, Per	l Risk Calcul msylvania.	ations f	or a Futuro F	Iypothetical Ch	ild Resident (,	Aged 0 to	6 Years), Nov	rak Sanitary Landl >	fill, South
					Ž	m-Cancer Risk			K	Cancer Risk	
Constituent		చ	•	SE	xDod	SExDip	ЫQ		SExDod	SExDip	ELCR
Inorganics								$\langle \rangle$		>	
Aluminum		6,200		1.1	E+00	7.58-05	NA	\langle	9.7E-02	6.4E-06	NC
Arsenic	•	18		3.(DE-04	2.26-07	9.9E.01		2.5E-05	1.9E-08	4.6E-05
Barium		4	· .	2.1	1E-03	5.6E-07	3.68-02		1.8E-04	4.8E-08	NC
Cadmium		13		.9	1E-04	1.6E-07	1.88+00	^ /	7.86-05	1.3E-08	8.2E-08
Chromium		14		.	1E-03	1.78-07	5.2E-01	>	9.7E-05	1.4E-08	5.98-07
Cobalt		16		.	8E-04	1.95-07	NA		3.3E-05	1.7E-08	NC
Copper	ц 	14		5.6	5E-04	1 /1E-01	CO-30%	1	2.2E-05	1.4E-08	NC
Lead an an		8			5E-03	1/18-06	AN		1.3E-04	9.5E-08	NC
Mangancso		28		1.0	5E-02	2.4E-06	10/28 V		1.4E-03	2.18-07	NC
Nickel	•	58		2.	3E-03	3.4E-07 /	1.1E-01		1.96-04	2.96-08	2.46-08
Selenium		0.99		1.4	SE-05	1.28-08	3.3E-03		1.4E-06	1.0E-09	NC
Vanadium		ន			115-03	2.8E-07	1.2E+00		6.9E-04	2.4E-08	NC
Zinc		80		Ž	SE-02	9.7E-01	5.0E-02		8.5E-04	8.3E-08	NC
						Total	4.9E+00			Total	5E-05
				۲,		k					
5 1	Constituent con	ncentration	in the soil	(mg(kg)). The lesser	of the maximu	m detect and	the 95 pen	cent upper con	undence limit is us	jed.
SEXDod	Soil exposure (dose from ;	incidental in inhalation of	gestion.	and domal c	contact (mg/kg-i 	lay).				
HO	Hazard guotien	tt. The sur	m of the haz	and anot	tients is the h	azard index (H)	ď				
ELCR	Excess lifetime	canter ris	-	-			<u>k</u>				
VN	Not applicable.	\checkmark									
NC	Not carcinogen	nic	>								
		/									
			>								

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able A-39.	Air Exposure Doses and Risk Calculations for a Potential Current Trespasser, Novak Sanitary Landfill, South Whitehall Township,
	Pennsylvania.

				$\overline{\langle}$	
		Non-Ca	ncer Risk		cer Risk
Constituent	Ca	AExD	ЮН	AEAD	ELCR
VOCs			<	>	
Acelone	0.0022	3.38-05	NA	4.38-06	NC
Benzene	0.0050	7.6E-05	NA /	9.7E-06	2.8E-07
2-Butanone	0.0076	1.26-04	<1.3E-03	1.5E-05	NC
Carbon disulfide	0.00037	5.6E-06),9E-03 <	7.26-07	NC
Carbon tetrachloride	0.00086	1.3E-05	NA NA	1.7E-06	2.26-07
Chloroform	0.00027	4.1E-06	NA	5.3E-07	4.3E-08
1,2-Dichloroethane	0.00027	4.16-06	NA NA	5.3E-07	4.88-08
Ethylbenzene	0.0014	2.16-08	7.36-05	2.7E-06	NC
Methylene chloride	0.0085	1.36,04	5E-03	1.7E-05	2.6E-08
Tetrachloroethene	0.00079	1.2E-45 🗸	AN <	1.5E-06	2.8E-09
Toluene	0.0072	1.16-04	1.9E-04	1.4E-05	NC
1,1,1-Trichloroethan	e 0.0019	2.9E-05	9.6E-05	3.7E-06	NC
Trichloroethene	0.0015	2.3E-05	NA	2.98-06	5.0E-08
Vinyl acetate	0.00028	4.2E-06	7.4E-05	5.5E-07	NC
Xylenes (total)	0.0130	2.0E-04	2.3E-03	2.5E-05	NC
		Total	7.4E-03	Total	7E-07
Cons	stituent concentration in air (m	a/m3). The lesser of the maxim	um detection and the 95	percent upper confidence li	imit is used.
AExD Exp	osure dose from inhaling VOC	s in the air (mg/kg-day).			
HQ Haz	rd quotient. The sum of the h	iazard quotients is the hazard ind	lex (HI).		
NA Not	as illetime cancer nak.				
NC Not	carcinogenic by the inhalation	route.			

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Constituent Ca AEx0 HQ AEx0 HQ AEx0 EC VOC3 Acetome 0.0023 6.15-04 MA 2.18-04 NC Acetome 0.0020 1.46-03 MA 2.18-04 NC Pharame 0.0003 2.18-03 MA 2.18-04 NC Pharame 0.0003 2.16-03 3.56-05 NC 7.28-04 NC Carbon tenselorids 0.00037 7.58-05 NA 2.66-05 2.18-04 NC Carbon tenselorids 0.00037 7.58-05 NA 2.66-05 2.18-04 NC Chronofirm 0.00037 7.58-05 NA 2.66-05 2.18-04 NC Chronofirm 0.00037 7.58-05 1.35-03 2.18-04 NC Ethylbrainesia 0.00037 7.58-05 1.35-03 2.18-04 NC Ethylbrainesia 0.00037 2.58-04 NA 2.68-05 NC Ethylbrainesi 0.00037 2.58-05			Non-Ca	neer Risk	Can	teer Risk
VOC3 6.1E-04 NA 2.1E-04 NC Actions 0.0020 1.4E-03 NA 4.7E-04 1.4E-03 2.Butamore 0.0030 1.4E-03 NA 4.7E-04 1.4E-03 2.Butamore 0.0030 1.4E-03 NA 4.7E-04 1.4E-03 2.Butamore 0.0030 2.1E-03 2.3E-03 NA 7.2E-04 NC Chronofinan 0.00030 2.4E-04 NA 2.5E-05 NC 7.2E-04 NC Chloroform 0.00031 7.5E-04 NA 2.6E-05 2.1E-03 2.3E-04 NC Chloroform 0.00031 7.5E-05 NA 2.6E-05 2.1E-03 2.1E-03 2.1E-03 2.1E-03 2.1E-03 2.1E-03 2.1E-03 NC Chloroform 0.00031 7.5E-04 NA 2.6E-05 2.1E-03 NC Ethylbrametric 0.00032 2.2E-04 NA 2.6E-05 2.1E-03 NC Chloroform 0.0014 2.3E-05 <td< th=""><th>Constituent</th><th>చ</th><th>AExD</th><th>δH</th><th>drav ></th><th>ELCR</th></td<>	Constituent	చ	AExD	δH	drav >	ELCR
Actors 0.002 6.1E-04 NA 2.1E-04 NA Benzere 0.0036 1.4E-03 NA 2.1E-04 NA 2.Platamene 0.0005 2.1E-03 2.3E-03 NA 2.1E-04 NC 2.Platamene 0.0005 2.1E-03 2.3E-03 NA 2.5E-05 NC 2.nhorder 0.00037 1.0E-04 3.5E-03 NA 2.6E-05 NC Carbon atrachfords 0.00037 7.5E-05 NA 2.6E-05 2.1E-03 2.5E-05 NC Carbon atrachfords 0.00037 7.5E-05 NA 2.6E-05 NC Ethylbenzene 0.00037 2.3E-05 NA 2.6E-05 2.1E-03 Methylne 3.5E-03 NA 2.6E-05 2.1E-03 NC Methylne 0.00037 2.3E-05 NA 2.6E-05 NC Ethylbenzene 0.00012 2.3E-05 NA 2.6E-05 NC Ethylbenzene 0.00012 2.3E-05 NA 2.6E-0	VOCs			\langle		
Bename 0.0050 1.4E-03 NA 4.7E-04 1.4E-03 2.blutatione 0.0076 2.1E-03 2.3E-02 7.2E-04 NC 2.chrom directione 0.00075 2.1E-03 2.3E-02 7.2E-04 NC Carbon directione 0.00075 2.4E-03 NA 2.6E-05 2.3E-03 NC Carbon directione 0.00073 7.5E-05 NA 2.6E-05 2.3E-03 NC Carbon directione 0.00073 7.5E-05 NA 2.6E-05 2.3E-03 NC Ethylbenizene 0.00073 2.3E-04 1.3E-03 NA 2.6E-05 2.3E-04 NC Reitylylene cilonide 0.00073 2.3E-04 1.3E-03 2.4E-03 NC 7.5E-03 NC Totellonorethene 0.0013 5.2E-04 NA 7.5E-03 NC 7.5E-03 NC Totellonorethene 0.0015 5.2E-04 NA 7.5E-03 NC 7.5E-03 NC 7.5E-03 NC 7.5E-03 NC 7.5	Acetone	0.0022	6.1E-04	NA N	2.1E-04	NC
2-Butance 0.0076 2.18-03 2.38-02 7.28-04 NC Carbon distificie 0.00037 1.08-04 3.58-05 NC Carbon terrachiorie 0.00027 7.58-05 NA 2.58-05 NC Carbon terrachiorie 0.00027 7.58-05 NA 2.66-05 2.18-0 Libbihorentane 0.00014 3.98/04 1.38-05 NC 0.66-05 2.18-05 Ritylbentane 0.00013 7.58-05 NA 2.66-05 2.18-05 Ritylbentane 0.00014 3.98/04 1.38-05 NC 0.66-05 2.18-05 Ritylbentane 0.00013 2.38-05 NA 2.68-05 1.38-05 NC Tolenen 0.00013 2.38-05 1.38-05 7.58-05 1.38-05 NC Tolenen 0.00015 2.28-05 1.38-05 NC NC NC Tolenen 0.00013 4.18-04 NA 2.58-05 1.38-05 NC Trichlororethene 0.00013 4.1	Benzene	0.0050	1.46-03	> VN	4.7E-04	1.4E-05
Carbon disulfide 0.00037 1.0E-04 3.5E-02 3.5E-02 3.5E-05 NC Carbon terrachonide 0.00036 2.4E-04 NA 2.6E-05 2.1E-05 1.1E-05 1.1E-04 1.2E-05 1.1E-04 1.2E-05 1.2E-05 1.2E-05 1.2E-05 1.2E-05 1.2E-05 1.2E-05 1.2E-05 1.2E-05	2-Butanone	0.0076	2.1E-03	2.3H-02	7.2E-04	NC
Carbon tetractionide 0.00056 2.4E.04 NA 8.1E-05 1.1E-05	Carbon disulfide	0.00037	1.05-04	3.5E-02	3.5E-05	NC
Chloroform 0.00027 7.58-05 2.16-05 <td>Carbon tetrachloride</td> <td>0.00086</td> <td>2.46-04</td> <td>VN V</td> <td>8.1E-05</td> <td>1.16-05</td>	Carbon tetrachloride	0.00086	2.46-04	VN V	8.1E-05	1.16-05
1,2-Dickhoncethane 0.00014 7.5E-05 7.5E-05 2.3E-04 NA 2.6E-05 2.3E-04 NC Ethylhenizme 0.0014 3.9E(04 1.3E-03 8.0E-04 1.3E-04 NC Terractionrecthane 0.00073 2.2E-04 NA 7.5E-05 1.3E-04 NC Tolterne 0.00073 2.2E-04 NA 7.5E-05 1.3E-04 NC Tolterne 0.0019 2.2E-04 NA 7.5E-05 1.3E-04 NC Tichlonrecthane 0.0019 5.2E-04 NA 1.4E-03 1.5E-03 0.5E-05 1.3E-04 NC Viryl acetate 0.0019 5.2E-04 NA 1.4E-03 1.4E-03 NC NC Viryl acetate 0.0019 4.1E-04 1.2E-03 1.3E-03 NC NC Viryl acetate 0.0013 0.013 3.6E-03 1.2E-03 NC NC Viryl acetate 0.0019 4.1E-04 1.1E-03 1.1E-03 NC I.4E-04 2.3E-05 NC Viryl acetate 0.0013 0.013 3.6E-03 1.2E-0	Chloroform	0.00027	7.5E-05	NA	2.6E-05	2.1E-06
Ethylbenizene0.00143.9E/041.3E-031.3E-04NCMethylenizene0.00032.3E-032.3E-038.0E-041.3E-03Toluene0.000732.2E-04NA7.5E-051.3E-03Toluene0.000132.1E-04NA7.5E-051.3E-04Tichloroethene0.00134.1E-04NA7.5E-051.3E-03U.1.1-Trichloroethene0.00134.1E-04NA7.5E-051.3E-03Vinyl accate0.00134.1E-04NA1.4E-04NCVinyl accate0.00134.1E-04NA1.4E-031.4E-04NCVinyl accate0.00134.1E-04NA1.4E-031.4E-042.4E-02Vinyl accate0.00134.1E-041.1E-011.4E-042.4E-021.2E-03Xylenes (total)0.0130.0134.2E-021.1E-013E-05ActorExposure dose from inhalting VOCs in the air (mg/m3). The lesser of the maximum detection and the 95 percent upper confidence limit is used.NANot application.Not application.Not application.NANot application.Not application.Not application.NANot application.Not application.Not application.NANot application.Not application.Not application.	1,2-Dichloroethane	0.00027	7.5E-05	VV	2.66-05	2.38-06
Methylene chloride 0.0035 2.3E-03 2.0E-03 8.0E-04 1.3E-03 Toluene 0.0072 2.2E-04 NA 7.5E-05 1.3E-03 Toluene 0.0015 3.2E-04 NA 7.5E-05 1.3E-03 Tichloroethene 0.0015 5.2E-04 NA 7.5E-05 1.3E-04 Vinyl actate 0.0015 5.2E-04 NA 7.5E-05 1.3E-04 Vinyl actate 0.0015 4.1E-04 NA 1.4E-04 2.4E-05 Vinyl actate 0.0013 3.6E-05 1.2E-03 2.3E-05 NC Vinyl actate 0.0013 3.6E-05 1.2E-03 2.3E-05 NC Vinyl actate 0.0013 3.6E-05 1.2E-03 2.3E-05 NC Xylenes (total) 0.013 3.6E-05 1.2E-03 2.3E-05 NC Xylenes (total) 0.013 3.6E-05 1.2E-03 NC 1.2E-03 NC Konstructurente 0.0013 3.6E-05 1.2E-03 NC 1.2E-03 NC Konstructurente 0.013 0.013 0.013 1.1E-01 Total 3E-05 Konstructurente 0.013 0.013 1.1E-01 Total 3E-05 1.2E-03	Ethylbenzene	0.0014	C 10/26'E	1.38-03	1.36-04	NC
Tetrachloroethene 0.00079 2.2E-04 NA 7.5E-05 1.3E-05 Tolueno 0.0072 2.0E-03 3.5E-03 6.8E-04 NC Tichloroethene 0.0015 5.2E-04 NA 7.5E-05 1.3E-04 Vinyl acetate 0.0015 5.2E-04 NA 1.4E-04 2.4E-04 Vinyl acetate 0.0015 4.1E-04 1.7E-03 1.4E-04 2.4E-04 Vinyl acetate 0.0013 4.1E-04 1.4E-04 2.4E-03 Xylenes (total) 0.013 3.6E-03 4.2E-03 1.2E-03 NC Xylenes (total) 0.013 3.6E-03 4.2E-02 1.2E-03 NC Kylenes (total) 0.013 7.0tal 1.1E-01 7.0tal 3.6-03 Kota Excoss liferine date of the maximum de	Methylene chloride	0.0085	2.36-03 <	Z/18-03	8.0E-04	1.35-06
Toluene 0.0072 2.0E-03 3.5E-03 3.5E-03 6.8E-04 NC 1,1,1-Trichlorochane 0.0019 5.2E-04 N N 1.8E-04 NC Trichlorochane 0.0015 5.2E-04 1.7E-03 1.8E-04 NC Viryl acctate 0.0015 5.6E-05 1.7E-03 1.8E-04 2.4B-04 Viryl acctate 0.0013 4.1E-04 N 1.4E-03 1.4E-04 2.4B-04 Xylenes (total) 0.013 3.6E-03 4.2E-02 1.2E-03 N Xylenes (total) 0.013 3.6E-03 4.2E-02 1.2E-03 N Ca Constituent concentration in air (mg/m3). The lesser of the maximum detection and the 95 percent upper confidence limit is used. AE.0 AE.0 HQ Hazard quotient. The and quotients is the hazard index (H). N Not applicable. Applicable.	Tetrachloroethene	0.00079	2.2E-04	N	7.5E-05	1.36-07
1.1.1-Trichlomeethane 0.0015 5.2.8-04 1.7.8-03 1.86-04 NC Trichloroethane 0.0015 4.18-04 NA 1.48-04 2.48-0 Vinyl acetate 0.00024 6.68-05 1.28-03 2.48-04 2.48-04 Vinyl acetate 0.0013 3.68-03 4.18-04 2.48-04 2.48-04 Xylenes (total) 0.013 3.68-03 4.28-02 1.28-03 NC Xylenes (total) 0.013 3.68-03 4.28-02 1.28-03 NC Xylenes (total) 0.013 3.68-03 4.28-02 1.18-01 Total 3.8-05 Xylenes (total) 0.013 3.68-03 4.28-02 1.18-01 Total 38-05 Xylenes (total) 0.013 7.04al 1.18-01 1.18-01 Total 38-05 AEAD Exposure dose from inhalting VOCs in the air (mg/kg-day). HQ Hazard quotient. The ann of the hazard index (HI). Total 38-05 NA Not applicable. Not applicable. <td< td=""><td>Tolueno</td><td>0.0072</td><td>2.0E-03</td><td>3.58-03</td><td>6.8E-04</td><td>NC</td></td<>	Tolueno	0.0072	2.0E-03	3.58-03	6.8E-04	NC
Trichloroethere 0.0015 4.1E-04 NA 1.4E-04 2.4E-06 Vinyl acetate 0.00024 6.6E-05 1.2E-03 2.3E-05 NC Xylenes (total) 0.013 3.6E-03 4.2E-02 1.2E-03 NC Ca Constituent concentration in air (mg/m3). The lesser of the maximum detection and the 95 percent upper confidence limit is used. Hazard guotient. The num of the hazard quotients is the hazard index (H). Total 3E-05 Not applicitle. Not applicitle. Not applicitle. Not applicitle. Not applicitle.	1,1,1-Trichloroethane	0.0019) 5.2E-04	1.7E-03	1.85-04	NC
Vinyl acctate0.000246.6E-051.2E-032.3B-05NCXylenes (total)0.0133.6E-034.2E-021.2E-03NCCaConstituent concentration in air (mg/m3). The lesser of the maximum detection and the 95 percent upper confidence limit is used.ActoHazard guotient. The lesser of the hazard index (H1).Exposure dose from inhaling VOCs in the air (mg/kg-day).NANot applicible.Not applicible.Not applicible.	Trichloroethene	0.0015	4.IE-04 /	NA	1.48-04	2.48-06
Xylenes (total) 0.013 3.6E-03 4.2E-02 1.2E-03 NC Ca Constituent concentration in air (mg/m3). The lesser of the maximum detection and the 95 percent upper confidence limit is used. 3E-05 AExD Exposure dose from inhaling VOCs in the air (mg/kg-day). 1.1E-01 Total 3E-05 HQ Hazard guotient. The sum of the hazard quotients is the hazard index (H1). 5 percent upper confidence limit is used. NA Not applicable. Not applicable. Not applicable.	Vinyl acctate	0.00024	6.6E-05	1.2E-03	2.3E-05	NC
Ca Total 1.1E.01 Total 3E.02 Ca Constituent concentration in air (mg/m3). The lesser of the maximum detection and the 95 percent upper confidence limit is used. 3E.02 AExD Exposure dose from inhaling VOCs in the air (mg/kg-day). Hazard guotient. The sum of the hazard quotients is the hazard index (H1). Second the 95 percent upper confidence limit is used. NA Not applicable. Not applicable.	Xylenes (total)	0.013 <	3.6E-03	4.2E-02	1.2E-03	NC
Ca Constituent concentration in air (mg/m3). The lesser of the maximum detection and the 95 percent upper confidence limit is used. AEXD Exposure dose from inhaling VOCs in the air (mg/kg-day). HQ Hazard guotient. The sum of the hazard quotients is the hazard index (H1). ELCR Excess lifetime cancer hist. NA Not applicable.			Total	1.1E-01	Total	3E-05
Ca Constituent concentration in air (mg/m3). The lesser of the maximum detection and the 95 percent upper confidence limit is used. AEXD Exposure dose from inhaling VOCs in the air (mg/kg-day). HQ Hazard guotient. The sum of the hazard quotients is the hazard index (HI). ELCR Excess lifetime cancer risk. NA Not applicable.						
AEXD Exposure dose from inhaling VOCs in the air (mg/kg-day). HQ Hazard guotient. The sum of the hazard quotients is the hazard index (HI). ELCR Excess lifetime cancer risk. NA Not applicable.	Ca Constituent	concentration in air (mg/	m3). The lesser of the max	timum detection and the	.95 percent upper confidence	o limit is used.
HQ Hazard guotient. The sum of the hazard quotients is the hazard index (HI). ELCR Excess lifetime cancer risk. NA Not applicable.	AExD Exposure d	pse from inhaling VOCs i	n the air (mg/kg-day).			
NA Not applicable.	HQ Hazard guid El CP Eucase Nicas	tient. The sum of the haz	ard quotients is the hazard	index (HI).		
	NA NA NA amlice	Ma value link.			۲.	
	No have and the second se	ation but the inhalation on				

