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	= Ingestion exposure
	C	= 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

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:

$$CA = (IEX_{child} + IEX_{adult}) \times SF$$

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
	SF	= 1.5 $(mg/kg/day)^{-1}$	= carcinogenic slope factor (upper 95 percent 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	= 8.28E-6 mg/kg/day	= Dermal exposure dose
	C	= 3.99 mg/kg	= Chemical concentration in soil
	SA	= 4734 cm^2/event	= Skin surface area available for contact
	AF	= 0.032 mg/cm^2	= Soil-to-skin adherence factor
	ABS	= 1	= Fraction from contaminated source
	EF	= 350 events/yr	= Exposure frequency
	ED	= 24 yrs	= Exposure duration
	BW	= 70 kg	= Body weight
	CF	= 1E-06 kg soil/mg soil	= Conversion factor
	AT	= 8760 days	= Averaging time, non-carcinogens (365 days/yr x 24 yrs)

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 cm^2) 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 cm^2-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:

$$NC = DEX / RfD$$

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

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:	E_{10}	= 3.12E-6 g/(m^2 sec)	= Particulates less than 10 microns (PM_{10}) average annual emission flux
	V	= 0.8	= fraction of vegetative cover
	U	= 4.2 m/sec	= mean annual wind speed (Baltimore closest city, table 4-1, Cowherd, et al.)
	Ut	= 4.32 m/sec	= threshold value of wind speed at 7 m (from equation, below)
	F(x)	= 1.7	= function based on x = 0.424 = 0.886 x Ut/U (from Figure 4-3, Cowherd)
	CF	= 1/3600 hr/sec	= conversion factor

$$Ut = U^* \times (1/0.4) \times \ln (z/z_0)$$

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:

$$R_{10} = E_{10} \times A$$

where: R_{10} = 3.12E-2 g/sec = Emission rate of soil as PM_{10}

E_{10}	= 3.12E-6 g/(m^2 sec)	= PM_{10} emission flux
A	= 100 X 100 m^2	= source area

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:

$$Q_I = R_{10} / P_R$$

where:	Q_I	= 1.06E-1 g/sec	= wind erosion scaling factor
	R_{10}	= 3.12E-2 g/sec	= PM_{10} emission rate
	P_R	= 0.296	= fraction of time wind erosion occurs (Figure 4-7, Cowherd)

$$X = Q_I \times F_I \times CF_2$$

where:	X	= 4.05E-4 mg/m^3	= average annual downwind respirable concentration of PM_{10}
	Q_I	= 1.06E-1 g/sec	= wind erosion scaling factor

F_1 = 3.837 (ug/m^3) / (g/sec) = 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 (PM_{10}) and the concentration of arsenic in soil, exposure to fugitive dust was then estimated using the following equations:

IEXr = (X x CS x IR x ET x EF x ED x IF-R)/(BW x AT)

and

IEXo = (X x CS x IR x ET x EF x ED x IF-O)/(BW x AT)

where: 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	= 4.05E-4 mg/m^3	= Downwind PM_{10} air concentration
CS	= 3.99E-6 g As/g soil	= Mass fraction of arsenic in soil (=As mg/kg x 1E-6kg/mg)
IR	= 0.83 m^3/hr	= Inhalation rate
ET	= 24 hr/day	= Exposure time
EF	= 350 day/yr	= Exposure frequency
ED	= 24 yr	= Exposure duration
BW	= 70 kg	= Body weight
AT	= 25550 days	= Averaging time, carcinogens (365 days/yr x 70 yrs)
IF-R	= 0.125	= inhaled fraction retained in lungs (Page 61, Cowherd)
IF-O	= 0.625	= 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, 0.5m^3/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 m^2, 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 (cm^2-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 cm^2-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	= 0.947 mg/kg	= beryllium representative concentration in sediment
	IR	= 200 mg soil/day	= Sediment ingestion rate
	Fi	= 1.0	= Fraction ingested from contaminated source
	BW	= 21.3 kg	= Body weight
	EF	= 7 days/yr	= Exposure frequency
	AT	= 25550 days	= Averaging time for carcinogens (365 days/yr x 70 yrs)
	CF	= 1E-6 kg soil/mg soil	= Conversion factor
	ED	= 6 yrs.	= Exposure Duration

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	= 6.29E-8	= incremental (upper bound) risk of developing cancer
	IEX	= 1.46E-8 mg/kg/day	= Ingestion exposure
	SF	= 4.3 $(mg/kg/day)^{-1}$	= carcinogenic slope factor (upper 95 percent confidence limit 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):

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

where:	DEX	= 9.23E-9 mg/kg/day	= Dermal exposure dose
	C	= 0.947 mg/kg	= Chemical concentration in soil
	AF	= 0.01 mg/cm^2	= 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:	NC	= 1.85E-4	= hazard quotient
	DEX	= 9.23E-9 mg/kg/day	= dermal exposure
	RfD	= 5E-5 mg/kg/day	= 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.

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)
	C	= 0.00306 mg/l	= PCE concentration in water
	IR	= 2 L/day	= Ingestion rate
	EF	= 350 days/yr	= Exposure frequency
	ED	= 24 yr	= Exposure duration
	BW	= 70 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:

$$CA = (IEXc + IEXa) \times SF$$

where:	CA	= 2.37E-6	= incremental (upper bound) lifetime risk of developing cancer
	IEXc	= 1.68E-5 mg/kg/day	= Ingestion exposure for child for 6 years
	IEXa	= 2.87E-5 mg/kg/day	= Ingestion exposure for adult for 24 years
	SF	= 5.2E-2 $(mg/kg/day)^{-1}$	= 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):

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

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

$$DA = 2 \times CF \times Kp \times Cv \times [((6 \times \tau \times t)/\pi)^{0.5}] \text{ for organics, } t < t^*$$

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

where: DA = 2.21E-7 mg/cm^2/event = PCE dose absorbed per event ($t < t^*$)

CF	= 0.001 L/cm^3	= Conversion factor
Kp	= 4.8E-2 cm/hr	= Permeability coefficient from water
Cv	= 0.00306 mg/L	= PCE concentration in water
t	= 0.33 hr/event	= Duration of event (bathing)
t*	= 4.3 hr/event	= Time to reach steady state (hr)
τ	= 0.9 hr	= Lag time
B	= 0.25	= Partition coefficient

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 (cm^2-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 cm^2-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 cm^2), 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):

$$DA = CF \times K \times Cv \times t \text{ for inorganics}$$

where: DA = 7.16E-10 mg/cm^2/event = Arsenic dose absorbed per event

CF	= 0.001 L/cm^3	= Conversion factor
K	= 1E-3 cm/hr	= Permeability coefficient from water
Cv	= 0.00217 mg/L	= Arsenic representative conc. in water
t	= 0.33 hr/event	= 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:

$$CA = (DAD_{child} + DAD_{adult}) \times SF$$

where:	CA	= 1.28E-6	= Incremental cancer risk
	DAD_{child}	= 8.27E-6 mg/kg/day	= Dermally absorbed PCE dose
	DAD_{adult}	= 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
Q	= 2.79 min	= Function of air exchange rate and time in shower and shower room
IR	= 14 L/min	= Inhalation rate
S	= 3.738 $ug/m^3/min$	= Indoor VOC generation rate
BW	= 70 kg	= Body weight
Ra	= 1.667E-2 min^{-1}	= Rate of air exchange
CF	= 10^6 ug X L / (mg X m^3)	= 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	= 15 min	= Duration of shower
Dt	= 20 min	= Total time in shower room
Ra	= 1.667E-2 min^{-1}	= Rate of air exchange

The term S is estimated as follows:

$$S = Cwd \times FR / SV$$

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

The term Cwd is calculated:

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

Cwd	= 1.1213 ug/L	= Concentration leaving water droplet after time ts
C	= 0.00306 mg/L	= 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
T_1	= 293 ^{o}K	= Calibration water temperature of KL
T_s	= 318 ^{o}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	= 10.136 cm/hr	= Mass transfer coefficient
R	= 8.21E-5 atm m^3/mol/^{o}K	= Ideal gas law constant
T	= 293 ^{o}K	= Absolute temperature
H	= 1.53E-2 atm m^3/mole	= Henry's Law constant
kg	= 988.38 cm/hr	= Gas-film mass transfer coefficient
kl	= 10.302 cm/hr	= Liquid-film mass transfer coefficient

The terms kg and kl are calculated:

$$kg = kH \times (MWH / MW)^{0.5}$$

$$kl = kC \times (MWC / MW)^{0.5}$$

kg	= 1440 cm/hr	= Gas-film mass transfer coefficient
kl	= 15.0 cm/hr	= Liquid-film mass transfer coefficient
kH	= 3000 cm/hr	= kg for water
kC	= 20 cm/hr	= kl for carbon dioxide
MWH	= 18 g/mole	= Molecular weight of water
MWC	= 44 g/mole	= Molecular weight of carbon dioxide
MW	= 165.83 g/mole	= 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:

$$CA = DI \times SFi$$

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)
	C	= 2.0E-4 mg/l	= vinyl chloride concentration in water
	IR	= 0.065 L/day	= Ingestion rate
	EF	= 7 days/yr	= Exposure frequency
	ED	= 6 yr	= Exposure duration
	BW	= 21.3 kg	= Body weight
	AT	= 25550 days	= Averaging time for carcinogens (365 days/yr x 70 yrs)

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

$$CA = IEX \times SF$$

where:	CA	= 1.90E-9	= incremental (upper bound) risk of developing cancer
	IEX	= 1.0E-9 mg/kg/day	= Ingestion exposure for child for 6 years
	SF	= 1.9 $(mg/kg/day)^{-1}$	= 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):

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

where:	DAD	= 1.14E-9 mg/kg/day	= Dermally absorbed vinyl chloride dose
	DA	= 4.40E-9 mg/cm^2/event	= vinyl chloride dose absorbed per event
	EV	= 1 event/day	= Event frequency
	EF	= 7 days/yr	= Exposure frequency
	SA_i	= (see Table Q-1)	= Surface area at age i
	BW_i	= (see Table Q-1)	= Body weight at age i
	AT	= 25550 days	= Averaging time, carcinogens (365 days/yr x 70 yrs)

$$DA = 2 \times CF \times Kp \times Cv \times [((6 \times \tau \times t)/\pi)^{0.5}] \text{ for organics, } t < t^*$$

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

where:	DA	= 4.40E-9 mg/cm^2/event	= dieldrin dose absorbed per event ($t < t^*$)
	CF	= 0.001 L/cm^3	= Conversion factor
	Kp	= 7.3E-3 cm/hr	= Permeability coefficient from water
	Cv	= 2.0E-4 mg/L	= vinyl chloride concentration in water
	t	= 2.6 hr/event	= Duration of event
	t*	= 0.51hr	= Time to reach steady state (hr.)
	τ	= 0.21 hr	= Lag time
	B	= 0.0023	= 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 (cm^2-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 cm^2-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, 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 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:	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
	C	= 0.285 mg/kg	= mercury representative concentration in Pond No. 1 Bass composite sample
	IR_f	= 8.15 g fish/day	= upper 95 percentile child fish ingestion rate, recreationally-caught fish only
	BW	= 15 kg	= Body weight
	EF	= 365 days/yr	= Exposure frequency
	ED	= 6 yrs	= Exposure duration
	CF	= 1E-3 kg fish /g fish	= Conversion factor
	AT	= 2190 days	= Averaging time, non-carcinogens (365 days/yr x 6 yrs)

$$IR_f = IR_{ch95tot} \times (IR_{chMeanRec} / IR_{chMeanTot})$$

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).

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

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

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

$$INTAKE_{INGESTION}\left(mg/kg\right)/day = \text{IEX} = \left[\left(C_b * IR_b\right) + \left(C_m * IR_m\right)\right] * \left[\frac{CF_1 * EF * ED}{AT * 365^{days}/_{year}}\right]$$

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

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

$IR_b = IR_{ch95ownAnimals}$ x $(IR_{All95ownAnimals} / IR_{All95anySource})$

$IR_b = 8.8222 = 8.51$ x $(7.51 / 7.24)$

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
$IR_{All95ownAnimals}$	= 7.51 g / kg-day	= upper 95 % all ages beef ingestion rate, only beef 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.

$IR_m = IR_{ch95AnySource}$ x $(IR_{All95ownAnimals} / IR_{All95anySource})$

$IR_m = 15.3 = 15.3$ x $(34.2 / 34.2)$

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):

$$C_r = C_s * B_r = 0.02394 = 3.99 * 6.0\text{E-}03$$

$$C_v = C_s * B_v = 0.1596 = 3.99 * 0.04$$

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):

$$I_w = IR_{sw} * \sum_{i}^{SWsources} \left\{C_{sw(i)} * \left(\%_{sw(i)}\right)\right\} * CF_2 * CF_3 = 0.03885 = 10 * \left\{0 * (0.75) + 4.1 * (0.25)\right\} * 0.001 * 3.79$$

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

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

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

Secondary Uptake by Plants from Soil(I_p):

$$C_r = C_s * B_r = 0.02394 = 3.99 * 6.0\text{E-}03$$

$$C_v = C_s * B_v = 0.1596 = 3.99 * 0.04$$

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):

$$I_w = IR_{sw} * \sum_{i}^{SWsources} \left\{C_{sw(i)} * \left(\%_{sw(i)}\right)\right\} * CF_2 * CF_3 = 0.1189 = 30.6 * \left\{0 * (0.75) + 4.1 * (0.25)\right\} * 0.001 * 3.79$$

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

$$C_m = \left[\left(I_p\right) + \left(I_s\right) + \left(I_w\right)\right] * B_m = 4.727\text{E-}05 = \left[(0.4694) + (0.1995) + (0.1189)\right] * 6.0\text{E-}05$$

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

BW = Body weight (kg)
AT = Averaging time (years)
C_r = 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)]
C_v = Concentration of COPC in vegetative (forage) plant dry matter (DM) (mg COPC / kg plant)
B_v = Soil-to-vegetative material biotransfer factor [(mg COPC / kg plant) / (mg COPC / kg soil)]
I_p = Intake of COPC in plant material by the cow (mg COPC / day)
Q_v = Overall daily forage (vegetative portion) ingestion rate (kg DM / day)
f_p = Fraction of cow's total daily plant (fruit or vegetative) intake from contaminated source (unitless)
f_s = Fraction of cow's daily soil intake from contaminated source (unitless)
Q_r = Overall daily feed concentrate (fruit portion) ingestion rate (kg DM / day)
I_s = Intake of COPC in soil by the cow (mg COPC / day)
C_s = COPC concentration in soil (mg COPC / kg soil)
Q_s = Contaminated soil ingestion rate (kg soil / day)
I_w = Intake of COPC in water by the cow (mg COPC / day)
IR_{sw} = Ingestion rate of water by the cow (gals / 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)
B_b = 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.

APPENDIX Q

SURFACE AREAS & BODY WEIGHT CALCULATIONS

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

50 Percentile Surface Areas, Body Weights, and Ratios
Children, Various Ages

						Surface Areas Divided by Body Weight					Percent of Total Surface Area by Body Part			
AGE	Male Surf. Area	Male Body Wt.	Female Surf. Area	Female Body Wt.	SA/BW AVE(M+F)	H+L+F SW-Wade	H+A+L+F SS, dry SED	H + F SED	H+A+F Seep Aq	WHOLE Swim/Bath	% TOT SA ARMS	% TOT SA HANDS	% TOT SA LEGS	% TOT SA FEET
1-2	---	---	---	---	617	216.259	296.469	73.732	153.942	617	13	5.68	23.1	6.27
2-3	6030	13.5	5790	12.7	451.286	160.522	213.774	55.824	109.076	451.286	11.8	5.3	23.2	7.07
3-4	6640	15.4	6490	14.7	436.333	169.472	229.904	57.552	117.984	436.333	13.85	5.885	25.65	7.305
4-5	7310	17.6	7060	16.7	419.048	165.503	222.284	54.665	111.446	419.048	13.55	5.6	26.45	7.445
5-6	7930	19.4	7790	19	409.381	161.685	217.156	53.404	108.875	409.381	13.55	5.6	26.45	7.445
6-7	8660	22	8430	21.3	394.706	156.521	209.609	48.174	101.262	394.706	13.45	4.955	27.45	7.25
7-8	9360	24.8	9170	23.8	381.357	151.227	202.52	46.545	97.837	381.357	13.45	4.955	27.45	7.25
8-9	10000	27.5	10000	27.5	363.636	144.2	193.109	44.382	93.291	363.636	13.45	4.955	27.45	7.25
			3 - 8 yr old	SUM =	2404	949	1275	305	631	2404		Λ		
			1 - 6 yr old	SUM =	2728	1030	1389	343	703	2728		Λ		

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.

						Total Surface Area by Body Part			
	H+L+F SW-Wade	H+A+F SS, dry SD	H + F SED	H+A+F Seep Aq	WHOLE Swim/Bath	TOT SA ARMS	TOT SA HANDS	TOT SA LEGS	TOT SA FEET
MALE	8700	5210	2300	5210	19400	2910	990	6400	1310
FEMALE	7417	4257	1957	4257	16900	2300	817	5460	1140
AVE.	8059	4734	2129	4734	18150				

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

Substance	Biotransfer Factor for Beef B(b)	Biotransfer Factor for Milk B(m)	Biotransfer Factor for Forage B(v)	Biotransfer Factor for Concentrate 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 COPC was not detected in applicable media that required a biotransfer factor

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

Substance	Biotransfer Factor for Beef B(b)	Biotransfer Factor for Milk B(m)	Biotransfer Factor for Forage B(v)	Biotransfer Factor for Concentrate 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 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 $B_r = B_v$.)

