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APPENDIX P

EXAMPLE RISK ASSESSMENT CALCULATIONS

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RISK ASSESSMENT EXAMPLE CALCULATIONS

Surface Soil Exposure

Three potential exposure routes are associated with theoretical surface soil direct contact at Keystone Sanitation Landfill Site areas of interest. These exposure routes include ingestion, dermal contact, and inhalation of fugitive dust. Example calculations for each of these routes of exposure are presented in the following text.

Incidental surface soil ingestion exposure for arsenic at Area A is estimated for an adult resident from the following equation (EPA, 1989a):

$$IEX = (C \times IR \times FI \times EF \times ED \times CF)/(BW \times AT)$$

where: IEX = 1.87E-6 mg/kg/day

CA

	6 6 9	
С	= 3.99 mg/kg	= arsenic representative concentration in soil
IR	= 100 mg soil/day	= Soil ingestion rate
Fi	= 1.0	= Fraction ingested from contaminated source
EF	= 350 days/yr	= Exposure frequency
ED	= 24 yrs	= Exposure duration
BW	= 70 kg	= Body weight
AT	= 25550 days	= Averaging time for carcinogens (365 days/yr x 70 yrs)
CF	= 1E-6 kg soil/mg soil	= Conversion factor

= Indestion exposure

As discussed in Section 4.1.3.2, the potential receptors for this scenario include adult residents and child residents. For an adult or child resident, an EF of 350 days was assumed. For a child resident, an IR of 200 mg soil/day, a BW of 15 kg, and an ED of 6 years were assumed; for an adult resident, BW and ED were assumed to be 70 kg and 24 years, respectively. Using the same equation, child ingestion is 4.37E-6 mg/kg/day.

The cancer risk for a lifetime resident from incidental ingestion of surface soil is calculated as follows:

= (IEX_{child} + IEX_{adult}) × SF where: CA = 9.37E-6 = incremental (upper bound) risk of developing cancer IEX_{child} = 4.37E-6 mg/kg/day = Ingestion exposure IEX_{adult} = 1.87E-6 mg/kg/day = Ingestion exposure $= 1.5 (mg/kg/day)^{-1}$ = carcinogenic slope factor (upper 95 percent SF confidence limit of a dose-response curve)

The lifetime cancer risk for a resident from incidental ingestion of surface soil is calculated using the above equation, which sums the risks for a child (6 years exposure duration) and an adult (24 years duration).

Dermal exposure to arsenic from Area A surface soil is estimated for an adult resident from the following equation (EPA, 1989a; EPA, 1992e):

$$DEX = (C \times SA \times AF \times ABS \times EF \times ED \times CF)/(BW \times AT)$$

where: DEX = Dermal exposure dose = 8.28E-6 mg/kg/dayС = Chemical concentration in soil = 3.99 ma/kaSA $= 4734 \text{ cm}^2/\text{event}$ = Skin surface area available for contact AF $= 0.032 \text{ ma/cm}^2$ = Soil-to-skin adherence factor = Fraction from contaminated source ABS = 1 = 350 events/vr = Exposure frequency EF ED = Exposure duration = 24 yrs = 70 kg BW = Body weight CF = 1E-06 kg soil/mg soil = Conversion factor AT = 8760 days = Averaging time, non-carcinogens (365 days/vr x 24 vrs)

As discussed in Section 4.1.3.2, the potential receptors for this scenario include adult residents and child residents. For an adult or child resident, an EF of 350 days was assumed. For a child resident, a BW of 15 kg and an ED of 6 years was assumed; for an adult resident, BW and ED were assumed to be 70 kg and 24 years, respectively. It was assumed that the primary areas of skin available for contact would be the hands, arms, and feet of adult residents (4734 cm²) and the arms, hands, legs, and feet of residential children.

For residential children, the ratio of surface area over body weight was added for six one-year increments. As calculated in Appendix Q, Table Q-1, the $(cm^2-yr) / (kg BW)$ values for ages one through six are 296.5, 213.8, 229.9, 222.3, 217.2, and 209.6, which yields a total of 1389 cm²-yr/kg that replaces the terms SA, BW, and ED in the above equation. Absorption factors recommended (EPA, 1995b) were 3.2% for arsenic, 1% for other metals, 0.05% for VOCs with vapor pressure >= 95.2 mm, 3% for other VOCs, 24.4% for pentachlorophenol, and 10% for pesticides.

The non-cancer hazard quotient for an adult resident from dermal contact with arsenic in surface soil at Area A is calculated as follows:

NC = DE	X / RfD
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where:	 = 2.91E-2 = 8.28E-6 mg/kg/day = 2.85E-4 mg/kg/day	 hazard quotient dermal exposure dermal reference dose (3E-4 Oral RfD x 0.95 GI absorption factor)
		ractor)

The hazard quotient for a child or adult resident from incidental ingestion of surface soil are calculated using the same equation.

Fugitive dust emissions and exposure to arsenic from Area A surface soil are estimated for an adult resident from the following equations (Cowherd, et al., 1984; EPA, 1989a):

Exposure to fugitive dust emissions can be estimated by first estimating the rate of distribution and arsenic emission from Area A and then relating this to the exposure rate for the receptors. Area A is conservatively estimated to have unlimited erosion potential (associated with small particle size and low vegetative cover).

Emission factors were estimated as follows:

 $E_{10} = (0.036) \times (1-V) \times (U/Ut)^3 \times F(x) \times CF$

where:	V U Ut F(x)	= 3.12E-6 g/(m ² sec) = 0.8 = 4.2 m/sec = 4.32 m/sec = 1.7	 Particulates less than 10 microns (PM₁₀) average annual emission flux fraction of vegetative cover mean annual wind speed (Baltimore closest city, table 4-1, Cowherd, et al.) threshold value of wind speed at 7 m (from equation, below) function based on x = 0.424 = 0.886 x Ut/U (from Figure 4-3, Cowherd)
	CF	= 1/3600 hr/sec	= conversion factor
	Ut	$= U^* x (1/0.4) x in (z/z_0)$	
where:	Ut	= 4.32 m/s	= wind speed at height z
	Z	= 700 cm	= height above surface (Cowherd)
	Z ₀	= 5 cm	 roughness height for suburban area, residential dwellings (Figure 3-6, Cowherd)
	U*	= 0.35 m/s	= friction velocity for assumed particle size 0.25mm (Figure 3-4, Cowherd)

From the emission flux, the emission rates are as follows:

 $= E_{10} \times A$ R_{10} where: R₁₀ = 3.12E-2 g/sec = Emission rate of soil as PM₁₀ = $3.12E-6 g/(m^2 sec)$ = $100 X 100 m^2$ = PM₁₀ emission flux E₁₀ = source area Α

To estimate the annual average air concentration to receptors near the site, a screening air dispersion model was used as described in Cowherd, et al. The screening model parameters were selected consistent with conservative assumptions (a 100 X 100 m source area and a 200 m downwind receptor located along the axis of most probable dispersion). Annual average air concentrations were estimated as follows:

	Q	= R ₁₀ / P _R	
where:	Q	= 1.06E-1 g/sec	= wind erosion scaling factor
	R ₁₀ P _R	= 3.12E-2 g/sec = 0.296	= PM ₁₀ emission rate = fraction of time wind erosion occurs (Figure 4-7, Cowherd)
	х	$= Q_1 \times F_1 \times CF_2$	
where:	х	= 4.05E-4 mg/m ³	= average annual downwind respirable concentration of PM ₁₀
	Qı	= 1.06E-1 g/sec	= wind erosion scaling factor

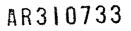
F ₁	= 3.837 (ug/m ³) / (g/sec	c) = unscaled conc. due to unit erosion rate (Cowherd, p. D-29)
CF ₂	= 1/1000 mg/ug	= conversion factor

From the air concentration of soil particles (PM₁₀) and the concentration of arsenic in soil, exposure to fugitive dust was then estimated using the following equations:

and	IEXr	= (X x CS x IR x ET x E	F x ED x IF-R)/(BW x AT)
anu	IEXo	= (X x CS x IR x ET x E	F x ED x IF-O)/(BW x AT)
where: and	IEXr	= 1.89E-11 mg/kg/day	= cancer dose from inhaled fraction retained in lungs for adult resident over 24 yr period
and	IEXo	= 9.45E-11 mg/kg/day	= cancer dose from inhaled fraction that is eventually swallowed for adult resident over 24 yr period
	X CS IR EF ED BW AT IF-R IF-O	= 4.05E-4 mg/m ³ = 3.99E-6 g As/g soil = 0.83 m ³ /hr = 24 hr/day = 350 day/yr = 24 yr = 70 kg = 25550 days = 0.125 = 0.625	 Downwind PM₁₀ air concentration Mass fraction of arsenic in soil (=As mg/kg x 1E-6kg/mg) Inhalation rate Exposure time Exposure frequency Exposure duration Body weight Averaging time, carcinogens (365 days/yr x 70 yrs) inhaled fraction retained in lungs (Page 61, Cowherd) inhaled fraction eventually swallowed (Page 61, Cowherd)

The cancer risk for an adult resident from inhalation ingestion of fugitive dust from surface soil is calculated as the sum of the risks from inhalation particles retained in the lungs and inhalation particles that are eventually swallowed:

	CA	= (IEXr x SFi) + (IEXo	x SFo)
where:	CA	= 4.27E-10	= incremental risk of developing cancer from the inhaled fraction retained in lungs (IEXr x SFi) plus risk of developing cancer from the inhaled fraction that is eventually swallowed (IEXs + SFs) for adult resident over 24 yr period
	IEXr	= 1.89E-11 mg/kg/day	= cancer dose from inhaled fraction retained in lungs for adult resident over 24 yr period
	SFi	= 1.51E+1 (mg/kg/day) ⁻¹	= inhalation carcinogenic slope factor for arsenic
	IEXo	= 9.45E-11 mg/kg/day	= cancer dose from inhaled fraction that is eventually swallowed for adult resident over 24 yr period
	SFo	= 1.5 (mg/kg/day) ⁻¹	= oral carcinogenic slope factor for arsenic



The cancer risk for a lifetime resident from inhalation of arsenic in surface soil is calculated using the above equation and summing the risks for an adult (24 yr. ED) and a child (6 yr. ED, 0.5m³/hr inhalation rate, 15 kg BW). Using the above equations, the child risk is 3.00E-10, and the lifetime cancer risk is 7.27E-10.

As discussed in Section 4.1.3.2, the potential receptors for this scenario were adult residents and child residents. The input parameters were selected from the options provided in the Cowherd model, including an area of contamination conservatively estimated from the site visits and analytical results as 10000 m², terrain roughness factors for a suburban residential dwellings type setting, and meteorological factors for the local geographic area. The cover factor was considered to be approximately 80 percent (0.8). For residents, the assumed distance from the site was zero (< 200 m), and therefore the strongest wind direction at 200 m was used to determine the unscaled concentration from the erosion rate. A median particle size of 0.25 mm was assumed for the study area; this particle size was used to derive the threshold friction velocity.

Sediment Exposure

Two potential exposure routes are associated with theoretical sediment direct contact at Keystone Sanitation Landfill Site areas of interest. These exposure routes include ingestion and dermal contact during wading/swimming. The methods used to assess these routes of exposure are discussed in the following text. These scenarios were evaluated in the same way as ingestion and dermal exposures for surface soil, which were explained above.

As discussed in Section 4.1.3.2, the potential receptors were recreational children (21.3 kg). The input parameters for sediment are the same as those for soil, with notable exceptions. Children involved in wading/swimming activities would be expected to be older than the typical 15-kilogram child (approximately 3 years old). Therefore, the recreational child in the wading/swimming scenario was assumed to be 3 to 8 years old (21.3 kilograms). Exposure to sediment during wading was expected to involve the hands and feet. Therefore, for residential children, the ratio of surface area over body weight was added for six one-year increments. As calculated in Appendix Q, Table Q-1, the (cm²-yr) / (kg BW) values for ages three through eight are 57.6, 54.7, 53.4, 48.2, 46.5, and 44.4, which yields a total of 305 cm²-yr/kg that replaces the terms SA, BW, and ED in the conventional dermal exposure equation.

Incidental sediment ingestion exposure to beryllium at Conewago Creek, Mundorff Tributary is estimated for a recreational child from the following equation (EPA, 1989a):

 $IEX = (C \times IR \times EF \times ED \times FI \times CF)/(BW \times AT)$

where:	IEX	= 1.46E-8 mg/kg/day	= Ingestion exposure
	C IR Fi BW EF AT CF ED	= 0.947 mg/kg = 200 mg soil/day = 1.0 = 21.3 kg = 7 days/yr = 25550 days = 1E-6 kg soil/mg soil = 6 yrs.	 beryllium representative concentration in sediment Sediment ingestion rate Fraction ingested from contaminated source Body weight Exposure frequency Averaging time for carcinogens (365 days/yr x 70 yrs) Conversion factor Exposure Duration

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The cancer risk for a child from incidental ingestion of beryllium in Mundorff Tributary sediment is calculated as follows:

	CA	= IEX x SF	
where:	CA IEX SF	= 6.29E-8 = 1.46E-8 mg/kg/day = 4.3 (mg/kg/day) ⁻¹	 incremental (upper bound) risk of developing cancer Ingestion exposure carcinogenic slope factor (upper 95 percent confidence lin of a dose-response curve)

Dermal exposure to beryllium from Mundorff Tributary sediment is estimated for a child from the following equation (EPA, 1989a; EPA, 1992e):

DEX = (C X AF x ABS x EF x CF)/(AT) x
$$\sum_{i=3}^{8} \frac{1yr. x SA_i}{BW_i}$$

where: DEX = 9.23E-9 mg/kg/day = Dermal exposure dose
C = 0.947 mg/kg = Chemical concentration in soil
AF = 0.01 mg/cm² = Soil-to-skin adherence factor
ABS = 1.0 = Fraction from contaminated source
EF = 7 events/yr = Exposure frequency
ED_i = (1 yr. increments) = Exposure duration at age i
SA_i = (see Table Q-1) = Surface area at age i
BW_i = (see Table Q-1) = Body weight at age i
CF = 1E-06 kg soil/mg soil = Conversion factor
AT = 2190 days = Averaging time, non-carcinogens (365 days/yr x 6 yrs)

Absorption factors recommended (EPA, 1995b) were 3.2% for arsenic, 1% for other metals, 0.05% for VOCs with vapor pressure >= 95.2 mm, 3% for other VOCs, 24.4% for pentachlorophenol, and 10% for pesticides.

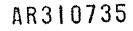
The same equations and input parameters were used for calculating dermally absorbed dose from exposure to pond sediment. For the trespasser exposure to seep sediment (that is covered with water), the absorbed dose and hazard quotient were calculated using the same equations, but substituting 45 days per year for the exposure frequency. For residential exposure to seeps that are dry for 180 days per year, the equations presented for surface soil were followed, but assuming 180 days per year as the exposure frequency.

The non-cancer hazard quotient for a child from dermal contact with beryllium in Mundorff Tributary sediment is calculated as follows:

	NC	= DEX / RfD		~
where:		= 1.85E-4 = 9.23E-9 mg/kg/day = 5E-5 mg/kg/day	= hazard quotient = dermal exposure = dermal reference dose	(5E-3 Oral RfD x 0.01 GI absorption

factor)

The hazard quotients for a child or adult resident from incidental ingestion of and dermal contact with surface soil are calculated using the same equation, but the associated absorbed dose equation uses the age-adjusted values for surface area and body weight that are presented in the example calculations for surface soil.



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Groundwater Exposure

Three potential exposure routes are associated with theoretical groundwater direct contact at Keystone Sanitation Landfill Site areas of interest. These exposure routes include ingestion, dermal contact, and inhalation of vapors during showering. The methods used to assess these routes of exposure are discussed in the following text.

Ingestion of PCE in groundwater at Area 1 for a future resident was evaluated using the following equation (EPA, 1989a):

 $IEX = (C \times IR \times EF \times ED)/(BW \times AT)$

where: IEX = 2.87E-5 = Ingestional exposure dose (mg/kg/day) С = 0.00306 mg/I = PCE concentration in water = Ingestion rate IR = 2 L/davEF = 350 days/vr = Exposure frequency = Exposure duration FD = 24 yr BW $= 70 \, \text{kg}$ = Body weight AT = 25550 days = Averaging time for carcinogens (365 days/yr x 70 yrs)

As discussed in Section 4.1.3.2, the potential receptors for this scenario include adult residents and child residents. For an adult resident, an EF of 350 days/yr, an IR of 2 L/day, and an ED of 24 yrs were assumed. For a child resident, an IR of 1L/day, an EF of 350 days/yr, a BW of 15 kg, and an ED of 6 years were assumed.

The lifetime cancer risk for a future resident from ingestion of PCE in groundwater at Area 1 is calculated as follows:

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where:	CA IEXc IEXa SF	= 2.37E-6 = 1.68E-5 mg/kg/day = 2.87E-5 mg/kg/day = 5.2E-2 (mg/kg/day) ⁻¹	 = incremental (upper bound) lifetime risk of developing cancer = Ingestion exposure for child for 6 years = Ingestion exposure for adult for 24 years = carcinogenic slope factor (upper 95 percent confidence limit
			of a dose-response curve)

Dermal exposure to PCE in Area 1 groundwater for a child resident was evaluated using the following equations (EPA, 1992e):

DAD = (DA x EV x EF)/(AT) x
$$\sum_{i=1}^{6} \frac{1yr. x SA_i}{BW_i}$$

where:	DAD	= 8.27E-6 mg/kg/day	= Dermally absorbed PCE dose
		= 2.21E-7 mg/cm ² /event = 1event/day = 350 days/yr = (see Table Q-1) = (see Table Q-1) = 25550 days	 PCE dose absorbed per event Event frequency Exposure frequency Surface area at age i Body weight at age i Averaging time, carcinogens (365 days/yr x 70 yrs)

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DA = 2 x CF x Kp x Cv x [((6 x τ x t)/ π)^{0.5}] for organics, t < t*

DA = Kp x CF x Cv x $[t/(1 + B) + [2 x \tau ((1 + 3B)/(1 + B))]]$ for organics, t > t*

where: DA = 2.21E-7 mg/cm²/event = PCE dose absorbed per event (t < t*)

CF Kp Cv t t* τ Β	= 0.001 L/cm ³ = 4.8E-2 cm/hr = 0.00306 mg/L = 0.33 hr/event = 4.3 hr/event = 0.9 hr = 0.25	 Conversion factor Permeability coefficient from water PCE concentration in water Duration of event (bathing) Time to reach steady state (hr) Lag time Partition coefficient
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For the residential child, the ratio of surface area over body weight was added for six one-year increments. As calculated in Appendix Q, Table Q-1, the (cm²-yr) / (kg BW) values for ages one through six are 617, 451.3, 436.3, 419.0, 409.4, and 394.7, which yields a total of 2728 cm²-yr/kg that replaces the terms SA, BW, and ED in the conventional dermal exposure equation.

Dermal exposure to PCE in Area 1 groundwater for an adult resident was evaluated using a modification of the above equation for DAD: replacing t with 0.25 hr./event (showering), and replacing the expression inside the summation with a product of the constants SA (18150 cm²), ED (24 yrs.), and 1/BW (70 yrs.). Making these substitutions, for the adult resident dermally exposed to PCE in groundwater, DAD = 1.64E-5 mg/kg/day.

Dermal exposure to arsenic in Area 1 groundwater for a child resident was evaluated using the same equation for DAD, substituting the following expression for DA (EPA, 1992e):

	DA	= CF x K x Cv x t for inorganics	
where:	DA	= 7.16E-10 mg/cm ² /event	= Arsenic dose absorbed per event
	CF K Cv t	= 0.001 L/cm ³ = 1E-3 cm/hr = 0.00217 mg/L = 0.33 hr/event	 Conversion factor Permeability coefficient from water Arsenic representative conc. in water Duration of event

The dermal absorption approach is based on the assumption that water contaminants are present in dilute solution and that percutaneous absorption is controlled by the flux of water. As discussed in Section 4.1.3.2, the potential receptors for this scenario were adult residents (showering) and child residents (bathing). Adult and child residents were assumed to take daily showers and baths, respectively, and therefore their total body surface areas were used. Conventional values were used for most input parameters. K, Kp, B, τ , and t* were chemical-specific values obtained from EPA, 1992e or derived from the molecular weight and Kow as demonstrated therein. As recommended by the guidance, default K values of 1E-3 cm/hr were used for metals for which experimental values had not been obtained (EPA, 1992e).

The incremental cancer risk for a lifetime resident from dermal contact with PCE in groundwater at Area A is calculated from the child and adult dermally absorbed doses as follows:

CA

= (DAD_{child} + DAD_{adult}) × SF

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where:	CA	= 1.28E-6	= Incremental cancer risk
	DAD _{child}	= 8.27E-6 mg/kg/day	= Dermally absorbed PCE dose
	DAD _{adutt}	= 1.64E-5 mg/kg/day	= Dermally absorbed PCE dose
	SF	= 5.2E-2 (mg/kg/day) ⁻¹	= slope factor (5.2E-2 / 1.0 GI absorption factor)

For Area 1, inhalation exposure to PCE in groundwater (during showering) was calculated for adult residents only using the following equations (EPA, 1989a; Foster and Chrostowski, 1987):

 $DI = D \times EF \times ED / AT$

DI	= 4.11E-5 mg/kg/day	= Inhalation dose
D	= 1.251E-4 mg/kg/shower	= Inhalation dose
EF	= 350 showers/yr	= Exposure frequency
ED	= 24 yrs	= Exposure duration
AT	= 25550 days	= Averaging time, carcinogens (365 days/yr x 70 yrs)
The term D is	estimated as follows:	

$$D = [(IR \times S) / (BW \times Ra \times CF)] \times Q$$

D	= 1.251E-4 mg/kg/shower	 Inhalation dose Function of air exchange rate and time in shower and
Q	= 2.79 min	shower room
IR S BW Ra CF	= 14 L/min = 3.738 ug/m ³ /min = 70 kg = 1.667E-2 min ⁻¹ = 10 ⁶ ug X L / (mg X m ³)	 Inhalation rate Indoor VOC generation rate Body weight Rate of air exchange Conversion factor

The term Q is calculated:

 $Q = Ds + [(exp(-Ra \times Dt))/Ra] - [(exp(Ra \times (Ds-Dt)))/Ra]$

Q	= 2.79 min	= Function of air exchange rate and time in shower and shower room	
Ds Dt Ra	= 15 min = 20 min = 1.667E-2 min ⁻¹	 Duration of shower Total time in shower room Rate of air exchange 	
m S is estimated as follows:			

The term

S	= Cwd x FR / SV	-
S Cwd FR SV	= 3.738 ug/m ³ /min = 1.1213 ug/L = 20 L/min = 6 m ³	 Indoor voc generation rate Concentration leaving water droplet Shower flow rate Shower room air volume

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The term Cwd is calculated:

 $Cwd = C \times CF \times (1-exp[(-KaL \times ts)/60d)])$

Cwd C	= 1.1213 ug/L = 0.00306 mg/L	 Concentration leaving water droplet after time ts Concentration in water
CF	= 1000 ug/mg	= Conversion factor
KaL	= 13.692 cm/hr	= Adjusted overall mass transfer coefficient
ts	= 2 sec	= Shower droplet time
d	= 1 mm	= Shower droplet diameter

The term KaL is calculated:

KaL = KL / $[(T_1 \times \mu_S)/(T_s \times \mu_1)]^{0.5}$

KaL	= 13.692 cm/hr	= Adjusted overall mass transfer coefficient
KL	= 10.136 cm/hr	= Mass transfer coefficient
T₁	= 293 ⁰ K	= Calibration water temperature of KL
Ts	= 318 ⁰ K	= Shower water temperature
μ_1	= 1.002 centipoise	= Water viscosity at T ₁
μ _s	= 0.596 centipoise	= Water viscosity at T _s

The term KL is calculated as follows:

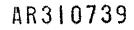
 $KL = 1/[(1/kl) + ((R \times T)/(H \times kg))]$

KL R T H kJ kl	= 10.136 cm/hr = 8.21E-5 atm m ³ /mol/ ^O K = 293 ^O K = 1.53E-2 atm m ³ /mole = 988.38 cm/hr = 10.302 cm/hr	 Mass transfer coefficient Ideal gas law constant Absolute temperature Henry's Law constant Gas-film mass transfer coefficient Liquid-film mass transfer coefficient 	
ms ka a	and kl are calculated.		

The terms kg and kl are calculated:

kg = kł	$kg = kH \times (MWH / MW)^{0.5}$			
kl = kC	x (MWC / MW) ^{0.5}			
kg ki kC MWH MWC MW	= 1440 cm/hr = 15.0 cm/hr = 3000 cm/hr = 20 cm/hr = 18 g/mole = 44 g/mole = 165.83 g/mole	 Gas-film mass transfer coefficient Liquid-film mass transfer coefficient kg for water kl for carbon dioxide Molecular weight of water Molecular weight of carbon dioxide Molecular weight of PCE 		

The volatile chemical generation rate was estimated using the Foster and Chrostowski mass transfer model, which is based on two-phase film theory. The model employs contaminant-specific mass transfer coefficients,



Henry's Law constants, droplet drop time, viscosity, temperature, etc. Specific details regarding the application of the mass transfer model can be found in the source documents (Foster and Chrostowski, 1987).

The incremental cancer risk for an adult resident from inhalation exposure (during showering) to PCE in groundwater at Area 1 is calculated as follows:

where: CA = 8.35E-8 = Incremental cancer risk DI = 4.11E-5 mg/kg/day = Inhalation PCE dose SFi = 2.03E-3 (mg/kg/day)⁻¹ = Inhalation slope factor

It was assumed that small children would take baths rather than showers; therefore, only adult residents were selected as potential receptors for this pathway.

Surface Water Exposure

Two potential exposure routes are associated with theoretical surface water direct contact at Keystone Sanitation Landfill Site areas of interest. These exposure routes include ingestion and dermal contact during wading/swimming. The methods used to assess these routes of exposure are discussed in the following text. These scenarios were evaluated in the same way as ingestion and dermal exposures for groundwater, which were explained in the previous section.

The input parameters for this exposure route, along with the rationale for the selection of each value, are presented in Table 4-7. As discussed in Section 4.1.3.2, the potential receptors were recreational children (21.3 kg). The input parameters for surface water are the same as those for groundwater, with notable exceptions. Children involved in wading/swimming activities would be expected to be older than the typical 15-kilogram child (approximately three years old). Therefore, the recreational child in the wading/swimming scenario was assumed to be between three and eight years old (average weight 21.3 kg). Exposure to surface water during wading was expected to involve either legs, feet, and hands for wading in streams; whole body for swimming; or hands, arms, and feet for exposure to seeps during trespassing.

Ingestion of vinyl chloride in surface water at Conewago Creek, Keystone Tributary during wading was evaluated using the following equation (EPA, 1989a):

$$IEX = (C \times IR \times EF \times ED)/(BW \times AT)$$

where: IEX = 1.00E-9 = Ingestional exposure dose (mg/kg/day) С = 2.0E-4 ma/l = vinvl chloride concentration in water IR = 0.065 L/day = Ingestion rate FF = 7 days/yr = Exposure frequency = Exposure duration ED = 6 yrBW = 21.3 kg = Body weight AT = 25550 days = Averaging time for carcinogens (365 days/yr x 70 yrs)

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The incremental cancer risk for a child from ingestion of vinyl chloride in surface water at Keystone Tributary is calculated as follows:

	CA	= IEX x SF	
where:	IEX	= 1.90E-9 = 1.0E-9 mg/kg/day = 1.9 (mg/kg/day) ⁻¹	 incremental (upper bound) risk of developing cancer Ingestion exposure for child for 6 years carcinogenic slope factor (upper 95 percent confidence limit of a dose-response curve)

Dermal exposure to vinyl chloride in Keystone Tributary surface water during wading was evaluated using the following equations (EPA, 1992e):

	DAD	= (DA x EV x EF)/(AT) x \sum	$\int_{i=1}^{6} \frac{1 yr. \times SA_i}{BW_i}$
where:	DAD	= 1.14E-9 mg/kg/day	= Dermally absorbed vinyl chloride dose
	EV	= 4.40E-9 mg/cm ² /event = 1 event/day = 7 days/yr = (see Table Q-1) = (see Table Q-1) = 25550 days	 vinyl chloride dose absorbed per event Event frequency Exposure frequency Surface area at age i Body weight at age i Averaging time, carcinogens (365 days/yr x 70 yrs)
	DA = 2	x CF x Kp x Cv x [((6 x τ x t)/	π) ^{0.5}] for organics, t < t*
	DA = K	[p x CF x Cv x [t/(1 + B) + [2 x	τ ((1 + 3B)/(1 + B))]] for organics, t > t*
where:	DA	= 4.40E-9 mg/cm ² /event = c	lieldrin dose absorbed per event (t < t*)
	CF Kp Cv t t* τ B	= 0.001 L/cm ³ = 7.3E-3 cm/hr = 2.0E-4 mg/L = 2.6 hr/event = 0.51hr = 0.21 hr = 0.0023	 = Conversion factor = Permeability coefficient from water = vinyl chloride concentration in water = Duration of event = Time to reach steady state (hr.) = Lag time = Partition coefficient

For the recreational child, the ratio of surface area over body weight was added for six one-year increments. As calculated in Appendix Q, Table Q-1, the (cm²-yr) / (kg BW) values for ages three through eight are 169.5, 165.5, 161.7, 156.5, 151.2, and 144.2, which yields a total of 949 cm²-yr/kg that replaces the terms SA, BW, and ED in the conventional dermal exposure equation.

The dermal absorption approach is based on the assumption that water contaminants are present in dilute solution and that percutaneous absorption is controlled by the flux of water. K, Kp, B, t, and t* were chemicalspecific values obtained from EPA, 1992e or derived from the molecular weight and Kow as demonstrated therein. As recommended by the guidance, default K values of 1E-3 cm/hr were used for metals for which experimental values had not been obtained (EPA, 1992e).

APP. P-12

The incremental cancer risk for a recreational child from dermal contact with vinyl chloride in surface water at the Keystone Tributary to Conewago Creek is calculated as follows:

$$CA = DAD \times SF$$

where:	here: CA = 2.18E-9		= Incremental cancer risk
	DAD	= 1.14E-9 mg/kg/day	= Dermally absorbed vinyl chloride dose
	SF	= 1.9 (mg/kg/day) ⁻¹	= slope factor (1.9 / 1.0 GI absorption factor)

For the trespasser exposure to seeps, the absorbed dose and cancer risks were calculated using the same equations, but substituting 0.001 L/day for the ingestion rate, 45 days per year for the exposure frequency, and surface areas for hands, arms, and feet given in Table Q-1. For exposure to ponds during swimming, the whole body surface areas were used from Table Q-1, along with 0.13 L/day ingestion rate and 7 days per year exposure frequency.

Fish Tissue Exposure

As discussed in Section 4.1.3.2, the potential receptors were residential adults and children who live in a household where recreationally-caught fish are consumed.

Ingestion exposure to mercury present in fish tissue from Pond No. 1 is estimated for a residential child from the following equation (EPA, 1989a):

 $IEX = (C \times IR_f \times EF \times ED \times CF)/(BW \times AT)$ where: IEX = 1.55E-4 mg/kg/day = Ingestion exposure С = 0.285 mg/kg= mercury representative concentration in Pond No. 1 Bass composite sample = 8.15 g fish/day= upper 95 percentile child fish ingestion rate, recreationally-IR_f caught fish only BW $= 15 \, \text{kg}$ = Body weight = 365 days/yr= Exposure frequency EF = Exposure duration ED = 6 vrsCF = 1E-3 kg fish /g fish = Conversion factor AT = 2190 davs = Averaging time, non-carcinogens (365 days/yr x 6 yrs) IR_f = IR_{ch95tot} x (IR_{chMeanRec} / IR_{chMeanTot})

where:	IR _{ch95tot}	= 16.5 g /day	= upper 95 percentile child fish ingestion rate, all sources
	IR _{chMeanRec}	= 5.63 g /day	= mean child fish ingestion rate, recreationally-caught only
•	IR chMeanTot	= 11.4 g /day	= mean child fish ingestion rate, fish from all sources

Ingestion rate sources: EPA, 1996e, Tables 10-1 and 10-32.

For an adult, the first equation used different values for BW (70 kg), ED (24 yrs.), and IR_f (38.74 g/day). The 38.74 g/day intake was obtained from Table 10-34, EPA, 1996e, as the upper 95 percentile adult fish consumption rate (recreationally-caught only).

APP. P-13

The non-cancer hazard quotient for a child from ingestion of fish containing mercury from Pond No. 1 is calculated as follows:

	NC	= IEX / RfD	
where:	NC	= 1.5	= hazard quotient
	IEX	= 1.55E-4 mg/kg/day	= ingestion exposure
	RfD	= 1.0E-4 mg/kg/day	= Oral reference dose (methyl mercury)

The non-cancer hazard quotient for an adult from ingestion of recreationally-caught fish is calculation using the same equations, substituting different values for IR_f (38.74), ED (24 years), AT (365 days/yr x 24 yrs.), and BW (70 kg).

Agricultural Products (Beef and Milk) Exposure

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Ingestion exposure to arsenic in beef and milk is estimated from the following equations (EPA, 1989a):

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Ingestion of Home-produced Beef and Milk by the Child Residential Receptor:

 $INTAKE_{INGESTION} (mg/kg)/day = IEX = \left[(C_b * IR_b) + (C_m * IR_m) \right] * \left| \frac{CF_t * EF * ED}{AT * 365^{days}/year} \right]$

$$INTAKE_{INGESTION} (mg/kg)/day = 7.544E - 06 = \left[(8.098E - 04 * 8.8222) + (4.727E - 05 * 15.3) \right] * \left[\frac{0.001 * 350 * 6}{6 * 365} \right]$$

(Note that the daily intakes C_b and C_m are intakes per kilogram body weight, so BW is not a separate term.)

IR_b = IR_{ch95ownAnimals} × (IR_{Al/95ownAnimals}/ IR_{Al/95anySource})

 $IR_{b} = 8.8222 = 8.51 \times (7.51 / 7.24)$

where: IR_b = upper 95 percentile child beef ingestion rate, considering only beef raised on own farm

IR _{ch95ownAnimals}	= 8.51 g / kg-day	= upper 95 % child beef ingestion rate, all sources of home-produced beef
IR _{Alt95ownAnimals}	= 7.51 g / kg-day	= upper 95 % all ages beef ingestion rate, only beef
Allowing initials		from own farm
IR _{All95anySource}	= 7.24 g / kg-day	= upper 95 % all ages beef ingestion rate, all sources
		of home-produced beef

Ingestion rate sources: EPA, 1996e, Table 12-36. Child intakes were obtained by averaging the intake values given in the table for ages 1-2 with ages 3-5. Adult values were obtained by averaging the intakes given for ages 20-39 and 40-69.