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Table A-41.	Air Exposure Doses and Risk Calc South Whitehall Township, Penns	culations for a Future Hypothe ylvania.	tical Child Resident (Aged	0 to 6 Years), Novak Sani	itary Landfill,
		Non-Can	cer Risk	Cances	r Rísk
Constituent	CB	AExD	HQ	AELD	ELCR
VOCs			<	>	
Acetone	0.0022	2.8E-03	VN V	2.4E-04	NC
Benzene	0.0050	6.4E-03	NA	5.SE-04	1.6E-05
2-Butanone	0.0076	9.8E-03	1.16-01	8.4E-04	NC
Carbon disulfid	le 0.00037	4.8E-04	1.6ÈQI	4.1E-05	NC
Carbon tetrachl	loride 0.00086	1.1E-03	NA .	9.5E-05	1.2E-05
Chloroform	0.00027	3.5E-04	NA	3.0E-05	2.4E-06
1,2-Dichloroetl	hane 0.00027	3.5E-04	NA	3.0E-05	2.7E-06
Ethylbenzene	0.0014	1.8E-03	6.2E-03	1.5E-04	NC
Methylene chia	nide 0.0085	1.1E-02	1.36.02	9.4E-04	1.5E-06
Tetrachloroethe	ene 0.00079	1.0E-03 / /	Xí <	8.7E-05	1.6E-07
Toluene	0.0072	9.3E-03	1.66-02	8.0E-04	NC
1,1,1-Trichlore	clinane 0.0019	2.4E-03	8.2E-03	2.1E-04	NC
Trichloroethen	e 0.00150	1.9E-03	VN V	1.7E-04	2.8E-06
Vinyl acetate	0.00028	3.6E-04	6.3E-03	3.16-05	NC
Xylenes (total)	0.013)1.7E-02	1.9E-01	1.4E-03	NC
		Total	5.2E-01	Total	4E-05
ů	Constituent concentration in air (m	ag/m3). The lesser of the max	imum detection and the 95	percent upper confidence	limit is used.
AExD	Exposure dose from inhaling VOC	s in the air (mg/kg-day).			
нQ гг др	Hazard quotient. The sum of the i	hazard quotients is the hazard i	index (HI).		
ELCK NA	Excess lifetime cencer risk.		ı		
NC	Not carcinogenic by the inhabition	roule.			
	>				
)					
		-			CA NHLLER

Table A-42.	Equations and Sample Calculations for Exposure to Leachate Seep Area, Nova	k
	Sanitary Landfill, South Whitehall Township, Pennsylvania.	

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Equation De	efinitions:
LExD =	$\frac{C_{1,x}(R_{1,x} + ISSA \times PC \times UC1) \times ET \times EF \times ED}{BW \times AP} + \frac{C_{1,x}(R_{1,x} + ISSA \times SAR \times BAFI) \times EF \times ED}{BW \times AP \times UC2}$
HQ =	LExD/RfD.
ELCR =	LEXD x CSF.
where:	
AP	Averaging period (equal to ED x 365 days/year for non-cancer effects; 25,550 days [70 years x 365 days/year] for cancer effects) (USEPA, 1989a).
BAF	Bioavailability adjustment factor for dermal exposure (unitless) (from Table A- 17).
BW	Body weight (70 kg for an adult; 38 kg for an older child [aged 6 to 15]; 15 kg for a young child [aged 0 to 6]) (USEPA, 1991a; USEPA, 1989d).
CL	Constituent concentration in the leachate seep water (mg/L) (lesser of 95 percent upper confidence limit on the arithmetic average or maximum concentration).
CLS	Constituent concentration in the sufficial soil collected in the vicinity of the leachate seep areas (mg/kg) (lesser of 95 percent upper confidence limit on the arithmetic average or maximum concentration).
CSF _e ED	Cancer slope factor for oral exposure (mg/kg-day) ⁻¹ (Table A-16). Exposure duration (30 years for an adult: 9 years for an older child laged 6 to
. EF	15]; 6 years for a young child [aged 0 to 6]. Exposure frequency (50 days/year [1 day/week for 50 weeks/year] for a young child or older child; 12 days/year [1 day/month for 12 months/year for an adult).
ELCR	Excess lifetime cancer risk (unitless).
EI	Exposure time (1' hour/day for a young child or an older child; U.S hour/day for an adult).
₽Q _	Hazard quotient (unitless).
	Incidental ingestion rate of leachate seep water (0.005 L/hour).
	areas (100 mg/day).
LÈxP	Exposure dose from contact with seep water and surface soils collected in the vicinity of the leachate seep areas (mg/kg-day).
PC	Permeability constant (cm/hour) (from Table A-18).
SAR	Soil adherence rate (1.45 mg/cm ² -day) (USEPA, 1989a).
SSA	[aged 0 to 6] hands and feet; 1,488 cm ² for an older child [aged 6 to 15] hands and feet) (IISEPA 1989d)
RfD	Reference dose for oral exposure (mg/kg-day) (from Table A-16)
UCI	Unit conversion 1 (10 ³ L/cm ³).
UC2	Unit conversion 2 (10 ^e mg/kg).

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Page 2 of 2 Table A-42. Equations and Sample Calculations for Exposure to Leachate Seep Area, Novak Sanitary Landfill, South Whitehall Township, Pennsylvania.

Beryl	liur	m Sample Calculations: Potential Current Trespasser	
	r I	Effects	
LExD	3	(1.1E-02 mg/L) x {(0.005 L/hr) + [(1.488 cm ²) x (8.0E-04 cm/hr) x (10 ⁻³ L/cm ³)]} x {(1 hr/d) x (50 d/vr) x (9 vr) (38 kg) x (70 yr x 365 d/yr)	
	+	$\frac{(1.5E+00 \text{ mg/kg}) \times \{(100 \text{ mg/d}) + [(1.488 \text{ cm}^2) \times (1.45 \text{ mg/cm}^2 - 0) \times (0.1)]\} \times (50^{\circ} \text{ dyr}) \times (9^{\circ} \text{ yr})}{(38 \text{ kg}) \times (70 \text{ yr} \times 365 \text{ d/yr}) \times (10^{\circ} \text{ mg/kg})}$	
	#	2.5E-07 mg/kg-day	
ELCR	=	(2.5E-07 mg/kg-day) x (4.3E+00 (mg/kg-day) ⁻¹)	
	=	1.1E-06	
Non-	Car	ncer Effects	
LExD	3	$\frac{(1.1E-02 \text{ mg/L}) \times \{(0.005 \text{ L/hour}) + [(1.488 \text{ cm}^3) \times (8.0E-04 \text{ cm/hour}) \times (10^3 \text{ L/cm}^3)] \times (1 \text{ hr/d}) \times (50 \text{ d/yr}) \times (9 \text{ yr})}{(38 \text{ kg}) \times (9 \text{ yr})(365 \text{ d/yr})}$	
	+	$\frac{(1.5E+00 \text{ mg/kg}) \times \{(100 \text{ me/d}) + [(1.488 \text{ cm}^3 \times (1.45 \text{ me/cm}^2 \text{-d}) \times (0.1)]\} \times (50 \text{ d/yr}) \times (9 \text{ yr})}{(38 \text{ kg}) \times (9 \text{ yr} \times 365 \text{ e/yr}) \times (10^{\circ} \text{ mg/kg})}$	
	3	2.0E-06 mg/kg-day	
HQ	3	(2.0E-06 mg/kg-day)/(5,0E-03 (mg/kg-day))	
	3	3.9E-04	

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			Non-Car	ncer Risk	Cano	xer Risk
Constituent .	۵	CIs	LEXD	НQ	LEAD	BLCR
YOC				<		
Acetone	0.044	0.23	1.5E-06	1.58-05	1.98-07	NC
Benzene	0100.0	Q	6.1E-07	YN	7.9E-08	2.3E-09
2-Butanone	QN	0.015	3.5E-08	< 6.9È-07	4.4E-09	NC .
Chlorobenzene	0.011	0.0090	1.3E-05	6.66-04	1.78-06	NC
Chloroethane	0.0040	Q	2.7E-07	1.36-05	3.4E-08	NC
Chloromethane	QN	0.0040	9.2E-09	NA	1.2E-09	1.5E-11
Ethylbenzene	0.021	0.031	J.5B-04	1.56-03	2.0E-05	NC
Tolucne	0.018	Ð	9.8E-05	4.96-04	1.38-05	NC
Xylenes (total)	0.019	0.13	7.08-00	3.5E-07	9.0E-08	NC
Renaric acid	0.46	010	ALAF A	1 6E-05	8 IR-M	UN
Bis(2-ethylhexyl)phthalato	Ę	2	1.48-05	6.88-04	1.88-06	2.5E-08
Butylbenzylphthalate	QN	64	5.66-05	2.86-04	7.2E-06	NC
1,4-Dichlorobenzene	0.0030		1.4E-06	NA	1.7E-07	4.2E-09
4-Methylphenol	0.093		1.1E-05	2.2E-04	1.4E-06	NC
c-PAHs	QN	\ 	•	•	1.0E-06	1.2E-05
t-PAHs	QN	12	1.5E-05	3.6E-03	•	ŀ
Inorranics	(>				
Aluminum	69	10,000	4.4E-02	NA	5.7E-03	NC
Ammonia	86	QZ	1.5E-03	NA	2.6E-04	NC
Antimony	((35.0)	110	9.08-04	2.3E+00	1.28-04	NC
Arsenic	(LZD)Q	9.3	4.8E-06	1.68-02	6.1E-07	1.18-06
Barium	4.6	640	8.3E-04	1.28-02	1.1E-04	NC
Beryllium	110.0	1.5	2.08-06	3.98-04	2.58-07	1.1E-06

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Page 2 of 2

Leachate Seep Area Exposure Doses and Risk Calculations for a Potential Current Trespasser, Novak Sanitary Landfill, South W. Township, Pennsylvania.	
able A-43.	

			Non-Can	cer Risk	Cancer	· Risk
Constituent	IJ	Cls	LExD	ðн	Days	ELCR
			5		~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	
Cedmium	0.083	31	5.46-05	1.15-01	6.9E-00	NC
Chloride	200	Q	1.9E-06	NA /	5.7B-04	NC
Chronium	0.21	20	4.3E-05	8.6E-03	5.5E-06	NC
Cobalt	0.12	19	1.4E-0S	× × ×	1.9E-06	N
Copper	0.29	22	1.7E-05	4.7E-04	2.2E-06	NC
Fluoride	6.4	QN	6.5E-06	1.1E-04	1.8E-05	NC
Lead	0.64	26	2.5E-05	NAN	3.26-06	NC
Manganese	16	430	1.2E-03	1.2E-02	1.5E-04	NC
Nickel	0.23	56	1.1E-04	5.6E-03	1.4E-05	NC
Selenium	0.0020	QN	4.5E-08	>8.9E-06	5.7E-09	NC
Silver	0.029	2.8	\2.3B-05	7.8E-03	3.0E-06	NC
Vanadium	0.32	35	2.96-04	4.2E-02	3.8E-05	NC
Zinc	3.3	160	\$.4E-04	2.7E-03	7.0E-05	NC
			Total	2.5E+00	Total	1E-05

water (mg/L). The lesser of the maximum and the 95 percent upper confidence limit is used. Constituent concentration in the surficial soil (mg/kg). The lesser of the maximum and the 95 percent upper confidence limit is used. Exposure dose from contact with seep water and surface soils (mg/kg-day). Hazard quotient. The sum of the hazard quotients is the hazard index (HI). Constituent concentration in the leachate see Not carcinogenic by the oral/dermal route. Excess lifetime capcer risk. Not applicable. Not detected.

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			Non-Car	neer Risk	Cancer	Risk
Constituent	σ	อื	LEXD	ЮН	LEXD	ELCR
VOCs				<		
Acetone	0.044	0.23	9.8E-08	9.80E-07	4.2E-08	NC
Benzene	0.0010	QN	2.2E-08	VIV /	9.4E-09	2.7E-10
2-Butanone	Q	0.015	2.7E-09	< 5.46E-08	1.26-09	NC
Chlorobenzene	0.011	0.0090	4.7E-07	2.33E-05	2.0E-07	NC
Chloroethane	0.0040	QN	1.1E-08	5.70E-07	4.9E-09	NC
Chloromethane	QN	0.0040	7.3E-10	NN	3.1E-10	4.1E-12
Sthylbenzene	0.021	0.031	5:4E-06	5.39E-05	2.38-06	NC
Coluene	0.018	Q	3.4E-06	1.70E-05	1.5E-06	NC
(ylenes (total)	0.019	0.13	4.8E-08	2.40E-08	2.1E-08	U N N
ami-vucs						
		0.10	4.4.1.4.0	0.09E-07	00-201	
is(2-cthylhexyl)phthalate			N2E-06	6.06E-05	5.2E-07	7.3E-09
lutyIbenzyiphthalate	ON 3	49	4.9E-06	2.47E-05	2.18-06	NC
,4-Dichlorobenzene	0.0030		4.9E-08	NA	2.1E-08	5.0E-10
Methylphenol	0.093		4.7E-07	9.46E-06	2.0E-07	NC
-PAHs	- QN		•	•	3.1E-07	3.5E-06
-PAHS	QN	12	1.3E-06	3.19E-04	·	
norganics	(>				
Numinum	69	10,000	3.36-03	NA	1.4E-03	NC
Ammonia	8	ND	1.2E-04	VN	5.2E-05	NC
Antimony	<t< td=""><td>110</td><td>6.5E-05</td><td>1.63E-01</td><td>2.8E-05</td><td>NC</td></t<>	110	6.5E-05	1.63E-01	2.8E-05	NC
Arsenic		9.3	5.3E-07	1.76E-03	2.38-07	4.1E-07
anium	4.6	640	7.1E-05	1.01E-03	3.0E-05	NC

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Leachate Seep Area Exposure Doses and Risk Calculations for a Future Hypothetical Adult Resident, Novak Sanitary Landfill, South Whitehall Townshin, Pennsvivania. Table A-44.

