

**FINAL
PRELIMINARY ASSESSMENT
OF
ERIE COUNTY CONSERVATION LEAGUE
FIRING RANGE**

REVISION 0

**NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
PLUM BROOK STATION
SANDUSKY, OHIO**



Prepared for:

NASA Glenn Research Center
Plum Brook Station
Plum Brook Reactor Facility
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ACRONYMS AND ABBREVIATIONS

CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
ECCL	Erie County Conservation League
EMB	Environmental Management Branch
EPA	United States Environmental Protection Agency
GIS	Geographic Information System
GRC	Glenn Research Center
NASA	National Aeronautics and Space Administration
ODNR	Ohio Department of Natural Resources
Ohio EPA	Ohio Environmental Protection Agency
PA	Preliminary Assessment
PAH	polycyclic aromatic hydrocarbons
PBS	Plum Brook Station
SAIC	Science Applications International Corporation
VSI	Visual Site Inspection

1. INTRODUCTION

Science Applications International Corporation (SAIC) has been contracted to perform a Preliminary Assessment (PA) at the current Erie County Conservation League (ECCL) firing range as requested by the National Aeronautics and Space Administration (NASA) pursuant to Special Task Number 300.40 under NASA contract NAS3-02150. This PA document has been prepared to evaluate the potential sources of environmental contamination and provide information to support determination of further investigation upon final closure of the ECCL firing range in August 2007. This PA was performed under the authority of the NASA Environmental Management Branch (EMB). The ECCL is located at 7511 Milan Road, Sandusky, Ohio 44870 on the eastern side of NASA Plum Brook Station (PBS), on NASA property which has been leased to ECCL.

1.1 PURPOSE AND SCOPE OF THE PRELIMINARY ASSESSMENT

The scope of this PA is to evaluate the threat of release from the ECCL Firing Range where trap, skeet, rifle, and handgun ranges have been operated and potential impacts on human or environmental receptors due to current and past activities at the site.

This PA was performed in accordance with the United States Environmental Protection Agency (EPA)'s *Guidance for Performing Preliminary Assessments under Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)* (EPA 1991).

In accordance with EPA guidance, specific tasks for this PA include:

- A file search of Ohio Environmental Protection Agency (Ohio EPA) Records, NASA Glenn Research Center (GRC)/PBS records, and available ECCL records regarding the site to evaluate the threat of release from the site and potential impacts on human or environmental receptors.
- A desktop review of maps, Geographic Information System (GIS) information, and aerial photos to identify human populations, sensitive environments, and evidence of past site use.
- A site reconnaissance to visually observe the site, document current use, and identify potential source types, locations, and migration pathways. Photographs of the site taken during the site reconnaissance conducted on January 20, 2006 are provided in Attachment 1.
- Score groundwater, surface water, soil, and air pathway exposures using the standard PA score sheets (Attachment 2).

This PA is considered a supplement to the *Preliminary Assessment/Visual Site Inspection (VSI) Report for NASA Plum Brook Station* (Tech Law 1998) and *Plum Brook Station Preliminary Assessment* (PBS PA) (SAIC 1991). Information relating to local geologic setting, hydrologic setting, climatic data, area demographics, and water utilization presented in these documents was used to supplement site-specific information for the evaluation of the threat of release from the site and potential impacts on human or environmental receptors.

1.2 REPORT ORGANIZATION

This report is organized according to the outline presented in Table 4-1 of the *Guidance for Performing Preliminary Assessments under CERCLA* (EPA 1991). These sections include:

- *Section 2: Site Description, Operational History, and Waste Characteristics*

This section provides the site description and history of the ECCL Firing Range and identifies wastes generated and potential source areas.

- *Section 3: Pathway and Environmental Hazard Assessment*

This section summarizes the environmental setting and discusses the threats and targets associated with each media-specific pathway.

- *Section 4: Summary and Conclusions*

This section summarizes the results of the PA scoring and identifies the major pathways and targets of concern.

- *Section 5: References*

This section presents the references cited in the PA report.

Attachments are included at the end of this report as supporting information. The attachments include:

- *Attachment 1: Photo Documentation Log*

This attachment shows the original photographs of the site and pertinent site features taken during the site reconnaissance conducted on January 20, 2006.

- *Attachment 2: PA Score Sheets*

This attachment provides documentation of the assumptions and pathway-specific values used to calculate the PA score.

2. SITE DESCRIPTION, OPERATIONAL HISTORY, AND WASTE CHARACTERISTICS

2.1 SITE DESCRIPTION

ECCL currently leases approximately 57 acres of land from NASA on the east side of PBS at the intersection of Route 250 and Fox Road, south of Sandusky, Ohio. The ECCL facility is currently an inactive firing range. The facility was thought to have closed on or about August 18, 2007. The geographic coordinates are 41° 22' 38.74" N latitude and 82° 38' 50.60" W longitude. Figure 2-1 shows the location of the ECCL firing range.

The ECCL facility includes the following:

- A club house;
- Three trap and two skeet fields;
- A 25 yard pistol range;
- A 50 yard pistol and rifle range;
- A high power rifle range with firing benches at 100 and 200 yards, respectively; and
- An archery range and elevated archery stand.

A 250 gallon aboveground diesel storage tank located on a concrete pad is on site for fueling maintenance equipment; no leaks or spills have been reported. A shallow man-made pond (approximately 2 to 3 feet deep and approximately 10,000 feet²) is south-southwest of the trap and skeet ranges, approximately 275 feet west of the ECCL club house (Figure 2-1).

The pistol/rifle ranges consist of a firing stand, earthen mound backstop (to contain bullets and fragments), and side berms (to contain ricochets). The trap range consists of five-shooting positions and one structure, the 'traphouse', from which the targets are thrown by a machine called a 'trap'. Shooting positions at the skeet ranges are arranged along an arc between two structures, the 'high house' and the 'low house', where targets are released. All firearms are discharged to the north. Trees and bushes are located at various places along the west side of the range. Access to the pistol and rifle ranges are restricted to range members only through fencing.

The ECCL facility is bordered to the west by the NASA Plum Brook Facility. Properties to the south and east of the facility consist of a mixture of agricultural and residential with several commercial facilities along U.S. Highway 250. Residential developments occupy much of the property to the north.

2.2 OPERATIONAL HISTORY

The ECCL was founded in 1948 with the purpose of conserving wildlife and improving hunting, fishing and other outdoor activities in Erie County. In the late 1950s or early 1960s, NASA acquired the ECCL property through eminent domain to act as a security buffer and leased the property back to ECCL.

The ECCL facility originally consisted of a single trap range, skeet range, and rifle range, respectively. In the early 1960s the 50-yard pistol and rifle range was added. In the early to mid 1960s, the additional trap and skeet ranges were added to the facility and the 25-yard pistol range was built in the mid 1980s. The ECCL currently operates under a Range Safety Plan that provides general rules and operational guidelines.

