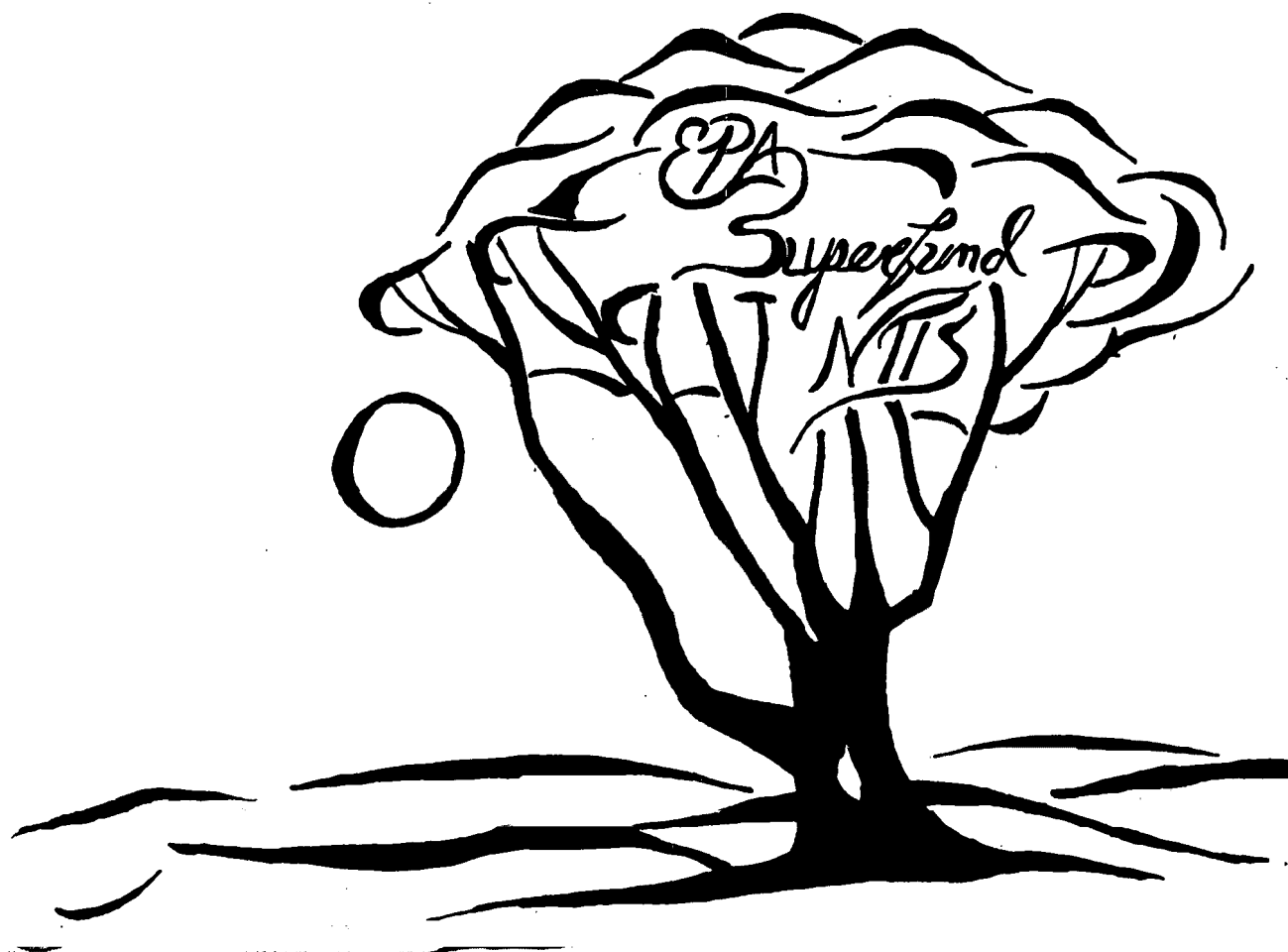


PB94-964136
EPA/ROD/R05-94/262
April 1995

EPA Superfund Record of Decision:

**Wright-Patterson Air Force Base
(Operable Unit 1), Dayton, OH
6/30/1994**



RECORD OF DECISION

OFF-SOURCE OPERABLE UNIT AND FINAL REMEDIAL ACTION

LANDFILLS 8 AND 10

**Wright-Patterson Air Force Base
Greene County, Ohio**

**Prepared by:
Office of Environmental Management
Restoration Branch
645 ABW/EMR
5490 Pearson Road
Wright-Patterson AFB, OH 45433-5332**

**FINAL
JUNE 1994**

**RECORD OF DECISION
OFF-SOURCE OPERABLE UNIT-LANDFILLS 8 & 10**

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**RECORD OF DECISION
OFF-SOURCE OPERABLE UNIT-LANDFILLS 8 & 10**

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RECORD OF DECISION
OFF-SOURCE OPERABLE UNIT - LANDFILLS 8 & 10

I. THE DECLARATION

A. Site Name and Location

Off-Source Operable Unit - Landfills 8 and 10
Wright-Patterson AFB
Greene County, Ohio
(CERCLIS Operable Unit 1, Event 4)

B. Statement of Basis and Purpose

This decision document presents the selection of the no action remedial alternative for the Off-Source Operable Unit and adoption of the previously approved Source Control remedial action as the final cleanup remedy for the Landfills 8 & 10 site, at Wright-Patterson AFB. The selection process was conducted in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act (SARA), and the National Contingency Plan (NCP). This decision is based on the administrative record for the site. All documents, correspondence, and other resources which comprise the administrative record upon which this decision is based are identified in the attached index.

C. Description of Selected Remedy/Rationale For No Action

Landfills 8 & 10 comprise the first of eleven operable units identified for Remedial Investigation/Feasibility Study (RI/FS) at Wright-Patterson AFB, Ohio. Past waste disposal sites on-base have been grouped into discreet operable units based on geographical proximity and similarities in waste characteristics. Separation of the Landfills 8 & 10 site into two operable units, one which addressed the source and the other which addressed areas outside (i.e., off-source) but potentially affected by the landfills, enabled the base to accelerate the cleanup effort. Both Wright-Patterson and the regulatory agencies agreed there was no reason to delay that portion of the overall site remedy dealing with the landfills themselves while awaiting sampling results from areas outside, but potentially affected by the site. The previous Record of Decision (ROD) for the Source Control Operable Unit was approved in July 1993 and addressed the sources of contamination and the threat posed by migration of contamination to groundwater. The Focused Remedial

RECORD OF DECISION
OFF-SOURCE OPERABLE UNIT - LANDFILLS 8 & 10

Investigation Report and Focused Feasibility Study for the landfills themselves formed the basis of this previous ROD. The findings of the follow-on Off-Source RI Report revealed that there were no new pathways of exposure presenting a risk which had not already been identified during the previous Focused RI, precluding the need for any additional feasibility studies. The Source Control remedial action is comprehensive and will ultimately eliminate all exposure pathways where a risk was identified.

The comprehensive remedial action which has been previously approved incorporates the following components:

- Low Permeability Clay Cap
- Leachate Collection and Treatment
- Landfill Gas Collection and Treatment
- Public Water Supply for Private Well Users
- Operation and Maintenance and Performance Monitoring
- Disposal of Nonhazardous Drill Cuttings under the Clay Cap
- Removal of Asphalt Slabs from Surface Water Stream
- Site Access Restrictions

RECORD OF DECISION
OFF-SOURCE OPERABLE UNIT - LANDFILLS 8 & 10

D. Declaration Statement

United States Air Force

It has been determined that no further remedial action is necessary at the site. The previously approved Source Control remedial action is comprehensive and eliminates the need to conduct additional remedial action. The Source Control remedial action is protective of human health and environment, complies with Federal and State requirements that are legally applicable or relevant and appropriate to the remedial action, and is cost-effective. This remedy utilizes permanent solutions and alternative treatment or resource recovery technologies, to the maximum extent practicable. While the Source Control remedial action will ultimately eliminate all exposure pathways where a risk was identified, some contaminants will remain on-site above health-based levels. As a result, and in accordance with CERCLA Section 300.430 (f)(4)(ii), a review will be conducted within five years after commencement of the remedial action to ensure that the remedy continues to provide adequate protection of human health and the environment.