IR_m = IR_{ch95AnySource} × (IR_{All95ownAnimals}/ IR_{All95anySource})

 $IR_m = 15.3 = 15.3 \times (34.2 / 34.2)$

APP. P-14

where: IR_m = upper 95 percentile child ingestion rate, considering only milk produced on own farm

IR _{ch95AnySource}	= 15.3 g / kg-day	= upper 95 % child dairy product ingestion rate, all sources of home-produced dairy products
IR _{All95ownAnimals}	= 34.2 g / kg-day	= upper 95 % all ages dairy ingestion rate, only dairy from own farm
IR _{All95anySource}	= 34.2 g / kg-day	= upper 95 % all ages dairy ingestion rate, all sources of home-produced dairy

Ingestion rate sources: EPA, 1996e, Table 12-29. Child intakes were obtained by averaging the intake values given in the table for ages 1-2 with ages 3-5. Adult values were obtained by averaging the intakes given for ages 20-39 and 40-69.

Intake of Contaminant Sources by Beef Cows (from plants, soil, and water):

Secondary Uptake by Plants from Soil (I_p):

 $C_r = C_s * B_r = 0.02394 = 3.99 * 6.0E - 03$ $C_v = C_s * B_v = 0.1596 = 3.99 * 0.04$

Intake of Plants by Cows (I_p):

$$I_{p} = \left[Q_{v} * f_{p}\right] * C_{v} + \left[Q_{r} * f_{p}\right] * C_{r} = 0.1666 = \left[2.61 * 0.25\right] * 0.1596 + \left[10.43 * 0.25\right] * 0.02394$$

Intake of Soil by Cows(I_s):

$$I_s = C_s * Q_s * f_s = 0.1995 = 3.99 * 0.2 * 0.25$$

Intake of Water by Cows (I_w):

$$I_{w} = IR_{sw} * \sum_{i}^{SW sources} \left\{ C_{sw(i)} * (\%_{sw(i)}) \right\} * CF_{2} * CF_{3} = 0.03885 = 10 * \left\{ 0 * (0.75) + 4.1 * (0.25) \right\} * 0.001 * 3.79$$

Total Intake From All Sources for Beef Cow (C_b):

$$C_b = \left[\left(I_p \right) + \left(I_s \right) + \left(I_w \right) \right] * B_b = 8.098 \text{E} - 04 = \left[\left(0.1666 \right) + \left(0.1995 \right) + \left(0.0388 \right) \right] * 2.0 \text{E} - 03$$

APP. P-15

Intake of Contaminant Sources by Milk Cows (from plants, soil, and water):

Secondary Uptake by Plants from Soil(I_p):

 $C_r = C_s * B_r = 0.02394 = 3.99 * 6.0E - 03$ $C_v = C_s * B_v = 0.1596 = 3.99 * 0.04$

Intake of Plants by Cows (I_p):

$$I_p = \left[Q_v * f_p\right] * C_v + \left[Q_r * f_p\right] * C_r = 0.4694 = \left[10.48 * 0.25\right] * 0.1596 + \left[8.57 * 0.25\right] * 0.02394$$

Intake of Soil by Cows (I_s):

$$I_s = C_s * Q_s * f_s = 0.1995 = 3.99 * 0.2 * 0.25$$

Intake of Water by Cows (I_w):

$$I_{w} = IR_{sw} * \sum_{i}^{SW sources} \left\{ C_{sw(i)} * (\%_{sw(i)}) \right\} * CF_{2} * CF_{3} = 0.1189 = 30.6 * \left\{ 0 * (0.75) + 4.1 * (0.25) \right\} * 0.001 * 3.79$$

Total Intake From All Sources for Milk Cow (C_m):

$$C_{m} = \left[\left(I_{p} \right) + \left(I_{s} \right) + \left(I_{w} \right) \right] * B_{m} = 4.727 \text{E} - 05 = \left[\left(0.4694 \right) + \left(0.1995 \right) + \left(0.1189 \right) \right] * 6.0 \text{E} - 05$$

 $\begin{array}{ll} C_b & = \text{COPC concentration in beef (mg COPC / kg beef)} \\ C_m & = \text{COPC concentration in milk (mg COPC / kg milk)} \\ IR_m & = \text{Intake of home-produced milk by receptor [(g milk / kg body wt.) / day]} \\ IR_b & = \text{Intake of home-produced beef by receptor [(g beef / kg body wt.) / day]} \\ CF_1 & = \text{Conversion Factor (1 kg / 1000 g)} \\ EF & = \text{Exposure frequency (days / yr)} \\ ED & = \text{Exposure duration (years)} \end{array}$

APP. P-16

BW	= Body weight (kg)
AT	= Averaging time (years)
Cr	 Concentration of COPC in reproductive (fruit/feed concentrate) plant dry matter (DM) (mg COPC / kg plant)
B _r	= Soil-to-reproductive material biotransfer factor [(mg COPC / kg plant) / (mg COPC / kg soil)]
Ċv	= Concentration of COPC in vegetative (forage) plant dry matter (DM) (mg COPC / kg plant)
Bv	= Soil-to-vegetative material biotransfer factor [(mg COPC / kg plant) / (mg COPC / kg soil)]
	= Intake of COPC in plant material by the cow (mg COPC / day)
I _p Q _v	= Overall daily forage (vegetative portion) ingestion rate (kg DM / day)
f	= Fraction of cow's total daily plant (fruit or vegetative) intake from contaminated source (unitless)
f _p f _s	= Fraction of cow's daily soil intake from contaminated source (unitless)
Qr	= Overall daily feed concentrate (fruit portion) ingestion rate (kg DM / day)
l _s	= Intake of COPC in soil by the cow (mg COPC / day)
Cs	= COPC concentration in soil (mg COPC / kg soil)
Q_s	= Contaminated soil ingestion rate (kg soil / day)
l _w	= Intake of COPC in water by the cow (mg COPC / day)
IR_{sw}	= Ingestion rate of water by the cow (gais / day)
C _{sw (i)}	= COPC concentration in surface water from the i th specific source (ug / liter)
% _{sw (i)}	= Fraction of surface water intake from the i th specific source
CF_2	= Conversion Factor (1 mg / 1000 ug)
CF ₃	= Conversion Factor (3.79 liters / gal)
Bb	= biotransfer factor for beef [(mg COPC / kg beef) / (mg COPC / day)]
B _m	= biotransfer factor for milk [(mg COPC / kg milk) / (mg COPC / day)]

The non-cancer hazard quotient for a child from ingestion of home-produced beef and milk contaminated with arsenic from cattle raised in Area A is calculated as follows:

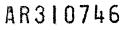
NC =	IEX / RfD
------	-----------

where:	NC	= 2.51E-2	= hazard quotient
	IEX	= 7.544E-6 mg/kg/day	= ingestion exposure
	RfD	= 3.0E-4 mg/kg/day	= oral reference dose

To compute the noncancer risk from beef and milk ingestion for an adult, the first equation used different values for BW (70 kg), ED (24 yrs.), IR_b (6.1666 g/day) and Ir_m (16.05 g/day). Lifetime cancer risks for beef and milk consumption were obtained using the above equations with the customary cancer risk modifications for slope factor (SF) and averaging time (AT = 70 yrs.), and then adding child plus adult risks.

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APPENDIX Q

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SURFACE AREAS & BODY WEIGHT CALCULATIONS

Table Q-1	Surface Areas and Body Weights Used for Exposure Assessment Keystone Sanitation Landfill Site, OU-2
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50 Percentile Surface Areas, Body Weights, and Ratios

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							Surface Areas Divided by Body Weigh	Divided by	Body Weigh				ace Area by I	y Body Part
Male Male Female Female SA/BW	Female	Female	e	SAUBW	_	3+7+H	H+A+L+F	∃ + H	H+A+F	WHOLE	*		% TOT SA % T	% TOT SA
Surf. Area Body Wt. Surf. Area Body Wt. AVE(M+F	Body Wt. Surf. Area Body Wt. /	Body Wt. /	Nt. /	AVE(M+F)	SW-Wade	SS, dry SED	SED	Seep Aq	Swim/Bath	ARMS	HANDS	LEGS	FEET
		1		617		216.259	296.469	73.732	153.942	617	13	5.68	23.1	6.27
13.5 5790 12.7	5790 12.7	12.7		451.286		160.522	213.774	55.824	109.076	451.286	11.8	5.3	23.2	7.07
15.4 6490 14.7	6490 14.7	14.7		436.333		169.472	229.904	57.552	117.984	436.333	13.85	5.885	25.65	7.305
7310 17.6 7060 16.7 419.048	7060 16.7	16.7		419.048		165.503	222.284	54.665	111.446	419.048	13.55	5.6	26.45	7,445
19.4 7790 19	7790 1 19	19		409.381		161.685	217.156	53.404	108.875	409.381	13.55	5.6	26.45	7.445
8430 21.3	8430 21.3	21.3		394.706		156.521	209.609	48.174	101.262	394.706	13.45	4.955	27.45	7.25
24.8 9170	9170 23.8	23.8		381.357		151.227	202.52	46.545	97.837	381.357	13.45	4.955	27.45	7.25
10000 27.5	10000 27.5	27.5	27.5	363.636		144.2	193.109	44.382	93.291	363.636	13.45	4.955	27.45	7.25
[-3 + 8×ysold)SUM =	SUM =	SUM =	SUM =	2404	. 1	949	1275	0202 · · ·	J631	2404		<		
14	14	14	14	2728		1030	1389 - 13	343	203	2728		<		

ave. of Japanese & NHANES data (EPA, 1985)

50 Percentile Surface Areas Adults

All data are from the 1996 EPA Exposure Assessment Guide, except where noted.

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TOT SA FEET 1310 1140 Body OT SA LEGS 6400 5460 ĺЪ otal Surface Area TOT SA HANDS 990 817 **TOT SA ARMS** 2910 2300 H+A+F WHOLE Seep Ag Swim/Bath 9400 5210 H + F SED 2300 2300 H+A+F SS, dry SD 5210 SW-Wade <u>H+L+F</u> 8700 FEMALE **A**

SA_BWDAT.WK4

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APPENDIX R

BIOTRANSFER FACTORS FOR COPCS IN AGRICULTURAL PRODUCTS

 Table R-1

 Biotransfer Factors for COPCs - Area A (Agricultural Scenario)

 Keystone Sanitation Landfill Site, OU-2

	Biotransfer	Biotransfer	Biotransfer	Biotransfer
	Factor for Beef	Factor for Milk	Factor for Forage	Factor for Concentrate
Substance	B(b)	B(m)	B(v)	B(r)
antimony	1.00E-03	1.00E-04	2.00E-01	3.00E-02
arsenic	2.00E-03	6.00E-05	4.00E-02	6.00E-03
barium	1.50E-04	3.50E-04	1.50E-01	1.50E-02
manganese	4.00E-04	3.50E-04	2.50E-01	5.00E-02
nickel	6.00E-03	1.00E-03	4.00E-02	6.00E-02
silver	1.00E-01	2.00E-02	NA	NA
zinc	3.00E-03	1.00E-02	1.50E+00	9.00E-01
4,4'-DDD	1.26E-02	3.02E-03	1.05E-01	1.05E-01
4,4'-DDE	4.90E-02	9.55E-03	1.05E-01	1.05E-01
4,4'-DDT	2.82E-02	2.40E-03	1.58E-02	1.58E-02
alpha-chlordane	7.41E-03	3.72E-04	NA	NA
gamma-chlordane	7.41E-03	3.72E-04	NA	NA
gamma-BHC (Lindane)	1.66E-02	2.51E-03	3.89E-01	3.89E-01
heptachlor epoxide	7.94E-02	3.55E-02	NA	NA
NA - Not applicable, this COP	OPC was not detected in applicable media that required a biotransfer factor	le media that required a biotran	ısfer factor	

INA - INU applicable, IIIIS COPO was filot defected III applicable filedia triat required a biotra

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Sources: Travis and Arms 1988 and Baes et. al. 1984

 Table R-2

 Biotransfer Factors for COPCs - Area B (Agricultural Scenario)

 Keystone Sanitation Landfill Site, OU-2

	Biotransfer	Biotransfer	Biotransfer	Biotransfer
	Factor for Beef	Factor for Milk	Factor for Forage	Factor for Concentrate
Substance	B(b)	B(m)	B(v)	B(r)
aluminum	1.50E-03	2.00E-04	4.00E-03	6.50E-04
arsenic	2.00E-03	6.00E-05	4.00E-02	6.00E-03
barium	1.50E-04	3.50E-04	1.50E-01	1.50E-02
beryllium	1.00E-03	9.00E-07	1.00E-02	1.50E-03
chromium	5.50E-03	1.50E-03	7.50E-03	4.50E-03
cobalt	2.00E-02	2.00E-03	2.00E-02	7.00E-03
copper	1.00E-02	1.50E-03	4.00E-01	2.50E-01
iron	2.00E-02	2.50E-04	4.00E-03	1.00E-03
lead	3.00E-04	2.50E-04	4.50E-02	9.00E-03
manganese	4.00E-04	3.50E-04	2.50E-01	5.00E-02
mercury	2.50E-01	4.50E-04	9.00E-01	2.00E-01
nickel	6.00E-03	1.00E-03	4.00E-02	6.00E-02
selenium	1.50E-02	4.00E-03	2.50E-02	2.50E-02
zinc	3.00E-03	1.00E-02	1.50E+00	9.00E-01
1,4-dichlorobenzene	5.85E-05	2.30E-05	4.25E-01	4.25E-01
bis(2-ethylhexyl)phthalate	5.49E-03	1.59E-03	3.35E-02	3.35E-02
aldrin	8.51E-02	2.40E-02	2.14E-02	2.14E-02
dieldrin	7.94E-03	1.07E-02	3.64E-01	3.64E-01
4,4-DDD	1.26E-02	3.02E-03	1.05E-01	1.05E-01
endrin aldehyde	1.12E-02	3.16E-03	2.24E-02	2.24E-02
NA - Not applicable, this COPC wa	C was not detected in applicable media that required a biotransfer factor	ledia that required a biotransfel	r factor	

NA - Not applicable, this COPC was not detected in applicable media that required a biotransfer factor Sources: Travis and Arms 1988 and Baes et. al. 1984 (For organics it is assumed that $B_r = B_v$.)

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APPENDIX S

SUMMARY OF COPC SELECTIONS, BACKGROUND COMPARISON TESTS, AND SOURCE AREA COMPARISONS FOR CONTAMINANT ATTRIBUTION

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Defect No. 6 - Color	ninwater	Area 1 Gro
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o Site COPC Back To Site COPC	Back To Si	Site COPC

Found in On-Site Mon.Wells Above Background or Selected As COPCs

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arsenic	7	γ	۲	У	z		X	_			AN I		N	Υ	٢	N		N	_	Ā
barium	7	۲	۲	X	z	۲	Y	N	ΥI	Y N		Y	N	Υ	Y	N	Y	Υ	N	٩Þ
Iberyllium NA	7	۲	۲	z	z	_	QN	_	_	_	_		z	λ	AA	NA	_	NA		٩A
chromium	> -	7	≻	7	z	≻	<u>-</u>		_				N	N	Y	N	N	N		٩A
cobalt Y	7	7	7	z	z	z	z		۲ ۲		-		z	z	z	N	Y	N		Ą
copper	X	7	7	7	z	► ►	<u>ہ</u>	-	-	_			z	Y	Y	N	Y	N	_	Ą
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magnesium Y	>	z	۲	Y	۲	N	Y		Z	_	NA		γ	z	z	z	N	۲		Ą
manganese Y	7	Y	۲	λ	7			_	_	Y Y			γ	۲	Y	۲	Y	z		¥
mercury (tot. all) Y	λ	N	٢	NA	NA	NA	NA	_		A NA		AN	NA	A	AN	A	AN	AN	-	A
mercury, low d.l. test	۲	z	۲	NA	NA	NA		NA []	NA N	NA NA			NA	NA	AA	NA	NA	NA	-	¥
mercury, routine test Y	7	Y	7	۲	Y	۲	DN	N	N	Y Y	NA		N	z	z	z	۲	N	N	Ā
thallium ND	z	7	≻	z	z	N	z	N	N N		A NA	z	N	N	z	v	z	NA	_	Ā
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Not Present On-Site Above Background and Not Selected As COPCs

antimony	QN	Y	z	z	z	z	-	z	z		z		NA	z	z	z	N	Z	z	N	z	AN
cadmium	QN	≻	z	z	z	z	z	z		N	NA	NA	NA	z	N	z	z	N	N	NA	AN	AN
calcium	z	≻	z	z	7	z	_	Υ			7		NA	۲	N	z	۲	N	N	۲	z	NA
nickel	z	7	z	z	z	z		z		_	z	-	NA	z	N	z	z	N	N	z	z	AN
potassium	z	7	z	z	>	z	-	_ ۲	-		z		NA	Y	N	Z	Y	z	z	z	z	AN
selenium	z	≻	z	z	z	z	┝	z			z	-	NA	z	N	N	N	N	N	DN	z	NA
silver	QN	۲	z	z	z	z	z		z	_	QN	-	AN	z	z	z	NA	NA	N	DN	z	NA
sodium	z	7	z	z	z	z	┡	z	-	_	z	-	NA	Y	z	z	Y	z	z	N	z	AN
vanadium	z	Х	z	z	z	v	z	NA			z		NA	z	z	z	AA	NA	z	N	z	AN
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NA = Not applicable to this data se ND = Not detected.

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					Spring N	No. 1 Sediment		Jotable S	Potable Spring No. 1	-	Spring No. 2 Sediment	z Seaime		Potable Spring No. 2	- 'NII 6	:		CONCEMADO, NEY. IL. SEU.		collemago, hey. It. of	5
	Detected	Detected	Selected	<u> </u>	Detect 1	-		L	<u> </u>		-	Sele	-	_	Sele	_	May be	Select	Detect	d)	Select
	On-Site	In Any Area	As COPC	COPC or	Above	-							_		_		Attrib.	Asa	Above	Attrib	Asa
	Above Back	Above Back above Back In Any Area	In Any Area	On-Site	Back	To Site C	COPC	Back To	To Site CC	COPC Ba	Back To	To Site COPC	C Back	To Site	e COPC	Back	To Site	COPC	Back	To Site	COPC
Found in On-Site Mon.Wells Above Background or Selected As COPCs	Ils Above Ba	ckground or	Selected As	copcs														Ĩ			
chloride	 }	 ≻	z	Y	QN	z	N	NA	NA	Z N	_	Z	_	A	z	g	z	z	A	¥	z
nitrate	z	z	<u> </u>	Y	QN	z	z	DN	N	N		N	QN	z	z	g	z	z	9	z	z
nitrite	z	z	Y	7	Q	z	z	QN	_			N	DN	z	N	QN	z	z	QN	z	z
aluminum	z	Y	۲	Y	z	z	z	QN	z		N	N	Y	z	7	≻	z	z	≻	z	≻
arsenic	z	Y	7	<u> </u>	z	z	z	QN	z	z	N	N		z	z	z	z	z	≻	z	≻
barium	z	7	Y	×	z	z	z	_ ≻	z		z	N N	7	z	z	≻	z	z	Y	N	≻
bervlium	AN	\ \	7	7	z	z	\vdash	Q	z	z	z	z z	Q	z	z	z	z	z	z	z	z
chromium	z	· >	\ \	/	z	z	-	g		-	_	z	<u>≻</u>	z	z	z	z	N	٢	z	≻
cohait	 	,	>	<u>}</u>	z	z		DN N		z		z z	z	z	z	7	۲	N	Y	۲	z
conner	. z	· />	· >	<u>}</u>	z	z	┝		z		z	z	z	z	z	7	z	z	٢	z	z
iron	: > 	· >	. ,		z	z	z	z	z		Z			≻	7	z	z	z	Y	Y	۲
lead	z	· >	· >	- >	z	z		D Q	z		z	z z	≻	z	۲	۲	z	z	٢	z	۲
macnesium	· >		z	<u>}</u>	z	z	$\left \right $	z	-			z	<u>≻</u>	<u>۲</u>	z	z	z	z	Y	۲	z
mandanese	 -	}	7	 >	z	z	┝	g	╞	z		z z	z	z	z	Y	٢	λ	7	۲	۲
mercury (tot. all)	· >-		z	· /-	Q	z	┢	Q	z	-		Z Z		۲	z	≻	۲	z	٢	۲	z
mercury low d l test	\ \ \	>	z	Y	Ð	z				_		z z	>	7	z	۲	۲	z	۲	7	z
mercury. routine test		<i>></i>	7	>	Q	z	z	QN	-	Z Z	DN DN	Z Z	Z	z	z	z	z	z	z	z	z
thallium	QN	z	7	7	QN	z	z	QN	_			N N	Q	z	z	g	z	z	¥	¥	~
zinc	7	Y	۲	٢	z	N.	z	z	z	z	z	Z N	>	≻ —	z	z	z	z	≻	~	z
		-0 1 1 1 1																			
Not Present Un-Site Above Background and Not Selected As COLCS	re backgroun	a and not se	in se naisai	571						┞	-	$\left \right $	ŀ						4		-
antimony	DN	7	z	z	Ð	z	z		+	+			+	z	z	2 S	z	z		z	z
cadmium	Q	≻	z	z	Q	z	N	QN	_	_	- 	_		¥	z		z	z	P	z	z
catcium	z	λ	z	z	z	z	z	z	z			N	z	Z	z	>	z	z	>	z	z
nickel	z	7	z	z	z	z	z	DN	z	N		N		z	z	z	z	z	~	z	z
notassium	z	>	z	z	z	z	z	z	_	_		Z Z	z	z	z	۲	z	z	۲	z	z
		>		14	C A	2								z	z	>	2	z	Ş	z	z

district via	ב	-	-	-	5	-	:		:													
Cadmium	GN	\ \	z	z	Q	z	z	QN	z	z	7	z	z	A	AN	z	g	z	z	g	z	z
coloinm	2	. >	2	2	Z	z	z	2	Z	z	z	z	z	z	z	z	- >	z	z	Y	z	z
uterol		• >	: z		z	z	z	- CE	z	z	z	z	z	┝	z	z	z	z	z	<u>}</u>	z	z
nutaesitim	: z	- >-	: Z		z	: z	z	z	z	z	Q	z	z	z	z	z	7	z	z	Y	z	z
selanium	: z	. >-	z	z	2	z	z	g	z	z	g	z	z	Q	z	z	- >	z	z	QN	z	z
eilver	, CN	. >-	z	z	g	z	z	≻	z	z	Q	z	z	g	z	z	g	z	z	AN	NA	z
sodium	Z		z		G	z	z	z	z	z	g	z	z	z	z	z	- >	z	z	۲	z	z
vanadium	z	.	z	z	z	z	z	z	z	z	z	z	z	۲	z	z	z	z	z	z	z	z
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COPCFINL XLS 10/

WS:	elect	4s a	OPC	
ago,Mun.Tr.Sed. Conewago,Mun.Tr.SW Conewago,West.Tr.Sed Conewago,West.Tr.SW Conewago,East.Tr.Sed Conewago,East.Tr.SW	May be Select	Attrib. As a Above Attrib. As a	To Site COPC Back To Site COPC	
Conewaç	Select Detect May be Select Detect	Above	Back	
fr.Sed	Select	Asa	COPC	
go,East.	May be	Attrib.	To Site	
Conewa	Detect	Above	Back	
.Tr.SW	Select	Asa	COPC	
igo,West	May be	Attrib.	To Site	
Conewa	Detect	Above	Back	
Tr.Sed	Select	Asa	COPC	
go,West.	May be	Attrib.	To Site	
Conewa	Detect	Above	Back	
Tr.SW	Select	Asa	COPC	
unw'obi	May be Select Detect May be Select Detect May be Se	Attrib.	To Site	
Conewa	Detect	Above	Back	
Fr.Sed.	Select	Asa	COPC	
go,Mun.1	May be Select D	Attrib.	To Site	
Conewa	Detect	Above		
	Either a	COPC or	On-Site	
	Selected	As COPC	In Any Area	
	Detected	On-Site In Any Area As COPC COPC or	Above Back above Back In Any Area On-Site Back	
	Detected	On-Site	Above Back	

or Selected As COPCs 244 Molle On CHO MA 1

Found In Un-Site Mon. Wells Above Background of Selected As COPUS	IS ADOVE BACI	equination or e	SH Dalbalac	solution																	
chloride	۲	۲	z	Y	DN	z	z	DN			DN		NN	NA	z	Q	z	z	Q	z	z
nitrate	z	z	۲	٨	QN	N		DD	_		_	N	QN N	_	z	QN	z	N	ND	z	z
nitrite	z	z	≻	~	g	z	_	QN	-	N	DN		_		N	QN	z	z	DN	N	z
aluminum	z	≻	≻	Y	z	z		<u>ــــــــــــــــــــــــــــــــــــ</u>	z				N Y	_	N	z	z	N	Y	N	z
arsenic	z	_ ≻	Y	Υ	z	z	-	z							z	z	z	N	DN	N	N
barium	z	≻	≻	۲	<u>۲</u>	z		Y				NN			z	z	z	z	N	N	z
beryllium	AN	۲	۲	Y	Y	z	Y	NA	_	, Т		_		N	z	z	z	z	QN	z	z
chromium	z	7	X	λ	z	z	-	۲		_			_	N	z	z	N.	z	γ	z	z
cobalt	7	۲	Y	7	<u> </u>	┝	╞	z		_		-	_	z	z	z	z	z	N	z	z
copper	z	Y	Y	7	z	z	-				-	z z	Z	z	z	z	z	z	N	z	z
iron	λ	7	Y	7	 ≻			۲ ۲						Y	z	z	N	N	Y	Y	z
lead	z	Y	٢	7	- ≻	z	<u> </u>	z	-					z	z	z	N	N	Y	z	z
magnesium	Y	<u>}</u>	z	7	z	z		z	z		z	N	Z	2	z	z	Z	N	Y	٢	z
manganese	Y	7	≻	Y	- ≻	7	_	Y				NN		_	z	z	N	z	Y	Υ	z
mercury (tot. all)	۲	≻	z	7	z	z	z	z		_		N N			z	z	z	z	۲	٢	z
mercury, low d.l. test	۲	7	z	λ	٨	7	N	z	_	N	_	Z Z	_		z	z	z	z	QN	z	z
mercury, routine test	≻	۲	٢	Y	N	z		z		_		_	_		z	z	z	z	≻	۲	z
thallium	QN	z	≻	Y	z	z	z	QN					DN N		z	Q	z	z	QN	N	z
zinc	7	≻	≻	Y	z	z	z	Y	۲	Z	z	N N	NY	۲	z	z	z	z	٢	۲	z

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Not Present On-Site Above Background and Not Selected As COPCs

antimony	QN	7	z	z	g	z	z	Q				z	z	g	z	_	QN	z	z	QN	z	z
cadmium	QN	7	z	z	Q	z	z	g	\vdash			z	z	Q	z		DN	z	z	QN	z	z
calcium	z	7	z	z	z	z	z	Y	z	z	z	z	z	۲	z	z	N	N	z	7	z	Z
nickel	z	7	z	z	z	z	z	7			z	z	z	Q	z		N	N	z	۲	z	z
potassium	z	×	z	z	7	z	z	7	-		z	z	z	z	z		N	N	N	z	N	z
selenium	z	≻	z	z	7	z	z	Q	-		z	z	z	QN	z		Y	N	N	DN	z	z
silver	QN	 ≻	z	z	QN	z	z	g	<u> </u>		QN	z	z	QN	z		DN	N	N	QN	z	z
sodium	z	7	z	z	z	z	z	z	-	_	Y	z	z	z	z	-	N	N	N	z	z	z
vanadium	z	≻	z	z	z	z	z	≻			z	z	z	z	z	-	z	z	z	z	z	z
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ND = Not detected.

				ľ	Pinev Cr.	Budry.Tr.Sed.		iney Cr.,	Bndry.T	r.SW Pi	Piney Cr., Bndry. Tr. SW Piney Cr., North. Tr. Sed.	orth.Tr. 5		Piney Cr.,North.Tr. SW	th.Tr. SM		Pond No. 1 Sediment	diment	Po	Pond No. 1 SW	Ŵ
	Detected	Detected	Selected	Eithera		Mav be S		Detect N	May be S	Select D	Detect Ma	May be Se	Select Detect	ect May be	be Select	t Detect	t May be	Select	Detect	May be	Select
	On-Site	In Any Area										Attrib. As		ve Attrib.		Above	Attrib.	Asa	Above	Attrib.	Asa
	Above Back	Above Back above Back In Anv Areal On-Site	In Anv Area	-							Back To	-	COPC Back	k To Site	te COPC	Back	To Site	COPC	Back	To Site	COPC
					1	1															
Found in On-Site Mon.Wells Above Background or Selected As COPCs	Ils Above Ba	ckground or	Selected As	COPCs																	
chloride			z	7	QN	N	N	DN	z	N	- ON	Z	Q N		z	Q	z	z	g	z	z
nitrate	z	z	λ	Y	QN	z	N	QN	N	N	QN	Z	DN N	z	z	g	z	z	g	z	z
nitrite	z	z	7	7	QN	z	z	Q	z	N	DN	N	DN N	N	z	Q	z	z	g	z	z
aluminum	z	7	λ	7	z	z	z	>	z	N	N	N	NY	z	z	z	z	z	z	z	z
arsenic	z	7	Y	7	z	z	z	<u>ہ</u>	z	Y	z	N	DN ND		z	z	z	z	g	z	z
barium	z	\ \	\ \	7	z	z	z	z	z	z	۲	N	X N	Z	Z	۲	z	z	z	z	z
beryllium	A	\ \ -	7	<u>}</u>	z	z	z	AN	AN	Y	z	z	AN 1	AN N	λ	z	z	z	QN	z	z
chromium	z	>	×	7	z	z	z	<u></u> ≻	z	z	z	z	z z	z	z	z	z	N	DN	z	z
cohalt	· >	<u>}</u>	>	≻	z	z	z	z	z	z	_ ≻	- 	۲ N	7	z	z	z	z	QN	z	z
conter	z		>	<u>}</u>	z	z	z	z	z	z	z	z	X N	z	z	z	z	z	z	z	z
iron	 -	/	\ \	≻	z	z	z	 ≻	<u>├</u>	- ≻	z	Z	≻ N	Y	۲	z	z	N	z	z	z
lead	z	>	7	≻	 ≻	z	z	<u>}</u>	z	<u>}</u>	z	z	N N	z	z	z	z	N	Z	z	z
magnesium	:) -	,	z	<u>}</u>	z	z	z	z	z	z	z	z	z z	z	z	z	Z.	N	۲	۲	z
manganese	 } -	> -	<i>\</i>	>	7	≻	<u>}</u>	 >	<u>├</u>	z	_ ≻	Ĺ	۲ ۲	≻	z	Y	۲	z	v	z	z
mercury (tot. all)		► >	z	≻	R	z	z	Q	z	z	 ≻	۲ ۲	z z	N	Z	z	z	z	z	z	z
mercury. low d.l. test	≻	>	z	7	Ð	z	z	Q	z	z	N	N	NN	z	z	z	z	z	ĝ	z	z
mercury, routine test	۶	λ.	7	Y	z	z	v	DD	Z	v	N			z	z	g	z	z	z	z	z
thallium	QN	z	۲	7	Q	z	z	QN	Z	N	DN	N	_		z	₽	z	z	2	z	z
zinc	≻	۲	γ	Y	N	z	z	- 7	۲	z	z	z	≻ v	۲ _	z	z	z	z	z	z	z
	nice de la	d and Mot Co	loctod Ac CC	e Car																	
NOT AIR OIL OIL OIL OIL					CN	2	- N	UN		Z				Z	z	QN	z	z	QN	z	z
		_	2			: 2	: 2		: z	╀		-	╀		z	2	z	z	g	z	z
caomum		_ >	2 2	2 2		2 2	2 2	e z	zz	: 2					z	>	z	z	z	z	z
calcium	z z	- >	zz	2 2	zz	zz	- : z	╞	: z	z		╀	F	-	z	z	z	z	QN	z	z
			: 2	: 2	: 2	: 2		. 2	- z	: z		╞	+	-	z	z	z	z	z	z	z
potassium	2	_	-	=			╈		+	-	+	╉	╀		: z					1	Z

antimony	2	~	z	z	2	z	z	R	z	z	Z	z	z	- Z	z	Z	20	N	1 1		-	-
cadmirum	CN	 -	z	Z	Q	z	z	Q	z	z	g	z	z	Q	z	z	Q	z	Z	QN	z	z
calcium	z		Z	z	Z	z	z	z	z	z	z	z	z	z	z	z	7	z	z	z	N	z
nickel	: z	, , ,	z	z	z	z	z	>-	z	z	z	z	z	Q	z	z	z	z	z	DN	z	z
notassium	z	<i>></i>	z	z	z	z	z	z	z	z	≻	z	z	Y	N	N	z	z	z	z	z	z
selenium	z	 	z	z	≻	z	z	QN	z	z	≻	z	z	z	v	N	N	N	z	Z	z	z
silver	GN	/	z	z	Q	z	z	g	z	z	g	z	z	QN	z	N	a	z	N	QN	z	z
sodirum			z	z	<u>}</u>	z	z	z	z	z	z	z	z	z	z	z	z	z	z	N	Z	z
vanadium	z	· >-	z	z	z	z	z	z	z	z	z	z	z	Y	z	z	z	z	z	QN	z	z
NA = Not applicable to this data set	data set.																					
ND = Not detected.																						