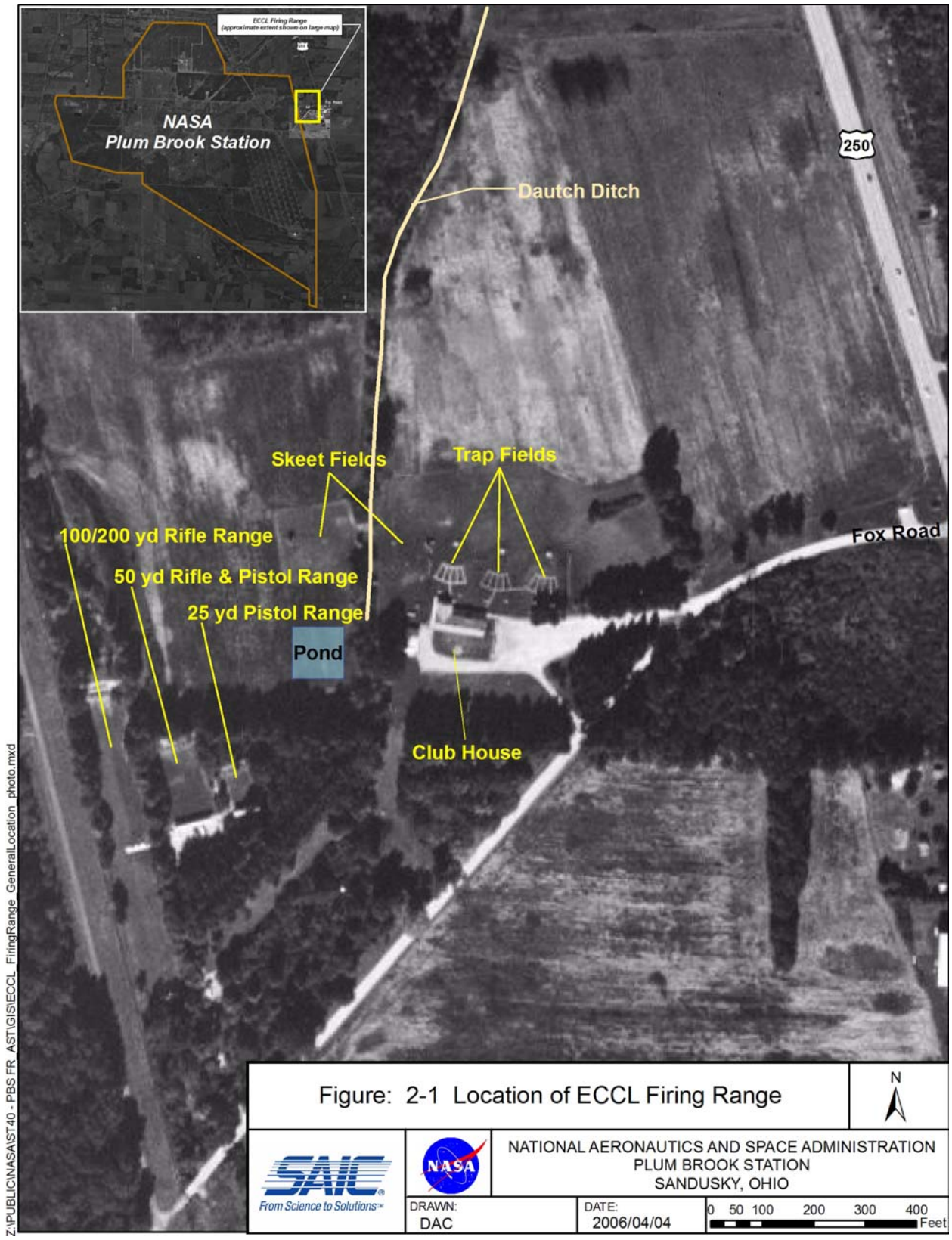


Figure 2-1. ECCL Firing Range Location and Site Features

2.3 WASTE CHARACTERISTICS

Ammunition fired at the ECCL facility includes standard ball shot (< #6) and jacket ammunition (< 50 caliber). Clay targets (e.g., White Flyer[®] Standard AA Pitch Trap/Skeet Target) were historically used at the trap and skeet range, however biodegradable "E-birds" have been used since approximately 2002.

Probable substances of concern include lead deposited in the earthen backstops from bullets fired at the pistol/rifle ranges, lead shot from shotguns used at the trap and skeet range, and polycyclic aromatic hydrocarbons (PAHs) associated with the clay targets historically used at the trap and skeet range. Additional substances may include arsenic (present in lead shot), antimony (increases shot hardness), and copper and zinc (jacket alloy metal).

Areas of known or suspected contamination include the pistol and rifle range impact berms (deposition of contaminants associated with discharged ammunition), the trap and skeet range field (deposition of lead shot, fragmented clay targets, shell casings), and portions of the pistol and rifle range floor (deposition of bullet jackets). To facilitate the scoring of this facility, the impact berms are assessed as piles. The footprint areas (total area is approximately 8,780 feet²) were estimated from aerial photographs obtained from the Ohio Department of Information Technology website. The area of contaminated soil associated with the trap and skeet range is estimated to be 1,403,207 feet². The pistol and rifle range floor subject to potential contamination (approximately 8,200 feet²) was determined by estimating the width of the range at each firing position and assuming a potential deposition zone extending 25 feet from the firing position.

It is believed that reclamation of lead-impacted soils was conducted at the firing range approximately 10 years ago; however, no documentation of this removal activity is available.

A file search was conducted on March 6, 2006 at the Ohio EPA Northwest District Office to identify available records regarding the site to evaluate the threat of release from the site and potential impacts on human or environmental receptors. No information regarding known or suspected releases at or from the ECCL facility was identified.

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3. PATHWAY AND ENVIRONMENTAL HAZARD ASSESSMENT

3.1 GROUNDWATER

3.1.1 Hydrogeologic Setting

As noted in Section 2.1, the ECCL facility lies east of NASA PBS. The primary soil association present in the eastern portion of PBS is the Prout association. For this PA, the Prout soil association is assumed to be representative of the soils at the ECCL facility. The Prout soils are nearly level to generally sloping, dark colored, and somewhat poorly drained. These soils are underlain by shale bedrock at a depth ranging from 20 to 40 inches for Prout soils and at 40 to 60 inches for the Prout soils, deep variant. Prout soils are very sandy loams with moderately low permeabilities (0.2 to 0.63 inches/hour).

The bedrock formations in the vicinity of PBS consist of four Devonian Formations: the Columbus Limestone, the Delaware Limestone, the Plum Brook Shale/Prout Limestone, and the Ohio Shale. The Plum Brook Shale/Prout Limestone formations occur in the eastern portion of PBS and are assumed to be representative of the bedrock formations in the vicinity of the ECCL facility. The Plum Brook Shale/Prout Limestone consists of a blue-gray, calcareous shale or mudstone overlain by a thin, fossiliferous limestone or dolomitic mudstone. Groundwater yields obtained in the thin carbonaceous beds within the Plum Brook Shale underlying the eastern portion of PBS seldom exceed 3 gallons per minute. The regional water-bearing zones in the bedrock aquifers in the vicinity of PBS are depicted in PBS PA Figure 3-7 (SAIC 1991).

A detailed discussion of the hydrogeologic setting in the vicinity of PBS is provided in Section 3.1 of the PBS PA (SAIC 1991).

3.1.2 Groundwater Targets

Potable water used at the ECCL facility is supplied by the City of Sandusky. City and rural water systems primarily serve residences to the north and east of the facility, while residences to the south and west typically rely on wells and/or cisterns. There are 179 permitted private drinking water wells within a 4-mile radius of PBS (Tech Law 1998). The locations of the drinking water wells within a 4-mile radius of PBS are depicted in PBS PA Figure 3-9 (SAIC 1991). Those wells in the vicinity of the PBS facility are completed in bedrock at depths ranging from 20 to 150 feet. The closest recorded down-gradient well is approximately 1.5 miles from the ECCL facility at 3718 Bogart Road (Ohio Department of Natural Resources [ODNR] 2006). It was estimated that approximately 214 residents within a 4-mile radius of the PBS facility use private wells for drinking water, and it is assumed to be representative of the population in the vicinity of the ECCL facility (SAIC 1991).

3.1.3 Groundwater Conclusions

The potential for a release to groundwater that would result in impacts on human receptors due to current and past activities at the site is not suspected. Due to low to moderate soil permeability, shallow depth to shale bedrock, presence of drainage tile beneath the firing ranges, and proximity of potable wells in the vicinity of the ECCL facility, it is unlikely that potential leaching of soil contaminants (e.g., lead) to groundwater represents a viable exposure pathway via ingestion.

3.2 SURFACE WATER

3.2.1 Hydrologic Setting

The ECCL facility is located on relatively flat terrain characterized by topography that gently slopes northward toward Lake Erie. Overland drainage from the ECCL facility generally flows north to Dautch Ditch. In addition, the firing ranges are underlain with drain tile which convey drainage from the site to Dautch Ditch. Dautch Ditch is a canal that originates on-site and flows approximately 2.5 miles northeast before merging with Sawmill Creek, which flows approximately 2 additional miles northeast and drains into Lake Erie. The Huron River and its branches, located approximately 3.5 miles east of the ECCL facility, are the major streams in the vicinity of the site. A total of eleven streams pass through or originate from PBS west of the facility and are depicted in PBS PA Figure 3-5 (SAIC 1991).

A shallow man-made pond (approximately 2 to 3 feet deep and approximately 10,000 feet²) exists south-southwest of the trap and skeet ranges, approximately 275 feet west of the ECCL club house (Figure 2-1). Numerous additional ponds (man-made and natural) and streams lie within a 15-mile radius of the ECCL facility. The dominant surface water feature is Lake Erie, which is used extensively as a drinking water source and for recreation. The major surface water bodies within a 15-mile radius of PBS are depicted in PBS PA Figure 3-4 (SAIC 1991).

Additional discussion of the hydrologic setting is provided in Section 3.1 of the PBS PA (SAIC 1991).

3.2.2 Surface Water Targets

There are six drinking water intakes within a 15-mile radius of the ECCL facility. Five of these drinking water intakes are down-gradient of the ECCL facility on Lake Erie and in the vicinity of Sandusky Bay. One drinking water intake is southeast of the ECCL facility on the West Branch of the Huron River and supplies the Village of Monroeville. Bellevue's and Norwalk's reservoirs are located more than 10 miles south-southeast of the ECCL facility. The primary drinking water intakes down-gradient of the ECCL facility serve the City of Sandusky (population of 47,000 served) and City of Huron (population of 7,000 served). The Erie County Health Department does not permit surface water to be used as a private drinking water supply. The surface water intakes within a 15-mile radius of PBS are depicted in PBS PA Figure 3-8 (SAIC 1991).

Lake Erie and Sandusky Bay support a great deal of recreational boating, fishing, and swimming during summer months. It is not known whether ponds are used to water livestock in the area. Crop irrigation is not common in Ohio. It is unknown whether Dautch Ditch is used as a source for recreational activities.