APPENDIX S

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

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

					Area 1 Groundwater			Area 1 Res.Wells			Area 1 Mon. Wells			Area 2 Groundwater			Area 2 Res. Wells			Area 2 Mon. Wells		
	Detected On-Site Above Back	Detected In Any Area above Back	Selected As COPC In Any Area	Either a COPC or On-Site	Detect Above Back	May be Attrib. To Site	Select As a COPC	Detect Above Back	May be Attrib. To Site	Select As a COPC	Detect Above Back	May be Attrib. To Site	Select As a COPC	Detect Above Back	May be Attrib. To Site	Select As a COPC	Detect Above Back	May be Attrib. To Site	Select As a COPC	Detect Above Back	May be Attrib. To Site	Select As a COPC
Found in On-Site Mon.Wells Above Background or Selected As COPCs																						
chloride	Y	Y	N	Y	Y	Y	N	NA	NA	N	NA	NA	NA	Y	Y	N	NA	NA	N	NA	NA	NA
nitrate	N	N	Y	Y	N	N	Y	NA	NA	Y	NA	NA	NA	N	N	Y	NA	NA	Y	NA	NA	NA
nitrite	N	N	Y	Y	N	N	Y	NA	NA	Y	NA	NA	NA	N	N	N	NA	NA	N	NA	NA	NA
aluminum	N	Y	Y	Y	Y	N	N	Y	N	N	N	N	NA	Y	N	Y	Y	N	Y	N	N	NA
arsenic	N	Y	Y	Y	Y	N	Y	Y	N	Y	N	N	NA	Y	N	Y	Y	N	Y	N	N	NA
barium	N	Y	Y	Y	Y	N	Y	Y	N	Y	Y	N	NA	Y	N	Y	Y	N	Y	Y	N	NA
beryllium	NA	Y	Y	Y	N	N	N	ND	N	N	NA	NA	NA	NA	N	Y	NA	NA	Y	NA	NA	NA
chromium	N	Y	Y	Y	Y	N	Y	Y	N	Y	N	N	NA	Y	N	N	Y	N	N	N	N	NA
cobalt	Y	Y	Y	Y	N	N	N	N	N	Y	N	N	NA	N	N	N	N	N	Y	N	N	NA
copper	N	Y	Y	Y	Y	N	Y	Y	N	Y	N	N	NA	Y	N	Y	Y	N	Y	N	N	NA
iron	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	N	NA	Y	Y	Y	Y	Y	Y	Y	Y	NA
lead	N	Y	Y	Y	Y	N	Y	Y	N	Y	N	N	NA	Y	N	Y	Y	N	Y	N	N	NA
magnesium	Y	Y	N	Y	Y	Y	N	Y	Y	N	Y	Y	NA	Y	Y	N	N	N	N	Y	Y	NA
manganese	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	NA	Y	Y	Y	Y	Y	Y	N	N	NA
mercury (tot. all)	Y	Y	N	Y	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
mercury, low d.l. test	Y	Y	N	Y	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
mercury, routine test	Y	Y	Y	Y	Y	Y	Y	ND	N	N	Y	Y	NA	N	N	N	N	N	Y	N	N	NA
thallium	ND	N	Y	Y	N	N	N	N	N	N	NA	NA	NA	N	N	N	N	N	N	NA	NA	NA
zinc	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	NA	Y	Y	N	Y	Y	Y	N	N	NA
Not Present On-Site Above Background and Not Selected As COPCs																						
antimony	ND	Y	N	N	N	N	N	N	N	N	N	N	NA	N	N	N	N	N	N	N	N	NA
cadmium	ND	Y	N	N	N	N	N	N	N	N	NA	NA	NA	N	N	N	N	N	N	NA	NA	NA
calcium	N	Y	N	N	Y	N	N	Y	N	N	Y	N	NA	Y	N	N	Y	N	N	Y	N	NA
nickel	N	Y	N	N	N	N	N	N	N	N	N	N	NA	N	N	N	N	N	N	N	N	NA
potassium	N	Y	N	N	Y	N	N	Y	N	N	N	N	NA	Y	N	N	Y	N	N	N	N	NA
selenium	N	Y	N	N	N	N	N	N	N	N	N	N	NA	N	N	N	N	N	N	ND	N	NA
silver	ND	Y	N	N	N	N	N	ND	N	N	ND	N	NA	N	N	N	NA	NA	N	ND	N	NA
sodium	N	Y	N	N	N	N	N	N	N	N	N	N	NA	Y	N	N	Y	N	N	N	N	NA
vanadium	N	Y	N	N	N	N	N	NA	NA	N	N	N	NA	N	N	N	NA	NA	N	N	N	NA

NA = Not applicable to this 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

					Spring No. 1 Sediment			Potable Spring No. 1			Spring No. 2 Sediment			Potable Spring No. 2			Conewago, Key.Tr.Sed.			Conewago, Key.Tr. SW		
	Detected On-Site Above Back	Detected In Any Area above Back	Selected As COPC In Any Area	Either a COPC or On-Site	Detect Above Back	May be Attrib. To Site	Select As a COPC	Detect Above Back	May be Attrib. To Site	Select As a COPC	Detect Above Back	May be Attrib. To Site	Select As a COPC	Detect Above Back	May be Attrib. To Site	Select As a COPC	Detect Above Back	May be Attrib. To Site	Select As a COPC	Detect Above Back	May be Attrib To Site	Select As a COPC
Found In On-Site Mon.Wells Above Background or Selected As COPCs																						
chloride	Y	Y	N	Y	ND	N	N	NA	NA	N	ND	N	N	NA	NA	N	ND	N	N	NA	NA	N
nitrate	N	N	Y	Y	ND	N	N	ND	N	N	ND	N	N	ND	N	N	ND	N	N	ND	N	N
nitrite	N	N	Y	Y	ND	N	N	ND	N	N	ND	N	N	ND	N	N	ND	N	N	ND	N	N
aluminum	N	Y	Y	Y	N	N	N	ND	N	N	N	N	N	Y	N	Y	Y	N	N	Y	N	Y
arsenic	N	Y	Y	Y	N	N	N	ND	N	N	N	N	N	N	N	N	N	N	N	Y	N	Y
barium	N	Y	Y	Y	N	N	N	Y	N	N	N	N	N	Y	N	N	Y	N	N	Y	N	Y
beryllium	NA	Y	Y	Y	N	N	N	ND	N	N	N	N	N	ND	N	N	N	N	N	N	N	N
chromium	N	Y	Y	Y	N	N	N	ND	N	N	N	N	N	Y	N	N	N	N	N	Y	N	Y
cobalt	Y	Y	Y	Y	N	N	N	ND	N	N	N	N	N	N	N	N	Y	Y	N	Y	Y	N
copper	N	Y	Y	Y	N	N	N	ND	N	N	N	N	N	N	N	N	Y	N	N	Y	N	N
iron	Y	Y	Y	Y	N	N	N	N	N	N	N	N	N	Y	Y	Y	N	N	N	Y	Y	Y
lead	N	Y	Y	Y	N	N	N	ND	N	N	N	N	N	Y	N	Y	Y	N	N	Y	N	Y
magnesium	Y	Y	N	Y	N	N	N	N	N	N	N	N	N	Y	Y	N	N	N	N	Y	Y	N
manganese	Y	Y	Y	Y	N	N	N	ND	N	N	N	N	N	N	N	N	Y	Y	Y	Y	Y	Y
mercury (tot. all)	Y	Y	N	Y	ND	N	N	ND	N	N	ND	N	N	Y	Y	N	Y	Y	N	Y	Y	N
mercury, low d.l. test	Y	Y	N	Y	ND	N	N	ND	N	N	ND	N	N	Y	Y	N	Y	Y	N	Y	Y	N
mercury, routine test	Y	Y	Y	Y	ND	N	N	ND	N	N	ND	N	N	N	N	N	N	N	N	N	N	N
thallium	ND	N	Y	Y	ND	N	N	ND	N	N	ND	N	N	ND	N	N	ND	N	N	NA	NA	Y
zinc	Y	Y	Y	Y	N	N	N	N	N	N	N	N	N	Y	Y	N	N	N	N	Y	Y	N
Not Present On-Site Above Background and Not Selected As COPCs																						
antimony	ND	Y	N	N	ND	N	N	Y	N	N	ND	N	N	ND	N	N	ND	N	N	ND	N	N
cadmium	ND	Y	N	N	ND	N	N	ND	N	N	Y	N	N	NA	NA	N	ND	N	N	ND	N	N
calcium	N	Y	N	N	N	N	N	N	N	N	N	N	N	N	N	N	Y	N	N	Y	N	N
nickel	N	Y	N	N	N	N	N	ND	N	N	N	N	N	Y	N	N	N	N	N	Y	N	N
potassium	N	Y	N	N	N	N	N	N	N	N	ND	N	N	N	N	N	Y	N	N	Y	N	N
selenium	N	Y	N	N	ND	N	N	ND	N	N	ND	N	N	ND	N	N	Y	N	N	ND	N	N
silver	ND	Y	N	N	ND	N	N	Y	N	N	ND	N	N	ND	N	N	ND	N	N	NA	NA	N
sodium	N	Y	N	N	ND	N	N	N	N	N	ND	N	N	N	N	N	Y	N	N	Y	N	N
vanadium	N	Y	N	N	N	N	N	N	N	N	N	N	N	Y	N	N	N	N	N	N	N	N

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

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

					Conewago,Mun.Tr.Sed.			Conewago,Mun.Tr.SW			Conewago,West.Tr.Sed			Conewago,West.Tr.SW			Conewago,East.Tr.Sed			Conewago,East.Tr.SW		
	Detected On-Site Above Back	Detected In Any Area above Back	Selected As COPC In Any Area	Either a COPC or On-Site	Detect Above Back	May be Attrib. To Site	Select As a COPC	Detect Above Back	May be Attrib. To Site	Select As a COPC	Detect Above Back	May be Attrib. To Site	Select As a COPC	Detect Above Back	May be Attrib. To Site	Select As a COPC	Detect Above Back	May be Attrib. To Site	Select As a COPC	Detect Above Back	May be Attrib. To Site	Select As a COPC
Found in On-Site Mon.Wells Above Background or Selected As COPCs																						
chloride	Y	Y	N	Y	ND	N	N	ND	N	N	ND	N	N	NA	NA	N	ND	N	N	ND	N	N
nitrate	N	N	Y	Y	ND	N	N	ND	N	N	ND	N	N	ND	N	N	ND	N	N	ND	N	N
nitrite	N	N	Y	Y	ND	N	N	ND	N	N	ND	N	N	ND	N	N	ND	N	N	ND	N	N
aluminum	N	Y	Y	Y	N	N	N	Y	N	N	N	N	N	Y	N	N	N	N	N	Y	N	N
arsenic	N	Y	Y	Y	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	ND	N	N
barium	N	Y	Y	Y	Y	N	N	Y	N	N	N	N	N	Y	N	N	N	N	N	N	N	N
beryllium	NA	Y	Y	Y	Y	N	Y	NA	NA	Y	Y	N	N	ND	N	N	N	N	N	ND	N	N
chromium	N	Y	Y	Y	N	N	N	Y	N	N	N	N	N	N	N	N	N	N	N	Y	N	N
cobalt	Y	Y	Y	Y	Y	Y	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
copper	N	Y	Y	Y	N	N	N	Y	N	N	N	N	N	N	N	N	N	N	N	N	N	N
iron	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	N	N	Y	Y	N	N	N	N	Y	Y	N
lead	N	Y	Y	Y	Y	N	N	N	N	N	N	N	N	Y	N	N	N	N	N	Y	N	N
magnesium	Y	Y	N	Y	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	Y	Y	N
manganese	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	N	N	N	N	N	N	N	N	Y	Y	N
mercury (tot. all)	Y	Y	N	Y	N	N	N	N	N	N	N	N	N	ND	N	N	N	N	N	Y	Y	N
mercury, low d.l. test	Y	Y	N	Y	Y	Y	N	N	N	N	N	N	N	ND	N	N	N	N	N	ND	N	N
mercury, routine test	Y	Y	Y	Y	N	N	N	N	N	N	ND	N	N	ND	N	N	N	N	N	Y	Y	N
thallium	ND	N	Y	Y	N	N	N	ND	N	N	ND	N	N	ND	N	N	ND	N	N	ND	N	N
zinc	Y	Y	Y	Y	N	N	N	Y	Y	N	N	N	N	Y	Y	N	N	N	N	Y	Y	N
Not Present On-Site Above Background and Not Selected As COPCs																						
antimony	ND	Y	N	N	ND	N	N	ND	N	N	ND	N	N	ND	N	N	ND	N	N	ND	N	N
cadmium	ND	Y	N	N	ND	N	N	ND	N	N	ND	N	N	ND	N	N	ND	N	N	ND	N	N
calcium	N	Y	N	N	N	N	N	Y	N	N	N	N	N	Y	N	N	N	N	N	Y	N	N
nickel	N	Y	N	N	N	N	N	Y	N	N	N	N	N	ND	N	N	N	N	N	Y	N	N
potassium	N	Y	N	N	Y	N	N	Y	N	N	N	N	N	N	N	N	N	N	N	N	N	N
selenium	N	Y	N	N	Y	N	N	ND	N	N	N	N	N	ND	N	N	Y	N	N	ND	N	N
silver	ND	Y	N	N	ND	N	N	ND	N	N	ND	N	N	ND	N	N	ND	N	N	ND	N	N
sodium	N	Y	N	N	N	N	N	N	N	N	Y	N	N	N	N	N	N	N	N	N	N	N
vanadium	N	Y	N	N	N	N	N	Y	N	N	N	N	N	N	N	N	N	N	N	N	N	N

NA = Not applicable to this 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

					Piney Cr,Bndry.Tr.Sed.			Piney Cr.,Bndry.Tr.SW			Piney Cr.,North.Tr. Sed.			Piney Cr.,North.Tr. SW			Pond No. 1 Sediment			Pond No. 1 SW		
	Detected On-Site Above Back	Detected In Any Area above Back	Selected As COPC In Any Area	Either a COPC or On-Site	Detect Above Back	May be Attrib. To Site	Select As a COPC	Detect Above Back	May be Attrib. To Site	Select As a COPC	Detect Above Back	May be Attrib. To Site	Select As a COPC	Detect Above Back	May be Attrib. To Site	Select As a COPC	Detect Above Back	May be Attrib. To Site	Select As a COPC	Detect Above Back	May be Attrib. To Site	Select As a COPC
Found In On-Site Mon.Wells Above Background or Selected As COPCs																						
chloride	Y	Y	N	Y	ND	N	N	ND	N	N	ND	N	N	ND	N	N	ND	N	N	ND	N	N
nitrate	N	N	Y	Y	ND	N	N	ND	N	N	ND	N	N	ND	N	N	ND	N	N	ND	N	N
nitrite	N	N	Y	Y	ND	N	N	ND	N	N	ND	N	N	ND	N	N	ND	N	N	ND	N	N
aluminum	N	Y	Y	Y	N	N	N	Y	N	N	N	N	N	Y	N	N	N	N	N	N	N	N
arsenic	N	Y	Y	Y	N	N	N	Y	N	Y	N	N	N	ND	N	N	N	N	N	ND	N	N
barium	N	Y	Y	Y	N	N	N	N	N	N	Y	N	N	Y	N	N	Y	N	N	N	N	N
beryllium	NA	Y	Y	Y	N	N	N	NA	NA	Y	N	N	N	NA	NA	Y	N	N	N	ND	N	N
chromium	N	Y	Y	Y	N	N	N	Y	N	N	N	N	N	N	N	N	N	N	N	ND	N	N
cobalt	Y	Y	Y	Y	N	N	N	N	N	N	Y	Y	N	Y	Y	N	N	N	N	ND	N	N
copper	N	Y	Y	Y	N	N	N	N	N	N	N	N	N	Y	N	N	N	N	N	N	N	N
iron	Y	Y	Y	Y	N	N	N	Y	Y	Y	N	N	N	Y	Y	Y	N	N	N	N	N	N
lead	N	Y	Y	Y	Y	N	N	Y	N	Y	N	N	N	N	N	N	N	N	N	N	N	N
magnesium	Y	Y	N	Y	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	Y	Y	N
manganese	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	N	Y	Y	N	N	N	N
mercury (tot. all)	Y	Y	N	Y	ND	N	N	ND	N	N	Y	Y	N	N	N	N	N	N	N	N	N	N
mercury, low d.l. test	Y	Y	N	Y	ND	N	N	ND	N	N	N	N	N	N	N	N	N	N	N	ND	N	N
mercury, routine test	Y	Y	Y	Y	N	N	N	ND	N	N	N	N	N	ND	N	N	ND	N	N	N	N	N
thallium	ND	N	Y	Y	ND	N	N	ND	N	N	ND	N	N	ND	N	N	ND	N	N	ND	N	N
zinc	Y	Y	Y	Y	N	N	N	Y	Y	N	N	N	N	Y	Y	N	N	N	N	N	N	N
Not Present On-Site Above Background and Not Selected As COPCs																						
antimony	ND	Y	N	N	ND	N	N	ND	N	N	ND	N	N	ND	N	N	ND	N	N	ND	N	N
cadmium	ND	Y	N	N	ND	N	N	ND	N	N	ND	N	N	ND	N	N	ND	N	N	ND	N	N
calcium	N	Y	N	N	N	N	N	N	N	N	N	N	N	N	N	N	Y	N	N	N	N	N
nickel	N	Y	N	N	N	N	N	Y	N	N	N	N	N	ND	N	N	N	N	N	ND	N	N
potassium	N	Y	N	N	N	N	N	N	N	N	Y	N	N	Y	N	N	N	N	N	N	N	N
selenium	N	Y	N	N	Y	N	N	ND	N	N	Y	N	N	N	N	N	N	N	N	N	N	N
silver	ND	Y	N	N	ND	N	N	ND	N	N	ND	N	N	ND	N	N	ND	N	N	ND	N	N
sodium	N	Y	N	N	Y	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
vanadium	N	Y	N	N	N	N	N	N	N	N	N	N	N	Y	N	N	N	N	N	ND	N	N

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

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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. 1 Sediment			Seep No. 1 SW			Seep No. 2 Sediment			Seep No. 2 SW			Seep No. 3 Sediment			Seep No. 3 SW		
	Detected On-Site Above Back	Detected In Any Area above Back	Selected As COPC In Any Area	Either a COPC or On-Site	Detect Above Back	May be Attrib. To Site	Select As a COPC	Detect Above Back	May be Attrib. To Site	Select As a COPC	Detect Above Back	May be Attrib. To Site	Select As a COPC	Detect Above Back	May be Attrib. To Site	Select As a COPC	Detect Above Back	May be Attrib. To Site	Select As a COPC	Detect Above Back	May be Attrib. To Site	Select As a COPC
Found in On-Site Mon.Wells Above Background or Selected As COPCs																						
chloride	Y	Y	N	Y	ND	N	N	ND	N	N	ND	N	N	ND	N	N	ND	N	N	ND	N	N
nitrate	N	N	Y	Y	ND	N	N	ND	N	N	ND	N	N	ND	N	N	ND	N	N	ND	N	N
nitrite	N	N	Y	Y	ND	N	N	ND	N	N	ND	N	N	ND	N	N	ND	N	N	ND	N	N
aluminum	N	Y	Y	Y	N	N	N	Y	N	N	Y	N	N	N	N	N	N	N	N	N	N	N
arsenic	N	Y	Y	Y	Y	N	Y	N	N	N	N	N	N	ND	N	N	N	N	N	Y	N	Y
barium	N	Y	Y	Y	Y	N	N	Y	N	N	N	N	N	N	N	N	N	N	N	Y	N	N
beryllium	NA	Y	Y	Y	NA	NA	Y	NA	NA	Y	Y	N	N	ND	N	N	N	N	N	ND	N	N
chromium	N	Y	Y	Y	N	N	N	Y	N	N	N	N	N	ND	N	N	N	N	N	ND	N	N
cobalt	Y	Y	Y	Y	Y	Y	N	Y	Y	N	Y	Y	N	ND	N	N	N	N	N	N	N	N
copper	N	Y	Y	Y	Y	N	N	N	N	N	N	N	N	ND	N	N	N	N	N	N	N	N
iron	Y	Y	Y	Y	N	N	N	Y	Y	Y	Y	Y	Y	Y	Y	N	N	N	N	N	N	N
lead	N	Y	Y	Y	N	N	N	Y	N	Y	N	N	N	Y	N	Y	N	N	N	N	N	N
magnesium	Y	Y	N	Y	Y	Y	N	Y	Y	N	N	N	N	N	N	N	N	N	N	Y	Y	N
manganese	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	N	N	N	N	N	N	N	N	N	N	N
mercury (tot. all)	Y	Y	N	Y	ND	N	N	ND	N	N	N	N	N	ND	N	N	ND	N	N	ND	N	N
mercury, low d.l. test	Y	Y	N	Y	ND	N	N	ND	N	N	N	N	N	ND	N	N	ND	N	N	ND	N	N
mercury, routine test	Y	Y	Y	Y	NA	NA	N	ND	N	N	ND	N	N	N	N	N	ND	N	N	ND	N	N
thallium	ND	N	Y	Y	ND	N	N	ND	N	N	ND	N	N	ND	N	N	ND	N	N	N	N	N
zinc	Y	Y	Y	Y	Y	Y	N	Y	Y	N	N	N	N	ND	N	N	N	N	N	Y	Y	N
Not Present On-Site Above Background and Not Selected As COPCs																						
antimony	ND	Y	N	N	ND	N	N	ND	N	N	ND	N	N	ND	N	N	ND	N	N	ND	N	N
cadmium	ND	Y	N	N	ND	N	N	ND	N	N	ND	N	N	ND	N	N	ND	N	N	ND	N	N
calcium	N	Y	N	N	N	N	N	Y	N	N	N	N	N	N	N	N	N	N	N	N	N	N
nickel	N	Y	N	N	Y	N	N	Y	N	N	N	N	N	ND	N	N	N	N	N	ND	N	N
potassium	N	Y	N	N	N	N	N	Y	N	N	Y	N	N	N	N	N	N	N	N	N	N	N
selenium	N	Y	N	N	N	N	N	N	N	N	Y	N	N	ND	N	N	N	N	N	ND	N	N
silver	ND	Y	N	N	ND	N	N	ND	N	N	ND	N	N	ND	N	N	ND	N	N	ND	N	N
sodium	N	Y	N	N	NA	NA	N	Y	N	N	Y	N	N	N	N	N	N	N	N	N	N	N
vanadium	N	Y	N	N	N	N	N	Y	N	N	Y	N	N	ND	N	N	N	N	N	N	N	N

NA = Not applicable to this 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