	I OWHAUP, FOUNSTIVENIA.		I		<	
			Non-Car	cer Risk	Cancer	Risk
Constituent	C	Cc	LEXD	ЮН	oran	ELCR
Beryllium	0.011	1.5	1.76-07	3.326-05	.1E-08	3.1E-07
Cadmium	0.083	31	4.4E-06	8.82B-03	1.9E-06	NC
Chloride	200	QN	2.6E-04		1.1E-04	NC
Chromium	0.21	20	3.4E-06	6.75E-94	1.4E-06	NC
Cobalt	0.12	19	1.4E-06	N A	6.0E-07	NC
Copper	0.29	22	1.6E-06	4.38E-05	6.9E-07	NC
Fluoride	6.4	QN	8.5E-06	1.41E-04	3.6E-06	NC
Lead	0.64	26	2:2E-06	NĂ	9.3E-07	NC
Manganese	16	430	8.8E-05	8.78E-04	3.8E-05	NC
Nickel	0.23	56	0,0E-06	4.49E-04	3.8E-06	NC
Selenium	0.0020	Q	2.6E-09	5.29E-07	1.1E-09	NC
Silver	0.029	2.8	\ 1.7E-06	5.61E-04	7.28-07	NC
Vanadium	0.32	35	2.1E-05	3.00E-03	9.0E-06	NC
Zinc	3.3	<u>9</u>	4.0E-05	2.02E-04	1.7E-05	NC
			Total	1.8E-01	Total	4E-06
			~			
ס ז	Constituent concentration in the leacha	ate seep water (mg/L). The lesser of the m	trimum and the 95 perc	ent upper confidence limi	t is used.
	Constituent concentration in the surfic	ial soil mg/kg). Th	a lesser of the maximu	m and the 95 percent u	pper confidence limit is u	ed.
LEXD	Exposure dose from contact with seep	water and sufface so	ils (mg/kg-day).			
Р	Hazard quotient. The suffi of the haza	rd quotients is the h	azard index (HI).			

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Not carcinogenic by the obuldermal route. Not detectable.

Excess lifetime cancer risk,

HQ ELCR

Not applicable.

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			Non-Ca	ncer Rick		Rick
Constituent	σ	Cì	LExD	РОН	- TEXD	ELCR
VOCs				<		
Acetone	0.044	0.23	3.16-06	3.1B-05	2.7E-07	NC
Benzene	0.0010	QN	9.6E-07	AN .	8.2E-08	2.46-09
2-Butanone	QZ	0.015	5.8E-08	1.2E-06	5.0E-09 .	NC
Chlorobenzene	0.011	0.0000	2.0E-05	1.05.03	1.8E-06	NC
Chloroethane	0.0040	Q	4.8E-07	2.4E-05	4.1E-08	NC
Chloromethane	QN	0.0040	1.6E-08	NN	1.38-09	1.78-11
Ethylbenzene	0.021	0.031	2.46-04	2.4Ĕ-03	2.08-05	NC
Toluene	0.018	QN	1.56-04	7.5E-04	1.3E-05	NC
Xylencs (total)	0.019	0.13	125-06	7.3E-01	1.3E-07	
	4 4 4 4 4 6 7					
Renznic acid	U AK	010	1 DELA	2.6R-05	S QR-CA	Ĵ
Bis(2-ethylhexyl)phthalate	QX	12	P.SE.05	1.3E-03	2.2E-06	3.0E-08
Butylbenzylphthalate	QN	66	NOE-04	5.2E-04	8.8E-06	NC
1,4-Dichlorobenzene	0.0030	QN	2.16-06	NĂ	1.88-07	4.4E-09
4-Methylphenol	0.093	/ (090 /	1.9E-05	3.8E-04	1.6E-06	NC
c-PAHs	QN	\	~		1.3E-06	1.5E-05
t-PAHs	QN	/12	2.7E-05	6.7E-03	•	•
Inorganics		\rightarrow				
Aluminum	65	10,000	7.2E-02	NA	6.2E-03	, NC
Ammonia	<u>22</u>))	DN	4.8E-03	NA	4.1E-04	NC
Antimony	0.35	110	1.4E-03	3.6E+00	1.2E-04	NC
Arsenic	0.029	/ 9.3	1.1E-05	3.7E-02	9.5E-07	1.7E-06
Barium	4.6	640	1.6E-03	2.3E-02	1.4E-04	NC
Beryllium	110:0	1.5	3.7E-06	7.5E-04	3.26-07	1.4E-06

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	Hypoth		
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	for a F		
	lations		
	Calcu		
	d Risk		
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	sure De		
	ı Expo vania.		
	p Area ennsyl	•	
	ate Sec ship, F	:	
	Leach Town		
	. A −45.		
	Table		

			Non-Ca	ncer Risk	Cancer 1	Risk	I
Constituent	Ð	Cls	LEXD	> дн	LEAD	BLCR	
C admium	0.083	31	9.5E-05	10-36.1	5.98-06	NC	
Chloride	200	QN	1.0E-02	AN Y	9.0E-04	NC	
Chromium	0.21	50	7.7E-05	<u> </u>	6.6E-06	NC	
Cobalt	0.12	19	3. IE-05	NA /	2.7E-06	NC	
Copper	0.29	23	4.0E-05	1.1B-03	3.4E-06	NC	
Fluoride	6.4	QN	3.36-04	5.6E-03	2.9E-05	NC	
Lead .	0.64	26	6.1E-05	VN	5.2E-06	NC	
· Manganese	16	430	2:36-03	2.3Ĕ-02	1.96-04	NC	
Nickel	0.23	56	2.05-04	9.8E-03	1.7E-05	NC	
Selenium	0.0020	QN	1706-07	> 2.1E-05	9.0E-09	NC	
Silver	0.029	2.8	3.716-05	/ 1.2E-02	3.2E-06	NC	
Vanadium	0.32	35	\ 4.7E-04	6.7E-02	4.0E-05	NC	
Zinc	3.3	160	9.5E-04	4.7E-03	8.1E-05	NC	
		\langle	Total	4.0E+00	Total	2E-05	
							1
	•				1		

Constituent concentration in the leachata seep water (mg/L)/ The lesser of the maximum and the 95 percent upper confidence limit is used. Constituent concentration in the surficial sail (mg/kg). The lesser of the maximum and the 95 percent upper confidence limit is used. Exposure dose from contact with seep water and surface soils (mg/kg-day). Hazard quotient. The sum of the hazard quotients is the hazard index (HI). Not carcinogenic by the oral/dennal route. Excess lifetime cancer rjsk. Not applicable. Not detectable. NC CI NC NA NC NA NC CI NC CI

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			Non-Cat	ncer Risk	Cance	r Risk
onstituent	Csw	Csd	WEXD) DH	WEXD	ELCR
0Cs				<		
lorobenzene	Q	0.0040	1.9E-09	9.4E-08	2.48-10	NC
hylbenzene	Q	0.0055	2.6E-09	2.66-08	3.3E-10	NC
ethylene chloride	0.0010	Q	4.9E-08 <	8.1E-07	6.38-09	4.7E-11
ylenes (total)	Ð	0.0068	3.26-09	1.66-09	4.1E-10	NC
mi-VOCs				\sim		
i-n-butyl phthalate	0.010	QN	1.3E-07	1.3E-06	1.75-08	NC
PAHs	Q	2.6		•	7.08-08	8.4E-07
			(C8.8E-07)	2.2E-04		n P P P P P P P P P P P P P
organics						
mnnum	00.0	000'61	VZB-02	VN VN	1.08-03	U Z
nmonia	2.6		44E-05	4.6E-05	5.7E-06	
				8.0E-UZ	4.48-00	
senic		0.0	10-201	5.1E-04	2.0E-08	3.5H-OB
unu	0.48	8	2.0E-05	2.86-04	2.5E-06	NC
ryllium			3.6E-07	7.2E-05	4.6E-08	2.0E-07
dmium	0.017	8.3	3.0E-06	5.9E-03	3.8E-07	NC
loride	53	/ QN/	9.06-04	NA	1.28-04	NC
romium	0.016	A	6.7E-06	1.3E-03	8.68-07	NC
balt	0.028	19	1.7E-06	NA	2.28-07	NC
pper	0.20	17	4.0E-06	1.1E-04	5.1B-07	NC
anide	0.0082	QN	1.4E-07	7.0E-06	1.85-08	NC

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Table A-47.	Wading Exposure Doses and Rish Townshin Dennevlvania	c Calculations for a P	otential Current Child T	resp ass er, Novak Sanit	ary Landfill, South W	/hitchall
	Township I want to anno				<	
			Non-Car	cer Risk	Cancer	r Risk
Constituent	Csw	Csd	WExD	HQ	WEXD	ELCR
Fluoride	0.82	ND	1.4E-05	2.3E-04	√1.8E-06	NC
Lead	0.034	18	8.8E-07	VX	1.1E-07	NC
Manganese	2.4	750	3.2E-04	3.26-03	4.2B-05	NC
Mercury	0.00021	QN	3.6E-09 <	1.2E-05	4.6E-10	NC
Nickel	0.20	32	1.5E-05	7.76-04	2.0E-06	NC
Nitrate	4.1	QN	7.0E-05	4.4E-05	9.0E-06	NC
Silver	ND	2.0	3.8E-06	1.3E-03	4.8E-07	NC
Vanadium	0.003	30	5.6E-05	8. ÌÉ-03	7.3E-06	NC
Zinc	0.40	76	5.4E-05	2.7E-04	6.9E-06	NC
			Total	1.1E-01	Total	1E-06
				30 11	1	
Cel Cel	Constituent concentration in the s	urtace water (mg/L). Adiment (molk a) 71	I ne lesser of the maximum	num and the 95 percent a and the 95 percent un	t upper connuence ui mer confidence limit i	mit is used. Is nead
WExD	Exposure dose from wading activ	ity (mg/kg-day).				
рн	Hazard quotient. The sum of the	hazard quotients is th	he hazard index (HI).			
ELCR	Excess lifetime cancer risk.	/` ./	~			
NA	Not applicable.	$\Big\rangle$				
NC	Not carcinogenic by the oral/dern	nal ròule.				
UN	Not detected.	>				
			•			
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Tal 48. Wading Exposure Township, Penns	o Doses and Rii ylvania.	sk Calculations for 1	a Puturo (Ihetica	l Adult Resident, No	vak Samitary Landfill, Sc	outh Whitehall
			Non-Can	cer Risk	Cancer	r Risk
Constituent	Cave	Cad	WExD	ЮН	WEXD	ELCR
VOCs						
Chlorobenzene	Ð	0.0040	1.2E-09	6.2E-08	5.3E-10	NC
Ethylbenzene	Q	0.0055	1.7E-09	1:7B-08	7.36-10	NC
Methylene chloride	0.0010	Ð	3.0E-08	< 5.16-01 >	1.3E-08	9.8E-11
Xylenes (total)	QN	0.0068	2.1E-09	1.16-09	9.0E-10	NC
Semi-VDCe						
Di-n-butyl phthalate	0.010	QN	7.1E-08	7.1E-07	3.1E-08	NC
c-PAHs	ą	2.6		•	1.5E-07	1.8E-06
t-PAHs	QN	4.2	st/ie-eq	1.48-04	•	
						•
Inorganics)		
Aluminum	0.50	13,000	8.0日-03 〈	NA	3.4E-03	NC
Amonia Contraction of the second	2.6	£	2.5E(05)	2.6B-05	1.1E-05	
Antimony	0.045	18	2.3E-05	5.7E-02	9.7E-06	
Arsenic	QZ	6.6	9.8E-08	3.3E-04	4.2E-08	7.6E-08
Barium	0.48		1.2E-05	1.7E-04	5.2E-06	NC
Beryllium	QN	>6:1	>2.4E-07	4.7E-05	1.0E-07	4.4E-07
Cadmium	0.017	8.3	1.9E-06	3.8E-03	8.2E-07	NC
Chloride	53) / D	5.1E-04	NA	2.28-04	NC
Chromium	0.016	\ 	4.4E-06	8.7E-04	1.95-06	NC
Cobalt	0.028	> 61	1.1E-06	NA	4.66-07	NC
Copper	0.20	17	2.3E-06	6.3E-05	9.9E-07	NC
Cyanide	0.0082	ND	7.9E-08	4.0E-06	3.4E-08	NC
Fluoride	0.82	Ð	7.98-06	1.3E-04	3.4E-06	NC
Lead	0.034 /	18	5.2E-07	NN	2.26-07	NC
Manganese	2.4	750	2.16-04	2.1E-03	8.9E-05	NC

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Footnotes appear on page 2.

Table A-48.	Wading Exposure Do ces and Ris Township, Pennsylvania.	k Calculations fo	or a Future Hypothetic	al Adult Resident, No	wak Sanitary Landfill, Sou ^	outh Whitehall
			Non-Car	ncer Risk	Cancer	r Risk
Constituent	Csw	Csd	WEXD	НО	WEAD	ELCR
	-					
Mercury	0.00021	QN	2.0E-09	6.8E-06	8.7E-10	NC
Nickel	0.20	32	9.9E-06	4.95-04	4.2E-06	NC
Nitrate	4.1	DN	4.0E-05	2.5E-05 🔨	1.7E-05	NC
Silver	QN	2.0	2.5E-06	8.2E-04	1.1E-06	NC
Vanadium	0.0033	30	3.7E-05	5.3E-03	1.6E-05	NC
Zinc	0.40	76	3.5E-05	1:7E-04	1.5E-05	NC
			Total	7.1E-02	Total	2E-06
Csw Csd HQ NA NC NC ND	Constituent concentration in the Constituent concentration in the Exposure dose from wading acti Hazard quotient. The sum of th Excess lifetime cancer risk. Not applicable. Not carcinogenic by the oral/der Not detected.	surface water (m codiment (mg/kg-day) b hazard quotient mal router.	g(L). The lesser of the full). The lesser of the full is is the hazad index (e maximum and the 9: aximum and the 95 p (HI).	5 percent upper confidence l	ce limit is used. limit is used.
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onstituent Csw OCs ND 0 hlorobenzene ND 0 thylbenzene ND 0 fethylene chloride 0.0010 0 ylenes (total) ND 0					
onstituent Csw OCs ND 0 hlorobenzene ND 0 thytbenzene ND 0 fethylene chloride 0.0010 0 ylenes (total) ND 0	•	Non-Can	cer Risk	Cancer	Risk
OCs hlorobenzene ND 0 hlylbenzene ND 0 lethylene chloride 0.0010 ylenes (total) ND 0	Cad	WEXD	PIQ	WEXD	ELCR
blorobenzene ND 0 hylbenzene ND 0 ethylene chloride 0.0010 0 ylenes (total) ND 0		- - -	<		
hylbenzene ND 0 ethylene chloride 0.0010 (/lenes (total) ND (0.0040	4.7E-09	2,36-07	4.0E-10	NC
ethylene chloride 0.0010 lenes (total) ND 0	0.0055	6.5E-09	6.5E-08	5.5E-10	NC
lenes (total) ND 0	QN	1.26-07	2.0E-06	1.0E-08	7.8E-11
	0.0068	8.0E-09	4.0E-09	6.8E-10	NC
ni-VOCs a-butvl abthabata	CN	1 18.00	1 10-04		CN.
		- anin		2.75-08	
AH6	4.2	2.2806	S.5E-04		1.4E-00
minum 0.50 1	13,000	3.qE-02	NA	2.6B-03	NC
monia 2.6	Q	1.15-04	1.2E-04	9.68-06	NC
imony 0.045	18	8.613-05	2.2E-01	7.48-06	NC
enic ND	6.6	3.8E-07	1.3E-03	3.3E-08	5.9E-08
ium 0.48) ()) ()) ()	4.9E-05	7.0E-04	4.28-06	NC
yllium ND	/ / 2	2 9.0E-07	1.8E-04	7.7B-08	3.36-07
lmium 0.017)	7.4E-06	1.5E-02	6.3E-07	NC
loride 53		2.3E-03	NA	2.08-04	NC
romium 0.016) 21	1.7E-05	3.3E-03	1.46-06	NC
balt 0.028	19	4.3E-06	NA	3.6E-07	NC
pper	/17	1.0E-05	2.7E-04	8.6E-07	NC
anide 0.0082	DA DA	3.5E-07	1.8E-05	3.0E-08	NC

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	Township, Pennsylvania					
			Non-Can	cer Risk	Cance	er Risk
Constituent	Cşw	Crd	WEXD	но	WEND	BLCR
Bluorida	5	Ę	3 SB-MS	6 00 AA	Ane. Ak	
Lead	0.034	81	2.6B-06	AN.	2.28-07	
Manganese	2.4	750	8.1E-04	8.16-03	6.98-05	NC
Mercury	0.00021	QZ	9.0E-09	< 3.06-05 /	7.78-10	NC
Nickel	0.20	32	3.96-05	1.9E-03	3.36-06	NC
Nitrate		QN	1.8E-04	1.1E-04	1.5E-05	NC
Silver	QN	2.0	9.4E-06	3.1E-03	8.0E-07	NC
Vanadium	0.0093	30	1.48-04	2.0E-02	1.28-05	NC
Zinc	0.40	76	1.36-04	6.7E-04	1.28-05	NC
			Total	<u>2.7E-01</u>	Total	2E-06
Cew WEAD NC NC NC	Constituent concentration in Constituent concentration in Exposure dose from wading a Hazard quotient. The sum o Excess lifetime cancer risk. Not applicable. Not carcinogenic by the oral Not detected.	the surface water (mg/k) the sediment (mg/kg-day). If the hyzard quotjents is /dermal route.). The lesser of the maximum the lesser of the maximum the hazard index (HI).	aximum and the 95 per	ercent upper confidence limit cent upper confidence limit	ait is used. is used.
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		Excess Lifetime ⁴ Cancer Risk	Hazard Index
Potable Ground Water		. /<	· · · · · · · · · · · · · · · · · · ·
Ingestion:			\geq
Potential Current On-Site (Private	Well)	\wedge	
Adult		2×10^{4}	0.83
Child	(1) The second s Second second secon second second sec	8× 105	1.9
Potential Current Off-Site (Private	e Well NSL-RW-03		
Adult	•	7 x 10 ⁻⁷	0.13
Child		3 7 107	0.3
Potential Current Off-Site Private	Well NST -RW-04)	
Adult		5 x 10 ⁴	0.6
Child		2×10^{-4}	13
Potential Current Off-Site (Private	e Well NSL-RW-06)	
Adult		1×10^{-7}	0.7
Child		6 x 10 ⁴	1.6
Potential Current Off-Site Privat	e Well NSL-RW-07	2	
Adult		3 x 10°	0.8
Child	•	1 x 10 ⁻⁶	1.8
Potential Current Off-Site Privat	e Well NSI -RW-09)	
Adult		NCP	0.17
Child		NCP	0.4
			0.4
Potential Current Off-Site (Privat	e Well NSL-RW-10	2	
Adult	·	NCP	0.5
Child		NCP	1.2
Potential Current Off-Site (Privat	e Well NSL-RW-12) .	
Adult		1 x 10 ⁴	0.0006
Child	•	7 x 10 ⁹	0.001

Page 1 of 4 Table A-51. Risk Estimation Summary, Novak Sanitary Landfill, South Whitehall Township, Pennsylvania.