The nearest wetlands to the ECCL facility are at Sheldon's Marsh State Nature Preserve, located approximately 3.75 miles northeast of the facility. It lies in an "intra-basin" area between Plum Brook and Sawmill Creek at their discharges to Lake Erie.

3.2.3 Surface Water Conclusions

Due to the presence of a surface water pathway (i.e., Dautch Ditch) and focused discharge via the drainage system on-site, there is a potential for a release of on-site contaminants to surface water. No primary targets are identified because of expectations that the final discharge of any potential contaminants originating from the ECCL facility into Lake Erie (via Sawmill Creek) would result in undetectable concentrations due to dilution and attenuation. With the exception of Dautch Ditch, surface water bodies on-site, and within a 15-mile radius from the site (e.g., Huron River), are not expected to be impacted by site-contaminants due to

surface run-off. Additionally, no wetlands or other sensitive environments have been identified along Dautch Ditch.

3.3 SOIL EXPOSURE AND AIR

3.3.1 Physical Conditions

The ECCL pistol and rifle range facility is currently non-active. The wooden towers used on the trap course are in disrepair or have been torn down. The clay pigeon launchers used in the skeet course have been removed. The facility grounds and range fields are vegetated with grass. The pistol and rifle range impact berms are vegetated with grass and weeds. Trees and bushes are located at various places along the west side of the range. Access to the skeet and trap ranges is open. The pistol and rifle ranges are restricted and accessed only through fencing.

3.3.2 Soil and Air Targets

The total population within a 4-mile radius of the site was estimated at 31,250 (PBS PA Table 3-5 [SAIC 1991]). The ECCL facility currently employs two personnel. In addition, the facility has an annual membership of approximately 700 to 1,000 people. There are no schools or daycare facilities within 200 feet of the ECCL facility.

The nearest sensitive environment to the ECCL facility is the Erie Sand Barrens Nature Preserve, located approximately 3.5 miles southwest of the facility at the intersection of Taylor and Scheid Roads.

Table 3.1 summarizes the federal and state threatened and endangered species that are known or suspected of inhabiting or frequenting PBS. A biological survey has not been conducted to determine whether these species inhabit or frequent the ECCL property.

Table 3-1. Federal and State Threatened and Endangered Species in the Vicinity of Plum Brook Station (NASA 2005)

Plum Brook Animal Federally Listed Species
<i>Threatened</i>
Haliaeetus leucocephalus (bald eagle) - 2002
Plum Brook Plant State Listed Species (ODNR, 2004)
<i>Endangered</i>
Carex cephaloidea (thin-leaf sedge) - 2001
Hypericum gymnanthum (least St. John's wort) – 1994/2001
Juncus greenii (Greene's rush) - 2001
Prenanthes aspera (rough rattlesnake root) - 2001
<i>Threatened</i>
Bromus nottowanus (satin brome) - 2001
Carex brevior (tufted fescue sedge) - 2001
Carex conoidea (field sedge) – 1994/2001
Gratiola virginiana (short's hedge-hyssop) – 1994/2001
Helianthus mollis (ashy sunflower) – 1994/2001
Panicum boreale (northern panic-grass) - 2001
Sagittaria rigida (deer's tongue arrowhead) – 2001

Table 3-1. Federal and State Threatened and Endangered Species in the Vicinity of Plum Brook Station (NASA 2005) (continued)

Plum Brook State Listed Animals (ODNR, 2003)
<i>Endangered</i>
Bulbulcus ibis (cattle egret) – 1994/2001 Haliaeetus leucocephalus (bald eagle) - 2002 Spartiniphaga inops (moth, no common name) – 2001
<i>Threatened</i>
Bartramia longicauda (upland sandpiper) - 1994 Nycticorax nycterax (black-crowned night heron) – 1994/2001

3.3.3 Soil and Air Conclusions

The soil exposure pathway does not pose a primary threat to human receptor populations due to restricted access to the site pistol and rifle ranges and contact with the impact berm soils. However, the skeet and trap ranges may pose a greater risk to human receptors due to the unrestricted access to the shotgun ranges. Additionally, there is no threat of a release of contaminants from soil to air due to the non-volatile nature of the contaminants in site soils (e.g., metals), as well as to the presence of vegetative cover, which inhibits dust emissions. Due to the close proximity of the ECCL property to the PBS facility (i.e., less than ¼ mile), it is conservatively assumed that the federal and state threatened and endangered species identified for PBS warrant evaluation as secondary sensitive environments for the air pathway.

4. SUMMARY AND CONCLUSIONS

The ECCL facility was a firing range that has been in operation from the early 1950s through 2007. Due to the nature of the activities conducted at the site (e.g., discharge of firearms, use of clay targets), there is suspected soil contamination within the impact berm soils, the trap and skeet range fields, and potentially portions of the pistol/rifle range fields. Due to the hydrologic and geologic conditions in the vicinity of the ECCL property, it is unlikely that potential leaching of soil contaminants (e.g., lead) to groundwater represents a viable exposure pathway via ingestion. Likewise, the physical nature of the contaminants would not result in a release to the air pathway. There is strong potential for a release of site contaminants to surface water via run-off and discharge from the range drainage system. However, the overall threat to human receptors via ingestion is expected to be low.

The PA score sheets are provided in Attachment 2. The following scores were calculated for the ECCL facility:

- Groundwater Pathway: 3.84
- Surface Water Pathway: 46.08
- Soil Pathway: 3.13
- Air Pathway: 13.94
- Final Site Score: 24.2

The site score of 24.2 is below the EPA action level of 28.5, but is high enough to indicate adverse environmental impact. Additional site investigation is warranted upon final closure of the facility in August 2007.

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5. REFERENCES

- EPA (United States Environmental Protection Agency) 1991. Guidance for Performing Preliminary Assessments under CERCLA. September 1991.
- National Aeronautics and Space Administration Glenn Research Center 2005. Glenn Research Center Environmental Program Manual. Revised September 2005.
- ODNR (Ohio Department of Natural Resources) 2006. <http://www.dnr.state.oh.us/water>
- Ohio Office of Information Technology. <http://www.oit.ohio.gov/sdd/ess/ogrip/index.aspx>
- SAIC (Science Application International Corporation) 1991. Plum Brook Station Preliminary Assessment. June 1991.
- Tech Law 1998. Preliminary Assessment/Visual Site Inspection Report for NASA Plum Brook Station. August 24, 1998.

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ATTACHMENT 1
PHOTO DOCUMENTATION LOG

LIST OF PHOTOS

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Photo 1. Trap Field Looking Northeast



Photo 2. Skeet Field Looking Northeast



Photo 3. Skeet Field Looking Northwest



Photo 4. Ditch Looking North



Photo 5. Shallow Pond Looking Southwest, Back of Impact Berm



Photo 6. 200 Yard Rifle Range Looking North



Photo 7. 200 Yard Shooting Stands Looking West, Side Berm Visible



Photo 8. 200 Yard Rifle Range Looking Northwest



Photo 9. 50 Yard Rifle and Pistol Range



Photo 10. 50 Yard Rifle and Pistol Range Looking North East



Photo 11. 25 Yard Pistol Range Impact Area



Photo 12. 25 Yard Pistol Range Impact Area Looking East

**ATTACHMENT 2
PA SCORE SHEETS**

**ATTACHMENT 2
PA SCORE SHEETS**

ATTACHMENT 2

PA Scoresheets

Erie County Conservation League
Site Name: Firing Range

CERCLIS ID No.: _____

Street Address: 7511 Milan Road

City/State/Zip: Sandusky, OH 44870

Investigator: David M. Profusek

Agency/Organization: SAIC

Street Address: 8866 Commons Blvd Suite 201

City/State/Zip: Twinsburg, OH 44087

Date: 04/18/2006

GENERAL INFORMATION

Site Description and Operational History:

The Erie Country Conservation League (ECCL) currently leases approximately 57 acres of National Aeronautics and Space Administration (NASA) land on the east side of Plum Brook Station. The ECCL was founded in 1948 with the purpose of conserving wildlife and improving hunting, fishing and other outdoor activities in Erie County. Approximately in the late 1950's or early 1960's, NASA acquired the ECCL property through eminent domain to act as a security buffer and leased the property back to ECCL.

The facility includes trap and skeet ranges, archery range and elevated archery stand, 25 yard pistol range, 50 yard rifle range, and 100/200 yard high power rifle range. Firearms are discharged to the north and earthen mound backstops are at the end of each firing range to stop or redirect bullets fired at the ranges. A 250 gallon above ground diesel storage tank on a concrete pad is on-site for fueling maintenance equipment (no reported leaks or spills). A shallow (~2-3 ft) approximately 10,000 sq-ft man-made pond is west of the ECCL club house (not impacted by site activities).

Land use in the vicinity of the ECCL facility is primarily agricultural and residential. Several commercial facilities are within a 4-mile radius of the site. The NASA Plum Brook facility to the west. Dautch ditch is a canal that originates on site and flows northeast before merging with Sawmill Creek which drains into Lake Erie.

