116684

PRESENTATION

NOVAK SANITARY LANDFILL
REMEDIAL INVESTIGATION

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Prepared for

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
NOVAK SITE PRP GROUP

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NOVAK SANITARY LANDFILL

REMEDIAL INVESTIGATION

NOVAK RI/FS PRP GROUP

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NATURE OF CONCERN

Organic and Inorganic Compounds Detected in Water Supply Aquifer

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AR305050

REMEDIAL INVESTIGATION WORK PLAN

RI OBJECTIVES

- Develop an understanding of ground-water flow conditions
- Determine the presence or absence of constituents in ground water
- Determine ground-water quality at residential and community supply wells
- Assess the magnitude and extent of existing ground-water concerns, the potential for migration, and the potential environmental and health hazards in the local environmental setting
- Provide a sufficient data base for the development and detailed analysis of remedial alternatives

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RI TASKS

- Site Reconnaissance
- Fracture Trace Analysis
- Residential Well Inventory
- Installation of Test Boring
- Installation of Monitoring Wells
- Local Water-Level Survey
- Regional Water-Level Survey
- Short-Term Pumping Tests
- Jordan Creek Investigation
- Sampling and Analysis Program
- Storm-Water Retention Pond Evaluation
- Baseline Risk Assessment

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SITE BACKGROUND

- Private Landfill Operated from mid 1950's to 1988

- 93 Acre Parcel
  - 65 Acres South of Orefield Road
  - 28 Acres North of Orefield Road

- Accepted Varied Waste Streams Including:

  - Municipal Solid Waste
  - Commercial Solid Waste
  - Industrial Solid Waste

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DISPOSAL AREAS

- Old Surface Mine Area
- Demolition Fill Area
- Surface Fill Area
- Trench Fill Area

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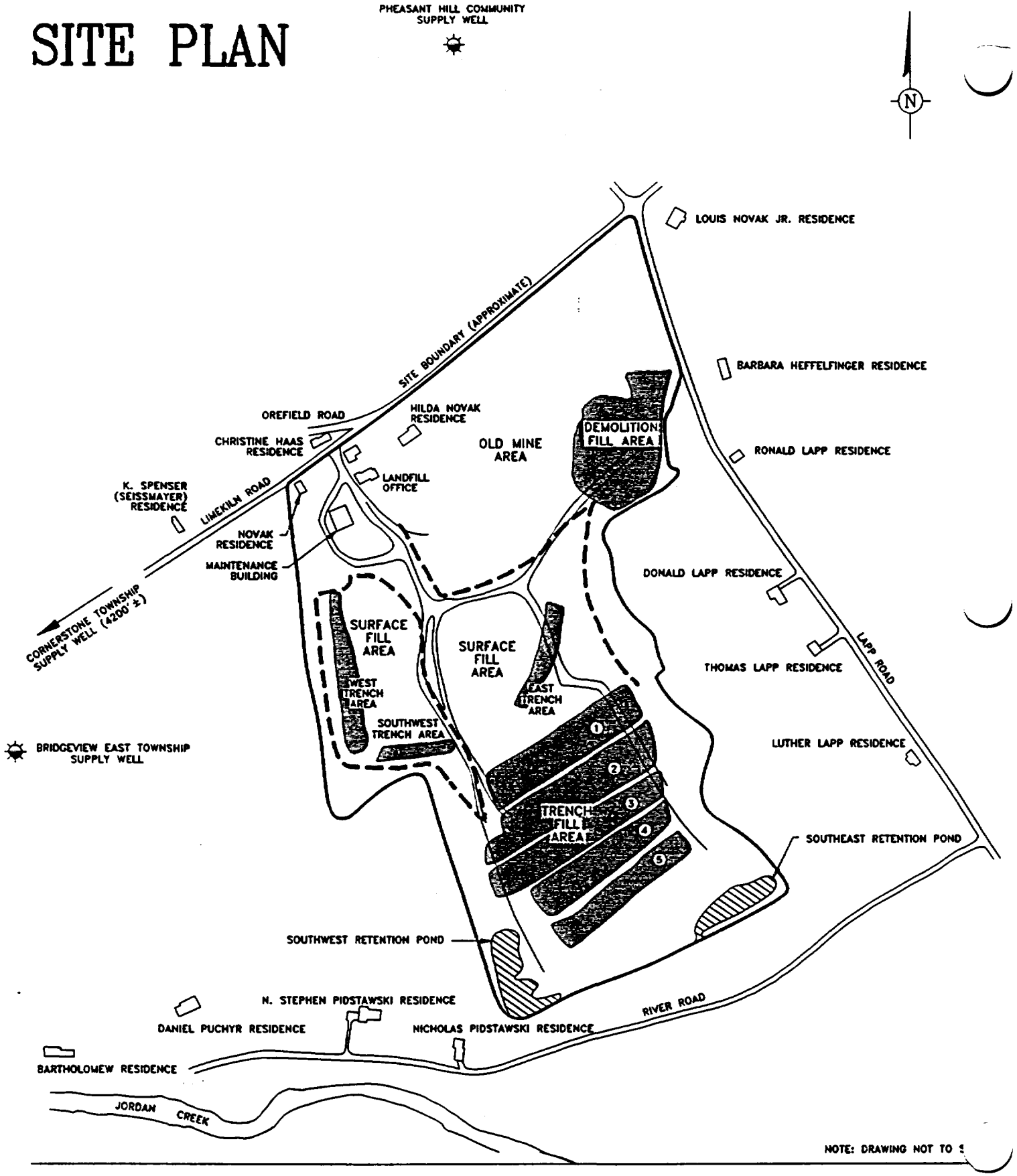
SITE PLAN