TABLE S-1 INORGANICS SELECTED AS COPCS OR PRESENT ABOVE BACKGROUND OR DETECTED IN ON-SITE MONITORING WELLS KEYSTONE SANITATION LANDFILL SITE, OU-2

W	Select	Asa	COPC
Seep No. 3 SW	May be Select	Attrib. As a Above Attrib. As a	To Site COPC Back To Site COPC
See	Detect	Above	Back
iment	Select	Asa	COPC
to. 3 Sediment	Detect May be Select De	Attrib.	To Site
Seep No. :		Above	Back
	Select	Asa	COPC
Seep No. 2 SW	Detect May be Select [Attrib.	To Site
	Detect	Above	Back
iment	Select	Asa	COPC
lo. 2 Sed	Detect May be Select [Attrib.	To Site
Seep No. 2 Sediment	Detect	Above	Back
	Detect May be Select [Asa	COPC
Seep No. 1 SW	May be	Attrib.	To Site
See	Detect	Above	Back
diment	Select	Asa	COPC
lo. 1 Sec	May be	Attrib.	To Site
Seep A	Detect	Above	Back
	Either a	COPC or	On-Site
	Selected	As COPC	n Any Area
	Detected Selected Either a Detect	On-Site In Any Area As COPC COPC or	bove Back above Back In Any Area On-Site Back
	Detected	On-Site	Above Back

Found in On-Site Mon.Wells Above Background or Selected As COPCs

I OUITA III OIL-OIL MOILINGI VIOLE PURISI OUITA OI OCICONA VI OCI											and the second se										and the second se
chloride	λ	7	z	۲	QN	z	z	DN	z	z	ND	N	N		N	DN	N	N	QN	z	z
nitrate	z	z	۲	7	QN	z	z	DN	v	N	QN		N	ND ND	N	QN	N	Z	QN	z	z
nitrite	z	z	۲	۲	QN	z	N	DN	z						N	QN	N O	Z	DN	z	z
aluminum	z	۲	Y	Υ	z	z	N	Y	z	N				N N	N N	_			Z	z	z
arsenic	z	۲	۲	Y	Y	z	Y	N	N					ND N				_	Y	z	Y
barium	z	۲	~	7	Y	z	z	γ	z				_					_	Y	z	z
beryllium	Ą	≻	7	λ	NA	AN	۲	NA	AA	_	_			N DN	_					N	z
chromium	z	7	7	7	z	z	z	├ ≻	z										_	z	z
cobalt	Y	٢	7	≻	7	 	z	>	- ≻		_	-	_	N D						N	z
copper	z	>	>	7	7	z	z	z	z	z	H			ND N				_		z	z
iron	γ	≻	7	Y	z	z	z	7	7						_		_		_	z	z
lead	z	7	7	λ	z	z	z	 ≻	z	_			-							Z	z
magnesium	7	۶	z	≻	7	≻	z	Y	<u>⊢</u>	z	N	Z	N	N	Z	z		z	Y	۲	z
manganese	7	٨	۲	λ	۲	Y	Y	۲	Y	_	_	_	_	2 7		_			_	z	z
mercury (tot. all)	7	۲	N	۲	QN	N	z	DN	N	_	_			D N			N	z	Q	z	z
mercury, low d.l. test	٨	۲	z	۲	QN	z	z	Q	N				_	ND ND	N	QN	_	z	QN	z	z
mercury, routine test	۲	۲	۲	۲	NA	NA	N	DN	N	z			N N	_	N		Z		Q	z	z
thallium	9	z	7	7	Q	z	z	QN	z		DN				N	DN		z	Z	z	z
zinc	≻	7	7	λ	<u>}</u>		z	7	7	z	z				2 7	N	Z		Y	۲	z

Not Present On-Site Above Background and Not Selected As COPCs

antimony	Q	≻	z	z	Q	z	z	Q		_						_				_	_	_
cadmium	QN	7	z	z	QN	z	z	QN		-	_	-	-				-	_				
calcium	z	7	z	z	z	z	z	<u> </u>	-										_			
nickel	z	7	z	z	<u>ک</u>	z	z	_ ≻	-	-	-		_	_			_			_		
potassium	z	7	z	z	z	z	z	<u>}</u>	-	-				_						_		
selenium	z	۲	z	z	z	z	z	z	┝	┝─	-	┝	<u> </u>				-	-	_	_		
silver	QN	≻	z	z	QN	z	z	Q	┝	_	┝	z	z	╞	-	_		_			-	
sodium	Z	۲	z	z	NA	AN	z	Y		z	<u>ک</u>	┢		N	N	N N		z	N N	N	z	
vanadium	z	۲	z	z	z	z	N	Y	N			z	N	_	_		-				_	
NA = Not applicable to this data set	tata set.																					l

NA = Not applicable to this data ND = Not detected.

					Seep No	o. 4 Sediment	nent	Seep	Seep No. 4 SW	┢	eep No.	Seep No. 5 Sediment	L	Seep No. 5	SW S	Seep No. 6	lo. 6 Sedi	Sediment	Seep	Seep No. 6 SW	>
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Found in On-Site Mon.Wells Above Background or Selected As COPCs	s Above Bac	kground or S	Selected As	copcs																ľ	[
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nitrite	z	z	7	>	g	z	z	QN	z	z	- ON				z	Q	z	z	g	z	z
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sodium	z	۲	z	z	Q	z	z	z	z	N	NA N		z	z	z	¥	Ą	z	z	z	z
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z z vanadium N NA = Not applicable to this data set. ND = Not detected. sodium

TABLE S-1 INORGANICS SELECTED AS COPCS OR PRESENT ABOVE BACKGROUND OR DETECTED IN ON-SITE MONITORING WELLS KEYSTONE SANITATION LANDFILL SITE, OU-2



				Seep No	Vo. 7 Sediment	nent	Seep	Seep No. 7 SW		Seep No. 8 Sediment	8 Sedim	rent	Seep No. 8 SW	No. 8 SV	_	Seep No. 9 Sediment	. 9 Sedin	_	Seep No. 9 SW	No. 9 S
Detected	Detected	Detected Selected Either a	Either a	Detect	May be	Select 1	Detect N	May be Select Detect May be Select	select D	etect M	tay be S	ielect D	tetect N	lay be S	elect	etect N	ay be §	Select	Detect	fay be
On-Site	On-Site In Any Area As COPC COPC or Above	As COPC	COPC or	Above	Attrib.	Asa	Above	Attrib. As a Above Attrib. As a	Asa A	bove A	Attrib.	Asa A	bove /	Attrib.	Asa A	bove /	Attrib.	Asa	Above	Attrib.
Above Back	Above Back above Back in Any Area On-Site Back	In Any Area	On-Site		To Site	COPC	Back 1	To Site COPC Back To Site COPC	SOPC 1	3ack T	o Site C	OPC 1	3ack 1	o Site C	OPC OPC	ack T	o Site (COPC	Back	o Site

Found in On-Site Mon.Wells Above Background or Selected As COPCs

					the second se						ł										
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luminum	z	_ ≻	λ	7	z	z		z	z	N					N			N	z	N	z
arsenic	z	7	٨	>	QN	z		 ≻	z	Y				_	N	z	2	Z	QN	N	z
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beryllium	NA	×	7	7	NA	NA		DN	N								_	A N	QN	z	z
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mercury (tot. all)	Y	Y	z	7	QN	z	_	QN	z	N	_	_		N D	Z				Q	z	z
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Not Present On-Site Above Background and Not Selected As COPCs

antimony	g	≻	z	z	Q	z		Q									QN	z		n	N	Z
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calcium	z	7	z	z	z	z	z	z	z	z	N	z	z	N	z	N	N	z	N	z	z	z
nickel	z	7	z	z	7	z	┝	Q	┝	-	z			Q		_	۲	z		Y	Z	z
potassium	z	>-	z	z	z	z	┡	z	\vdash	-	z			z			N	z		z	z	z
selenium	z	7	z	z	QN	z	-	Q	┝	┝─	g	-	_	Q	-	_	z	z		DN	N	z
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NA = Not applicable to this of	data set.																					

NA = Not applicable to 1 ND = Not detected.

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	Detected	Detected	Selected	Eithera	Detect	May be	Select	Detect	May be	Select	Detect	May be	Select	Detect	May be	Select As a
	Above Back	Above Back above Back In Any Area	As CUPU In Any Area		Back	To Site	COPC	Back		COPC	Back		COPC	Back	4	COPC
Found in On-Site Mon-Wells Ab	ils Above Bat	ove Background or Selected As COPCs	selected As	copcs												
chloride	┝		z	<u>}</u>	qN	z	z	QN	z	z	QZ	z	z	QN	z	z
nitrate	z	z	7	7	Q	z	z	Q	z	z	QN	N	z	DN	z	z
nitrite	z	z	7	7	QN	z	z	QN	z	z	QN	N	z	QN	z	z
aluminum	z	7	λ	7	z	z	z	z	z	z	z	N	N	z	z	z
arsenic	z	>	Y	7	7	z	۲	Y	z	Y	Y	z	۲	z	z	z
barium	z	7	7	7	z	z	z	z	z	z	N	N	N	z	z	z
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chromium	z	Y	7	٢	z	z	z	γ	z	۲	۲	N	Z	۲	z	7
cobalt	7	7	7	7	z	z	z	7	Y	z	N	z	z	z	z	z
copper	z	Y	۲	7	z	z	z	γ	z	z	٢	z	z	z	z	z
iron	\ \	<u>}</u>	7	7	z	z	z	7	≻	λ	۲	۲	۲	z	z	z
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magnesium	Y	>	z	۲	7	7	z	7	- ۲	z	z	N	z	۲	7	z
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mercury (tot. all)	×	7	z	7	NA	NA	NA	NA	NA	NA	AN	AN	AN	AN	₹	AN
mercury, low d.l. test	7	Y	z	γ	NA	NA	NA	AN	AN	A	AN	AN	A	¥	¥	¥
mercury, routine test	≻	λ	۲	γ	z	N	z	QN	z	z	g	z	z	g	z	z
thallium	Q	z	۲	Υ	QN	z	z	QN	z	z	z	z	z	g	z	z
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NA = Not applicable to this data set. ND = Not detected.

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APPENDIX T

BACKGROUND DATA POINTS EXCLUDED FROM BACKGROUND COMPARISON TESTS

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TABLE T-1 RESULTS EXCLUDED FROM BACKGROUND DATA SET: ORGANICS / NON-METALS KEYSTONE SANITATION LANDFILL SITE, OU-2

ROUND	SAMPLE	MASTER LOCATION	SUBSTANCE	CONCENTRATION
RW940101	RW-28	RW-17	BROMODICHLOROMETHANE	2
RW940101	RW-28	RW-17	BROMOFORM	0.5 J
RW940101	RW-28	RW-17	CHLOROFORM	g
RW940101	RW-28	RW-17	DIBROMOCHLOROMETHANE	C 7.0
RW940601	RZ-32	RW-17	BROMODICHLOROMETHANE	9
RW940601	RZ-32	RW-17	BROMOFORM	0.4 J
RW940601	RZ-32	RW-17	CHLOROFORM	27
RW940601	RZ-32	RW-17	DIBROMOCHLOROMETHANE	2
RW950101	RW-17	RW-17	BROMODICHLOROMETHANE	2.4
RW950101	RW-17	RW-17	BROMOFORM	10
RW950101	RW-17	RW-17	CHLOROFORM	11
RW950101	RW-17	RW-17	DIBROMOCHLOROMETHANE	U.8.0
RW951001	RW-17	RW-17	BROMODICHLOROMETHANE	0.4 J
RW951001	RW-17	RW-17	BROMOFORM	10
RW951001	RW-17	RW-17	CHLOROFORM	6.4
RW951001	RW-17	RW-17	DIBROMOCHLOROMETHANE	0.1 J
RW960301	RW-17	RW-17	BROMODICHLOROMETHANE	1 U
RW960301	RW-17	RW-17	BROMOFORM	1 U
RW960301	RW-17	RW-17	CHLOROFORM	2
RW960301	RW-17	RW-17	DIBROMOCHLOROMETHANE	1 U
RW960601	RW-17	RW-17	BROMODICHLOROMETHANE	0.3 J
RW960601	RW-17	RW-17	BROMOFORM	1 U
RW960601	RW-17	RW-17	CHLOROFORM	6.4
RW960601	RW-17	RW-17	DIBROMOCHLOROMETHANE	1 U
RW961001	RW-17	RW-17	BROMODICHLOROMETHANE	0.2 J
RW961001	RW-17	RW-17	BROMOFORM	1 U
RW961001	RW-17	RW-17	CHLOROFORM	5.5
RW961001	RW-17	RW-17	DIBROMOCHLOROMETHANE	1 U
SD940401	SD-18	SD-18	CYANIDE	1970 J
SD950201	SD-18	SD-18	2-BUTANONE	590 J
SD950201	SD-18	SD-18	TOLUENE	10200
SD950201	SD-21	SD-21	ACETONE	640 J

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TABLE T-1, CONTINUED RESULTS EXCLUDED FROM BACKGROUND: METALS KEYSTONE SANITATION LANDFILL SITE, OU-2

ROUND	SAMPLE	MASTER LOCATION	SUBSTANCE	CONCENTRATION
RW940101	RW-09	RW-46	LEAD	17.2
RW940101	RW-18	RW-48	LEAD	20.2
RW951001	RW-23	RW-23	LEAD	207
RW960301	RW-46	RW-46	LEAD	20.1
RW960301	RW-46-DUP	RW-46	LEAD	18.8
RW951001	RW-46	RW-46	LEAD	45
RW960601	RW-46	RW-46	LEAD	29.6 J
RW960601	RW-46-DUP	RW-46	LEAD	20.7 J
RW961001	RW-46	RW-46	LEAD	21
RW961001	RW-46-DUP	RW-46	LEAD	21
RW960302	RW-46	RW-46	LEAD	9.9
RW961001	RW-46-K	RW-46	LEAD	2
RW960301	RW-48	RW-48	LEAD	1.6 U
RW960601	RW-55	RW-55	LEAD	18.8 J
RW951001	RW-55	RW-55	LEAD	3 U
RW961001	RW-55	RW-55	LEAD	2
RW960302	RW-53-BF	RW-53	LEAD	16.6
RW960302	RW-60-BF	RW-60	LEAD	15.7
RW960302	RW-46-BF	RW-46	LEAD	54.7
RW960302	RW-23-BF	RW-23	LEAD	246
RW961001	RW-46-K	RW-46	ALUMINUM	200 U
RW961001	RW-46-K	RW-46	ANTIMONY	5 U
RW961001	RW-46-K	RW-46	ARSENIC	5 U
RW961001	RW-46-K	RW-46	BARIUM	200 U
RW961001	RW-46-K	RW-46	BERYLLIUM	3 U
RW961001	RW-46-K	RW-46	CADMIUM	5 U
RW961001	RW-46-K	RW-46	CALCIUM	3260
RW961001	RW-46-K	RW-46	CHROMIUM	10 U
RW961001	RW-46-K	RW-46	COBALT	50 U
RW961001	RW-46-K	RW-46	COPPER	120
RW961001	RW-46-K	RW-46	IRON	100 U
RW961001	RW-46-K	RW-46	LEAD	2
RW961001	RW-46-K	RW-46	MAGNESIUM	1760
RW961001	RW-46-K	RW-46	MANGANESE	15 U
RW961001	RW-46-K	RW-46	MERCURY	0.2 U



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TABLE T-1, CONTINUED RESULTS EXCLUDED FROM BACKGROUND: METALS KEYSTONE SANITATION LANDFILL SITE, OU-2

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ROUND	SAMPLE	MASTER LOCATION	SUBSTANCE	CONCENTRATION
RW961001	RW-46-K	RW-46	NICKEL	40 U
RW961001	RW-46-K	RW-46	POTASSIUM	1000 U
RW961001	RW-46-K	RW-46	SELENIUM	5 U
RW961001	RW-46-K	RW-46	SILVER	10 U
RW961001	RW-46-K	RW-46	SODIUM	5760
RW961001	RW-46-K	RW-46	THALLIUM	2 U
RW961001	RW-46-K	RW-46	VANADIUM	50 U
RW961001	RW-46-K	RW-46	ZINC	56
RW961001	RW-46-S	RW-46	ALUMINUM	200 U
RW961001	RW-46-S	RW-46	ANTIMONY	5 U
RW961001	RW-46-S	RW-46	ARSENIC	5 U
RW961001	RW-46-S	RW-46	BARIUM	200 U
	RW-46-S	RW-46	BERYLLIUM	3 U
RW961001	RW-46-S	RW-46	CADMIUM	5 U
RW961001	RW-46-S	RW-46	CALCIUM	9380
RW961001	RW-46-S	RW-46	CHROMIUM	10 U
RW961001	RW-46-S	RW-46	COBALT	50 U
RW961001	RW-46-S	RW-46	COPPER	155
RW961001	RW-46-S	RW-46	IRON	185
RW961001	RW-46-S	RW-46	LEAD	16
RW961001	RW-46-S	RW-46	MAGNESIUM	5770
RW961001	RW-46-S	RW-46	MANGANESE	22
	RW-46-S	RW-46	MERCURY	0.2 U
	RW-46-S	RW-46	NICKEL	40 U
RW961001	RW-46-S	RW-46	POTASSIUM	1000 U
RW961001	RW-46-S	RW-46	SELENIUM	5 U
RW961001	RW-46-S	RW-46	SILVER	10 U
RW961001	RW-46-S	RW-46	SODIUM	9610
RW961001	RW-46-S	RW-46	THALLIUM	2 U
RW961001	RW-46-S	RW-46	VANADIUM	50 U
RW961001	RW-46-S	RW-46	ZINC	40

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APPENDIX U

ECOLOGICAL ASSESSMENT SUPPLEMENT

Property owner denied access, Location observed from DATA FORM Public road, only. ROUTINE WETLAND DETERMINATION

(1987 COE Wetlands Delineation Manual)

Project/Site: <u>Keystone Sanitation Landfill Site OU-2 RT</u>	Date: <u>9/27/45</u>
Applicant/Owner:	County: <u>Adams</u>
Investigator: <u>Aura Stauffer</u> and Jennifer Hayes	State: <u>PA</u>
Do Normal Circumstances exist on the site? pastarc (Yes) No Is the site significantly disturbed (Atypical Situation)? Yes No Is the area a potential Problem Area? Yes No (If needed, explain on reverse.)	Community ID: <u>W- /</u> Transect ID: Plot ID:

VEGETAT:ON

Dominant Plant Species Stratum Indicator 1. Juncus effusus H FACUH 2. ACOTUS CALAMUS H OBL	Dominant Plant Species 9 10	<u>Stratum</u>	Indicator
3. GramineaeH	11 12		
5 6	13 14 15	·	14
7	16	·	·
Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-).	_at least 67%)	
Romarks: Vegetation observed from Area is used as a pasture.	public road.		

HYDROLOGY

Recorded Data (Describe in Remarks): Stream, Lake, or Tide Gauge Aerial Photographs Other No Recorded Data Available Field Observations: Depth of Surface Water: Could Not determine from Toud Depth to Free Water in Pit: Depth to Saturated Soil:	Wetland Hydrology Indicators: Primary Indicators: 		
Romarks: Evidence of tile drains Near barn. Area is fed by spring seep. Drought Year No measurable rain from mid August through mid September			

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Map Unit Name G (Series and Phase): <u>Wa</u> Taxonomy (Subgroup):	hadkee si	loam (GnB) It loam (Ud) giudults (GnB armaguepts ()	Drainage () Field Obse Md) Confirm	
Profile Description: Depth (inches) Horizon 	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Maist) to property	Mottle <u>Abundance/Contrast</u>	Texture, Concretions, Structure, etc.
Reducing	dor isture Regime Conditions Low-Chroma Color NOL Check		ganic Streaking in Sandy ted on Local Hydric Soil ted on National Hydric S ner (Explain in Remarks)	s List — Wd Soils List

WETLAND DETERMINATION

Hydrophytic Vegetation Present? (Tes) No (Circle) Wetland Hydrology Present? (Tes) No Hydric Soils Present? Could NOT (Tes) No Sample but listed on hydric soil list	(Circle) NA Is this Sampling Point Within a Wetland? Yes No Could Not Sample		
Remarks:			
<u>Note</u> : During this field visit, only a wetland overview was performed. The actual upland-wetland boundary was not determined.			
PEM5B	No Photo		
Northern boundary could not	be observed from road.		

Property owner denied access, Location observed from DATA FORM Dublic road, only. ROUTINE WETLAND DETERMINATION

(1987 COE Wetlands Delineation Manual)

Project/Site: <u>Keystone Sanitation Landfill Site</u> Applicant/Owner: Investigator: <u>Aura Stauffer and Jennifer Haye</u>		Date: <u>9/27/45</u> County: <u>Adams</u> State: <u>PA</u>
Do Normal Circumstances exist on the site? Pasture Is the site significantly disturbed (Atypical Situation)? Is the area a potential Problem Area? (If needed, explain on reverse.)	Yes No Yes No Yes No	Community ID: <u>W-2</u> Transect ID: Plot ID:

VEGETATION

Dominant Plant Species Stratum Indicator	Dominant Plant Species	<u>Stratum</u> In	dicator
1. Juncus effusus H FACH+	9		
2. Acorus calamus H OBL	10		
3. Gramineae H —	11		
4	12		
5	13	•	
6	14		
7	15		
8	16		
Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-).	_at least 67 %	, 2	
Romarks: Vegetation observed from	n public road.		
Area is used as a pasture.			
		-	······································

HYDROLOGY

Recorded Data (Describe in Remarks): 	Wetland Hydrology Indicators: Primary Indicators: Infundated - in Places Saturated in Upper 12 Inches Water Marks Drift Lines Sediment Deposits Orainege Patterns in Wetlands Secondary Indicators (2 or more required): Oxidized Root Channels in Upper 12 Inches Water-Stained Leaves Local Soil Survey Data FAC-Neutral Test Other (Explain in Remarks)			
Remarks: Area is fed by spring seep.				
Drought Year No measurable rain fr	om mid August through mid September			

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Map Unix Name Glenville silt (Series and Phase): <u>We had Kee sil</u> Aquic Frac Taxonomy (Subgroup): <u>Cumulic M</u>		_ Drainage Class: Field Observations	IWD-GNB D-Wd po? Yes NoNA
Profile Description: Depth Matrix Color (inches) Harizon (Munsell Moist) NA Denied Access	Mattle Calors Mottle (Munsell Moist) Abundar to property	Texture, <u>Ce/Contrast</u> <u>Structure</u>	Concretions, ., etc
Hydric Soil Indicators: Histosol Histic Epipedon Sulfidic Odor Aquic Moisture Regime Reducing Conditions Gleyed or Low-Chroma Colors	Organic Strei Listed on Loc Listed on Na Gther (Explai	Content in Surface Laye aking in Sandy Soils al Hydric Soils List tional Hydric Soils List n in Remarks)	
Romarks: Could not check to the property.	cK soils because	we were de	enied access

WETLAND DETERMINATION

Hydrophytic Vegetation Present? (23) No (Circle) Wetland Hydrology Present? (23) No Hydric Soils Present? (2010 Not (23) No sample but listed on hydric soil list	(Circle) NA Is this Sampling Point Within a Wetland? Yes No Could Not Sample
Remarks: <u>Note</u> : During this field visit, or performed. The actual up not determined.	rly a wetland overview was land-wetland boundary was
PEM5B	Photo 2

2

Project/Site: Keystone Sanitation Landfill Site OU-2 RT	Date: <u>9/27/95</u>
Applicant/Owner:	County: <u>Carroll</u>
Investigator: Aura Stauffer and Jennifer Hayes	State: <u>MD</u>
Do Normal Circumstances exist on the site? PASTURE (Yes) No Is the site significantly disturbed (Atypical Situation)? Yes No Is the area a potential Problem Area? Yes No (If needed, explain on reverse.)	

VEGETATION

Dominant Plant Species Stratum Indicator 1. Junçus effusus H FACW+ 2. Carey Spp. H === 3. Polygonum lapathifolium H FACW+ 4. Ludwigia palustris H OBL 5. Gramineae H == 7.	9	
8 Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). Remarks: Area is used as a cow pas	16 <u>at least 60%</u> ture -	

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HYDROLOGY

Recorded Data (Describe in Remarks): Stream, Lake, or Tide Gauge Aerial Photographs Other No Recorded Data Available	Wetland Hydrology Indicators: Primary Indicators: 	
Field Observations: Depth of Surface Water:(in.) Depth to Free Water in Pit:(in.) Depth to Saturated Soil:((in.))	Drainage Patterns in Wetlands Secondary Indicators (2 or more required): Oxidized Root Channels in Upper 12 Inches Water-Stained Leaves Local Soil Survey Data FAC-Neutral Test Other (Explain in Remarks)	
Drought Very	ep om mid August through mid September	

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Map Unit Name (Series and Phase): <u>Glenville Sill</u> Taxonomy (Subgroup): <u>Aquic</u> Fr	Drainage Class: <u>MWD</u> Field Observations Confirm Mapped Type? (es) No
Profile Description: DepthMatrix Cover (Munsell Moist) $O-3$ Organic $O-3$ Organic $3-4$ A 2.5 $5/2$ $4-18^+$ B 2.5 $7.6/0$	Mottle <u>Abundance/Contrast</u> <u>Common /distinct</u> <u>Clay loam</u> <u>K</u>
Hydric Soil Indicators: 	 ncretions ph Organic Content in Surface Layer in Sandy Soils ganic Streaking in Sandy Soils ted on Local Hydric Soils List ted on National Hydric Soils List her (Explain in Remarks) L ·

WETLAND DETERMINATION

Hydrophytic Vegetation Present? (es) No (Circle) Wetland Hydrology Present? (es) No Hydric Soils Present? (es) No	(Circle) Is this Sampling Point Within a Wetland? Yes No
Romarks: All three wetland parameter	s are met.
<u>Note</u> : During this field visit, on performed. The actual uplar not determined.	ly a wetland overview was ra-wetland boundary was
PEM5B - contains a small uplo	ind inclusion Photo 3
	Approved by HQUSACE 2/92

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Project/Site: Keystone Sanitation Landfill Site OU-2 RT	Date: <u>9/27/95</u>
Applicant/Owner:	County: <u>Adam.5</u>
Investigator: Aura Stauffer and Jennifer Hayes	State: <u>PA</u>
Do Normal Circumstances exist on the site? part of mouse (is not site in the site? part of mouse (is not site in the site significantly disturbed (Atypical Situation)? Yes No	Community ID: <u>W- 4</u>
Is the area a potential Problem Area? Yes No	Transect ID:
(If needed, explain on reverse.) Soils-fill Material	Plot ID:

VEGETATION

Dominant Plant Species Stratum Indicator 1. JUNCUS effusus II FACUE 2. CAREX SPP. II FACUE 3. Jupha latitolia II OBL	Dominant Plant Species 9 10 11.	Stratum Indicator		
4. Polygonum sagittatum H OBL 5. Impatiens capensis H FACU 6. Phalaris arundinaceae H FACU+ 7. Mentha spicata H FACU+ 8	12 13 14 15 16	· · /		
Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). <u>at least 86%</u> Remarks: Part of wetland is mowed.				

HYDROLOGY

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Recorded Data (Describe in Remarks): 	Wetland Hydrology Indicators: Primary Indicators: Inundated Saturated in Upper 12 Inches Water Marks Drift Lines Sediment Deposits Drainage Patterns in Wetlands Secondary Indicators (2 or more required): Oxidized Root Channels in Upper 12 Inches Water-Stained Leaves Local Soil Survey Data FAC-Neutral Test Other (Explain in Remarks)
Remarks: Drought Year No measurable rain fr	om mid August through mid September

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		Typic Oc	<u>n «quure)</u>	Commit	Mapped Type? Yes (No)
inches)	<u>Harizon</u>	Matrix Color (<u>Munsail Moist)</u> <u>fill Ma</u>	Mottie Colors (Munsell Maist) HCLIA	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
ydric Soi	I Indicators:	·			
-				oncretions igh Organic Content in Su rganic Streaking in Sandy sted on Local Hydric Soil: sted on National Hydric S ther (Explain in Remarks)	s List

Hydrophytic Vegetation Present? (fes) No (Circle) Wetland Hydrology Present? (fes) No Hydric Soils Present? (fes) No	(Circle) Is this Sampling Point Within a Wetland? Yes No
Romarks: NOTE: During this field visit, only The actual upland-wetland bour Soils disturbed (fill material), but FACW vegetation suggests this area	a wetland overview was performed. Indary was not determined. dominance of hydrophytic OBL and a is a wetland.
PEMQE	Photo 6
	Approved by HQUSACE 2/92

Project/Site: <u>Keystone Sanitation Landfill Site</u> Applicant/Owner: Investigator: <u>Aura Stauffer</u> and Jennifer Hay		Date: <u>9/28/95</u> County: <u>Adams</u> State: <u>PA</u>
Do Normal Circumstances exist on the site? Is the site significantly disturbed (Atypical Situation)? Is the area a potential Problem Area? (If needed, explain on reverse.)	Yes No Yes No Yes No	Community ID: <u>W- 5</u> Transect ID: Plot ID:

VEGETATION

Dominant Plant Species Stratum Indicator 1. In patiens capensis H FACW 2. Phalaris arundinacea H FACW+ 3. Juncus effusus H FACU+ 4. Symplocarpus foetidus H OBL 5. Polygonum sagittatum H OBL 6. Polygonum perfoliatum H FAC+ 7. Acorus calamus H OBL 8. Acer rubrum T FAC	Dominant Plant Species Stratum Indicator 9. Alnus serrulata S OBL 10. Sagittaria latifolia H OBL 11.			
Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-).				
(excluding FAC.). Remarks: Emergent and forested vegetation. Part of emergent area is in a # pasture.				

HYDROLOGY

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Recorded Data (Describe in Remarks): Stream, Lake, or Tide Gauge Aerial Photographs Other No Recorded Data Available Field Observations: Depth of Surface Water:(in.) Depth to Free Water in Pit:(in.)	Wetland Hydrology Indicators: Primary Indicators: Inundated Saturated in Upper 12 Inches Water Marks Drift Lines Sediment Deposits Drainage Patterns in Wetlands Secondary Indicators (2 or more required): Oxidized Root Channels in Upper 12 Inches Water-Stained Leaves Local Soil Survey Data FAC-Neutral Test Other (Explain in Remarks)		
Depth to Saturated Soii:()(in.)			
Remarks: ANCA is influenced by spring sceps ' Drought Year No measurable rain from mid August through mid September			

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Map Unit Name (Series and Phase): <u>الل</u> Taxonomy (Subgroup):			Field Obse	the second s
Profile Description: Depth (inches) Horizon 	Matrix Color (Munsell Moist)	, Mottle Color s (Munseil Moist)	Mottle <u>Abundance/Contrast</u> <u>few /faint</u>	Texture, Concretions, <u>Structure, etc.</u> <u>Silt loam</u>
Sulfidie C Aquic Mo Reducing Gleyed or	isture Regime Conditions · Low-Chroma Color:	5Hi O Li s	oncretions gh Organic Content in Si ganic Streaking in Sandy sted on Local Hydric Soil sted on National Hydric S ther (Explain in Remarks) high organic	s List Soils List

Hydrophytic Vegetation Present? (Yes) No (Circle) Wetland Hydrology Present? . Yes) No Hydric Soils Present? (Yes) No	(Circie) Is this Sampling Point Within a Wetland? (Yes) No
Remarks: All 3 PARAMETERS Met NOTE: During this field visit, only The actual upland-wetland bour	a wetland overview was performed. ndary was not determined.
PEMIBLPFOISE	Photo 4 Approved by HQUSACE 2/92

Project/Site: Keystone Sanitation Landfill Site Applicant/Owner: Investigator: Aura Stauffer and Jennifer Hay		Date: <u>9/28/95</u> County: <u>Adams</u> State: <u>PA</u>
Do Normal Circumstances exist on the site? Is the site significantly disturbed (Atypical Situation)? Is the area a potential Problem Area? (If needed, explain on reverse.)	Yes No Yes No Yes No	Community ID: <u>W-6</u> Transect ID: Plot ID:

VEGETATION

Remarks:

Drought Year

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Dominant Plant Species Stratum Indicator 1. Impatiens Spp. H FACUl 2. Acer rubrum T FAC 3. Salix Spp. T FACW 4. Lindern benzain S FACW- 5.	Dominant Plant Soecies Stratum Indicator 9
Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). Remarks: Forested area	100 %
Recorded Data (Describe in Remarks): 	Wetland Hydrology Indicators: Primary Indicators:
Field Observations: Depth of Surface Water:(in.) Depth to Free Water in Pit:(in.)	Sediment Deposits Drainage Patterns in Wetlands Secondary Indicators (2 or more required): Water-Stained Leaves Local Soil Survey Data

_(in.) Soil Survey Data FAC-Neutral Test <u>4″ (in.)</u> Other (Explain in Remarks) Depth to Saturated Soil: Hydrology is influenced by a seep.