THOMAS W. L. McCALL, Jr.
Deputy Assistant Secretary
of the Air Force
(Environmental, Safety and
Occupational Health)

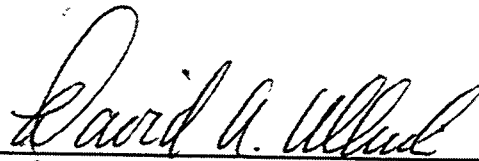
Jan 23, 1994
Date

RECORD OF DECISION
OFF-SOURCE OPERABLE UNIT - LANDFILLS 8 & 10

D. Declaration Statement

United States Environmental Protection Agency

It has been determined that no further remedial action is necessary at the site. The previously approved Source Control remedial action is comprehensive and eliminates the need to conduct additional remedial action. The Source Control remedial action is protective of human health and environment, complies with Federal and State requirements that are legally applicable or relevant and appropriate to the remedial action, and is cost-effective. This remedy utilizes permanent solutions and alternative treatment or resource recovery technologies, to the maximum extent practicable. While the Source Control remedial action will ultimately eliminate all exposure pathways where a risk was identified, some contaminants will remain on-site above health-based levels. As a result, and in accordance with CERCLA Section 300.430 (f)(4)(ii), a review will be conducted within five years after commencement of the remedial action to ensure that the remedy continues to provide adequate protection of human health and the environment.



for VALDAS V. ADAMKUS
Regional Administrator

U.S. Environmental Protection Agency Region V


6/30/94
Date

RECORD OF DECISION
OFF-SOURCE OPERABLE UNIT - LANDFILLS 8 & 10

D. Declaration Statement

Ohio Environmental Protection Agency

It has been determined that no further remedial action is necessary at the site. The previously approved Source Control remedial action is comprehensive and eliminates the need to conduct additional remedial action. The Source Control remedial action is protective of human health and environment, complies with Federal and State requirements that are legally applicable or relevant and appropriate to the remedial action, and is cost-effective. This remedy utilizes permanent solutions and alternative treatment or resource recovery technologies, to the maximum extent practicable. While the Source Control remedial action will ultimately eliminate all exposure pathways where a risk was identified, some contaminants will remain on-site above health-based levels. As a result, and in accordance with CERCLA Section 300.430 (f)(4)(ii), a review will be conducted within five years after commencement of the remedial action to ensure that the remedy continues to provide adequate protection of human health and the environment.


DONALD R. SCHREGARDUS
Director, Ohio Environmental Protection Agency

6/30/94

Date

II. DECISION SUMMARY

A. Site Name, Location, and Description

Wright-Patterson Air Force Base (WPAFB) is located in southwestern Ohio, east of the City of Dayton and adjacent to Fairborn. The Base is approximately 60 miles north of Cincinnati and approximately 50 miles west of Columbus (Figures 1 and 2).

The installation is composed of Wright and Patterson Fields, which are separated by State Route 444. Wright Field comprises Area B and Patterson Field comprises Areas A and C.

Landfills 8 & 10 are located in the northeast corner of Area B. Figure 3 presents the area location of the site which is bounded on the west by National Road, the north by Kauffman Avenue, and the east by Zink Road. Landfills 8 & 10 are separated by roughly 1,000 feet. An unnamed tributary to Hebble Creek flows through the valley between the landfills. Currently, the entire area encompassing Landfills 8 & 10 is fenced and posted as "Off Limits".

The area surrounding the site includes on-base military housing known as the Woodland Hills housing subdivision and off-base private homes on National and Zink Roads and Kauffman Avenue. These off-base homes are serviced by private drinking water wells. The Woodland Hills military housing units are serviced by the base water supply which draws its water from another area of base.

Geography: WPAFB lies within the Till Plains section of the Central Lowlands Physiographic Province. The regional land surface typically appears flat to gently rolling. Area streams and rivers have developed generally level flood plains, such as the Mad River flood plain on which much of WPAFB is situated.

The land surface altitude at WPAFB varies from 800 feet above the National Geodetic Vertical Datum of 1929 (NGVD) in Areas A and C, located within the Mad River flood plain, to 975 feet above NGVD in Areas B just west of Landfill 8. Landfills 8 and 10 are located in a high area that overlooks the Mad River valley. The land surface altitude in the vicinity of Landfill 8 is 945 feet above NGVD; in the vicinity of Landfill 10, the land surface altitude is 920 feet above NGVD. The Mad River valley immediately north of the landfills is located about 800 feet above NGVD.

The area surrounding the landfills is drained by an unnamed tributary to Hebble Creek. This unnamed tributary separates the landfills and flows north to Hebble Creek.

The Woodland Hills military housing subdivision, consisting of 368 dwelling units, occupies the area generally north of Landfill 8 and the areas generally west, east, and south of Landfill 10. Seven private homes are located along National Road just west and within 300 feet of Landfill 8. Five private homes are located east and within about 1000 feet of Landfill 10, with