					Seep No. 4 Sediment			Seep No. 4 SW			Seep No. 5 Sediment			Seep No. 5 SW			Seep No. 6 Sediment			Seep No. 6 SW		
	Detected On-Site Above Back	Detected In Any Area above Back	Selected As COPC In Any Area	Either a COPC or On-Site	Detect Above Back	May be Attrib. To Site	Select As a COPC	Detect Above Back	May be Attrib. To Site	Select As a COPC	Detect Above Back	May be Attrib. To Site	Select As a COPC	Detect Above Back	May be Attrib. To Site	Select As a COPC	Detect Above Back	May be Attrib. To Site	Select As a COPC	Detect Above Back	May be Attrib. To Site	Select As a COPC
Found in On-Site Mon.Wells Above Background or Selected As COPCs																						
chloride	Y	Y	N	Y	ND	N	N	ND	N	N	ND	N	N	ND	N	N	ND	N	N	ND	N	N
nitrate	N	N	Y	Y	ND	N	N	ND	N	N	ND	N	N	ND	N	N	ND	N	N	ND	N	N
nitrite	N	N	Y	Y	ND	N	N	ND	N	N	ND	N	N	ND	N	N	ND	N	N	ND	N	N
aluminum	N	Y	Y	Y	Y	N	N	Y	N	N	N	N	N	Y	N	N	N	N	N	Y	N	N
arsenic	N	Y	Y	Y	Y	N	Y	ND	N	N	Y	N	Y	Y	N	Y	ND	N	N	Y	N	Y
barium	N	Y	Y	Y	Y	N	N	Y	N	N	N	N	N	Y	N	N	N	N	N	Y	N	N
beryllium	NA	Y	Y	Y	Y	N	Y	ND	N	N	NA	NA	Y	NA	NA	Y	NA	NA	N	NA	NA	Y
chromium	N	Y	Y	Y	N	N	N	ND	N	N	N	N	N	Y	N	N	N	N	N	Y	N	N
cobalt	Y	Y	Y	Y	Y	Y	N	Y	Y	N	N	N	N	Y	Y	N	N	N	N	Y	Y	N
copper	N	Y	Y	Y	N	N	N	ND	N	N	Y	N	N	Y	N	N	N	N	N	N	N	N
iron	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	N	N	Y	Y	Y	N	N	N	Y	Y	Y
lead	N	Y	Y	Y	N	N	N	Y	N	N	N	N	N	Y	N	Y	N	N	N	Y	N	Y
magnesium	Y	Y	N	Y	N	N	N	N	N	N	Y	Y	N	Y	Y	N	N	N	N	Y	Y	N
manganese	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	N	N	N	N	N	N	N	N	Y	Y	N
mercury (tot. all)	Y	Y	N	Y	ND	N	N	ND	N	N	NA	NA	N	ND	N	N	ND	N	N	ND	N	N
mercury, low d.l. test	Y	Y	N	Y	ND	N	N	ND	N	N	NA	NA	N	ND	N	N	ND	N	N	ND	N	N
mercury, routine test	Y	Y	Y	Y	ND	N	N	ND	N	N	ND	N	N	ND	N	N	ND	N	N	ND	N	N
thallium	ND	N	Y	Y	ND	N	N	ND	N	N	ND	N	N	ND	N	N	ND	N	N	ND	N	N
zinc	Y	Y	Y	Y	N	N	N	ND	N	N	Y	Y	N	Y	Y	N	N	N	N	Y	Y	N
Not Present On-Site Above Background and Not Selected As COPCs																						
antimony	ND	Y	N	N	ND	N	N	ND	N	N	ND	N	N	ND	N	N	ND	N	N	ND	N	N
cadmium	ND	Y	N	N	ND	N	N	ND	N	N	ND	N	N	ND	N	N	ND	N	N	ND	N	N
calcium	N	Y	N	N	N	N	N	N	N	N	Y	N	N	N	N	N	N	N	N	N	N	N
nickel	N	Y	N	N	Y	N	N	ND	N	N	Y	N	N	Y	N	N	Y	N	N	Y	N	N
potassium	N	Y	N	N	Y	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
selenium	N	Y	N	N	ND	N	N	Y	N	N	N	N	N	ND	N	N	ND	N	N	ND	N	N
silver	ND	Y	N	N	ND	N	N	ND	N	N	ND	N	N	ND	N	N	ND	N	N	ND	N	N
sodium	N	Y	N	N	ND	N	N	N	N	N	NA	NA	N	N	N	N	NA	NA	N	N	N	N
vanadium	N	Y	N	N	Y	N	N	ND	N	N	N	N	N	Y	N	N	N	N	N	Y	N	N

NA = Not applicable to this 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

					Seep No. 7 Sediment			Seep No. 7 SW			Seep No. 8 Sediment			Seep No. 8 SW			Seep No. 9 Sediment			Seep No. 9 SW		
	Detected On-Site Above Back	Detected In Any Area above Back	Selected As COPC In Any Area	Either a COPC or On-Site	Detect Above Back	May be Attrib. To Site	Select As a COPC	Detect Above Back	May be Attrib. To Site	Select As a COPC	Detect Above Back	May be Attrib. To Site	Select As a COPC	Detect Above Back	May be Attrib. To Site	Select As a COPC	Detect Above Back	May be Attrib. To Site	Select As a COPC	Detect Above Back	May be Attrib. To Site	Select As a COPC
Found in On-Site Mon.Wells Above Background or Selected As COPCs																						
chloride	Y	Y	N	Y	ND	N	N	ND	N	N	ND	N	N	NA	NA	N	ND	N	N	ND	N	N
nitrate	N	N	Y	Y	ND	N	N	ND	N	N	ND	N	N	ND	N	N	ND	N	N	ND	N	N
nitrite	N	N	Y	Y	ND	N	N	ND	N	N	ND	N	N	ND	N	N	ND	N	N	ND	N	N
aluminum	N	Y	Y	Y	N	N	N	N	N	N	N	N	N	ND	N	N	N	N	N	N	N	N
arsenic	N	Y	Y	Y	ND	N	N	Y	N	Y	N	N	N	ND	N	N	N	N	N	ND	N	N
barium	N	Y	Y	Y	N	N	N	Y	N	N	N	N	N	Y	N	N	Y	N	N	Y	N	N
beryllium	NA	Y	Y	Y	NA	NA	Y	ND	N	N	NA	NA	N	ND	N	N	NA	NA	N	ND	N	N
chromium	N	Y	Y	Y	N	N	N	ND	N	N	N	N	N	ND	N	N	Y	N	N	ND	N	N
cobalt	Y	Y	Y	Y	N	N	N	Y	Y	N	N	N	N	ND	N	N	N	N	N	N	N	N
copper	N	Y	Y	Y	N	N	N	Y	N	N	N	N	N	ND	N	N	N	N	N	ND	N	N
iron	Y	Y	Y	Y	N	N	N	Y	Y	N	N	N	N	ND	N	N	N	N	N	N	N	N
lead	N	Y	Y	Y	N	N	N	N	N	N	N	N	N	ND	N	N	N	N	N	ND	N	N
magnesium	Y	Y	N	Y	N	N	N	N	N	N	N	N	N	N	N	N	Y	Y	N	N	N	N
manganese	Y	Y	Y	Y	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	Y	Y	N
mercury (tot. all)	Y	Y	N	Y	ND	N	N	ND	N	N	ND	N	N	ND	N	N	ND	N	N	ND	N	N
mercury, low d.l. test	Y	Y	N	Y	ND	N	N	ND	N	N	ND	N	N	ND	N	N	NA	NA	N	Y	Y	N
mercury, routine test	Y	Y	Y	Y	ND	N	N	ND	N	N	ND	N	N	ND	N	N	ND	N	N	ND	N	N
thallium	ND	N	Y	Y	ND	N	N	ND	N	N	ND	N	N	ND	N	N	ND	N	N	ND	N	N
zinc	Y	Y	Y	Y	Y	Y	N	Y	Y	N	N	N	N	N	N	N	N	N	N	ND	N	N
Not Present On-Site Above Background and Not Selected As COPCs																						
antimony	ND	Y	N	N	ND	N	N	ND	N	N	ND	N	N	ND	N	N	ND	N	N	ND	N	N
cadmium	ND	Y	N	N	ND	N	N	ND	N	N	ND	N	N	ND	N	N	ND	N	N	ND	N	N
calcium	N	Y	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
nickel	N	Y	N	N	Y	N	N	ND	N	N	N	N	N	ND	N	N	Y	N	N	Y	N	N
potassium	N	Y	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
selenium	N	Y	N	N	ND	N	N	ND	N	N	ND	N	N	ND	N	N	N	N	N	ND	N	N
silver	ND	Y	N	N	ND	N	N	ND	N	N	ND	N	N	ND	N	N	ND	N	N	ND	N	N
sodium	N	Y	N	N	NA	NA	N	N	N	N	ND	N	N	N	N	N	NA	NA	N	Y	N	N
vanadium	N	Y	N	N	N	N	N	ND	N	N	N	N	N	ND	N	N	Y	N	N	ND	N	N

NA = Not applicable to this 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

					Area A Surface Soil			Area B Surface Soil			Area C Surface Soil			Area D Surface Soil		
	Detected On-Site Above Back	Detected In Any Area above Back	Selected As COPC In Any Area	Either a COPC or On-Site	Detect Above Back	May be Attrib. To Site	Select As a COPC	Detect Above Back	May be Attrib. To Site	Select As a COPC	Detect Above Back	May be Attrib. To Site	Select As a COPC	Detect Above Back	May be Attrib. To Site	Select As a COPC
Found in On-Site Mon.Wells Above Background or Selected As COPCs																
chloride	Y	Y	N	Y	ND	N	N	ND	N	N	ND	N	N	ND	N	N
nitrate	N	N	Y	Y	ND	N	N	ND	N	N	ND	N	N	ND	N	N
nitrite	N	N	Y	Y	ND	N	N	ND	N	N	ND	N	N	ND	N	N
aluminum	N	Y	Y	Y	N	N	N	N	N	N	N	N	N	N	N	N
arsenic	N	Y	Y	Y	Y	N	Y	Y	N	Y	Y	N	Y	N	N	N
barium	N	Y	Y	Y	N	N	N	N	N	N	N	N	N	N	N	N
beryllium	NA	Y	Y	Y	ND	N	N	NA	NA	Y	NA	NA	Y	NA	NA	Y
chromium	N	Y	Y	Y	N	N	N	Y	N	Y	Y	N	N	Y	N	Y
cobalt	Y	Y	Y	Y	N	N	N	Y	Y	N	N	N	N	N	N	N
copper	N	Y	Y	Y	N	N	N	Y	N	N	Y	N	N	N	N	N
iron	Y	Y	Y	Y	N	N	N	Y	Y	Y	Y	Y	Y	N	N	N
lead	N	Y	Y	Y	N	N	N	N	N	N	N	N	N	N	N	N
magnesium	Y	Y	N	Y	Y	Y	N	Y	Y	N	N	N	N	Y	Y	N
manganese	Y	Y	Y	Y	Y	Y	Y	N	N	N	N	N	N	N	N	N
mercury (tot. all)	Y	Y	N	Y	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
mercury, low d.l. test	Y	Y	N	Y	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
mercury, routine test	Y	Y	Y	Y	N	N	N	ND	N	N	ND	N	N	ND	N	N
thallium	ND	N	Y	Y	ND	N	N	ND	N	N	N	N	N	ND	N	N
zinc	Y	Y	Y	Y	N	N	N	Y	Y	N	N	N	N	Y	Y	N
Not Present On-Site Above Background and Not Selected As COPCs																
antimony	ND	Y	N	N	N	N	N	N	N	N	N	N	N	ND	N	N
cadmium	ND	Y	N	N	ND	N	N	N	N	N	ND	N	N	ND	N	N
calcium	N	Y	N	N	N	N	N	Y	N	N	N	N	N	Y	N	N
nickel	N	Y	N	N	Y	N	N	Y	N	N	N	N	N	Y	N	N
potassium	N	Y	N	N	N	N	N	N	N	N	N	N	N	Y	N	N
selenium	N	Y	N	N	N	N	N	N	N	N	N	N	N	N	N	N
silver	ND	Y	N	N	ND	N	N	NA	NA	N	ND	N	N	ND	N	N
sodium	N	Y	N	N	ND	N	N	NA	NA	N	NA	NA	N	NA	NA	N
vanadium	N	Y	N	N	N	N	N	N	N	N	N	N	N	N	N	N

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

APPENDIX T

BACKGROUND DATA POINTS EXCLUDED FROM BACKGROUND COMPARISON TESTS

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	6
RW940101	RW-28	RW-17	DIBROMOCHLOROMETHANE	0.7 J
RW940601	RZ-32	RW-17	BROMODICHLOROMETHANE	6
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	1 U
RW950101	RW-17	RW-17	CHLOROFORM	11
RW950101	RW-17	RW-17	DIBROMOCHLOROMETHANE	0.8 J
RW951001	RW-17	RW-17	BROMODICHLOROMETHANE	0.4 J
RW951001	RW-17	RW-17	BROMOFORM	1 U
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	5
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

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

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

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
RW961001	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
RW961001	RW-46-S	RW-46	MERCURY	0.2 U
RW961001	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

APPENDIX U

ECOLOGICAL ASSESSMENT SUPPLEMENT

Property owner denied access, Location observed from public road, only.

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

Project/Site: Keystone Sanitation Landfill Site OU-2 RI Applicant/Owner: Investigator: Aura Stauffer and Jennifer Hayes	Date: 9/27/95 County: Adams State: PA
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.)	Community ID: W-1 Transect ID: Plot ID:

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. Juncus effusus	H	FACW+	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%

Remarks: Vegetation observed from public road.
Area is used as a pasture.

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 road

Depth to Free Water in Pit: _____ (in.)

Depth to Saturated Soil: _____ (in.)

Wetland Hydrology Indicators:
Primary Indicators:
✓ Inundated – in places
___ 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: Evidence of tile drains near barn.
Area is fed by spring seep.
Drought Year No measurable rain from mid August through mid September

SOILS

Map Unit Name (Series and Phase): Glenville silt loam (GnB) / Wehadkee silt loam (Wd) — Drainage Class: MwD-GnB / PD-Wd

Taxonomy (Subgroup): Aquic Fragiudults (GnB) / Cumulic Normaquepts (Wd) — Field Observations: Confirm Mapped Type? Yes No NA

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
NA	Denied Access to property				

Hydric Soil Indicators:

- ___ Histosol
- ___ Histic Epipedon
- ___ Sulfidic Odor
- ☑ Aquic Moisture Regime
- ___ Reducing Conditions
- ___ Gleyed or Low-Chroma Colors
- ___ Concretions
- ___ High Organic Content in Surface Layer in Sandy Soils
- ___ Organic Streaking in Sandy Soils
- ✓ Listed on Local Hydric Soils List — Wd
- ___ Listed on National Hydric Soils List
- ___ Other (Explain in Remarks)

Remarks: Could not check soils because we were denied access to the property.

WETLAND DETERMINATION

Hydrophytic Vegetation Present? (Yes) No (Circle)
Wetland Hydrology Present? (Yes) No
Hydric Soils Present? Could not (Yes) No
sample but listed on hydric soil list

Is this Sampling Point Within a Wetland? (Circle) NA Yes No
Could not sample

Remarks:

Note: During this field visit, only a wetland overview was performed. The actual upland-wetland boundary was not determined.

PEM5B

No Photo

Approved by HQUSACE 2/92

Northern boundary could not be observed from road.

Property owner denied access, Location observed from public road, only.

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

Project/Site: Keystone Sanitation Landfill Site OU-2 RI Applicant/Owner: Investigator: Aura Stauffer and Jennifer Hayes	Date: 9/27/95 County: Adams State: PA
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.)	Community ID: W-2 Transect ID: Plot ID:

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. Juncus effusus	H	FACW+	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 %

Remarks: Vegetation observed from public road. Area is used as a pasture.

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 road (in.)

Depth to Free Water in Pit: _____ (in.)

Depth to Saturated Soil: _____ (in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ✓ Inundated – in places
- ___ 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: Area is fed by spring seep.

Drought Year — No measurable rain from mid August through mid September

SOILS

Map Unit Name (Series and Phase): Glenville silt loam (GnB) / Wehadkee silt loam (Wd) — Drainage Class: MWD-GnB / PD-Wd

Taxonomy (Subgroup): Aquic Fragiudults (GnB) / Cumulic Normaquepts (Wd) — Field Observations Confirm Mapped Type? Yes No NA

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
NA	Denied Access to property				

Hydric Soil Indicators:

- ___ Histosol
- ___ Histic Epipedon
- ___ Sulfidic Odor
- ✓ Aquic Moisture Regime
- ___ Reducing Conditions
- ___ Gleyed or Low-Chroma Colors
- ___ Concretions
- ___ High Organic Content in Surface Layer in Sandy Soils
- ___ Organic Streaking in Sandy Soils
- ___ Listed on Local Hydric Soils List
- ___ Listed on National Hydric Soils List
- ___ Other (Explain in Remarks)

Remarks: Could not check soils because we were denied access to the property.

WETLAND DETERMINATION

Hydrophytic Vegetation Present? (Yes) No (Circle)
Wetland Hydrology Present? (Yes) No
Hydric Soils Present? Could not sample but listed on hydric soil list (Yes) No

Is this Sampling Point Within a Wetland? (Circle) NA Yes No
Could not sample

Remarks:

Note: During this field visit, only a wetland overview was performed. The actual upland-wetland boundary was not determined.

PEM 5B

Photo 2

Approved by HQUSACE 2/92

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

Project/Site: Keystone Sanitation Landfill Site OU-2 RI Applicant/Owner: Investigator: Aura Stauffer and Jennifer Hayes	Date: 9/27/95 County: Carroll State: MD
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.)	Community ID: W-3 Transect ID: Plot ID:

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. Juncus effusus	H	FACW+	9.		
2. Carex spp.	H		10.		
3. Polygonum lapathifolium	H	FACW+	11.		
4. Ludwigia palustris	H	OBL	12.		
5. Gramineae	H		13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). at least 60%

Remarks: Area is used as a cow pasture.

HYDROLOGY

___ Recorded Data (Describe in Remarks):
- ___ Stream, Lake, or Tide Gauge
- ___ Aerial Photographs
- ___ Other

✓ No Recorded Data Available

Field Observations:

Depth of Surface Water: 2 (in.)

Depth to Free Water in Pit: ____ (in.)

Depth to Saturated Soil: 0 (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: Area is fed by spring seep

Drought Year No measurable rain from mid August through mid September

SOILS

Map Unit Name (Series and Phase): Glenville silt loam (GvB) Drainage Class: MWD

Taxonomy (Subgroup): Aquic Fragiudults Field Observations Confirm Mapped Type? (Yes) No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-3	organic				
3-4	A	2.5 Y 5/2	10 YR 5/6	common/distinct	clay loam
4-18+	B	2.5 Y 6/0			"

Hydric Soil Indicators:

- ___ Histosol
- ___ Histic Epipedon
- ___ Sulfidic Odor
- ✓ Aquic Moisture Regime
- ✓ Reducing Conditions
- ✓ Gleyed or Low-Chroma Colors
- ___ Concretions
- ___ High Organic Content in Surface Layer in Sandy Soils
- ___ Organic Streaking in Sandy Soils
- ✓ Listed on Local Hydric Soils List
- ___ Listed on National Hydric Soils List
- ___ Other (Explain in Remarks)

Remarks: Hydric soil parameter is met.

WETLAND DETERMINATION

Hydrophytic Vegetation Present? (Yes) No (Circle)
Wetland Hydrology Present? (Yes) No
Hydric Soils Present? (Yes) No

Is this Sampling Point Within a Wetland? (Yes) No (Circle)

Remarks: All three wetland parameters are met.

Note: During this field visit, only a wetland overview was performed. The actual upland-wetland boundary was not determined.

PEM5B - contains a small upland inclusion Photo 3

Approved by HQUSACE 2/92

AR310771

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

Project/Site: Keystone Sanitation Landfill Site OU-2 RI Applicant/Owner: Investigator: Aura Stauffer and Jennifer Hayes	Date: 9/27/95 County: Adams State: PA
Do Normal Circumstances exist on the site? part of wetland currently mowed (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.) soils-fill material	Community ID: W-4 Transect ID: Plot ID:

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. Juncus effusus	H	FACW+	9.		
2. Carex spp.	H	—	10.		
3. Typha latifolia	H	OBL	11.		
4. Polygonum sagittatum	H	OBL	12.		
5. Impatiens capensis	H	FACW	13.		
6. Phalaris arundinacea	H	FACW+	14.		
7. Mentha spicata	H	FACW+	15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). at least 86%

Remarks: Part of wetland is mowed.

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: 4-5" (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:

Drought Year No measurable rain from mid August through mid September

SOILS

Map Unit Name (Series and Phase): Worsham silt loam (WoA) Drainage Class: PD

Taxonomy (Subgroup): Typic Ochraquults Field Observations Confirm Mapped Type? Yes (No)

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
	NA	fill material			

Hydric Soil Indicators:

- ___ Histosol
- ___ Histic Epipedon
- ___ Sulfidic Odor
- ___ Aquic Moisture Regime
- ___ Reducing Conditions
- ___ Gleyed or Low-Chroma Colors
- ___ Concretions
- ___ High Organic Content in Surface Layer in Sandy Soils
- ___ Organic Streaking in Sandy Soils
- ✓ Listed on Local Hydric Soils List
- ___ Listed on National Hydric Soils List
- ___ Other (Explain in Remarks)

Remarks: fill material - could not sample

WETLAND DETERMINATION

Hydrophytic Vegetation Present?	(Yes)	No	(Circle)
Wetland Hydrology Present?	(Yes)	No	
Hydric Soils Present?	(Yes)	No	

Is this Sampling Point Within a Wetland? (Yes) No (Circle)

Remarks:

NOTE: During this field visit, only a wetland overview was performed. The actual upland-wetland boundary was not determined.