Footnotes appear on page 4.

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	Excess Lifetime ^a Cancer Risk	Hazard [®] Index
Detection Correct Off Side (Driverte Molt NOT DW 16)	$\langle \wedge \rangle$	
Adult	NAP	> NAP
Child		NAP
Potential Current Off-Site (Private Well NSL-RW-16)		
Adult	NAP	NAP
Child	NAP	NAP
Potential Current Off-Site (Private Well NSL-RW-17)	\sim	·
Adult	2 x 10 ⁻⁵	0.005
Child	1 x 10 ⁵	0.01
	7	
Potential Current Off-Site (Community Supply Wehr	NC	0.25
	NC	0.23
		0.39
Future Hypothetical On-Site (Cluster 1)		
Adult /	9 x 10 ⁻⁵	1.0
Child	4 x 10 ⁻⁵	2.4
Future Hypothetical On-Site (Cluster 2)		
Adult	1 x 10 ⁴	0.65
Child	6 x 10 ⁵	1.5
Future Hypothetical On-Site (Cluster 3)		
Adult	1 x 10 ³	0.48
Child ~	6 x 10*	1.1
Future Hypothetical On-Site (Cluster 4)		
Adult	2×10^4	1.1
Child	1×10^{-4}	2.6
Showering:		
Potential Current On Site Private Wally	2 - 105	A 11
rotentide Current On-She (Filvate Well)	2 X 10.	V.11
Footnotes appear on page 4.		

Page 2 of 4 Table A-51. Risk Estimation Summary, Novak Sanitary Landfill, South Whitehall Township, Pennsylvania.

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Page 3 of 4 Table A-51. Risk Estimation Summary, Novak Sanitary Landfill, South Whitehall Township, Pennsylvania.

	Excess Lifetime ^a Cancer Risk	Hazard [*] Index
		. .
Potential Current Off-Site (Private Well NSL-RW-03)	1 x 10	0.00032
Potential Current Off-Site (Private Well NSL-RW-04)	7 x 10°	0.00012
Potential Current Off-Site (Private Well NSL-RW-06)	/2 x 10 ⁹	0.00012
Potential Current Off-Site (Private Well NSL-RW-07)	8× 107	0.048
Potential Current Off-Site (Private Well NSL-RW-09)		ND
Potential Current Off-Site (Private Well NSL-RW-10)	ND ND	ND
Potential Current Off-Site (Private Well NSL-RW-12)	1×10^{7}	0.00039
Potential Current Off-Site (Private Well NSL-RW-15)		ND
Potential Current Off-Site (Private Well NSL-RW-16)	ND	ND
Potential Current Off-Site (Private Well MSL-RW-17)	3 x 10 ⁻⁹	0.00068
Potential Current Off-Site (Community Supply Well)	ND	ND
Future Hypothetical On-Site (Cluster N	> NC	0.000061
Future Hypothetical On-Site (Cluster 2)	2×10^{-5}	0.11
Future Hypothetical On-Site (Cluster 3)	3 x 10 ⁻⁶	0.09
Future Hypothetical On-Site (Cluster 4)	3×10^{-5}	0.18
Surface Soil:		
Potential current trespasser	2 x 10 ⁻⁶	0.19
Future hypothetical adult resident	2 x 10 ⁻⁵	0.78
Future hypothetical child resident	5 x 10 ⁻⁵	4.9
\sim		
Air (Vapors):		
Potential current trespasser	7×10^{-7}	0.0074
Future hypothetical adult resident	3 x 10 ⁻⁵	0.11
Future hypothetical child resident	4×10^{-5}	0.52
(X, X)		
Seep Areas (Water and Soil):		
Potential current trespasser	1×10^{-5}	2.5
Future hypothetical adult resident	$4 \ge 10^{-6}$	0.18
Future hypothetical child resident	2×10^{-5}	4.0

Footnotes appear on page 4.

Page 4 of 4 Table A-51. Risk Estimation Summary, Novak Sanitary Landfill, South Whitehall Township, Pennsylvania.



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Table A-52.Comparison of Constituents Detected in Landfill Surface-Water Bodies with
Available Water-Quality Criteria, Novak Sanitary Landfill, South Whitehall
Township, Pennsylvania.

Constituent	Mean Surface-Water Concentration	Water-Quality Criteria ⁴	Does Surface Water Concentration Exceed Criteria
VOCs		\sim	
Methylene chloride	0.0010	2.368	No
Semi-VOCs			•
Di-n-butyl phthalate	0.0067	0.021	No
Inorganics			
Aluminum	0.37	0.087°	Yes
Antimony	0.035	0.219	No
Barium	0.23 🖓 🗟 🏹	4.1	No
Cadmium	0.0099	0.0032°	Yes
Chromium	0.0097 \	0.011/0.62 ^d	No
Cobalt	0.019	0.396	No
Copper //	$\gamma \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \$	0.037°	Yes
Cyanide / <	2 0.9044	0.005	No
Lead	0.017	0.017	No
Manganese	1.1	1.5°	No
Mercury	0.00014	0.000012	Yes
Nickel	0.078	0.488	No
Vanadium	0.0068	0.103	No
Zine)	0.16	0.328	No
Chemistry Parameters			
Ammonia-nitrogen	1.3 (0.0051) ^r	0.0083 ^z	No
Chloride	30	230 ^h	No
Fluoride	0.53		No
Nitrate	1.7	90 ⁱ	No

Footnotes appear on page 2.

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Page 2 of 2

Table A-52. Comparison of Constituents Detected in Landfill Surface-Water Bodies with Available Water-Quality Criteria, Novak Sanitary Landfill, South Whitehall Township, Pennsylvania.

Concentrations are given in milligrams per liter (mg/L).

- a Pennsylvania Water Quality Criteria for protection of aquatic life (via chronic exposure) unless specified otherwise.
- b USEPA proposed chronic FWQC (USEPA, 1988b).
- c Hardness-dependent criterion. Average hardness of on-site surface water is 380 mg/L CaCO₃. The chronic criterion presented is based on constituent-specific calculation of criterion using a hardness value of 380 mg/L (PADER, 1991).
- d Chronic FWQC for trivalent chromium. Hardness-dependent criterion using 380 mg/L hardness.
- e Value presented is not a criterion or standard but a threshold concentration below which no adverse effects to fish would be expected (USEPA, 1986).
- f Value in parentheses is the concentration of un-ionized animonia estimated (assuming a water temperature of 20°C and a pH/of 20) using USEPA (1984) method.
- g Chronic FWQC for un-ionized animonia in surface waters where salmonids and other sensitive coldwater species are absent.
- h Chronic FWQC (USEPA, 1988e).
- i Value presented is not a criteria or standard but the level of nitrate at or below which no adverse effects to most warmwater fish is expected (USEPA, 1986).

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ATTACHMENT H

TABLE 2-2A RUNOFF CURVE NUMBERS FOR URBAN AREAS

RETENTION BASIN FIELD NOTES

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			<u> </u>		
Cover description	Curve numbers for hydrologic soil group—				, ,
Cover type and hydrologic condition	Average percent impervious area ²	A	B	с	D
Fully developed urban areas (vegetation established)					
Open space (lawns, parks, golf courses, cemeteries, etc.) ² :					
Poor condition (grass cover < 50%)		68	79	86	89
Fair condition (grass cover 50% to 75%)		49	69	79	84
Good condition (grass cover > 75%)		39	61	74	80
Impervious areas:					
Paved parking lots, roofs, driveways, etc.					
(excluding right-of-way).		98	98	98	98
Streets and roads:					
Paved: curbs and storm sewers (excluding					•
right-of-way)		98	` 98	98	98
Paved: open ditches (including right-of-way)		83	89	92	93
Gravel (including right-of-way)		76	85	89	91
Dirt (including right-of-way)		72	82	87	89 \
Western desert urhan areas:				•••	
Natural desert landscaping (pervious areas only)"		63	77	85	88
Artificial desert landscaping (impervious weed		~~	••		
harrier, desert shrub with 1. to 2. inch sand					
or gravel mulch and basin borders)		96	96	96	96
Urhan districts:		•••	••	•••	
Commercial and husiness.	85	89	92	94	95
Industria)	77	81	89	91	93
Residential districts by average lot size	•=		~	••	50
1/8 acre or less (tours houses)	65	77	85	90	97
1/4 200	38	61	75.	83	87
1/3 200	30	57	72	81	86
1/2 2/79	25	54	70 -	80	85
1 2070	20	51	68	79	84
2 20198	- 12	46	65	77	82
		10		••	.06
Developing urban areas					•
Nexts graded areas (nervicus areas only					
no vegetation b		77	86	ا ت	
Idle lande (CN's are determined using over type		••	GU	31	24
eimilar to these in table 2.20)				•	
Summer of chose of caule 2.403.					4

Table 2-2a .- Runoff curve numbers for urban areas!

Average runoff condition, and I, = 0.2S.

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¹Average runoff condition, and I_n = 0.2S. ²The average percent impervious area shown was used to develop the composite CN's. Other assumptions are as follows: impervious areas are directly connected to the drainage system, impervious areas have a CN of 38, and pervious areas are considered equivalent to open space in good hydrologic condition. CN's for other combinations of conditions may be computed using figure 2.3 or 2.4. ²CN's shown are equivalent to those of pasture. Composite CN's may be computed for other combinations of open space cover type. ⁴Composite CN's for natural desert landscaping should be computed using figures 2.3 or 2.4 based on the impervious area percentage (CN' = 98) and the pervious area CN. The pervious area CN's are assumed equivalent to desert shrub in poor hydrologic condition. ⁴Composite CN's to use for the design of temporary measures during grading and construction should be computed using figure 2.3 or 2.4, based on the degree of development (impervious area percentage) and the CN's for the newly graded pervious areas.

(210-VI-TR-55, Second Ed., June 1986)



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AR208299

ATTACHMENT I

DEFINITION OF SYMBOLS USED IN THE GEOTECHNICAL TESTING REPORT

AR208300

GERAGHTY & MILLER, INC.

DEFINITION OF SYMBOLS

WL	Liquid Limit
W _P	Plastic Limit
W _{trim}	Water Content of Trimmings
Wo	Initial Water Content
Wc	Water Content After Consolidation
γ_{10}	Initial Total Unit Weight (Density)
Y 40	Initial Dry Unit Weight (Density)
$\gamma_{\mathbf{k}}$	Total Unit Weight (Density) After Consolidation
Yec	Dry Unit Weight (Density) After Consolidation
e _{v,c}	Volumetric Strain During Consolidation
$\overline{\sigma}_{e}$	Effective Consolidation Stress
U,	Backpressure
i,	Initial Hydraulic Gradient
tc	Consolidation Time
o/n	Overnight

GERAGHTY & MILLER, INC.

ATTACHMENT J

"DEFINITIONS OF SURVEYING AND ASSOCIATED TERMS" AND HORIZONTAL CONTROL DATA SHEET

GERAGHTY & MILLER, INC.

DEFINITIONS OF SURVEYING AND ASSOCIATED TERMS

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Prepared by a Joint Committee of the AMERICAN CONGRESSS ON SURVEYING AND MAPPING and the AMERICAN SOCIETY OF CIVIL ENGINEERS 1978 (rev.)

REPRINTED 1961

Library of Congress Catalogue Card No. 72-78807 © 1972, 1978, American Congress on Surveying and Mapping and American Society of Civil Engineers

(See thuiled states Coast and Geodetic Survey Reput for 1879, Appendix 8, pp. 112-114.)

Janual. Nouth American-The geodetic datum which is defined by the fullowing geographic position of triangulation station Meades Ranch and the arimult from that station to station Waldo, on the Charke spheroid of

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The North American datum is identical with the United States standard datum, the name of the datum being changed in 1913, when its adoption by the poverments of Canada and of Maxico for their control surveys pase ll an international character. See also datum, North American, 1927.

- North American datum at station Meade's Ranch, excert that the azimuth Meade's Ranch to Waldo was changed to 75°28'09.64. It was adopted in 1923 siles a readjustment of the Idiagulation of the salite country in which Lapisce atimuths were introduced. It is now the standard geodetic Lium, North Americaa, 1927 (1927 NAD)—This dalum is identical with the dalucis on the North American continent. See sto dolum, North American.
- country. Fur hydrographic work, including soundings on chatts and Idal predictious, a how water datum is preferred. Fur this purpose the datum adopted is mean for water for the Atlantic coast of the United States and lower low water for the Pacific coast of the United States And used for hydrographic purposes. In order that they may be recordred when and hiland possessions. In many other parts of the world low water springs no nteded, distum planes are referenced to fixed points known as bench marke. the tide. The datum in rood general use is based upon mean sea level and this is used as the reference for the first-order laws net extending over the whole depuis. The plane is called a tidal datum when defined by a certain phase of dature plane-A surface used as a seference from which to reckon heights or
 - "Dalum, Sea Level, 1929-A delermination of mean sea level that has been adopted as a standard datum for heights. The sea level is subject to some
- variations from year to year, but, as the permanency of any datam is of prime importance to enginerating work, a sca-level datum after adoption thould, in general, be malatalated indefinitely even though differing slightly from later determinations of mean sus level based on tonger saties of observations. The sca-favel datum now used for the United States Coast and Geodetic Survey (now known as National Ocean Survey) level nel is officially known as the "See Level Datum of 1929." the year ectering to the last general adjust-ment of the net. The datum ticell can be considered to be an adjustment bused on the lide observations taken at various tide stations along the cossic of line United States over a number of years. See also mean see level; datum, tidat
- tipleroid to give its map position. For illustrative purposes, the Lamberd contounal projection datum is thought of as being reputstated by a cone and the Transense Mercalor projection datum by a cylinder, after each hat been rolled and flat, or as a plane for other projections. Projection of dilances between puints on the ground to the datum is a two-stage parcets. first from Each eurlise of the ground to the spheroid and, zecond, thom there to the Solidawn. Thus, the map, in effect, is a scale reproduction of the cone or Netween the lines of intersection of the cone or the cylinder with the Chinteroid, and are above the scale set of or all segments of their with the dutum, state plane coordinates - The surface vala which each point of convern is transferred mathematically from the conceptanding point on the saria
- Coulside such lines of Intersection with the spheroid.

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- datum, tidal-Specific tide lavels which are used as surfaces of teleteace for depth measurements in the sea and as a base for the determination of elevation on land. Many different datums have been used, particularly for freeling operations. Also called tidal datum plane. Sea also Datum, Sea Level 1929
- datum, vertical- Any level surface (as for example, mean sea lavel) taken at a surface of reference from which to rection therelions. Although a fored surface is not a plane, the vertical datum is forqueally referred to as the defem plane. Also called datum lavel, reference lavel, reference plane, vertical-conisol datum, ventical geodetic datum.
 - day-A successive of time based upon the rolation of the earth on its axis with respect to the Venual Equinox, giving the addreed day, and the num, giving the selar day. See also time, rolar functional); time, tidareed (hitervel).

day, apparent sidereal-See time, sidereal fiaterrall.

day, apparent solar-See time, solar fintervall.

day, atesu sidetest-Sea time, sidetest fintenul).

day, wean solar-Sec time, solar finterval).

- declination-1) (attroumny) The angle at the center of the celerated sphere between the andue parting through a celetical body and the phase of the how celesital equator. Astronomic declination is measured by the new of the how circle between the celestical hody and the equator; it is plus when the body is north of the equator, and mixes when south of II. It corresponds to httlede on the earth, and with right ascention forms a pair of coordinates which define the position of a body on the celetical golent. 2) (meaned to httlede bearing (sectoread cast or wast from the morie branch of the position moridian plano) of magnetic north as determined by the positive yole of a freely suspended magnetic morth as automatical analysis pole of a freely suspended magnetic morth as automatical analysis for the magnetic disturbance. In manifest and automatical analysis to a the form engended weightub to use the automatical analysis of the same of a freely suspended magnetic morth as automatical analysis of the same disturbance. In manifest and automatical analysis of the same of a statistical analysis. variation of the compare or magnetic variation.
 - or on the rotar attachment of an engineer's hamil, on which the declination of the sun (corrected for refraction) is set off. This represents one side (point distance) of the astronomical triangle which is solved mechanically by the declination are (solar compace) - A gradanted are on a surreyor's solar compass tolar compass or all tchmont.
 - declination are (surveyor's compass)—A graduated are attached to the aldade of a surveyor's compast of transit, on which the magnetic declination is set off. When the magnetic declination is set off on the declination are of a surveyor's compary or liancil, a stading of the needle will give a beating corracted for that declaration.

decilization of gild worth-See zirement.

- declinometer-Au instrument, vlten self-segistering, for measuring or recording the declination of the magnetic needle.
- decree-The court's decision in equity. A decree usually directs a defendent to do or not to do some specific thing, as opposed to a judgment for damages in a court of twy. The muse court may ordinarily all ether as a copyrif of equity or a coult of law.
- dedication-To dedicate means to appropriate and set aperi [106 [1000 case's private property to some public use. The dedication may be [106 from case's implied. It is express when there is an express manifediation[10] the part of the owner of his purpose to devote the land to a particular phy pare, and of the streets in platted subdivisions. It is implied when the experts and the streets in platted subdivisions. It is implied when the experts and conduct manifed subdivisions. It is implied when the experts and conduct manifed an intention to devote the had to the public war. To eash the dedication complete, there must not only be the intention on put of the owner to rel apart the land for the use and benefit of the public, but there owned has a conducte to the use and benefit of the public, but there must be an accontance by the mutili-

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ATTACHMENT K

CORRESPONDENCE TO USEPA FROM MARK TRAVERS DATED FEBRUARY 28, 1992

GERAGHTY & MILLER, INC.