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No measurable rain from mid August through mid September

	d Phase): 11	lehad Kee silt Cumulic /	loam (wd) Vormaquepts	Drainage C Field Obse Confirm	
Profile De: Depth (inches)	<u>Harizon</u>	Matrix Color (Munsell Moist) 2-5-7572	Mattle Colors (Munsell Moist) 2-57 5/4	Mottle <u>Abundance/Contrast</u> <u>few</u> faint	Texture, Concretions, <u>Structure, etc.</u> <u>Silt loam</u>
Hydric Soi	Indicators:	·			
-	Reducing	ldor listure Regime	Hig Org List List	ncretions h Organic Content in Su anic Streaking in Sandy ed on Local Hydric Soil ed on National Hydric S er (Explain in Remarks)	s List Soils List
Remarks:	Hydri	c soil par	ameter is r	net	*

	Vegetation Present? drology Present? Present?	(783) No (Circie) (783) No (783) No	is this Sampling Point Within a Wetland?	(Circie) Yes No
Remarks:	All three	parameters met	•	
NOTE;	During this f The actual up	ield visit, only land-wetland bour	a wetland overview was perfondary was not determined.	ormed.
PFOLE		, 		photo 5
			Approved by HQUS	ACE 2/92

Project/Site: <u>Keystone Sanitation Landfill Site (</u> Applicant/Owner: Investigator: <u>Aura Stauffer</u> and Jennifer Hayes		Date: <u>9/28/95</u> County: <u>Adams</u> State: <u>PA</u>	
Do Normal Circumstances exist on the site? (Is the site significantly disturbed (Atypical Situation)? Is the area a potential Problem Area? (If needed, explain on reverse.)	Yes No Yes Ma Yes Mo	Community ID: <u>W-6-500</u> th Transect ID: Plot ID:	ern data point

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VEGETATION

Dominant Plant Species Stratum Indicator	Dominant Plant Species Stratum Indicator	
1. Polygonum sagittatum <u>H</u> OBL	9	
2. Sagittaria latifolia OBL	10	.
3. Alnus serrulata <u>5 OBL</u>	11	.
4. Acer rubrum S,T FAC	12	.
5. Impatiens Spp. H FACIU	13	. [
5. Carex stricta H OBL	14	. .
7. Chelone alabra H OBL	15	.
8	16	.
Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). Remarks: Dominant vegetation is hydr	<u>loo.%</u> pphytic	
HYDROLOGY		
Recorded Data (Describe in Remarks): Stream, Lake, or Tide Gauge Aerial Photographs Other Other	Wetland Hydrology Indicators: Primary Indicators: inundatedin_ places Saturated in Upper 12 Inches Water Marks	

No Recorded Data Available	Water Marks Drift Lines		
Field Observations:	Sediment Deposits Drainage Patterns in Wetlands Secondary Indicators (2 or more required):		
Depth of Surface Water:(in.)	VOxidized Root Channels in Upper 12 Inches		
Depth to Free Water in Fit:(in.)	Water-Stained Leaves Local Soil Survey Data FAC-Neutral Test		
Depth to Saturated Soil:O(in.)	Other (Explain in Remarks)		
Remarks: Area is fed mainly by sprind	teeps.		
Drought Year No measurable rain fr	om mid August through mid September		

Map Unit Name Series and Phase): <u>V</u> Faxonomy (Subgroup)			Field Obse	
Profile Description: Depth inches) Horizon B	Matrix Color (Munsell Moist)	Mottie Colors (Munsell Moist) 10 YR 4/4	Mottle <u>Abundance/Contrast</u> <u>few/faint</u>	Texture, Concretions, <u>Structure, etc.</u> <u>SIL: Joam</u>
Reducing	Odor oisture Regime g Conditions r Low-Chroma Color		rganic Streaking in Sandy sted on Local Hydric Soil sted on National Hydric S ther (Explain in Remarks)	s List Soils List

WETLAND DETERMINATION

	Vegetation Present? (Yes) No (Circle) drology Present? (Yes) No Present? (Yes) No	(Circle) Is this Sampling Point Within a Wetland? Yes No		
Remarks:	All three parameters me	-t -		
NOTE: During this field visit, only a wetland overview was performed. The actual upland-wetland boundary was not determined.				
PEMAP	551B			
		Approved by HQUSACE 2/92		

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Project/Site: Keystone Sanitation Landfill Site OU-2 RT	Date: <u>9/27/95</u>
Applicant/Owner:	County: <u>Adam5</u>
Investigator: Aura Stauffer and Jennifer Hayes	State: <u>PA</u>
Do Normal Circumstances exist on the site? (Yes No Is the site significantly disturbed (Atypical Situation)? Yes (No Is the area a potential Problem Area? part of wetland Yes (No (If needed, explain on reverse.) is mowed	Community ID: <u>W- 7</u> Transect ID: Plot ID:

VEGETATION

Dominant Plant Species Stratum Indicator 1. Carex spp H — 2. Impatiens capensis H FA(U) 3. Polygonum arifolium H OBL 4. Acer rubrum S,T FAC 5. Sagittaria latifolia H OBL 6. Eupatorium perfoliatum H FACW+ 7. Mentha piperita H FACW+ 8.	Dominant Plant Species 9 10 11 12 13 14 15 16.	
Percent of Dominant Species that are OBL. FACW or FAC (excluding FAC-). Remarks: Dominant vegetation is hydro Part of the wetland vegetation is	<u>at least 86%</u> phytic: mowed ·	

HYDROLOGY

Recorded Data (Describe in Remarks): Stream, Lake, or Tide Gauge Aerial Photographs Other No Recorded Data Available	Wetland Hydrology Indicators: Primary Indicators: Inundated Saturated in Upper 12 Inches Water Marks Drift Lines	
Field Observations: Depth of Surface Water:(in.) Depth to Free Water in Pit:(in.) Depth to Saturated Soil:(in.)	Sediment Deposits Orainage Patterns in Wetlands Secondary Indicators (2 or more required): Oxidized Root Channels in Upper 12 Inches Water-Stained Leaves Local Soil Survey Data FAC-Neutral Test Other (Explain in Remarks)	
Remarks: Spring seeps influence hydi Drought Year No measurable rain fr	om mid August through mid September	

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axonomy	(Subgroup):	<u> </u>	<u>chraquult</u>	Confirm	Mapped Type? (Yes) No
Profile Des Depth	scription:	Matrix Color	Mortia Colors	Mottle	Texture. Concretions,
inches)	Horizon	(Munsell Moist)	(Munsell Moist)	Abundance/Contrast	Structure, etc.
	B	10 YR 5/1	10 YR 4/6	few/faint_	silt loam
				• ••••••••••••••••••••••••••••••••••••	
	<u></u>	. <u></u>		• ••••••••••••••••••••••••••••••••••••	مربقه المحمد
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		· · · · · · · · · · · · · · · · · · ·			
lydric Soi	Indicators:		. –	· ·	
	Histosol		Co	oncretions	
-	Histic Epi Sulfidic C	•		gh Organic Content in Su ganic Streaking in Sandy	urface Layer in Sandy Soils
-		nisture Regime	- The second	ited on Local Hydric Soil:	
	Reducing			tted on National Hydric S	
-	Gleyed of	Low-Chroma Color	s0	her (Explain in Remarks)	

WETLAND DETERMINATION

Hydrophytic Vegetation Present? (es No (Circle) Wetland Hydrology Present? (es No Hydric Soils Present? (es No	(Circle) Is this Sampling Point Within a Wetland? Yes No
Remarks: All three parameters met	· · · · · · · · · · · · · · · · · · ·
NOTE: During this field visit, only The actual upland-wetland bour POW also located in Wetland 7(a wetland overview was performed. ndary was not determined. (pond)
PEM2/PSSIB	Photo 7
	Approved by HQUSACE 2/92

Project/Site: <u>Keystone Sanitation Landfill Site</u> Applicant/Owner: Investigator: <u>Aura Stauffer</u> and Jennifer Hay		Date: <u>9/27/95</u> County: <u>Adams</u> State: <u>PA</u>
Do Normal Circumstances exist on the site? Is the site significantly disturbed (Atypical Situation)? Is the area a potential Problem Area? (If needed, explain on reverse.)	Yes No Yes No Yes No	Community ID: <u>W- 8</u> Transect ID: Plot ID:

VEGETATION

Dominant Plant Species Stratum Indicator	Dominant Plant Soecies Stratum Indicator
1. Impatiens seo H FACW	9
2-Symplocarpus foetidus H OB/	10
3. Toxicoderdron radicans H.V. FAC	11
4. Pilea pumila H FACIN	12
5. Boehmeria eylindrica H FACULT	13
6	14
7	15
8	16
Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-).	100 %
Remarks: Dominant regetation is hyd	drophytic

HYDROLOGY

.

Recorded Data (Describe in Remarks): Stream, Lake, or Tide Gauge Aerial Photographs Other No Recorded Data Available	Wetland Hydrology Indicators: Primary Indicators: Inundated Saturated in Upper 12 Inches Water Marks Drift Lines Sediment Deposits
Field Observations: Depth of Surface Water:(in.) Depth to Free Water in Pit:(in.) Depth to Saturated Soil:(in.)	Drainage Patterns in Wetlands Secondary Indicators (2 or more required): Oxidized Root Channels in Upper 12 Inches Water-Stained Leaves Local Soil Survey Data FAC-Neutral Test Other (Explain in Remarks)
Remarks: Spring seep Drought Year No measurable rain fro	om mid August through mid September

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Map Unit Name (Series and Phase):]] Taxonomy (Subgroup		It loam (u. Normaque)	Field Obse	The second se
Profile Description: Depth (inches) Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle <u>Abundance/Contrast</u> Common (distinc	Texture, Concretions, <u>Structure, etc.</u> <u>5,112 loaM</u>
		· · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·	
Hydric Soil Indicators: Histosol Histic Er	-7		ncretions	urface Layer in Sandy Soils
Sulfidic Aquic M Reducing Gleyed c			ganic Streaking in Sand ited on Local Hydric Soil ited on National Hydric S her (Explain in Remarks)	y Soils Is List Soils List
indinana trya				

	Vegetation Present? drology Present? Present?	(fes) No (Circle) (fes) No (fes) No	is this Sampling Point Within a Wetland?	(Circ	ie) Na
Remarks:	All three	parameters met			
NOTE;	During this f The actual up	ield visit, only land-wetland boun	a wetland overview was perfondary was not determined.	ormed.	
PEMAR			Approved by HQUS	Noto	<u>8</u>

Project/Site: <u>Keystone Sanitation Landfill Site</u> Applicant/Owner: Investigator: <u>Aura Stauffer</u> and Jennifer Hay		Date: <u>9/27/95</u> County: <u>Adams</u> State: <u>PA</u>
Do Normal Circumstances exist on the site? Is the site significantly disturbed (Atypical Situation)? Is the area a potential Problem Area? (If needed, explain on reverse.)	Yes No Yes No Yes No	Community ID: <u>W-9</u> Transect ID: Plot ID:

VEGETATION

Dominant Plant Species Stratum Indicator 1. Impatiens capensis # FACU 2. Palygonum arifolium # OBL 3. Alnus serrulata 5 OBL 4.	Dominant Plant Species Stratum Indicator 9
Percent of Dominant Species that are OBL. FACW or FAC (excluding FAC-). Remarks: Dominant vegetation is hydro	<u>100 %</u> phytic

HYDROLOGY

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Recorded Data (Describe in Remarks): Stream, Lake, or Tide Gauge Aerial Photographs Other Other No Recorded Data Available Field Observations: Depth of Surface Water: (in.) Depth to Free Water in Pit: (in.) Depth to Saturated Soil: (in.)	Wetland Hydrology Indicators: Primary Indicators:
Remarks: Scep Drought Year No measurable rain fro	om mid August through mid September

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(Series and Phase): <u> λ</u>)e Taxonomy (Subgroup): <u>(</u>				فندا المستعليه عن الأن مستقد اليه بيه ومنها ال
<u>Profile Description:</u> Depth M (inches) <u>Horizon (N</u>	fatrix Color Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast Lew/Faint	Texture, Concretions, Structure, etc.
Hydric Soil Indicators:	· · · · · · · · · · · · · · · · · · ·			
Histosol Histic Epiped Sulfidic Odo Aquic Moista ∕Reducing Co ⁄Gleyed or Lo	r ure Regime	Hig Org List	icretions n Organic Content in Su anic Streaking in Sandy ed on Local Hydric Soils ed on National Hydric S er (Explain in Remarks)	s List
Remarks: Hudric	Sail DATA	meter is me	+ ·	

	Vegetation Present? irology Present? Present?	(res) No (Circle) (res) No (res) No	ls this Sampling Point Within a Wetland?	(Circle) Yes No
Remarks: NOTE ;	During this f	parameters met ield visit, only land-wetland bour	a wetland overview was perf ndary was not determined.	ormed.
9551 B			Approved by HQUS	<u>Photo 9</u> JACE 2/92

Project/Site: <u>Keystone Sanitation Landfill Site</u> Applicant/Owner: Investigator: <u>Aura Stauffer</u> and Jennifer Hay		Date: <u>9/28/95</u> County: <u>Adams</u> State: <u>PA</u>
Do Normal Circumstances exist on the site? Is the site significantly disturbed (Atypical Situation)? Is the area a potential Problem Area? (If needed, explain on reverse.)	Yes No Yes No Yes No	Community ID: <u>W-10</u> Transect ID: Plot ID:

VEGETATION

Dominant Plant Species Stratum Indicator 1. Acorus Calamus H 0BL 2. Sagittaria 1atifolia H 0BL 3	Dominant Plant Species Stratum Indi 9					
Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). Remarks: Dominant vegetation is hydrophytic						
Recorded Data (Describe in Remarks):	Wetland Hydrology Indicators:					

Stream, Lake, or Tide Gauge Stream, Lake, or Tide Gauge Aerial Photographs Other No Recorded Data Available	Primary Indicators: 		
Field Observations: Depth of Surface Water:	Sediment Deposits Drainage Patterns in Wetlands Secondary Indicators (2 or more required): Oxidized Root Channels in Upper 12 Inches Water-Stained Leaves Local Soil Survey Data FAC-Neutral Test Other (Explain in Remarks)		
Remarks: 10W ARA along Stream Drought Year No measurable rain fr	om mid August through mid September		

Profile Description:	: <u>Cumulic</u>	Norma que	<u>Confirm</u>	Mapped Type? (Yes) No
Depth (inches) Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
<u>B</u>	<u>10 YR 4/1</u>			silt loom
			<u></u>	
<u></u>		<u></u>		
		<u> </u>		
		<u></u>	•• ••••••••••••••••••••••••••••••••••••	
	•••• •••••••••••••••••••••••••••••••••			- <u> </u>
lydric Soil Indicators	: 	= .		
Histoso Histic E			oncretions ich Organic Content in Si	urface Layer in Sandy Soils
Sulfidic			rganic Streaking in Sandy sted on Local Hydric Soil	y Soils
Reducin	g Conditions or Low-Chroma Color	u	sted on National Hydric S ther (Explain in Remarks)	Soils List
· Clayed		° °	dior (Explain in nomarks)	

Remarks: All three parameters met NOTE: During this field visit, only a wetland overview was performed. The actual upland-wetland boundary was not determined. PEM2B Photo 10		Vegetation Present? drology Present? Present?	Ves No (Circle) Ves No Ves No	Is this Sampling Point Within a Wetland?	(Circle) (Yes) No
The actual upland-wetland boundary was not determined.	Remarks:	All three f	parameters met		<u></u>
	NOTE;	During this fi The actual up]	ield vîsit, only Land-wetland bou	v a wetland overview was perfondary was not determined.	ormed.
			,		
Approved by HOUSACE 2/92	PEMA	<u>B</u>		Approved by HQUS	2000 10

Project/Site: Keystone Sanitation Landfill Site Applicant/Owner: Investigator: Aura Stauffer and Jennifer Hay		Date: <u>9/28/95</u> County: <u>Adams</u> State: <u>PA</u>
Do Normal Circumstances exist on the site? Is the site significantly disturbed (Atypical Situation)? Is the area a potential Problem Area? (If needed, explain on reverse.)	Yes No Yes No Yes No	Community ID: <u>W-11</u> Transect ID: Plot ID:

VEGETATION

Dominant Plant Species Stratum Indicator 1. Polygonum sagittatum III OBL 2. Phalaris arundinacea III FACUIT 3. Carex Jurida III OBL 4. Sagittaria latifolia III OBL 5. Eupatoria latifolia III FACUIT 6. Eupatoria delphus fistulous II FACUIT	Dominant Plant Species 9	
7. <u>ACEL PUBRUM</u> <u>T</u> FAC 8 Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). Remarks: Dominant vegetation is hyd,	15 16 IOO % Mphytic.	

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HYDROLOGY

Recorded Data (Describe in Remarks): Stream, Lake, or Tide Gauge Aerial Photographs Other No Recorded Data Available Field Observations: Depth of Surface Water: (in.) Depth to Free Water in Pit: (in.) Depth to Saturated Soil: (in.)	Wetland Hydrology Indicators: Primary Indicators:
Remarks: Seeps Drought Year No measurable rain fr	om mid August through mid September

Profile Des Depth inches)	scription: Horizon B	Matrix Color (Munsell Moist) 2:5 Y 6/6	Mottle Colors (Munsell Maist) 10 YR 5/6	Mottle <u>Abundance/Contrast</u> <u>COMMON/PROM</u>	Texture, Concretions, Structure, etc. Silt bam
					·
				·	
	Reducing	dor isture Regime	— Hi Or 	ncretions ih Organic Content in Su ganic Streaking in Sandy ted on Local Hydric Soil ted on National Hydric S her (Explain in Remarka)	s List Goils List

WETLAND DETERMINATION

Hydrophytic Vegetation Present? Yes No (Circle) Wetland Hydrology Present? Yes No Hydric Soils Present? Yes No	(Circle) Is this Sampling Point Within a Wetland? Yes No				
Romarks: All three parameters met	<u>.</u> .				
NOTE: During this field visit, only a wetland overview was performed. The actual upland-wetland boundary was not determined. fed by seep POW (farm pond) is located near per wetland					
PEM2B/PFOIE	photo 11				
	Approved by HQUSACE 2/92				

Project/Site: Keystone Sanitation Landfill Site Applicant/Owner: Investigator: Aura Stauffer and Jennifer Hay		Date: <u>9/28/95</u> County: <u>Adam5</u> State: <u>PA</u>
Do Normal Circumstances exist on the site? Is the site significantly disturbed (Atypical Situation)? Is the area a potential Problem Area? (If needed, explain on reverse.)	Yes No Yes No Yes No	Community ID: <u>W- 12</u> Transect ID: Plot ID:

VEGETATION

Dominant Plant Species Stratum Indicator	Dominant Plant Species	Stratum Indicator	
1. Symplecorpus foetidus H OB/	9		
2. Impatiens capensis H_ FACU)	10		
3. Polygonum arifolium H_OBL	11		
4. Lindera benzoin <u>5</u> FACW-	12		
5. Viburnum dentatum <u>S</u> FAC	13		
6	14		
7	15		1
8	16		
Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-).	1.00 %		
Romarks: Dominant vegetation is h	ydrophytic.		
	•		
· · · · · · · · · · · · · · · · · · ·			
	· · · · · · · · · · · · · · · · · · ·	- · ·	•••
HYDROLOGY			

Recorded Data (Describe in Remarks): Stream, Lake, or Tide Gauge Aerial Photographs Other No Recorded Data Available 	Wetland Hydrology Indicators: Primary Indicators:
Depth to Free Water in Pit:(in.) Depth to Saturated Soil:(in.)	Local Soil Survey Data FAC-Neutral Test Other (Explain in Remarks)
Remarks: fed by Spring Sceps Drought Year No measurable rain fr	om mid August through mid September

Map Unit Name (Series and Phase): <u>Wehadkee</u> Taxonomy (Subgroup): <u>Cumul</u>		Drainage Class: PD Field Observations Confirm Mapped Type? (Yes) No
Profile Description: Depth Matrix Color (inches) Horizon (Munsell Moi 0-8" A 10 YR 2/ 8"+ relival		Texture, Concretions, Ince/Contrest Structure, etc. Silt loam
Hydric Soil Indicators: Histosol Histic Epipedon Sulfidic Odor Aquic Moisture Regime CReducing Conditions Gleyed or Low-Chroma	Organic Stre Listed on Lo Listed on Na	c Content in Surface Layer in Sandy Soils baking in Sandy Soils cal Hydric Soils List htional Hydric Soils List in in Remarks)
Remarks: Hydric Soil	parameter is met.	

WETLAND DETERMINATION

	Vegetation Present? irology Present? Present?	(rea No (Circle) . (rea No . (rea No	Is this Sampling Point Within a Wetland?	(Circle)
Remarks:	All three	parameters met	·	
NOTE;	During this f The actual up	ield visit, only land-wetland bou	a wetland overview was perfo ndary was not determined.	ormed.
PEM2B	1P55 B		Pho	
		ч.	Approved by HQUS	ACE 2/92

Project/Site: <u>Keystone Sanitation Landfill Site</u> Applicant/Owner: Investigator: <u>Aura Stauffer</u> and Jennifer Hay		Date: <u>9/28/95</u> County: <u>Adams</u> State: <u>PA</u>
Do Normal Circumstances exist on the site? Is the site significantly disturbed (Atypical Situation)? Is the area a potential Problem Area? (If needed, explain on reverse.)	Yes No Yes No Yes No	Community ID: <u>W-13</u> Transect ID: Plot ID:

VEGETATION

Dorminant Plant Species <u>Stratum Indicator</u> 1. <u>Symplocarpus foetidus H</u> <u>OBL</u> 2. <u>Acer rubrum T FAC</u> 3. <u>Lindera benzoin S FACW-</u> 4. <u>Pilea pumila H FACW</u> 5. <u>Alnus serrulata S OBL</u> 6. <u>Impatiens capensis H FACW</u> 7. <u>Viburnum dentatum S FAC</u>	Dominant Plant Species 9	<u>Indicator</u>
8	16	
Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-).	100 %	
Romarks: Dominant vegetation is	hy drophy tic	

HYDROLOGY

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Recorded Data (Describe in Remarks): Stream, Lake, or Tide Gauge Aerial Photographs Other No Recorded Data Available	Wetland Hydrology Indicators: Primary Indicators: Inundated Saturated in Upper 12 Inches Water Marks Drift Lines	
Field Observations: Depth of Surface Water:(in.) Depth to Free Water in Pit:(in.) Depth to Saturated Soil:(in.)	Sediment Deposits Drainage Patterns in Wetlands Secondary Indicators (2 or more required): Oxidized Root Channels in Upper 12 Inches Water-Stained Leaves Local Soil Survey Data FAC-Neutral Test Other (Explain in Remarks)	
Remarks: SMall Wetland along Stream Drought Year No measurable rain fro	om mid August through mid September	

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	We had Kee si		, Field Obse	
Profile Description: Depth (inches) Horizor	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle <u>Abundance/Contrast</u> <u>few/faint</u>	Texture, Concretions, <u>Structure, etc.</u> <u>SIL loa M</u>
Hydric Soil Indicato	rs:		·	
Sulfid Aquic Reduc Gleye	sol Epipedon ic Odar Moisture Regime sing Conditions d ar Low-Chroma Colors 	Hi Or Lis Lis Ot	ncretions gh Organic Content in Su ganic Streaking in Sandy ated on Local Hydric Soil ated on National Hydric S her (Explain in Remarks)	s List Soils List

Hydrophytic Vegetation Present? (Tes) No (Circ Wetland Hydrology Present? (Tes) No Hydric Soils Present? (Tes) No	(Circle)
Romarks: All three parameters	et
NOTE: During this field visit, o The actual upland-wetland	ly a wetland overview was performed. oundary was not determined.
P551 B	NO Dhoto Approved by HQUSACE 2/92

Project/Site: Keystone Sanitation Landfill Site Applicant/Owner: Investigator: Aura Stauffer and Jennifer Hay		Date: <u>9/29/95</u> County: <u>Carroll</u> State: <u>mp</u>
Do Normal Circumstances exist on the site? Is the site significantly disturbed (Atypical Situation)? Is the area a potential Problem Area? (If needed, explain on reverse.)	Yes No Yes No Yes No	Community ID: <u>W-14</u> Transect ID: Plot ID:

VEGETATION

Dominant Plant Species Stratum Indicator 1. Impatiens capensis H FACIU 2. Polygonum sagittatum H OBL 3. Solidago SPP H	Dorminant Plant Species Stratum Indicator 9	
Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). Remarks: Dominant vegetation is hyd	at least 60 %	
HYDROLOGY	······································	
Recorded Data (Describe in Remarks): Stream, Lake, or Tide Gauge Aerial Photographs Other	Wetland Hydrology Indicators: Primary Indicators: Inundated Saturated in Upper 12 Inches	

Water Marks No Recorded Data Available Drift Lines Sediment Deposits **Drainage Patterns in Wetlands** Field Observations: Secondary Indicators (2 or more required): A Oxidized Root Channels in Upper 12 Inches Depth of Surface Water: (in.) Water-Stained Leaves Local Soil Survey Data Depth to Free Water in Pit: (in.) FAC-Neutral Test Ó Other (Explain in Remarks) Depth to Saturated Soil: (in.) spring seep Remarks: Drought Year No measurable rain from mid August through mid September

Profile De: Depth inches)	<u>scription:</u> Horizon	Matrix Color (Munsell Moist) 2.5 ¥ 5/2	Mottle Calars (Munsell Moist) 10 YR 9/6	Mottle Abundance/Contrast few/faint	Texture, Concretions, <u>Structure, etc.</u> Silt loam
		·	· · · · · · · · · · · · · · · · · · ·		
		· · · · · · · · · · · · · · · · · · ·			
lydric Soi	i Indicators:	· · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·	• • • • • • • • • • • • • • • • • • •	
-	Reducing	ldor listure Regime	Hi O i	ncretions gh Organic Content in Se ganic Streaking in Sendy sted on Local Hydric Soil sted on National Hydric S ther (Explain in Remarks)	s List Goils List

Hydrophytic Vegetation Pre Wetland Hydrology Present Hydric Soils Present?	× · ·	Is this Sampling Point Within a Wetland?	(Circle) Yes No
Remarks: All +	vice parameters met	-	
NOTE: During th The actua	is field visit, only 1 upland-wetland bou	a wetland overview was perfo ndary was not determined.	ormed.
PEM2B		Approved by HQUS.	<u>Vo photo</u> Ace 2/92

Project/Site: <u>Keystone Sanitation Landfill Sit</u> Applicant/Owner: Investigator: <u>Aura Stauffer</u> and Jennifer Ha		Date: <u>9/29/95</u> County: <u>Carroll</u> State: <u>MD</u>
Do Normal Circumstances exist on the site? Is the site significantly disturbed (Atypical Situation)? Is the area a potential Problem Area? (If needed, explain on reverse.)	Yes No Yes No Yes No	Community ID: <u>W-15</u> Transect ID: Plot ID:

VEGETATION

Dominant Plant SpeciesStratumIndicator1. SagittariaIntifoliaHOBL2. Eupatorium perfoliatumHFA(U)H3. Impatiens capensisHFA(U)H4. SymplecarpusfortidusH5. AcerrubrumT6. ViburnumContatumS7. LigustrumVulgareS8. OnocloaSensibilisH	Dominant Plant Species Stratum Indicator 9
Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). Remarks: Dominant regetation is hyd	<u>87%</u> drophytic:
Recorded Data (Describe in Remarks): Stream, Lake, or Tide Gauge Aerial Photographs Other Other No Recorded Data Available Field Observations: Depth of Surface Water:(in.) Depth to Free Water in Pit:(in.)	Wetland Hydrology Indicators: Primary Indicators:

:

Remarks:

Drought Year

No measurable rain from mid August through mid September

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Profile Description: Depth (inches) Horizon	Matrix Color (Munsell Moist) 2.57.4/2	Mattle Calors (Munsell Maist) 10 YR 4/6	Mottle <u>Abundance/Contrast</u> <u>few/faint</u>	Texture, Concretions, <u>Structure, etc.</u> <u>Silt loam</u>
	·····		· · · · · · · · · · · · · · · · · · ·	·
lydric Soil Indicator	3:			
Sulfidi Aquic Reduc	ol Epipedon 5 Odor Moisture Regime ng Conditions 1 or Low-Chroma Colors		oncretions gh Organic Content in Su rganic Streaking in Sandy sted on Local Hydric Soil sted on National Hydric S ther (Explain in Remarks)	s List Soils List

	Vegetation Present? drology Present? Present?	(Yes) No (Circle) (Yes) No (Yes) No	Is this Sampling Point Within a Wetland?	(Circle)
Remarks:	All three	parameters met		
NOTE:	During this f The actual up	ield visit, onl land-wetland bo	y a wetland overview was perf undary was not determined.	ormed.
PEMZE	PFOLE	, 	Approved by HQUS	vo photo

Project/Site: Keystone Sanitation Landfill Site Applicant/Owner: Investigator: Aura Stauffer and Jennifer Haye		Date: <u>9/29/95</u> County: <u>Carroll</u> State: <u>MP</u>
Do Normal Circumstances exist on the site? Is the site significantly disturbed (Atypical Situation)? Is the area a potential Problem Area? (If needed, explain on reverse.)	Yes No Yes No Yes No	Community ID: <u>W-16</u> Transect ID: Plot ID:

VEGETATION

Dominant Plant Species Stratum Indicator 1. Torrison Plant Species V. H. FAC. 2. Onocloa Sensibilis H. FACW 3. Lindern benzoin S. FACW- 4. Acer Saccharinum T. FACW 5. Viburnum recognitum S. FACW 6	Dorminant Plant Species Stratum Indicator 9
Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-).	100 %
Romarks: Pominant vegetation is hu	ldro phytic

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HYDROLOGY

Recorded Data (Describe in Remarks): Stream, Lake, or Tide Gauge Aerial Photographs Other No Recorded Data Available	Wetland Hydrology Indicators: Primary Indicators: Inundated Saturated in Upper 12 Inches Water Marks Drift Lines
Field Observations: Depth of Surface Water:(in.) Depth to Free Water in Pit:(in.)	Sediment Deposits Drainage Patterns in Wetlands Secondary Indicators (2 or more required): Oxidized Root Channels in Upper 12 Inches Water-Stained Leaves Water-Stained Leaves Local Soil Survey Data
Depth to Saturated Soil:(in.)	FAC-Neutral Test Other (Explain in Remarks)
Remarks: Seep Drought Year No measurable rain fr	om mid August through mid September

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Series and Phase):		ic Haplagi	Field Obse	Mapped Type? (Yes) No
Profile Description: Depth (nches) Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottie Abundance/Contrast	Texture, Concretions, Structure, etc.
	<u>2.5¥ 5/2</u>	<u>10 YR 5/6</u>		
Reducing Gleyed o	Odor Disture Regime I Conditions r Low-Chroma Colors		ganic Streaking in Sandy ted on Local Hydric Soil ted on National Hydric S her (Explain in Remarks)	s List Soils List

Hydrophytic Vegetation Present? Ver No (Circle) Wetland Hydrology Present? (193) No Hydric Soils Present? (193) No	(Circle) Is this Sampling Point Within a Wetland? Yes No
Remarks:	
NOTE: During this field visit, only The actual upland-wetland bou	a wetland overview was performed. ndary was not determined.
PFO1E	No Photo
	Approved by HQUSACE 2/92

Project/Site: Keystone Sanitation Landfill Site OU- Applicant/Owner: Investigator: Aura Stauffer and Jennifer Hayes	-2 RI	Date: <u>9 /29/95</u> County: <u>Carroll</u> State: <u>MD</u>
Do Normal Circumstances exist on the site? Is the site significantly disturbed (Atypical Situation)? Is the area a potential Problem Area? (If needed, explain on reverse.)		Community ID: <u>W-17</u> Transect ID: Plot ID:

VEGETATION

Dominant Plant Species <u>Stratum Indicator</u> 1. Polygonum sagittatum <u>H</u> OBL 2. Impatiens capensis <u>H</u> FACW 3. Sagittaria latifolia <u>H</u> OBL 4. Aster Spp <u>H</u>	Dominant Plant Species 9		ndicator
5. Acer saccharinum T FACW 6. Leersia oryzoides H OBI 7 8	13 14 15 16		
Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-).	at least		
Remarks: Dominant vegetation is hyd	rophytic.	<u>, , , , , , , , , , , , , , , , , , , </u>	

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HYDROLOGY

Recorded Data (Describe in Remarks): Stream, Lake, or Tide Gauge Aeriai Photographs Other No Recorded Data Available	Wetland Hydrology Indicators: Primary Indicators: Inundated Saturated in Upper 12 Inches Water Marks Drift Lines Sediment Deposits Drainage Patterns in Wetlands Secondary Indicators (2 or more required): Water-Stained Leaves Local Soil Survey Data FAC-Neutral Test Other (Explain in Remarks)
Field Observations: Depth of Surface Water:(in.) Depth to Free Water in Pit:(in.) Depth to Saturated Soil:(in.)	
Romarks: Area along stream. Area is Drought Year No measurable rain fr	on mid August through mid September

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Profile De: Depth (inches)	<u>scription:</u> <u>Horizon</u>	Matrix Color (Munsell Moist)	Mattle Calors (Munsell Maist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
		10 YR 5/1			Silt loam
····		· · · · · · · · · · · · · · · · · · ·			
		· · · · · · · · · · · · · · · · · · ·			
lydric Soi	Histosol	· ···	c	oncretions	
_	Histic Epi Sulfidic C	•		igh Organic Content in Su rganic Streaking in Sandy	urface Layer in Sandy Soils / Soils
	Aquic Mo	isture Regime		sted on Local Hydric Soil sted on National Hydric S	
		Low-Chroma Colors		ther (Explain in Remarks)	

WETLAND DETERMINATION

Romarks: All three parameters NOTE: During this field vis	sit, only a wetland overview was per	· ·
NOTE: During this field vi	sit only a watland avanuation and a sec	· ·
The actual upland-we	tland boundary was not determined.	iormed.
PEMZBIPFOIE	No Approved by HQU	Photo

Project/Site: <u>Keystone Sanitation Landfill Site OU-</u>	2 <u>RT</u> Date: <u>9/29/95</u>
Applicant/Owner:	<u>County: Carroll</u>
Investigator: <u>Aura Stauffer</u> and Jennifer Hayes	State: <u>MD</u>
Do Normal Circumstances exist on the site? (Yes Is the site significantly disturbed (Atypical Situation)? Yes Is the area a potential Problem Area? Yes (If needed, explain on reverse.)	No Transect ID:

VEGETATION

Dominant Plant Species Stratum Indicator 1. Impatiens capensis H FACW 2. Pilea pumila H FACW 3. Polygonum cespitasum H FACU- 4. Acer saccharinum T FACW 5.	Dominant Plant Species Stratum Indicator 9				
Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 7.5% Remarks: Dominant vegetation is hydrophytic					

HYDROLOGY

Recorded Data (Describe in Remarks): Stream, Lake, or Tide Gauge Aeriai Photographs Other No Recorded Data Available	Wetland Hydrology Indicators: Primary Indicators: Inundated Saturated in Upper 12 Inches Water Marks Drift Lines Sediment Deposits
Field Observations: Depth of Surface Water:(in.) Depth to Free Water in Pit:(in.) Depth to Saturated Soil:(in.)	Drainage Patterns in Wetlands Secondary Indicators (2 or more required): Oxidized Root Channels in Upper 12 Inches Water-Stained Leaves Local Soil Survey Data FAC-Neutral Test Other (Explain in Remarks)
Remarks: low area along stream. Drought Year No measurable rain fr	om mid August through mid September

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rofile De epth nches)	<u>scription:</u> <u>Horizon</u>	Matrix Color (Munseil Moist) 10 V.R. 7/2	Mottle Colors (Munsell Moist) 10. YR 6/6	Mottle <u>Abundance/Contrast</u> . <u>Common Idistind</u>	Texture, Concretions, <u>Structure, etc.</u> Silt_loam
	· · · · · · · · · · · · · · · · · · ·	·	· · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·
rdric Sai	i Indicators:	·		·	
-	Reducing	Idor iisture Regime		ncretions gh Organic Content in Su ganic Streaking in Sandy sted on Local Hydric Soils sted on National Hydric S ther (Explain in Remarks)	: List

WETLAND DETERMINATION

	Vegetation Present? irology Present? Present?	(Tes) No (Circle) (Tes) No (Tes) No	Is this Sampling Point Within a Wetland?	Ve	Circle) B No
Remarks:	All three	parameters met			
NOTE:	During this f The actual up	ield visit, only land-wetland bou	a wetland overview was perf ndary was not determined.	orme	ed.
PFOIE	-			No	Photo
			Approved by HQUS	ACE.	2/92

Project/Site: <u>Keystone Sanitation Landfill Site OU-2</u> Applicant/Owner: Investigator: <u>Aura Stauffer</u> and Jennifer Hayes	Date: 9/29/95 County: Carrol/ State: MD
Do Normal Circumstances exist on the site? (Yes) Is the site significantly disturbed (Atypical Situation)? Yes Is the area a potential Problem Area? Yes (If needed, explain on reverse.)	No Community ID: W-19 No Transect ID:

VEGETATION

Dominant Plant Species Stratum Indicate	Dominant Plant Species Stratum Indicator				
1. Polygonum sagittatum H OBL	9				
2. Impatiens capensis It EACL	2 10				
3. Juncus effusus H EACU	± 11				
4. Solidage spp. H	_ 12				
5. Aster puniceus H OBL	13				
6	14				
7	15				
8					
Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-).					
Remarks: Dominant vegetation is hydrophytic.					