Soils disturbed (fill material), but dominance of hydrophytic OBL and FACW vegetation suggests this area is a wetland.

PEM2E Photo 6

Approved by HQUSACE 2/92

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

Project/Site: Keystone Sanitation Landfill Site OU-2 RI Applicant/Owner: Investigator: Aura Stauffer and Jennifer Hayes	Date: 9/28/95 County: Adams State: PA
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? Yes (No) (If needed, explain on reverse.)	Community ID: W-5 Transect ID: Plot ID:

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. Impatiens capensis	H	FACW	9. Alnus serrulata	S	OBL
2. Phalaris arundinacea	H	FACW+	10. Sagittaria latifolia	H	OBL
3. Juncus effusus	H	FACW+	11.		
4. Symplocarpus foetidus	H	OBL	12.		
5. Polygonum sagittatum	H	OBL	13.		
6. Polygonum perfoliatum	H	FAC+	14.		
7. Acorus calamus	H	OBL	15.		
8. Acer rubrum	T	FAC	16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 100 %

Remarks: Emergent and forested vegetation. Part of emergent area is in a pasture.

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: 0 (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: Area is influenced by spring seeps.

Drought Year — No measurable rain from mid August through mid September

SOILS

Map Unit Name (Series and Phase): Wehadkee silt loam (Wd) Drainage Class: PD

Taxonomy (Subgroup): Cumulic Normaquepts Field Observations Confirm Mapped Type? (Yes) No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
6"	B	2.5 Y 4/2	10 YR 4/6	few / faint	silt loam

Hydric Soil Indicators:

- ___ Histosol
- ✓ Histic Epipedon – in places
- ___ Sulfidic Odor
- ___ Aquic Moisture Regime
- ✓ Reducing Conditions
- ✓ Gleyed or Low-Chroma Colors
- ___ Concretions
- ___ High Organic Content in Surface Layer in Sandy Soils
- ___ Organic Streaking in Sandy Soils
- ✓ Listed on Local Hydric Soils List
- ___ Listed on National Hydric Soils List
- ___ Other (Explain in Remarks)

Remarks: In some areas the soil has a high organic content.

WETLAND DETERMINATION

Hydrophytic Vegetation Present? (Yes) No (Circle)
Wetland Hydrology Present? (Yes) No
Hydric Soils Present? (Yes) No

Is this Sampling Point Within a Wetland? (Circle) (Yes) No

Remarks: All 3 parameters met.

NOTE: During this field visit, only a wetland overview was performed. The actual upland-wetland boundary was not determined.

PEMIB/PFO1B E Photo 4

Approved by HQUSACE 2/92

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

Project/Site: Keystone Sanitation Landfill Site OU-2 RI Applicant/Owner: _____ Investigator: Aura Stauffer and Jennifer Hayes	Date: 9/28/95 County: Adams State: PA
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? Yes (No) (If needed, explain on reverse.)	Community ID: W-6 Transect ID: _____ Plot ID: _____

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. Impatiens spp.	H	FACW	9.		
2. Acer rubrum	T	FAC	10.		
3. Salix spp.	T	FACW	11.		
4. Lindera benzoin	S	FACW-	12.		
5.			13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 100 %

Remarks: Forested area

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: 4" (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: Hydrology is influenced by a seep.

Drought Year — No measurable rain from mid August through mid September

SOILS

Map Unit Name (Series and Phase): Wehadkee silt loam (Wd) Drainage Class: PD

Taxonomy (Subgroup): Cumulic Normaquepts Field Observations Confirm Mapped Type? (Yes) No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
	B	2.5Y 5/2	2.5Y 5/4	few, faint	silt loam

Hydric Soil Indicators:

- ___ Histosol
- ___ Histic Epipedon
- ___ Sulfidic Odor
- ___ Aquic Moisture Regime
- ✓ Reducing Conditions
- ✓ Gleyed or Low-Chroma Colors
- ___ Concretions
- ___ High Organic Content in Surface Layer in Sandy Soils
- ___ Organic Streaking in Sandy Soils
- ✓ Listed on Local Hydric Soils List
- ___ Listed on National Hydric Soils List
- ___ Other (Explain in Remarks)

Remarks: Hydric soil parameter is met

WETLAND DETERMINATION

Hydrophytic Vegetation Present? (Yes) No (Circle)
Wetland Hydrology Present? (Yes) No
Hydric Soils Present? (Yes) No

Is this Sampling Point Within a Wetland? (Yes) No (Circle)

Remarks: All three parameters met.

NOTE: During this field visit, only a wetland overview was performed. The actual upland-wetland boundary was not determined.

PFO1E

photo 5

Approved by HQUSACE 2/92

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

Project/Site: Keystone Sanitation Landfill Site OU-2 RI Applicant/Owner: Investigator: Aura Stauffer and Jennifer Hayes	Date: 9/28/95 County: Adams State: PA
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? Yes (No) (If needed, explain on reverse.)	Community ID: W-6-southern data point Transect ID: Plot ID:

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. Polygonum sagittatum	H	OBL	9.		
2. Sagittaria latifolia	H	OBL	10.		
3. Alnus serrulata	S	OBL	11.		
4. Acer rubrum	S,T	FAC	12.		
5. Impatiens spp.	H	FACW	13.		
6. Carex stricta	H	OBL	14.		
7. Chelone glabra	H	OBL	15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 100%

Remarks: Dominant vegetation is 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: 3" (in.)

Depth to Free Water in Pit: ____ (in.)

Depth to Saturated Soil: 0 (in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ✓ Inundated - in places
- ✓ 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: Area is fed mainly by spring seeps.

Drought Year — No measurable rain from mid August through mid September

SOILS

Map Unit Name (Series and Phase): Worsham silt loam (WoA) Drainage Class: PD

Taxonomy (Subgroup): Typic Ochraquults Field Observations Confirm Mapped Type? (Yes) No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
	B	2.5Y 4/2	10YR 4/4	few / faint	silt loam

Hydric Soil Indicators:

- ___ Histosol
- ___ Histic Epipedon
- ___ Sulfidic Odor
- ___ Aquic Moisture Regime
- ✓ Reducing Conditions
- ✓ Gleyed or Low-Chroma Colors
- ___ Concretions
- ___ High Organic Content in Surface Layer in Sandy Soils
- ___ Organic Streaking in Sandy Soils
- ✓ Listed on Local Hydric Soils List
- ___ Listed on National Hydric Soils List
- ___ Other (Explain in Remarks)

Remarks: Hydric soil parameter is met.

WETLAND DETERMINATION

Hydrophytic Vegetation Present? (Yes) No (Circle)
Wetland Hydrology Present? (Yes) No
Hydric Soils Present? (Yes) No

Is this Sampling Point Within a Wetland? (Circle) (Yes) No

Remarks: All three parameters met.

NOTE: During this field visit, only a wetland overview was performed. The actual upland-wetland boundary was not determined.

PEM2/PSS1B

Approved by HQUSACE 2/92

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

Project/Site: Keystone Sanitation Landfill Site OU-2 RI Applicant/Owner: ____ Investigator: Aura Stauffer and Jennifer Hayes	Date: 9/27/95 County: Adams State: PA
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: W-7 Transect ID: ____ Plot ID: ____

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. Carex spp	H	—	9.		
2. Impatiens capensis	H	FACW	10.		
3. Polygonum arifolium	H	OBL	11.		
4. Acer rubrum	S,T	FAC	12.		
5. Sagittaria latifolia	H	OBL	13.		
6. Eupatorium perfoliatum	H	FACW+	14.		
7. Mentha piperita	H	FACW+	15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). at least 86%

Remarks: Dominant vegetation is hydrophytic.
Part of the wetland vegetation is mowed.

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: 0 (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: spring seeps influence hydrology.

Drought Year — No measurable rain from mid August through mid September

SOILS

Map Unit Name (Series and Phase): Worsham silt loam (WoA) Drainage Class: PD

Taxonomy (Subgroup): Typic Ochraquults Field Observations Confirm Mapped Type? (Yes) No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
	B	10YR 5/1	10YR 4/6	few/faint	silt loam

Hydric Soil Indicators:

- ___ Histosol
- ___ Histic Epipedon
- ___ Sulfidic Odor
- ___ Aquic Moisture Regime
- ✓ Reducing Conditions
- ___ Gleyed or Low-Chroma Colors
- ___ Concretions
- ___ High Organic Content in Surface Layer in Sandy Soils
- ___ Organic Streaking in Sandy Soils
- ✓ Listed on Local Hydric Soils List
- ___ Listed on National Hydric Soils List
- ___ Other (Explain in Remarks)

Remarks: Hydric soil parameter is met.

WETLAND DETERMINATION

Hydrophytic Vegetation Present? (Yes) No (Circle)
Wetland Hydrology Present? (Yes) No
Hydric Soils Present? (Yes) No

Is this Sampling Point Within a Wetland? (Yes) No (Circle)

Remarks: All three parameters met

NOTE: During this field visit, only a wetland overview was performed. The actual upland-wetland boundary was not determined.

POW also located in wetland 7 (pond)

PEM2/PSS1B

Photo 7

Approved by HQUSACE 2/92

AR310781

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

Project/Site: Keystone Sanitation Landfill Site OU-2 RI Applicant/Owner: _____ Investigator: Aura Stauffer and Jennifer Hayes	Date: 9/27/95 County: Adams State: PA
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? Yes (No) (If needed, explain on reverse.)	Community ID: W-8 Transect ID: _____ Plot ID: _____

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. Impatiens spp	H	FACW	9.		
2. Symplocarpus foetidus	H	OBL	10.		
3. Toxicodendron radicans	H, V	FAC	11.		
4. Pilea pumila	H	FACW	12.		
5. Boehmeria cylindrica	H	FACW+	13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 100 %

Remarks: Dominant vegetation is 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: _____ (in.)

Depth to Free Water in Pit: _____ (in.)

Depth to Saturated Soil: 10 (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: spring seep

Drought Year No measurable rain from mid August through mid September

SOILS

Map Unit Name (Series and Phase): Wehadkee silt loam (wd) Drainage Class: PD

Taxonomy (Subgroup): Cumulic Normaquepts Field Observations Confirm Mapped Type? (Yes) No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
	B	10YR 5/1	2.5Y 5/6	common / distinct	silt loam

Hydric Soil Indicators:

- ___ Histosol
- ___ Histic Epipedon
- ___ Sulfidic Odor
- ___ Aquic Moisture Regime
- ✓ Reducing Conditions
- ✓ Gleyed or Low-Chroma Colors
- ___ Concretions
- ___ High Organic Content in Surface Layer in Sandy Soils
- ___ Organic Streaking in Sandy Soils
- ✓ Listed on Local Hydric Soils List
- ___ Listed on National Hydric Soils List
- ___ Other (Explain in Remarks)

Remarks: Hydric soil parameter is met.

WETLAND DETERMINATION

Hydrophytic Vegetation Present? (Yes) No (Circle)
Wetland Hydrology Present? (Yes) No
Hydric Soils Present? (Yes) No

Is this Sampling Point Within a Wetland? (Circle) (Yes) No

Remarks: All three parameters met.

NOTE: During this field visit, only a wetland overview was performed. The actual upland-wetland boundary was not determined.

PEM2E

Photo 8

Approved by HQUSACE 2/92

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

Project/Site: Keystone Sanitation Landfill Site OU-2 RI Applicant/Owner: _____ Investigator: Aura Stauffer and Jennifer Hayes	Date: 9/27/95 County: Adams State: PA
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? Yes (No) (If needed, explain on reverse.)	Community ID: W-9 Transect ID: _____ Plot ID: _____

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. Impatiens capensis	H	FACW	9.		
2. Polygonum arifolium	H	OBL	10.		
3. Alnus serrulata	S	OBL	11.		
4.			12.		
5.			13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 100 %

Remarks: Dominant vegetation is 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:	0-2	(in.)
Depth to Free Water in Pit:	—	(in.)
Depth to Saturated Soil:	0	(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: seep

Drought Year No measurable rain from mid August through mid September

SOILS

Map Unit Name (Series and Phase): Wehadkee silt loam (Wd) Drainage Class: PD

Taxonomy (Subgroup): Cumulic Normaquepts Field Observations Confirm Mapped Type? (Yes) No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
	B	10 YR 4/2	10 YR 4/6	few/faint	silt loam

Hydric Soil Indicators:

- ___ Histosol
- ___ Histic Epipedon
- ___ Sulfidic Odor
- ___ Aquic Moisture Regime
- ✓ Reducing Conditions
- ✓ Gleyed or Low-Chroma Colors
- ___ Concretions
- ___ High Organic Content in Surface Layer in Sandy Soils
- ___ Organic Streaking in Sandy Soils
- ___ Listed on Local Hydric Soils List
- ___ Listed on National Hydric Soils List
- ___ Other (Explain in Remarks)

Remarks: Hydric soil parameter is met.

WETLAND DETERMINATION

Hydrophytic Vegetation Present? (Yes) No (Circle)
Wetland Hydrology Present? (Yes) No
Hydric Soils Present? (Yes) No

Is this Sampling Point Within a Wetland? (Yes) No (Circle)

Remarks: All three parameters met

NOTE: During this field visit, only a wetland overview was performed. The actual upland-wetland boundary was not determined.

PSS1 B Photo 9

Approved by HQUSACE 2/92

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

Project/Site: Keystone Sanitation Landfill Site OU-2 RI Applicant/Owner: _____ Investigator: Aura Stauffer and Jennifer Hayes	Date: 9/28/95 County: Adams State: PA
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? Yes (No) (If needed, explain on reverse.)	Community ID: W-10 Transect ID: _____ Plot ID: _____

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. Acorus calamus	H	OBL	9.		
2. Sagittaria latifolia	H	OBL	10.		
3.			11.		
4.			12.		
5.			13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 100 %

Remarks: Dominant vegetation is 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:	0-2 (in.)
Depth to Free Water in Pit:	— (in.)
Depth to Saturated Soil:	0 (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: low area along stream

Drought Year No measurable rain from mid August through mid September

SOILS

Map Unit Name (Series and Phase): Wehadkee silt loam (Wd) Drainage Class: PD

Taxonomy (Subgroup): Cumulic Normaquepts Field Observations Confirm Mapped Type? (Yes) No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
	B	10 YR 4/1			silt loam

Hydric Soil Indicators:

- ___ Histosol
- ___ Histic Epipedon
- ___ Sulfidic Odor
- ___ Aquic Moisture Regime
- ✓ Reducing Conditions
- ✓ Gleyed or Low-Chroma Colors
- ___ Concretions
- ___ High Organic Content in Surface Layer in Sandy Soils
- ___ Organic Streaking in Sandy Soils
- ✓ Listed on Local Hydric Soils List
- ___ Listed on National Hydric Soils List
- ___ Other (Explain in Remarks)

Remarks: Hydric soil parameter is met.

WETLAND DETERMINATION

Hydrophytic Vegetation Present? (Yes) No (Circle)
Wetland Hydrology Present? (Yes) No
Hydric Soils Present? (Yes) No

Is this Sampling Point Within a Wetland? (Yes) No (Circle)

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

Approved by HQUSACE 2/92

AR310787

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

Project/Site: Keystone Sanitation Landfill Site OU-2 RI Applicant/Owner: Investigator: Aura Stauffer and Jennifer Hayes	Date: 9/28/95 County: Adams State: PA
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? Yes (No) (If needed, explain on reverse.)	Community ID: W-11 Transect ID: Plot ID:

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. Polygonum sagittatum	H	OBL	9.		
2. Phalaris arundinacea	H	FACW+	10.		
3. Carex lurida	H	OBL	11.		
4. Sagittaria latifolia	H	OBL	12.		
5. Eupatorium perfoliatum	H	FACW+	13.		
6. Eupatoriadelphus fistulosus	H	FACW	14.		
7. Acer rubrum	T	FAC	15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 100 %

Remarks: Dominant vegetation is 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: 1" (in.)

Depth to Free Water in Pit: — (in.)

Depth to Saturated Soil: 0 (in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ✓ Inundated in places
- ✓ 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: seeps

Drought Year No measurable rain from mid August through mid September

SOILS

Map Unit Name (Series and Phase): Wehadkee silt loam (Wd) Drainage Class: PD

Taxonomy (Subgroup): Cumulic Normaquepts Field Observations Confirm Mapped Type? (Yes) No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
	B	2.5Y 6/0	10YR 5/6	common/prom	silt loam

Hydric Soil Indicators:

- ___ Histosol
- ___ Histic Epipedon
- ___ Sulfidic Odor
- ___ Aquic Moisture Regime
- ✓ Reducing Conditions
- ✓ Gleyed or Low-Chroma Colors
- ___ Concretions
- ___ High Organic Content in Surface Layer in Sandy Soils
- ___ Organic Streaking in Sandy Soils
- ✓ Listed on Local Hydric Soils List
- ___ Listed on National Hydric Soils List
- ___ Other (Explain in Remarks)

Remarks: Hydric soil parameter is met.

WETLAND DETERMINATION

Hydrophytic Vegetation Present? (Yes) No (Circle)
Wetland Hydrology Present? (Yes) No
Hydric Soils Present? (Yes) No

Is this Sampling Point Within a Wetland? (Yes) No (Circle)

Remarks: All three parameters met.

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 PEM wetland
PEM2B/PF01E Photo 11

Approved by HQUSACE 2/92

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

Project/Site: Keystone Sanitation Landfill Site OU-2 RI Applicant/Owner: _____ Investigator: Aura Stauffer and Jennifer Hayes	Date: 9/28/95 County: Adams State: PA
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? Yes (No) (If needed, explain on reverse.)	Community ID: W-12 Transect ID: _____ Plot ID: _____

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. Symplocarpus foetidus	H	OBL	9.		
2. Impatiens capensis	H	FACW	10.		
3. Polygonum arifolium	H	OBL	11.		
4. Lindera benzoin	S	FACW-	12.		
5. Viburnum dentatum	S	FAC	13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 100 %

Remarks: Dominant vegetation is 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: 1 (in.)

Depth to Free Water in Pit: — (in.)

Depth to Saturated Soil: 0 (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 seeps

Drought Year — No measurable rain from mid August through mid September

SOILS

Map Unit Name (Series and Phase): Wehadkee silt loam (Wd) Drainage Class: PD

Taxonomy (Subgroup): Cumulic Normaquepts Field Observations Confirm Mapped Type? (Yes) No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-8"	A	10YR 2/1	—	—	silt loam
8"+ refusal					

Hydric Soil Indicators:

- ___ Histosol
- ___ Histic Epipedon
- ___ Sulfidic Odor
- ___ Aquic Moisture Regime
- ✓ Reducing Conditions
- ✓ Gleyed or Low-Chroma Colors
- ___ Concretions
- ___ High Organic Content in Surface Layer in Sandy Soils
- ___ Organic Streaking in Sandy Soils
- ✓ Listed on Local Hydric Soils List
- ___ Listed on National Hydric Soils List
- ___ Other (Explain in Remarks)

Remarks: Hydric soil parameter is met.

WETLAND DETERMINATION

Hydrophytic Vegetation Present? (Yes) No (Circle)
Wetland Hydrology Present? (Yes) No
Hydric Soils Present? (Yes) No

Is this Sampling Point Within a Wetland? (Circle) (Yes) No

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/PSS1B

Photo 12

Approved by HQUSACE 2/92

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

Project/Site: Keystone Sanitation Landfill Site OU-2 RI Applicant/Owner: _____ Investigator: Aura Stauffer and Jennifer Hayes	Date: 9/28/95 County: Adams State: PA
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? Yes (No) (If needed, explain on reverse.)	Community ID: W-13 Transect ID: _____ Plot ID: _____

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. Symplocarpus foetidus	H	OBL	9.		
2. Acer rubrum	T	FAC	10.		
3. Lindera benzoin	S	FACW-	11.		
4. Pilea pumila	H	FACW	12.		
5. Alnus serrulata	S	OBL	13.		
6. Impatiens capensis	H	FACW	14.		
7. Viburnum dentatum	S	FAC	15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 100 %

Remarks: Dominant vegetation is 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: ___ (in.)

Depth to Free Water in Pit: ___ (in.)