Probable Substances of Concern: (Previous investigations, analytical data)

Ammunition fired at the ECCL facility includes standard ball shot and jacket ammunition (< 50 caliber). Clay targets were historically used at the trap and skeet range, however currently biodegradable "E-birds" are being used.

Probable substances of concern include lead deposited in the earthen backstops from bullets fired at the pistol/rifle ranges, lead shot from shotguns used at the trap and skeet range, and polycyclic aromatic hydrocarbons (PAHs) associated with the clay targets historically used at the trap and skeet range. Additional substances may include arsenic (present in lead shot), antimony (increases shot hardness), and copper and zinc (jacket alloy metal).

GENERAL INFORMATION (continued)

Site Sketch:

(Show all pertinent features, indicate sources and closest targets, indicate north)

See report Section 2.

SOURCE EVALUATION

Source No.: 1	Source Name: Pile	Source Waste Quantity (WQ) Calculations:
Source Description: Earthen mound backstops at the pistol/rifle ranges. Deposition of contaminants associated with ammunition (e.g. lead).		25-yd Pistol Range = 1,960 sq-ft 50-yd Rifle Range = 3,303 sq-ft 100/200 Rifle Range = 3,517 sq-ft WQ = 8,780 sq-ft/13 = 675.38

Source No.: 2	Source Name: Contaminated Soil	Source Waste Quantity (WQ) Calculations:
Source Description: Trap and skeet range area. Deposition of lead shot and clay targets. Pistol/rifle range floor evaluated as range-specific width extending 25 ft from firing positions. Potential deposition of bullet jackets.		Contaminated soil area: Trap and Skeet Range = 1,403,207 sq-ft 25-yd Pistol Range = 1,625 sq-ft 50-yd Rifle Range = 2,275 sq-ft 100/200 Rifle Range = 4,300 sq-ft WQ = 1,411,407 sq-ft/34,000 = 41.51

Source No.:	Source Name:	Source Waste Quantity (WQ) Calculations:
Source Description:		

Total WQ = 41.51 + 675.38 = 716.89
WC = 32 (Table 1b: Total WQ > 100 to 10,000)

Site WC: 32

PA TABLE 1: WASTE CHARACTERISTICS (WC) SCORES
PA Table 1a: WC Scores for Single Source Sites and Formulas for Multiple Source Sites

TIER	SOURCE TYPE	SINGLE SOURCE SITES (assigned WC scores)			MULTIPLE SOURCE SITES
		WC = 18	WC = 32	WC = 100	Formula for Assigning Source WQ Values
UNDESIGNED	N/A	≤ 100 lb	> 100 to 10,000 lb	> 10,000 lb	<i>lb + 1</i>
	N/A	≤ 500,000 lb	> 500,000 to 50 million lb	> 50 million lb	<i>lb + 5,000</i>
VOLU ME	Landfill	≤ 6.75 million ft ³ ≤ 250,000 yd ³	> 6.75 million to 675 million ft ³ > 250,000 to 25 million yd ³	> 675 million ft ³ > 25 million yd ³	<i>ft³ + 67,500</i> <i>yd³ + 2,500</i>
	Surface impoundment	≤ 6,750 ft ² ≤ 250 yd ²	> 6,750 to 675,000 ft ² > 250 to 25,000 yd ²	> 675,000 ft ² > 25,000 yd ²	<i>ft² + 67.5</i> <i>yd² + 2.5</i>
	Drums	≤ 1,000 drums	> 1,000 to 100,000 drums	> 100,000 drums	<i>drums + 10</i>
	Tanks and non-drum containers	≤ 50,000 gallons	> 50,000 to 5 million gallons	> 5 million gallons	<i>gallons + 500</i>
	Contaminated soil	≤ 6.75 million ft ² ≤ 250,000 yd ²	> 6.75 million to 675 million ft ² > 250,000 to 25 million yd ²	> 675 million ft ² > 25 million yd ²	<i>ft² + 67,500</i> <i>yd² + 2,500</i>
	Pile	≤ 6,750 ft ² ≤ 250 yd ²	> 6,750 to 675,000 ft ² > 250 to 25,000 yd ²	> 675,000 ft ² > 25,000 yd ²	<i>ft² + 67.5</i> <i>yd² + 2.5</i>
ARE A	Other	≤ 6,750 ft ² ≤ 250 yd ²	> 6,750 to 675,000 ft ² > 250 to 25,000 yd ²	> 675,000 ft ² > 25,000 yd ²	<i>ft² + 67.5</i> <i>yd² + 2.5</i>
	Landfill	≤ 340,000 ft ² ≤ 7.8 acres	> 340,000 to 34 million ft ² > 7.8 to 780 acres	> 34 million ft ² > 780 acres	<i>ft² + 3,400</i> <i>acres + 0.078</i>
	Surface impoundment	≤ 1,300 ft ² ≤ 0.029 acres	> 1,300 to 130,000 ft ² > 0.029 to 2.9 acres	> 130,000 ft ² > 2.9 acres	<i>ft² + 13</i> <i>acres + 0.00029</i>
	Contaminated soil	≤ 3.4 million ft ² ≤ 78 acres	> 3.4 million to 340 million ft ² > 78 to 7,800 acres	> 340 million ft ² > 7,800 acres	<i>ft² + 34,000</i> <i>acres + 0.78</i>
	Pile*	≤ 1,300 ft ² ≤ 0.029 acres	> 1,300 to 130,000 ft ² > 0.029 to 2.9 acres	> 130,000 ft ² > 2.9 acres	<i>ft² + 13</i> <i>acres + 0.00029</i>
Land treatment	≤ 27,000 ft ² ≤ 0.62 acres	> 27,000 to 2.7 million ft ² > 0.62 to 62 acres	> 2.7 million ft ² > 62 acres	<i>ft² + 270</i> <i>acres + 0.0062</i>	

1 ton = 2,000 lb = 1 yd³ = 4 drums = 200 gallons

* Use area of land surface under pile, not surface area of pile.

PA Table 1b: WC Scores for Multiple Source Sites

WQ Total	WC Score
> 0 to 100	18
> 100 to 10,000	32
> 10,000	100

**GROUND WATER PATHWAY
GROUND WATER USE DESCRIPTION**

Describe Ground Water Use Within 4-miles of the Site:

(Describe stratigraphy, information on aquifers, municipal and/or private wells)

See report Section 3.

Calculations for Drinking Water Populations Served by Ground Water:

GROUND WATER PATHWAY CRITERIA LIST	
SUSPECTED RELEASE	PRIMARY TARGETS
<p>Y N U e o n s k</p> <p><input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Are sources poorly contained?</p> <p><input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> Is the source a type likely to contribute to ground water contamination (e.g., wet lagoon)?</p> <p><input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Is waste quantity particularly large?</p> <p><input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Is precipitation heavy?</p> <p><input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> Is the infiltration rate high?</p> <p><input type="checkbox"/> <input checked="" type="checkbox"/> Is the site located in an area of karst terrain?</p> <p><input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> Is the subsurface highly permeable or conductive?</p> <p><input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> Is drinking water drawn from a shallow aquifer?</p> <p><input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> Are suspected contaminants highly mobile in ground water?</p> <p><input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> Does analytical or circumstantial evidence suggest ground water contamination?</p> <p><input type="checkbox"/> <input checked="" type="checkbox"/> Other criteria? _____</p> <p><input type="checkbox"/> <input checked="" type="checkbox"/> SUSPECTED RELEASE?</p>	<p>Y N U e o n s k</p> <p><input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> Is any drinking water well nearby?</p> <p><input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> Has any nearby drinking water well been closed?</p> <p><input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> Has any nearby drinking water user reported foul-tasting or foul-smelling water?</p> <p><input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> Does any nearby well have a large drawdown or high production rate?</p> <p><input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> Is any drinking water well located between the site and other wells that are suspected to be exposed to a hazardous substance?</p> <p><input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> Does analytical or circumstantial evidence suggest contamination at a drinking water well?</p> <p><input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> Does any drinking water well warrant sampling?</p> <p><input type="checkbox"/> <input checked="" type="checkbox"/> Other criteria? _____</p> <p><input type="checkbox"/> <input checked="" type="checkbox"/> PRIMARY TARGET(S) IDENTIFIED?</p>
<p>Summarize the rationale for Suspected Release (attach an additional page if necessary):</p> <p>Due to low to moderate soil permeability, shallow depth to shale bedrock, presence of drainage tile beneath the firing ranges, and proximity of potable wells in the vicinity of the ECCL facility, it is unlikely that potential leaching of soil contaminants (e.g., lead) to groundwater represents a viable exposure pathway via ingestion.</p>	<p>Summarize the rationale for Primary Targets (attach an additional page if necessary):</p> <p>No drinking water wells in close proximity (< 1 mile) to the site.</p>

GROUND WATER PATHWAY SCORESHEET

<i>Pathway Characteristics</i>	
Do you suspect a release (see Ground Water Pathway Criteria List, page 7)?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Is the site located in karst terrain?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Depth to aquifer:	_____ ft
Distance to the nearest drinking water well:	_____ ft