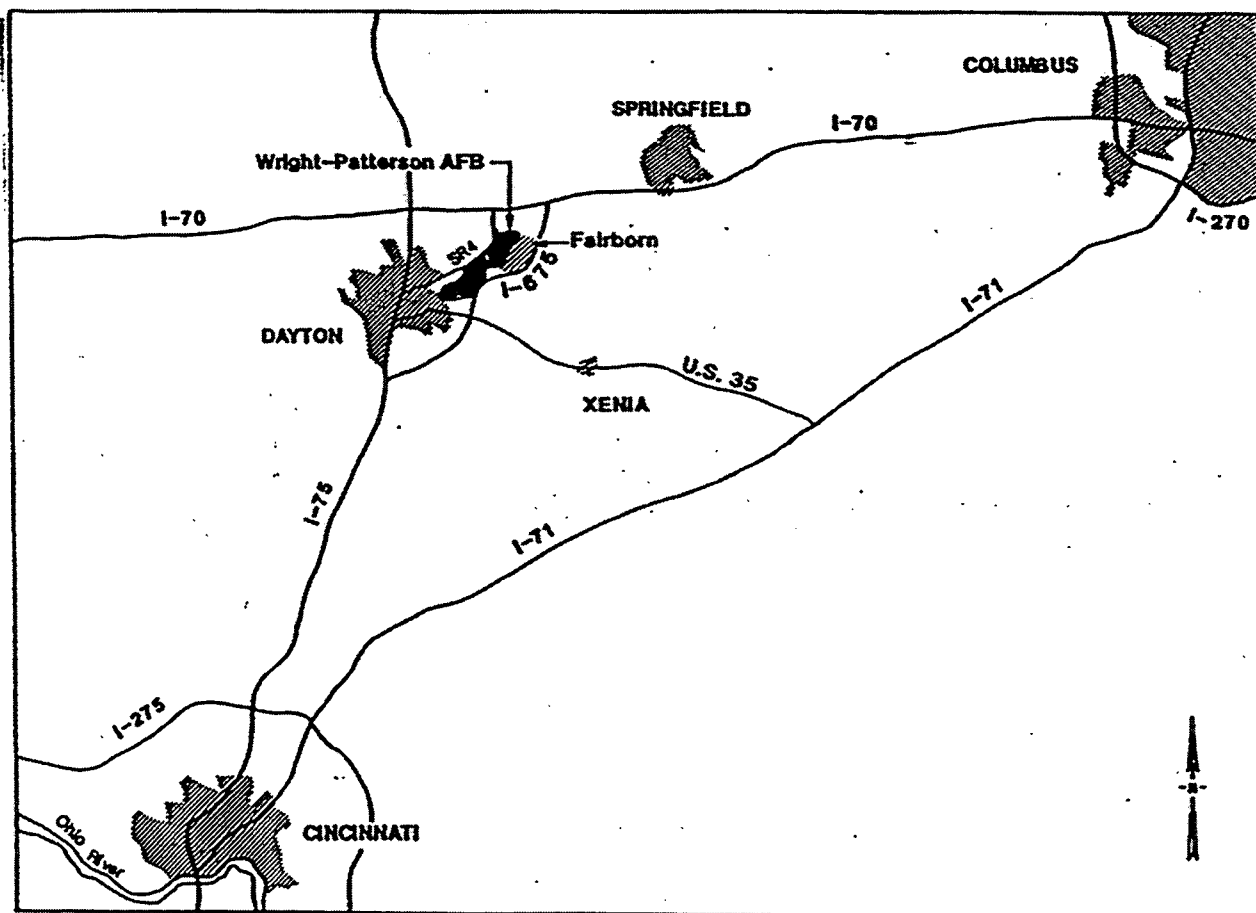


Figure 1 - Area Location Map

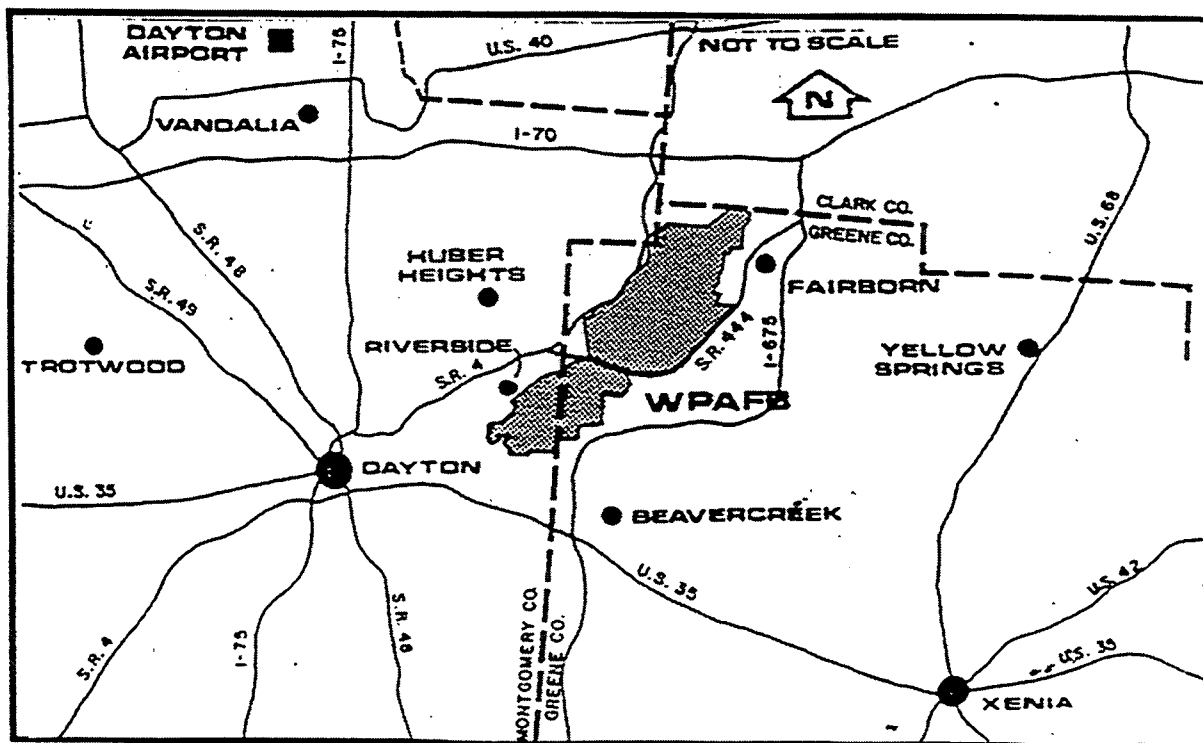
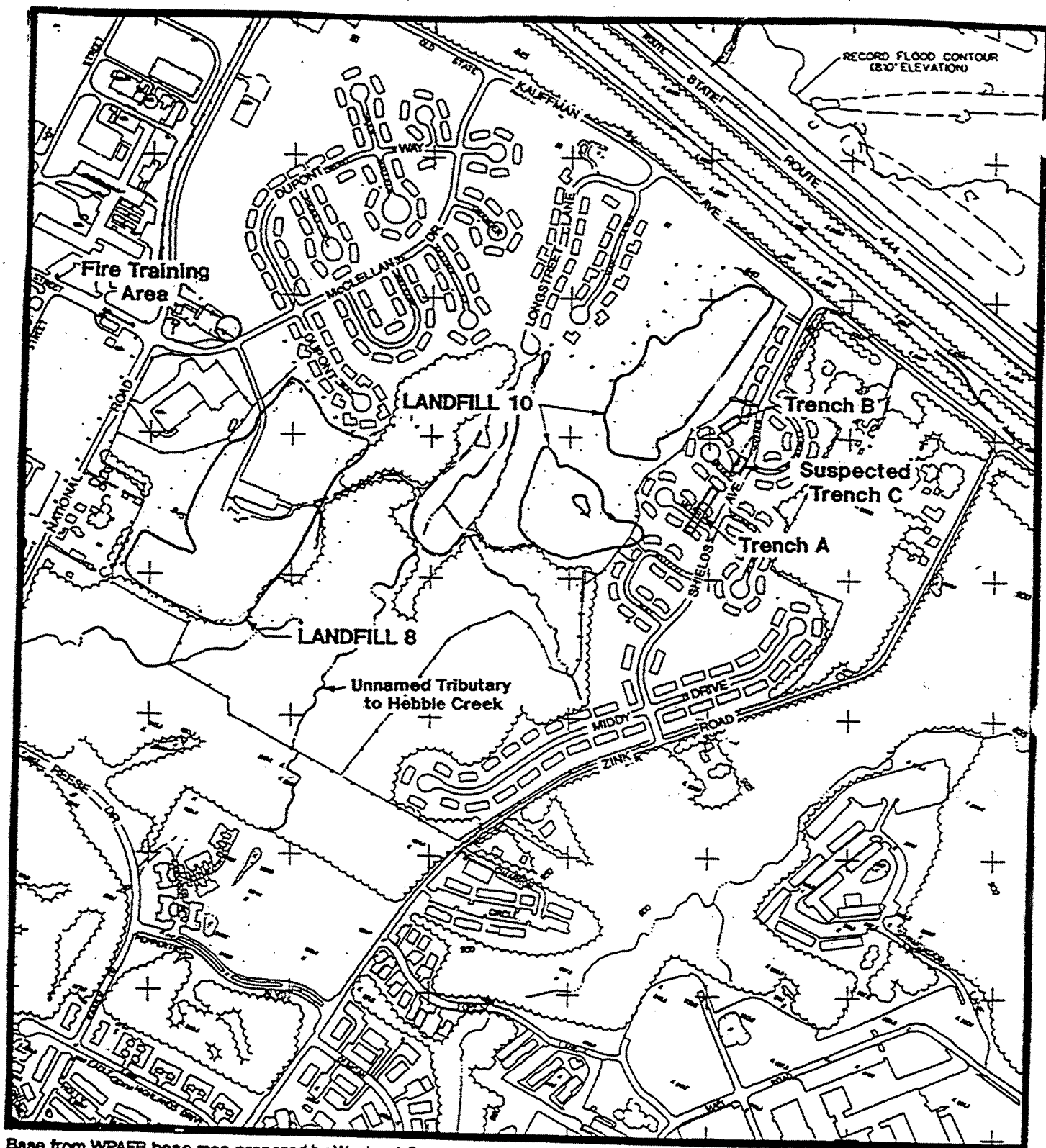


Figure 2 - WPAFB Location Map



Base from WPAFB base map prepared by Woolpert Consultants, March, 1987.