Depth to Saturated Soil: 0 (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: small wetland along stream

Drought Year — No measurable rain from mid August through mid September

SOILS

Map Unit Name (Series and Phase): Wehadkee silt loam (Wd) Drainage Class: PD

Taxonomy (Subgroup): Cumulic Normaquepts Field Observations Confirm Mapped Type? (Yes)

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
		2.5Y 4/2	10YR 4/6	few / faint	silt loam

Hydric Soil Indicators:

- ___ Histosol
- ___ Histic Epipedon
- ___ Sulfidic Odor
- ___ Aquic Moisture Regime
- ✓ Reducing Conditions
- ✓ Gleyed or Low-Chroma Colors
- ___ Concretions
- ___ High Organic Content in Surface Layer in Sandy Soils
- ___ Organic Streaking in Sandy Soils
- ✓ Listed on Local Hydric Soils List
- ___ Listed on National Hydric Soils List
- ___ Other (Explain in Remarks)

Remarks: Hydric soil parameter met

WETLAND DETERMINATION

Hydrophytic Vegetation Present?	(Yes) No (Circle)		(Circle)
Wetland Hydrology Present?	(Yes) No		
Hydric Soils Present?	(Yes) No	Is this Sampling Point Within a Wetland?	(Yes) No

Remarks: All three parameters met

NOTE: During this field visit, only a wetland overview was performed. The actual upland-wetland boundary was not determined.

PSS1B

No photo

Approved by HQUSACE 2/92

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

Project/Site: Keystone Sanitation Landfill Site OU-2 RI Applicant/Owner: Investigator: Aura Stauffer and Jennifer Hayes	Date: 9/29/95 County: Carroll State: MD
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? Yes (No) (If needed, explain on reverse.)	Community ID: W-14 Transect ID: Plot ID:

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. Impatiens capensis	H	FACW	9.		
2. Polygonum sagittatum	H	OBL	10.		
3. Solidago spp	H	—	11.		
4. Aster spp	H	—	12.		
5. Sagittaria latifolia	H	OBL	13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). at least 60%

Remarks: Dominant vegetation is 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:	___ (in.)
Depth to Free Water in Pit:	___ (in.)
Depth to Saturated Soil:	0 (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: spring seep

Drought Year No measurable rain from mid August through mid September

SOILS

Map Unit Name (Series and Phase): Hathaway silt loam (Ht) Drainage Class: PD

Taxonomy (Subgroup): Fluventic Haplaquepts Field Observations Confirm Mapped Type? (Yes) No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
		2.5 Y 5/2	10YR 4/6	few/faint	silt loam

Hydric Soil Indicators:

- ___ Histosol
- ___ Histic Epipedon
- ___ Sulfidic Odor
- ___ Aquic Moisture Regime
- ✓ Reducing Conditions
- ✓ Gleyed or Low-Chroma Colors
- ___ Concretions
- ___ High Organic Content in Surface Layer in Sandy Soils
- ___ Organic Streaking in Sandy Soils
- ✓ Listed on Local Hydric Soils List
- ___ Listed on National Hydric Soils List
- ___ Other (Explain in Remarks)

Remarks: Hydric soil parameter is met.

WETLAND DETERMINATION

Hydrophytic Vegetation Present? (Yes) No (Circle)
Wetland Hydrology Present? (Yes) No
Hydric Soils Present? (Yes) No

Is this Sampling Point Within a Wetland? (Yes) No (Circle)

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 No photo

Approved by HQUSACE 2/92

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

Project/Site: Keystone Sanitation Landfill Site OU-2 RI Applicant/Owner: _____ Investigator: Aura Stauffer and Jennifer Hayes	Date: 9/29/95 County: Carroll State: MD
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? Yes (No) (If needed, explain on reverse.)	Community ID: W-15 Transect ID: _____ Plot ID: _____

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. Sagittaria latifolia	H	OBL	9.		
2. Eupatorium perfoliatum	H	FACW+	10.		
3. Impatiens capensis	H	FACW	11.		
4. Symplocarpus foetidus	H	OBL	12.		
5. Acer rubrum	T	FAC	13.		
6. Viburnum dentatum	S	FAC	14.		
7. Ligustrum vulgare	S	FACU	15.		
8. Onoclea sensibilis	H	FACW	16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 87%

Remarks: Dominant vegetation is 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:	1	(in.)
Depth to Free Water in Pit:	—	(in.)
Depth to Saturated Soil:	0	(in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ✓ Inundated (in places)
- ✓ 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 from mid August through mid September

SOILS

Map Unit Name (Series and Phase): Hatboro silt loam (Ht) Drainage Class: PD

Taxonomy (Subgroup): Fluventic, Haplaquepts Field Observations Confirm Mapped Type? (Yes) No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
		2.5Y 4/2	10YR 4/6	few/faint	silt loam

Hydric Soil Indicators:

- ___ Histosol
- ___ Histic Epipedon
- ___ Sulfidic Odor
- ___ Aquic Moisture Regime
- ✓ Reducing Conditions
- ✓ Gleyed or Low-Chroma Colors
- ___ Concretions
- ___ High Organic Content in Surface Layer in Sandy Soils
- ___ Organic Streaking in Sandy Soils
- ✓ Listed on Local Hydric Soils List
- ___ Listed on National Hydric Soils List
- ___ Other (Explain in Remarks)

Remarks: Hydric soil parameter is met.

WETLAND DETERMINATION

Hydrophytic Vegetation Present? (Yes) No (Circle)
Wetland Hydrology Present? (Yes) No
Hydric Soils Present? (Yes) No

Is this Sampling Point Within a Wetland? (Yes) No (Circle)

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/PFO1E No Photo

Approved by HQUSACE 2/92

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

Project/Site: Keystone Sanitation Landfill Site OU-2 RI Applicant/Owner: _____ Investigator: Aura Stauffer and Jennifer Hayes	Date: 9/29/95 County: Carroll State: MD
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? Yes (No) (If needed, explain on reverse.)	Community ID: W-16 Transect ID: _____ Plot ID: _____

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. Toxicodendron radicans	V, #	FAC	9.		
2. Onoclea sensibilis	#	FACW	10.		
3. Lindera benzoin	S	FACW-	11.		
4. Acer saccharinum	T	FACW	12.		
5. Viburnum recognitum	S	FACW	13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 100 %

Remarks: Dominant vegetation is 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:	____ (in.)
Depth to Free Water in Pit:	____ (in.)
Depth to Saturated Soil:	4 (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: seep

Drought Year No measurable rain from mid August through mid September

SOILS

Map Unit Name (Series and Phase): Hatboro silt loam (Ht) Drainage Class: PD

Taxonomy (Subgroup): Fluventic Haplaquepts Field Observations Confirm Mapped Type? (Yes) No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
		2.5Y 5/2	10YR 5/6	few / faint	silt loam

Hydric Soil Indicators:

- ___ Histosol
- ___ Histic Epipedon
- ___ Sulfidic Odor
- ___ Aquic Moisture Regime
- ✓ Reducing Conditions
- ✓ Gleyed or Low-Chroma Colors
- ___ Concretions
- ___ High Organic Content in Surface Layer in Sandy Soils
- ___ Organic Streaking in Sandy Soils
- ✓ Listed on Local Hydric Soils List
- ___ Listed on National Hydric Soils List
- ___ Other (Explain in Remarks)

Remarks: Hydric soil criteria is met.

WETLAND DETERMINATION

Hydrophytic Vegetation Present?	(Yes)	No	(Circle)
Wetland Hydrology Present?	(Yes)	No	
Hydric Soils Present?	(Yes)	No	
Is this Sampling Point Within a Wetland?	(Yes)	No	(Circle)

Remarks:

NOTE: During this field visit, only a wetland overview was performed. The actual upland-wetland boundary was not determined.

PFO1E No Photo

Approved by HQUSACE 2/92

AR310799

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

Project/Site: Keystone Sanitation Landfill Site OU-2 RI Applicant/Owner: Investigator: Aura Stauffer and Jennifer Hayes	Date: 9/29/95 County: Carroll State: MD
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? Yes (No) (If needed, explain on reverse.)	Community ID: W-17 Transect ID: Plot ID:

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. Polygonum sagittatum	H	OBL	9.		
2. Impatiens capensis	H	FACW	10.		
3. Sagittaria latifolia	H	OBL	11.		
4. Aster spp	H	—	12.		
5. Acer saccharinum	T	FACW	13.		
6. Leersia oryzoides	H	OBL	14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). at least 83 %

Remarks: Dominant vegetation is 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: ___ (in.)

Depth to Free Water in Pit: ___ (in.)

Depth to Saturated Soil: 0 (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: Area along stream. Area is also influenced by seeps.

Drought Year — No measurable rain from mid August through mid September

SOILS

Map Unit Name (Series and Phase): Hatboro silt loam (Ht) Drainage Class: PD

Taxonomy (Subgroup): Fluventic Haplaquepts Field Observations Confirm Mapped Type? (Yes) No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
		10 YR 5/1	—	—	Silt loam

Hydric Soil Indicators:

- ___ Histosol
- ___ Histic Epipedon
- ___ Sulfidic Odor
- ___ Aquic Moisture Regime
- ✓ Reducing Conditions
- ✓ Gleyed or Low-Chroma Colors
- ___ Concretions
- ___ High Organic Content in Surface Layer in Sandy Soils
- ___ Organic Streaking in Sandy Soils
- ✓ Listed on Local Hydric Soils List
- ___ Listed on National Hydric Soils List
- ___ Other (Explain in Remarks)

Remarks: Hydric soil parameter is met

WETLAND DETERMINATION

Hydrophytic Vegetation Present? (Yes) No (Circle)
Wetland Hydrology Present? (Yes) No
Hydric Soils Present? (Yes) No

Is this Sampling Point Within a Wetland? (Yes) No (Circle)

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/PFO1E No Photo

Approved by HQUSACE 2/92

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

Project/Site: Keystone Sanitation Landfill Site OU-2 RI Applicant/Owner: Investigator: Aura Stauffer and Jennifer Hayes	Date: 9/29/95 County: Carroll State: MD
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? Yes (No) (If needed, explain on reverse.)	Community ID: W-18 Transect ID: Plot ID:

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. Impatiens capensis	H	FACW	9.		
2. Pilea pumila	H	FACW	10.		
3. Polygonum cespitosum	H	FACW-	11.		
4. Acer saccharinum	T	FACW	12.		
5.			13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 75%

Remarks: Dominant vegetation is 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: ____ (in.)

Depth to Free Water in Pit: ____ (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: low area along stream.

Drought Year No measurable rain from mid August through mid September

SOILS

Map Unit Name (Series and Phase): Hatboro silt loam (Ht) Drainage Class: PD

Taxonomy (Subgroup): Fluventic Haplaquepts Field Observations Confirm Mapped Type? (Yes) No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
		10YR 7/2	10YR 6/6	common/distinct	silt loam

Hydric Soil Indicators:

- ___ Histosol
- ___ Histic Epipedon
- ___ Sulfidic Odor
- ___ Aquic Moisture Regime
- ✓ Reducing Conditions
- ✓ Gleyed or Low-Chroma Colors
- ___ Concretions
- ___ High Organic Content in Surface Layer in Sandy Soils
- ___ Organic Streaking in Sandy Soils
- ✓ Listed on Local Hydric Soils List
- ___ Listed on National Hydric Soils List
- ___ Other (Explain in Remarks)

Remarks: Hydric soil parameter is met.

WETLAND DETERMINATION

Hydrophytic Vegetation Present?	(Yes) No (Circle)	
Wetland Hydrology Present?	(Yes) No	
Hydric Soils Present?	(Yes) No	Is this Sampling Point Within a Wetland? (Circle) (Yes) No

Remarks: All three parameters met.

NOTE: During this field visit, only a wetland overview was performed. The actual upland-wetland boundary was not determined.

PFO1E No Photo

Approved by HQUSACE 2/92

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

Project/Site: Keystone Sanitation Landfill Site OU-2 RI Applicant/Owner: _____ Investigator: Aura Stauffer and Jennifer Hayes	Date: 9/29/95 County: Carroll State: MD
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? Yes (No) (If needed, explain on reverse.)	Community ID: W-19 Transect ID: _____ Plot ID: _____

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. Polygonum sagittatum	H	OBL	9.		
2. Impatiens capensis	H	FACW	10.		
3. Juncus effusus	H	FACW+	11.		
4. Solidago spp.	H	—	12.		
5. Aster puniceus	H	OBL	13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). at least 80 %

Remarks: Dominant vegetation is 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: _____ (in.)

Depth to Free Water in Pit: _____ (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:

Drought Year No measurable rain from mid August through mid September

SOILS

Map Unit Name (Series and Phase): Hatboro silt loam (Ht) Drainage Class: PD

Field Observations

Taxonomy (Subgroup): Fluventic Haplaquepts Confirm Mapped Type? (Yes) No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
		10YR 6/2	10YR 5/6	common/distinct	silt loam

Hydric Soil Indicators:

___ Histosol
___ Histic Epipedon
___ Sulfidic Odor
___ Aquic Moisture Regime
✓ Reducing Conditions
✓ Gleyed or Low-Chroma Colors
___ Concretions
___ High Organic Content in Surface Layer in Sandy Soils
___ Organic Streaking in Sandy Soils
___ Listed on Local Hydric Soils List
___ Listed on National Hydric Soils List
___ Other (Explain in Remarks)

Remarks: Hydric soil parameter is met.

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 parameters met.

NOTE: During this field visit, only a wetland overview was performed. The actual upland-wetland boundary was not determined.

PEMIE Photo 13

Approved by HQUSACE 2/92

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

Project/Site: Keystone Sanitation Landfill Site OU-2 RI Applicant/Owner: Investigator: Aura Stauffer and Jennifer Hayes	Date: 9/29/95 County: Carroll State: MD
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? Yes (No) (If needed, explain on reverse.)	Community ID: W-20 Transect ID: Plot ID:

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. Symplocarpus foetidus	H	OBL	9.		
2. Impatiens capensis	H	FACW	10.		
3. Acer rubrum	T	FAC	11.		
4. Pilea pumila	H	FACW	12.		
5.			13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 100 %

Remarks: Dominant vegetation is 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: _____ (in.)

Depth to Free Water in Pit: _____ (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: Forested area along stream

Drought Year No measurable rain from mid August through mid September

AR310806

SOILS

Map Unit Name (Series and Phase): Hatboro silt loam (Ht) Drainage Class: PD

Taxonomy (Subgroup): Fluventic Haplaquepts Field Observations Confirm Mapped Type? (Yes) No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
		2.5Y 4/2	10YR 4/6	few/prom.	silt loam

Hydric Soil Indicators:

- ___ Histosol
- ___ Histic Epipedon
- ___ Sulfidic Odor
- ___ Aquic Moisture Regime
- ✓ Reducing Conditions
- ✓ Gleyed or Low-Chroma Colors
- ___ Concretions
- ___ High Organic Content in Surface Layer in Sandy Soils
- ___ Organic Streaking in Sandy Soils
- ✓ Listed on Local Hydric Soils List
- ___ Listed on National Hydric Soils List
- ___ Other (Explain in Remarks)

Remarks: Hydric soil criteria is met

WETLAND DETERMINATION

Hydrophytic Vegetation Present?	(Yes) No (Circle)	(Circle)
Wetland Hydrology Present?	(Yes) No	
Hydric Soils Present?	(Yes) No	Is this Sampling Point Within a Wetland? (Yes) No

Remarks: All three parameters met.

NOTE: During this field visit, only a wetland overview was performed. The actual upland-wetland boundary was not determined.

PF01E Photo 14

Approved by HQUSACE 2/92

AR310807

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

Project/Site: Keystone Sanitation Landfill Site OU-2 RI Applicant/Owner: _____ Investigator: Aura Stauffer and Jennifer Hayes	Date: 9/29/95 County: Carroll State: MD
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? Yes (No) (If needed, explain on reverse.)	Community ID: W-21 Transect ID: _____ Plot ID: _____

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. Acorus calamus	H	OBL	9.		
2. Polygonum perfoliatum	H	FAC	10.		
3. Polygonum sagittatum	H	OBL	11.		
4.			12.		
5.			13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 100 %

Remarks: Dominant vegetation is 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: _____ (in.)
- Depth to Free Water in Pit: _____ (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:

Drought Year No measurable rain from mid August through mid September

SOILS

Map Unit Name (Series and Phase): Hatboro silt loam (Ht) Drainage Class: PD

Taxonomy (Subgroup): Fluventic Haplaquepts Field Observations Confirm Mapped Type? (Yes) No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
		10YR 5/1	10YR 4/6	few/prom	silt loam

Hydric Soil Indicators:

- ___ Histosol
- ___ Histic Epipedon
- ___ Sulfidic Odor
- ___ Aquic Moisture Regime
- ✓ Reducing Conditions
- ✓ Gleyed or Low-Chroma Colors
- ___ Concretions
- ___ High Organic Content in Surface Layer in Sandy Soils
- ___ Organic Streaking in Sandy Soils
- ✓ Listed on Local Hydric Soils List
- ___ Listed on National Hydric Soils List
- ___ Other (Explain in Remarks)

Remarks: Hydric soil parameter is met.

WETLAND DETERMINATION

Hydrophytic Vegetation Present? (Yes) No (Circle)
Wetland Hydrology Present? (Yes) No
Hydric Soils Present? (Yes) No

Is this Sampling Point Within a Wetland? (Circle) (Yes) No

Remarks: All three parameters met

NOTE: During this field visit, only a wetland overview was performed. The actual upland-wetland boundary was not determined.

PEM2E Photo 15

Approved by HQUSACE 2/92

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

Project/Site: Keystone Sanitation Landfill Site OU-2 RI Applicant/Owner: Investigator: Aura Stauffer and Jennifer Hayes	Date: 9/29/95 County: Carroll State: MD
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? Yes (No) (If needed, explain on reverse.)	Community ID: W-22 Transect ID: Plot ID:

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. Polygonum sagittatum	H	OBL	9.		
2. Aster puniceus	H	OBL	10.		
3. Impatiens capensis	H	FACW	11.		
4. Carex stricta	H	OBL	12.		
5. Agrimonia parviflora	H	FAC	13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 100 %

Remarks: Dominant vegetation is 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: ____ (in.)
- Depth to Free Water in Pit: ____ (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:

Drought Year No measurable rain from mid August through mid September

SOILS

Map Unit Name (Series and Phase): Hatboro silt loam (Ht) Drainage Class: PD

Taxonomy (Subgroup): Fluventic Haplaquepts Field Observations Confirm Mapped Type? (Yes) No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
		2.5Y 4/2	10YR 4/6	few/faint	silt loam

Hydric Soil Indicators:

- ___ Histosol
- ___ Histic Epipedon
- ___ Sulfidic Odor
- ___ Aquic Moisture Regime
- ✓ Reducing Conditions
- ✓ Gleyed or Low-Chroma Colors
- ___ Concretions
- ___ High Organic Content in Surface Layer in Sandy Soils
- ___ Organic Streaking in Sandy Soils
- ✓ Listed on Local Hydric Soils List
- ___ Listed on National Hydric Soils List
- ___ Other (Explain in Remarks)

Remarks: Hydric soil parameter is met

WETLAND DETERMINATION

Hydrophytic Vegetation Present?	(Yes) No (Circle)		(Circle)
Wetland Hydrology Present?	(Yes) No		
Hydric Soils Present?	(Yes) No	Is this Sampling Point Within a Wetland?	(Yes) No

Remarks: All three parameters met

NOTE: During this field visit, only a wetland overview was performed. The actual upland-wetland boundary was not determined.

PEM2E Photo 16

Approved by HQUSACE 2/92

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

Project/Site: Keystone Sanitation Landfill Site OU-2 RI Applicant/Owner: _____ Investigator: Aura Stauffer and Jennifer Hayes	Date: 9/29/95 County: Carroll State: MD
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? Yes (No) (If needed, explain on reverse.)	Community ID: W-23 Transect ID: _____ Plot ID: _____

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. Polygonum sagittatum	H	OBL	9.		
2. Solidago spp.	H	—	10.		
3. Impatiens capensis	H	FACW	11.		
4. Aster puniceus	H	OBL	12.		
5.			13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). at least 75%

Remarks: Dominant vegetation is 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: — (in.)