LIKELIHOOD OF RELEASE

	A <i>Suspected Release</i> <small>(550)</small>	B <i>No Suspected Release</i> <small>(500 or 340)</small>	<i>References</i>
1. SUSPECTED RELEASE: If you suspect a release to ground water (see page 7), assign a score of 550. Use only column A for this pathway.	550		_____
2. NO SUSPECTED RELEASE: If you do not suspect a release to ground water, and the site is in karst terrain or the depth to aquifer is 70 feet or less, assign a score of 500; otherwise, assign a score of 340. Use only column B for this pathway.			_____
LR =	550		_____

TARGETS

3. PRIMARY TARGET POPULATION: Determine the number of people served by drinking water wells that you suspect have been exposed to a hazardous substance from the site (see Ground Water Pathway Criteria List, page 7). _____ people x 10 =	0		_____
4. SECONDARY TARGET POPULATION: Determine the number of people served by drinking water wells that you do NOT suspect have been exposed to a hazardous substance from the site, and assign the total population score from PA Table 2. Are any wells part of a blended system? Yes ___ No <input checked="" type="checkbox"/> If yes, attach a page to show apportionment calculations.	4		_____
5. NEAREST WELL: If you have identified a primary target population for ground water, assign a score of 50; otherwise, assign the Nearest Well score from PA Table 2. If no drinking water wells exist within 4 miles, assign a score of zero.	9		_____
6. WELLHEAD PROTECTION AREA (WHPA): If any source lies within or above a WHPA, or if you have identified any primary target well within a WHPA, assign a score of 20; assign 5 if neither condition holds but a WHPA is present within 4 miles; otherwise assign zero.	0		_____
7. RESOURCES	5		_____
T =	18		_____

WASTE CHARACTERISTICS

8. A. If you have identified any primary target for ground water, assign the waste characteristics score calculated on page 4, or a score of 32, whichever is GREATER; do not evaluate part B of this factor.	<small>(100 or 32)</small>		_____
B. If you have NOT identified any primary target for ground water, assign the waste characteristics score calculated on page 4.	<small>(100, 32, or 18)</small>	<small>(100, 32, or 18)</small>	_____
32			_____
WC =	32		_____

GROUND WATER PATHWAY SCORE:

$$\frac{LR \times T \times WC}{82,500}$$

<small>(subject to a maximum of 100)</small>
3.84

PA TABLE 2: VALUES FOR SECONDARY GROUND WATER TARGET POPULATIONS

PA Table 2a: Non-Karst Aquifers

Distance from Site	Population	Nearest Well (choose highest)	Population Served by Wells Within Distance Category										Population Value	
			1 to 10	11 to 30	31 to 100	101 to 300	301 to 1,000	1,001 to 3,000	3,001 to 10,000	10,001 to 30,000	30,001 to 100,000	Greater than 100,000		
0 to ¼ mile	0	20	1	2	5	16	52	163	521	1,633	5,214	16,325	_____	
> ¼ to ½ mile	0	18	1	1	3	10	32	101	323	1,012	3,233	10,121	_____	
> ½ to 1 mile	3	⑨	①	1	2	5	17	52	167	522	1,668	5,224	1	
>1 to 2 miles	44	5	1	1	①	3	9	29	94	294	939	2,938	1	
>2 to 3 miles	63	3	1	1	①	2	7	21	68	212	678	2,122	1	
>3 to 4 miles	104	2	1	1	1	①	4	13	42	131	417	1,306	1	
Nearest Well =		9											Score =	4

PA Table 2b: Karst Aquifers

Distance from Site	Population	Nearest Well (use 20 for karst)	Population Served by Wells Within Distance Category										Population Value	
			1 to 10	11 to 30	31 to 100	101 to 300	301 to 1,000	1,001 to 3,000	3,001 to 10,000	10,001 to 30,000	30,001 to 100,000	Greater than 100,000		
0 to ¼ mile	-----	20	1	2	5	16	52	163	521	1,633	5,214	16,325	_____	
> ¼ to ½ mile	-----	20	1	1	3	10	32	101	323	1,012	3,233	10,121	_____	
>½ to 1 mile	-----	20	1	1	3	8	26	82	261	816	2,607	8,162	_____	
>1 to 2 miles	-----	20	1	1	3	8	26	82	261	816	2,607	8,162	_____	
>2 to 3 miles	-----	20	1	1	3	8	26	82	261	816	2,607	8,162	_____	
>3 to 4 miles	-----	20	1	1	3	8	26	82	261	816	2,607	8,162	_____	
Nearest Well =													Score =	

**SURFACE WATER PATHWAY
MIGRATION ROUTE SKETCH**

Surface Water Migration Route Sketch:

(include runoff route, probable point of entry, 15-mile target distance limit, intakes, fisheries, and sensitive environments).

See report Section 2.

SURFACE WATER PATHWAY CRITERIA LIST	
<i>SUSPECTED RELEASE</i>	<i>PRIMARY TARGETS</i>
<p>Y N U e o n s k</p> <p><input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Is surface water nearby?</p> <p><input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Is waste quantity particularly large?</p> <p><input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> Is the drainage area large?</p> <p><input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Is rainfall heavy?</p> <p><input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Is the infiltration rate low?</p> <p><input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Are sources poorly contained or prone to runoff or flooding?</p> <p><input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Is a runoff route well defined (e.g., ditch or channel leading to surface water)?</p> <p><input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> Is vegetation stressed along the probable runoff route?</p> <p><input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> Are sediments or water unnaturally discolored?</p> <p><input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> Is wildlife unnaturally absent?</p> <p><input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> Has deposition of waste into surface water been observed?</p> <p><input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> Is ground water discharge to surface water likely?</p> <p><input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> Does analytical or circumstantial evidence suggest surface water contamination?</p> <p><input type="checkbox"/> <input checked="" type="checkbox"/> Other criteria? _____</p> <p><input checked="" type="checkbox"/> <input type="checkbox"/> SUSPECTED RELEASE?</p>	<p>Y N U e o n s k</p> <p><input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> Is any target nearby? If yes:</p> <p style="margin-left: 40px;"><input type="checkbox"/> Drinking water intake</p> <p style="margin-left: 40px;"><input type="checkbox"/> Fishery</p> <p style="margin-left: 40px;"><input type="checkbox"/> Sensitive environment</p> <p><input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> Has any intake, fishery, or recreational area been closed?</p> <p><input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> Does analytical or circumstantial evidence suggest surface water contamination at or downstream of a target?</p> <p><input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> Does any target warrant sampling? If yes:</p> <p style="margin-left: 40px;"><input type="checkbox"/> Drinking water intake</p> <p style="margin-left: 40px;"><input type="checkbox"/> Fishery</p> <p style="margin-left: 40px;"><input type="checkbox"/> Sensitive environment</p> <p><input type="checkbox"/> <input checked="" type="checkbox"/> Other criteria? _____</p> <p><input type="checkbox"/> <input checked="" type="checkbox"/> PRIMARY INTAKE(S) IDENTIFIED?</p> <p><input type="checkbox"/> <input checked="" type="checkbox"/> PRIMARY FISHERY(IES) IDENTIFIED?</p> <p><input type="checkbox"/> <input checked="" type="checkbox"/> PRIMARY SENSITIVE ENVIRONMENT(S) IDENTIFIED?</p>
<p>Summarize the rationale for Suspected Release (attach an additional page if necessary):</p> <p>The presence of surface water (Dautch Ditch) originating from the site and lack of engineered containment.</p>	<p>Summarize the rationale for Primary Targets (attach an additional page if necessary):</p> <p>City of Sandusky and City of Huron intakes are within 15 mile target radius of the site. Discharge of surface water originating from the site into Lake Erie would likely result in undetectable concentrations.</p>

**SURFACE WATER PATHWAY
LIKELIHOOD OF RELEASE AND DRINKING WATER THREAT SCORESHEET**

Pathway Characteristics	
Do you suspect a release (see Surface Water Pathway Criteria List, page 11)?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Distance to surface water:	<u> </u> <25 ft
Flood frequency:	<u> </u> yrs
What is the downstream distance to the nearest drinking water intake?	<u> </u> miles
Nearest fishery? <u> </u> miles	Nearest sensitive environment? <u> </u> miles