MAR 02 '92 03107PM AMERICAN OFFICE EVEN

de maximis, inc.

9041 Executive Park Drive Suite 401 Knoxville, TN 37923 (615) 691-5052

February 28, 1992

VIA FACSIMILE AND FIRST CLASS MAIL

Mr. Cesar Lee, P.E. United States Environmental Protection Agency 841 Chestnut Building Philadelphia, Pennsylvania 19107

Re: Waste Characterization Novak Sanitary Landfill Site ("NSL") South Whitehall Township, Pennsylvania

Dear Mr. Lee:

This letter outlines the proposed revisions to the waste characterization section of the Remedial Investigation ("RI") report. These proposed revisions are intended to address the comments of the United States Environmental Protection Agency ("U.S. EPA") as provided in your January 17, 1992 correspondence, received January 20, 1992. This letter is being provided, as decided during our meeting on February 13, 1992, as a result of the extended consideration of U.S. EPA's comments a-c, Section 4.3.1, by the Novak RI/FS PRP Group ("Group") and U.S. EPA during the December 18, 1991 and February 13, 1992 meetings, and during subsequent conversation between the Group and U.S. EPA.

The U.S. EPA guidance for "Conducting Remedial Investigations/Feasibility Studies at CERCLA Municipal Landfill Sites" ("Landfill Guidance") describes the waste types typically disposed of in municipal landfills. It states that "municipal wastes disposed of in these landfills typically includes a heterogeneous mixture of materials primarily composed of household refuse such as yard and food wastes and paper, and commercial waste such as plastics, inert mineral waste, glass, and metals." Landfill Guidance, 1-2. It then notes that the landfills contain principally municipal waste, and to a lesser extent, hazardous waste, such as that resulting from smallquantity generators, household hazardous wastes, biodegradation of wastes and pre-RCRA operations. Id.

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Mr. Casar Lee, P.E. February 28, 1992 Page 2

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The Landfill Guidance states that the characterization of such a landfill's contents is generally not necessary because containment of the landfill contents, which often is the most practicable technology, does not require such information. Landfill Guidance, ES-3. Characterization of a landfill's contents may provide valuable information for PRP determination, however, the objective of a RI is not to identify PRP's, but to determine the impacts of a facility or site on human health and the environment.¹ Id. In consideration of the guidance and the heterogeneous nature of the waste disposed at the NSL, the following text outlines the proposed revision to the Waste Characterization section of the RI report.

Outline of Proposed Revision

Since the landfill contents are the principal sources of impacts to human health and the environment at the NSL, the primary objective of the Wasta Characterization section of the RI report is to describe the general categories of wastes that were accepted by the NSL during the years of operation. As provided for in the Landfill Guidance, characterization of a municipal landfill's contents should be based on a review of historical records, and need not require sampling of the landfill contents. Thus, the characterization of the contents of the NSL is based on a review of available records (<u>0.0.</u>, responses to §104(e) requests) and other materials currently in the files of the U.S. EPA and/or the Pennsylvania Department of Environmental Resources ("PADER"). This approach is also consistent with the Work Plan for the RI/FS, as approved by EPA, which provided for a records review, but did not call for preparation of an appendix providing ~ entity-specific information for approximately 900 entities (the current estimate of site users), 225 entities (the number

To the extent U.S. EPA is seeking additional information about specific entities for the purposes of PRP identification, we note that the Group has actively assisted U.S. EPA in reviewing responses to \$104(e) requests and related information to identify PRPs. The Group expects to submit the results of its most recent review to U.S. EPA shortly. In addition, a copy of the Complaint filed against other users of the NSL by certain Group members is enclosed with Ken Markowitz' copy of this letter, per his request at the February 13, 1992 meeting. This information should also be useful in identifying PRPs. ייאל טב ישב עליישב איישאיי ארבאנטאט עררונב צעיין

P.4

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Mr. Cesar Lee, P.E. February 28, 1992 Page 3

selected by U.S. EPA in its comments), or some select portion thereof.

Information concerning the general characteristics of the wastes disposed at the NSL were obtained from the following sources: responses to \$104(e) requests issued by the U.S. EPA; interviews with Louis C. Novak, Jr. and other persons with knowledge of landfill operations; landfill inspection records generated by the PADER; PADER correspondence. The information reviewed indicates that the landfill contents are typical of materials accepted by permitted municipal landfills during the period of time that NSL operated. Many of these same materials are accepted at currently permitted municipal landfills.

As the U.S. EPA and PADER are aware, the type of information that is available through such efforts does not routinely include results of laboratory analyses. In most instances, it also does not include the type of information requested by U.S. EPA in its comments; <u>e.g.</u>, manufacturing processes and specific chemical constituents of resulting wastes for each entity that may have disposed of waste at the NSL. Furthermore, this type of information was not generally required of either a site operator or a waste generator, under any regulatory framework, during most of the time this or other similarly permitted facilities operated.

In general, the available information indicates that the NSL received dry refuse, construction debris and demolition material from municipal, residential, commercial, and industrial sources. This includes the following general categories of waste materials:

- Residential Trash
- Lawn Clippings
- Waste Paper and Cardboard
- Metallic Materials
- Construction and Demolition Debris (<u>e.g.</u>, concrete, wood, asphaltic materials, metal)

Due to U.S. EPA's request for a more specific description regarding various waste types and quantities, the Group has undertaken an additional review of the existing documents. Based on that review, the Group proposes to incorporate the following information into the Waste Characterization section of the RI. MAR 02 '92 03: 28PM AMERICAN OFFICE EQPT

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Mr. Cesar Lee, P.E. February 28, 1992 Page 4

A PADER memorandum from 1978 states that 30 percent of the materials being accepted by the NSL were paper and wood: products, and residential trash.

In addition to the materials listed above, PADER records indicate that the landfill was authorized to accept waste sludges from select commercial and industrial sources. These materials were only accepted upon approval by PADER. The approval by PADER was required as a safeguard against the NSL accepting what PADER considered hazardous waste. A generic list of the sludges will be included in the RI once a review of available records has been completed. If laboratory analyses are available from the PADER files, such information will be appended to the RI report. Other materials not clearly identified at sludges but likely of similar consistency to sludges, and approved for disposal at the NSL include a neutralized label pulp.

PADER inspection reports contain references, on three occasions, to storage, not disposal, of drums/barrels. It is not clear whether the drums/barrels contained liquid. The first reference to the storage of drums/barrels at the NSL is in a September 28, 1978 inspection report prepared by PADER. The report orders the operator to remove all drums/barrels im-mediately. Inspection reports for October 20, 1978, and November 20, 1978 again refer to the drums/barrels and orders the owner/ operator to remove the drums/barrels immediately. The drums/ barrels were apparently removed after the third request by PADER since there is no reference to the drums/barrels in subsequent inspection reports. Since waste disposed of at the NSL was compacted throughout the site's operation, any drums which may have been disposed of in the landfill would have been crushed and compacted along with the other wastes. However, based on interviews with Louis C. Novak, Jr. and others familiar with the landfill operations, NSL did not accept drums and if a drum was identified in a load of material, it was removed.

In conclusion, the records review and results of leachate sampling and analysis demonstrate that the NSL should be classified as a Type I landfill site as defined in the Landfill Guidance, excepting specific reference to significant co-disposal of hazardous waste. Landfill Guidance 3-17. There are no known hot spot areas, and historical records and physical evidence, gathered during the RI, do not document any discrete subsurface disposal areas. As such, the information from the listed sources adequately characterizes wastes disposed of in the landfill for the purposes of selecting a remedy through the RI/FS process. MAR 02 '92 03:08PM AMERICAN OFFICE EQPT

de maximis

Mr. Cesar Lee, P.E. February 28, 1992 Page 5

Similar waste characterizations have been determined to be sufficient and appropriate for numerous other CERCLA sites that are municipal landfills, like the NSL. Examples of suchsites in U.S. EPA Region II are the Dorney Road [Oswald], Old City of York and Reeser Landfills. In fact, some of these sites, unlike the NSL, were not permitted during their periods of operation. As such, even less information was likely to have been available for these sites. Nevertheless, it was not necessary to prepare an extensive appendix, listing users of the site, manufacturing processes and chemical constituents of waste, as is now being requested by EPA.

If you or your staff have any questions regarding the proposed format for revising the Waste Characterization section of the RI, please do not hesitate to contact me. We hope to hear from you within one week regarding U.S. EPA's response 'to this proposal.

Sincerely,

de maximis, inc.

Mark A. Travers Senior Project Director

MAT/mml

cc: Julie A. Parker, Esq., Hannoch Weisman Kenneth Markowitz, Esq., U.S. EPA (w/enclosure - Complaint)

ATTACHMENT L

CORRESPONDENCE TO LAWRENCE W. DIAMOND FROM USEPA DATED MARCH 9, 1992

MAR 30 '92 02:00PM DE MAXIMIS MAR-09-1992 17:03 FROM EPA

TO 96156916485

F.2/? -03 P.001/006



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY REGION II 841 Chestnut Building Philadelphia, Pennsylvania 19107

Office of Superfund SE Pennsylvania Remedial Section Direct Dial (215) 597-8257 Mail Code 8HW21

Re: 3d

March 9, 1992

FACSIMILE # 201-403-0725 Mr. Lawrence W. Diamond Hannoch Weisman

4 Becker Farm Road Roseland, NJ 07068

SUBJECT: Novak Sanitary Landfill Waste Characterization

Dear Mr. Diamond,

EPA has received and reviewed a February 28, 1992 letter from de maximis, inc., providing identification of certain remaining tasks that was promised to EPA by the Novak Sanitary Landfill ("NSL") Steering Committee as a result of our draft RI meeting regarding the NSL on February 13, 1992. Although we were pleased to see your letter, we are disappointed that your proposal was presented as an essentially narrative description of your concerns rather than as a crisp outline of remaining tasks. It appears, however, that we are in agreement on the basic tasks at hand. In order to keep things clear and to move this project forward, we are confirming below several tasks identified in your letter that the NSL Steering Committee will complete as part of the RI/FS.

1. Review of the 104(e) responses to extract information on substances present at the Site.

We are pleased that your review of this is underway. As we have explained, this is an essential task in "detailing the specifics of disposal activities and of types and quantities of waste" (see attached EPA Guidance, <u>Conducting Remedial</u> <u>Investigations/Feasibility Studies for CERCLA Municipal</u> <u>Landfill Sites</u>, No. 540/p-91/001, page 2-7). It is especially important for this Site, which operated for over 35 years, constitutes approximately 34 acres, contains over 1,000,000 cubic yards of refuse from approximately 900 site users, and which is located on a fracture area, as summarized in your RI/FS report. MAR 30 '92 02:01FM DE MAXIMIS MAR-09-1993 17:03 FROM EPA

TO 86156916485

P.3/7 P.022/225

Mr. Lawrence W. Diamond

2. Review of DER files to extract information on substances present: at: the Site.

2

Your latter mentions that a PADER memorandum from 1978 (pre-RCRA waste) states that 80 percent of the materials being accepted by the NSL were paper and wood products and residential trash. As explained above, the question of what constitutes the rest of the 20% of the materials disposed at the NSL is an important one that should be investigated and answered before the RI/FS goes out for public review and a remedy is selected. The referenced PADER memo should be attached in the RI/FS report as part of the supporting documentation, and all other relevant PADER information should be located and reviewed carefully. This is particularly important in view of the fact that we do not have 104(e) responses from all of the entities whose waste went to the NSL. PADER files may provide us direct information, and may help to fill in some of the gap that exists between our approximately two hundred (200) 104(e) responses and the nine hundred (900) contributors of waste.

3. Present the obtained information in a useful, summary format.

As we have discussed, it is not necessary for you to obtain information from sources other than the references (104(e) responses, PADER files, etc.) that you set forth in your letter. However, it is important that the RI/FS contain an informational and capsulized summary of the located information regarding wastes and substances disposed of at the Site. Such a summary will add a great deal of value by enabling report readers and reviewers to efficiently determine the wastes present at the Site. For this purpose, we recommend use of the summary tables which are attached to this letter. If you wish to propose an alternative format that could serve as an equivalent, we would be happy to evaluate it.

In addition to the above items, we note one correction to the information you presented in your February 28 letter: the citation to EPA Landfill Guidance. It appears that your citation to "3-17" may be in error, and may have been intended to refer to p. 3-1 (see page 3-1 of EPA Guidance 540/p-91/001 as attached). Please also check the contents of that citation since the phrase "...do not document any discrete subsurface disposal areas." means separate or unconnected areas such as the "Subtitle D AR 30 '92 02:02PM DE MAXIMIS

-09-1992 17:04 FROM EFA

TC 86156916465

P.4/7 P.003/005

N . Lawrence W. Diamond

March 9, 1992

fudy" in your RI/FS report and the "Region II landfills¹". I merefore this citation should be amended since those situation do not exist at the NSL site.

3

EPA looks forward to receiving a description of the waste bant to the NSL Site, based on the detailed record review of available information that you have cited, and set forth in an iformational and summarized format as in the attached example. is should be included with your submittal of the final RI, pursuant to the schedule agreed upon in our meeting of February 3, 1992. I would be happy to discuss the points raised in this atter should you believe it necessary.

Please call if you have any questions.

Sincerely,

Cesar Lee (3HW21) Remedial Project Manager

Attachments

1

- :c: P. Anderson (3HW21)
 M. Snoparsky (3HW15)
 K. Markowitz (3RC21)
 - C.K. Lee (3HW51)
 - M. Heffron, Dynamac
 - M. Mustard, PADER
 - J. Runkle, PADER
 - M. Travers, de maximus (FACSIMILE # 615-691-6485)

IGT: CL: cl/030992A.NOV

Letter from Mr. Mark A. Travers, de maximis, inc. to Mr. Cesar Lee, US EPA dated February 28, 1992. Page 5, 1st paragraph.

P.5/7 MAR 30 '92 02:03PM DE MAXIMIS TO 96156916465 P.084/006 FROM EPA MAR-29-1992 17:05 Mr. Lawrence W. Diamond March 9, 1992 4 TABLE (A): Solid Waste Summary Solid Approx. Year Location(unit) Waste Wastes of Disocsal Quantity Disposed Generator Remarks Restaurant Trash Residential Trash Lawn Cuts Farm Waste Construction Debris etc. TABLE (B): Specific Waste Summary Specific Year Location(unit) Approx. Waste Wastes Quantity Disposed of Disposal Generator Remarks Waste Treatment Sludge Lab. Package Hospital Waste Incinerator Ash Waste Solvent etc.

AR208316

Sec. 2. 10

MAR 30 '92 02:03PM DE MAXIMIS MAR-09-1991 17:05 FROM EPA P.6/7 P.005/006

Section 3 SITE CHARACTERIZATION STRATEGIES

Once a work plan has been developed. field activities are undertaken to further characterize the site. The purpose of site characterization is to assess the risks to human health and the environment posed by the site and to develop a remediation strategy to mitigate these current and potential threats.

As described in Section 2, site characterization begins with an evaluation of previous data and analytical results. This information is combined with field investigations to fill in data gaps and to test hypotheses about the site developed during scoping. In this section, characterization activities are described by the different media that might be contaminated by a municipal landfill site, and different site characterization strategies for two types of municipal landfill sites are discussed.

Most municipal landfill sites on the NPL are co-disposal facilities that may or may not have known or suspected hot spots. Hot spots consist of highly toxic and/or highly mobile material and present a potential principal threat to human health or the environment (see 40 CFR Sec. 300.430(a)(1)(lit)(C)). Excavation or treatment of hot spots is generally practicable where the waste type or mixture of wastes is in a discrete, accessible location of a landfill. A hot spot should be large enough that its remediation will significantly reduce the risk posed by the overall site, but small enough that it is reasonable to consider removal and/or treatment.

The two principal types of municipal landfills are as follows:

 Landfill Type I. This is a co-disposal facility where records or some other form of evidence indicate that hazardous wastes were disposed of with municipal solid wastes. There are no known or suspected hot spot areas, and historical records and physical evidence. such as aerial photographs and the site visit, do <u>not_document_anv_discrete_subsurface_ disposal areas.</u> Landfill Type 11. This is a co-disposal facility where approximate locations of hot spots are known or suspected, either through documentation, physical evidence, or consistent employee/resident interviews. Small- to moderate-sized landfills (for example, less than 100,000 cubic yards) that pose a principal threat to human health and the environment are included in this group because it may be appropriate to consider excavating and/or treatment of the contents of these landfills.

Placing municipal landfill sites into these two categories allows more efficient characterization through avoidance of extensive and unnecessary sampling, and streamlines the RI/FS process. It should be noted that the distinction between these landfill types will not always be clear. Therefore, the application of the approaches described below should be flexible and adapted to the specific site characteristics.

In general, categorizing landfills into different types allows the site characterization to focus on detecting and then characterizing hot spots. Because there are no known or suspected hot spots, the feasibility study for Landfill Type I can focus on capping alternatives as part of an operable unit. This focused feasibility study could precede or be conducted concurrently with the groundwater investigation, particularly at sites where leachate is not a problem. At Landfill Type IL more effort can be expended on characterizing and remediating the hot spots. At these sites, the feasibility studies can focus on the operable units and remedial action alternatives for these units.

Site characterization strategies for the landfill types are described below by medium. The focus of the descriptions is primarily on those media most often requiring remediation at municipal landfill sites 'e.g., groundwater, leachate, landfill contents, 'est spots, and landfill gas). Other areas such as wetlands, surface water, and sediments are also discussed, but in less detail, since the nature of contamination is not unique

1,1

MAR 30 '92 02:04PM DE MAXIMIS 199-1992 17:06 - FROM EPA

TD 85155916485

As mentioned above, the site description should include the areas, if any, of active landfilling operations; locations selected for sampling or well installation should consider the impact on the site's normal operation and maintenance. Meteorologic data should also be collected and considered during the development of the work plan. Meteorologic data can be used to determine appropriate times for site visits, to direct sampling efforts, and to evaluate remedial action alternatives, such as incineration, capping, or grading. Barometric pressure data are also useful for interpreting landfill gas volume collection data.