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HYDROLOGY

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Recorded Data (Describe in Remarks): Stream, Lake, or Tide Gauge Aerial Photographs Other No Recorded Data Aveilable Field Observations:	Wetland Hydrology Indicators: Primary Indicators: Inundated Saturated in Upper 12 Inches Water Marks Drift Lines Sediment Deposits Drainage Patterns in Wetlands
Depth of Surface Water:(in.) Depth to Free Water in Fit:(in.) Depth to Saturated Soil:(in.)	Secondary Indicators (2 or more required): Oxidized Root Channels in Upper 12 Inches Water-Stained Leaves Local Soil Survey Data V FAC-Neutral Test Other (Explain in Remarks)
Remarks: Drought Year No measurable rain fr	om mid August through mid September

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Inches) Horizon (Munsell Moist) (Munsell Moist) Abundance/Contrast Structure, etc. IOYR_6/2 IOYR_57/6 Common/distinct Silt loam IOYR Silt Io Io Io IOYR_6/2 IOYR_57/6 Common/distinct Silt Io IOYR Silt Io Io Io Io IOYR Silt Io Io Io Io Io Io Io Io Io Io Io Io Io Io Io Io Io Io Io Io Io Io Io Io Io Io Io Io Io Io Io Io Io Io Io Io Io Io Io Io Io Io Io Io Io Io Io Io Io Io Io Io Io Io Io Io Io Io Io Io Io Io Io Io Io Io Io	anonomy	(oabgioap).		c Haplagi	Commin	Mapped Type? (Yes) No
Hydric Soil Indicators: 	Profile Des Depth (inches)					
HistosolConcretions Histic EpipedonHigh Organic Content in Surface Layer in Sandy Soils Sulfidic OdorOrganic Streaking in Sandy Soils			10 YR 6/2	10 YR 5/6	. common/distinct	- silt loam
Histosol Concretions Histic Epipedon High Organic Content in Surface Layer in Sandy Soils Sulfidic Odor Organic Streaking in Sandy Soils						
Histosol Concretions Histic Epipedon High Organic Content in Surface Layer in Sandy Soils Sulfidic Odor Organic Streaking in Sandy Soils		a	. <u></u>			<u></u>
Histosol Concretions Histic Epipedon High Organic Content in Surface Layer in Sandy Soils Sulfidic Odor Organic Streaking in Sandy Soils			·	······································		
Histosol Concretions Histic Epipedon High Organic Content in Surface Layer in Sandy Soils Sulfidic Odor Organic Streaking in Sandy Soils		<u></u>			· · · · · · · · · · · · · · · · · · ·	
Histosol Concretions Histic Epipedon High Organic Content in Surface Layer in Sandy Soils Sulfidic Odor Organic Streaking in Sandy Soils						• <u>////</u>
Histic Epipedon High Organic Content in Surface Layer in Sandy Soils Sulfidic Odor Organic Streaking in Sandy Soils	-lydric Soil	I Indicators:		<u></u>	<u>, , , , , , , , , , , , , , , , , , , </u>	
Aquic Moisture Regime Listed on Local Hydric Soils List		Histic Epi Sulfidic C	Idor listure Regime	Hig Or Lis	gh Organic Content in Su ganic Streaking in Sandy ted on Local Hydric Soils	/ Soils s List
Reducing ConditionsListed on National Hydric Soils List Gleyed or Low-Chroma ColorsOther (Explain in Remarks)						ioils List

	Vegetation Present? (res No (Circle) drology Present? (res No Present? (res No	(Circle) Is this Sampling Point Within a Wetland? Yes No
Remarks:	All three parameters met	
NOTE:	During this field visit, only The actual upland-wetland bou	a wetland overview was performed. ndary was not determined.
PEMIE		Photo 13 Approved by HOUSACE 2/92

Project/Site: <u>Keystone Sanitation Landfill Site</u> Applicant/Owner: Investigator: <u>Aura Stauffer</u> and Jennifer Hay		Date: <u>9/29/95</u> County: <u>Carroll</u> State: <u>MD</u>
Do Normal Circumstances exist on the site? Is the site significantly disturbed (Atypical Situation)? Is the area a potential Problem Area? (If needed, explain on reverse.)	Yes No Yes Ng Yes Ng	Community ID: <u>W- 20</u> Transect ID: Plot ID:

VEGETATION

Dominant Plant Species Stratum Indicator 1. Symplecarpus forbidus H ABL 2. Impatiens capensis H FACUL 3. Acer rubrum T FAC 4. Pilea pumila H FACUL 5.	Dominant Plant Species 9	
Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-).	100 %	
Romarks: Dominant vegetation is hy	drophytic	

HYDROLOGY

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Recorded Data (Describe in Remarks): Stresm, Lake, or Tide Gauge Aerial Photographs Other No Recorded Data Available	Wetland Hydrology Indicators: Primary Indicators: Inundated Saturated in Upper 12 Inches Water Marks Drift Lines
Field Observations: Depth of Surface Water:(in.) Depth to Free Water in Pit:(in.) Depth to Saturated Soil:(in.)	Sediment Deposits Drainage Patterns in Wetlands Secondary Indicators (2 or more required): Oxidized Root Channels in Upper 12 Inches Water-Stained Leaves Local Soil Survey Data FAC-Neutral Test Other (Explain in Remarks)
Remarks: Forested area along stream Drought Year No measurable rain fr	om mid August through mid September

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	(Subgroup):		ic Haplaq	<u>(LEPT.S</u> Comm	Mapped Type? (es) No
Profile De Depth (inches)	Horizon	Matrix Còlor (Munsell Moist) 2.574/2	Mattle Colors (Munsell Moist) 10 YR 4/6	Mottle <u>Abundance/Contrast</u> <u>few/prom·</u>	Texture, Concretions, <u>Structure, etc.</u> Silt loam
				•	
		<u></u>			<u> </u>
		••••••••••••••••••••••••••••••••••••••		·	
		<u></u>	<u></u>		
ydric Soi	I Indicator s :	<u></u>	<u></u>	····	
-	Reducing	dor isture Regime		ncretions gh Organic Content in So ganic Streaking in Sandy tted on Local Hydric Soil tted on National Hydric S her (Explain in Remarks)	s List Soils List

	Vegetation Present? Irology Present? Present?	(Tes) No (Circle) (Tes) No (Tes) No	Is this Sampling Point Within a Wetland?	(Circie) Yes No
Remarks: NOTE :	All three During this f	parameters met	a wetland overview was perf ndary was not determined.	ormed.
PFOLE			ndary was not determined.	Photo 14
		·	Approved by HQUS	ACE 2/92

Project/Site: Keystone Sanitation Landfill Sit Applicant/Owner: Investigator: <u>Aura Stauffer</u> and Jennifer Ha		Date: <u>9/29/95</u> County: <u>Carroll</u> State: <u>MD</u>
Do Normal Circumstances exist on the site? Is the site significantly disturbed (Atypical Situation)? Is the area a potential Problem Area? (If needed, explain on reverse.)	Ves No Yes No Yes No	Community ID: <u>W- 2 </u> Transect ID: Plot ID:

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VEGETATION

Dominant Plant Species Stratum Indicator 1. Acorus calamus H OBL 2. Palygonum perfoliatum H FAC 3. Polygonum sagittatum H OBL 4.	Dominant Plant Species Stratum Indicator 9
6	14
7	16
Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-).	100 %
Romarks: Dominant vegetation is hyd	rophytic

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HYDROLOGY

Recorded Data (Describe in Remarks): Stream, Lake, or Tide Gauge Aerial Photographs Other No Recorded Data Available	Wetland Hydrology Indicators: Primary Indicators: Inundated Saturated in Upper 12 Inches Water Marks Drift Lines Sediment Deposits		
Field Observations: Depth of Surface Water:(in.) Depth to Free Water in Pit:(in.) Depth to Saturated Soil:(in.)			
Remarks: Drought Year No measurable rain fr	om mid August through mid September		

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	d Phase):		t ham CHI c Haplagu	Field Obse	
Profile Des Depth (inches)		Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle <u>Abundance/Contrast</u>	Texture, Concretions, Structure, etc.
				·	
				· · · · · · · · · · · · · · · · · · ·	
	Reducing	ldor Isture Regime		ncretions gh Organic Content in Si ganic Streaking in Sandy ted on Local Hydric Soil ted on National Hydric S her (Explain in Remarks)	s List Gails List
Remarks:	Hydri	c soil pan	ameter is m	iet ·	

	Vegetation Present? drology Present? Present?	(es) No (Circle) (es) No (es) No	is this Sampling Point Within a Wetland?	(Circie) Yes No
Remarks:	All three	parameters n	net	
NOTE :	During this fi The actual upl	eld visit, only and-wetland bou	a wetland overview was perf ndary was not determined.	ormed.
PEM2	E		Approved by HQUS	Photo 15

Project/Site: <u>Keystone Sanitation Landfill Site</u> Applicant/Owner: Investigator: <u>Aura Stauffer</u> and Jennifer Hay		Date: <u>9/29/95</u> County: <u>Carroll</u> State: <u>MD</u>
Do Normal Circumstances exist on the site? Is the site significantly disturbed (Atypical Situation)? Is the area a potential Problem Area? (If needed, explain on reverse.)	Yes No Yes No Yes No	Community ID: <u>W-22</u> Transect ID: Plot ID:

VEGETATION

Dominant Plant Species Stratum Indicator 1. Polyganum_sagittatum H OBL 2. Aster puniceus H OBL 3. Impatiens capensis H FACW 4. Carex stricta H OBL 5. Agrimonia parviflom H FAC 6.	Dominant Plant Species 9	
8 Percent of Dominant Species that are OBL FACW or FAC (excluding FAC-). Remarks: Dominant vegetation is hy	16 <u>100 %</u> dro phytic:	 n and a second secon

HYDROLOGY

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Recorded Data (Describe in Remarks): Stream, Lake, or Tide Gauge Aerial Photographs Other No Recorded Data Available	Wetland Hydrology Indicators: Primary Indicators: Inundated Saturated in Upper 12 Inches Water Marks Drift Lines Sediment Deposits		
Field Observations: Depth of Surface Water:(in.) Depth to Free Water in Pit:(in.) Depth to Saturated Soii:(in.)	Drainage Patterns in Wetlands Secondary Indicators (2 or more required): Oxidized Root Channels in Upper 12 Inches Water-Stained Leaves Local Soil Survey Data FAC-Neutral Test Other (Explain in Remarks)		
Remarks: Drought Year No measurable rain fr	om mid August through mid September		

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	Phase):	_	<u>1t han (H</u> Haplaque	Field Obse	
Profile Desc Depth		Matrix Color (Munsell Moist)	Mattle Colors (Munseil Maist)	Mottle <u>Abundance/Contrast</u> <u>few/faint</u>	Texture, Concretions, Structure, etc.
			·		
		· · · · · · · · · · · · · · · · · · ·			
	Histosol Histic Ep Sulfidic C Aquic Ma Reducing		— Hiq Hiq Or ↓ Lis	ncretions gh Organic Content in Su ganic Streaking in Sandy ted on Local Hydric Soil ted on National Hydric S her (Explain in Remarks)	s List Soils List

WETLAND DETERMINATION

	Vegetation Present? Yes No (Circle) drology Present? Yes No Present? Tes No Is this Sampling	(Circle) Point Within a Wetland?
Remarks:	All three parameters met	
NOTE:	During this field visit, only a wetland o The actual upland-wetland boundary was no	verview was performed. t determined.
PEMZI	E	Photo 16
	•	Approved by HQUSACE 2/92

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Project/Site: <u>Keystone Sanitation Landfill Site</u> Applicant/Owner: Investigator: <u>Aura Stauffer</u> and Jennifer Hay		Date: <u>9/29/95</u> County: <u>Carrell</u> State: <u>MD</u>
Do Normal Circumstances exist on the site? Is the site significantly disturbed (Atypical Situation)? Is the area a potential Problem Area? (If needed, explain on reverse.)	Yes No Yes No Yes No	Community ID: <u>W- 23</u> Transect ID: Plot ID:

VEGETATION

Dorminant Plant Species Stratum Indicator 1. Poly gonum sngittatum H OBL 2. Solidago Spp H — 3. Importions capensis H FACW 4. Aster puniceus H OBL 5.	Dominant Plant Species 9	·	
Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-).	at least 75%		
Remarks: Dominant vegetation is h			

HYDROLOGY

Recorded Data (Describe in Remarks): Stream, Lake, or Tide Gauge Aerial Photographs Other No Recorded Data Available	Wetland Hydrology Indicators: Primary Indicators: Inundated Saturated in Upper 12 Inches Water Marks Drift Lines
Field Observations: Depth of Surface Water:(in.) Depth to Free Water in Pit:(in.) Depth to Saturated Soil:(in.)	Sediment Deposits Drainage Patterns in Wetlands Secondary Indicators (2 or more required): Oxidized Root Channels in Upper 12 Inches Water-Stained Leaves Local Soii Survey Data PAC-Neutral Test Other (Explain in Remarks)
Remarks: Drought Year No measurable rain fr	rom mid August through mid September

Map Unit Name (Series and Phase): Taxonomy (Subgroup):		•	Drainage C Field Obser PDES Confirm M	
Profile Description: Depth (inches) Horizon	Matrix Color (Munsell Moist) 2.5.7.5/2	Mottle Colors (Munsell Moist) 10 YR 4/6	Mottle <u>Abundance/Contrast</u> <u>common/distinct</u>	Texture, Concretions, <u>Structure, etc.</u> <u>Silt Ing M</u>
Reducing Gleyed or	dor isture Regime Conditions Low-Chroma Colors	Hig Org List List	anic Streaking in Sandy ad on Local Hydric Soils ad on National Hydric S ar (Explain in Remarks)	List

Hydrophytic Vegetation Present? (795) No (1 Wetland Hydrology Present? (793) No Hydric Soils Present? (793) No	Circle) (Circle) Is this Sampling Point Within a Wetland? (Yes) No
Remarks: All three paraw NOTE: During this field visit, The actual upland-wetlan	when the method overview was performed. d boundary was not determined.
PEMZE	Photo 17 Approved by HOUSACE 2/92

Project/Site: Keystone Sanitation Landfill Site Applicant/Owner: Investigator: Aura Stauffer and Jennifer Haye		Date: <u>9/29/95</u> County: <u>Corroll</u> State: <u>MD</u>
Do Normal Circumstances exist on the site? Is the site significantly disturbed (Atypical Situation)? Is the area a potential Problem Area? (If needed, explain on reverse.)	Yes Yes Yes Yes	Community ID: <u>W-24</u> Transect ID: Plot ID:

VEGETATION

Dominant Plant SpeciesStratumIndicator1. AcoruscalamusHOBL2. CareyStrictaHOBL3. ImpatienscapensisHFACW4. Polygonumsagi HatumHOBL5. Sagi HarialatifaliaHOBL6. Asterspo.H	Dominant Plant Soecies 9	Stratum Indicator
8	16	
Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-).	at least 83%	······································
Remarks: pominant vegetation is	hydrophytic.	

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HYDROLOGY

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Recorded Data (Describe in Remarks): Stream, Lake, or Tide Gauge Aerial Photographs Other No Recorded Data Available Field Observations:	Wetland Hydrology Indicators: Primary Indicators: Inundated Saturated in Upper 12 Inches Water Marks Drift Lines Sediment Deposits Drainage Patterns in Wetlands Secondary Indicators (2 or more required):
Depth of Surface Water:(in.) Depth to Free Water in Fit:(in.) Depth to Saturated Soil:(in.)	Oxidized Root Channels in Upper 12 Inches Water-Stained Leaves Local Soil Survey Data FAC-Neutral Test Other (Explain in Remarks)
Remarks: fed by spring seeps Drought Year No measurable rain fr	om mid August through mid September

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ofile Desc epth aches)		Matrix Color (Munsell Moist)	<u>C Haplague</u> Mottle Colors (Munsell Moist) 16 VR 4/6	Mottle <u>Abundance/Contrast</u> Faw / Fain t	Texture, Concretions, Structure, etc.
					
····-				,	
vdric Soil	Indicators:				· · · · · · · · · · · ·
	Histosol Histic Epi Sulfidic O Aquic Mo Reducing	dor isture Regime		ncretions h Organic Content in So ganic Streaking in Sandy ted on Local Hydric Soil ted on National Hydric S her (Explain in Remarks)	s List Goils List

	Irology Present? · Yes No		Is this Sampling Point Within a Wetland?	(Circle) (Yes) No	
Remarks:	All three paramet	ers me	t		
NOTE: During this field visit, only a wetland overview was performed. The actual upland-wetland boundary was not determined.					
PEMIE			P	roto 18	
	· · · · · · · · · · · · · · · · · · ·		Approved by HQUS.	ACE 2/92	

Project/Site: <u>Keystone Sanitation Landfill Site</u> Applicant/Owner: Investigator: <u>Aura Stauffer</u> and Jennifer Hay		Date: <u>10/3/95</u> County: <u>Adam3</u> State: <u>PA</u>
Do Normal Circumstances exist on the site? Is the site significantly disturbed (Atypical Situation)? Is the area a potential Problem Area? (If needed, explain on reverse.)	Yes No Yes No Yes No	Community ID: <u>W- 25</u> Transect ID: Plot ID:

VEGETATION

Dominant Plant SpeciesStratumIndicator1. Lindombenzoin5FACU/-2. Acer rubrum5, TFAC3. Impatiens5PPH4. JuncuseffususH5. PolygonumsagittatumH6. Aster puniceusH7. PolygonumperfoliatumH8.Percent of Dominant Species that are OBL, FACW or FACRemarks:Dominant vegetation8.	Dominant Plant Species Stratum Indicator 9		
HYDROLOGY	· · · - · · · · · · · · · · · · · · · ·		
Recorded Data (Describe in Remarks): Stream, Lake, or Tide Gauge Aerial Photographs Other No Recorded Data Available Wetland Hydrology Indicators: Primary Indicators: Inundated Saturated in Upper 12 Inches in SCEP Water MarksO.Nea.S Drift Lines			

Necorded Data (Describe in Remarks).	Primary Indicators:
Aerial Photographs Other 1No Recorded Data Available	Inundated ✓ Saturated in Upper 12 Inches in SCEP Water Marks A.PEAS Drift Lines
Field Observations:	Sediment Deposits Drainage Patterns in Wetlands Secondary Indicators (2 or more required):
Depth of Surface Water:(in.)	✓ Oxidized Root Channels in Upper 12 Inches — Water-Stained Leaves
Depth to Free Water in Pit:(in.)	Local Soil Survey Data FAC-Neutral Test
Depth to Saturated Soii:(in.)	Other (Explain in Remarks)
Remarks: Flood plain area Area is also influenced by spri	ng seeps.
	om mid August through mid September

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Map Unit Name (Series and Phase): WOTSHAM SILT LOAM (WOA) Drainage Class: PD Field Observations Field Observations Taxonomy (Subgroup): Typic Ochragualts						
Profile Des Depth (inches)		Matrix Color (Munsell Moist) 5 Y 6/3	Mottle Colors (<u>Munsell Moist)</u> <u>10 V R 6 /6</u>	Mottle <u>Abundance/Contrast</u> <u>few/faint</u>	Texture, Concretions, <u>Structure, etc.</u> <u>Silt loam</u>	
Hydric Soil Indicators:						
Remarks:				Hes in in dhydrology	a flood plain evidence ¹³ strong·	

WETLAND DETERMINATION

Hydrophytic Vegetation Present? (es No (Circle) Wetland Hydrology Present? (es No Hydric Soils Present? (es No Strong hydro phytic use and hydrology	(Circle) Is this Sampling Point Within a Wetland? Yes No
Remarks gest that this is a wetland soil	•
NOTE: During this field visit, only The actual upland-wetland bou	a wetland overview was performed. ndary was not determined.
	2nd roll
PFOLE/PEMZB	Photo 6
	Approved by HQUSACE 2/92
	Approved by HQUSACE 2/92

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Project/Site: <u>Keystone Sanitation Landfill Site</u> Applicant/Owner: Investigator: <u>Aura Stauffer</u> and Jennifer Hay		Date: 101319.5 County: <u>Adams</u> State: <u>PA</u>
Do Normal Circumstances exist on the site? Is the site significantly disturbed (Atypical Situation)? Is the area a potential Problem Area? {If needed, explain on reverse.}	Yes No Yes No Yes No	Community ID: <u>W-26</u> Transect ID: Plot ID:

VEGETATION

Dominant Plant Species Stratum Indicator 1. TUDCUS effusus H FACW+ 2. Carex Spp. H — 3. Piloa pumila H FACW+ 4. Polygonum pensylvanicum H FACW+ 5. Gramineae H — 6.	Dominant Plant Species Stratum Indicator 9					
7 8	15					
Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-).						
Remarks: Pominant regetation is vegetation was mowed.	hydrophytic					

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HYDROLOGY

Recorded Data (Describe in Remarks):Stream, Lake, or Tide GaugeAerial PhotographsOtherNo Recorded Data Available Field Observations: Depth of Surface Water:(in.) Depth to Free Water in Fit:(in.) Depth to Saturated Soii:(in.)	Wetland Hydrology Indicators: Primary Indicators:
Remarks: 10W ARO Along Stream Drought Year No measurable rain fro	om mid August through mid September

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Map Unit Name (Series and Phase): <u>WORSham Silt Joan (UbA)</u> Drainage Class: <u>PP</u> Field Observations Taxonomy (Subgroup): <u>Typic Ochraouults</u> Confirm Mapped Type? (Yes) No						
Profile Der Depth (inches)	<u>Horizon</u>	Matrix Color (<u>Munsell Moist)</u> <u>16 YR 6/1</u>	Mattle Colors (Munsell Moist)	Mottle <u>Abundance/Contrast</u>	Texture, Concretions, <u>Structure, etc.</u> <u>Silt loam</u>	
Hydric Soil Indicators:						

WETLAND DETERMINATION

Hydrophytic Vegetation Present? (Yes) No (Circle) Wetland Hydrology Present? (Yes) No Hydric Soils Present? (Yes) No	(Circle) Is this Sampling Point Within a Wetland? Yes No
Remarks: All three para weters net NOTE: During this field visit, only The actual upland-wetland bour	a wetland overview was performed.
PEMIB	roll 2 photo 7 Approved by HQUSACE 2/92

Project/Site: <u>Keystone Sanitation Landfill Site</u> Applicant/Owner: Investigator: <u>Aura Stauffer</u> and Jennifer Hay		Date: 10/3/95 County: <u>Carroll</u> State: <u>MD</u>
Do Normal Circumstances exist on the site? Is the site significantly disturbed (Atypical Situation)? Is the area a potential Problem Area? (If needed, explain on reverse.)	Yes No Yes No Yes No	Community ID: <u>W- 27</u> Transect ID: Plot ID:

VEGETATION

Dominant Plant Species Stratum Indicator 1. Leersia oryzaides H OBL 2. Impatiens capensis H FACW 3. Polygonum sagittatum H OBL 4. Carex Jurida H OBL 5. Acer rubrum 5;T FAC 6.	Dominant Plant Species 9			
8 16 Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-).				
Remarks: Dominant regetation is hydrophytic				

HYDROLOGY

Recorded Data (Describe in Remarks): Stream, Lake, or Tide Gauge Aeriai Photographs Other No Recorded Data Available	Wetland Hydrology Indicators: Primary Indicators: Inundated -in places Saturated in Upper 12 Inches Water Marks Drift Lines		
Field Observations:Depth of Surface Water: $1 - 4^{-1/2}$ (in.)Depth to Free Water in Pit: (in.)Depth to Saturated Soil: (in.)	Sediment Deposits Oreinage Patterns in Wetlands Secondary Indicators (2 or more required): Oxidized Root Channels in Upper 12 Inches Water-Stained Leaves Local Soil Survey Data FAC-Neutral Test Other (Explain in Remarks)		
seeps.	eam and also contains some spring om mid August through mid September		

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)epth inches)	<u>scription:</u> Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
			10. YR 4/6		silt loam
·		· · ·			
<u></u>					
			·	<u></u>	
	······································				
		. <u></u>		•	
ydne So	I Indicators:				
•	Histosol Histic Epi		Hig		urface Layer in Sandy Soils
•	Sulfidic O	dor isture Regime		ganic Streaking in Sandy ted on Local Hydric Soil	
-	Aquic Mo			ted on National Hydric S	

WETLAND DETERMINATION

Hydrophytic Vegetation Present? (es) No (Circle) Wetland Hydrology Present? (es) No Hydric Soils Present? No	(Circle) Is this Sampling Point Within a Wetland? (Ve3) No
Remarks: All three paramete NOTE: During this field visit, on The actual upland-wetland be	ly a wetland overview was performed.
PEM2BLPFOIE	Foll 2 Photo 8 Approved by HOUSACE 2/92

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Project/Site: Keystone Sanitation Landfill Site	Date: 10/3/95	
Applicant/Owner:	County: <u>Carroll</u>	
Investigator: Aura Stauffer and Jennifer Hay	State: <u>mp</u>	
Do Normal Circumstances exist on the site? Is the site significantly disturbed (Atypical Situation)? Is the area a potential Problem Area? (If needed, explain on reverse.)	No P Y Y Y S S S S S S S S S S S S S S S S	Community ID: <u>W-28</u> Transect ID: Plot ID:

VEGETATION

Dominant Plant Species Stratum Indicator 1. ACOTUS CALAMUS H OBL 2. JUNCUS EFFUSUS H FACW+ 3. Gramineae	11			
(excluding FAC-).				
Decession Stress	Other (Explain in Remarks) Ream. Dominance of hydrophytic vegetation om mid August through mid September			

AR310822

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Map Unit Name (Series and Phase): <u>Hatboro Silt bam (Ht)</u> Taxonomy (Subgroup): <u>Fluventic Haplaquepts</u> Field Observations Confirm Mapped Type? (Yes) No
Profile Description: Matrix Color Mattle Colors Mottle Texture, Concretions, Depth (Munsell Moist) (Munsell Moist) Abundance/Contrast Structure, etc. Most Sampled wetland Was viewed
Hydric Soil Indicators:
Remarks: Hydric soil will have to be confirmed if a delineation is performed.

WETLAND DETERMINATION

Hydrophytic Vegetation Present? (es) No (Circle) Wetland Hydrology Present? Need (es) No Hydric Soils Present? to verify (es) No	(Circle) Is this Sampling Point Within a Wetland? Yes No
Remarks: Area was viewed f	rom the road. Hydrology and
NOTE: During this field visit, only The actual upland-wetland bou SOILS Need to be checked if PEMIE	a delineation is n performed · Roll 2 Photo 9
· · · · · · · · · · · · · · · · · · ·	Approved by HQUSACE 2/92

AR310823

Project/Site: Keystone Sanitation Landfill Site	Date: <u>10/3/9.5</u>	
Applicant/Owner:	County: <u>Carro II</u>	
Investigator: Aura Stauffer and Jennifer Hay	State: <u>MD</u>	
Do Normal Circumstances exist on the site? Is the site significantly disturbed (Atypical Situation)? Is the area a potential Problem Area? (If needed, explain on reverse.)	Yes No Yes No Yes No	Community ID: <u>W- 29</u> Transect ID: Plot ID:

VEGETATION

Dominant Plant Species Stratum Indicator 1. Lindera benzoin 5 FACW- 2. Acer rubrum 5, T FAC 3.	Dominant Plant Soecies Stratum Indicator 9				
8					

HYDROLOGY

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Recorded Data (Describe in Remarks): Stream, Lake, or Tide Gauge Aerial Photographs Other No Recorded Data Available	Wetland Hydrology Indicators: Primary Indicators: Inundated Saturated in Upper 12 Inches Water Marks Drift Lines	
Field Observations: Depth of Surface Water:(in.) Depth to Free Water in Pit:(in.) Depth to Saturated Soil:(in.)	Sediment Deposits Drainage Patterns in Wetlands Secondary Indicators (2 or more required): Oxidized Root Channels in Upper 12 Inches Water-Stained Leaves Local Soil Survey Data FAC-Neutral Test Other (Explain in Remarks)	
Remarks: Areas Arar Stream Drought Year No measurable rain fr	om mid August through mid September	

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1	Name d Phase): / (Subgroup):	A .	E loam (Gr Fraqiudu	. Hisia Ubsa	
Profile De Depth (inches)	<u>Scription:</u> Horizon	Matrix Color (Munsell Moist) 2.575/2	Mattle Calars (Munsell Maist) 10 VR 4/6	Mottle <u>Abundance/Contrast</u> <u>few/faint</u>	Texture, Concretions, <u>Structure, etc.</u> <u>SIL JOAM</u>
Hydric Soil Indicators:					
Romarks: Hydric soil parameter is met.					

Romarks: All three parameters met NOTE: During this field visit, only a wetland overview was performed. The actual upland-wetland boundary was not determined. Wetland Complex - A delineation Wetland complex - A delineation		Vegetation Present? (Yes) No (Circle) drology Present? (Yes) No Present? (Yes) No	Is this Sampling Point Within a Wetland?	(Circie) Yes No
The actual upland-wetland boundary was not determined.	Remarks:	All three parameters	met	
PFOIE poundaries in this stream valley. Photo 10		The actual upland-wetland boun Wetland complex - is necessary to determin	ndary was not determined. A delineation re wetland-upland r	ormed. roll 2 10

Project/Site: Keystone Sanitation Landfill Site	Date: <u>10 3 95</u>	
Applicant/Owner:	County: <u>Carro II</u>	
Investigator: Aura Stauffer and Jennifer Hay	State: <u>MD</u>	
Do Normal Circumstances exist on the site? Is the site significantly disturbed (Atypical Situation)? Is the area a potential Problem Area? (If needed, explain on reverse.)	Yes No Yes No Yes No	Community ID: <u>W- 30</u> Transect ID: Plot ID:

VEGETATION

Dominant Plant Species Stratum Indicator 1. Pileo pumilo H FACW 2. Polygonum pensylvanicum H FACW 3. Impatiens Spp H FACW 4.	Dominant Plant Species 9	·				
Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-).						
Remarks: Dominant vegetation is	hydro phy tic					

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HYDROLOGY

Recorded Data (Describe in Remarks): Stream, Lake, or Tide Gauge Aerial Photographs Other No Recorded Data Available Field Observations: Depth of Surface Water: Depth to Free Water in Pit: Depth to Saturated Soil: O((in.))	Wetland Hydrology Indicators: Primary Indicators: Inundated Saturated in Upper 12 Inches Water Marks Drift Lines Sediment Deposits Drainage Patterns in Wetlands Secondary Indicators (2 or more required): Koxidized Root Channels in Upper 12 Inches Water-Stained Leaves Local Soil Survey Data FAC-Neutral Test Other (Explain in Remarks)	
Remarks: Fed by spring seep Drought Year No measurable rain fr	om mid August through mid September	

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11	d Phase): M	t. Airy che Tupic du	<u>innery loam</u> strochrepts	Held Uose		
Profile De Depth (inches)	<u>scription:</u> <u>Horizon</u>	Matrix Color (Munsell Moist) 25.7.572	Mottle Colors (Munsell Moist) 2-5-7-6/6	Mottle <u>Abundance/Contrast</u> <u>few / pro M</u>	Texture, Concretions, <u>Structure, etc.</u> <u>SILL loaM</u>	-
	Reducing	dor Disture Regime Conditions Low-Chroma Colors	— Hig — Orç _ List _ List	panic Streaking in Sandy ted on Local Hydric Soil ted on National Hydric S ter (Explain in Remarks)	i s List Soils List	

Hydrophytic Vegetation Present? (Yes) No (Circle) Wetland Hydrology Present? (Yes) No Hydric Soils Present? (Yes) No	(Circle) Is this Sampling Point Within a Wetland? Yes No
Remarks: All three parameters Mer NOTE: During this field visit, only The actual upland-wetland bour	a wetland overview was performed.
PEM2B	roll 2 Photo 11 Approved by HQUSACE 2/92

Project/Site: <u>Keystone Sanitation Landfill Site</u>	Date: <u>11/9/95</u>	
Applicant/Owner:	County: <u>Adams</u>	
Investigator: <u>Aura Stauffer</u> and Jennifer Hay	State: <u>PA</u>	
Do Normal Circumstances exist on the site? Is the site significantly disturbed (Atypical Situation)? Is the area a potential Problem Area? (If needed, explain on reverse.)	Yes No Yes No Yes No	Community ID: <u>W-3</u> Transect ID: Plot ID:

VEGETATION

Dominant Plant SpeciesStratumIndicator1. Impatiens capensisHFACUI2. CarexIuridaHOBL3. CarexSpp.H—4. JuncuseffususHFACUI+5. PalygonumsagittatumHOBL6. SagittarialatifoliaHOBL7. AcerrubrumSiTFAC8	Dorminant Plant Species Stratum Indicator 9
(excluding FAC-). Remarks: Dominant vegetation is HYDROLOGY	
Recorded Data (Describe in Remarks):Stream, Lake, or Tide GaugeAerial PhotographsOtherNo Recorded Data Available Field Observations: Depth of Surface Water: Depth to Free Water in Pit: Depth to Saturated Soil: Depth t	Wetland Hydrology Indicators: Primary Indicators: Inundated Saturated in Upper 12 Inches Water Marks Drift Lines Sediment Deposits Drainage Patterns in Wetlands Secondary Indicators (2 or more required): Voxidized Root Channels in Upper 12 Inches Water-Stained Leaves Local Soil Survey Data FAC-Neutral Test Other (Explain in Remarks)
Romarks: Influenced by spring see	pg ·

Drought Year No measurable rain from mid August through mid September

	Name d Phase): <u> </u>		t bam (wo ochraguult	Field Obse	
Profile De Depth (inches)	Scription: Horizon	Matrix Color (<u>Munsell Moist)</u> 10 Y.R .571	Mottle Colors (Munsell Moist)	Mottle <u>Abundance/Contrast</u>	Texture, Concretions, <u>Structure, etc.</u> <u>Silt loam</u>
	Reducing Gleyed or	dor isture Regime Conditions Low-Chroma Color	с К с С 0 т	rganic Streaking in Sandy sted on Local Hydric Soil sted on National Hydric S ther (Explain in Remarks)	s List Soils List

WETLAND DETERMINATION

	Vegetation Present? (es) No (Circl drology Present? (es) No Present? (es) No	e) (Circle) Is this Sampling Point Within a Wetland? (Cercle)		
Remarks:	All three f	varameters met.		
NOTE: During this field visit, only a wetland overview was performed. The actual upland-wetland boundary was not determined.				
		roll 2		
PEMIL	PFOIB	Photo 12		
	· ·	Approved by HQUSACE 2/92		

Project/Site: <u>Keystone Sanitation Landfill Site</u> Applicant/Owner: Investigator: <u>Aura Stauffer</u> and Jennifer Hay		Date: <u>10/9/9.5</u> County: <u>Carroll</u> State: <u>pD</u>
Do Normal Circumstances exist on the site? Is the site significantly disturbed (Atypical Situation)? Is the area a potential Problem Area? (If needed, explain on reverse.)	Yes No Yes No Yes No	Community ID: <u>W-32</u> Transect ID: Plot ID:

VEGETATION

Dominant Plant Species Stratum Indicator 1. ACCT rubrum S,T FAC 2. ACCT saccharinum T FAC 3. Toxicodendron radicans H FAC 4. Tenpatiens capensis H FAC 5. Eugatorium perfoliatum H FAC W 6.	Dominant Plant Species 9				
Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). <u>100 %</u> Remarks: Dominant vegetation is hydrophytic.					