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FEET



Figure 3 - Location of Landfills 8 & 10 and Area Housing Units

one on Kauffman Avenue and four on Zink Road. A new subdivision is currently under construction in the area immediately south of Landfills 8 & 10.

Both landfills support several small stands of cattails that have developed in saturated depressions on the landfill caps. The depressions are the result of compaction and settling of the previous soil covering.

Landfill 8 & 10 support two and eight cattail stands, respectively, that total about 3,450 square feet (about 0.08 acre). Mean stand size is less than 0.01 acre.

Climate: The climate in the area is temperate and humid with a mean annual temperature of 52.3 degrees Fahrenheit (°F) and a mean annual precipitation of 36.25 inches. Precipitation is evenly distributed throughout the year. In the spring, the average final occurrence of freezing temperatures is in mid-April, and in the autumn, the average initial occurrence of freezing temperatures is in late October. Temperatures of 0°F or below will be experienced in about four years out of five, while 100°F or higher will occur in about one year out of five.

B. Site History

History of Site Activities: Landfills 8 & 10 and surrounding base property have been used for both operational and recreational purposes. Initially used for military training, the area was then converted to fill areas for refuse disposal. Landfill 8, the older of the two, began operation about 1947 and encompasses approximately 11 acres. Landfill 10 was opened in 1965 and covers about 8 acres. Following closure in the early 1970's, just prior to construction of the Woodland Hills housing units, the landfills and surrounding area were then used for recreation until April 1985. At that time, WPAFB designated the area off-limits and restricted access to both landfills and the intervening valley with a security fence in response to concerns expressed by the Ohio Environmental Protection Agency (OEPA) and the United States Environmental Protection Agency (U.S. EPA) over potential exposure of local residents to hazardous waste.

Refuse was deposited in both landfills in a trench-and-cover operation. General refuse containing unknown quantities of oily wastes, organic and inorganic chemicals, and hospital wastes was reportedly deposited in the landfills. Fire training activities were conducted in an area just north of Landfill 8 as early as 1948 until the early 1960's. Trenches east of Landfill 10 were reportedly used for disposal of hazardous chemicals.

The depth of Landfill 8 varies across the refuse trenches from 6 to 44 feet. The thickness of the cover material varies between 3 and 12 feet. The total volume of waste material buried at Landfill 8 is estimated at 187,300 cubic yards.

The depth of Landfill 10 varies across the refuse trenches from 17-25 feet, and the cover thickness is typically 1-3 feet. The total volume of waste material buried at Landfill 10 is estimated at 171,600 cubic yards.

History of Site Investigations and Remedial Actions: Beginning in the early 1980's, several investigations have been conducted at Landfills 8 & 10. A records search was performed in 1981, followed by a limited field investigation in 1984. This limited field investigation included installing monitoring wells and leachate/gas wells, sampling surface water, leachate, and groundwater, and performing geophysical surveys. Additional field investigation work was conducted in 1986, which included the installation of supplementary monitoring wells; sampling groundwater from both new and existing wells; drilling shallow borings to investigate landfill covers and estimate infiltration to the landfills; and monitoring landfill cover borings and leachate/landfill gas wells for hydrogen sulfide and combustible gas concentrations. Resampling the groundwater monitoring wells, as well as sampling of leachate, surface water, and sediment along the unnamed tributary between Landfills 8 & 10 was accomplished in 1988.

Response actions were taken by WPAFB in June 1989, in consultation with OEPA, to address the leachate seep problem closest to the Woodland Hills residential area. Dirt, gravel, and lime were placed over the seep located on the eastern slope of Landfill 10 in an effort to control odors. A passive temporary leachate collection system was then installed in March 1991 along the northern and eastern slopes of Landfill 10. This system consists of a permeable geosynthetic fabric overlaid with an impermeable geomembrane with perforated piping at the toe of each slope. Leachate from the system holding tank is periodically emptied to a tanker truck and appropriately disposed of by WPAFB personnel.

Three corollary investigations were conducted during the preliminary stage of the Remedial Investigation/Feasibility Study (RI/FS) for Landfills 8 & 10 beginning in 1989. These included soil gas surveys, additional geophysical surveys, and a study to identify combustible gas (methane) migration from the landfills. A comprehensive RI/FS of Landfills 8 & 10 began in December 1990 and culminated with public release of the final Off-Source Remedial Investigation (OSRI) Report in October 1993.

Military housing units north of Landfill 8 and east of Landfill 10 that are adjacent to the landfills were vacated in 1990, partially in response to a Health Consultation issued by the Agency for Toxic Substances and Disease Registry (ATSDR). Several factors contributed to the decision to vacate homes, including temporary, periodic displacement of residents during the environmental investigation fieldwork; detection of subsurface migration of methane gas towards the housing units; and long-term planning considerations related to eventual installation of a multi-layer cap on both landfills. Based upon the absence of significant concentrations of methane or other gases detected during indoor air monitoring and upon consultation with ATSDR, U.S. EPA, and OEPA, the Air Force reoccupied selected homes in 1992. All vacated homes north of Landfill 8 were reoccupied. Reoccupied homes were equipped with continuous methane monitors as a precaution. Because of the eventual

installation of a multi-layer cap, 14 structures east of Landfill 10 remain vacant. Of these vacant homes, there are eight structures which will be demolished in order to install the cap. Six additional structures which are currently vacant may be salvageable depending on how the footprint of the cap impacts the backyards of those homes.

Prior to publication of the final OSRI Report, WPAFB, OEPA, and U.S. EPA jointly agreed that a remedial action aimed at controlling any current or potential risks posed by contamination at the site was justified based on initial sampling data. They further agreed that there was no reason to delay that portion of the overall site remedy dealing with the landfills themselves (Source Control Operable Unit or SCOU) while awaiting sampling results from areas outside (Off-Source Operable Unit or OSOU), but potentially affected by, Landfills 8 & 10. With this goal in mind, the Focused RI Report for the SCOU was published in March 1992 and concluded that both landfills were continuing sources of contamination. A Focused FS followed shortly thereafter in August 1992 and outlined the detailed analysis of alternatives considered for source control. Information presented in these two documents formed the basis of the previous Proposed Plan and subsequent ROD for the SCOU approved in July 1993 for cleanup of the landfills themselves. Design of the SCOU landfill caps and gas and leachate collection/treatment systems is already underway with implementation estimated to begin in the fall of 1994.

C. Highlights of Community Participation

Wright-Patterson AFB offered many opportunities for public input and community participation during the Remedial Investigation and Feasibility Study for Landfills 8 & 10, the Proposed Plan for the Source Control Operable Unit, and the Proposed Plan for the Off-Source Operable Unit. Specifically, the base held three public meetings during an eighteen month time period to discuss the investigatory activities taking place at the site. At each of these meetings, the fieldwork for the landfills was discussed as well as the methane migration study and methane monitoring program. A listing of community relations activities is contained in Attachment 1 of this ROD.

In 1990, Base officials also conducted a special meeting with 14 Woodland Hills residents directly affected by the methane migration study and methane monitoring program. A relocation plan was developed by the Base Environmental Management Office for the 14 residents and was approved by the Installation Commander. An emergency evacuation plan was prepared in the event that high methane levels were detected in homes where monitors were installed as a precautionary measure. Local print and broadcast media were invited to this meeting in an effort to keep the public informed of the actions taken by the base.