Depth to Free Water in Pit: — (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:

Drought Year No measurable rain from mid August through mid September

AR310812

SOILS

Map Unit Name (Series and Phase): Hatboro silt loam (Ht) Drainage Class: PD

Taxonomy (Subgroup): Fluventic Haplaquepts Field Observations Confirm Mapped Type? (Yes) No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
		2.5Y 5/2	10YR 4/6	common/distinct	silt loam

Hydric Soil Indicators:

- ___ Histosol
- ___ Histic Epipedon
- ___ Sulfidic Odor
- ___ Aquic Moisture Regime
- ✓ Reducing Conditions
- ✓ Gleyed or Low-Chroma Colors
- ___ Concretions
- ___ High Organic Content in Surface Layer in Sandy Soils
- ___ Organic Streaking in Sandy Soils
- ✓ Listed on Local Hydric Soils List
- ___ Listed on National Hydric Soils List
- ___ Other (Explain in Remarks)

Remarks: Hydric soil parameter is met

WETLAND DETERMINATION

Hydrophytic Vegetation Present?	(Yes) No (Circle)	(Circle)
Wetland Hydrology Present?	(Yes) No	
Hydric Soils Present?	(Yes) No	Is this Sampling Point Within a Wetland? (Yes) No

Remarks: All three parameters met

NOTE: During this field visit, only a wetland overview was performed. The actual upland-wetland boundary was not determined.

PEM2E photo 17

Approved by HQUSACE 2/92

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

Project/Site: Keystone Sanitation Landfill Site OU-2 RI Applicant/Owner: Investigator: Aura Stauffer and Jennifer Hayes	Date: 9/29/95 County: Carroll State: MD
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? Yes (No) (If needed, explain on reverse.)	Community ID: W-24 Transect ID: Plot ID:

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. Acorus calamus	H	OBL	9.		
2. Carex stricta	H	OBL	10.		
3. Impatiens capensis	H	FACW	11.		
4. Polygonum sagittatum	H	OBL	12.		
5. Sagittaria latifolia	H	OBL	13.		
6. Aster spp.	H	—	14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). at least 83%

Remarks: Dominant vegetation is 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: ___ (in.)

Depth to Free Water in Pit: ___ (in.)

Depth to Saturated Soil: 0 (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 seeps

Drought Year — No measurable rain from mid August through mid September

SOILS

Map Unit Name (Series and Phase): Hatboro silt loam (Ht) Drainage Class: PD

Taxonomy (Subgroup): Fluventic Haplaquepts Field Observations Confirm Mapped Type? (Yes) No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
		2.5Y 4/2	10 YR 4/6	few/faint	silt loam

Hydric Soil Indicators:

- ___ Histosol
- ___ Histic Epipedon
- ___ Sulfidic Odor
- ___ Aquic Moisture Regime
- ✓ Reducing Conditions
- ✓ Gleyed or Low-Chroma Colors
- ___ Concretions
- ___ High Organic Content in Surface Layer in Sandy Soils
- ___ Organic Streaking in Sandy Soils
- ✓ Listed on Local Hydric Soils List
- ___ Listed on National Hydric Soils List
- ___ Other (Explain in Remarks)

Remarks: Hydric soil parameter is met.

WETLAND DETERMINATION

Hydrophytic Vegetation Present? (Yes) No (Circle)
Wetland Hydrology Present? (Yes) No
Hydric Soils Present? (Yes) No

Is this Sampling Point Within a Wetland? (Circle) (Yes) No

Remarks: All three parameters met

NOTE: During this field visit, only a wetland overview was performed. The actual upland-wetland boundary was not determined.

PEMIB Photo 18

Approved by HQUSACE 2/92

AR310815

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

Project/Site: Keystone Sanitation Landfill Site OU-2 RI Applicant/Owner: _____ Investigator: Aura Stauffer and Jennifer Hayes	Date: 10/3/95 County: Adams State: PA
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? Yes (No) (If needed, explain on reverse.)	Community ID: W-25 Transect ID: _____ Plot ID: _____

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. Lindera benzoin	S	FACW-	9.		
2. Acer rubrum	S,T	FAC	10.		
3. Impatiens spp	H	FACW	11.		
4. Juncus effusus	H	FACW+	12.		
5. Polygonum sagittatum	H	OBL	13.		
6. Aster puniceus	H	OBL	14.		
7. Polygonum perfoliatum	H	FAC	15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 100 %

Remarks: Dominant vegetation is 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: _____ (in.)

Depth to Free Water in Pit: _____ (in.)

Depth to Saturated Soil: 0 (in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ___ Inundated
- ✓ Saturated in Upper 12 Inches in seep areas
- ___ 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: Floodplain area
Area is also influenced by spring seeps.
Drought Year No measurable rain from mid August through mid September

SOILS

Map Unit Name (Series and Phase): Worsham silt loam (WoA) Drainage Class: PD

Taxonomy (Subgroup): Typic Ochraquults Field Observations Confirm Mapped Type? (Yes) No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
		5Y 6/3	10YR 6/6	few/faint	silt loam

Hydric Soil Indicators:

- ___ Histosol
- ___ Histic Epipedon
- ___ Sulfidic Odor
- ___ Aquic Moisture Regime
- ✓ Reducing Conditions
- ✓ Gleyed or Low-Chroma Colors
- ___ Concretions
- ___ High Organic Content in Surface Layer in Sandy Soils
- ___ Organic Streaking in Sandy Soils
- ✓ Listed on Local Hydric Soils List
- ___ Listed on National Hydric Soils List
- ___ Other (Explain in Remarks)

Remarks: 3 chroma soil with mottles [redacted] in a floodplain area. Hydrophytic veg and wetland hydrology evidence is strong.

WETLAND DETERMINATION

Hydrophytic Vegetation Present? (Yes) No (Circle)
Wetland Hydrology Present? (Yes) No
Hydric Soils Present? (Yes) No

Is this Sampling Point Within a Wetland? (Yes) No (Circle)

strong hydrophytic veg and hydrology suggest that this is a wetland soil.

Remarks:

NOTE: During this field visit, only a wetland overview was performed. The actual upland-wetland boundary was not determined.

PFO1E/PEM2B

2nd roll Photo 6

Approved by HQUSACE 2/92

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

Project/Site: Keystone Sanitation Landfill Site OU-2 RI Applicant/Owner: Investigator: Aura Stauffer and Jennifer Hayes	Date: 10/3/95 County: Adams State: PA
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? Yes (No) (If needed, explain on reverse.)	Community ID: W-26 Transect ID: Plot ID:

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. Juncus effusus	H	FACW+	9.		
2. Carex spp.	H	—	10.		
3. Picea pumila	H	FACW	11.		
4. Polygonum pensylvanicum	H	FACW	12.		
5. Graminoae	H	—	13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). at least 60%

Remarks: Dominant vegetation is hydrophytic vegetation was mowed.

HYDROLOGY

___ Recorded Data (Describe in Remarks):
- ___ Stream, Lake, or Tide Gauge
- ___ Aerial Photographs
- ___ Other

✓ No Recorded Data Available

Field Observations:

Depth of Surface Water:	1	(in.)
Depth to Free Water in Pit:	—	(in.)
Depth to Saturated Soil:	0	(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: low area along stream

Drought Year No measurable rain from mid August through mid September

SOILS

Map Unit Name (Series and Phase): Worsham silt loam (WoA) Drainage Class: PD

Taxonomy (Subgroup): Typic Ochraquults Field Observations Confirm Mapped Type? (Yes) No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
		10YR 6/1	—	—	silt loam

Hydric Soil Indicators:

- ___ Histosol
- ___ Histic Epipedon
- ___ Sulfidic Odor
- ___ Aquic Moisture Regime
- ✓ Reducing Conditions
- ✓ Gleyed or Low-Chroma Colors
- ___ Concretions
- ___ High Organic Content in Surface Layer in Sandy Soils
- ___ Organic Streaking in Sandy Soils
- ✓ Listed on Local Hydric Soils List
- ___ Listed on National Hydric Soils List
- ___ Other (Explain in Remarks)

Remarks: Hydric soil parameter is met.

WETLAND DETERMINATION

Hydrophytic Vegetation Present? (Yes) No (Circle)
Wetland Hydrology Present? (Yes) No
Hydric Soils Present? (Yes) No

Is this Sampling Point Within a Wetland? (Yes) No (Circle)

Remarks: All three parameters met.

NOTE: During this field visit, only a wetland overview was performed. The actual upland-wetland boundary was not determined.

roll 2
photo 7

PEMIB

Approved by HQUSACE 2/92

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

Project/Site: Keystone Sanitation Landfill Site OU-2 RI Applicant/Owner: Investigator: Aura Stauffer and Jennifer Hayes	Date: 10/3/95 County: Carroll State: MD
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? Yes (No) (If needed, explain on reverse.)	Community ID: W-27 Transect ID: Plot ID:

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. Leersia oryzoides	H	OBL	9.		
2. Impatiens capensis	H	FACW	10.		
3. Polygonum sagittatum	H	OBL	11.		
4. Carex lurida	H	OBL	12.		
5. Acer rubrum	S,T	FAC	13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 100 %

Remarks: Dominant vegetation is 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: 1-4" (in.)

Depth to Free Water in Pit: ___ (in.)

Depth to Saturated Soil: 0 (in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ✓ Inundated - in places
- ✓ 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: Area is located along a stream and also contains some spring seeps.
Drought Year No measurable rain from mid August through mid September

SOILS

Map Unit Name (Series and Phase): Baile silt loam (BaB) Drainage Class: PD

Taxonomy (Subgroup): Typic Ochraquults Field Observations Confirm Mapped Type? (Yes) No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
		10YR 6/2	10YR 4/6	few/prom	silt loam

Hydric Soil Indicators:

- ___ Histosol
- ___ Histic Epipedon
- ___ Sulfidic Odor
- ___ Aquic Moisture Regime
- ✓ Reducing Conditions
- ✓ Gleyed or Low-Chroma Colors
- ___ Concretions
- ___ High Organic Content in Surface Layer in Sandy Soils
- ___ Organic Streaking in Sandy Soils
- ✓ Listed on Local Hydric Soils List
- ___ Listed on National Hydric Soils List
- ___ Other (Explain in Remarks)

Remarks: Hydric soil parameter is met.

WETLAND DETERMINATION

Hydrophytic Vegetation Present? (Yes) No (Circle)
Wetland Hydrology Present? (Yes) No
Hydric Soils Present? (Yes) No

Is this Sampling Point Within a Wetland? (Circle) (Yes) No

Remarks: All three parameters met.

NOTE: During this field visit, only a wetland overview was performed. The actual upland-wetland boundary was not determined.

roll 2
Photo 8

PEM2B/PFO1E

Approved by HQUSACE 2/92

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

Project/Site: Keystone Sanitation Landfill Site OU-2 RI Applicant/Owner: Investigator: Aura Stauffer and Jennifer Hayes	Date: 10/3/95 County: Carroll State: MD
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? Yes (No) (If needed, explain on reverse.)	Community ID: W-28 Transect ID: Plot ID:

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. Acorus calamus	H	OBL	9.		
2. Juncus effusus	H	FACW+	10.		
3. Gramineae			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%

Remarks: emeregent veg in pasture observed from road

HYDROLOGY – not confirmed

___ 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:
- ___ 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: low lying area along stream. Dominance of hydrophytic vegetation.
Drought Year No measurable rain from mid August through mid September

SOILS

Map Unit Name (Series and Phase): Hatboro silt loam (Ht) Drainage Class: PD

Taxonomy (Subgroup): Fluventic Haplaquepts Field Observations Confirm Mapped Type? (Yes) No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
		Not sampled - wetland was viewed			
		from road only			

Hydric Soil Indicators:

- ___ Histosol
- ___ Histic Epipedon
- ___ Sulfidic Odor
- ___ Aquic Moisture Regime
- ___ Reducing Conditions
- ___ Gleyed or Low-Chroma Colors
- ___ Concretions
- ___ High Organic Content in Surface Layer in Sandy Soils
- ___ Organic Streaking in Sandy Soils
- ✓ Listed on Local Hydric Soils List
- ___ Listed on National Hydric Soils List
- ___ Other (Explain in Remarks)

Remarks: Hydric soil will have to be confirmed if a delineation is performed.

WETLAND DETERMINATION

Hydrophytic Vegetation Present? (Yes) No (Circle)
Wetland Hydrology Present? need to verify (Yes) No
Hydric Soils Present? (Yes) No

Is this Sampling Point Within a Wetland? (Yes) No (Circle)

Remarks: Area was viewed from the road. Hydrology and soils need to be checked if a delineation is performed. Roll 2 Photo 9

NOTE: During this field visit, only a wetland overview was performed. The actual upland-wetland boundary was not determined.

PEMIE

Approved by HQUSACE 2/92

AR310823

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

Project/Site: Keystone Sanitation Landfill Site OU-2 RI Applicant/Owner: _____ Investigator: Aura Stauffer and Jennifer Hayes	Date: 10/3/95 County: Carroll State: MD
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? Yes (No) (If needed, explain on reverse.)	Community ID: W-29 Transect ID: _____ Plot ID: _____

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. Lindera benzoin	S	FACW-	9.		
2. Acer rubrum	S,T	FAC	10.		
3.			11.		
4.			12.		
5.			13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 100 %

Remarks: Dominant vegetation is 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: _____ (in.)

Depth to Free Water in Pit: _____ (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: Area near stream

Drought Year — No measurable rain from mid August through mid September

SOILS

Map Unit Name (Series and Phase): Glenville silt loam (GrB) Drainage Class: MWD

Taxonomy (Subgroup): Aquic Fragiudults Field Observations Confirm Mapped Type? (Yes) No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
		2.5Y5/2	10YR 4/6	few/faint	silt loam

Hydric Soil Indicators:

- ___ Histosol
- ___ Histic Epipedon
- ___ Sulfidic Odor
- ✓ Aquic Moisture Regime
- ✓ Reducing Conditions
- ✓ Gleyed or Low-Chroma Colors
- ___ Concretions
- ___ High Organic Content in Surface Layer in Sandy Soils
- ___ Organic Streaking in Sandy Soils
- ✓ Listed on Local Hydric Soils List
- ___ Listed on National Hydric Soils List
- ___ Other (Explain in Remarks)

Remarks: Hydric soil parameter is met.

WETLAND DETERMINATION

Hydrophytic Vegetation Present? (Yes) No (Circle)
Wetland Hydrology Present? (Yes) No
Hydric Soils Present? (Yes) No

Is this Sampling Point Within a Wetland? (Circle) (Yes) No

Remarks: 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 is necessary to determine wetland-upland boundaries in this stream valley. roll 2 Photo 10

PFOIE

Approved by HQUSACE 2/92

AR310825

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

Project/Site: Keystone Sanitation Landfill Site OU-2 RI Applicant/Owner: Investigator: Aura Stauffer and Jennifer Hayes	Date: 10/3/95 County: Carroll State: MD
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? Yes (No) (If needed, explain on reverse.)	Community ID: W-30 Transect ID: Plot ID:

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. Pilea pumila	H	FACW	9.		
2. Polygonum pensylvanicum	H	FACW	10.		
3. Impatiens spp.	H	FACW	11.		
4.			12.		
5.			13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 100 %

Remarks: Dominant vegetation is 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: ____ (in.)

Depth to Free Water in Pit: ____ (in.)

Depth to Saturated Soil: 0 (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 seep

Drought Year No measurable rain from mid August through mid September

SOILS

Map Unit Name (Series and Phase): Mt. Airy channery loam (MtE) Drainage Class: wp

Taxonomy (Subgroup): Typic dystrochrepts Field Observations Confirm Mapped Type? Yes (No)

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
		2.5Y 5/2	2.5Y 6/6	few / prom	silt loam

Hydric Soil Indicators:

- ___ Histosol
- ___ Histic Epipedon
- ___ Sulfidic Odor
- ___ Aquic Moisture Regime
- ✓ Reducing Conditions
- ✓ Gleyed or Low-Chroma Colors
- ___ Concretions
- ___ High Organic Content in Surface Layer in Sandy Soils
- ___ Organic Streaking in Sandy Soils
- ___ Listed on Local Hydric Soils List
- ___ Listed on National Hydric Soils List
- ___ Other (Explain in Remarks)

Remarks: Hydric soil parameter is met.

WETLAND DETERMINATION

Hydrophytic Vegetation Present? (Yes) No (Circle)
Wetland Hydrology Present? (Yes) No
Hydric Soils Present? (Yes) No

Is this Sampling Point Within a Wetland? (Circle) (Yes) No

Remarks: All three parameters met.

NOTE: During this field visit, only a wetland overview was performed. The actual upland-wetland boundary was not determined.

roll 2
Photo 11

PEM2B

Approved by HQUSACE 2/92

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

Project/Site: Keystone Sanitation Landfill Site OU-2 RI Applicant/Owner: Investigator: Aura Stauffer and Jennifer Hayes	Date: 10/9/95 County: Adams State: PA
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? Yes (No) (If needed, explain on reverse.)	Community ID: W-31 Transect ID: Plot ID:

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. Impatiens capensis	H	FACW	9.		
2. Carex lurida	H	OBL	10.		
3. Carex spp.	H	—	11.		
4. Juncus effusus	H	FACW+	12.		
5. Polygonum sagittatum	H	OBL	13.		
6. Sagittaria latifolia	H	OBL	14.		
7. Acer rubrum	S,T	FAC	15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). at least 86%

Remarks: Dominant vegetation is 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: ____ (in.)

Depth to Free Water in Pit: ____ (in.)

Depth to Saturated Soil: 0 (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: Influenced by spring seeps.

Drought Year — No measurable rain from mid August through mid September

SOILS

Map Unit Name (Series and Phase): Worsham silt loam (WoA) Drainage Class: _____

Field Observations

Taxonomy (Subgroup): Typic Ochraquults Confirm Mapped Type? (Yes) No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
		10 YR 5/1			silt loam

Hydric Soil Indicators:

- ___ Histosol
- ___ Histic Epipedon
- ___ Sulfidic Odor
- ___ Aquic Moisture Regime
- ✓ Reducing Conditions
- ✓ Gleyed or Low-Chroma Colors
- ___ Concretions
- ___ High Organic Content in Surface Layer in Sandy Soils
- ___ Organic Streaking in Sandy Soils
- ✓ Listed on Local Hydric Soils List
- ___ Listed on National Hydric Soils List
- ___ Other (Explain in Remarks)

Remarks: Hydric soil parameter met.

WETLAND DETERMINATION

Hydrophytic Vegetation Present?	(Yes) No (Circle)	(Circle)
Wetland Hydrology Present?	(Yes) No	
Hydric Soils Present?	(Yes) No	Is this Sampling Point Within a Wetland? (Yes) No

Remarks: All three parameters met.

NOTE: During this field visit, only a wetland overview was performed. The actual upland-wetland boundary was not determined.

roll 2

PEM1/PFO1B Photo 12

Approved by HQUSACE 2/92

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

Project/Site: Keystone Sanitation Landfill Site OU-2 RI Applicant/Owner: _____ Investigator: Aura Stauffer and Jennifer Hayes	Date: 10/9/95 County: Carroll State: MD
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? Yes (No) (If needed, explain on reverse.)	Community ID: W-32 Transect ID: _____ Plot ID: _____

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. Acer rubrum	S,T	FAC	9.		
2. Acer saccharinum	T	FACW	10.		
3. Toxicodendron radicans	H	FAC	11.		
4. Impatiens capensis	H	FACW	12.		
5. Eupatorium perfoliatum	H	FACW	13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 100 %

Remarks: Dominant vegetation is 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: ____ (in.)

Depth to Free Water in Pit: ____ (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:

Drought Year No measurable rain from mid August through mid September

SOILS

Map Unit Name (Series and Phase): Cadorus silt loam — Drainage Class: MuD

Field Observations — Confirm Mapped Type? (Yes) No

Taxonomy (Subgroup): Aquic Fluventic Dystrochrepts

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
		10 YR 7/1	10 YR 6/8	many / prom.	silt loam

Hydric Soil Indicators:

- ___ Histosol
- ___ Histic Epipedon
- ___ Sulfidic Odor
- ✓ Aquic Moisture Regime
- ✓ Reducing Conditions
- ✓ Gleyed or Low-Chroma Colors
- ___ Concretions
- ___ High Organic Content in Surface Layer in Sandy Soils
- ___ Organic Streaking in Sandy Soils
- ___ Listed on Local Hydric Soils List
- ___ Listed on National Hydric Soils List
- ___ Other (Explain in Remarks)

Remarks: Hydric soil parameter met.

WETLAND DETERMINATION

Hydrophytic Vegetation Present? (Yes) No (Circle)
Wetland Hydrology Present? (Yes) No
Hydric Soils Present? (Yes) No

Is this Sampling Point Within a Wetland? (Yes) No (Circle)

Remarks: All three parameters met

NOTE: During this field visit, only a wetland overview was performed. The actual upland-wetland boundary was not determined.

roll 2
PF01E Photo 13

Approved by HQUSACE 2/92

AR310831

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

Project/Site: Keystone Sanitation Landfill Site OU-2 RI Applicant/Owner: Investigator: Aura Stauffer and Jennifer Hayes	Date: 10/9/95 County: Carroll State: MD
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? Yes (No) (If needed, explain on reverse.)	Community ID: W-33 Transect ID: Plot ID:

Part of the wetland has been cleared and fill has recently been placed in the wetland.