HYDROLOGY

Recorded Data (Describe in Remarks): Stream, Lake, or Tide Gauge Aeriai Photographs Other No Recorded Data Available	Wetland Hydrology Indicators: Primary Indicators: Inundated Saturated in Upper 12 Inches Water Marks Drift Lines Sediment Deposits
Field Observations: Depth of Surface Water:(in.)	Drainage Patterns in Wetlands Secondary Indicators (2 or more required): Dradized Root Channels in Upper 12 Inches
Depth to Free Water in Pit:(in.) Depth to Saturated Soii:(in.)	Water-Stained Leaves Local Soil Survey Data FAC-Neutral Test Other (Explain in Remarks)
Remarks: Drought Year No measurable rain fr	om mid August through mid September

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	o): <u>Codorus s</u> proup): <u>Aquic Flave</u>		Drainage (Field Obse	rvations		
Taxonomy (Subg		nric vystic	INCULSComm	Mapped Type? (Yes) No		
Profile Descriptio Depth (inches) Horiz	Matrix Color	Mottle Colors (Munsell Moist) 10 YR 6 /8	Mottie <u>Abundance/Contrest</u> Many /prom·	Texture, Concretions, <u>Structure, etc.</u> <u>SiH laaM</u>		
		· · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·			
Hydric Soil Indica	itors:		· · · · · · · · · · · · · · · · · · ·			
Histosol Concretions Histic Epipedon High Organic Content in Surface Layer in Sandy Soils Sulfidic Odor Organic Streaking in Sandy Soils Aquic Moisture Regime Listed on Local Hydric Soils List Reducing Conditions Listed on National Hydric Soils List Gleyed or Low-Chroma Colors Other (Explain in Remarks)						
Remarks: H	ydric soil	parameter r	net.			

WETLAND DETERMINATION

	rology riesentr		No (Circle) No No	Is this Sampling Point Within a Wetland?	(Cir Yes	rcie)) No
Remarks:		All	three f	arameters met		
NOTE:	During this fie The actual upla	eld v: and-we	isit, only etland bour	a wetland overview was perfo ndary was not determined.	ormed	•
					roll	
PFOIE		<u> </u>		۲۲ Approved by HQUS	1010	
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Project/Sits: Keystone Sanitation Landfil Applicant/Owner: Investigator: Aura Stauffer and Jennif	County: Carroll
Do Normal Circumstances exist on the site? Is the site significantly disturbed (Atypical Situa Is the area a potential Problem Area? (If needed, explain on reverse.)	Yes (No) Plot ID:
Part of the wetland has been clea in the wetland.	red and fill has recently been placed
Dominant Plant Species Stratum Indicator 1. Phalaris arundinacea H FACUL 2. Polygonum sagittum H OBL 3. Impatiens capensis H FACUL 4. Onacka sensibilis H FACUL 5. Scirflus cuperinus H FACUL 6.	Dominant Plant Species Stratum Indicator 9
YDROLOGY	
Recorded Data (Describe in Remarks): Stream, Lake, or Tide Gauge Aerial Photographs Other No Recorded Data Available Field Observations: Depth of Surface Water:(in.) Depth to Free Water in Pit:(in.) Depth to Saturated Soil:(in.)	Wetland Hydrology Indicators: Primary Indicators: fnundated in placeS Saturated in Upper 12 Inches Saturated in Upper 12 Inches Sediment Deposits Drift Lines Sediment Deposits Drainage Patterns in Wetlands Secondary Indicators (2 or more required): Oxidized Root Channels in Upper 12 Inches Vater-Stained Leaves Local Soil Survey Data FAC-Neutral Test Other (Explain in Remarks)
Romarks: Flood plain area Drought Year No measurable rain fro	om mid August through mid September

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Profile Des Jepth Inches)	<u>Horizon_</u>	Matrix Color (Munsell Moist) 2-575/3	Mottle Colors (Munsell Moist) 10 YR 5/4	Mottle <u>Abundance/Contrast</u> <u>ComMon (diStin</u> t	Texture, Concretions, <u>Structure, etc.</u> <u>5112 IOAM</u>	 -
		· · · · · · · · · · · · · · · · · · ·				
ydric Soil	Indicators:					
	Reducing	idor isture Regime	Hig Org Us Lis	ncretions ph Organic Content in Su ganic Streaking in Sandy ted on Local Hydric Soils ted on National Hydric S ner (Explain in Remarks)	Soils : List	ils

Hydrophytic Vegetati Wetland Hydrology P Hydric Soils Present?	resent? . Yes No	is this Sampling Point Within a Wetland? ((Circle) Yes Na
Remarks:			
NOTE: Durin The a	ng this field visit, onl actual upland-wetland bo	y a wetland overview was perfor undary was not determined.	med.
PEMIB	· .	Pho	roll #2 105 14,15,16
		Approved by HQUSAC	E 2/92

Project/Site: Keystone Sanitation Landfill Site Applicant/Owner: Investigator: Aura Stauffer and Jennifer Hay		Date: <u>1019195</u> County: <u>Carroll</u> State: <u>MD</u>
Do Normal Circumstances exist on the site? Is the site significantly disturbed (Atypical Situation)? Is the area a potential Problem Area? (If needed, explain on reverse.)	Yes No Yes No Yes No	Community ID: <u>W-34</u> Transect ID: Plot ID:

VEGETATION

Dominant Plant Species Stratum Indicator 1-foly gonum Sngittatum # OBL 2. Acorus calamus # OBL 3. Impatiens opensis # FACU 4. Poly gonum perfoliatum # FACU 5.	Dominant Plant Species 9		Indicator			
Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). Remarks: Dominant vegetation is hydrophytic.						

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HYDROLOGY

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Recorded Data (Describe in Remarks): Stream, Lake, or Tide Gauge Aerial Photographs Other No Recorded Data Available Field Observations:	Wetland Hydrology Indicators: Primary Indicators: Inundated Saturated in Upper 12 Inches Water Marks Drift Lines Sediment Deposits Drainage Patterns in Wetlands
Depth of Surface Water:(in.) Depth to Free Water in Fit:(in.) Depth to Saturated Soii:(in.)	Secondary Indicators (2 or more required): Coxidized Root Channels in Upper 12 Inches Water-Stained Leaves Local Soil Survey Data FAC-Neutral Test Other (Explain in Remarks)
Remarks: Fed by Spring Seeps Drought Year No measurable rain fro	om mid August through mid September

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		<u>Typic</u> d	ystrachrepts	S Confirm	Mapped Type? Yes No?	
rofile De: Depth inches)	<u>Horizon</u>	Matrix Color (Munsell Moist) 10 YR 6/1	Mottle Colors (Munsell Moist)	Mottle <u>Abundance/Contrast</u>	Texture, Concretions, Structure, etc. Silt loam	-
	<u> </u>			·		-
lydric Soi	I Indicator s :					
-	Reducing	dor isture Regime	Hig Org Lis Lis	ncrations h Organic Contant in Se janic Streaking in Sandy ted on Local Hydric Soil ted on National Hydric S ter (Explain in Remarks)	s List Soils List	:

WETLAND DETERMINATION

Hydrophytic Vegetation Present? Wetland Hydrology Present? Hydric Soils Present?	Ver No (Circie) Ver No Ver No	is this Sampling Point Within a Wetla	(Circle) Ind? Yes No
NOTE: During this field	parameters ld visit, only nd-wetland bour	met. a wetland overview was p ndary was not determined.	erformed.
PEM2B		Approved by H	roll 2 Photo 17 IQUSACE 2/92

Project/Site: Keystone Sanitation Landfill Site Applicant/Owner: Investigator: Aura Stauffer and Jennifer Hay		Date: <u>10/9/95</u> County: <u>Carroll</u> State: <u>MD</u>
Do Normal Circumstances exist on the site? Is the site significantly disturbed (Atypical Situation)? Is the area a potential Problem Area? (If needed, explain on reverse.)	Yes No Yes No Yes No	Community ID: <u>W-35</u> Transect ID: Plot ID:

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VEGETATION

Dominant Plant Species Stratum Indicator 1. Leersia Gryzoides H OBL 2. Carex Jurida H OBL 3. Sagittaria latifolia H OBL 4. Typha latifolia H OBL 5.	Dominant Plant Species 9 10 11 12 13 14 15	
7 8 Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). Remarks: Dominant vegetation is	15 16 <i>10090</i> hydrophytic	

HYDROLOGY

Recorded Data (Describe in Remarks): Stream, Lake, or Tide Gauge Aerial Photographs Other No Recorded Data Available Field Observations: Depth of Surface Water: <u>2-3</u> (in.) Depth to Free Water in Fit:(in.) Depth to Saturated Soil:(in.)	Wetland Hydrology Indicators: Primary Indicators: Inundated Saturated in Upper 12 Inches Water Marks Drift Lines Sediment Deposits Drainage Patterns in Wetlands Secondary Indicators (2 or more required): Oxidized Root Channels in Upper 12 Inches Water-Stained Leaves Local Soil Survey Data FAC-Neutral Test Other (Explain in Remarks)	
Remarks: fed by spring sceps Drought Year No measurable rain from mid August through mid September		

SOILS

Map Unit Name (Series and Phase): Taxonomy (Subgroup):		It bam Lic Haplag	Drainage Field Obs UCDLC Confirm	Class: <u>P.D</u> servations Mapped Type? (Yes) No
Profile Description: Depth (inches) Horizon	Matrix Color (Munsell Moist) 2:5 ¥ 5/2	Mottle Colors (Munsell Moist)	Mottie Abundanca/Contrast	Texture, Concretions, <u>Structure, etc.</u> <u>SILE 16a M</u>
Reducing	dor isture Regime		oncretions gh Organic Content in S rganic Streaking in Sano stad on Local Hydric So stad on National Hydric ther (Explain in Remarks	ils List Soils List
Remarks: 2 ct veg (OBL) and			les, but s at this area	

WETLAND DETERMINATION

	Vegetation Present? drology Present? Present?	Kan No (Circle) Kan No Kan No	Is this Sampling Point Within a Wetland?	(Circie) (res No
Remarks:				
NOTE:	During this fi The actual upl	eld visit, only. and-wetland bou	v a wetland overview was perf Indary was not determined.	ormed.
				roll 2
PEMIE	3		Ph	oto 18
		, .	Approved by HQU:	SACE 2/92

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DATA FORM ROUTINE WETLAND DETERMINATION (1987 COE Wetlands Delineation Manual)

Project/Site: Keystone Sanitation Landfill Sit Applicant/Owner: Investigator: Aura Stauffer and Jennifer Ha		Date: 12/7/95 County: <u>Adams</u> State: <u>PA</u>
Do Normal Circumstances exist on the site? Is the site significantly disturbed (Atypical Situation)? Is the area a potential Problem Area? (If needed, explain on reverse.)	Yes No Yes No Yes No	Community ID: <u>W-36</u> Transect ID: Plot ID:

VEGETATION

Dorminant Plant Species Straturn Indicator 1. Lindern benzoin S FACU2- 2. Symplacarpus frietidus H OBL 3.	Dominant Plant Soecies 9		
8 Percent of Dominant Species that are OBL FACW or FAC (excluding FAC-). Remarks: Dominant regetation is	16 100 % hydrophytic:	· · · · · · · · · · · · · · · · · · ·	

HYDROLOGY

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Recorded Data (Describe in Remarks): Stream, Lake, or Tide Gauge Aerial Photographs Other No Recorded Data Available	Wetland Hydrology Indicators: Primary Indicators: Inundated Saturated in Upper 12 Inches Water Marks Drift Lines Sediment Daposits		
Field Observations: Depth of Surface Water:(in.) Depth to Free Water in Pit:(in.) Depth to Saturated Soil:(in.)	Sediment Deposits Drainage Patterns in Wetlands Secondary Indicators (2 or more required): Oxidized Root Channels in Upper 12 Inches Water-Stained Leaves Local Soil Survey Data FAC-Neutral Test Other (Explain in Remarks)		
Romarks: Forested area along stream	with sceps feeding the stream.		

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rofile Desc epth nches) 1	ription: Horizon	<u>Aquic</u> F Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Mapped Type? (Yes) No Texture, Concretions, Structure, etc.
-20		10 YR 4/3 10 YR 4/2	10 YR 4/4	few / prom	silt loam
				· · · · · ·	
Z	Histosol Histic Epi Sulfidic O Aquic Mo Reducing		— Hi — Or — Lis _ Lis	ncretions gh Organic Content in So ganic Streaking in Sandy ted on Local Hydric Soil ted on National Hydric S her (Explain in Remarks)	s List Soils List

WETLAND DETERMINATION

Hydrophytic Vegetation Present? (Yes No (Circle) Wetland Hydrology Present? (Yes No Hydric Soils Present? (Yes No	(Circle) Is this Sampling Point Within a Wetland? (Circle)
Remarks:	
NOTE: During this field visit, only The actual upland-wetland bou All three parameters f	
PFOIC	
	Approved by HQUSACE 2/92

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DATA FORM ROUTINE WETLAND DETERMINATION (1987 COE Wetlands Delineation Manual)

Project/Site: Keystone Sanitation Landfill Site C Applicant/Owner: Investigator: Stauffer and Jennifer		Date: July 23, 1996 County: Carroll State: MD
Do Normal Circumstances exist on the site? Is the site significantly disturbed (Atypical Situation)? Is the area a potential Problem Area? (If needed, explain on reverse.)	Yes No Yes No Yes No	Community ID: <u>w-37</u> Transect ID: Plot ID:

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VEGETATION

Dominant Plant Species 1. Solidage Spp. 2. Impatiens Spp. 3. Polygenum sagittatum 4. Oncelea sersi pilis 5. Pilea pumila 6. Eupaterium perfoliatum 7. Acer rubrum 8. Acer sacchrinum		FACW FACW FACW FACW FACU FACU FAC	Dominant Plant Species 9. Mentha 5pp 10. Rosa Muiti Elarca 11. 12. 13. 14. 15. 16.		
Percent of Dominant Species Remarks: Dominant				least t	70 %
	, cyc wron	. <u> </u>	· , · .		

HYDROLOGY

Recorded Data (describe in remarks): Stream, Lake, or Tide Gauge Aerial Photographs Other V No Recorded Data Available	Wetland Hydrology Indicators: Primary Indicators:
Field Observations: Depth of Surface Water: (in.) in places Depth to Free Water in Pit: (in.) Depth to Saturated Soil: (in.)	Sediment Deposits Drainage Patterns in Wetlands Secondary Indicators (2 or more required): Oxidized Root Channels in Upper 12 inches Water-Stained Leaves Local Soil Survey Data FAC-Neutral Test Other (Explain in Remarks)
Remarks: Area is along silver Run. Groundwater influence (seeps)	
	AR310840

	LAUR Flu	ventic Pust	machrepts a	Field Observations Confirm Mapped Type? (Yes) No
Profile Description: Depth N inches) Horizon (I 	Matrix Color Munsell Moist) 10 YR 4/2	Mottle Colors (Munsell Moist) 	Mottle <u>Abundance/Contrast</u>	Texture, Concentrations, <u>Structure, etc.</u> <u>Silt wam</u>
Hydric Soil Indicators: Histosol Histic Epipedo Sulfidic Odor Aquic Moistur Gleyed or Lov Remarks:	re Regime nditions	Organic S Listed on Listed on	ations anic Content in Surface La Streaking in Sandy Soils Local Hydric Soils List National Hydric Soils List plain in Remarks)	yer in Sandy Soils

WETLAND DETERMINATION

Hydrophytic Vegetation Present? Wetland Hydrology Present?	Yes No (Yes No	7	(Circle)	
Hydric Soils Present?	(re) No	Is this Sampling Point Within a Wetland?	(Yes) No	
Remarks: Probably the area ider	tified as	potential bog turtle habitat	by MP DNR.	
This area may have been	a pasture	at one time, but has si		
over grown with rose and other invasive species.				
Note: During this field visit, only a wetland overview was performed. The actual				
PFOI/PEM2B wetland-up	land boundar	y was not delineated.		

Approved by HQUSACE 2/92

DATA FORM ROUTINE WETLAND DETERMINATION (1987 COE Wetlands Delineation Manual)

Project/Site: <u>Keystone</u> Sanitation Landfill Applicant/Owner: Investigator: <u>Aura Stauffer and Jennifer</u>	Site 00-2 Hayes	Date: June 23, 1996 County: <u>Carroll</u> State: <u>MD</u>
Do Normal Circumstances exist on the site? Is the site significantly disturbed (Atypical Situation)? Is the area a potential Problem Area? (If needed, explain on reverse.)	Yes No Yes No Yes No	Community ID: <u>Wetland 38</u> Transect ID: Plot ID:

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VEGETATION

Dominant Plant Soecies 1. Symplocarpus foet 2. Anhris arundinated 3. Acorus calamus 4. Sagittaria latifo 5 6 8		Indicator OBL FACUI OBL OBL	Dominant Plant Soecies 9		
	nt vegetation			090	-

HYDROLOGY

Recorded Data (describe in remarks): Stream, Lake, or Tide Gauge Aerial Photographs Other No Recorded Data Available	Wetland Hydrology Indicators: Primary Indicators: Saturated in Upper 12 Inches Water Marks Drift Lines Sediment Deposits
Field Observations: Depth of Surface Water: <u> </u>	Drainage Patterns in Wetlands Secondary Indicators (2 or more required): Oxidized Root Channels in Upper 12 inches Water-Stained Leaves Local Soil Survey Data FAC-Neutral Test Other (Explain in Remarks)
Remarks: Ground water influence	

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Map Unit Name (Series and Phase): Taxonomy (Subgroup):	A	ventic Dyst	ch)	Drainage Class: <u>MWD</u> Field Observations onfirm Mapped Type? (Fest No	
Profile Description: Depth (inches) Horizon	Matrix Color (Munsell Moist) 2:57 5/2	Mottle Colors (Munsell Moist) _{&VR 4/6	Mottle <u>Abundance/Contrast</u> <u>common /distint</u>	Texture, Concentrations, Structure, etc. Silt bam	
Hydric Soil Indicators:					
 Histosol Histic Epipedon Sulfidic Odor Sulfidic Odor Aquic Moisture Regime Histo on Local Hydric Soils List Reducing Conditions Listed on National Hydric Soils List Gieyed or Low-Chroma Colors Other (Explain in Remarks) 				yer in Sandy Soils	
Remarks:					

WETLAND DETERMINATION

Hydrophytic Vegetation Present? Wetland Hydrology Present? Hydric Soils Present?	Yes No Yes No Yes No	is this Sampling Point Within a Wetland?	(Circle) Yes No
Remarks: <u>Note</u> ; Note during performed. The actual we	this field Hand-upland	visit, only a wetland over L boundary was not delinea	new was led ·
		Approved by	HQUSACE 2/92

Project <u>Key Stone</u> Lond fill Wetland Site Number ____

RELATIVE WETLAND QUALITY BASED ON WETLAND FUNCTIONS

CHECKLIST.

A. <u>OCCURRENCE</u>

Potential functions ranked in descending order of probable occurrence.

- _____1. Passive Recreation and Natural Heritage Value** (occurs often).
- 2. Habitat for Terrestrial Wildlife
- _____ 3. Habitat for Aquatic Wildlife amphibians & reptiles
- ✓ 4. Sediment Trapping
- ____ 5. Flood Desynchronization
- 6. Nutrient Retention
- 7. Food Web Support (nutrient export)
- 8. Dissipation of Erosive Forces
- 9. Active Recreation
- 10. Groundwater Discharge
- 11. Shoreline Anchoring
- 12. Ground Water Recharge (few occurrences)
- B. VALUE

Rating

Any combination of functions including 2 or 3 and 7. High

Any combination of three functions from the functions list, excluding 2, 3 and 7.

Less than three functions total.

Medium Low

Value

C. TYPE OF WETLANDS

_____ Tidal

Non-tidal

**Threatened or Endangered Species habitat or Areas of State Critical Concern are always "high" valued wetlands regardless of function, size, or location.

Source: Adapted from "A Method for Wetland Functional Assessment", Federal Highway Administration, 1983.

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Project <u>Keystone</u> Land fill Wetland Site Number <u>2</u>

RELATIVE WETLAND QUALITY BASED ON WETLAND FUNCTIONS

CHECKLIST

A. <u>OCCURRENCE</u>

Potential functions ranked in descending order of probable occurrence.

- 1. Passive Recreation and Natural Heritage Value** (occurs often).
- ____ 2. Habitat for Terrestrial Wildlife
- J. Habitat for Aquatic Wildlife-amphibians & reptiles
- 4. Sediment Trapping
- _____ 5. Flood Desynchronization
- 6. Nutrient Retention
- 7. Food Web Support (nutrient export)
- 8. Dissipation of Erosive Forces
- 9. Active Recreation
- _____ 10. Groundwater Discharge
- _____11. Shoreline Anchoring
- 12. Ground Water Recharge (few occurrences)
- B. VALUE

Rating

Any combination of functions including 2 or 3 and 7. High

Any combination of three functions from the functions list, excluding 2, 3 and 7.

Medium

Value

Less than three functions total. ____ Low

C. <u>TYPE OF WETLANDS</u>

____ Tidal

**Threatened or Endangered Species habitat or Areas of State Critical Concern are always "high" valued wetlands regardless of function, size, or location.

RELATIVE WETLAND QUALITY BASED ON WETLAND FUNCTIONS

CHECKLIST

Α. OCCURRENCE

Potential functions ranked in descending order of probable occurrence.

- Passive Recreation and Natural Heritage Value** 1. (occurs often).
- Habitat for Terrestrial Wildlife 2.
- Habitat for Aquatic Wildlife amphibians & reptiles √ 3.
- 4. Sediment Trapping
- Flood Desynchronization 5.
- 6. Nutrient Retention
- Food Web Support (nutrient export) 7.
- . . . Dissipation of Erosive Forces
- Active Recreation 9.
- 10. Groundwater Discharge
- 11. Shoreline Anchoring
- 12. Ground Water Recharge (few occurrences)
- Β. VALUE

Rating

Value

Any combination of functions including 2 or 3 and 7. High

Any combination of three functions from the functions list, excluding 2, 3 and 7.

Medium

Less than three functions total.

TYPE OF WETLANDS c.

> Tidal Non-tidal

**Threatened or Endangered Species habitat or Areas of State Critical Concern are always "high" valued wetlands regardless of function, size, or location.

Project <u>Keystone</u> Landfill Wetland Site Number 4

Wetland Site Number

CHECKLIST

Α. OCCURRENCE

Potential functions ranked in descending order of probable occurrence.

- Passive Recreation and Natural Heritage Value** 1. (occurs often).
- Habitat for Terrestrial Wildlife 2.
- 3. Habitat for Aquatic Wildlife
- × 4. Sediment Trapping
- ____ 5. Flood Desynchronization
- Nutrient Retention 6.
- 7. Food Web Support (nutrient export)
- Dissipation of Erosive Forces 8.
- ____ 9. Active Recreation
- 10. Groundwater Discharge
- _____ 11. Shoreline Anchoring
- 12. Ground Water Recharge (few occurrences)
- в. VALUE

Rating

Any combination of functions including 2 or 3 and 7. High

Any combination of three functions from the functions list, excluding 2, 3 and 7.

Less than three functions total.

c. TYPE OF WETLANDS

> Tidal Non-tidal

**Threatened or Endangered Species habitat or Areas of State Critical Concern are always "high" valued wetlands regardless of function, size, or location.

Source: Adapted from "A Method for Wetland Functional Assessment", Federal Highway Administration, 1983.

AR310847

Value

Medium

Low

RELATIVE WETLAND QUALITY BASED ON WETLAND FUNCTIONS

CHECKLIST

A. <u>OCCURRENCE</u>

Potential functions ranked in descending order of probable occurrence.

1. Passive Recreation and Natural Heritage Value** (occurs often).

. . .

- ✓ 2. Habitat for Terrestrial Wildlife
- 3. Habitat for Aquatic Wildlife
- 4. Sediment Trapping
- 5. Flood Desynchronization
- 6. Nutrient Retention
- 7. Food Web Support (nutrient export)
- 8. Dissipation of Erosive Forces
- 9. Active Recreation
- 10. Groundwater Discharge
- ____ 11. Shoreline Anchoring
- 12. Ground Water Recharge (few occurrences)
- B. <u>VALUE</u>

Rating

Any combination of functions including 2 or 3 and 7.

Any combination of three functions from the functions list, excluding 2, 3 and 7. Medium

Less than three functions total. - Low

C. TYPE OF WETLANDS

Tidal Non-tidal

**Threatened or Endangered Species habitat or Areas of State Critical Concern are always "high" valued wetlands regardless of function, size, or location.

Source: Adapted from "A Method for Wetland Functional Assessment", Federal Highway Administration, 1983.

Value

High

Project <u>Keystone</u> Landfill Wetland Site Number <u>6</u>

RELATIVE WETLAND QUALITY BASED ON WETLAND FUNCTIONS

CHECKLIST

A. OCCURRENCE

Potential functions ranked in descending order of probable occurrence.

- 1. Passive Recreation and Natural Heritage Value** (occurs often).
- 2. Habitat for Terrestrial Wildlife
- Habitat for Aquatic Wildlife
- _____4. Sediment Trapping
- 5. Flood Desynchronization
- _____6. Nutrient Retention
- _____ 7. Food Web Support (nutrient export)
- 8. Dissipation of Erosive Forces
- 9. Active Recreation
- 10. Groundwater Discharge
- ____ 11. Shoreline Anchoring
- ____ 12. Ground Water Recharge (few occurrences)
- B. VALUE

Rating

Any combination of functions including 2 or 3 and 7. High

Any combination of three functions from the functions list, excluding 2, 3 and 7.

Less than three functions total. Low

C. <u>TYPE OF WETLANDS</u>

_____ Tidal

**Threatened or Endangered Species habitat or Areas of State Critical Concern are always "high" valued wetlands regardless of function, size, or location.

Source: Adapted from "A Method for Wetland Functional Assessment", Federal Highway Administration, 1983.

AR310849

Value

Medium

RELATIVE WETLAND QUALITY BASED ON WETLAND FUNCTIONS

CHECKLIST

A. <u>OCCURRENCE</u>

Potential functions ranked in descending order of probable occurrence.

- 1. Passive Recreation and Natural Heritage Value** (occurs often).
- $\sqrt{2}$. Habitat for Terrestrial Wildlife
- \checkmark 3. Habitat for Aquatic Wildlife
- _____4. Sediment Trapping
- 5. Flood Desynchronization
- ____ 6. Nutrient Retention
- 7. Food Web Support (nutrient export)
- 8. Dissipation of Erosive Forces
- 9. Active Recreation
- ____ 10. Groundwater Discharge
- 11. Shoreline Anchoring
- 12. Ground Water Recharge (few occurrences)
- B. VALUE

RatingValueAny combination of functions including 2 or 3 and 7.High

Any combination of three functions from the

functions list, excluding 2, 3 and 7.

Less than three functions total.

C. TYPE OF WETLANDS

Tidal Non-tidal

**Threatened or Endangered Species habitat or Areas of State Critical Concern are always "high" valued wetlands regardless of function, size, or location.

Source: Adapted from "A Method for Wetland Functional Assessment", Federal Highway Administration, 1983.

Low

RELATIVE WETLAND QUALITY BASED ON WETLAND FUNCTIONS

CHECKLIST

A. <u>OCCURRENCE</u>

Potential functions ranked in descending order of probable occurrence.

- 1. Passive Recreation and Natural Heritage Value** (occurs often).
- \checkmark 2. Habitat for Terrestrial Wildlife
- _____ 3. Habitat for Aquatic Wildlife
- _____4. Sediment Trapping
- ____ 5. Flood Desynchronization
- 6. Nutrient Retention
- 7. Food Web Support (nutrient export)
- 8. Dissipation of Erosive Forces
- 9. Active Recreation
- 10. Groundwater Discharge
- ____ 11. Shoreline Anchoring
- 12. Ground Water Recharge (few occurrences)
- B. VALUE

Rating

Value

Any combination of functions including 2 or 3 and 7. High

Any combination of three functions from the functions list, excluding 2, 3 and 7. (Medium)

Less than three functions total. Low

C. <u>TYPE OF WETLANDS</u>

_____ Tidal _____ Non-tidal

**Threatened or Endangered Species habitat or Areas of State Critical Concern are always "high" valued wetlands regardless of function, size, or location.

Project Keystone Londfil

Wetland Site Number

CHECKLIST

A. <u>OCCURRENCE</u>

Potential functions ranked in descending order of probable occurrence.

- ____1. Passive Recreation and Natural Heritage Value** (occurs often).
- $\sqrt{2}$. Habitat for Terrestrial Wildlife
- 3. Habitat for Aquatic Wildlife
- 4. Sediment Trapping
- 5. Flood Desynchronization
- 6. Nutrient Retention
- 7. Food Web Support (nutrient export)
- 8. Dissipation of Erosive Forces
- 9. Active Recreation
- _____ 10. Groundwater Discharge
- 11. Shoreline Anchoring
- 12. Ground Water Recharge (few occurrences)
- B. <u>VALUE</u>

Rating

Value

Any combination of functions including 2 or 3 and 7. High

Any combination of three functions from the functions list, excluding 2, 3 and 7.

.

Medium

Less than three functions total.

C. <u>TYPE OF WETLANDS</u>

Tidal

Non-tidal

**Threatened or Endangered Species habitat or Areas of State Critical Concern are always "high" valued wetlands regardless of function, size, or location.

Source: Adapted from "A Method for Wetland Functional Assessment", Federal Highway Administration, 1983.

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Project <u>Keystone</u> Landfill Wetland Site Number <u>10</u>

RELATIVE WETLAND QUALITY BASED ON WETLAND FUNCTIONS

CHECKLIST

A. <u>OCCURRENCE</u>

Potential functions ranked in descending order of probable occurrence.

- ____ 1. Passive Recreation and Natural Heritage Value** (occurs often).
- 2. Habitat for Terrestrial Wildlife
- ____ 3. Habitat for Aquatic Wildlife
- 4. Sediment Trapping
- 5. Flood Desynchronization
- _____ 6. Nutrient Retention
- 7. Food Web Support (nutrient export)
- 8. Dissipation of Erosive Forces
- 9. Active Recreation
- ____ 10. Groundwater Discharge
- 11. Shoreline Anchoring
- 12. Ground Water Recharge (few occurrences)
- B. <u>VALUE</u>

Rating

Value

Medium

Any combination of functions including 2 or 3 and 7. High

Any combination of three functions from the functions list, excluding 2, 3 and 7.

Less than three functions total.

C. <u>TYPE OF WETLANDS</u>

_____ Tidal

**Threatened or Endangered Species habitat or Areas of State Critical Concern are always "high" valued wetlands regardless of function, size, or location.

Source: Adapted from "A Method for Wetland Functional Assessment", Federal Highway Administration, 1983.

Project <u>Keystone</u> <u>Landfill</u> Wetland Site Number <u>II</u>

RELATIVE WETLAND QUALITY BASED ON WETLAND FUNCTIONS

CHECKLIST

A. <u>OCCURRENCE</u>

Potential functions ranked in descending order of probable occurrence.

- 1. Passive Recreation and Natural Heritage Value** (occurs often).
- _____ 2. Habitat for Terrestrial Wildlife
- 3. Habitat for Aquatic Wildlife
- 4. Sediment Trapping
- 5. Flood Desynchronization
- 6. Nutrient Retention
- 7. Food Web Support (nutrient export)
- 8. Dissipation of Erosive Forces
- 9. Active Recreation
- 10. Groundwater Discharge
- _____ 11. Shoreline Anchoring
- 12. Ground Water Recharge (few occurrences)
- B. VALUE
- Rating Value

Any combination of functions including 2 or 3 and 7. (High)

Any combination of three functions from the functions list, excluding 2, 3 and 7. Medium

Less than three functions total. Low

C. <u>TYPE OF WETLANDS</u>

Tidal

Non-tidal

**Threatened or Endangered Species habitat or Areas of State Critical Concern are always "high" valued wetlands regardless of function, size, or location.

Project Keystone Landt

Wetland Site Number

CHECKLIST

A. OCCURRENCE

Potential functions ranked in descending order of probable occurrence.

- ____ 1. Passive Recreation and Natural Heritage Value** (occurs often).
- 2. Habitat for Terrestrial Wildlife
- _____ 3. Habitat for Aquatic Wildlife
- _____4. Sediment Trapping
- 5. Flood Desynchronization
- 6. Nutrient Retention
- 7. Food Web Support (nutrient export)
- 8. Dissipation of Erosive Forces
- ____ 9. Active Recreation
- 10. Groundwater Discharge
- _____ 11. Shoreline Anchoring
- 12. Ground Water Recharge (few occurrences)
- B. <u>VALUE</u>

Rating

Value

Medium

LOW

Any combination of functions including 2 or 3 and 7. High

Any combination of three functions from the functions list, excluding 2, 3 and 7.

Less than three functions total.

C. TYPE OF WETLANDS

Tidal Non-tidal

**Threatened or Endangered Species habitat or Areas of State Critical Concern are always "high" valued wetlands regardless of function, size, or location.

RELATIVE WETLAND QUALITY BASED ON WETLAND FUNCTIONS

CHECKLIST

A. <u>OCCURRENCE</u>

Potential functions ranked in descending order of probable occurrence.

- 1. Passive Recreation and Natural Heritage Value** (occurs often).
- 2. Habitat for Terrestrial Wildlife
- 3. Habitat for Aquatic Wildlife

4. Sediment Trapping

5. Flood Desynchronization

6. Nutrient Retention

7. Food Web Support (nutrient export)

- 8. Dissipation of Erosive Forces
- 9. Active Recreation
- 10. Groundwater Discharge
- 11. Shoreline Anchoring
- 12. Ground Water Recharge (few occurrences)
- B. <u>VALUE</u>

Rating

Value

Any combination of functions including 2 or 3 and 7. High

Any combination of three functions from the functions list, excluding 2, 3 and 7. Medium

Less than three functions total.

C. TYPE OF WETLANDS

· · · ·

Tidal Non-tidal

**Threatened or Endangered Species habitat or Areas of State Critical Concern are always "high" valued wetlands regardless of function, size, or location.

Source: Adapted from "A Method for Wetland Functional Assessment", Federal Highway Administration, 1983.

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Project <u>Keysbne</u> Landfill Wetland Site Number <u>14</u>

CHECKLIST

A. <u>OCCURRENCE</u>

Potential functions ranked in descending order of probable occurrence.

- 1. Passive Recreation and Natural Heritage Value** (occurs often).
- 2. Habitat for Terrestrial Wildlife
- 3. Habitat for Aquatic Wildlife
- 4. Sediment Trapping
- ____ 5. Flood Desynchronization
- ____ 6. Nutrient Retention
- 7. Food Web Support (nutrient export)
- 8. Dissipation of Erosive Forces
- 9. Active Recreation
- _____10. Groundwater Discharge
- ____ 11. Shoreline Anchoring
- 12. Ground Water Recharge (few occurrences)
- B. VALUE

Rating

Value

Any combination of functions including 2 or 3 and 7. High

Any combination of three functions from the functions list, excluding 2, 3 and 7.

Medium

Less than three functions total.