A public comment period was held from October 23, 1992 until December 23, 1992 for the Proposed Plan for the Source Control Operable Unit. The public comment period for the Proposed Plan for the Off-Source Operable Unit was held from January 10, 1994 until February 10, 1994. A final public meeting was held on January 25, 1994 to present the proposed plan for the final site remedial action. A summary of the comments received for the

most recent comment period can be found in Section III.-Responsiveness Summary of this document.

D. Scope and Role of the Off-Source Operable Unit Within Site Strategy

With consideration for the proximity of area residents to Landfills 8 & 10, a decision was made among WPAFB, OEPA, and U.S. EPA early during the remedial investigation to proceed with selection of a source control remedy aimed at controlling any current or potential risks posed by contamination migrating from the site. All parties agreed that this approach which was based on the initial sampling data would not jeopardize the remaining investigation of areas outside, but potentially affected by, the site and would be compatible with the final site remedy.

This Record of Decision refers to the Off-Source Operable Unit or OSOU (i.e., areas outside but potentially affected by the site), as distinguished from the Source Control Operable Unit or SCOU (i.e., the landfills themselves). Separation of the site into two operable units enabled WPAFB to accelerate the cleanup effort.

The significance of the no action decision for the OSOU must be viewed in the context of the Source Control remedial action already chosen for the site (see ROD for Source Control, 1993). The comprehensive elements of the Source Control remedial action are described in Table 1.

Cleanup goals for the site as a whole are to prevent direct contact with on-site contaminants, to prevent on-site contamination from spreading, to capture contaminated groundwater that has already migrated from the site, and to eliminate the potential exposure to site-related contaminants during use of private water sources for drinking and showering.

The Source Control remedial action is comprehensive and will achieve these cleanup goals through a combination of waste containment and treatment and institutional controls. The remedy will address air, gases, soil, surface water/sediments, and groundwater from within and downgradient of the landfills and will ultimately eliminate those exposure pathways where a risk has been identified.

E. Summary of Site Characteristics

Site Geology and Hydrology: The geology of the area consists of Ordovician and Silurian Age rocks overlain by unconsolidated deposits of Pleistocene Age and Recent Age.

The Richmond Group of Ordovician Age is the bedrock unit underlying most of WPAFB. The Richmond Group consists of up to 265 feet of interbedded shales and limestones that crop out in portions of eastern Montgomery and Western Greene Counties.

The Richmond Group is capped by thin, discontinuous erosion remnants of Brassfield Limestone of Silurian Age in some areas of WPAFB. The Brassfield Limestone is a relatively pure limestone up to 30 feet thick.

**TABLE 1
COMPREHENSIVE
SITE REMEDIAL ACTION**

- Covering both landfills with clay caps to reduce rainwater passing through the landfills (which contributes to formation of leachate) and hazards from dust, and to minimize landfill gas emissions
- Collecting and treating the landfill gas to reduce gas emissions
- Collecting and treating the leachate from the landfills to prevent contaminants from migrating to surface water and groundwater
- Collecting and treating contaminated groundwater (in excess of MCLs* or risk-based levels) downgradient of the site to eliminate any potential hazards from exposure to groundwater
- Connecting the residents of National and Zink roads and Kauffman Avenue to the City of Fairborn public water supply to eliminate any potential hazards from exposure to groundwater
- Removal of asphalt slabs in the unnamed tributary to Hebble Creek to eliminate a potential source of contaminants
- Long-term monitoring of soil gas, groundwater, and air to ensure the effectiveness of remedial actions
- Deed restrictions designed to legally prohibit construction, mining, drilling, and installation of wells on WPAFB property at and surrounding the site to prevent future exposure to contaminated groundwater and site contaminants
- Continue to restrict site access with a combination of fencing, warning signs, and security patrols to help prevent direct contact with site contaminants

*Note: MCLs - Maximum Contaminant Levels are concentrations of specific chemicals established by the USEPA under authority of the Federal Safe Drinking Water Act.

The bedrock reflects a preglacial drainage system that differs somewhat from that currently seen in the area. This drainage system is masked by overlying unconsolidated glacial deposits.

Unconsolidated materials of the Pleistocene Age overlie bedrock and are represented in the area by glacial till and outwash deposits. These materials were deposited during the last period of major glaciation, the Wisconsin, and are present throughout the area.

Glacial till consists of a heterogeneous mixture of cobbles, gravel, sand, silt and clay that were deposited directly by the glacier as it moved over the region. These deposits, interbedded with water-bearing sand and gravel zones, locally may form confining aquifers or may limit recharge to underlying unconsolidated aquifers.

As the glacier retreated, melt streams flowing through the valleys and lowlands deposited large accumulations of sand and gravel identified as outwash deposits. Outwash deposits attain a maximum thickness of 250 feet at Dayton and usually overlie till deposits. Outwash deposits form the most prolific aquifer of the Ohio region.

Recent Age alluvium deposited in relatively thin sequences by modern streams is present in the ground surface adjacent to all major streams. The alluvium consists of both sorted and unsorted accumulations of sand, silt, gravel, and clay.

Water is present in the unconsolidated deposits and the underlying bedrock. Water occurs in intergranular pore spaces in the unconsolidated deposits. In bedrock, water occurs in fractures, joints, and solution openings in the shale and limestone.

The unconsolidated alluvium, outwash, and till interact to form a complex aquifer system at WPAFB. Outwash is locally separated from overlying alluvial materials by 2 to 7 feet of dense, unsorted till composed of clay, silt, gravel, and sand. In many areas, the till layer is thin or absent and alluvium directly overlays the outwash deposits. Also, in many areas two till layers occur within the glacial outwash, dividing it locally into separate hydraulic units. The till, wherever it occurs, can be described as a semiconfining layer with many holes, tears, and missing pieces.

Alluvial deposits may be locally productive, yielding 100 to 500 gallons per minute (gpm). Normal practice in the Dayton area, however, is to obtain water supplies from the more productive, underlying glacial outwash deposits. The alluvium, where present at WPAFB, is typically 40 to 60 feet thick and occurs under water-table conditions. The alluvial deposits provide base flow to streams during low flow periods.

Outwash deposits yield greater than 1,000 gpm. At WPAFB, the hydraulic conductivity of the outwash ranges from 1,000 to 3,000 gallons per day per square foot (gpd/ft²). The buried valley aquifer, a Federally designated Sole Source Aquifer, is used by WPAFB for water supply and is also the primary unit from which municipal supplies are drawn at the nearby Dayton Municipal Wellfield on Rohrer's Island. The City of Fairborn's North Wellfield also

draws water from this aquifer. Fairborn uses this wellfield only during periods of drought for emergency use and twice a year during hydrant flushing. Groundwater occurs in the outwash deposits under both water table and artesian conditions and locally may provide base flow to streams during low flow conditions in areas where it is at or near the ground surface. Total depth of the sole source aquifer varies between approximately 50-250 feet depending on position within the buried valley and also depending on water producing horizons within that range.

Groundwater contained in the scattered sand and gravel sequences of till provides domestic supplies on the order of 10 gpm. The till is generally more than 20 feet thick and may overlie units of greater productivity.

The bedrock deposits are a minor source of groundwater. The shale and interbedded limestone of the Richmond Group yield water of sufficient quantity only for household use. The Brassfield Limestone generally yields greater quantities of water than the Richmond Group and is suitable for both farm and home use.

Nature and Extent of Contamination: Results of the remedial investigation indicate that both Landfills 8 & 10 are continuing sources of contamination and that the contaminants are dispersed throughout the landfills. Based on historical data and data collected during the remedial investigation, no extremely high and isolated contaminant concentrations, or "hot spots", were found that would indicate leaking buried containers or localized hazardous waste disposal areas. Releases of contaminants from the landfills are primarily associated with the production of leachate from refuse and soil. Precipitation percolating through the landfills is primarily responsible for leachate production, with groundwater moving laterally through Landfill 8 providing additional contribution. Contamination was found in the groundwater monitoring wells adjacent to the landfills. Spread of the contaminants off-site was limited and there was no identifiable plume of any contaminants or group of contaminants flowing from either landfill. Major groundwater contaminants detected in groundwater monitoring wells located adjacent to the site are presented in Table 2. The depth at which these contaminants were found in off-site monitoring wells ranged from approximately 10-60 feet.