2.2.2 Site History

The site history section should detail, in chronological order, the history of previous regulatory actions, disposal activities, types and quantities of wastes, previous owners or operators, site uses, and site engineering studies. Significant effort should be expended in detailing the specifics of disposal activities and of types and quantities of wastes. Site records and interviews with nearby residents and former site operators are valuable sources of this information.

The history of previous disposal activities at a municipal landfill often directly affects the RI objectives, <u>specifically the need to determine</u> whether hot spots may be present and worthy of investigation. In addition to investigating a potential principal threat, the contents of hot spots are important for associating PRPs withthe site. Identifying the chemical components may aid in identifying the sources of the waste in the hot spots.

A brief history of operations at adjoining ornearby facilities and other relevant environmental contamination at or near the site should also be included. These potential offsite sources of contamination should be considered during the development of the work plan. Theymay affect the choice of sampling and monitoring well locations and may contribute contamination to various media. Multiple sources of contaminants in the vicinity can make is difficult to identify all PRPs.

2.2.3 Regional and Site Geology and Hydrogeology

In addition to the preliminary site base map, preliminary geologic cross sections should be developed, if possible, to provide a threedimensional overview of soils and geology and the possible extent of soil and groundwater contamination at the site. The purpose of this effort is to identify any changes or correlations in the type and movement of contamination and soil types and structure. This information will be used to:

- Estimate the depth of the landfill
- Estimate the depth to groundwater
- Identify the limits of subsurface sampling programs
- Select appropriate soil sampling and drilling methods

The preliminary soil/geologic cross-section can be developed from existing site maps, soil and geologic publications, reports on soil borings and monitoring well installation, and analytical results of soil sampling and groundwater sampling, if available. A suggested type of cross-section is shown in Figure 2-2. Features shown on a cross section of this type should include:

- Ground surface leatures (for example, buildings, above-ground tanks, roads)
- Soil horizons (for example, clay lenses or other soil layers with differing characteristics)
- Major geologic units
- Locations of domestic and/or public supply wells
- Locations of existing borings, wells, and test pits
- Existing sample locations, including the location of offsite sampling locations to

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March 31, 1992

VIA HAND DELIVERY

Mr. Cesar Lee ⁴ United States Environmental Protection Agency 841 Chestnut Street Philadelphia, Pennsylvania

RE: Responses to Comments to the RI Report Novak Sanitary Landfill Site

Dear Mr. Lee:

On behalf of the Novak RI/FS PRP Group, this letter transmits four copies of the responses to the comments of the United States Environmental Protection Agency (U.S. EPA) to the Remedial Investigation (RI) report. Dynamac Corporation and the Pennsylvania Department of Environmental Resources have been provided with one and two copies, respectively. As mutually agreed, the proposed revisions provided in the enclosed response document will be incorporated into a revised RI report within two weeks of receipt of U.S. EPA's comments to the response document.

In addition to the responses and proposed revisions provided in the enclosed response document the following should be noted:

The basic conclusion of the risk assessment has not been changed by the revised method of calulating ground water exposures requested by the U.S. EPA.

 The waste characterization text will be revised if additional information relating to sludges is identified.

If you or your staff have any questions regarding the enclosed response document, or any other aspect of this project, please do not hesitate to contact me.

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(a) March March (1997) and (19

Sincerely, de maximis, inc

Mark A. Travers Senior Project Director

Enclosures

cc: Julie Parker, Esq., Hannoch Weisman Joseph Keller, Geraghty & Miller Vincent Uhl, Vincent Uhl & Associates Novak RI/FS PRP Group de maximis, inc.



9041 Executive Park Drive Suite 401 Knoxville, TN 37923 (615) 691-5052

Hannoch Weisman

April 16, 1992

VIA FACSIMILE AND FIRST CLASS MAIL

Mr. Cesar Lee United States Environmental Protection Agency 841 Chestnut Building Philadelphia, Pennsylvania 19107

RB: Revision of the Feasibility Study Report Novak Sanitary Landfill Site South Whitehall Township, Pennsylvania

Dear Mr. Lee:

This letter memorializes the proposed schedule for submittal of the revised Feasibility Study report. As we discussed, the revised Feasibility Study report will be submitted four weeks after submittal of the revised Remedial Investigation report. This will allow sufficient time for incorporation of those comments to the Remedial Investigation report which impact the Feasibility Study report.

We interpret this to be a modification of paragraph VIII, Work to be Performed, subpart G, of the Administrative Order on Consent ("AOC") for this project. Pursuant to paragraph XXII, the AOC may be amended by mutual agreement of the U.S. EPA and the Respondents, and the concomitant modification to the Work Plan schedule may be made by mutual agreement of the Project Coordinators. Such modifications shall be made by an exchange of letters by the Project Coordinators. I therefore request that you provide, at your earliest convenience, a letter confirming U.S. EPA's agreement to the schedule as previously discussed.

If you have any questions regarding any aspect of the referenced project, please do not hesitate to contact me.

Sincerely, de maximis, inc.

Márk Á. Travers Senior Project Director

psm

cc: Julie Parker, Esq., Hannoch Weisman Joseph Keller, Geraghty & Miller Vincent Uhl, Vincent Uhl & Associates Novak RI/FS PRP Group Technical Committee de maximis, inc.

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9041 Executive Park Drive Suite 401 Knoxville, TN 37923 (615) 691-5052



HANNOCH WEISMAN

June 9, 1992

VIA OVERNIGHT COURIER

Mr. Cesar Lee United States Environmental Protection Agency 841 Chestnut Building Philadelphia, Pennsylvania

RE: Revised Remedial Investigation Report Novak Sanitary Landfill Site South Whitehall Township, Pennsylvania

Dear Mr. Lee:

Geraghty & Miller has transmitted under separate cover, on behalf of the Novak RI/FS PRP Group, four copies (one unbound) of the revised Remedial Investigation (RI) report for the Novak Sanitary Landfill site. In addition, three copies are being transmitted directly to the Pennsylvania Department of Environmental Resources (PADER) and one copy to Dynamac Corporation. The enclosed RI report has been revised consistent with the "Responses to the U.S. Environmental Protection Agency's Comments on the Novak Sanitary Landfill Remedial Investigation" dated March 1992 and the comments of the United States Environmental Protection Agency (U.S. EPA) dated May 26, 1992.

In addition to the revisions to the enclosed RI, there are a few comments which are not appropriate for incorporation in the RI report, but which the Group nevertheless believes are important to evaluation of the RI report. These comments are presented in the following text.

> Comparison of the ground water quality prior to purging with that of the ground water quality after purging is inconsistent with the procedures recommended by the U.S. EPA Ground Water Handbook (Ground Water Handbook, Volume II: Methodology, U.S. EPA, July 1991) and RCRA Guidance (RCRA Ground-Water Monitoring Technical Enforcement Guidance Document, U.S. EPA, September, 1986). In addition, the U.S. EPA had requested at the time the initial RI/FS Work Plan was being prepared that all wells be purged so that the quality of the water in the aquifer could be determined, not the stagnant water within the well.

Physical testing (e.g., gradation sieve analysis, organic

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Mr. Cesar Lee June 9, 1992 Page 2 of 3

> content, percent water, and Ph) were not considered necessary in consideration of the objectives of the sampling and analysis of Jordan Creek sediments, nor did the U.S. EPA request that such information be collected. The information which was collected is sufficient for the intended use of the data. Finally, the U.S. EPA approved the Jordan Creek sampling and analysis program as proposed in the Addendum to the RI/FS Work Plan/Field Operations Plan and the Group believes it is inappropriate for the U.S. EPA to now question the usefulness of the resulting data.

- The waste characterization section of the RI report will be revised, if necessary, after each of the Group members have has the opportunity to review the report and attachments provided by the U.S. EPA (prepared by Dynamac Corporation, May 1992). The Group's position regarding this issue, and confirmation of its previous agreement with U.S. EPA, will be provided in a separate letter from the Group's Chair, Lawrence W. Diamond, to Kenneth Markowitz, U.S. EPA. The Group will act in accordance with the approach outlined in that letter.
- The landfill gas survey, which was conducted as part of the Feasibility Study (FS) field activities, encountered gas at the landfill perimeter which exceeded 90 percent of the lower explosive limit (LEL) for methane. Despite the determination of the extent of the landfill gas in the shallow subsurface, the U.S. EPA has requested that the Group perform a combustible gas survey in the basements of residents proximate to the landfill. As previously communicated to the U.S. EPA, the Group has agreed to undertake such a survey. The components of the a survey will be outlined in a separate letter to the U.S. EPA and the results similarly reported.
- Both the U.S. EPA and the PADER take the position that the Pennsylvania ARAR for ground water for hazardous substances is that all ground water be remediated to "background" quality as specified by 25 PA Code 264.90-264.100, specifically 25 PA Code 264.91 (i) and (j) and 264.100 (a) (9). The Group does not agree that this requirement is an ARAR or that this regulation requires all ground water to be remediated to background levels.

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Mr. Cesar Lee June 9, 1992 Page 3 of 3

> Assuming however that this requirement continues to be considered an ARAR for purposes of any ground water remediation (active or passive) at this site, the Group believes that the ARAR should be waived under Section 121 of CERCLA.

In response to comment no. 1 of the U.S. EPA regarding 5.1.2 comments on "4.4.3.2 Bedrock Lithology", a copy of the original field notes concerning MW-7 have been provided at Appendix N. However, the Group objects to the comment of the U.S. EPA in that it suggests the Geraghty & Miller has or would engage in improper practices.

If you have any questions regarding any aspect of the enclosed revision to the RI report, or any other aspect of the referenced project, please do not hesitate to contact me.

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Sincerely, de maximis, inc. NU rk A. Travers

Mark A. Travers Senior Project Director

cc: Julie Parker, Esq., Hannoch Weisman Joseph Keller, Geraghty & Miller Vincent Uhl, Vincent Uhl & Associates Novak RI/FS PRP Group Diana Brems, PADER Kate Crowley, PADER Meg Mustard, PADER Michael Heffron, Dynamac Corporation SO WEST STATE STREET SUITE 1400 P.O. BOX 1298 TRENTON, NJ 08507-1298 (809) 392-2100 FACSIMILE - {609} 392-7958

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HANNOCH WEISMAN

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PLEASE REPLY TO: P.O. BOX 1040 NEWARK, NJ 07101-9819

June 16, 1992

1130 SEVENTEENTH STREET. N.W. SUITE 800 WASHINGTON, D.C. 20036 (202) 296-3432

OF COUNSEL RICHARD J. HUGHES JOSEPH A. WEISMAN ROBERT A. MATTHEWS

FILE # 42668-2

WRITER'S DIRECT LINE: (201) 535-5493

VIA TELECOPIER AND FIRST CLASS MAIL

Kenneth Markowitz, Esq. (3RC23) Assistant Regional Counsel Remedial Enforcement Section Office of Regional Counsel U.S. Environmental Protection Agency Region III 841 Chestnut Building Philadelphia, Pennsylvania 19107

> Re: Novak Sanitary Landfill, Inc.; Waste Characterization Section of Remedial Investigation Report

Dear Mr. Markowitz:

Pursuant to our conversation last week regarding the referenced subject, I telephoned you yesterday, and left a detailed voice mail message, requesting a further extension of time, until June 26, 1992, to respond to the Dynamac Report and to submit the Revised Waste Characterization Section of the RI Report. As I explained on the message, the Group Members are still preparing responses to company specific issues, some of which necessitate further follow-up with the companies. Based upon our previous conversation, it is my understanding that USEPA will approve the requested extension of time. We ask that you confirm approval in writing at your earliest convenience. In the interim, we will, of course, make every practicable effort to submit the responses prior to June 26.

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A PROFESSIONAL CORPORATION

Kenneth Markowitz, Esq. June 16, 1992 Page 2

Thank you for your anticipated cooperation.

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Very truly yours,

HANNOCH WEISMAN

aikerfmmz By: (Julie A. Parker

JAP/mml

cc: Cesar Lee, P.E., USEPA (Via Telecopier) Mark A. Travers, de maximis, inc. (Via Telecopier)

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9041 Executive Park Drive Suite 401 Knoxville, TN 37923 (615) 691-5052 Fax (615) 691-6485

October 9, 1992

VIA FACSIMILE AND FIRST CLASS MAIL

Mr. Cesar Lee Remedial Project Manager United States Environmental Protection Agency 841 Chestnut Street Philadelphia, Pennsylvania

RE: Force Majeure Report/Request for Schedule Extension Novak Sanitary Landfill Site South Whitehall Township, Lehigh County, Pennsylvania

Dear Mr. Lee:

This letter is written on behalf of the Novak RI/FS PRP Group ("Group") which are the Respondents to the Administrative Order by Consent ("Consent Order") in the matter of the Novak Sanitary Landfill Site ("NSL") in South Whitehall Township, Lehigh County, Pennsylvania. Pursuant to Section XVI of the Consent Order, you were notified by telephone on October 5, 1992 of circumstances the Group believes constitutes a force majeure event under the Consent Order. This verbal notice was provided within two business days after becoming aware of conditions constituting a force majeure event. This letter provides the follow-up written notice required by the Consent Order and specifically describes the nature of the delay. In addition, this letter provides the reasons the delay was unanticipated and beyond the reasonable control of the Group, the actions that have been and will be taken to mitigate the delay, the anticipated length of the delay, and the timetable/request for schedule extension.

The Force Majeure

The Group was informed by their contractor (Geraghty & Miller) on Thursday, October 1, 1992 that the U.S.EPA comments received on September 25 and September 28, 1992 required clarification by the U.S.EPA and a significant level of effort, including additional field work, to incorporate. Therefore, prior to revision of either the remedial investigation report ("RI") or the feasibility study report ("FS") a schedule modification would be necessary, because the 14 day response period set forth in Section VIII.G of the Consent Order for revision of the reports is insufficient. For example, the work required prior to revision of either report would include preparation of an addendum to the U.S.EPA approved RI/FS Work Plan ("Work Plan") and Field Operations Plan ("FOP"), followed by implementation of the associated field work upon receipt of approval from the U.S.EPA.

As required by Section VIII.G of the Consent Order, if the U.S.EPA disapproves of a revised preliminary or final Report the Group has 14 days from the receipt of the U.S.EPA's notice of disapproval to incorporate U.S.EPA's requested revisions and resubmit the report. The comments received from the U.S.EPA on September 25 and 28, 1992 are in excess of what the Group could reasonably have anticipated receiving from the U.S.EPA in the third round of comments. The most recent comments from the U.S.EPA include extensive comments to text which was previously submitted to the U.S.EPA

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Mr. Cesar Lee October 9, 1992 Page 2 of 3

(in response to the first round of the U.S.EPA's comments), and which the U.S.EPA did not previously comment upon. As such the Group is justified in considering such original language as approved and acceptable to the U.S.EPA.

It is the Group's opinion that the nature of the comments received from the U.S.EPA could not reasonably be anticipated in consideration of the responses received from previously revised documents, and could not have been within the contemplation of the parties in agreeing to the language provided in Section VIII.G of the Consent Order and paraphrased above.

The excessive number of comments to previously reviewed and apparently approved revisions, and the lack of an opportunity to confer with the specific individuals who provided the comments constitute additional basis for the force majeure and schedule extension.

Anticipated Delay

At the present time, it is not possible to quantify the anticipated delay caused by the event. The Group has attempted to arrange for a teleconference/meeting with the U.S.EPA to discuss the recently received comments; however, the U.S.EPA has informed the Group that the individuals which prepared a majority of the comments in question are not available until October 9, 1992 (the due date for the revised RI Report based on a 14 day response period). Thus, until the Group has the opportunity to discuss the comments in detail and resolve any outstanding issues, neither the RI nor the FS Reports can be revised. Therefore, the impact of this event cannot be predicted without further discussions with the U.S.EPA. However, Geraghty & Miller has informed the Group that to implement the activities requested in the recent comments from the U.S.EPA, an extension of approximately one year would need to be made to the schedule.

Steps Taken to Mitigate Schedule Impacts

The Group has undertaken several steps on parallel tracks in an effort to overcome the recent events and current situation.

On October 2, 1992, the U.S.EFA was contacted in order to arrange for a meeting or telephone conference to discuss the comments which had been received. A telephone conference was arranged for Monday, October 5, 1992 and subsequently canceled due to the unavailability of various individuals which had prepared the comments in question. This telephone conference was tentatively rescheduled for October 9, 1992.

The Group, in the Interest of finalizing the RI and FS Reports, has authorized Geraghty & Miller to make those revisions which do not require further clarification from the U.S.EPA. These are primarily comments relating to further clarification of revisions made to the RI or FS reports in response to comments received from the U.S.EPA on May 26, 1992.

Finally, the Group has verbally presented alternatives to the U.S.EPA, for resolving those issues for which the Group is awaiting to discuss with the appropriate persons at the U.S.EPA.

Timetable/Request for Schedule Extension

The Group requests that the U.S.EFA approve an extension in the schedule for submittal of a revised Final RI and FS Reports. The extension is needed to allow for U.S.EPA to clarify various comments which were believed to have been resolved previously. The level of schedule extension necessary is

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Mr. Cesar Lee October 9, 1992 Page 3 of 3

dependent on further discussions with the U.S.EPA. If the U.S.EPA withdraws those comments which do not relate to clarification of comments provided in correspondence dated May 26, 1992, and considered previously acceptable, the necessary extension could be minimized (approximately two weeks). As stated above, incorporation of the U.S.EPA comments, without further clarification or revision, could require a schedule extension of one year or more.

Conclusion

It should be noted that the issues raised by the U.S.EPA in correspondence received September 25 and 28, 1992 were entirely unexpected considering the comments received on May 26, 1992 and subsequent discussion with the U.S.EPA. In addition, the comments received September 25 and 28, 1992 were received beyond the schedule provided for in Section VIII.G of the Consent Order. As provided for in the Consent Order, the U.S.EPA shall within 30 days of receipt of the revised report notify, in writing, the Respondents of U.S.EPA's approval or disapproval of the revised report. The comments were received well beyond the required 30 days after the U.S.EPA's receipt of the revised RI and FS reports.