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RESIDENTIAL WELL INVENTORY

- Approximately 110 Residential Wells Within 1/2 Mile Radius of Landfill
  - 16 Residential Wells in Proximity to Landfill
  - 2 Inactive Residential Wells (Residences on Public Water)
  - 2 On-site Residential Wells
    1 Shallow Hand-dug Well
- 2 Community Water Supply Wells Within 1/2 Mile Radius of Landfill
  - Bridgeview East Well
    (South Whitehall Township)
  - Pheasant Hills Community Well

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OVERVIEW OF FIELD ACTIVITIES

16	Monitoring Wells
45	Residential Well Samples
40	Monitoring Well Samples
3	Soil Borings
3	Soil Samples
6	On-Site Surface Water Samples
8	On-Site Sediment Samples
6	Jordan Creek Sediment Samples
2	Leachate Samples
2	Leachate Stained Soil Samples

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RI SAMPLING AND ANALYSIS PROGRAM

- Ground Water
  - 15 Residential Wells
    - 26 Volatile Organic Compound Samples
    - 17 Metals and Inorganics Samples
    - 11 Ground-Water Chemistry Samples
  - 20 Monitoring Wells
    - 40 Volatile Organic Compound Samples
    - 13 Semi-Volatile Organic Compound Samples
    - 13 Pesticide/PCB Samples
    - 19 Metals and Inorganic Samples
    - 13 Ground-Water Chemistry Samples
  - 2 Community Wells
    - 2 Volatile Organic Compound Samples
    - 5 Metals and Inorganic Samples
    - 2 Ground-Water Chemistry Samples

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RI SAMPLING AND ANALYSIS PROGRAM

- Seep Areas
  - 5 Volatile Organic Compound Samples
  - 5 Semi-Volatile Organic Compound Samples
  - 5 Pesticides/PCBs Samples
  - 5 Metals and Inorganic Samples
  - 2 Ground-Water Chemistry Samples

- Surface-Water and Sediments
  - 13 Volatile Organic Compound Samples
  - 13 Semi-Volatile Organic Compound Samples
  - 13 Pesticides/PCBs Samples
  - 13 Metals and Inorganic Samples
  - 6 Ground-Water Chemistry Samples

- Soils
  - 1 Volatile Organic Compound Sample
  - 12 Metals and Inorganics Samples

- Jordan Creek Sediments
  - 6 Semi-Volatile Organic Compound Samples
  - 6 Metals and Inorganics Samples

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SUMMARY OF MONITORING WELL SAMPLING AND ANALYSIS

- The highest VOC concentrations were detected in shallow wells near the Trench Fill Area.
- Volatile Organic Compound concentrations an order of magnitude less were detected in the deeper wells.
- Semi-VOCs were detected in the shallow wells near the Trench Fill Area.
- Metals were primarily detected near the Trench Fill Area.