LIKELIHOOD OF RELEASE

	A Suspected Release <small>(550)</small>	B No Suspected Release <small>(500, 400, 300 or 100)</small>	References												
1. SUSPECTED RELEASE: If you suspect a release to surface water (see page 11), assign a score of 550. Use only column A for this pathway.	550														
2. NO SUSPECTED RELEASE: If you do not suspect a release to surface water, use the table below to assign a score based on distance to surface water and flood frequency. Use only column B for this pathway.															
<table border="1"> <tr><td>Distance to surface water ≤ 2,500 feet</td><td align="center">500</td></tr> <tr><td>Distance to surface water > 2,500 feet, and</td><td></td></tr> <tr><td> Site in annual or 10-year floodplain</td><td align="center">500</td></tr> <tr><td> Site in 100-year floodplain</td><td align="center">400</td></tr> <tr><td> Site in 500-year floodplain</td><td align="center">300</td></tr> <tr><td> Site outside 500-year floodplain</td><td align="center">100</td></tr> </table>	Distance to surface water ≤ 2,500 feet	500	Distance to surface water > 2,500 feet, and		Site in annual or 10-year floodplain	500	Site in 100-year floodplain	400	Site in 500-year floodplain	300	Site outside 500-year floodplain	100			
Distance to surface water ≤ 2,500 feet	500														
Distance to surface water > 2,500 feet, and															
Site in annual or 10-year floodplain	500														
Site in 100-year floodplain	400														
Site in 500-year floodplain	300														
Site outside 500-year floodplain	100														
LR =	550														

DRINKING WATER THREAT TARGETS

3. Record the water body type, flow (if applicable), and number of people served by each drinking water intake within the target distance limit. If there is no drinking water intake within the target distance limit, factors 4, 5, and 6 each receive zero scores.																			
<table border="1"> <thead> <tr> <th>Intake Name</th> <th>Water Body Type</th> <th>Flow</th> <th>People Served</th> </tr> </thead> <tbody> <tr> <td>City of Sandusky</td> <td>Great Lake</td> <td>N/A cfs</td> <td>47,000</td> </tr> <tr> <td>City of Huron</td> <td>Great Lake</td> <td>N/A cfs</td> <td>7,000</td> </tr> <tr> <td></td> <td></td> <td></td> <td>cfs</td> </tr> </tbody> </table>	Intake Name	Water Body Type	Flow	People Served	City of Sandusky	Great Lake	N/A cfs	47,000	City of Huron	Great Lake	N/A cfs	7,000				cfs			
Intake Name	Water Body Type	Flow	People Served																
City of Sandusky	Great Lake	N/A cfs	47,000																
City of Huron	Great Lake	N/A cfs	7,000																
			cfs																
4. PRIMARY TARGET POPULATION: If you suspect any drinking water intake listed above has been exposed to a hazardous substance from the site (see Surface Water Pathway Criteria List, page 11), list the intake name(s) and calculate the factor score based on the total population served.																			
0 people x 10 =	0																		
5. SECONDARY TARGET POPULATION: Determine the number of people served by drinking water intakes that you do NOT suspect have been exposed to a hazardous substance from the site, and assign the total population score from PA Table 3.																			
Are any intakes part of a blended system? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> If yes, attach a page to show apportionment calculations.	1																		
6. NEAREST INTAKE: If you have identified a primary target population for the drinking water threat (factor 4), assign a score of 50; otherwise, assign the Nearest Intake score from PA Table 3. If no drinking water intake exists within the target distance limit, assign a score of zero.	0																		
7. RESOURCES	5																		
T =	6																		

PA TABLE 3: VALUES FOR SECONDARY SURFACE WATER TARGET POPULATIONS

Surface Water Body Flow (see PA Table 4)	Population	Nearest Intake (choose highest)	Population Served by Intakes Within Distance Category										Population Value	
			1 to 10	31 to 100	101 to 300	301 to 1,000	1,001 to 3,000	3,001 to 10,000	10,001 to 30,000	30,001 to 100,000	100,001 to 300,000	300,001 to 1,000,000		Greater than 1,000,000
<10 cfs	_____	20	2	5	16	52	163	521	1,633	5,214	16,325	52,136	163,246	_____
10 to 100 cfs	_____	2	1	1	2	5	16	52	163	521	1,633	5,214	16,325	_____
>100 to 1,000 cfs	_____	1	0	0	1	1	2	5	16	52	163	521	1,633	_____
>1,000 to 10,000 cfs	_____	0	0	0	0	0	1	1	2	5	16	52	163	_____
>10,000 cfs or Great Lakes	54,000	⓪	0	0	0	0	0	0	1	⓪	2	5	16	1
3-mile Mixing Zone	_____	10	1	3	8	26	82	261	816	2,607	8,162	26,068	81,663	_____
Nearest Intake =		0											Score =	1

PA TABLE 4: SURFACE WATER TYPE / FLOW CHARACTERISTICS WITH DILUTION WEIGHTS FOR SECONDARY SURFACE WATER SENSITIVE ENVIRONMENTS

TYPE OF Surface Water Body		Dilution Weight
Water Body Type	OR FLOW	
minimal stream	<10 cfs	1
small to moderate stream	10 to 100 cfs	0.1
moderate to large stream	>100 to 1,000 cfs	N/A
large stream to river	1,000 to 10,000 cfs	N/A
large river	>10,000 cfs	N/A
3-mile mixing zone of quiet flowing streams or rivers	10 cfs or greater	N/A
coastal tidal water (harbors, sounds, bays, etc.), ocean, or Great Lakes	N/A	N/A

**SURFACE WATER PATHWAY (continued)
HUMAN FOOD CHAIN THREAT SCORESHEET**

LIKELIHOOD OF RELEASE		A	B	References
		Suspected Release <small>(550)</small>	No Suspected Release <small>(500,400,300 or 100)</small>	
Enter Surface Water Likelihood of Release score from page 12.	LR =	550		

HUMAN FOOD CHAIN THREAT TARGETS

8. Record the water body type and flow (if applicable) for each fishery within the target distance limit. If there is no fishery within the target distance limit, assign a Targets score of 0 at the bottom of the page.

Fishery Name	Water Body Type	Flow
Lake Erie	Great Lake	N/A cfs
_____	_____	_____ cfs
_____	_____	_____ cfs
_____	_____	_____ cfs
_____	_____	_____ cfs

9. PRIMARY FISHERIES: If you suspect any fishery listed above has been exposed to a hazardous substance from the site (see Surface Water Criteria List, page 11), assign a score of 300 and do not evaluate Factor 10. List the primary fisheries:

10. SECONDARY FISHERIES

- A. If you suspect a release to surface water and have identified a secondary fishery but no primary fishery, assign a score of 210.
- B. If you do not suspect a release, assign a Secondary Fisheries score from the table below using the lowest flow at any fishery within the target distance limit.

Lowest Flow	Secondary Fisheries Score
< 10 cfs	210
10 to 100 cfs	30
> 100 cfs, coastal tidal waters, oceans, or Great Lakes	12

	(300)	
	(210)	
	210	
		(210,30, or 12)
	(300, 210, or 0)	(210, 30, 12 or 0)
	210	
T =		

**SURFACE WATER PATHWAY (continued)
ENVIRONMENTAL THREAT SCORESHEET**

LIKELIHOOD OF RELEASE		A	B	References
		<i>Suspected Release</i>	<i>No Suspected Release</i>	
Enter Surface Water Likelihood of Release score from page 12.		(550) 550	(500,400,300 or 100)	

ENVIRONMENTAL THREAT TARGETS

11. Record the water body type and flow (if applicable) for each surface water sensitive environment within the target distance limit (see PA Tables 4 and 5). If there is no sensitive environment within the target distance limit, assign a Targets score of 0 at the bottom of the page.

<i>Environment Name</i>	<i>Water Body Type</i>	<i>Flow</i>
_____	_____	_____ cfs
_____	_____	_____ cfs
_____	_____	_____ cfs
_____	_____	_____ cfs
_____	_____	_____ cfs

12. PRIMARY SENSITIVE ENVIRONMENTS: If you suspect any sensitive environment listed above has been exposed to a hazardous substance from the site (see Surface Water Criteria List, page 11), assign a score of 300 and do not evaluate factor 13. List the primary sensitive environments:

_____, _____
_____, _____

13. SECONDARY SENSITIVE ENVIRONMENTS: If sensitive environments are present, but none is a primary sensitive environment, evaluate Secondary Sensitive Environments based on flow.

A. For secondary sensitive environments on surface water bodies with flows of 100 cfs or less, assign scores as follows, and do not evaluate part B of this factor:

<i>Flow</i>	<i>Dilution Weight (PA Table 4)</i>	<i>Environment Type and Value (PA Tables 5 and 6)</i>	<i>Total</i>
cfs	x		=
cfs	x		=
cfs	x		=
cfs	x		=
cfs	x		=

Sum =

B. If all secondary sensitive environments are located on surface water bodies with flows > 100 cfs, assign a score of 10.