TABLE 2
COMPARISON OF MAJOR CONTAMINANTS IN GROUNDWATER
WITH REGULATORY STANDARDS

CONTAMINANT	CONCENTRATION RANGE IN OFF-SOURCE WELLS (ug/L)	MAXIMUM CONTAMINANT LEVEL (MCL) (ug/L)
Benzene	1.0-9.0	5.0
1,2-Dichloroethane	1.0-11.0	5.0
Vinyl Chloride	2.0-23.0	2.0
Barium	306-1210	2000
Arsenic	2.0-139J	50

Note: ug/L=micrograms per liter and J=estimated value

Elevated concentrations of vinyl chloride, 1,2-dichloroethane, barium, and arsenic were detected in off-source monitoring wells on the east and north side of Landfill 8. Benzene and barium were detected in off-source wells on the west, south, and east sides of Landfill 10.

Ambient (breathing) air and private water sources in the vicinity of Landfill 8 and 10 have not shown significant chemical contamination attributable to the landfills. However, the potential exists for these media to become contaminated in the future.

Prevailing background environmental conditions in the general area contributed to surface water/sediment and air contamination. Overall, surface water contamination that may be related to Landfills 8 & 10 was not readily discernable in the unnamed tributary to Hebble Creek between the landfills.

The chemicals of concern were found to be unevenly distributed throughout both landfills, which is expected from a trench-and-cover burial operation. Further, Landfills 8 and 10 were found to be essentially the same in terms of the types and concentrations of contaminants. This conclusion is important in that the clean-up alternative selected for both landfills is the same.

F. Summary of Site Risks

The human health risk assessment was conducted in two phases. Initially, a "qualitative" risk assessment was performed in conjunction with the SCOU. This risk assessment addressed only the risk attributable to the actual landfills themselves, and was performed as a "screening" tool to determine if early remedial actions were necessary to reduce human health risk. A "quantitative" risk assessment was performed in conjunction with the OSRI. This "quantitative" risk assessment, also known as the baseline risk assessment, addresses risk associated with the landfills, as well as risk from any contaminants which may have migrated beyond the landfill boundaries. The baseline risk assessment was performed without regard to any present or future remedial actions and it examined risk in both current and future land use scenarios.

Using *hypothetical worst-case* exposure scenarios developed for residential land use, which assumed residents were ingesting soil directly from the landfills and drinking water from areas adjacent to the landfills which do not currently have drinking water supply wells, the "qualitative" risk assessment identified ingestion of contaminated soil and groundwater, and inhalation of chemicals volatilizing from household water as exposure pathways which may exceed target risk levels. Migration of explosive gases, predominantly methane, into homes directly adjacent to the landfills was also considered to present an unacceptable risk.

The baseline risk assessment identified contaminated groundwater, sediment and soil as posing an unacceptable risk through both the ingestion and dermal exposure (direct contact) routes. Inhalation of indoor and outdoor air and direct contact with surface water and leachate seeps were also identified as potential sources of elevated risk. Table 3 lists the environmental media

and exposure pathways of potential concern based on the results of the remedial investigation. For purposes of this risk assessment, the exposed individual (the most "at risk") is an individual who currently lives adjacent to the landfills for a period of thirty years, and spends a certain amount of time trespassing on the landfills, resulting in direct contact with, and ingestion of, contaminated soils, sediments, and surface waters. For the future land use scenario, the individual most at risk would be a future resident who might build a home in such close proximity to the landfills as to be in direct contact with, or ingest, contaminated soils, sediments, surface water, and/or groundwater, and live in that residence for thirty years.

The ecological risk assessment portion of the baseline risk assessment indicated a moderate potential for adverse ecological effects, attributable to contaminated surface water and sediments.

The comprehensive site remedial action (Source Control ROD, 1993) will ultimately eliminate all exposure pathways where a risk was identified. It will accomplish the following cleanup objectives: prevent direct contact with site contaminants, prevent future release of contaminants, eliminate potential threat from exposure to groundwater, control surface water run-off and erosion, evaluate the effectiveness through long-term monitoring, and continue to restrict access to the site.

TABLE 3
ENVIRONMENTAL MEDIA AND POTENTIAL PATHWAYS OF CONCERN

ENVIRONMENTAL MEDIA	POTENTIAL PATHWAYS OF CONCERN
Groundwater	Ingestion, Direct Contact & Inhalation
Landfill Gases	Inhalation & Fire/Explosion
Leachate	Direct Contact & Ingestion
Landfill Wastes & Soils	Direct Contact & Ingestion
Ambient (Breathing) Air*	Inhalation
Surface Water/Sediments*	Direct Contact

*Note: Prevailing background environmental conditions in the area contributed to the risk in these media.

G. Description of the No Action Alternative

Selection of the no action alternative for the Off-Source Operable Unit is based on several factors. No new pathways of exposure presenting a risk were identified in the Off-Source RI Report which had not already been identified during the previous Focused RI, precluding the need for any additional feasibility studies. The previously approved Source Control remedial action is comprehensive and will ultimately eliminate all exposure pathways where a risk was identified. In addition, migration of contaminants beyond the boundaries of the landfills was found to be limited and contaminants were present at relatively low levels. The no action alternative for the Off-Source Operable Unit was the preferred remedy presented in the Proposed Plan released for public review and comment from 10 January through 10 February 1994. Adoption of the Source Control remedial action as the final cleanup for the Landfills 8 & 10 site was also presented in the Proposed Plan.

While the Source Control remedial action will ultimately eliminate all exposure pathways where a risk was identified, some contaminants will remain on-site above health-based levels. As a result, and in accordance with CERCLA Section 300.430 (f)(4)(ii), a review will be conducted within five years after commencement of the remedial action to ensure that the remedy continues to provide adequate protection of human health and the environment.

III. RESPONSIVENESS SUMMARY

A. Overview

Wright-Patterson Air Force Base has presented the preferred no action alternative for the Off-Source Operable Unit and adoption of the comprehensive Source Control remedial action as the final site clean-up for Landfills 8 & 10.

Judging from the comments received during the public comment period, the residents of Woodland Hills housing area on-base, the surrounding community, and the U.S. and Ohio Environmental Protection Agencies agree with Wright-Patterson Air Force Base's recommended alternative.

B. Background on Community Involvement

Community interest in Landfills 8 & 10 dates back to 1985 when residents in the Woodland Hills military family housing area reported material, or leachate, surfacing in their backyards and noticed an odor coming from the general vicinity of the landfills.

Members of the community have expressed concerns during various stages of the remedial investigation and feasibility study. Many of these concerns have been addressed in the previous Record of Decision for the Source Control Remedial Action (see ROD, July 1993). In addition, concerns raised during the public comment period and the public meeting for the Off-Source Operable Unit are addressed in Section III. C-Summary of Public Comments of this ROD which follows.

C. Summary of Public Comments

The public comment period for the Proposed Plan for the Off-Source Operable Unit at Landfills 8 & 10 was held from January 10, 1994 until February 10, 1994. A public meeting was held on January 25, 1994. Verbal comments received during the public meeting as well as written comments received during the public comment period are addressed in this section.

Comment Summary and Response to Local Community Concerns:

(1) A resident wanted to know how extensive was the list of contaminants that we tested for in the samples taken from the landfills and would we consider that an exhaustive list in the context of landfill age and suspected contaminants?