C. <u>TYPE OF WETLANDS</u>

Tidal Non-tidal

**Threatened or Endangered Species habitat or Areas of State Critical Concern are always "high" valued wetlands regardless of function, size, or location.

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RELATIVE WETLAND QUALITY BASED ON WETLAND FUNCTIONS

CHECKLIST

A. <u>OCCURRENCE</u>

Potential functions ranked in descending order of probable occurrence.

- 1. Passive Recreation and Natural Heritage Value** (occurs often).
- 2. Habitat for Terrestrial Wildlife
- 3. Habitat for Aquatic Wildlife
- 4. Sediment Trapping

5. Flood Desynchronization

6. Nutrient Retention

7. Food Web Support (nutrient export)

8. Dissipation of Erosive Forces

- 9. Active Recreation
- 10. Groundwater Discharge
- 11. Shoreline Anchoring
- 12. Ground Water Recharge (few occurrences)
- B. <u>VALUE</u>

Rating

Value

Medium

Any combination of functions including 2 or 3 and 7. High

and a second second

····

Any combination of three functions from the functions list, excluding 2, 3 and 7.

Less than three functions total.

C. <u>TYPE OF WETLANDS</u>

Tidal Non-tidal

**Threatened or Endangered Species habitat or Areas of State Critical Concern are always "high" valued wetlands regardless of function, size, or location.

Source: Adapted from "A Method for Wetland Functional Assessment", Federal Highway Administration, 1983.

Project <u>Keysbne</u> L Wetland Site Number ____

CHECKLIST

A. <u>OCCURRENCE</u>

Potential functions ranked in descending order of probable occurrence.

- $\sqrt{2}$. Habitat for Terrestrial Wildlife
- 3. Habitat for Aquatic Wildlife
- _____4. Sediment Trapping
- _____ 5. Flood Desynchronization
- 6. Nutrient Retention
- 7. Food Web Support (nutrient export)
- 8. Dissipation of Erosive Forces
- 9. Active Recreation
- _____ 10. Groundwater Discharge
- _____ 11. Shoreline Anchoring
- 12. Ground Water Recharge (few occurrences)
- B. <u>VALUE</u>

Rating

Value

Medium

T.OL

Any combination of functions including 2 or 3 and 7. High

Any combination of three functions from the functions list, excluding 2, 3 and 7.

Less than three functions total.

C. TYPE OF WETLANDS

_____ Tidal _____ Non-tidal

**Threatened or Endangered Species habitat or Areas of State Critical Concern are always "high" valued wetlands regardless of function, size, or location.

Wetland S

Project Keystone Landfill

CHECKLIST

A. <u>OCCURRENCE</u>

Potential functions ranked in descending order of probable occurrence.

- 1. Passive Recreation and Natural Heritage Value** (occurs often).
- 2. Habitat for Terrestrial Wildlife
- 3. Habitat for Aquatic Wildlife
- 4. Sediment Trapping
- 5. Flood Desynchronization
- _____6. Nutrient Retention
- ✓ 7. Food Web Support (nutrient export)
- 8. Dissipation of Erosive Forces
- 9. Active Recreation
- _____ 10. Groundwater Discharge
- 11. Shoreline Anchoring
- 12. Ground Water Recharge (few occurrences)
- B. <u>VALUE</u>

Rating

Value

Low

Any combination	of functions including 2 or 3 and 7.	High
Any combination functions list,	of three functions from the excluding 2, 3 and 7.	Medium

Less than three functions total.

C. <u>TYPE OF WETLANDS</u>

Tidal Non-tidal

**Threatened or Endangered Species habitat or Areas of State Critical Concern are always "high" valued wetlands regardless of function, size, or location.

Source: Adapted from "A Method for Wetland Functional Assessment", Federal Highway Administration, 1983.

Project <u>Keystone</u> Wetland Site Number

CHECKLIST

A. <u>OCCURRENCE</u>

Potential functions ranked in descending order of probable occurrence.

- 1. Passive Recreation and Natural Heritage Value** (occurs often).
- 2. Habitat for Terrestrial Wildlife
- ____ 3. Habitat for Aquatic Wildlife
- 4. Sediment Trapping
- ____ 5. Flood Desynchronization
- 6. Nutrient Retention
- 7. Food Web Support (nutrient export)
- 8. Dissipation of Erosive Forces
- 9. Active Recreation
- ____ 10. Groundwater Discharge
- 11. Shoreline Anchoring
- 12. Ground Water Recharge (few occurrences)
- B. <u>VALUE</u>

Rating

Value

Medium

Low

Any combination of functions including 2 or 3 and 7. High

Any combination of three functions from the functions list, excluding 2, 3 and 7.

Less than three functions total.

C. <u>TYPE OF WETLANDS</u>

Tidal Non-tidal

**Threatened or Endangered Species habitat or Areas of State Critical Concern are always "high" valued wetlands regardless of function, size, or location.

RELATIVE WETLAND QUALITY BASED ON WETLAND FUNCTIONS

CHECKLIST

A. <u>OCCURRENCE</u>

Potential functions ranked in descending order of probable occurrence.

- 1. Passive Recreation and Natural Heritage Value** (occurs often).
- 2. Habitat for Terrestrial Wildlife
- 3. Habitat for Aquatic Wildlife
- 4. Sediment Trapping
- 5. Flood Desynchronization
- 6. Nutrient Retention
- 7. Food Web Support (nutrient export)
- 8. Dissipation of Erosive Forces
- 9. Active Recreation
- 10. Groundwater Discharge
- 11. Shoreline Anchoring
- 12. Ground Water Recharge (few occurrences)
- B. <u>VALUE</u>

<u>Ratinq</u>

Value

Any combination of functions including 2 or 3 and 7. High

Any combination of three functions from the functions list, excluding 2, 3 and 7.

Medium

Less than three functions total.

C. <u>TYPE OF WETLANDS</u>

_____ Tidal

**Threatened or Endangered Species habitat or Areas of State Critical Concern are always "high" valued wetlands regardless of function, size, or location.

Source: Adapted from "A Method for Wetland Functional Assessment", Federal Highway Administration, 1983.

RELATIVE WETLAND QUALITY BASED ON WETLAND FUNCTIONS

CHECKLIST

A. <u>OCCURRENCE</u>

Potential functions ranked in descending order of probable occurrence.

- _____l. Passive Recreation and Natural Heritage Value** (occurs often).
- 2. Habitat for Terrestrial Wildlife
- _____ 3. Habitat for Aquatic Wildlife
- 4. Sediment Trapping
- 5. Flood Desynchronization
- _____ 6. Nutrient Retention
- ____ 7. Food Web Support (nutrient export)
- 8. Dissipation of Erosive Forces
- 9. Active Recreation
- _____ 10. Groundwater Discharge
- 11. Shoreline Anchoring
- 12. Ground Water Recharge (few occurrences)
- B. <u>VALUE</u>

Rating

Value

Any combination of functions including 2 or 3 and 7. High

Any combination of three functions from the functions list, excluding 2, 3 and 7.

Medium

Less than three functions total. Low

C. <u>TYPE OF WETLANDS</u>

Tidal Non-tidal

**Threatened or Endangered Species habitat or Areas of State Critical Concern are always "high" valued wetlands regardless of function, size, or location.

Source: Adapted from "A Method for Wetland Functional Assessment", Federal Highway Administration, 1983.

RELATIVE WETLAND QUALITY BASED ON WETLAND FUNCTIONS

CHECKLIST

A. <u>OCCURRENCE</u>

Potential functions ranked in descending order of probable occurrence.

- 1. Passive Recreation and Natural Heritage Value** (occurs often).
- V 2. Habitat for Terrestrial Wildlife
- ____ 3. Habitat for Aquatic Wildlife.
- 4. Sediment Trapping
- 5. Flood Desynchronization
- 6. Nutrient Retention
- 7. Food Web Support (nutrient export)
- 8. Dissipation of Erosive Forces
- 9. Active Recreation
- 10. Groundwater Discharge
- ____ 11. Shoreline Anchoring
- 12. Ground Water Recharge (few occurrences)
- B. VALUE

Rating

Value

Any combination of functions including 2 or 3 and 7. High

Any combination of three functions from the functions list, excluding 2, 3 and 7.

Less than three functions total.

Low

AR310864

Medium

C. TYPE OF WETLANDS

Tidal Non-tidal

**Threatened or Endangered Species habitat or Areas of State Critical Concern are always "high" valued wetlands regardless of function, size, or location.

Source: Adapted from "A Method for Wetland Functional Assessment", Federal Highway Administration, 1983.

RELATIVE WETLAND QUALITY BASED ON WETLAND FUNCTIONS

CHECKLIST

A. <u>OCCURRENCE</u>

Potential functions ranked in descending order of probable occurrence.

- 1. Passive Recreation and Natural Heritage Value** (occurs often).
- 2. Habitat for Terrestrial Wildlife
- ____ 3. Habitat for Aquatic Wildlife
- 4. Sediment Trapping
- 5. Flood Desynchronization
- _____ 6. Nutrient Retention
- 7. Food Web Support (nutrient export)
- 8. Dissipation of Erosive Forces
- 9. Active Recreation
- 10. Groundwater Discharge
- 11. Shoreline Anchoring
- 12. Ground Water Recharge (few occurrences)
- B. VALUE

Rating

Value

Mediu

Low

AR310865

Any combination of functions including 2 or 3 and 7. High

Any combination of three functions from the functions list, excluding 2, 3 and 7.

Less than three functions total.

C. <u>TYPE OF WETLANDS</u>

_____ Tidal

**Threatened or Endangered Species habitat or Areas of State Critical Concern are always "high" valued wetlands regardless of function, size, or location.

RELATIVE WETLAND QUALITY BASED ON WETLAND FUNCTIONS

CHECKLIST

A. <u>OCCURRENCE</u>

Potential functions ranked in descending order of probable occurrence.

- 1. Passive Recreation and Natural Heritage Value** (occurs often).
- 2. Habitat for Terrestrial Wildlife
- ____ 3. Habitat for Aquatic Wildlife
- ____4. Sediment Trapping
- 5. Flood Desynchronization
- 6. Nutrient Retention
- 7. Food Web Support (nutrient export)
- 8. Dissipation of Erosive Forces
- 9. Active Recreation
- 10. Groundwater Discharge
- 11. Shoreline Anchoring
- 12. Ground Water Recharge (few occurrences)
- B. <u>VALUE</u>

Rating Value

Any combination of functions including 2 or 3 and 7. High

Any combination of three functions from the functions list, excluding 2, 3 and 7.

Less than three functions total.

C. TYPE OF WETLANDS

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____ Tidal ____ Non-tidal

**Threatened or Endangered Species habitat or Areas of State Critical Concern are always "high" valued wetlands regardless of function, size, or location.

Source: Adapted from "A Method for Wetland Functional Assessment", Federal Highway Administration, 1983.

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Low

RELATIVE WETLAND QUALITY BASED ON WETLAND FUNCTIONS

CHECKLIST

A. <u>OCCURRENCE</u>

Potential functions ranked in descending order of probable occurrence.

- \checkmark 1. Passive Recreation and Natural Heritage Value** (occurs often).
- _____ 2. Habitat for Terrestrial Wildlife
- ____ 3. Habitat for Aquatic Wildlife
- _____ 4. Sediment Trapping
- 5. Flood Desynchronization
- ____ 6. Nutrient Retention
- 7. Food Web Support (nutrient export)
- _____ 8. Dissipation of Erosive Forces
- 9. Active Recreation
- _____ 10. Groundwater Discharge
- ____ 11. Shoreline Anchoring
- 12. Ground Water Recharge (few occurrences)
- B. <u>VALUE</u>

Rating

Value

Medium

Any combination of functions including 2 or 3 and 7. High

Any combination of three functions from the functions list, excluding 2, 3 and 7.

Less than three functions total. Low

C. <u>TYPE OF WETLANDS</u>

Tidal Non-tidal

**Threatened or Endangered Species habitat or Areas of State Critical Concern are always "high" valued wetlands regardless of function, size, or location.

Project Keystone Londfill Wetland Site Number _25

RELATIVE WETLAND QUALITY BASED ON WETLAND FUNCTIONS

CHECKLIST

A. <u>OCCURRENCE</u>

Potential functions ranked in descending order of probable occurrence.

- 1. Passive Recreation and Natural Heritage Value** (occurs often).
- 2. Habitat for Terrestrial Wildlife
- ____ 3. Habitat for Aquatic Wildlife
- 4. Sediment Trapping
- 5. Flood Desynchronization
- 6. Nutrient Retention

7. Food Web Support (nutrient export)

8. Dissipation of Erosive Forces

9. Active Recreation - hunting

- 10. Groundwater Discharge
- ____ 11. Shoreline Anchoring

12. Ground Water Recharge (few occurrences)

B. VALUE

Rating

Any combination of functions including 2 or 3 and 7. High

Any combination of three functions from the functions list, excluding 2, 3 and 7.

Medium

AR310868

Value

Less than three functions total.

C. <u>TYPE OF WETLANDS</u>

____ Tidal

**Threatened or Endangered Species habitat or Areas of State Critical Concern are always "high" valued wetlands regardless of function, size, or location.

Project Keyshne Lanfill Wetland Site Number 26

RELATIVE WETLAND QUALITY BASED ON WETLAND FUNCTIONS

CHECKLIST

A. <u>OCCURRENCE</u>

Potential functions ranked in descending order of probable occurrence.

- ____ 1. Passive Recreation and Natural Heritage Value** (occurs often).
- 2. Habitat for Terrestrial Wildlife
- ____ 3. Habitat for Aquatic Wildlife
- 4. Sediment Trapping
- 5. Flood Desynchronization
- _____6. Nutrient Retention
- 7. Food Web Support (nutrient export)
- 8. Dissipation of Erosive Forces
- ____ 9. Active Recreation
- ____ 10. Groundwater Discharge
- 11. Shoreline Anchoring
- 12. Ground Water Recharge (few occurrences)
- B. <u>VALUE</u>

Rating

<u>Value</u>

Any combination of functions including 2 or 3 and 7. High

Any combination of three functions from the functions list, excluding 2, 3 and 7.

Medium

Less than three functions total.

C. <u>TYPE OF WETLANDS</u>

Tidal Non-tidal

**Threatened or Endangered Species habitat or Areas of State Critical Concern are always "high" valued wetlands regardless of function, size, or location.

RELATIVE WETLAND QUALITY BASED ON WETLAND FUNCTIONS

- - -

CHECKLIST

A. <u>OCCURRENCE</u>

Potential functions ranked in descending order of probable occurrence.

- 1. Passive Recreation and Natural Heritage Value** (occurs often).
- V 2. Habitat for Terrestrial Wildlife
- 3. Habitat for Aquatic Wildlife
- 4. Sediment Trapping
- 5. Flood Desynchronization
- 6. Nutrient Retention
- ____ 7. Food Web Support (nutrient export)
- 8. Dissipation of Erosive Forces
- 9. Active Recreation
- 10. Groundwater Discharge
- 11. Shoreline Anchoring
- 12. Ground Water Recharge (few occurrences)
- B. <u>VALUE</u>

Rating

Value

Medium

Low

Any combination of functions including 2 or 3 and 7. High

Any combination of three functions from the functions list, excluding 2, 3 and 7.

Less than three functions total.

C. TYPE OF WETLANDS

Tidal Non-tidal

**Threatened or Endangered Species habitat or Areas of State Critical Concern are always "high" valued wetlands regardless of function, size, or location.

Project <u>Keystone</u> Lan Wetland Site Number __2

CHECKLIST

A. OCCURRENCE

Potential functions ranked in descending order of probable occurrence.

- 1. Passive Recreation and Natural Heritage Value** (occurs often).
- ____ 2. Habitat for Terrestrial Wildlife
- 3. Habitat for Aquatic Wildlife
- 4. Sediment Trapping
- 5. Flood Desynchronization
- 6. Nutrient Retention
- 7. Food Web Support (nutrient export)
- 8. Dissipation of Erosive Forces
- 9. Active Recreation
- 10. Groundwater Discharge
- ____ 11. Shoreline Anchoring
- 12. Ground Water Recharge (few occurrences)
- B. VALUE

Rating

Value

Medium

Low

Any combination of functions including 2 or 3 and 7. High

Any combination of three functions from the functions list, excluding 2, 3 and 7.

Less than three functions total.

C. TYPE OF WETLANDS

Tidal

**Threatened or Endangered Species habitat or Areas of State Critical Concern are always "high" valued wetlands regardless of function, size, or location.

Source: Adapted from "A Method for Wetland Functional Assessment", Federal Highway Administration, 1983.

RELATIVE WETLAND QUALITY BASED ON WETLAND FUNCTIONS

CHECKLIST

A. <u>OCCURRENCE</u>

Potential functions ranked in descending order of probable occurrence.

- 1. Passive Recreation and Natural Heritage Value** (occurs often).
- 2. Habitat for Terrestrial Wildlife
- 3. Habitat for Aquatic Wildlife
- 4. Sediment Trapping
- 5. Flood Desynchronization
- 6. Nutrient Retention

7. Food Web Support (nutrient export)

8. Dissipation of Erosive Forces

9. Active Recreation -hunting

10. Groundwater Discharge

11. Shoreline Anchoring

12. Ground Water Recharge (few occurrences)

B. <u>VALUE</u>

Rating

Value

Medium

Low

Any combination of functions including 2 or 3 and 7. High

Any combination of three functions from the functions list, excluding 2, 3 and 7.

Less than three functions total.

C. TYPE OF WETLANDS

_____ Tidal

**Threatened or Endangered Species habitat or Areas of State Critical Concern are always "high" valued wetlands regardless of function, size, or location.

Source: Adapted from "A Method for Wetland Functional Assessment", Federal Highway Administration, 1983.

Project <u>keysbale</u> Landhill Wetland Site Number <u>30</u>

RELATIVE WETLAND QUALITY BASED ON WETLAND FUNCTIONS

CHECKLIST

A. <u>OCCURRENCE</u>

Potential functions ranked in descending order of probable occurrence.

- 1. Passive Recreation and Natural Heritage Value** (occurs often).
- 2. Habitat for Terrestrial Wildlife
- 3. Habitat for Aquatic Wildlife
- _____4. Sediment Trapping
- 5. Flood Desynchronization
- _____ 6. Nutrient Retention
- 7. Food Web Support (nutrient export)
- ____ 8. Dissipation of Erosive Forces
- 9. Active Recreation hunting
- 10. Groundwater Discharge
- 11. Shoreline Anchoring
- 12. Ground Water Recharge (few occurrences)
- B. VALUE

Rating

<u>Value</u>

Medium

Low

Any combination of functions including 2 or 3 and 7. High

Any combination of three functions from the functions list, excluding 2, 3 and 7.

Less than three functions total.

C. TYPE OF WETLANDS

Tidal Non-tidal

**Threatened or Endangered Species habitat or Areas of State Critical Concern are always "high" valued wetlands regardless of function, size, or location.

Project <u>Keysbre Landfill</u> Wetland Site Number 31

RELATIVE WETLAND QUALITY BASED ON WETLAND FUNCTIONS

CHECKLIST

A. <u>OCCURRENCE</u>

Potential functions ranked in descending order of probable occurrence.

- 1. Passive Recreation and Natural Heritage Value** (occurs often).
- 2. Habitat for Terrestrial Wildlife
- _____3. Habitat for Aquatic Wildlife
- 4. Sediment Trapping
- 5. Flood Desynchronization
- 6. Nutrient Retention
- 7. Food Web Support (nutrient export)
- 8. Dissipation of Erosive Forces
- 9. Active Recreation
- 10. Groundwater Discharge
- 11. Shoreline Anchoring
- 12. Ground Water Recharge (few occurrences)
- B. <u>VALUE</u>

Rating Value

Any combination of functions including 2 or 3 and 7. High

Any combination of three functions from the functions list, excluding 2, 3 and 7.

Medium

Low

Less than three functions total.

C. <u>TYPE OF WETLANDS</u>

Tidal Non-tidal

**Threatened or Endangered Species habitat or Areas of State Critical Concern are always "high" valued wetlands regardless of function, size, or location.

Project <u>(eystone Landfill</u> Wetland Site Number <u>32</u>

RELATIVE WETLAND QUALITY BASED ON WETLAND FUNCTIONS

CHECKLIST

A. OCCURRENCE

Potential functions ranked in descending order of probable occurrence.

- 1. Passive Recreation and Natural Heritage Value** (occurs often).
- 2. Habitat for Terrestrial Wildlife
- _____ 3. Habitat for Aquatic Wildlife
- 4. Sediment Trapping
- _____ 5. Flood Desynchronization
- _____ 6. Nutrient Retention
- 7. Food Web Support (nutrient export)
- ____ 8. Dissipation of Erosive Forces
- 9. Active Recreation
- 10. Groundwater Discharge
- 11. Shoreline Anchoring
- _____12. Ground Water Recharge (few occurrences)
- B. VALUE

Rating

<u>Value</u>

Any combination of functions including 2 or 3 and 7. High

Any combination of three functions from the functions list, excluding 2, 3 and 7.

Low

Less than three functions total.

C. TYPE OF WETLANDS

_____ Tidal

**Threatened or Endangered Species habitat or Areas of State Critical Concern are always "high" valued wetlands regardless of function, size, or location.

Source: Adapted from "A Method for Wetland Functional Assessment", Federal Highway Administration, 1983.

RELATIVE WETLAND QUALITY BASED ON WETLAND FUNCTIONS

Project Keysphe Lanfill

· · · ·

Wetland Site Number

CHECKLIST

A. <u>OCCURRENCE</u>

Potential functions ranked in descending order of probable occurrence.

- 1. Passive Recreation and Natural Heritage Value** (occurs often).
- 2. Habitat for Terrestrial Wildlife
- 3. Habitat for Aquatic Wildlife
- 4. Sediment Trapping
- ____ 5. Flood Desynchronization
- 6. Nutrient Retention
- 7. Food Web Support (nutrient export)
- 8. Dissipation of Erosive Forces
- 9. Active Recreation
- <u>10.</u> Groundwater Discharge
- 11. Shoreline Anchoring
- 12. Ground Water Recharge (few occurrences)
- B. VALUE

Rating

Value

Any combination of functions including 2 or 3 and 7. High

Any combination of three functions from the functions list, excluding 2, 3 and 7.

Medium Low

Less than three functions total.

C. TYPE OF WETLANDS

____ Tidal

Non-tidal

**Threatened or Endangered Species habitat or Areas of State Critical Concern are always "high" valued wetlands regardless of function, size, or location.

Project <u>Keystone Landfill</u> Wetland Site Number <u>34</u>

RELATIVE WETLAND QUALITY BASED ON WETLAND FUNCTIONS

CHECKLIST

A. OCCURRENCE

Potential functions ranked in descending order of probable occurrence.

- 1. Passive Recreation and Natural Heritage Value** (occurs often).
- 2. Habitat for Terrestrial Wildlife
- 3. Habitat for Aquatic Wildlife
- _____4. Sediment Trapping
- 5. Flood Desynchronization
- 6. Nutrient Retention
- _____ 7. Food Web Support (nutrient export)
- 8. Dissipation of Erosive Forces
- 9. Active Recreation
- 10. Groundwater Discharge
- _____ 11. Shoreline Anchoring
- 12. Ground Water Recharge (few occurrences)

B. <u>VALUE</u>

<u>Rating</u>

Value

Any combination of functions including 2 or 3 and 7. High

Any combination of three functions from the functions list, excluding 2, 3 and 7.

Medium Low

Less than three functions total.

C. <u>TYPE OF WETLANDS</u>

____ Tidal

Non-tidal

**Threatened or Endangered Species habitat or Areas of State Critical Concern are always "high" valued wetlands regardless of function, size, or location.

Wetland Site Number ______

Project Keysone Lamf

RELATIVE WETLAND QUALITY BASED ON WETLAND FUNCTIONS

CHECKLIST

A. <u>OCCURRENCE</u>

Potential functions ranked in descending order of probable occurrence.

- 1. Passive Recreation and Natural Heritage Value** (occurs often).
- ____2. Habitat for Terrestrial Wildlife
- 3. Habitat for Aquatic Wildlife
- 4. Sediment Trapping
- 5. Flood Desynchronization
- 6. Nutrient Retention
- 7. Food Web Support (nutrient export)
- 8. Dissipation of Erosive Forces
- 9. Active Recreation
- 10. Groundwater Discharge
- ____ 11. Shoreline Anchoring
- 12. Ground Water Recharge (few occurrences)
- B. VALUE

Rating

Value

Medium

Low

Any combination of functions including 2 or 3 and 7. High

Any combination of three functions from the functions list, excluding 2, 3 and 7.

Less than three functions total.

C. TYPE OF WETLANDS

_____ Tidal

**Threatened or Endangered Species habitat or Areas of State Critical Concern are always "high" valued wetlands regardless of function, size, or location.

Project <u>Keysfore Indfill</u> Wetland Site Number 36

RELATIVE WETLAND QUALITY BASED ON WETLAND FUNCTIONS

CHECKLIST

A. <u>OCCURRENCE</u>

Potential functions ranked in descending order of probable occurrence.

- _____1. Passive Recreation and Natural Heritage Value** (occurs often).
- 2. Habitat for Terrestrial Wildlife
- ____ 3. Habitat for Aquatic Wildlife
- 4. Sediment Trapping
- 5. Flood Desynchronization
- _____6. Nutrient Retention
- _____ 7. Food Web Support (nutrient export)
- 8. Dissipation of Erosive Forces
- 9. Active Recreation hulving
- ____ 10. Groundwater Discharge
- ____ 11. Shoreline Anchoring
- 12. Ground Water Recharge (few occurrences)
- B. <u>VALUE</u>

Rating

Value

Any combination of functions including 2 or 3 and 7. High

Any combination of three functions from the functions list, excluding 2, 3 and 7.

Medium

Low

Less than three functions total.

C. <u>TYPE OF WETLANDS</u>

Tidal Non-tidal

**Threatened or Endangered Species habitat or Areas of State Critical Concern are always "high" valued wetlands regardless of function, size, or location.

Project <u>Keystone</u> <u>Indfill</u> Wetland Site Number <u>37</u>

RELATIVE WETLAND QUALITY BASED ON WETLAND FUNCTIONS

CHECKLIST

A. OCCURRENCE

Potential functions ranked in descending order of probable occurrence.

- 1. Passive Recreation and Natural Heritage Value** (occurs often).
- 2. Habitat for Terrestrial Wildlife

the second se

- 3. Habitat for Aquatic Wildlife
- 4. Sediment Trapping
- 5. Flood Desynchronization
- 6. Nutrient Retention
- 7. Food Web Support (nutrient export)
- 8. Dissipation of Erosive Forces
- 9. Active Recreation
- 10. Groundwater Discharge
- 11. Shoreline Anchoring
- 12. Ground Water Recharge (few occurrences)
- B. VALUE

Rating

Any combination of functions including 2 or 3 and 7. High

Any combination of three functions from the functions list, excluding 2, 3 and 7.

Medium

Value

Low

Less than three functions total.

C. TYPE OF WETLANDS

____ Tidal _____ Non-tidal

**Threatened or Endangered Species habitat or Areas of State Critical Concern are always "high" valued wetlands regardless of function, size, or location.

Source: Adapted from "A Method for Wetland Functional Assessment", Federal Highway Administration, 1983.

Project <u>Keystone Landfill</u> Wetland Site Number 38

RELATIVE WETLAND QUALITY BASED ON WETLAND FUNCTIONS

CHECKLIST

A. <u>OCCURRENCE</u>

Potential functions ranked in descending order of probable occurrence.

- $-\checkmark$ 1. Passive Recreation and Natural Heritage Value** (occurs often).
- 2. Habitat for Terrestrial Wildlife
- 3. Habitat for Aquatic Wildlife Herps
- _____4. Sediment Trapping
- _____5. Flood_Desynchronization
- 6. Nutrient Retention
- 7. Food Web Support (nutrient export)
- 8. Dissipation of Erosive Forces
- 9. Active Recreation
- \checkmark 10. Groundwater Discharge
- 11. Shoreline Anchoring
- 12. Ground Water Recharge (few occurrences)

B. <u>VALUE</u>

Rating

Value

Any combination of functions including 2 or 3 and 7. High Any combination of three functions from the functions list, excluding 2, 3 and 7. Medium Less than three functions total. Low

C. <u>TYPE OF WETLANDS</u>

Tidal Non-tidal

**Threatened or Endangered Species habitat or Areas of State Critical Concern are always "high" valued wetlands regardless of function, size, or location.



Parris N. Glendening Governor

Maryland Department of Natural Resources

Wildlife Division P.O. Box 68 Wye Mills, Maryland 21679

30 May 1996

Aura Stauffer Gannett Fleming, Inc. P.O. Box 67100 Harrisburg, PA 17106-7100

RE: Keystone Landfill Site Operable Unit -2

Dear Ms. Stauffer:

The proposed project area within Maryland does not have a known bog turtle site, however two wetlands (see attached map) along Silver Run are potential habitat. Bog turtles have been recorded from wetlands along Big Pipe Creek, of which Silver Run is a tributary, thus there is good potential for bog turtles to occur within the project area.

I have forwarded your request for information on other endangered species and exemplary natural communities within the project area to our Annapolis office. For your future reference, formal requests for environmental review should be sent to Maryland Department of Natural Resources, Heritage & Biodiversity Conservation Programs, Tawes State Office Building, E-1, 450 Taylor Avenue, Annapolis, MD 21401.

If you have any further questions concerning potential bog turtle habitat within the project area please contact me at our Wye Mills office (410-827-8612).

Sincerely,

r At a. Amile

Scott A. Smith Eastern Regional Mgr. Heritage & Biodiversity Conservation Programs

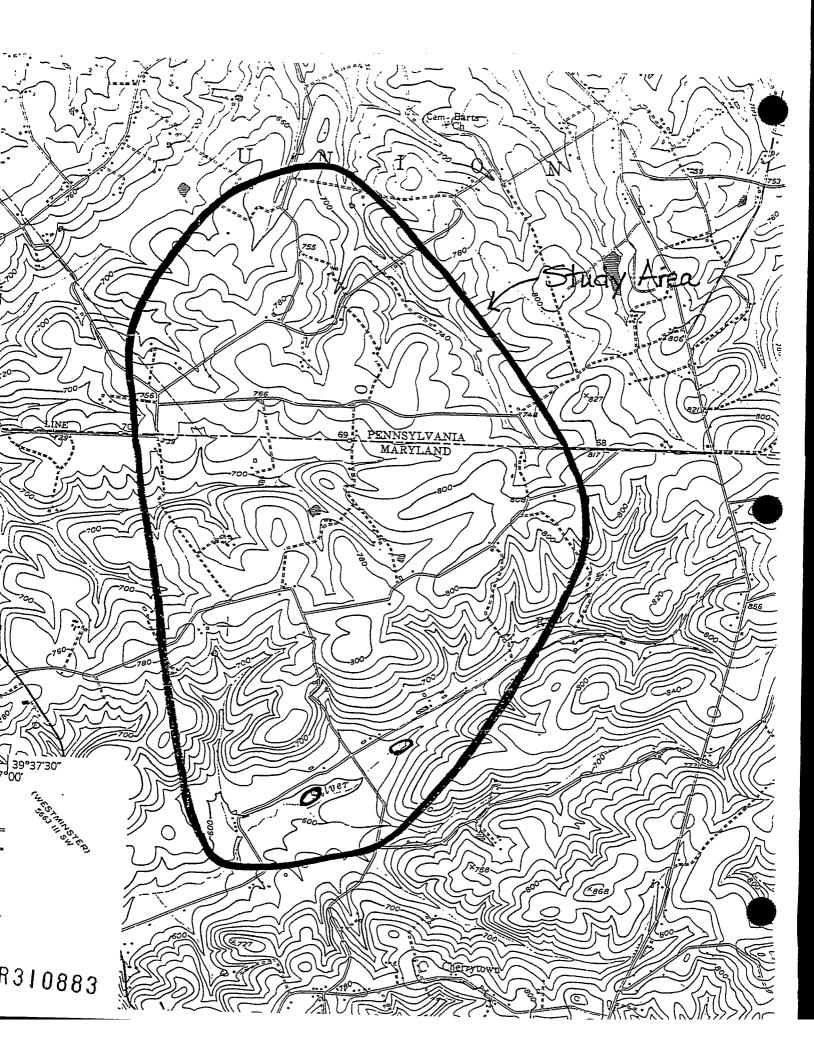
cc: D. Brinker, Central Regional Mgr. HBCP



attachment

John R. Griffin Secretary

Ronald N. Young Deputy Secretary





United States Department of the Interior



FISH AND WILDLIFE SERVICE Suite 322 315 South Allen Street State College, Pennsylvania 16801

March 28, 1996

Ms. Jennifer Hayes Gannett Fleming, Inc. PO Box 67100 Harrisburg, PA 17106-7100

Dear Ms. Hayes:

This responds to your letter of March 5, 1996 requesting information about federally listed and proposed endangered and threatened species within the study area for the proposed Keystone Landfill Site Operable Unit-2, located in Adams County, Pennsylvania and Carroll County, Maryland. This response pertains only to that portion of the study area located within Pennsylvania; you will be receiving a response under separate cover from our Chesapeake Bay Field Office for that portion of the study area within Maryland. The following comments are provided pursuant to the Endangered Species Act of 1973 (87 Stat. 884, as amended; 16 U.S.C. 1531 et seq.) to ensure the protection of endangered and threatened species.

Federally Listed and Proposed Species

Except for occasional transient species, no federally listed or proposed threatened or endangered species under our jurisdiction are known to exist in the project impact area. Therefore, no Biological Assessment or further Section 7 consultation under the Endangered Species Act (87 Stat. 884, as amended; 16 U.S.C. 1531 et seq.) is required with the Fish and Wildlife Service. Should project plans change, or if additional information on listed or proposed species becomes available, this determination may be reconsidered. A compilation of certain federal status species in Pennsylvania is enclosed for your information.

Federal Candidate Species

Candidate species are species for which the Service currently has substantial information on file to support the appropriateness of proposing to list as threatened or endangered. These species are known to be facing various threats, and have usually suffered substantial population declines and/or habitat loss. The Service, therefore, strongly encourages federal agencies and other planners to consider candidate species when planning and implementing their projects.

This project is within the known range of the bog turtle (*Clemmys muhlenbergi*), a federal candidate species. Several recent occurrences of the bog turtle are known from Adams County, and this species could be adversely affected if project activities will directly or indirectly impact any wetlands. The northern population of the bog turtle (occurring in the states of Connecticut, New York, Pennsylvania, Maryland, New Jersey, Delaware and Massachusetts) has declined by approximately 50 percent, primarily over the past 15-20 years due to hydrological alteration of its wetland habitat (via draining, ditching, filling, impoundment

and dredging), invasion and alteration of habitat by invasive native and exotic plant species (e.g., multiflora rose, *Phragmites*, red maple, reed canary grass, purple loosestrife) and illegal collection for the pet trade. In addition, the Pennsylvania Fish and Boat Commission has classified the bog turtle as endangered.