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SUMMARY OF RESIDENTIAL WELL SAMPLING AND ANALYSIS

- The Novak residential well (unoccupied residence) contains the highest contamination with VOC concentrations exceeding Federal and State Maximum Contaminant Levels.
- The Luther Lapp and Thomas Lapp residential wells contain trace concentrations of VOCs but do not exceed Federal or State drinking water standards.
- Trace levels of VOCs were detected in the Puchyr and Bartholomew residential wells.
- Elevated iron and and slightly elevated barium concentrations were detected in the Bartholomew residential well.

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SUMMARY OF COMMUNITY SUPPLY WELL SAMPLING AND ANALYSIS

- Bridgeview East Well
  - VOCs were not detected
  - Metal and inorganic compounds were either not detected or detected at low concentrations
- Pheasant Hill Community Supply Well
  - VOCs were not detected
  - Metal and inorganic compounds were either not detected or detected at low concentrations
  - Elevated nitrate/nitrite concentrations are attributable to local agricultural activities

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COMPARISON OF NOVAK SANITARY LANDFILL LEACHATE AND GROUND-WATER CHARACTERISTICS TO USEPA SUBTITLE D STUDY*

COMPOUNDS	USEPA SUBTITLE D STUDY		NSL DATA		
	LOW (ppb)	HIGH (ppb)	LEACHATE (ppb)	SHALLOW ZONE (ppb)	DEEP ZONE (ppb)
Volatile Organic Compounds					
Acetone	140	11,000	44	4	ND
Benzene	2	410	1	11	ND
Chlorobenzene	2	237	11	29	1
Chloroethane	5	170	4	42	ND
1,1-Dichloroethene	2	6,300	ND	170	9
1,2-Dichloropropane	2	100	ND	13	ND
Ethylbenzene	5	580	21	5	1
Total Ketones	10	28,000	14	ND	ND
Tetrachloroethene	2	100	ND	1	3
Toluene	2	1600	18	66	14
1,1,1-Trichloroethane	0	2400	ND	12	2
Vinyl Chloride	0	100	ND	10	ND
Xylene	12	79	19	19	ND

* Subtitle D Study (1986) Phase 1 Report, EPA/530-SW-86-054, USEPA

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COMPARISON OF NOVAK SANITARY LANDFILL LEACHATE AND GROUND-WATER CHARACTERISTICS TO USEPA SUBTITLE D STUDY

COMPOUNDS	USEPA SUBTITLE D STUDY LOW (ppb)	USEPA SUBTITLE D STUDY HIGH (ppb)	NSL DATA LEACHATE (ppb)	NSL DATA SHALLOW ZONE (ppb)	NSL DATA DEEP ZONE (ppb)
Semi-Volatile Organic Compounds					
1,4-Dichlorobenzene	2	20	ND	49	ND
Diethyl phthalate	2	45	ND	3	ND
bis(2-Ethylhexyl)phthalate	6	110	ND	3	2
Naphthalene	4	19	ND	3	ND

* Subtitle D Study (1986) Phase 1 Report, EPA/530-SW-86-054, USEPA

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COMPARISON OF NOVAK SANITARY LANDFILL LEACHATE AND GROUND-WATER CHARACTERISTICS TO USEPA SUBTITLE D STUDY