In conclusion, it is the Group's opinion, based on review of the recent comments received from the U.S.EPA (to include the additional work items), that the U.S.EPA does not anticipate revision of the recommended alternative provided in the FS report, and is preparing the Proposed Remedial Action Plan (PRAP) for the NSL. In consideration of this fact, it seems inappropriate to delay issuance of the PRAP and the ultimate remedial action for one year or more. The Group has been extremely cooperative and undertaken activities which were clearly beyond the scope of the approved RI/FS Work Plan in the interest of moving this project forward. Any further study would not be in the interest of the public and apparently, based on communication with the U.S.EPA, would likely not impact the ultimate remedy for the NSL.

It is the Group's desire to meet with the U.S.EPA as soon as possible to discuss the issues outlined in this letter/force majeure and the recently received comments to the RI/FS reports. In the meantime, if you or any of your staff have any questions regarding any aspect of this project, please do not hesitate to contact me. I am confident, based on our discussions on October 8, 1992, that we will be able to resolve any outstanding issues and bring the RI/FS to an expenditious conclusion.

Sincerely, de maximis, inc

Mark A. Travers Senior Project Director

cc: Julle Parker, Esq., Hannoch Weisman Joseph Keller, Geraghty & Miller Novak RI/FS PRP Group Novak RI/FS PRP Group Technical Committee

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9041 Executive Park Drive Suite 401 Knoxville, TN 37923 (615) 691-5052 Fax (615) 691-6485

November 4, 1992

VIA OVERNIGHT COURIER

Mr. Cesar Lee United States Environmental Protection Agency 841 Chestnut Street Philadelphia, Pennsylvania

RE: Final Remedial Investigation and Feasibility Study Reports Novak Sanitary Landfill Site South Whitehall Township, Pennsylvania

Dear Mr. Lee:

This letter transmits, on behalf of the Novak RI/FS PRP Group ("Group"), four (4) copies of the Final Remedial Investigation and Feasibility Study reports plus 1 redline/delete version of the same. The reports have been revised in consideration of comments received from the United States Environmental Protection Agency (U.S. EPA) on October 21, 1992. The revisions also consider the recent conversations with the U.S. EPA regarding the comments.

The following letter report briefly responds, where responses are necessary, to the comments provided by the U.S. EPA on October 21, 1992. The comment of the U.S. EPA is provided prior to the Group's response. Each of the U.S. EPA comments is provided in the format provided in the U.S. EPA correspondence. The Group's responses is provided in bold. Not all of the comments required response; therefore, responses to all of U.S. EPA's comments are not provided below.

Responses to the U.S. EPA comments on the "REMEDIAL INVESTIGATION REPORT NOVAK SANITARY LANDFILL SOUTH WHITEHALL TOWNSHIP, PENNSYLVANIA" Report dated June 1992

1.0 COMMENTS ON "4.0 EXPOSURE CHARACTERIZATION"

COMMENTS ON "4.4 EXPOSURE DOSE CALCULATIONS"

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Mr. Cesar Lee November 4, 1992 Page 2 of 19

COMMENTS ON "4.4.4 LEACHATE SEEP WATER AND ASSOCIATED SOIL"

Comment No. 1

Page A-75

The assumption of incidental ingestion of 5 mg/d of surficial soil from the vicinity of leachate seeps is underprotective. The scenario should assume that, on days when these soils are contracted, 100 mg of incidental ingestion occurs.

Response

Calculations regarding exposure doses were prepared using the Incidental ingestion rate of 100 mg/day; it was an oversight that the text was not corrected. The text has been corrected for the final RI submittal.

Comment No. 3

Table A-79: Risk Estimation Summary

... cancer risk to children is additive with that to adults. These risks should be combined.

Response

These risks were combined as noted in footnote C of Table A-79.

Comment No. 4

The table should contain a risk summary for a potential current off-site resident - child (analogous to that for an adult, shown third from the top on page 1 of the table). Although the appropriate route-specific risks were presented in earlier tables, they were omitted from the summary table.

Response

The risks related to exposure of a current off-site resident - child (i.e., ingestion of ground water from residential well NSL-RW-07 [excess lifetime cancer risk = 1×10^4 and hazard index = 2) were inadvertently omitted from Table A-79. A risk summary (analogous to that presented for an adult) has been presented for a potential current off-site child resident in the revised Table A-79.

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Mr. Cesar Lee November 4, 1992 Page 3 of 19

2.0 COMMENTS ON "7.0 PHASE ONE BASELINE ECOLOGICAL EVALUATION"

Comment No. 1

It is suggested that the investigator modify all of Section 7 of the AI except for the portion related to endangered species, or Special Resources/Critical Habitats as referred to in the RI. They appear to have contacted the appropriate people in both state and federal government regarding this aspect.

It is recommended that the chapter be reorganized to include lists of flora and fauna found on site and in the surrounding areas and describe the habitats existing in support of these resources. Since it is a site demonstrating such diversity of habitat, an attempt should be made to census and map populations against habitats and to carry out a habitat impact assessment for the design alternatives during the pre-design phase. Details regarding appropriate habitat restoration will also be developed during the pre-design phase.

Response

The Phase I Baseline Ecological Evaluation presented in Section 7.0 of the RI is based on findings of three field evaluations conducted at the NSL: a site reconnaissance conducted from February 12 through February 20, 1990 (refer to Section 3.2.5 of the RI); a site walkover conducted on February 19, 1992 with a representative of the U.S. EPA (refer to Section 7.0 of the RI); and a preliminary wetlands evaluation conducted on March 11, 1992 (refer to Section 7.0 of the RI). In addition, Section 7.0 of the RI is supported by on-site drainageway, sediment and surface water sampling and analysis and off-site sediment sampling and analysis. All activities were conducted pursuant to the U.S. EPA approved RI/FS Work Plan amd Field Operations Plan.

Finally, it is our understanding that the reference to including a list of flora and fauna in Section 7 (beyond that currently included) would be done during the habitat impact assessment which may be conducted on-site during the RD phase of the project as a supplement to those activities conducted pursuant to the U.S. EPA approved RI/FS Work Plan and Field Operations Plan. In addition, it is our understanding that the reference to "appropriate habitat restoration" applies to the restoration of habitat which legally requires restoration.

COMMENTS ON "7.7 SEDIMENT AND SURFACE WATER SAMPLING" Comments on "Jordan Creek sampling Analysis"

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Mr. Cesar Lee November 4, 1992 Page 4 of 19

Comment No. 2

It is inappropriate to utilize soil contaminant levels to evaluate the potential impact of these contaminants in sediments for Jordan Creek and on-site sediments.

<u>Response</u>

The comparison between the constituent concentrations detected in Jordan Creek sediments and the soil contaminant concentrations presented in *Element Concentrations in Soils and Other Surficial Materials of the Conterminous United States* (Shacklette and Boerngen, 1984) was provided as a general comparison to demonstrate that the lead concentrations detected in Jordan Creek sediments are within naturally occurring lead concentrations for soils. Soils are generally considered the natural source for constituents in sediments, particularly in areas where the bedrock is mantled by soil covers.

Based upon conversations with representatives of PADER, guidelines regarding typical constituent concentrations for freshwater sediments in Pennsylvania are not available. However, guidelines are available from other regulatory agencies and geographic areas. The comparison has been expanded with reference to sediment data from published sources. All lead concentrations detected in the Jordon Creek sediments were consistent with concentrations provided in the identified references.

COMMENTS ON '7.8 SUMMARY AND CONCLUSIONS' Comment on '7.8.3 Conclusions'

Comment No. 3

EPA does not agree with the conclusions reached in this section, specifically. "Based upon the ecological investigations conducted during the RI, there has been little to no effect on off site ecological Characteristics" and "(a)Ithough...practices (on site) have disturbed the ...ecological setting...no available evidence demonstrates any significant effects to the current ecological characteristics...*

We object to use of the term 'ecological investigations' as none was done to the best of our knowledge. In place of this, the consultant used a reconnaissance site visit by a member of EPA staff and a subsequent one-day visit by a site contractor. They have misrepresented the conversations and notes made by EPA staff as sufficient to fulfill the need for full flora and fauna characterization as well as habitat evaluation. Since ecological investigations were not carried out, it is obvious that evidence is not available to 'demonstrate any significant effects'.

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Mr. Cesar Lee November 4, 1992 Page 5 of 19

It is instructive to note at this point that the reconnaissance site visit demonstrated that a very desirable set of habitat conditions are present and improving at the site. A rich mixture of uplands (open fields and immature forest), scattered wetlands (small pockets scattered over the site with at least three larger and well developed areas) were noted. With such a rich mixture, it would be difficult to complete a vegetation list during a one-day site visit. The one-day visit also showed a diversity of wildlife demonstrating that numerous wildlife receptors are prevalent on site.

In conclusion, it is recommended that flora and fauna characterizations be completed along with the various habitats located in the area and viewed through the perception of landscape. In this way, the ecological characterization can be viewed as a working whole rather than as individual parts. The vegetative cover should be described in terms of acreage. Design alternatives should be developed in terms of protecting and enhancing the current habitat and landscape conditions.

<u>Response</u>

It was not the intent of the March 11, 1992 site walk-through with EPA staff to replace a full flora and fauna characterization or habitat characterization. It was agreed upon at the February 13, 1992 meeting that this site reconnaissance visit would provide a perspective of the habitat values at the site and a preliminary wetlands evaluation.

Similarly, in conjunction with the site walk-through, it was agreed a preliminary wetlands evaluation would be conducted during the RI to obtain an initial perspective of potential wetland environments at the NSL. It was also agreed that a complete wetlands evaluation would not be conducted until the RD. In performing the preliminary wetlands evaluation, the site was inspected for evidence of wetland hydrologic conditions, the plant community composition was examined, and general site topography, man-made features, disturbances, and general drainage patterns were noted. This site visit was not the first but the third of three activities associated with documenting general site conditions including ecological evaluations.

As stated previously, it is our understanding that the U.S. EPA intends to request an assessment of on-site habitat(s) during the RD phase of the project to supplement the activities conducted to date pursuant to the U.S. EPA approved RI/FS Work Plan and Field Operations Plan. In addition, restoration of habitat eliminated by the RA will be conducted if determined to be appropriate and legally required.

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Mr. Cesar Lee November 4, 1992 Page 7 of 19

remediation (active or passive) at this site, the Group believes that the ARAR should be waived under Section 121 of CERCLA."

If a waiver is to be considered, the Waiver of this Pennsylvania ARAR must comply with Section 121 (d)(4) of CERCLA and Section 300.430 (f)(1)(ii)(c) of the National Contingency Plan.

Response

The Group previously responded to this comment March 1992. The Clean Streams Law of Pennsylvania, the Pennsylvania Air Pollution Control Act, and the Pennsylvania Air Quality Management Regulations are identified in Section 8.4 of the RI. These ARARs would be triggered by the particular remedial activities that are selected to accomplish a selected remedy.

The second paragraph in Section 8.4 ACTION-SPECIFIC ARARs has been revised to state:

Action-specific ARARs are generally not identified until remedial alternatives are assembled during the FS. Therefore, the only action-specific requirements which will be considered during this preliminary identification of ARARS are the closure requirements for solid waste management facilities. These requirements are defined in RCRA Subtitle D (42 U.S.C. §§ 6907, 6944, 6949, 42 U.S.C. §§ 1345; 40 CFR §257 and 258), and the Pennsylvania Solid Waste Management Act (35 P.S. §§ 6018.101-6018.1003; Title 25 PA. Code. The Pennsylvania Clean Streams Law (35 P.S. §§ 619.1 et.seq.), Pennsylvania Air Pollution Control Act (35 P.S. §§ 4110, et.seq.) and Pennsylvania Air Pollution Control Regulations (25 PA Code §§123.1 et.seq. and 25 PA Code §§131.1 et.seq. are other action-specific ARARs that would be considered upon remedial design. Additional action-specific ARARs will be identified during the FS phase.

The following footnote, used throughout the RI and FS, will be revised as follows and will be included in Section 8.4:

Both the U.S. EPA and PADER take the position that the Pennsylvania requirement for groundwater for hazardous substances is that all groundwater be remediated to "background" quality as specified in 25 PA Code 264.90 - 264.100, specifically 25 PA Code 264.97 (i) and (j) and 264.100 (a)(9). The Group does not agree that this requirement is an ARAR or that this regulation requires all ground water to be remediated to background levels. Assuming however that this requirement continues to be considered an ARAR for purposes of any ground-water remediation (active or passive)

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3.0 <u>COMMENTS ON "8.0 PRELIMINARY IDENTIFICATION OF APPLICABLE OR</u> <u>RELEVANT AND APPROPRIATE REQUIREMENTS (ARARs)"</u>

Comment No. 1

The following Pennsylvania Chemical Specific ARARs must be included and addressed in the Final Remedial Investigation Report for the Novak Sanitary Landfill Site:

- The Clean Streams Law of Pennsylvania, Act of June 22, 1937, P.L. 1987, 35 P.S. §§619.1 <u>et.seq.</u>
- The Air Pollution Control Act, Act of January 8, 1960, P.L. 2119, 35 P.S. §§4110, et.seq..
- Pennsylvania Air Quality Management Regulations:
 - 25 PA Code §§123.1 et. seq. (Chapter 123-Standards for Contaminants)
 - 25 {PA Code §§131.1 et. seq. (Chapter 131-Ambient Air Quality Standards)
 - The Pennsylvania ARAR for groundwater for hazardous substances is that all groundwater must be remediated to "background" quality as specified by 25 PA Code §264.90-264.100, specifically 25 PA Code §§264.97 (i) and (j) and 264.100 (a) (9). The Commonwealth of Pennsylvania also maintains the requirement to remediate to background is found in other legal authorities including Article 1, Section 27 of the Pennsylvania Constitution, Section 301, 307, 401 and 402 of the Pennsylvania Clean Streams Law, and the Solid Waste Management Act. The Department has recently finalized a Ground Water Quality Protection Strategy dated February 1992 which also addresses remediation of groundwater within the Commonwealth of Pennsylvania. This Chemical Specific ARAR must be addressed due to the presence of hazardous substances found in the groundwater (i.e. TCE) above background levels.

The PRP's letter to EPA dated June 9, 1992 states:

"Both the U.S. EPA and the PADER take the position that the Pennsylvania ARAR for groundwater for hazardous substances is that all groundwater be remediated to "background" quality as specified by 25 PA Code 264.90-264.100, specifically 25 PA Code 264.97 (i) and (j) and 264.100 (a)(9). The Group does not agree that this requirement is an ARAR or that this regulation requires all ground water to be remediated to background levels. Assuming however that this requirement continues to be considered an ARAR for purposes of any ground water

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> at this site, the Group believes that the ARAR should be waived under Section 121 (d) (4) of CERCLA and 3300.430 (f)(1)(ii)(c) of the National Contingency Plan in that compliance with such a requirement would be technically impracticable from an engineering perspective due to the geologic setting of the site.

4.0 <u>COMMENTS ON "APPENDIX A: PHASE ONE BASELINE RISK</u> <u>ASSESSMENT"</u>

GENERAL COMMENTS

Comment No. 2

Nothing is provided to substantiate the "no impacts" conclusion. The absence of listed endangered species or critical habitats does not mean there are no adverse environmental effects to ecological resources associated with the site. Additional activities in the form of an habitat impact assessment may be conducted during the RD phase to supplement those activities conducted to date.

Response

The data from the RI and supplemental investigations do provide an indication of impacts to the ecological resources. Specifically, the work completed assessed the ecological resources and was approved by the U.S. EPA as part of the RI/FS Work Plan and Field Operations Plan.

5.0 COMMENTS ON "CHEMICAL DATA TABLES"

Comment No. 1

As per Region III guidance, all data tables in the main bodies of the RI and risk assessment should include detection limits and the code 'U' for all non-detect observations. (If a compound was not detected in any sample of a particular medium, however, it is reasonable to omit it from the summary tables, as was done.)

Response

The tables have been revised in accordance with discussions with the U.S. EPA (i.e., detection limits are provided in a different format than suggested by this comment).

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Responses to the U.S. EPA Comments on the "FEASIBILITY STUDY NOVAK SANITARY LANDFILL SOUTH WHITEHALL TOWNSHIP, PENNSYLVANIA Report dated July 8, 1992

GENERAL COMMENTS

Page ES-8, Paragraph 3, Sentence 1. Remedial Alternatives 4 through 8 do not meet the Pennsylvania ARAR for groundwater. Alternatives 7 and 8 may meet the PA groundwater ARAR if groundwater remediation continues until background quality is reached.

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<u>Response</u>

In support of the Group's position regarding this matter and as previously stated, the footnote which appears throughout the RI has been revised.

Secondly, it is correct that Alternatives 7 and 8 may meet the Pennslyvania ground water requirement; however, it is unlikely considering the technical impractical ability of pumping the formation to restore ground-water quality or to contain any impacts to the ground water. Elimination of infiltration and subsequent leaching of the landfill, supplemented by monitoring of drinking water wells, would be more appropriate and equally protective.

1.0 INTRODUCTION

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1.3 CHARACTERISTICS OF ENVIRONMENTAL MEDIA

1.3.2 Leachate

Page 1-25, 3rd Paragraph:

This section states, "The investigation determined that the standing liquid is primarily located along the southwestern corner of the surface fill area, between the surface fill area and the northwestern corner of the Trench Area in all five trenches." This determination did not take into account that the greatest factor associated with the presence of leachate in the gas vents is not the location of the vents, but the depth in which the vents are located below ground. Gas vents between 1.5 and 4.5 feet below the ground did not contain any standing liquid. Thirty-six percent of the vents between 4.5 and 5.5. feet below the ground contained standing liquid. Seventy-two percent of the gas vents 5.6 feet and deeper contained standing liquid. The deeper gas vents contained the majority of the standing liquid encountered in the upper zone of the landfill.

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Ninety-three percent of the gas vents in the Trench Area were 5.6 feet below grade or deeper. The leachate appeared more prevalent in this area because the deeper vents made the leachate more accessible than the other areas of the landfill. Eighty-two percent of the gas vents in the northwestern portion of the Surface Fill Area were 4.4 feet below grade or less, which could account for the lack of standing water in the vents located in this area. Eighty percent of the gas vents 5.6 feet or deeper in the Old Mine Area contained standing liquid.