T =

(550)	
(10)	(10)
0	

PA TABLE 5: SURFACE WATER AND AIR PATHWAY SENSITIVE ENVIRONMENTS VALUES

<i>Sensitive Environment</i>	<i>Assigned Value</i>
Critical habitat for Federally designated endangered or threatened species Marine Sanctuary National Park Designated Federal Wilderness Area Ecologically important areas identified under the Coastal Zone Wilderness Act Sensitive Areas identified under the National Estuary Program or Near Coastal Water Program of the Clean Water Act Critical Areas Identified under the Clean Lakes Program of the Clean Water Act (subareas in lakes or entire small lakes) National Monument (air pathway only) National Seashore Recreation Area National Lakeshore Recreation Area	100
Habitat known to be used by Federally designated or proposed endangered or threatened species National Preserve National or State Wildlife Refuge Unit of Coastal Barrier Resources System Federal land designated for the protection of natural ecosystems Administratively Proposed Federal Wilderness Area Spawning areas critical for the maintenance of fish/shellfish species within a river system, bay, or estuary Migratory pathways and feeding areas critical for the maintenance of anadromous fish species in a river system Terrestrial areas utilized for breeding by large or dense aggregations of vertebrate animals (air pathway) or semi-aquatic foragers (surface water pathway) National river reach designated as Recreational	75
Habitat known to be used by State designated endangered or threatened species Habitat known to be used by a species under review as to its Federal endangered or threatened status Coastal Barrier (partially developed) Federally designated Scenic or Wild River	50
State land designated for wildlife or game management State designated Scenic or Wild River State designated Natural Area Particular areas, relatively small in size, important to maintenance of unique biotic communities	25
State designated areas for protection/maintenance of aquatic life under the Clean Water Act	5
Wetlands	See PA Table 6 (Surface Water Pathway) or PA Table 9 (Air Pathway)

PA TABLE 6: SURFACE WATER PATHWAY WETLANDS FRONTAGE VALUES

<i>Total Length of Wetlands</i>	<i>Assigned Value</i>
Less than 0.1 mile	0
0.1 to 1 mile	25
Greater than 1 to 2 miles	50
Greater than 2 to 3 miles	75
Greater than 3 to 4 miles	100
Greater than 4 to 8 miles	150
Greater than 8 to 12 miles	250
Greater than 12 to 16 miles	350
Greater than 18 to 20 miles	450
Greater than 20 miles	500

**SURFACE WATER PATHWAY (concluded)
WASTE CHARACTERISTICS, THREAT, AND PATHWAY SCORE SUMMARY**

WASTE CHARACTERISTICS	A	B
	<i>Suspected Release</i>	<i>No Suspected Release</i>
14. A. If you have identified any primary target for surface water (pages 12, 14, or 15), assign the waste characteristics score calculated on page 4, or a score of 32, whichever is GREATER; do not evaluate part B of this factor.	[100 or 32]	
B. If you have NOT identified any primary target for surface water, assign the waste characteristics score calculated on page 4.	[100,32, or 18] 32	[100,32, or 18]
WC =	32	

SURFACE WATER PATHWAY THREAT SCORES

Threat	<i>Likelihood of Release (LR) Score (from page 12)</i>	<i>Targets (T) Score (pages 12, 14, 15)</i>	<i>Pathway Waste Characteristics (WC) Score (determined above)</i>	<i>Threat Score LR x T x WC / 82,500</i>
Drinking Water	550	6	32	[subject to a maximum of 100] 1.28
Human Food Chain	550	210	32	[subject to a maximum of 100] 44.8
Environmental	550	0	32	[subject to a maximum of 80] 0

**SURFACE WATER PATHWAY SCORE
(Drinking Water Threat + Human Food Chain Threat + Environmental Threat)**

[subject to a maximum of 100] 46.08

SOIL EXPOSURE PATHWAY CRITERIA LIST	
SUSPECTED CONTAMINATION	RESIDENT POPULATION
<p>Surficial contamination can generally be assumed.</p>	<p>Y N U e o n s k</p> <p><input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> Is any residence, school, or daycare facility on or within 200 feet of an area of suspected contamination?</p> <p><input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> Is any residence, school, or daycare facility located on adjacent land previously owned or leased by the site owner/operator?</p> <p><input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> Is there a migration route that might spread hazardous substances near residences, schools, or daycare facilities?</p> <p><input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> Have onsite or adjacent residents or students reported adverse health effects, exclusive of apparent drinking water or air contamination problems?</p> <p><input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> Does any neighboring property warrant sampling?</p> <p><input type="checkbox"/> <input checked="" type="checkbox"/> Other criteria? _____</p> <p><input type="checkbox"/> <input checked="" type="checkbox"/> RESIDENT POPULATION IDENTIFIED?</p>
<p>Summarize the rationale for Resident Population (attach an additional page if necessary):</p> <p>Presence of impact berms and operational guidelines restrict soil contamination on-site.</p>	

SOIL EXPOSURE PATHWAY SCORESHEET

Pathway Characteristics	
Do any people live on or within 200 ft of areas of suspected contamination?	Yes ___ No <u>X</u>
Do any people attend school or daycare on or within 200 ft of areas of suspected contamination?	Yes ___ No <u>X</u>
Is the facility active? Yes <u>X</u> No ___ If yes, estimate the number of workers: <u>2</u>	

LIKELIHOOD OF EXPOSURE	Suspected Contamination	References										
1. SUSPECTED CONTAMINATION: Surficial contamination can generally be assumed, and a score of 550 assigned. Assign zero only if the absence of surficial contamination can be confidently demonstrated. LE =	550 <small>(550 or 0)</small>											
RESIDENT POPULATION THREAT TARGETS												
2. RESIDENT POPULATION: Determine the number of people occupying residences or attending school or daycare on or within 200 feet of areas of suspected contamination (see Soil Exposure Pathway Criteria List, page 18). <u>0</u> people x 10 =	0 <small>(50 or 0)</small>											
3. RESIDENT INDIVIDUAL: If you have identified a resident population (factor 2), assign a score of 50; otherwise, assign a score of 0.	0 <small>(15, 10, 5, or 0)</small>											
4. WORKERS: Use the following table to assign a score based on the total number of workers at the facility and nearby facilities with suspected contamination:												
<table border="1"> <thead> <tr> <th>Number of Workers</th> <th>Score</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>0</td> </tr> <tr> <td>1 to 100</td> <td>5</td> </tr> <tr> <td>101 to 1,000</td> <td>10</td> </tr> <tr> <td>>1,000</td> <td>15</td> </tr> </tbody> </table>	Number of Workers	Score	0	0	1 to 100	5	101 to 1,000	10	>1,000	15	5	
Number of Workers	Score											
0	0											
1 to 100	5											
101 to 1,000	10											
>1,000	15											
5. TERRESTRIAL SENSITIVE ENVIRONMENTS: Use PA Table 7 to assign a value for each terrestrial sensitive environment on an area of suspected contamination:												
<table border="1"> <thead> <tr> <th>Terrestrial Sensitive Environment Type</th> <th>Value</th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> </tr> </tbody> </table>	Terrestrial Sensitive Environment Type	Value										
Terrestrial Sensitive Environment Type	Value											
Sum =	0 <small>(5 or 0)</small>											
6. RESOURCES	5											
T =	10											
WASTE CHARACTERISTICS												
7. Assign the waste characteristics score calculated on page 4. WC =	32 <small>(100, 32, or 10)</small>											

RESIDENT POPULATION THREAT SCORE: $\frac{LE \times T \times WC}{82,500}$ (subject to a maximum of 100)
2.13

NEARBY POPULATION THREAT SCORE: (4, 2, or 1)
1

SOIL EXPOSURE PATHWAY SCORE: Resident Population Threat + Nearby Population Threat (subject to a maximum of 100)
3.13

**PA TABLE 7: SOIL EXPOSURE PATHWAY
TERRESTRIAL SENSITIVE ENVIRONMENT VALUES**

<i>Terrestrial Sensitive Environment</i>	Assigned Value
Terrestrial critical habitat for Federally designated endangered or threatened species National Park Designated Federal Wilderness Area National Monument	100
Terrestrial habitat known to be used by Federally designated or proposed threatened or endangered species National Preserve (terrestrial) National or State terrestrial Wildlife Refuge Federal land designated for protection of natural ecosystems Administratively proposed Federal Wilderness Area Terrestrial areas utilized by large or dense aggregations of animals (vertebrate species) for breeding	75
Terrestrial habitat used by State designated endangered or threatened species Terrestrial habitat used by species under review for Federal designated endangered or threatened status	50
State lands designated for wildlife or game management State designated Natural Areas Particular areas, relatively small in size, important to maintenance of unique biotic communities	25

AIR PATHWAY CRITERIA LIST	
SUSPECTED RELEASE	PRIMARY TARGETS
<p>Y N U e o n s k</p> <p><input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> Are odors currently reported?</p> <p><input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> Has release of a hazardous substance to the air been directly observed?</p> <p><input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> Are there reports of adverse health effects (e.g., headaches, nausea, dizziness) potentially resulting from migration of hazardous substances through the air?</p> <p><input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> Does analytical or circumstantial evidence suggest a release to the air?</p> <p><input type="checkbox"/> <input checked="" type="checkbox"/> Other criteria? _____</p> <p><input type="checkbox"/> <input checked="" type="checkbox"/> SUSPECTED RELEASE?</p>	<p>If you suspect a release to air, evaluate all populations and sensitive environments within 1/4 mile (including those onsite) as primary targets.</p>
<p>Summarize the rationale for Suspected Release (attach an additional page if necessary):</p> <p>There is no threat of a release of contaminants from soil to air due to the non-volatile nature of the contaminants in site soils (e.g., metals), as well as to the presence of vegetative cover, which inhibits dust emissions.</p>	