COMPOUNDS	USEPA SUBTITLE D STUDY		NSL DATA		
	LOW (ppb)	HIGH (ppb)	LEACHATE (ppb)	SHALLOW ZONE (ppb)	DEEP ZONE (ppb)
Metals/Inorganics					
Iron	200,000	5,500,000	331,000	224,000	263
Zinc	600	220,000	3,310	134	ND
Mangenese	600	41,000	16,200	2,750	220
Sodium	20,000	7,600,000	145,000	432,000	35,500
Copper	1,000	9,000	286	ND	ND
Lead	1	1,440	644	ND	ND
Magnesium	3,000	15,600,000	130,000	75,000	52,200
Potassium	35,000	2,300,000	104,000	152,000	12,500
Cadmium	0	375	83	7.5	5.6
Selenium	0	2700	2	ND	ND
Chromium	20	18,000	212	ND	ND

* Subtitle D Study (1986) Phase 1 Report, EPA/530-SW-86-054, USEPA

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COMPARISON OF NOVAK SANITARY LANDFILL LEACHATE AND GROUND-WATER CHARACTERISTICS TO USEPA SUBTITLE D STUDY*

COMPOUNDS	USEPA SUBTITLE D STUDY		NSL DATA		
	LOW (ppb)	HIGH (ppb)	LEACHATE (ppb)	SHALLOW ZONE (ppb)	DEEP ZONE (ppb)
Water Chemistry					
Chemical oxygen demand	50,000	90,000,000	430,000	380,000	30,000
Total organic carbon	50,000	45,000,000	160,000	130,000	11,000
Total dissolved solids	725,000	55,000,000	1,300,000	1,500	650
Alkalinity (as CaCo3)	100	20,350,000	1,400,000	620,000	520,000
Sulfate	25,000	500,000	170,000	62,000	46,000
Hardness (as CaCo3)	100	36,000,000	1,380,000	490,000	474,000
Nitrate nitrogen	100	45,000	ND	6,000	1,500
Ammonia nitrogen	100	2,000,000	92,000	260,000	7,100

* Subtitle D Study (1986) Phase 1 Report, EPA/530-SW-86-054, USEPA

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RISK ASSESSMENT

- Purpose and major components
- Results of the Baseline Risk Assessment

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RISK ASSESSMENT PURPOSES

- Evaluate potential human health and environmental risks as a result of current and future exposure to constituents released from the waste
- Determine whether response action is required at the site
- Establish site-specific clean-up goals

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RISK ASSESSMENT COMPONENTS

- Data Collection and Evaluation
- Exposure Assessment
- Toxicity Assessment
- Risk Characterization

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DATA COLLECTION AND EVALUATION

- Gather and Analyze Site Data
- Determine Constituents of Potential Concern

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EXPOSURE ASSESSMENT

- Evaluate Type and Magnitude of Exposure
- Collect Information About the Exposure Setting

  Site Characteristics
  - climate
  - hydrology
  - geology
  - location of surface-water bodies

  Potentially-Exposed Populations
  - land use (current and future)
  - location
  - activity patterns

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EXPOSURE ASSESSMENT (cont.)

- Identification of Exposure Pathways

  Where the Constituent is Coming From (Source)

  How the Constituent is Being Transported (Transport Medium)

  Where Individuals are Exposed (Exposure Point)

  How Individuals are Exposed (Exposure Route)

  Who is Exposed (Receptor)

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EXPOSURE ASSESSMENT (cont.)

- Calculation of Exposure Doses

  Depends on:

  Constituent Concentration
  Exposure Route

  $$\text{Dose} = \text{Constituent Concentration} \times \frac{\text{Daily Intake}}{\text{Body Weight}}$$

- Standard Exposure Assumptions

  Daily water intake = 2 liters/day
  Soil ingestion rate = 100 milligams/day

- Reasonable Maximum Exposure

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TOXICITY ASSESSMENT

- Collect Information About the Hazards or Adverse Health Effects of the Constituents
- Dose-Response Evaluation

  Relationship Between Dose Given and Incidence of Adverse Effects

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TOXICITY ASSESSMENT (cont.)