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. Phalaris arundinacea	H	FACW	9.		
2. Polygonum sagittum	H	OBL	10.		
3. Impatiens capensis	H	FACW	11.		
4. Onoclea sensibilis	H	FACW	12.		
5. Scirpus cyperinus	H	FACW	13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 100 %

Remarks: Dominant vegetation is 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:	1-2	(in.)
Depth to Free Water in Pit:	—	(in.)
Depth to Saturated Soil:	0	(in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ✓ Inundated in places
- ✓ 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: Flood plain area

Drought Year — No measurable rain from mid August through mid September

SOILS

Map Unit Name (Series and Phase): Codorus silt loam — Drainage Class: MWD

Taxonomy (Subgroup): Aquic Fluventic Dystrochrepts — Field Observations Confirm Mapped Type? (Yes) No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
		2.5Y5/3	10YR 5/4	common/distinct	silt loam

Hydric Soil Indicators:

- ___ Histosol
- ___ Histic Epipedon
- ___ Sulfidic Odor
- ✓ Aquic Moisture Regime
- ✓ Reducing Conditions
- ___ Gleyed or Low-Chroma Colors
- ___ Concretions
- ___ High Organic Content in Surface Layer in Sandy Soils
- ___ Organic Streaking in Sandy Soils
- ✓ Listed on Local Hydric Soils List
- ___ Listed on National Hydric Soils List
- ___ Other (Explain in Remarks)

Remarks: soil is 3 chroma with mottles, but strong veg and wetland hydrology suggest that this floodplain area is a wetland.

WETLAND DETERMINATION

Hydrophytic Vegetation Present? (Yes) No (Circle)
Wetland Hydrology Present? (Yes) No
Hydric Soils Present? (Yes) No

Is this Sampling Point Within a Wetland? (Circle) (Yes) No

Remarks:

NOTE: During this field visit, only a wetland overview was performed. The actual upland-wetland boundary was not determined.

PEM1B

roll #2
Photos 14, 15, 16

Approved by HQUSACE 2/92

AR310833

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

Project/Site: Keystone Sanitation Landfill Site OU-2 RI Applicant/Owner: Investigator: Aura Stauffer and Jennifer Hayes	Date: 10/9/95 County: Carroll State: MD
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? Yes (No) (If needed, explain on reverse.)	Community ID: W-34 Transect ID: Plot ID:

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. Polygonum sagittatum	H	OBL	9.		
2. Acorus calamus	H	OBL	10.		
3. Impatiens capensis	H	FACW	11.		
4. Polygonum perfoliatum	H	FAC+	12.		
5.			13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 100 %

Remarks: Dominant vegetation is 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:	—	(in.)
Depth to Free Water in Pit:	—	(in.)
Depth to Saturated Soil:	0	(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 seeps.

Drought Year — No measurable rain from mid August through mid September

SOILS

Map Unit Name (Series and Phase): Mt. Airy Channery loam (MtD2) Drainage Class: WD

Field Observations

Taxonomy (Subgroup): Typic dystrochrepts Confirm Mapped Type? Yes (No)

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
		10 YR 6/1	—	—	silt loam

Hydric Soil Indicators:

- ___ Histosol
- ___ Histic Epipedon
- ___ Sulfidic Odor
- ___ Aquic Moisture Regime
- ✓ Reducing Conditions
- ✓ Gleyed or Low-Chroma Colors
- ___ Concretions
- ___ High Organic Content in Surface Layer in Sandy Soils
- ___ Organic Streaking in Sandy Soils
- ___ Listed on Local Hydric Soils List
- ___ Listed on National Hydric Soils List
- ___ Other (Explain in Remarks)

Remarks: Hydric soil parameter met.

WETLAND DETERMINATION

Hydrophytic Vegetation Present?	(Yes)	No (Circle)	(Circle)
Wetland Hydrology Present?	(Yes)	No	
Hydric Soils Present?	(Yes)	No	Is this Sampling Point Within a Wetland? (Yes) No

Remarks: All three parameters met.

NOTE: During this field visit, only a wetland overview was performed. The actual upland-wetland boundary was not determined.

roll 2
Photo 17

PEM2B

Approved by HQUSACE 2/92

AR310835

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

Project/Site: Keystone Sanitation Landfill Site OU-2 RI Applicant/Owner: Investigator: Aura Stauffer and Jennifer Hayes	Date: 10/9/95 County: Carroll State: MD
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? Yes (No) (If needed, explain on reverse.)	Community ID: W-35 Transect ID: Plot ID:

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. Leersia oryzoides	H	OBL	9.		
2. Carex lurida	H	OBL	10.		
3. Sagittaria latifolia	H	OBL	11.		
4. Typha latifolia	H	OBL	12.		
5.			13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 100%

Remarks: Dominant vegetation is 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:	2-3	(in.)
Depth to Free Water in Pit:	—	(in.)
Depth to Saturated Soil:	0	(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 seeps

Drought Year — No measurable rain from mid August through mid September

SOILS

Map Unit Name (Series and Phase): Hatboro silt loam — Drainage Class: PD

Taxonomy (Subgroup): Fluventic Haplaquepts — Field Observations Confirm Mapped Type? (Yes) No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
		2.5Y 5/2	—	—	silt loam

Hydric Soil Indicators:

- ___ Histosol
- ___ Histic Epipedon
- ___ Sulfidic Odor
- ___ Aquic Moisture Regime
- ✓ Reducing Conditions
- ✓ Gleyed or Low-Chroma Colors
- ___ Concretions
- ___ High Organic Content in Surface Layer in Sandy Soils
- ___ Organic Streaking in Sandy Soils
- ✓ Listed on Local Hydric Soils List
- ___ Listed on National Hydric Soils List
- ___ Other (Explain in Remarks)

Remarks: 2 chroma with no mottles, but strong hydrophytic veg (OBL) and hydrology suggest that this area is a wetland.

WETLAND DETERMINATION

Hydrophytic Vegetation Present?	(Yes)	No (Circle)	(Circle)
Wetland Hydrology Present?	(Yes)	No	
Hydric Soils Present?	(Yes)	No	Is this Sampling Point Within a Wetland? (Yes) No

Remarks:

NOTE: During this field visit, only a wetland overview was performed. The actual upland-wetland boundary was not determined.

roll 2
Photo 18

PEM1B

Approved by HQUSACE 2/92

AR310837

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

Project/Site: Keystone Sanitation Landfill Site OU-2 RI Applicant/Owner: _____ Investigator: Aura Stauffer and Jennifer Hayes	Date: 12/7/95 County: Adams State: PA
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? Yes (No) (If needed, explain on reverse.)	Community ID: W-36 Transect ID: _____ Plot ID: _____

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. Lindera benzoin	S	FACW-	9.		
2. Symplocarpus foetidus	H	OBL	10.		
3.			11.		
4.			12.		
5.			13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 100 %

Remarks: Dominant vegetation is 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: _____ (in.)

Depth to Free Water in Pit: 8 (in.)

Depth to Saturated Soil: 8 (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: Forested area along stream with seeps feeding the stream.

SOILS

Map Unit Name (Series and Phase): Glenville silt loam (GnB) Drainage Class: MWD

Taxonomy (Subgroup): Aquic Fragiudults Field Observations Confirm Mapped Type? (Yes) No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-8		10YR 4/3			
8-20		10YR 4/2	10YR 4/4	few/prom	silt loam

Hydric Soil Indicators:

- ___ Histosol
- ___ Histic Epipedon
- ___ Sulfidic Odor
- ✓ Aquic Moisture Regime
- ✓ Reducing Conditions
- ✓ Gleyed or Low-Chroma Colors
- ___ Concretions
- ___ High Organic Content in Surface Layer in Sandy Soils
- ___ Organic Streaking in Sandy Soils
- ___ Listed on Local Hydric Soils List
- ___ Listed on National Hydric Soils List
- ___ Other (Explain in Remarks)

Remarks:

WETLAND DETERMINATION

Hydrophytic Vegetation Present? (Yes) No (Circle)
Wetland Hydrology Present? (Yes) No
Hydric Soils Present? (Yes) No

Is this Sampling Point Within a Wetland? (Yes) No (Circle)

Remarks:

NOTE: During this field visit, only a wetland overview was performed. The actual upland-wetland boundary was not determined.

All three parameters met

P FOIC

Approved by HQUSACE 2/92

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

Project/Site: Keystone Sanitation Landfill Site OU-2	Date: July 23, 1996
Applicant/Owner:	County: Carroll
Investigator: Aura Stauffer and Jennifer Hayes	State: MD
Do Normal Circumstances exist on the site? (Yes) No	Community ID: W-37
Is the site significantly disturbed (Atypical Situation)? Yes (No)	Transect ID:
Is the area a potential Problem Area? Yes (No)	Plot ID:
(If needed, explain on reverse.)	

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. Solidago spp.	H	—	9. Mentha spp.	H	—
2. Impatiens spp.	H	FACW	10. Rosa multiflora	S	FACU
3. Polygonum sagittatum	H	OBL	11.		
4. Onoclea sensibilis	H	FACW	12.		
5. Pilea pumila	H	FACW	13.		
6. Eupatorium perfoliatum	H	FACW+	14.		
7. Acer rubrum	S,T	FAC	15.		
8. Acer saccharinum	T	FACW	16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-): at least 70 %

Remarks: Dominant vegetation is 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: ~1 (in.) in places

Depth to Free Water in Pit: 0 (in.)

Depth to Saturated Soil: 0 (in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ✓ Inundated - in places
- ✓ 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: Area is along Silver Run. Groundwater influence (seeps)

AR310840

SOILS

Map Unit Name (Series and Phase): Codorus silt loam (Ch) Drainage Class: MWD

Taxonomy (Subgroup): Aquic Fluventic Dystrochrepts Field Observations Confirm Mapped Type? (Yes) No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concentrations, Structure, etc.
—	—	10 YR 4/2	10 YR 4/6	—	silt loam

Hydric Soil Indicators:

- ___ Histosol
- ___ Histic Epipedon
- ___ Sulfidic Odor
- ✓ Aquic Moisture Regime
- ✓ Reducing Conditions
- ✓ Gleyed or Low-Chroma Colors
- ___ Concentrations
- ___ High Organic Content in Surface Layer in Sandy Soils
- ___ Organic Streaking in Sandy Soils
- ✓ Listed on Local Hydric Soils List
- ___ Listed on National Hydric Soils List
- ___ Other (Explain in Remarks)

Remarks:

WETLAND DETERMINATION

Hydrophytic Vegetation Present? (Yes) No

Wetland Hydrology Present? (Yes) No

Hydric Soils Present? (Yes) No

(Circle)

Is this Sampling Point Within a Wetland? (Yes) No

Remarks: Probably the area identified as potential bog turtle habitat by MD DNR. This area may have been a pasture at one time, but has since become over grown with rose and other invasive species.

Note: During this field visit, only a wetland overview was performed. The actual PFO1/PEM2B wetland-upland boundary was not delineated.

Approved by HQUSACE 2/92

AR310841

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

Project/Site: Keystone Sanitation Landfill Site OU-2
Applicant/Owner:
Investigator: Aura Stauffer and Jennifer Hayes

Date: June 23, 1996
County: Carroll
State: MD

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? Yes (No)
(If needed, explain on reverse.)

Community ID: Wetland 38
Transect ID:
Plot ID:

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. Symplocarpus foetidus	H	OBL	9.		
2. Phalaris arundinacea	H	FACW+	10.		
3. Acorus calamus	H	OBL	11.		
4. Sagittaria latifolia	H	OBL	12.		
5.			13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-): 100 %

Remarks: Dominant vegetation is 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: 1-2 (in.)
Depth to Free Water in Pit: 0 (in.)
Depth to Saturated Soil: 0 (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: Groundwater influence

AR310842

SOILS

Map Unit Name (Series and Phase): Codorus silt loam (Ch) Drainage Class: MWD

Taxonomy (Subgroup): Aquic Fluventic Dystrochrepts Field Observations Confirm Mapped Type? (Yes) No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concentrations, Structure, etc.
		2.5Y 5/2	10YR 4/6	common/distinct	silt loam

Hydric Soil Indicators:

- ___ Histosol
- ___ Histic Epipedon
- ___ Sulfidic Odor
- ✓ Aquic Moisture Regime
- ✓ Reducing Conditions
- ✓ Gleyed or Low-Chroma Colors
- ___ Concentrations
- ___ High Organic Content in Surface Layer in Sandy Soils
- ___ Organic Streaking in Sandy Soils
- ✓ Listed on Local Hydric Soils List
- ___ Listed on National Hydric Soils List
- ___ Other (Explain in Remarks)

Remarks:

WETLAND DETERMINATION

Hydrophytic Vegetation Present? (Yes) No

Wetland Hydrology Present? (Yes) No

Hydric Soils Present? (Yes) No

(Circle)

Is this Sampling Point Within a Wetland? (Yes) No

Remarks: Note: Note during this field visit, only a wetland overview was performed. the actual wetland-upland boundary was not delineated.

PEM2B

Approved by HQUSACE 2/92

Project Keystone Landfill
Wetland Site Number 1

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 - 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	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. 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 Keystone Land fill
Wetland Site Number 2

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 - 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	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. 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 Keystone Landfill
Wetland Site Number 3

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 — 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	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. 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 Keystone Landfill
Wetland Site Number 4

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	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. 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

Project Keystone Landfill
Wetland Site Number 5

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	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. 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 Keystone Landfill
Wetland Site Number 6

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	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. 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 Keystone Landfill
Wetland Site Number 7

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	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. 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 Keystone Landfill
Wetland Site Number 8

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	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. 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 Keystone Landfill
Wetland Site Number 9

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	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. 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 Keystone Landfill
Wetland Site Number 10

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	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. 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 Keystone Landfill
Wetland Site Number 11

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	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. 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 Keystone Landfill
Wetland Site Number 12

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	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. 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 Keystone Landfill
Wetland Site Number 13

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	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. 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 Keystone Landfill
Wetland Site Number 14

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	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. 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 Keystone Landfill
Wetland Site Number 15

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	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. 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 Keystone Landfill
Wetland Site Number 16

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	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. 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 Keystone Landfill
Wetland Site Number 17

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	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. 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 Keystone Landfill
Wetland Site Number 18

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	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. 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 Keystone Landfill
Wetland Site Number 19

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	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. 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 Keystone Landfill
Wetland Site Number 20

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	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. 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 Keystone Landfill
Wetland Site Number 21

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	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. 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 Keystone Landfill
Wetland Site Number 22

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	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. 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 Keystone Landfill
Wetland Site Number 23

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	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. 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 Keystone Landfill
Wetland Site Number 24

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	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. 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 Keystone Landfill
Wetland Site Number 23

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 – hunting
- ✓ 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. 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 Keystone Landfill
Wetland Site Number 26

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	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. 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 Keystone Landfill
Wetland Site Number 27

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	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. 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 Keystone Landfill
Wetland Site Number 28

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	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. 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 Keystone Landfill
Wetland Site Number 29

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 – hunting
- ____ 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. 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 Keystone Landfill
Wetland Site Number 30

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—hunting
- ✓ 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. 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 Keystone Landfill
Wetland Site Number 31

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	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. 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 Keystone Landfill
Wetland Site Number 32

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	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. 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 Keystone Landfill
Wetland Site Number 33

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	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. 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 Keystone Landfill
Wetland Site Number 34

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	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. 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 Keystone Landfill
Wetland Site Number 35

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	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. 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 Keystone Landfill
Wetland Site Number 36

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 - hunting

____ 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. 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 Keystone Landfill
Wetland Site Number 37

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	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. 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 Keystone Landfill
Wetland Site Number 38

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 – herps
- ✓ 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. 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.

Parris N. Glendening
Governor

Maryland Department of Natural Resources

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

John R. Griffin
Secretary

Ronald N. Young
Deputy Secretary

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.

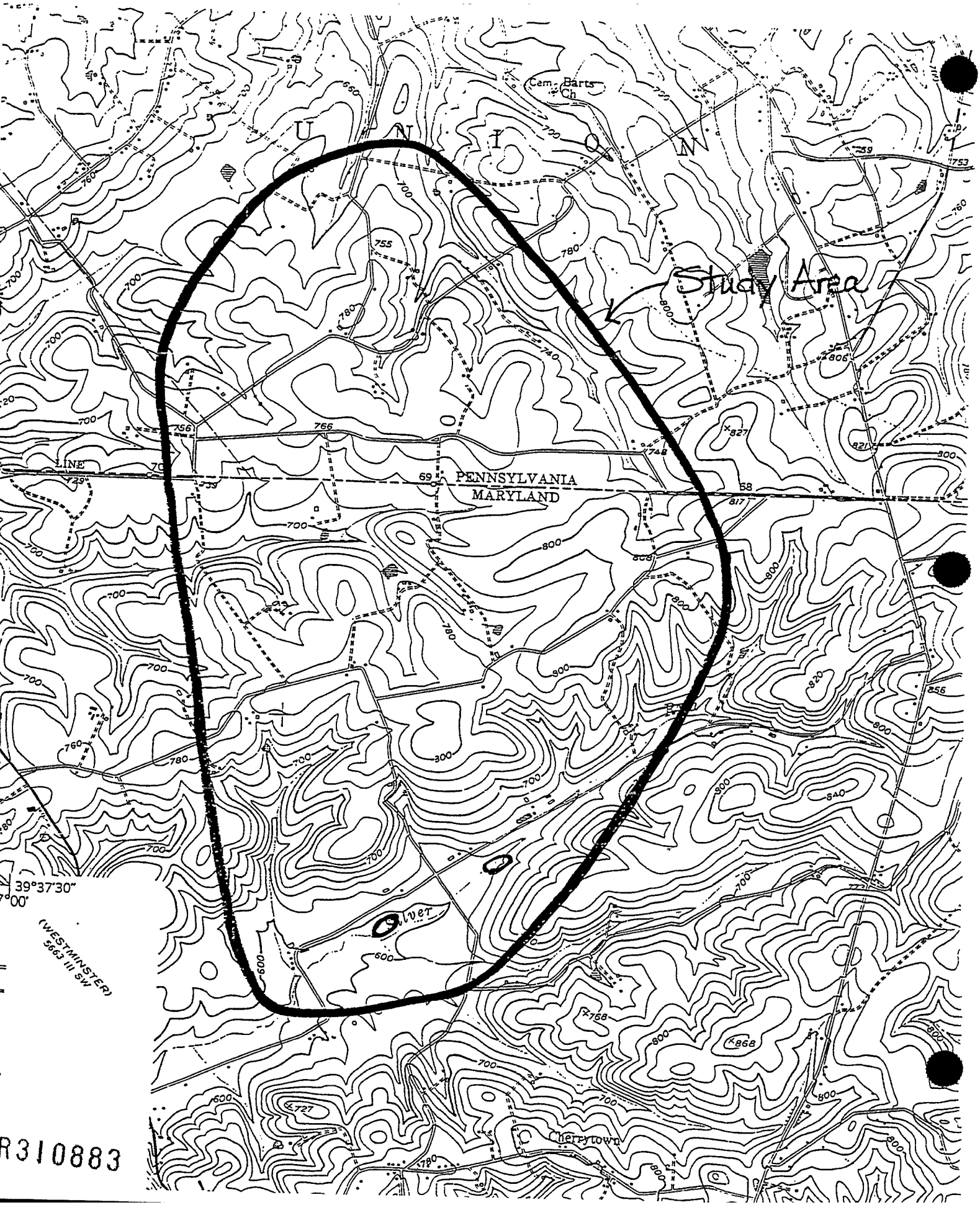
If you have any further questions concerning potential bog turtle habitat within the project area please contact me at our Wye Mills office (410-827-8612).

Sincerely,

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

cc: D. Brinker, Central Regional Mgr. HBCP

attachment


Study Area
PENNSYLVANIA
MARYLAND
LINE
Cem.
Barts
Ch
Cherrytown
39°37'30"
(WESTMINSTER)
5863 III SW

R310883

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 muhlenbergii*), 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,

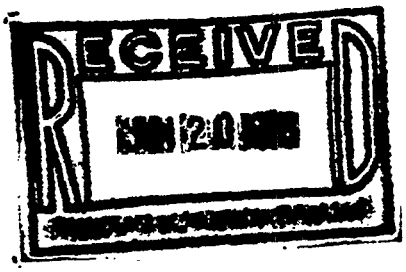
Charles J. Kulp
Supervisor

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

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

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) 974-2870.