Response: The Air Force tested for an extensive number of chemicals during the investigation. Early during project planning and work plan development, Air Force environmental specialists sat down with Ohio EPA, U.S. EPA, and contractor support personnel to determine what chemicals should be included in the testing program based on past AF activities and suspected contaminants. Approximately 270 chemicals were identified as being potential contaminants in the landfills and were tested for during this project. During the course of the investigation, we sampled soil, groundwater, surface water, sediments (in surface water), gases, and air (both indoor and outdoor) in a very specific approach. We sampled three times over the course of a year. At the end of each sampling round, we looked at the testing results and if a chemical didn't show up, we made a decision as to whether or not we should continue testing for that specific chemical. The chemical categories included volatile and semivolatile organic compounds, pesticides, polychlorinated biphenyls (PCBs), chlorinated herbicides, metals, radioactive isotopes, dioxins, and dibenzofurans. U.S. EPA and OEPA agreed the number of chemicals included in our testing program was exhaustive and covered all categories of possible contaminants.

(2) A resident indicated that the type of cap proposed for these landfills as described in the public meeting appears to be for a sanitary landfill situation (i.e., household garbage) and can that be reconciled with the situation described for Landfills 8 & 10 which involves industrial-type chemicals?

Response: The base believes the sanitary landfill closure being proposed is adequate for the contaminants and potential contamination that exists at these landfills. Our investigation confirmed that the site is a typical sanitary landfill with the bulk of landfill material being generally office waste, paper, etc. We did find some chemicals, but some of these same types of chemicals can also be found in a typical sanitary landfill, i.e., petroleum products such as discarded motor oil. Ohio EPA added that high levels of chemicals indicative of hot spots in isolated areas were not found and, as a result, selective removal of wastes and hazardous site closure requirements were not needed.

This was not a hazardous waste dump as some had initially feared four years ago when we began the planning for this investigation.

(3) To address a quality of life aspect of this project, there are still a large number of vacant houses along Shields Avenue. These vacancies have contributed to the rundown appearance of the neighborhood. What is the ultimate fate of these houses?

Response: We hope to have the vacant units removed by the end of calendar year 1994. The houses are being removed to facilitate construction of the landfill caps. Some of the homes are

right at the edge of the landfill and to get the necessary elevation of added soil as part of the various layers of the engineered structure of the cap, these homes will have to be demolished. Otherwise the back of these homes would be covered up with 3-4 feet of dirt (in the back yard). That has prompted us to identify eight homes which will definitely need to be removed and another six homes which may need to come down dependent on the footprint of the cap and that's why these 14 homes remain vacant. In addition, we hope to improve some of the entrance ways to the Woodland Hills area in the process.

(4) Is there a plan to ensure adequate drainage in the area given the buildup of soil and cover material that will occur with installation of the cap?

Response: Adequate drainage is one of the important considerations of the remedial design effort. It is intended that construction of the cap will enhance natural drainage in the area.

(5) Is it correct to state that as a result of the on-site remedial action planned for Landfills 8 & 10 that no actions will be needed off-site?

Response: Yes, that is correct.

(6) One citizen who owns property adjacent to Landfill 8 expressed concern about the appearance of small areas of seepage on his property possibly coming from the landfill and migrating groundwater. He wanted to know if there is groundwater migrating away from Landfills 8 & 10, and will the Air Force perform any further testing?

Response: The predominant groundwater flow direction in the vicinity of Landfill 8 is to the east and north toward the unnamed tributary to Hebble Creek between the two landfills. There is a limited groundwater flow line to the south of Landfill 8. Groundwater in the vicinity of Landfill 10 flows radially away from the landfill. Any southward flow from the immediate landfill area is diverted either to the east or west by a groundwater high that exists south of Landfill 10.

There will be an extensive monitoring program associated with the remedial action to ensure that effectiveness is being achieved. Samples of groundwater, surface water/sediment, air, and gases will be collected periodically for analysis during the cleanup effort. Both Ohio EPA and U.S. EPA Region V will be involved in establishing and evaluating this monitoring program.

(7) How much of a reduction in leachate production will occur once the leachate collection system is in place?

Response: We are hoping to capture a maximum of 50 gallons per minute through the leachate collection system, which is a relatively small amount of flow moving through the landfills. In addition, the remedial action will be designed to keep leachate and contaminated groundwater from moving past the boundaries of the landfills.

(8) Just what is the risk to human health as a result of the baseline risk assessment?

Response: There is a low risk associated with the landfills. In explaining the risk in numerical terms, it is important to note that within the general population in this country the incidence of cancer is 1 in 3 to 1 in 4. That is, in a random population of 1 million people, we can expect cancer to occur in 250,000 people as a result of lifestyle, genetic heritage or a combination of these factors. To put the increased cancer risk associated with Landfills 8 & 10 into perspective, under specific worst case scenario assumptions including living adjacent to the site for 30 years and assuming no remedial action is taken to mitigate risks, there would be less than a 1% increase in the incidence of cancer over and above the current incidence in the general population. To apply this relatively small increase in risk to the previous explanation, that would result in 250,400 cases of cancer out of 1 million people.

We discovered during our investigation and baseline risk assessment, that background environmental conditions which occur here in the Miami Valley as a result of urban/industrial impacts are contributing to the increased risk found in our study. These background environmental impacts are particularly evident in air and surface water environmental media. Automobile exhaust, surface water run-off from roads, emissions from industrial plants, and general application of pesticides and herbicides can contribute to background environmental conditions.

Ohio EPA emphasized that the baseline risk assessment and associated risk numbers are used by the regulators and the Base primarily to justify taking a remedial action and these numbers do not necessarily translate into a probability of getting cancer. In conjunction with the baseline risk assessment, specific risk trigger levels are established by the regulatory agencies. If those trigger levels are exceeded under conditions considered to be worst case for a particular site, then a remedial action may be justified in the context of other site-specific considerations.

(9) Has it been determined that Landfills 8 & 10 is not a hazardous materials waste dump?

Response: Yes, under the definitions established under the Resource Conservation and Recovery Act (RCRA), Landfills 8 & 10 are not classified as hazardous materials/waste landfills.

(10) One citizen associated with the Fairborn City Planning Board indicated that the city's planning board had recently heard a case involving private property just south of and adjacent to Landfill 8. He was seeking clarification about the recommended remedial action.

Response: The Air Force with consensus from Ohio EPA and U.S. EPA Region V has recommended in the Proposed Plan for the Off-Source Operable Unit that no remedial action is needed for the areas surrounding the landfills based on limited migration of landfill contaminants. Additionally, the previously approved Source Control remedial action is comprehensive and will eventually eliminate all pathways of exposure which were identified as pathways of concern in the baseline risk assessment. The Source Control remedial action will be confined to the area of the landfills.

(11) A citizen expressed concerns about the impact of the landfill cap covering and blocking the existing WPAFB bikeway. If it is necessary to cover the bikeway then a new asphalt bikeway should be built closer to Kauffman Avenue. It is important to connect the streets in Woodland Hills without having to use Kauffman Avenue. (Note: The citizen's letter is included in its entirety in Attachment 3 of this ROD.)

Response: The existing bikeway on the south side of Kauffman Avenue between Shields Avenue and Long Street will likely be disrupted during construction of the cap at Landfill 10. A temporary walk/bikeway will be provided south of Kauffman Avenue, when necessary, to maintain a connection between the streets in Woodland Hills. A permanent walk/bikeway will be rebuilt once the cap construction activities are completed.

The area north of Kauffman Avenue will not be disrupted during construction of the cap at Landfill 10. Therefore, the proposed Kauffman Avenue bikeway extension will not be affected.

(12) A property owner south of Landfill 8 has expressed concerns about possible contaminantion on his land and whether the recommended remedial action as described in the Proposed Plan for the Off-Source Operable Unit will be an effective cleanup. The land owner has included a report prepared by his environmental consultants which concerns potential impacts of groundwater contamination. (Note: The citizen's letter and accompanying report is included in its entirety in Attachment 3 of this ROD.)