- Toxicity Values

  Non-Cancer Effects

  Threshold
  Dose that Causes No Adverse Effect in Most Sensitive Species
  Reference Dose (Acceptable Dose)

  Cancer Effects

  No Threshold
  Relationship Between Dose and Response
  Slope Factor

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RISK CHARACTERIZATION

- Combine Exposure and Toxicity Assessment to Estimate Risk
- Estimate Potential for Non-Cancer Effects for Each Constituent and Pathway
- Estimate Potential for Cancer Risk for Each Carcinogen and Pathway

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CONSTITUENT PATHWAYS

MATRIX	PATHWAY
Ground Water	- Ingestion - Dermal Contact (Showering) - Inhalation (Showering)
Surface Soil	- Dermal Contact - Incidental Ingestion
Leachate Seep Areas	- Dermal Contact - Incidental Ingestion
Surface Water and Sediments	- Dermal Contact - Incidental Ingestion
Air	- Inhalation

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CURRENT EXPOSURE PATHWAYS EVALUATED

POTENTIALLY EXPOSED POPULATION	EXPOSURE POINT/ MEDIUM OF EXPOSURE	EXPOSURE ROUTE
Adult/Child Residents	Private on-site well; private off-site well; community supply well/ground water	Ingestion of water and inhalation of volatiles while showering
Trespasser	On-site/surface soil	Ingestion of and dermal contact with surface soils. Inhalation of fugitive dusts
Trespasser	On-site leachate seep areas/ water and soil	Ingestion of and dermal contact with leachate or affected surface soil

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CURRENT EXPOSURE PATHWAYS EVALUATED

POTENTIALLY EXPOSED POPULATION	EXPOSURE POINT/ MEDIUM OF EXPOSURE	EXPOSURE ROUTE
Trespasser	On-site surface water retention ponds/ surface water and sediments	Ingestion of and dermal contact with affected water or sediment.
Trespasser	Air	Inhalation of air containing vapor-phase organics.
Aquatic Life	Jordan Creek/surface water and sediments	Exposure to water-borne constituents and to sediment bound constituents.
Terrestrial biota (Deer, rabbits)	On-site surface water and soil	Exposure to constituents in surface soils and water.

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FUTURE EXPOSURE PATHWAYS EVALUATED

POTENTIALLY EXPOSED POPULATION	EXPOSURE POINT/ MEDIUM OF EXPOSURE	EXPOSURE ROUTE
Adult/Child Residents	Private on-site well; private off-site well/ ground water	Ingestion of water and inhalation of volatiles while showering.
Adult/Child Residents	On-site/surface soils	Ingestion of and dermal contact with surface soils. Inhalation of fugitive dusts.
Adult Residents	On-site leachate seep areas/water and soil	Ingestion of and dermal contact with leachate or affected surface soil.

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FUTURE EXPOSURE PATHWAYS EVALUATED

POTENTIALLY EXPOSED POPULATION	EXPOSURE POINT/ MEDIUM OF EXPOSURE	EXPOSURE ROUTE
Adult/Child Residents	On-site surface water retention ponds/ surface water and sediments	Ingestion of and dermal contact with water or sediment.
Adult/Child Residents	Air	Inhalation of air containing vapor-phase organics.

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RESULTS OF BASELINE RISK ASSESSMENT (ON-SITE)

Matrix/Pathway	Excess Lifetime Cancer Risk	Hazard Index
Ground-Water (Ingestion):		
Potential Current On-Site (Private Well):		
Adult	2 x 10(-4)	0.86
Child	8 x 10(-5)	2.0
Future Hypothetical On-Site (Private Well):		
Adult	2 x 10(-4)	1.7
Child	1 x 10(-4)	4.0
Ground-Water (Showering):		
Potential Current On-Site (Private Well):	7 x 10(-6)	0.034
Future Hypothetical On-Site (Private Well):	4 x 10(-6)	0.056

Note: An Estimated Lifetime Cancer Risk of Between 1 x 10(-6), and 1 x 10(-4), and an estimated hazard index less than unity (1) is considered "acceptable" by regulators

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RESULTS OF BASELINE RISK ASSESSMENT (OFF-SITE)