AIR PATHWAY SCORESHEET

<i>Pathway Characteristics</i>	
Do you suspect a release (see Air Pathway Criteria List, page 21)?	Yes ___ No X
Distance to the nearest individual:	_____ ft

	A	B	<i>References</i>
	<i>Suspected Release</i> <small>(640)</small>	<i>No Suspected Release</i> <small>(600)</small>	
1. SUSPECTED RELEASE: If you suspect a release to air (see page 21), assign a score of 550. Use only column A for this pathway.			
2. NO SUSPECTED RELEASE: If you do not suspect a release to air, assign a score of 500. Use only column B for this pathway.		500	
LR =		500	

TARGETS											
3. PRIMARY TARGET POPULATION: Determine the number of people subject to exposure from a suspected release of hazardous substances to the air. _____ people x 10 =											
4. SECONDARY TARGET POPULATION: Determine the number of people not suspected to be exposed to a release to air, and assign the total population score using PA Table 8.		25									
5. NEAREST INDIVIDUAL: If you have identified any Primary Target Population for the air pathway, assign a score of 50; otherwise, assign the Nearest Individual score from PA Table 8.		20									
6. PRIMARY SENSITIVE ENVIRONMENTS: Sum the sensitive environment values (PA Table 5) and wetland acreage values (PA Table 9) for environments subject to exposure from a suspected release to the air.											
<table border="1" style="width: 100%; border-collapse: collapse; margin-bottom: 5px;"> <thead> <tr> <th style="text-align: left; padding: 2px;"><i>Sensitive Environment Type</i></th> <th style="text-align: left; padding: 2px;"><i>Value</i></th> </tr> </thead> <tbody> <tr><td style="padding: 2px;"> </td><td style="padding: 2px;"> </td></tr> <tr><td style="padding: 2px;"> </td><td style="padding: 2px;"> </td></tr> <tr><td style="padding: 2px;"> </td><td style="padding: 2px;"> </td></tr> </tbody> </table>	<i>Sensitive Environment Type</i>	<i>Value</i>									
<i>Sensitive Environment Type</i>	<i>Value</i>										
Sum =											
7. SECONDARY SENSITIVE ENVIRONMENTS: Use PA Table 10 to determine the score for secondary sensitive environments.		21.88									
8. RESOURCES		5									
T =		71.88									

WASTE CHARACTERISTICS			
9. A. If you have identified any Primary Target for the air pathway, assign the waste characteristics score calculated on page 4, or a score of 32, whichever is GREATER; do not evaluate part B of this factor.			
B. If you have NOT identified any Primary Target for the air pathway, assign the waste characteristics score calculated on page 4.		32	
WC =		32	

AIR PATHWAY SCORE:	$\frac{LR \times T \times WC}{82,500}$	<table border="1" style="margin: auto; padding: 5px;"> <tr><td style="font-size: small;">(Subject to a maximum of 100)</td></tr> <tr><td style="font-size: large;">13.94</td></tr> </table>	(Subject to a maximum of 100)	13.94
(Subject to a maximum of 100)				
13.94				

PA TABLE 8: VALUES FOR SECONDARY AIR TARGET POPULATIONS

Distance from Site	Population	Nearest Individual (choose highest)	Population Within Distance Category												Population Value	
			1 to 10	11 to 30	31 to 100	101 to 300	301 to 1,000	1,001 to 3,000	3,001 to 10,000	10,001 to 30,000	30,001 to 100,000	100,001 to 300,000	300,001 to 1,000,000	Greater than 1,000,000		
Onsite		20	1	2	5	16	52	163	521	1,633	5,214	16,325	52,136	163,246		
>0 to ¼ mile	600	20	1	1	1	4	13	41	130	408	1,303	4,081	13,034	40,811	13	
>¼ to ½ mile	450	2	0	0	1	1	3	9	28	88	282	882	2,815	8,815	3	
>½ to 1 mile	2,130	1	0	0	0	1	1	3	8	26	83	261	834	2,612	3	
>1 to 2 miles	5,500	0	0	0	0	0	1	1	3	8	27	83	266	833	3	
>2 to 3 miles	9,100	0	0	0	0	0	1	1	1	4	12	38	120	376	1	
>3 to 4 miles	13,450	0	0	0	0	0	0	1	1	2	7	23	73	229	2	
Nearest Individual =		20													Score =	25

PA TABLE 8: AIR PATHWAY VALUES FOR WETLAND AREA	
Wetland Area	Assigned Value
Less than 1 acre	0
1 to 50 acres	25
Greater than 50 to 100 acres	75
Greater than 100 to 150	125
Greater than 150 to 200 acres	175
Greater than 200 to 300 acres	250
Greater than 300 to 400 acres	350
Greater than 400 to 500 acres	450
Greater than 500 acres	500

PA TABLE 10: DISTANCE WEIGHTS AND CALCULATIONS FOR AIR PATHWAY SECONDARY SENSITIVE ENVIRONMENTS			
Distance	Distance Weight	Sensitive Environment Type and Value (from PA Table 5 or 9)	Product
Onsite	0.10	x	
		x	
0-1/4 mi	0.025	x	
		x	See attached worksheet.
		x	
1/4-1/2 mi	0.0054	x	
		x	
		x	
		x	
Total Environments Score =			21.88

SITE SCORE CALCULATION

	S	S ²
GROUND WATER PATHWAY SCORE (S _{gw}):	3.84	14.75
SURFACE WATER PATHWAY SCORE (S _{sw}):	46.08	2,123.37
SOIL EXPOSURE PATHWAY SCORE (S _s):	3.13	9.82
AIR PATHWAY SCORE (S _a):	13.94	194.31
SITE SCORE:	$\sqrt{\frac{S_{gw}^2 + S_{sw}^2 + S_s^2 + S_a^2}{4}}$	
	24.2	

SUMMARY

	YES	NO
1. Is there a high possibility of a threat to any nearby drinking water well(s) by migration of a hazardous substance in ground water? A. If yes, identify the well(s). _____ B. If yes, how many people are served by the threatened well(s)? _____	<input type="checkbox"/>	<input checked="" type="checkbox"/>
2. Is there a high possibility of a threat to any of the following by hazardous substance migration in surface water? A. Drinking water intake B. Fishery C. Sensitive environment (wetland, critical habitat, others) D. If yes, identify the target(s). _____ _____ _____	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
3. Is there a high possibility of an area of surficial contamination within 200 feet of any residence, school, or daycare facility? If yes, identify the property(ies) and estimate the associated population(s). _____	<input type="checkbox"/>	<input checked="" type="checkbox"/>
4. Are there public health concerns at this site that are not addressed by PA scoring considerations? If yes, explain: _____ _____ _____	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Supplement to PA Table 10: Distance Weights and Calculations for Air Pathway Secondary Sensitive Environments

Federal or State Threatened or Endangered Species	Sensitive Environment Value from PA Table 5	Distance Weight	Product
Plum Brook Animal Federally Listed Species			
Threatened			
<i>Haliaeetus leucocephalus</i> (bald eagle) - 2002	75	0.025	1.88
Plum Brook Plant State Listed Species (ODNR, 2004)			
Endangered			
<i>Carex cephaloidea</i> (thin-leaf sedge) - 2001	50	0.025	1.25
<i>Hypericum gymnanthum</i> (least St. John's wort) – 1994/2001	50	0.025	1.25
<i>Juncus greenii</i> (Greene's rush) - 2001	50	0.025	1.25
<i>Prenanthes aspera</i> (rough rattlesnake root) - 2001	50	0.025	1.25
Threatened			
<i>Bromus nottowayanus</i> (satin brome) - 2001	50	0.025	1.25
<i>Carex brevior</i> (tufted fescue sedge) - 2001	50	0.025	1.25
<i>Carex conoidea</i> (field sedge) – 1994/2001	50	0.025	1.25
<i>Gratiola virginiana</i> (short's hedge-hyssop) – 1994/2001	50	0.025	1.25
<i>Helianthus mollis</i> (ashy sunflower) – 1994/2001	50	0.025	1.25
<i>Panicum boreale</i> (northern panic-grass) - 2001	50	0.025	1.25
<i>Sagittaria rigida</i> (deer's tongue arrowhead) – 2001	50	0.025	1.25
Plum Brook State Listed Animals (ODNR, 2003)			
Endangered			
<i>Bulbulcus ibis</i> (cattle egret) – 1994/2001	50	0.025	1.25
<i>Haliaeetus leucocephalus</i> (bald eagle) - 2002	50	0.025	1.25
<i>Spartiniphaga inops</i> (moth, no common name) – 2001	50	0.025	1.25
Threatened			
<i>Bartramia longicauda</i> (upland sandpiper) - 1994	50	0.025	1.25
<i>Nycticorax nycticorax</i> (black-crowned night heron) – 1994/2001	50	0.025	1.25
Total Environmental Score =			21.88