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,

Edward W. Chamberlain

for 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	COMMENT	EXCLUDE	GW AREA	SOURCE AREA
MW-11A	MW960701 MW-11A	MW960701	MW-11A	MW-11A	Monitoring Well	M	S1GW	
MW-11A	MW960701 MW-11A-F	MW960701	MW-11A-F	MW-11A	Monitoring Well, Filt.		S1GW	
MW-11B	MW960701 MW-11B	MW960701	MW-11B	MW-11B	Monitoring Well		S1GW	
MW-11B	MW960701 MW-11B-F	MW960701	MW-11B-F	MW-11B	Monitoring Well, Filt.	M	S1GW	
MW-11C	MW960701 MW-11C	MW960701	MW-11C	MW-11C	Monitoring Well		S1GW	
MW-11C	MW960701 MW-11C-F	MW960701	MW-11C-F	MW-11C	Monitoring Well, Filt.	M	S1GW	
MW-12A	MW960701 MW-12A	MW960701	MW-12A	MW-12A	Monitoring Well	M	S1GW	
MW-12A	MW960701 MW-12A-F	MW960701	MW-12A-F	MW-12A	Monitoring Well, Filt.		S1GW	
MW-12B	MW960701 MW-12B	MW960701	MW-12B	MW-12B	Monitoring Well	M	S1GW	
MW-12B	MW960701 MW-12B-F	MW960701	MW-12B-F	MW-12B	Monitoring Well, Filt.		S1GW	
MW-12C	MW960701 MW-12C	MW960701	MW-12C	MW-12C	Monitoring Well	M	S1GW	
MW-12C	MW960701 MW-12C-F	MW960701	MW-12C-F	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-F	MW-13B	Monitoring Well, Filt.	M	S1GW	ONMW
MW-13C	MW960701 MW-13C	MW960701	MW-13C	MW-13C	Monitoring Well		S1GW	ONMW
MW-13C	MW960701 MW-13C-F	MW960701	MW-13C-F	MW-13C	Monitoring Well, Filt.	M	S1GW	ONMW
MW-A04	MW960701 MW-A04	MW960701	MW-A04	MW-A04	Monitoring Well	M	S1GW	
MW-A04	MW960701 MW-A04-F	MW960701	MW-A04-F	MW-A04	Monitoring Well, Filt.		S1GW	
MW-A05	MW960701 MW-A05	MW960701	MW-A05	MW-A05	Monitoring Well	M	S1GW	
MW-A05	MW960701 MW-A05-F	MW960701	MW-A05-F	MW-A05	Monitoring Well, Filt.		S1GW	
MW-A06	MW960701 MW-A06	MW960701	MW-A06	MW-A06	Monitoring Well	M	S1GW	
MW-A06	MW960701 MW-A06-F	MW960701	MW-A06-F	MW-A06	Monitoring Well, Filt.		S1GW	
MW-AD	MW940901 MW-AD	MW940901	MW-AD	MW-AD	Monitoring Well		S1GW	
MW-AD	MW950201 MW-AD	MW950201	MW-AD	MW-AD	Monitoring Well		S1GW	
MW-AD	MW960401 MW-AD	MW960401	MW-AD	MW-AD	Monitoring Well		S1GW	
MW-AI	MW940901 MW-AI	MW940901	MW-AI	MW-AI	Monitoring Well		S1GW	
MW-AI	MW950201 MW-AI	MW950201	MW-AI	MW-AI	Monitoring Well		S1GW	
MW-AI	MW950201 MW-AI-0301	MW950201	MW-AI-0301	MW-AI	Monitoring Well		S1GW	
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	MW960401	MW-AI-DUP	MW-AI	Monitoring Well		S1GW	
MW-AI	MW960401 MW-AI-DUP-F	MW960401	MW-AI-DUP-F	MW-AI	Monitoring Well, Filt.	M	S1GW	
MW-AI	MW960401 MW-AI-F	MW960401	MW-AI-F	MW-AI	Monitoring Well, Filt.	M	S1GW	
MW-AS	MW940901 MW-AS	MW940901	MW-AS	MW-AS	Monitoring Well		S1GW	
MW-AS	MW950201 MW-AS	MW950201	MW-AS	MW-AS	Monitoring Well		S1GW	
MW-AS	MW960401 MW-AS	MW960401	MW-AS	MW-AS	Monitoring Well		S1GW	
MW-B01	MW960701 MW-B01	MW960701	MW-B01	MW-B01	Monitoring Well	M	S1GW	
MW-B01	MW960701 MW-B01-F	MW960701	MW-B01-F	MW-B01	Monitoring Well, Filt.		S1GW	
MW-B04	MW960701 MW-B04	MW960701	MW-B04	MW-B04	Monitoring Well		S1GW	
MW-B04	MW960701 MW-B04-F	MW960701	MW-B04-F	MW-B04	Monitoring Well, Filt.	M	S1GW	
MW-B05	MW960701 MW-B05	MW960701	MW-B05	MW-B05	Monitoring Well	M	S1GW	
MW-B05	MW960701 MW-B05-F	MW960701	MW-B05-F	MW-B05	Monitoring Well, Filt.		S1GW	
MW-B06	MW960701 MW-B06	MW960701	MW-B06	MW-B06	Monitoring Well	M	S1GW	
MW-B06	MW960701 MW-B06-F	MW960701	MW-B06-F	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	MW-BS	Monitoring Well		S1GW	
MW-BS	MW940901 MW-BS-DUP	MW940901	MW-BS-DUP	MW-BS	Monitoring Well		S1GW	
MW-BS	MW950201 MW-BS	MW950201	MW-BS	MW-BS	Monitoring Well		S1GW	
MW-BS	MW960401 MW-BS	MW960401	MW-BS	MW-BS	Monitoring Well		S1GW	
MW-C01	MW960701 MW-C01	MW960701	MW-C01	MW-C01	Monitoring Well		S1GW	ONMW
MW-C01	MW960701 MW-C01-F	MW960701	MW-C01-F	MW-C01	Monitoring Well, Filt.	M	S1GW	ONMW
MW-C05	MW960701 MW-C05	MW960701	MW-C05	MW-C05	Monitoring Well		S1GW	ONMW
MW-C05	MW960701 MW-C05-F	MW960701	MW-C05-F	MW-C05	Monitoring Well, Filt.	M	S1GW	ONMW
MW-C12	MW960701 MW-C12	MW960701	MW-C12	MW-C12	Monitoring Well		S1GW	ONMW
MW-C12	MW960701 MW-C12-F	MW960701	MW-C12-F	MW-C12	Monitoring Well, Filt.	M	S1GW	ONMW
MW-C13	MW960701 MW-C13	MW960701	MW-C13	MW-C13	Monitoring Well		S1GW	ONMW
MW-C13	MW960701 MW-C13-F	MW960701	MW-C13-F	MW-C13	Monitoring Well, Filt.	M	S1GW	ONMW
MW-CD	MW940901 MW-CD	MW940901	MW-CD	MW-CD	Monitoring Well		S2GW	
MW-CD	MW950201 MW-CD	MW950201	MW-CD	MW-CD	Monitoring Well		S2GW	
MW-CD	MW960401 MW-CD	MW960401	MW-CD	MW-CD	Monitoring Well		S2GW	
MW-CI	MW940901 MW-CI	MW940901	MW-CI	MW-CI	Monitoring Well		S2GW	
MW-CI	MW950201 MW-CI	MW950201	MW-CI	MW-CI	Monitoring Well		S2GW	
MW-CI	MW960401 MW-CI	MW960401	MW-CI	MW-CI	Monitoring Well		S2GW	
MW-CI	MW960401 MW-CI-F	MW960401	MW-CI-F	MW-CI	Monitoring Well, Filt.	M	S2GW	
MW-CS	MW940901 MW-CS	MW940901	MW-CS	MW-CS	Monitoring Well		S2GW	

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	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	MW-EI	MW-EI	Monitoring Well		S2GW	
MW-FD	MW940901 MW-FD	MW940901	MW-FD	MW-FD	Monitoring Well		S2GW	
MW-FD	MW950201 MW-FD	MW950201	MW-FD	MW-FD	Monitoring Well		S2GW	
MW-FD	MW960401 MW-FD	MW960401	MW-FD	MW-FD	Monitoring Well		S2GW	
MW-FS	MW940901 MW-FS	MW940901	MW-FS	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.	M	S2GW	
MW-GD	MW960401 MW-GD	MW960401	MW-GD	MW-GD	Monitoring Well		S2GW	
MW-GD	MW960401 MW-GD-F	MW960401	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	MW-GS	Monitoring Well		S2GW	
MW-GS	MW950201 MW-GS	MW950201	MW-GS	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		S1GW	ONMW
MW-HD	MW950201 MW-HD	MW950201	MW-HD	MW-HD	Monitoring Well		S1GW	ONMW
MW-HD	MW960401 MW-HD	MW960401	MW-HD	MW-HD	Monitoring Well		S1GW	ONMW
MW-HN-01D	MW960701 MW-HN-01D	MW960701	MW-HN-01D	MW-HN-01D	Monitoring Well		S2GW	
MW-HN-01D	MW960701 MW-HN-01D-F	MW960701	MW-HN-01D-F	MW-HN-01D	Monitoring Well, Filt.	M	S2GW	
MW-HN-01I	MW960701 MW-HN-01I	MW960701	MW-HN-01I	MW-HN-01I	Monitoring Well		S2GW	
MW-HN-01I	MW960701 MW-HN-01I-F	MW960701	MW-HN-01I-F	MW-HN-01I	Monitoring Well, Filt.	M	S2GW	
MW-HN-01S	MW960701 MW-HN-01S	MW960701	MW-HN-01S	MW-HN-01S	Monitoring Well		S2GW	
MW-HN-01S	MW960701 MW-HN-01S-F	MW960701	MW-HN-01S-F	MW-HN-01S	Monitoring Well, Filt.	M	S2GW	
MW-HN-02D	MW960701 MW-HN-02D	MW960701	MW-HN-02D	MW-HN-02D	Monitoring Well		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	MW960701	MW-HN-02I	MW-HN-02I	Monitoring Well	M	BGGW	
MW-HN-02I	MW960701 MW-HN-02I-F	MW960701	MW-HN-02I-F	MW-HN-02I	Monitoring Well, Filt.		BGGW	
MW-HN-02S	MW960701 MW-HN-02S	MW960701	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	MW-HN-02S	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.		BGGW	
MW-HN-03I	MW960701 MW-HN-03I	MW960701	MW-HN-03I	MW-HN-03I	Monitoring Well		BGGW	
MW-HN-03I	MW960701 MW-HN-03I-F	MW960701	MW-HN-03I-F	MW-HN-03I	Monitoring Well, Filt.	M	BGGW	
MW-HN-03S	MW960701 MW-HN-03S	MW960701	MW-HN-03S	MW-HN-03S	Monitoring Well	M	BGGW	
MW-HN-03S	MW960701 MW-HN-03S-F	MW960701	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.	M	BGGW	
MW-HN-04I	MW960701 MW-HN-04I	MW960701	MW-HN-04I	MW-HN-04I	Monitoring Well		BGGW	
MW-HN-04I	MW960701 MW-HN-04I-F	MW960701	MW-HN-04I-F	MW-HN-04I	Monitoring Well, Filt.	M	BGGW	
MW-HN-04S	MW960701 MW-HN-04S	MW960701	MW-HN-04S	MW-HN-04S	Monitoring Well	M	BGGW	
MW-HN-04S	MW960701 MW-HN-04S-F	MW960701	MW-HN-04S-F	MW-HN-04S	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	MW-HS	Monitoring Well		S1GW	ONMW
MW-HS	MW950201 MW-HS-F	MW950201	MW-HS-F	MW-HS	Monitoring Well, Filt.	M	S1GW	ONMW
MW-HS	MW960401 MW-HS	MW960401	MW-HS	MW-HS	Monitoring Well		S1GW	ONMW
MW-HS	MW960401 MW-HS-F	MW960401	MW-HS-F	MW-HS	Monitoring Well, Filt.	M	S1GW	ONMW
MW-ID	MW940901 MW-ID	MW940901	MW-ID	MW-ID	Monitoring Well		S2GW	
MW-ID	MW950201 MW-ID	MW950201	MW-ID	MW-ID	Monitoring Well		S2GW	
MW-ID	MW960401 MW-ID	MW960401	MW-ID	MW-ID	Monitoring Well		S2GW	
MW-II	MW940901 MW-II	MW940901	MW-II	MW-II	Monitoring Well		S2GW	

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	MW-II	Monitoring Well		S2GW	
MW-IS	MW940901 MW-IS	MW940901	MW-IS	MW-IS	Monitoring Well		S2GW	
MW-IS	MW950201 MW-IS	MW950201	MW-IS	MW-IS	Monitoring Well		S2GW	
MW-IS	MW950201 MW-IS-DUP	MW950201	MW-IS-DUP	MW-IS	Monitoring Well		S2GW	
MW-IS	MW960401 MW-IS	MW960401	MW-IS	MW-IS	Monitoring Well		S2GW	
MW-K-01	MW960701 MW-K-01	MW960701	MW-K-01	MW-K-01	Monitoring Well		S1GW	ONMW
MW-K-01	MW960701 MW-K-01-F	MW960701	MW-K-01-F	MW-K-01	Monitoring Well, Filt.	M	S1GW	ONMW
MW-K-02	MW960701 MW-K-02	MW960701	MW-K-02	MW-K-02	Monitoring Well	M	S2GW	ONMW
MW-K-02	MW960701 MW-K-02-DUP	MW960701	MW-K-02-DUP	MW-K-02	Monitoring Well	M	S2GW	ONMW
MW-K-02	MW960701 MW-K-02-F	MW960701	MW-K-02-F	MW-K-02	Monitoring Well, Filt.		S2GW	ONMW
MW-K-04	MW960701 MW-K-04	MW960701	MW-K-04	MW-K-04	Monitoring Well		S2GW	ONMW
MW-K-05	MW960701 MW-K-05	MW960701	MW-K-05	MW-K-05	Monitoring Well	M	S2GW	ONMW
MW-K-05	MW960701 MW-K-05-F	MW960701	MW-K-05-F	MW-K-05	Monitoring Well, Filt.		S2GW	ONMW
MW-K-06	MW960701 MW-K-06	MW960701	MW-K-06	MW-K-06	Monitoring Well		S1GW	ONMW
MW-K-07	MW960701 MW-K-07	MW960701	MW-K-07	MW-K-07	Monitoring Well		S2GW	ONMW
MW-K-07	MW960701 MW-K-07-F	MW960701	MW-K-07-F	MW-K-07	Monitoring Well, Filt.	M	S2GW	ONMW
MW-K-08	MW960701 MW-K-08	MW960701	MW-K-08	MW-K-08	Monitoring Well	M	S2GW	ONMW
MW-K-08	MW960701 MW-K-08-DUP	MW960701	MW-K-08-DUP	MW-K-08	Monitoring Well	M	S2GW	ONMW
MW-K-08	MW960701 MW-K-08-DUP-F	MW960701	MW-K-08-DUP-F	MW-K-08	Monitoring Well, Filt.		S2GW	ONMW
MW-K-08	MW960701 MW-K-08-F	MW960701	MW-K-08-F	MW-K-08	Monitoring Well, Filt.		S2GW	ONMW
MW-K-08A	MW960701 MW-K-08A	MW960701	MW-K-08A	MW-K-08A	Monitoring Well	M	S1GW	
MW-K-08A	MW960701 MW-K-08A-DUP	MW960701	MW-K-08A-DUP	MW-K-08A	Monitoring Well	M	S1GW	
MW-K-08A	MW960701 MW-K-08A-DUP-F	MW960701	MW-K-08A-DUP-F	MW-K-08A	Monitoring Well, Filt.		S1GW	
MW-K-08A	MW960701 MW-K-08A-F	MW960701	MW-K-08A-F	MW-K-08A	Monitoring Well, Filt.		S1GW	
MW-MD-01	MW940901 MW-MD-01	MW940901	MW-MD-01	MW-MD-01	Monitoring Well		S2GW	
MW-MD-01	MW950201 MW-MD-01	MW950201	MW-MD-01	MW-MD-01	Monitoring Well		S2GW	
MW-MD-01	MW950201 MW-MD-01-F	MW950201	MW-MD-01-F	MW-MD-01	Monitoring Well, Filt.	M	S2GW	
MW-MD-01	MW960701 MW-MD-01	MW960701	MW-MD-01	MW-MD-01	Monitoring Well		S2GW	
MW-MD-01	MW960701 MW-MD-01-F	MW960701	MW-MD-01-F	MW-MD-01	Monitoring Well, Filt.	M	S2GW	
MW-MD-02	MW940901 MW-MD-02	MW940901	MW-MD-02	MW-MD-02	Monitoring Well		S2GW	
MW-MD-02	MW950201 MW-MD-02	MW950201	MW-MD-02	MW-MD-02	Monitoring Well		S2GW	
MW-MD-02	MW960401 MW-MD-02	MW960401	MW-MD-02	MW-MD-02	Monitoring Well		S2GW	
MW-MD-03	MW940901 MW-MD-03	MW940901	MW-MD-03	MW-MD-03	Monitoring Well		S2GW	
MW-MD-03	MW950201 MW-MD-03	MW950201	MW-MD-03	MW-MD-03	Monitoring Well		S2GW	
MW-MD-03	MW960401 MW-MD-03	MW960401	MW-MD-03	MW-MD-03	Monitoring Well		S2GW	
MW-MD-04	MW950201 MW-MD-04	MW950201	MW-MD-04	MW-MD-04	Monitoring Well		S2GW	
MW-MD-04	MW960701 MW-MD-04	MW960701	MW-MD-04	MW-MD-04	Monitoring Well		S2GW	
MW-MD-04	MW960701 MW-MD-04-F	MW960701	MW-MD-04-F	MW-MD-04	Monitoring Well, Filt.	M	S2GW	
MW-MD-05	MW940901 MW-MD-05	MW940901	MW-MD-05	MW-MD-05	Monitoring Well		S2GW	
MW-MD-05	MW950201 MW-MD-05	MW950201	MW-MD-05	MW-MD-05	Monitoring Well		S2GW	
MW-MD-05	MW960401 MW-MD-05	MW960401	MW-MD-05	MW-MD-05	Monitoring Well		S2GW	
MW-MD-06	MW940901 MW-MD-06	MW940901	MW-MD-06	MW-MD-06	Monitoring Well		S2GW	
MW-MD-06	MW950201 MW-MD-06	MW950201	MW-MD-06	MW-MD-06	Monitoring Well		S2GW	
MW-MD-06	MW960401 MW-MD-06	MW960401	MW-MD-06	MW-MD-06	Monitoring Well		S2GW	
MW-MD-07	MW940901 MW-MD-07	MW940901	MW-MD-07	MW-MD-07	Monitoring Well		S2GW	
MW-MD-07	MW950201 MW-MD-07	MW950201	MW-MD-07	MW-MD-07	Monitoring Well	M	S2GW	
MW-MD-07	MW950201 MW-MD-07-F	MW950201	MW-MD-07-F	MW-MD-07	Monitoring Well, Filt.		S2GW	
MW-MD-07	MW960701 MW-MD-07	MW960701	MW-MD-07	MW-MD-07	Monitoring Well		S2GW	
MW-MD-07	MW960701 MW-MD-07-F	MW960701	MW-MD-07-F	MW-MD-07	Monitoring Well, Filt.	M	S2GW	
MW-MD-08	MW940901 MW-MD-08	MW940901	MW-MD-08	MW-MD-08	Monitoring Well		S2GW	
MW-MD-08	MW950201 MW-MD-08	MW950201	MW-MD-08	MW-MD-08	Monitoring Well		S2GW	
MW-MD-08	MW960401 MW-MD-08	MW960401	MW-MD-08	MW-MD-08	Monitoring Well		S2GW	
MW-MD-09	MW940901 MW-MD-09	MW940901	MW-MD-09	MW-MD-09	Monitoring Well		S2GW	
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	MW-OW4	MW-OW4	Monitoring Well		S1GW	ONMW
MW-OW4	MW960701 MW-OW4-F	MW960701	MW-OW4-F	MW-OW4	Monitoring Well, Filt.	M	S1GW	ONMW
MW-P	MW960701 MW-P	MW960701	MW-P	MW-P	Monitoring Well		S1GW	
MW-P	MW960701 MW-P-F	MW960701	MW-P-F	MW-P	Monitoring Well, Filt.	M	S1GW	