Matrix/Pathway	Excess Lifetime Cancer Risk	Hazard Index
Ground-Water (Ingestion):		
Potential Current Off-Site (Private Well):		
Adult	2 x 10(-6)	0.76
Child	1 x 10(-6)	1.8
Potential Current Off-Site (Community Supply Well):		
Adult	NC	0.048
Child	NC	0.11
Ground-Water (Showering):		
Potential Current Off-Site (Private Well):	1 x 10(-7)	0.0089
Potential Current Off-Site (Community Supply Well):	ND	ND

Note: An Estimated Lifetime Cancer Risk of Between 1 x 10(-6), and 1 x 10(-4), and an estimated hazard index less than unity (1) is considered "acceptable" by regulators

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RESULTS OF BASELINE RISK ASSESSMENT

Matrix/Pathway	Excess Lifetime Cancer Risk	Hazard Index
Surface Soil:		
Potential Current Trespasser	2 x 10(-6) (2 x 10(-6))	0.17 (0.29)
Future Hypothetical Adult Resident	2 x 10(-5) (2 x 10(-5))	0.69 (1.3)
Future Hypothetical Child Resident	5 x 10(-5) (3 x 10(-5))	4.2 (7.4)
Seep Areas (Water and Soil):		
Potential Current Trespasser	1 x 10(-5)	2.3
Future Hypothetical Adult Resident	2 x 10(-6)	0.16
Future Hypothetical		

Note: An Estimated Lifetime Cancer Risk of Between 1 x 10(-6), and 1 x 10(-4), and an estimated hazard index less than unity (1) is considered "acceptable" by regulators

( ) Estimated Risk on Constituent Concentrations in Background Samples

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RESULTS OF BASELINE RISK ASSESSMENT

Matrix/Pathway	Excess Lifetime Cancer Risk	Hazard Index
Surface Water and Sediments (Wading):		
Potential Current Trespasser	1 x 10(-6)	0.11
Future Hypothetical Adult Resident	2 x 10(-6)	0.071
Future Hypothetical Child Resident	2 x 10(-6)	0.27
Air Vapors:		
Potential Current Trespasser	3 x 10(-7) (2 x 10(-7))	0.052 (0.042)
Future Hypothetical Adult Resident	2 x 10(-5) (7 x 10(-6))	0.94 (0.77)
Future Hypothetical Child Resident	2 x 10(-5) (9 x 10(-6))	4.4 (4.3)

Note: An Estimated Lifetime Cancer Risk of Between 1 x 10(-6), and 1 x 10(-4), and an estimated hazard index less than unity (1) is considered "acceptable" by regulators

( ) Estimated Risk on Constituent Concentrations in Background Samples

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SUMMARY AND CONCLUSIONS

- Ground Water
  - Elevated constituent concentrations are primarily limited to the shallow monitoring wells near the Trench Fill Area.
  - An elongated ground-water mound exists in the southern portion of the site and reaches from the southeastern site boundary across the southwestern site boundary to River Road.
  - Elevated concentrations of VOCs in residential wells are consistant with the limits of the elongated mound.
  - Ground-water contamination has apparently stabilized
  - Ingestion exposure pathways from ground water pose excess lifetime cancer risks greater than 1×10^{-4} and hazard indices greater than unity (1).

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SUMMARY AND CONCLUSIONS (cont.)

- Landfill Contents
  - There is no evidence indicating RCRA Subtitle C would be applicable or appropriate to NSL.

- Leachate Seeps
  - Exposure pathways from leachate seeps indicate hazard indices greater than unity (1).

  - The leachate at the NSL is a "mild" leachate based on comparison to other municipal landfills.

- Surface Water
  - The NSL has not effected Jordan Creek.

  - Surface water and sediments on the site do not pose excess lifetime cancer risks greater than 1×10^{-4} or hazard indices greater than unity (1).

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SUMMARY AND CONCLUSIONS (cont.)

- Soil
  - Soil quality at the NSL is consistant with background soil quality.
- Air
  - Concentrations of target VOCs were detected far below concentrations established in the following guidelines:
    - Multimedia Environmental Goals
    - Ambient Concentration Levels (American Conference of Governmental Industrial Hygienists)
    - Ambient Air Toxic Guidelines (PADER)
  - Air quality at the NSL is consistant with background air quality.

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