Bog turtles inhabit shallow, spring-fed fens, sphagnum bogs, swamps, marshy meadows and pastures characterized by soft, muddy bottoms; clear, cool, slow-flowing water, often forming a network of rivulets; high humidity; and an open canopy. Bog turtles usually occur in small, discrete populations occupying suitable wetland habitat dispersed along a watershed. The occupied "intermediate successional stage" wetland habitat is usually a mosaic of micro-habitats ranging from dry pockets, to areas that are saturated with water, to areas that are periodically flooded. Some wetlands occupied by bog turtles are located in agricultural areas and are subject to grazing by livestock. It appears that light to moderate grazing may benefit bog turtles by functioning to impede succession in these wetlands (i.e., by preventing or minimizing the encroachment of invasive native and exotic plants). Heavy grazing, however, will destroy turtles and their habitat.

We recommend that the proposed project be sited to avoid direct and indirect impacts to wetlands to protect potential bog turtle habitat, as well as to protect habitat for other fish and wildlife species dependent upon this rapidly declining habitat type. If wetland impacts cannot be avoided, the Service requests that a qualified biologist with bog turtle field survey experience thoroughly survey all potentially suitable bog turtle habitat within all areas to be directly or indirectly impacted by the proposed project. Surveys for this species are best conducted from April to early June--after bog turtles have emerged from hibernation and before wetland vegetation becomes dense, making searching difficult. Survey results should be submitted to the Service for review and concurrence. A recommended bog turtle survey protocol is enclosed.

Please contact Carole Copeyon of my staff at 814-234-4090 if you have any questions or require further assistance regarding endangered, threatened or candidate species.

Sincerely,

Charles J. Kulp Supervisor

Enclosures



COMMONWEALTH OF PENNSYLVANIA PENNSYLVANIA FISH & BOAT COMMISSION Division of Fisheries Management 450 Robinson Lane Bellefonte, PA 16823-9620 (814) 359-5110

in reply refer to PNDI# 1467

June 18, 1996



GANNETT FLEMING Aura Stauffer P.O. Box 67100 Harrisburg, PA 17106-7100

Dear Ms. Stauffer:

RE: Environmental Assessment Keystone Landfill Site Operable Unit - 2 Adams County, Pennsylvania and Carroll County, Maryland

I have examined the map accompanying your recent correspondence which shows the location for the proposed above referenced project.

Presently, none of the fishes, amphibians or reptiles we list as endangered or threatened are known to occur at or in the immediate vicinity of this study area.

To allow faster processing of PNDI reviews in the future, we are requesting that the attached form be completed and returned to this office together with other relevant project information. Please make copies of this form and use them whenever the need arises. Please note that the PFBC conducts PNDI reviews only for reptiles, amphibians, fishes, and aquatic invertebrates. Reviews concerning other natural resources must be submitted to other appropriate agencies. Thank you in advance for your cooperation.

Sincerely,

Andrew L. Shiels

Andrew L. Shiels Nongame and Endangered Species Unit

GR/csk

Encl. (1)



Pennsylvania Department of Conservation and Natural Resources

Rachel Carson State Office Building P.O. Box 8552 Harrisburg, PA 17105-8552 May 16, 1996

Bureau of Forestry

717-787-3444 Fax: 717-783-5109

Jennifer Hayes Gannett Fleming Inc. P.O. Box 67100 Harrisburg, PA 17106-7100

Re: Review of the Keystone Landfill Unit 2 Site, Union Township, Adams County, Pennsylvania PER Ref. No. 004204

Dear Ms. Hayes:

This letter is in response to your request of March 5, 1996, for information to complete an ecological assessment for the referenced facility. Our office has compared the study area with files of the Pennsylvania Natural Diversity Inventory (PNDI).

Paronychia fasitgiata var nuttallii, Whitlow wort, was collected 2.5 miles east-southeast of Littlestown in 1955. This wildflower is listed as *Tentatively Undetermined* under Chapter 82 of the Pennsylvania Code. The Pennsylvania Biological Survey, after extensive field investigation has recommended that *Paronychia fasitgiata* var nuttallii be listed as *Pennsylvania Endangered* in the next update to regulations. Whitlow wort is typically found in open woods or on woodland edges, in dry rocky or sandy soil. We recommended that any areas of suitable habitat within the project area be surveyed by a qualified botanist to confirm or deny the presence of Whitlow wort. Any population found should be delineated and efforts to conserve the plant and its habitat be included in project planning. Please report the results of any survey to this office. PNDI staff are available to assist with conservation planning.

The Pennsylvania Natural Diversity Inventory (PNDI) is a site specific information system describing plant and animal species of special concern, exemplary natural communities and unique geological features of the Commonwealth. PNDI is a cooperative project of DCNR, The Nature Conservancy and the Western Pennsylvania Conservancy, funded through contributions to the Wild Resource Conservation Fund. This response represents an up-to-date summary of PNDI files. However, an absence of information does not attest to absence of species on-site. A field survey of any site may reveal previously unreported populations.

Be advised that legal authority for Pennsylvania's biological resources resides with three administrative agencies. The enclosure titled *PNDI Management Agencies*, outlines which species groups are managed by these agencies. Please phone this office if you have questions concerning this response or the PNDI system.

Sincerely.

Edward T. Dix Botanist Forest Advisory Services

Enclosure

Stewardship

Partnership Service

An Equal Opportunity/Affirmative Action Employer



Parris N. Glendening Governor Maryland Department of Natural Resources Fish, Heritage and Wildlife Administration Tawes State Office Building Annapolis, Maryland 21401

John R. Griffin Secretary

Ronald N. Young Deputy Secretary

March 18, 1996

Ms. Jennifer Hayes Environmental Scientist GANNETT FLEMING Engineers and Planners PO Box 67100 Harrisburg, PA 17106-7100

RE: Keystone Landfill Site Operable Unit-2

Dear Ms. Hayes:

The Fish, Heritage and Wildlife Administration has no records for Federal or State rare, threatened or endangered plants or animals within this project site. This statement should not be interpreted as meaning that no rare, threatened or endangered species are present. Such species could be present but have not been documented because an adequate survey has not been conducted or because survey results have not been reported to us.

Sincerely,

Michael E. Slattery/dec

Michael E. Slattery, Associate Director - Administration

MES:fmb ER# 96.236.CA

> Telephone: (410) 974-3195 DNR TTY for the Deaf: 301-974-3683

and the second second



United States Department of the Interior

FISH AND WILDLIFE SERVICE Chesapeake Bay Field Office 177 Admiral Cochrane Drive Annapolis, MD 21401

March 13, 1996

Ms. Jennifer Hayes Gannett Fleming P.O. Box 67100 Harrisburg, PA 17106-7100

> Re: Keystone Landfill Site Operable Unit - 2 Carroll County, MD

Dear Ms. Hayes:

This responds to your March 5, 1996, request for information on the presence of species which are Federally listed or proposed for listing as endangered or threatened in the Maryland portion of the project area. We have reviewed the information you enclosed and are providing comments in accordance with Section 7 of the Endangered Species Act (87 Stat. 884, as amended; 16 U.S.C. 1531 *et seq.*).

Except for occasional transient individuals, no Federally listed or proposed endangered or threatened species are known to exist in the project impact area. Therefore, no Biological Assessment or further Section 7 Consultation with the U.S. Fish and Wildlife Service is required. Should project plans change, or if additional information on the distribution of listed or proposed species becomes available, this determination may be reconsidered. This response relates only to endangered species under our jurisdiction. For information on other rare species, you should contact Ms. Lynn Davidson of the Maryland Natural Heritage Program at (410) 974-2370.

The Bog Turtle (*Clemmys muhlenbergii*) is a Candidate species (those placed under review in the Federal Register to determine suitability for listing) that may be present on the subject property. Bog Turtles primarily inhabit palustrine emergent wetlands, many of which include some shrub cover. A soft mud bottom, shallow water or exposed mud, and tussocks of emergent vegetation are important habitat components. Due to population declines over the past 15 years, the species is listed as threatened by the State of Maryland. The Maryland Department of Natural Resources (DNR) is the lead agency regarding the status and distribution of the Bog Turtle in Maryland. You can obtain further information regarding the presence of Bog Turtles in the project area from Scott Smith of the DNR at (410) 827-8612. We recommend that you thoroughly inspect the subject property for the presence of appropriate Bog Turtle habitat. Should this investigation reveal the presence of emergent or shrub/scrub wetlands, we recommend that a survey for Bog Turtles be completed. Mr. Smith can provide further details regarding the habitat requirements of Bog Turtles, names of qualified surveyors, and appropriate survey techniques for determining if the species is present.

Candidate species are not legally protected under the Endangered Species Act and biological assessment and consultation requirements pursuant to that legislation do not apply to them. They are included here for the purpose of notifying you of possible future proposals and listings in advance, for consideration in your National Environmental Policy Act review process if applicable, and to encourage efforts to avoid adverse impacts to them.

An additional concern of the Service is wetlands protection. Both the Federal and the multi-state Chesapeake Bay Program wetlands policy have the interim goal of no overall net loss of the Basin's remaining wetlands, and the long term goal of increasing the quality and quantity of the Basin's wetlands resource base. Because of this policy and the functions and values wetlands perform, the Service recommends avoiding wetland impacts. All wetlands within the project area should be identified, and if construction in wetlands is proposed, the U.S. Army Corps of Engineers, Baltimore District, should be contacted for permit requirements. They can be reached at (410) 962-3670.

Thank you for your interest in fish and wildlife issues. If you have any questions or need further assistance, please contact Andy Moser at (410) 573-4537.

Sincerely,

John P. Wolflin Supervisor Chesapeake Bay Field Office

APPENDIX V

FILTERED AND UNFILTERED METALS SAMPLES SELECTED FOR USE IN QUANTITATIVE RISK CALCULATIONS

FILTERED AND UNFILTERED MONITORING WELL DATA USED IN QUANTITATIVE RISK ASSESSMENT

The monitoring wells excluded from use in risk assessment for metals fraction are listed with an "M" in the column titled "EXCLUDE" Filtered samples have a "-F" in the suffix of the column titled "SAMPLE". Duplicates are denoted with a "-DUP".

	NSAMPLE	ROUND	SAMPLE	MASTERLOC				SOURCE AREA
MW-11A	MW960701 MW-11A	MW960701		MW-11A	Monitoring Well	M	S1GW	
MW-11A	MW960701 MW-11A-F	MW960701		MW-11A	Monitoring Well, Filt.		SIGW	
MW-11B	MW960701 MW-11B	MW960701		MW-11B	Monitoring Well		S1GW	ļ
MW-11B	MW960701 MW-11B-F	MW960701		MW-11B	Monitoring Well, Filt.	<u>M</u>	S1GW	
MW-11C MW-11C	MW960701 MW-11C	MW960701 MW960701	and the second	MW-11C MW-11C	Monitoring Well	M	S1GW	
MW-112A	MW960701 MW-11C-F MW960701 MW-12A	MW960701	and the second sec	MW-12A	Monitoring Well, Filt. Monitoring Well	M	SIGW	
MW-12A	MW960701 MW-12A	MW960701	and the second	MW-12A	Monitoring Well, Filt.	141	SIGW	
MW-12B	MW960701 MW-12B	MW960701		MW-12B	Monitoring Well	м	S1GW	
MW-12B	MW960701 MW-12B-F	MW960701	the second s	MW-12B	Monitoring Well, Filt.		S1GW	
MW-12C	MW960701 MW-12C	MW960701		MW-12C	Monitoring Well	M	S1GW	
MW-12C	MW960701 MW-12C-F	MW960701		MW-12C	Monitoring Well, Filt.		S1GW	
MW-13A	MW960701 MW-13A	MW960701	MW-13A	MW-13A	Monitoring Well		S1GW	ONMW
MW-13A	MW960701 MW-13A-F	MW960701	MW-13A-F	MW-13A	Monitoring Well, Filt.	M	S1GW	ONMW
MW-13B	MW960701 MW-13B	MW960701	MW-13B	MW-13B	Monitoring Well		S1GW	ONMW
MW-13B	MW960701 MW-13B-F	MW960701		MW-13B	Monitoring Well, Filt.	M	S1GW	ONMW
MW-13C	MW960701 MW-13C	MW960701		MW-13C	Monitoring Well		S1GW	ONMW
MW-13C	MW960701 MW-13C-F	MW960701		MW-13C	Monitoring Well, Filt.	M	S1GW	ONMW
MW-A04	MW960701 MW-A04	MW960701	the second s	MW-A04	Monitoring Well	M	S1GW	
MW-A04	MW960701 MW-A04-F	MW960701		MW-A04	Monitoring Well, Filt.		SIGW	
MW-A05	MW960701 MW-A05	MW960701		MW-A05	Monitoring Well	M	S1GW	····-
MW-A05	MW960701 MW-A05-F MW960701 MW-A06	MW960701 MW960701		MW-A05	Monitoring Well, Filt.	M	S1GW S1GW	
MW-A06 MW-A06	MW960701 MW-A06-F	MV960701		MW-A06 MW-A06	Monitoring Well Monitoring Well, Filt.	W	SIGW	<u> </u>
MW-AD	MW940901 MW-AD	MW940901		MW-A08	Monitoring Well		SIGW	
MW-AD	MW950201 MW-AD	MW950201		MW-AD	Monitoring Well	<u> </u>	SIGW	
MW-AD	MW960401 MW-AD	MW960401		MW-AD	Monitoring Well	}	S1GW	<u> </u>
MW-AI	MW940901 MW-AI	MW940901		MW-AI	Monitoring Well		S1GW	
MW-AI	MW950201 MW-AI	MW950201		MW-AI	Monitoring Well		S1GW	
MW-AI	MW950201 MW-AI-0301		MW-AI-0301	MW-AI	Monitoring Well		S1GW	<u> </u>
MW-AI	MW950201 MW-AI-DUP	MW950201	MW-AI-DUP	MW-AI	Monitoring Well		S1GW	
MW-AI	MW950201 MW-AI-F	MW950201	MW-AI-F	MW-AI	Monitoring Well, Filt.	M	S1GW	
MW-AI	MW960401 MW-AI	MW960401	MW-AI	MW-AI	Monitoring Well		S1GW	
MW-AI	MW960401 MW-AI-DUP		MW-AI-DUP	MW-AI	Monitoring Well		S1GW	
MW-AI	MW960401 MW-AI-DUP-F		MW-AI-DUP-F	MW-AI	Monitoring Well, Filt.	M	S1GW	
MW-AI	MW960401 MW-AI-F	MW960401	and the second se	MW-AI	Monitoring Well, Filt.	<u>M</u>	S1GW	
MW-AS	MW940901 MW-AS	MW940901		MW-AS	Monitoring Well		SIGW	
MW-AS	MW950201 MW-AS	MW950201		MW-AS	Monitoring Well		SIGW	<u> </u>
MW-AS MW-B01	MW960401 MW-AS	MW960401 MW960701		MW-AS MW-B01	Monitoring Well Monitoring Well	M	S1GW S1GW	
MW-B01	MW960701 MW-B01 MW960701 MW-B01-F	MW960701		MW-B01	Monitoring Well, Filt.		SIGW	
MW-B01	MW960701 MW-B04	MV960701		MW-B04	Monitoring Well		SIGW	
MW-B04	MW960701 MW-B04-F	MW960701		MW-B04	Monitoring Well, Filt.	M	SIGW	
MW-B05	MW960701 MW-B05	MW960701		MW-B05	Monitoring Well	M	S1GW	}
MW-805	MW960701 MW-B05-F	MW960701		MW-B05	Monitoring Well, Filt.		SIGW	
MW-B06	MW960701 MW-B06	MW960701		MW-B06	Monitoring Well	M	S1GW	
MW-B06	MW960701 MW-B06-F	MW960701		MW-B06	Monitoring Well, Filt.		S1GW	
MW-BD	MW940901 MW-BD	MW940901	MW-BD	MW-BD	Monitoring Well		S1GW	
MW-BD	MW960401 MW-BD	MW960401	MW-BD	MW-BD	Monitoring Well		S1GW	
MW-BS	MW940901 MW-BS	MW940901		MW-BS	Monitoring Well		SIGW	
MW-BS	MW940901 MW-BS-DUP		MW-BS-DUP	MW-BS	Monitoring Well		S1GW	L
MW-BS	MW950201 MW-BS	MW950201		MW-BS	Monitoring Well		S1GW	
MW-BS	MW960401 MW-BS	MW960401		MW-BS	Monitoring Well	<u> </u>	S1GW	<u> </u>
MW-C01	MW960701 MW-C01	MW960701		MW-C01	Monitoring Well	L	SIGW	ONMW
MW-C01	MW960701 MW-C01-F	MW960701		MW-C01	Monitoring Well, Filt.	M	S1GW	ONMW
MW-C05	MW960701 MW-C05	MW960701		MW-C05	Monitoring Well		SIGW	ONMW
MW-C05	MW960701 MW-C05-F	MW960701		MW-C05	Monitoring Well, Filt.	M	S1GW	ONMW
MW-C12	MW960701 MW-C12	MW960701 MW960701		MW-C12 MW-C12	Monitoring Well	3 1	S1GW S1GW	ONMW ONMW
MW-C12 MW-C13	MW960701 MW-C12-F MW960701 MW-C13	MW960701		MW-C13	Monitoring Well, Filt. Monitoring Well	M	SIGW	ONMW
MW-C13	MW960701 MW-C13-F	MV960701		MW-C13	Monitoring Well, Filt.	M	SIGW	ONMW
MW-CD	MW940901 MW-CD	MV980701		IMW-CD	Monitoring Well	IV.	S2GW	
MW-CD	MW950201 MW-CD	MW950201		MW-CD	Monitoring Well	<u>├</u>	S2GW	}
MW-CD	MW960401 MW-CD	MW960401		MW-CD	Monitoring Well		S2GW	·······
MW-CI	MW940901 MW-CI	MW940901		MW-CI	Monitoring Well		S2GW	
MW-CI	MW950201 MW-CI	MW950201		MW-CI	Monitoring Well		S2GW	i
MW-CI	MW960401 MW-CI	MW960401		MW-CI	Monitoring Well		S2GW	
MW-CI	MW960401 MW-CI-F	MW960401		MW-CI	Monitoring Well, Filt.	M	S2GW	

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FILTERED AND UNFILTERED MONITORING WELL DATA USED IN QUANTITATIVE RISK ASSESSMENT

The monitoring wells excluded from use in risk assessment for metals fraction are listed with an "M" in the column titled "EXCLUDE" Filtered samples have a "-F" in the suffix of the column titled "SAMPLE". Duplicates are denoted with a "-DUP".

NSAMPLE	ROUND	SAMPLE	MASTERLOC	COMMENT	EXCLUDE	GW AREA	SOURCE AREA
MW-CS MW950201 MW-CS	MW950201	MW-CS	MW-CS	Monitoring Well		S2GW	
MW-CS MW960401 MW-CS	MW960401	MW-CS	MW-CS	Monitoring Well		S2GW	
MW-DI MW940901 MW-DI	MW940901	MW-DI	MW-DI	Monitoring Well		BGGW	
MW-DI MW950201 MW-DI	MW950201		MW-DI	Monitoring Well		BGGW	
MW-DI MW960401 MW-DI	MW960401	MW-DI	MW-DI	Monitoring Well		BGGW	
MW-DI MW960401 MW-DI-DUP	MW960401	MW-DI-DUP	MW-DI	Monitoring Well		BGGW	
MW-DI MW960401 MW-DI-F	MW960401	MW-DI-F	MW-DI	Monitoring Well, Filt.	M	BGGW	
MW-EI MW940901 MW-EI	MW940901	MW-EI	MW-EI	Monitoring Well		S2GW	
MW-EI MW950201 MW-EI	MW950201	MW-EI	MW-EI	Monitoring Well		S2GW	
MW-EI MW950201 MW-EI-F	MW950201	MW-EI-F	MW-EI	Monitoring Well, Filt.	M	S2GW	
MW-EI MW960401 MW-EI	MW960401 MW940901		MW-EI MW-FD	Monitoring Well		S2GW S2GW	
MW-FD MW940901 MW-FD MW-FD MW950201 MW-FD	MW950201	MW-FD	MW-FD	Monitoring Well Monitoring Well		S2GW	
MW-FD MW960401 MW-FD	MW960401		MW-FD	Monitoring Well		S2GW	
MW-FS MW940901 MW-FS	MW940901		MW-FS	Monitoring Well		S2GW	
MW-FS MW940901 MW-FS-DUP	MW940901	MW-FS-DUP	MW-FS	Monitoring Well		S2GW	
MW-FS MW950201 MW-FS	MW950201	MW-FS	MW-FS	Monitoring Well	·	S2GW	
MW-FS MW960401 MW-FS	MW960401	MW-FS	MW-FS	Monitoring Well		S2GW	
MW-GD MW940901 MW-GD	MW940901	MW-GD	MW-GD	Monitoring Well		S2GW	
MW-GD MW950201 MW-GD	MW950201	MW-GD	MW-GD	Monitoring Well		S2GW	
MW-GD MW950201 MW-GD-F	MW950201	MW-GD-F	MW-GD	Monitoring Well, Filt.	M	S2GW	
MW-GD MW960301 MW-GD	MW960301	MW-GD	MW-GD	Monitoring Well		S2GW	
MW-GD MW960301 MW-GD-F	MW960301	MW-GD-F	MW-GD	Monitoring Well, Filt.	М	S2GW	
MW-GD MW960401 MW-GD	MW960401	MW-GD	MW-GD	Monitoring Well		S2GW	1
MW-GD MW960401 MW-GD-F	MVV960401	MW-GD-F	MW-GD	Monitoring Well, Filt.	M	S2GW	
MW-GI MW940901 MW-GI	MW940901	MW-GI	MW-GI	Monitoring Well		S2GW	
MW-GI MW950201 MW-GI	MW950201	MW-GI	MW-GI	Monitoring Well		S2GW	
MW-GI MW960401 MW-GI	MW960401	MW-GI	MW-GI	Monitoring Well		S2GW	
MW-GS MW940901 MW-GS	MW940901		MW-GS	Monitoring Well		S2GW	
MW-GS MW950201 MW-GS	MW950201		MW-GS	Monitoring Well		S2GW	
MW-GS MW960401 MW-GS	MW960401	MW-GS	MW-GS	Monitoring Well		S2GW	
MW-HD MW940901 MW-HD	MW940901	MW-HD	MW-HD	Monitoring Well		SIGW	ONMW
MW-HD MW950201 MW-HD		MW-HD	MW-HD	Monitoring Well		S1GW	ONMW
MW-HD MW960401 MW-HD	MW960401		MW-HD	Monitoring Well		S1GW	ONMW
MW-HN-01D MW960701 MW-HN-01D		MW-HN-01D		Monitoring Well		S2GW	
MW-HN-01D MW960701 MW-HN-01D-F		MW-HN-01D-F	MW-HN-01D MW-HN-01I	Monitoring Well, Filt. Monitoring Well	M	S2GW S2GW	
MW-HN-01I MW960701 MW-HN-01I MW-HN-01I MW960701 MW-HN-01I-F		MW-HN-01I-F	MW-HN-011	Monitoring Well, Filt.	M	S2GW	
MW-HN-01S MW960701 MW-HN-01S		MW-HN-01S	MW-HN-01S	Monitoring Well	101	S2GW	
MW-HN-01S MW960701 MW-HN-01S-F		MW-HN-01S-F	MW-HN-01S	Monitoring Well, Filt.	м	S2GW	
MW-HN-02D MW960701 MW-HN-02D	MW960701	MW-HN-02D	the second s	Monitoring Well	141	BGGW	
MW-HN-02D MW960701 MW-HN-02D-F	MW960701	MW-HN-02D-F	MW-HN-02D	Monitoring Well, Filt.	M	BGGW	
MW-HN-02I MW960701 MW-HN-02I		MW-HN-021	MW-HN-02I	Monitoring Well	M	BGGW	
MW-HN-02I MW960701 MW-HN-02I-F	MW960701	MW-HN-02I-F	MW-HN-021	Monitoring Well, Filt.		BGGW	
MW-HN-02S MW960701 MW-HN-02S		MW-HN-02S	MW-HN-02S	Monitoring Well	M	BGGW	
MW-HN-02S MW960701 MW-HN-02S-DUP	MW960701	MW-HN-02S-DUP	MW-HN-02S	Monitoring Well	M	BGGW	
MW-HN-02S MW960701 MW-HN-02S-DUP-F	MW960701	MW-HN-02S-DUP-F	the second se	Monitoring Well, Filt.		BGGW	
MW-HN-02S MW960701 MW-HN-02S-F	MW960701	MW-HN-02S-F	MW-HN-02S	Monitoring Well, Filt.		BGGW	
MW-HN-03D MW960701 MW-HN-03D	MW960701	MW-HN-03D	MW-HN-03D	Monitoring Well	M	BGGW	
MW-HN-03D MW960701 MW-HN-03D-F	MW960701	MW-HN-03D-F	MW-HN-03D	Monitoring Well, Filt.	l	BGGW	
MW-HN-03I MW960701 MW-HN-03I		MW-HN-03I	MW-HN-03I	Monitoring Well		BGGW	i
MW-HN-03I MW960701 MW-HN-03I-F		MW-HN-03I-F		Monitoring Well, Filt.	M	BGGW	
MW-HN-03S MW960701 MW-HN-03S		MW-HN-03S		Monitoring Well	М	BGGW	
MW-HN-03S MW960701 MW-HN-03S-F		MW-HN-03S-F	MW-HN-03S	Monitoring Well, Filt.		BGGW	
MW-HN-04D MW960701 MW-HN-04D	MW960701	MW-HN-04D	MW-HN-04D	Monitoring Well		BGGW	
MW-HN-04D MW960701 MW-HN-04D-F	MW960701	MW-HN-04D-F	MW-HN-04D	Monitoring Well, Filt.	М	BGGW	
MW-HN-04I MW960701 MW-HN-04I		MW-HN-04I	MW-HN-041	Monitoring Well		BGGW	
MW-HN-04I MW960701 MW-HN-04I-F		MW-HN-04I-F	MW-HN-041	Monitoring Well, Filt.	M	BGGW	
MW-HN-04S MW960701 MW-HN-04S		MW-HN-04S	MW-HN-04S	Monitoring Well	М	BGGW	
MW-HN-04S MW960701 MW-HN-04S-F		MW-HN-04S-F		Monitoring Well, Filt.		BGGW	
MW-HS MW940901 MW-HS	MW940901	MW-HS	MW-HS	Monitoring Well		S1GW	ONMW
MW-HS MW950201 MW-HS	MW950201		MW-HS	Monitoring Well		S1GW	ONMW
MW-HS MW950201 MW-HS-F	MW950201		MW-HS	Monitoring Well, Filt.	M	S1GW	ONMW
MW-HS MW960401 MW-HS	MW960401		MW-HS	Monitoring Well	ļ	S1GW	ONMW
MW-HS MW960401 MW-HS-F	MW960401		MW-HS	Monitoring Well, Filt.	M	S1GW	ONMW
MW-ID MW940901 MW-ID	MW940901		MW-ID	Monitoring Well		S2GW	
MW-ID MW950201 MW-ID	MW950201		MW-ID	Monitoring Well	L	S2GW	
MW-ID MW960401 MW-ID	MW960401		MW-ID	Monitoring Well	L	S2GW	
MW-II MW940901 MW-II	MW940901	(MVV-1)	MW-II	Monitoring Well	1	S2GW	1 1

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FILTERED AND UNFILTERED MONITORING WELL DATA USED IN QUANTITATIVE RISK ASSESSMENT

The monitoring wells excluded from use in risk assessment for metals fraction are listed with an "M" in the column titled "EXCLUDE" Filtered samples have a "-F" in the suffix of the column titled "SAMPLE". Duplicates are denoted with a "-DUP".

	NSAMPLE	ROUND	SAMPLE	MASTERLOC	COMMENT	EXCLUDE	GW AREA	SOURCE AREA
MW-II	MW950201 MW-II	MW950201	MW-II	MW-II	Monitoring Well		S2GW	
MW-II	MW960401 MW-II	MW960401		MW-II	Monitoring Well		S2GW	
MW-IS	MW940901 MW-IS	MW940901	MW-IS	MW-IS	Monitoring Well		S2GW	
MW-IS	MW950201 MW-IS	MW950201	the second s	MW-IS	Monitoring Well		S2GW	
MW-IS	MW950201 MW-IS-DUP		MW-IS-DUP	MW-IS	Monitoring Well		S2GW	
MW-IS	MW960401 MW-IS	MW960401		MW-IS	Monitoring Well		S2GW	
MW-K-01	MW960701 MW-K-01	MW960701		MW-K-01	Monitoring Well		S1GW	ONMW
MW-K-01	MW960701 MW-K-01-F		MW-K-01-F	MW-K-01	Monitoring Well, Filt.	M	S1GW	ONMW
MW-K-02	MW960701 MW-K-02	MW960701		MW-K-02	Monitoring Well	M	S2GW	ONMW
MW-K-02	MW960701 MW-K-02-DUP		MW-K-02-DUP	and the second second	Monitoring Well	M	S2GW	ONMW
MW-K-02	MW960701 MW-K-02-F		MW-K-02-F		Monitoring Well, Filt.		S2GW	ONMW
MW-K-04	MW960701 MW-K-04	MW960701		MW-K-04	Monitoring Well		S2GW	ONMW
MW-K-05	MW960701 MW-K-05	MW960701			Monitoring Well	М	S2GW	ONMW
MW-K-05	MW960701 MW-K-05-F		MW-K-05-F	MW-K-05	Monitoring Well, Filt.		S2GW	ONMW
MW-K-06	MW960701 MW-K-06	MW960701		MW-K-06	Monitoring Well		S1GW	ONMW
MW-K-07	MW960701 MW-K-08	MW960701		MW-K-07	Monitoring Well		S2GW	ONMW
MW-K-07	MW960701 MW-K-07-F		MW-K-07-F	MW-K-07	Monitoring Well, Filt.	<u>M</u>	S2GW	ONMW
MW-K-08	MW960701 MW-K-08	MW960701		MW-K-08	Monitoring Well	M	S2GW	ONMW
MW-K-08	MW960701 MW-K-08-DUP		MW-K-08-DUP	MW-K-08	Monitoring Well	M	S2GW	ONMW
MW-K-08	MW960701 MW-K-08-DUP-F		MW-K-08-DUP-F		Monitoring Well, Filt.		S2GW	ONMW
MW-K-08	MW960701 MW-K-08-F		MW-K-08-F		Monitoring Well, Filt.		S2GW	ONMW
MW-K-08A	MW960701 MW-K-08A		MW-K-08A		Monitoring Well	M	S1GW	
MW-K-08A	MW960701 MW-K-08A-DUP		MW-K-08A-DUP		Monitoring Well	<u>M</u>	S1GW	
MW-K-08A	MV960701 MW-K-08A-DUP-F		MW-K-08A-DUP-F		Monitoring Well, Filt.		S1GW	
MW-K-08A	MW960701 MW-K-08A-F		MW-K-08A-F	the second s	Monitoring Well, Filt.		S1GW	
MW-MD-01	MW940901 MW-MD-01	MW940901			Monitoring Well		S2GW	
MW-MD-01	MW950201 MW-MD-01		MW-MD-01		Monitoring Well		S2GW	
MW-MD-01	MW950201 MW-MD-01-F		MW-MD-01-F		Monitoring Well, Filt.	M	S2GW	
MW-MD-01	MW960701 MW-MD-01		MW-MD-01		Monitoring Well		S2GW	
MW-MD-01	MW960701 MW-MD-01-F		MW-MD-01-F		Monitoring Well, Filt.	M	S2GW	
MW-MD-02	MW940901 MW-MD-02	MW940901			Monitoring Well		S2GW	
MW-MD-02	MW950201 MW-MD-02		MW-MD-02		Monitoring Well		S2GW	
MW-MD-02	MW960401 MW-MD-02	MW960401			Monitoring Well		S2GW	
MW-MD-03	MW940901 MW-MD-03		MW-MD-03		Monitoring Well		S2GW	
MW-MD-03	MW950201 MW-MD-03	and the second se	MW-MD-03		Monitoring Well		S2GW	
MW-MD-03	MW960401 MW-MD-03		MW-MD-03		Monitoring Well		S2GW	
MW-MD-04	MW950201 MW-MD-04		MW-MD-04		Monitoring Well		S2GW	
MW-MD-04	MW960701 MW-MD-04	MW960701			Monitoring Well		S2GW	
MW-MD-04	MW960701 MW-MD-04-F		MW-MD-04-F		Monitoring Well, Filt.	M	S2GW	
MW-MD-05	MW940901 MW-MD-05		MW-MD-05		Monitoring Well		S2GW	
MW-MD-05	MW950201 MW-MD-05		MW-MD-05		Monitoring Well		S2GW	
MW-MD-05	MW960401 MW-MD-05		MW-MD-05		Monitoring Well		S2GW	
MW-MD-06	MW940901 MW-MD-06	MW940901			Monitoring Well		S2GW	
MW-MD-06	MW950201 MW-MD-06	MW950201			Monitoring Well		S2GW	
MW-MD-06	MW960401 MW-MD-06	MW960401			Monitoring Well		S2GW	
MW-MD-07	MW940901 MW-MD-07		MW-MD-07		Monitoring Well		S2GW	
MW-MD-07	MW950201 MW-MD-07		MVV-MD-07		Monitoring Well	M	S2GW	
MW-MD-07	MW950201 MW-MD-07-F		MW-MD-07-F		Monitoring Well, Filt.		S2GW	
MW-MD-07	MW960701 MW-MD-07		MW-MD-07		Monitoring Well	-	S2GW	
MW-MD-07	MW960701 MW-MD-07-F		MW-MD-07-F		Monitoring Well, Filt.	М	S2GW	
MW-MD-08	MW940901 MW-MD-08	MW940901			Monitoring Well		S2GW	
MW-MD-08	MW950201 MW-MD-08	MW950201			Monitoring Well		S2GW	
MW-MD-08	MW960401 MW-MD-08	MW960401			Monitoring Well	_	S2GW	
MW-MD-09	MW940901 MW-MD-09	MW940901			Monitoring Well		\$2GW	
MW-MD-09	MW950201 MW-MD-09	MW950201	MW-MD-09	MW-MD-09	Monitoring Well		S2GW	
MW-MD-09	MW960401 MW-MD-09	MW960401	MW-MD-09	MW-MD-09	Monitoring Well		S2GW	
MW-OW4	MW960701 MW-OW4	MW960701			Monitoring Well		S1GW	ONMW
MW-OW4	MW960701 MW-OW4-F	MW960701			Monitoring Well, Filt.	м	S1GW	ONMW
MW-P	MW960701 MW-P	MW960701			Monitoring Well		S1GW	
	MW960701 MW-P-F	MW960701			Monitoring Well, Filt.	M	S1GW	

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