The leachate, or perched water in the landfill has not been fully characterized. A comprehensive investigation of the leachate at the landfill should be performed before the conclusions about the volume of the leachate to be removed, as discussed in this report, can be substantiated.

Response

The USEPA Landfill Guidance (EPA/540/P-91/001, February 1991) states that the objectives of leachate investigations are to:

- determine location of leachate seeps;
- determine chemical characteristics of leachate;
- locate potential source areas; and
- determine leachate impact on ground water.

The RI field investigations have identified these objectives; thus the leachate has been characterized. Further field investigations regarding the specific volume of leachate should be deferred until RD.

Finally, the volume of leachate in the fill is based on positive identification of liquid in the landfill gas vents. The lack of liquid was not considered an indication that no leachate existed just a lack of leachate at the depth penetrated by the gas vents.

1.3.3 Landfill Gas

Page 1-29:

This section clearly states that 10 of the landfill gas probes on the boundary of the landfill exceeded 90% the Lower Explosive Limit (LEL). According to § 258.23 of the Federal Register, Volume 26, No. 196, date October 9, 1991, there are several mandates that are required when the LEL is exceeded at the property boundary. These mandates include, but are not limited to a minimum of quarterly monitoring, and notification of the State. EPA may wish to pursue a course of action regarding this issue.

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Response

The Solid Waste Disposal Facility Criteria states at §258.23 "if the concentration of methane gas generated by the facility exceeds 25 percent of the lower explosive limit for methane in facility structures and exceeds the lower explosive limit for methane at the facility property boundary owners and operators of the municipal solid waste landfill must implement a routine methane monitoring program." These requirements routinely apply to measurements made in ambient air space not in the gases contained in the soil pore spaces as was measured during the perimeter gas survey.

These mandates are more appropriately addressed in Section 4.0 (Development of Remedial Alternatives) where Remedial Alternatives 2 through 8 discuss compliance with these mandates. Under these remedial alternatives, methods for controlling landfill gas migration would be implemented. As described in the FS, the specific methodology selected for controlling landfill gas migration would be determined during RD/RA. Procedures for monitoring the effectiveness of the selected remedy would be included in the remedy for controlling landfill gas migration.

Page 1-31

The new Maximum Contamination Limits (MCLs) should be incorporated in the discussion of contaminants exceeding drinking water standards. The following contaminants, and the fact that they exceeded the drinking water standards should be discussed:

Contaminant	Observed	MCL
Viny! Chloride	10 ug/l	2 ua/l
1,2-trichloroethane	5 ug/l	5 ua/l
Benzene	7 ug/l	5 ua/l
Tetrachioroethylene	5 ua/i	5 ug/t
Cadmium	7.5 ug/l	5 ua/l
Nickel	197 ug/1	100 ug/l

Response

The new MCLs have been incorporated into Section 1.3.4. The last sentence of the U.S.EPA comments is incorrect, in that 4 of the 6 above-listed MCL's are exceeded; the remaining two are equal to (do not exceed) the MCL's.

1.3.8 <u>Soils</u>

Page 1-35, 2nd Paragraph

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The sentence, "In summary all evidence suggests that the former activities at the NSL have not altered the quality of the soils at the site," should be removed as suggested in the original comments submitted March 12, 1992. The sediments of the leachate seep on the southern portion of the landfill revealed acetone at 230 ug/kg, 2-butanone at 15 ug/kg (Table 5-4 of the RI Report), and elevated levels of numerous semi-volatile compounds (Table 5-6 of RI Report). The sediments of the northeaster leachate seep revealed ethylbenzene at 31 ug/kg, xylenes at 130 ug/kg (Table 5-4 of RI Report), and elevated levels of semi-volatile compounds (Table 5-6 of RI Report).

Response

There is confusion regarding references to soils and on-site sediments. The sentence "In summary all evidence suggests that the former activities at the NSL have not altered the quality of the soils at the site" will remain in the report because this statement is supported by sampling and analysis performed strictly on soils during field investigations. The on-site sediments, which have been affected the leachate seeps, have been addressed in Section 1.3.7.2 - On-site Sediments.

2.0 IDENTIFICATION AND SCREENING TECHNOLOGIES

2.2 REMEDIAL ACTION OBJECTIVES

2.2.2 Site Specific Remedial Action Objectives

Page 2-4, Landfill Gas

<u>Comment</u>

As presented in the numerous comments previously submitted, the Ambient Air Monitoring Program conducted was very limited and not comprehensive. Based on this fact, the statement referring to this program should read, "Based upon a very limited Ambient Air Monitoring Program...". A statement should be added to address the fact that additional air monitoring will be conducted during the RD/RA phase of the project. During the March 31, 1992 meeting between the PRPs and the EPA, it was agreed that the Ambient Air Monitoring Program was very limited and that additional monitoring would be conducted during the RD/RA.

Response

The objective in the referenced statement has been revised to read "limited". The use of the adjective "very" seems excessive and inappropriate in consideration of

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> the scope provided in the U.S. EPA approved RI/FS Work Plan and Field Operations Plan. As previously discussed, two objectives were identified for the Ambient Air Monitoring Program. The first objective was to evaluate the ambient air quality of the site to identify air quality conditions from a health and safety perspective. The second objective was to screen the site for target VOCs, which, if identified, would have warranted further investigations. Those objectives were met and target VOCs were not detected above any health and safety guidelines. The U.S. EPA stated during the March 31, 1992 meeting that the ambient air monitoring program may be supplemented by additional monitoring performed during RD.

2.5 IDENTIFICATION OF AREAS AND VOLUMES TO BE REMEDIATED

2.5.3 Landfill Gas

Page 2-24, 3rd Sentence

The third sentence, and the other sentences throughout the report, should be rephrased to remove "if any", which implies that the landfill gas evaluation may or may not be performed. As discussed during the March 31, 1992 meeting between the EPA and the PRPs and comments on the RI and FS Reports, the volume and composition of the landfill gas migrating from the site needs to be evaluated.

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Response

The third sentence on page 2-24 has been revised to state:

"...During the RD/RA phase of the project, when the final configuration of the landfill and the landfill gas venting system is known, the volumes of landfill gas venting or migrating from the site can be evaluated." Appropriate revisions have also been made to other portions of Section 2.5.3.

4.0 DEVELOPMENT OF SITE WIDE REMEDIAL ALTERNATIVES

GENERAL COMMENTS

Comment No. 1

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Comment No. 2

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Comment No. 3

Remedial alternatives should be developed in terms of protecting and enhancing the current habitat and landscape conditions. The following recommendations are offered to point the direction of remediation with habitats in mind. It is not to be considered a complete and total set of suggestions, but merely a point of departure in remediating with ecological values as a primary consideration.

- Area 1 should be cleared of waste rubble and debris and enhanced for ecological values, i.e., diverse flora and fauna.
- The swale (area 8) should also be cleared of waste rubble, debris, etc. and designed to carry water slowly through it towards the proposed ponded are in the southwest corner of the property. Area 8 should also be revegetated with desirable wetlands species.
- The cap, if put in place, should be designed to duplicate the undulating cover so that swales and pocket wetlands emulate current conditions as closely as possible. Maintenance in swales, if required, should be carried out after the killing frost in autumn and the vegetation clipped at a height of 15 to 24 inches and no lower.
- The southeast retention pond should be expanded only with care as it is currently a high quality cattail wetlands in conjunction with a maturing forest on one side. This area represents good diversity and should be protected as much as possible.

Response

In developing remedial alternatives, the NCP states that nine criteria should be considered for evaluation: overall protection of human health and the environment, compliance with ARARs, long-term effectiveness and permanence, reduction of toxicity, mobility, or volume through treatment, short-term effectiveness, implementability, cost, state acceptance and community acceptance. The NCP makes no mention with respect to enhancement of the current habitat and landscape conditions as criteria for evaluation. Remedial alternatives have been developed and evaluated regarding the nine evaluation criteria identified in the NCP.

The selected remedy may be enhanced as deemed appropriate by any on-site habitat impact conducted during the RD as determined to be legally required.

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4.5 REMEDIAL ALTERNATIVE

The original comment on the temporary wells for dewatering was not addressed. The Remedial Measure LCH-3 proposes using temporary well points for the one time dewatering of leachate in the Surface Fill and Trench Area. The well construction and design needs to be discussed.

Response

As discussed in previous responses to the USEPA, well construction and design of the temporary well points are more appropriately discussed in detail during the RD phase of the project. However, the cost estimates provided in the FS do provide assumptions on well size, etc. Any additional details would not be appropriate during the RI/FS phase of the project.

7.0 REMEDIAL ALTERNATIVES SELECTION AND RECOMMENDATION

If the landfill is to undergo closure by October 9, 1993, the landfill must meet the requirements of the Final Rule on Solid Waste Disposal Facilities, as outlined in Federal Register No. 56, dated October 9, 1991. At a minimum, the following sections should be taken into account in the remedy selection:

§ 258.6 (a)(1)	The infiltration layer should have an infiltration rate of < 10 cm/sec, common borrow material may not meet these criteria, or PADER § 264.31(1) and 273.234(1)(2)(3) should be followed.
§ 258.23 (a)(2)	The state director should be notified. (c)(1)
§ 258,61 (a)(4)	A gas monitoring system must be implemented.
§ 258.61 (a)(2)	A leachate collection system in accordance with § 258.40 to maintain less than a 30-cm depth of leachate over the liner. Also, PADER § $264.310(6)(III)$ and § $273.192(5)$ should be followed.

A pre-agreement with the Lehigh County Wastewater Pretreatment Plant should also be documented.

It should be mentioned that the final landfill gas venting system design will be modified according to the results of a Remedial Assessment Investigation.

Response

The closure/design criteria as described above from Subtitle D is more appropriately evaluated during RD.

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It should be pointed out that the NSL was designed and permitted as a natural attenuation landfill and as such does not have a liner or a leachate collection system.

Verbal communications with representatives of the Lehigh County Wastewater Pretreatment Plant indicate that approval would be more appropriately provided closer to a point in time when the facility would ship liquids.

As previously stated, the landfill gas venting system would be more appropriately developed and modified following the results from any Remedial Design Investigations.

TABLES

TABLE 2-5 SUMMARY OF PRELIMINARY GOALS FOR GROUND WATER

Comment No. 1

Tables of preliminary remedial goals (PRGs) have been added, but these are inadequate in several ways.

First, PRGs are supposed to be developed in the scoping stage, in order to facilitate an early start on developing remedial alternatives. PRGs are intended to be revised on the basis of the RI and baseline risk assessment to consider the effects of (1) multiple contaminants, (2) multiple routes of exposure, and (3) site-specific exposure patterns. Presentation of single-contaminant, single-route PRGs in a feasibility study in effect was the information gained by the baseline risk assessment.

Second, PRGs have been presented only for groundwater and leachate. Surface soil, air, surface area, and sediments have been omitted despite the fact that all these medial present risks greater than 10⁻⁶ to some receptors.

Third, the groundwater PRGs consider only ingestion, even though inhalation exposure also presented significant risks.

To address this deficiency, it is suggested the following tabes of risk-based cleanup goals be added:

1. For non-carcinogenic effects, based on the most sensitive receptor (usually children for residential scenarios, adults for occupational scenarios, and teenagers for trespassing scenarios), one table for each receptor which exceeded a total hazard index of 1 for all exposure routes combined. For this site, this should include current on-site residents, current off-site residents, current trespassers, and hypothetical future on-site residents. Each table should list all substances

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> contributing 1% or more of the total hazard index, the exposure concentration used in the baseline risk assessment for each exposure route, and the concentration at which the total hazard index would be 1. There exists considerable latitude for exercising judgment in the last item, except that the total hazard index should be 1. These concentrations become the risk-based cleanup goals.

2. For carcinogenic effects, based on the sum of risk to adults and children, one table for each receptor which exceeded a total carcinogenic risk of 10⁻⁶ for all exposure routes combined. As for non-carcinogenic effects, each table should list all substances contributing 1% or more of the total risk, and the exposure concentration used in the baseline risk assessment for each exposure route. Instead of a single set of concentrations adding to a hazard index of 1, the table should contain three sets of concentrations adding to 10⁻⁶, 10⁻⁵, and 10⁻⁶ total cancer risk. As for non-carcinogens, judgment should be used to apportion risk among exposure routes and chemicals to arrive at these fixed risk levels.

<u>Response</u>

During the scoping phase of the RI for the NSL, the PRG guidance document was not available. In fact, prior to the release of the Human Health Evaluation Part B Manual in December 1991, USPA provided no guidance on the method to be used to calculate PRGs or any other type of remediation goals. The only risk assessmentrelated task included the USEPA approved work plan documents at that time was a preliminary risk assessment identifying constituents potentially present at a site. The PRG guidance document became available in December 1991, well into the Novak RI/FS.

PRGs were developed only for those exposure scenarios where the excess lifetime cancer risks exceeded 10⁻⁴ or the hazard index exceeded 1. This was done in accordance with following USEPA guidance which states that "Where the cumulative carcinogenic site risk to an individual based on reasonable maximum exposure for both current and future land use is less than 10⁻⁴, and the non-carcinogenic hazard quotient is less than 1, action generally is not warranted unless there are adverse environmental impacts. However, If MCLs or non-zero MCLGs are exceeded, action generally is warranted." (OSWER Directive 9355.0-30, April 22, 1991). The guidance document goes on to state that "The upper boundary of the risk range is not a discrete line at 1 x 10⁻⁴, although EPA generally uses 10⁻⁴ in making risk management decisions. A specific risk estimate around 10⁻⁴ may be considered acceptable if justified based on site-specific conditions. ... Therefore, in certain cases EPA may consider risk estimates slightly greater than 1 x 10⁻⁴ to be protective." This guidance was followed when selecting the exposure pathways and media requiring development of PRGs.

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> Risk based remediation goals were developed following the methodology presented in the Human Health Evaluation Manual Part B for all environmental media with risks exceeding 10⁻⁶ or a hazard index exceeding 1 or to be conservative, if a combination of hazard indices when added together would exceed 1. This approach is considered to be consistent with current USEPA guidance. Within the Human Health Evaluation Manual Part B, only pathways for a particular medium are considered to be additive, and the individual constituent target risk level is set at 10⁻⁶, "the NCP's point of departure for analysis of remedial alternatives." Furthermore, as stated in the Human Health Evaluation Manual Part B, "the total risk for noncarcinogenic effects is set at an HI of 1 for each chemical in a particular medium." Therefore, PRGs recalculated for ground water were calculated based on both ingestion and inhalation exposures. This procedure was followed for all pathways where more than one type of exposure could occur.

> The Human Health Evaluation Manual Part B does not require or discuss apportioning risk among various media and exposure pathways for an individual receptor. If this approach had been followed, pathways which are considered to be unlikely to occur would be considered in developing remediation goals for pathways considered likely to occur. For example, private ground-water wells are used by residents near NSL where Ingestion and Inhalation exposure scenarios are likely to occur. However, it is not likely that an individual living near the NSL would contact surface water, sediments, soils, or leachate seeps at the site. Therefore, by including all of these pathways and apportioning the risks between the media, unrealistic and overly conservative remediation goals for the site would result.

Table A-1

Several readings are noted to have initially read 100% and then dropped to a lower level. This is very important fact and should be discussed in the text. If the needle on the explosimeter pegs and then returns to zero it is an indication that the readings exceeded the upper explosive limit. The quick peak and deflection to zero occurs because the gas mixture in the combustion cell is too rich to burn and causes the filament to conduct a current just as if the atmosphere contained no combustion at all. Geraghty and Miller should reassess their field notes to be sure that all soil gas locations that originally peaked on the explosimeter be included in the table. According to the EPA contractor's notes, LFG #81 and LFG #1 locations also exhibited a quick peak and then zero on the LEL meter.

Response

Geraghty & Miller reviewed the field notes from the soil gas survey. Landfill soil gas probe samples LFG #1 and #81 did not exhibit a quick peak and a deflection to zero. Without the USEPAs' contractors notes this section cannot be revised. Secondly, it is our understanding the U.S. EPA intends that a more extensive methane survey be conducted during the RD phase of this project.

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Please be informed that the Group was not aware of any misunderstanding that the USEPA may have had with respect to Section 7 of the RI Report dated June 1992. As you are aware, Section 7 was intended to further explain and summarize those activities related to a "preliminary ecological evaluation." This section of the RI Report was submitted to the USEPA in May 1992 without subsequent comments from USEPA. Section 7 of the RI Report was not intended to be a "substitute" for an ecological investigation. Please be reminded that such a study was not a component of the USEPA-approved RI/FS Workplan or Field Operations Plan. In addition, we strongly disagree with the USEPA's assertion that Tables 1-4 and 2-6 of the FS Report, which were revised and resubmitted to the USEPA on September 22, 1992, contain "significant inaccuracies". The text of the FS Report was not being revised because we had not received any comments on the text portion of the report from the USEPA subsequent to submittal. Tables 1-4 and 2-6 were revised to be consistent with the MCLs which were in effect upon submittal of the FS Report to the USEPA on July 8, 1992. The newer MCLs were not effective until July 17, 1992. Also, it was our understanding, based on subsequent numerous deliberate telephone conversations with the USEPA, that the USEPA comments dated September 25 and 28, 1992 were being withdrawn and that a new set of comments would be resubmitted to reflect the USEPA decision that some components of the work were not necessary or would be appropriately conducted during the RD phase.

As previously stated, those comments for which responses are not provided above, the comment was considered in revision of the appropriate sections of the Final RI and FS reports. If you or any of your staff have any question regarding the revised Final RI or FS reports, or any other aspect of this project, please do not hesitate to contact us.

Sincerely, de maximis, inc.

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Mark A. Travers

Enclosures

cc: Julie Parker, Esquire Joseph Keller, Geraghty & Miller, Inc. Vincent Uhl, Vincent Uhl Associates Michael Heffron, Dynamac Corporation Meg Mustard, PADER Kate Crowley, PADER Diana Breams, PADER Novak RI/FS PRP Group

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