Response: The predominant groundwater flow direction in the vicinity of Landfill 8 is to the north and east toward the unnamed tributary between Landfills 8 & 10. A limited groundwater flow line was identified for the area south of Landfill 8. Evidence of shallow groundwater discharge to the creek has been identified along the creek slopes as evidenced by the presence of numerous seeps. In addition, we know from stream flow measurements that in the vicinity of the landfills, the creek is a "gaining" body of water. That is, groundwater is discharging to the creek. In terms of water balance, the amount of water in the creek appears from our study to be directly proportional to the amount of groundwater estimated to be discharging into the creek. The creek does create a hydraulic barrier for groundwater movement. It would be highly improbable for groundwater to move under the creek and uphill to the other side given specific hydraulic and physical limitations. Deeper groundwater in this area is moving generally toward the buried valley aquifer to the north and east of Landfills 8 & 10.

Based on the results of the remedial investigation, which included sampling the creek and creek sediments three times over a period of one year, surface water contamination that may be related to Landfill 8 & 10 is not readily discernible. Contaminants detected in both upstream and downstream samples are indicative of urban/industrial environmental impact (prevailing background conditions). However, in order to mitigate any negative contributions to overall surface water quality resulting from erosion and surface water run-off along the landfill slopes, the comprehensive site cleanup will include removing asphalt slabs present in the creek bed, in addition to smoothing out and capping the landfill slopes.

The comprehensive site cleanup will include a leachate collection and treatment system which will be designed to capture leachate and contaminated groundwater flowing off the landfills. This collection system will provide hydraulic control and prevent migration of contaminated groundwater beyond landfill boundaries. Based on the limited migration of contaminants found during the remedial investigation and the expected capture zone or "zone of influence" of the system once it is operational, it was not necessary to expand the leachate collection system in off-source areas.

An extensive monitoring program will be established to determine the effectiveness of the site cleanup. Samples of groundwater, surface water/sediments, air, and gases will be collected periodically for analysis. Ohio EPA and U.S. EPA Region V will be involved in evaluation of monitoring results and effectiveness of the cleanup. A formal review will be conducted within five years after commencement of the remedial action to ensure that the remedy continues to provide adequate protection of human health and the environment.

The evaluation of possible contamination on property south of Landfill 8 as presented in the Tamarron letter has thus far not included considerations of prior site history; present activities relative to land development, including the impact of earth moving and grading activities; quality assurance/quality control during sampling to ensure data reliability and usability; and background determination using the same sampling methodology employed during this environmental consultant's limited study. It should be noted that the data collection activities directly related to the Remedial Investigation of Landfills 8 & 10 were regulated by both OEPA and U.S. EPA and met rigorous quality assurance/quality control standards set by these agencies.

Attachment 1: Community Relations Activities Conducted for Landfills 8 and 10

WPAFB conducted community interviews with the mayors and other local officials in the cities of Dayton and Fairborn (1986).

WPAFB published the Community Relations Plan (1986).

WPAFB issued news release announcing the Consent Order between Ohio and WPAFB (February 1988).

WPAFB established the Information Repository at the Fairborn Branch of the Greene County Library (1988).

WPAFB established the Administrative Record at Wright State University Library, Archives Section (1988).

WPAFB updated the Community Relations Plan (1989).

WPAFB issued news release announcing interagency agreement between USEPA and WPAFB (March 1991).

WPAFB held a public meeting at Fairborn High School in Fairborn, OH to update the Woodland Hills residents on the Remedial Investigation and Feasibility Study at Landfills 8 & 10 (April 29, 1992).

WPAFB issued a news release announcing the availability of the Focused Remedial Investigation Report for Landfills 8 & 10 (May 29, 1992).

WPAFB issued a paid public notice advising the Wright-Patterson and surrounding local communities of the public comment period on the Proposed Plan for the Source Control at Landfills 8 & 10. The Fairborn Daily Herald and the Dayton Daily News published the notice three times each. (October and November 1992).

WPAFB issued a news release announcing a public meeting to discuss the Proposed Plan for Source Control at Landfills 8 & 10 (November 6, 1992).

WPAFB sent a letter to National and Zink Road residents inviting them to the public meeting on November 10, 1992 to discuss the Proposed Plan for Source Control at Landfills 8 and 10 (October 29, 1992).

WPAFB held a public meeting at Fairborn High School in Fairborn, OH to discuss the Proposed Plan for Source Control at Landfills 8 and 10 and respond to citizen's questions and concerns about the proposed plan. Approximately 50 people attended the meeting, including Woodland

Hills residents, National Road residents, local media, Environmental Management officials, and U.S. and Ohio EPA officials (November 10, 1992).

WPAFB issued fact sheets explaining the Proposed Plan for Source Control at Landfills 8 and 10 at the public meeting (November 1992).

WPAFB issued a news release announcing that the public comment period for the Proposed Plan for Source Control at Landfills 8 & 10 had been extended for an additional 30 days (November 27, 1992). The original public comment period was from October 23-November 23, 1992. The base accepted comments until December 23, 1992.

WPAFB issued two paid public notices advising the Wright-Patterson and surrounding communities that the public comment period on the Proposed Plan for Source Control had been extended for 30 days. The Fairborn Daily Herald and the Dayton Daily News published the public notices (November 1992).

WPAFB sent a letter to National and Zink Road and Kauffman Avenue residents and Woodland Hills residents advising them the public comment period for the Proposed Plan for Source Control at Landfills 8 & 10 had been extended for an additional 30 days. (December 2, 1992).

WPAFB issued a news release announcing the first Record of Decision (ROD) for Landfills 8 and 10 (August 12, 1993).

WPAFB issued a news release announcing the availability of the second environmental investigation report for Landfills 8 and 10. This report is also known as the Off-Source Remedial Investigation Report for Landfills 8 & 10 (October 19, 1993).

WPAFB released the Proposed Plan for the Off-Source Operable Unit for public review and began the 30 day public comment period (January 10, 1994).

WPAFB placed a series of paid public notices in local newspapers announcing the public comment period and the public meeting for the Off-Source Proposed Plan. The Dayton Daily News published five notices; the Fairborn Daily Herald and the Beavercreek News-Current published seven notices each (January-February 1994).

WPAFB held a public meeting at Fairborn High School to answer the local community's questions and concerns about the Proposed Plan for the Off-Source Operable Unit (January 25, 1994).

WPAFB has written more than 30 articles, fact sheets, and newsletter articles related to the remedial investigation and feasibility study for Landfills 8 and 10 (1988-1994).

Attachment 2: Administrative Record Index for Landfills 8 and 10.

Document Number: Hard Copy on File Title: Letter EPA to WPAFB Documentation Requirements for Source Control Operable Unit Landfills 8 and 10 Date: August 14, 1991 Author: WPAFB
Document Number: Hard Copy on File Title: Letter from WPAFB to EPA - Proposed Schedule for Focused RI/FS at Landfills 8 and 10 Date: September 4, 1991 Author: WPAFB
Document Number: Hard Copy on File Title: Letter from WPAFB to EPA - Provides a Revised Proposed Schedule for Focused RI/FS Date: October 2, 1992 Author: WPAFB
Document Number: Hard Copy on File Title: Letter from EPA to WPAFB - Provides a Date-Certain Schedule for Focused RI/FS Date: October 15, 1992 Author: USEPA
Document Number: Hard Copy on File Title: Letter from WPAFB to EPA - WPAFB Final Schedule Proposal Date: December 2, 1991 Author: WPAFB
Document Number: Hard Copy on File Title: Letter from EPA to WPAFB - Approving Schedule Date: December 9, 1991 Author: USEPA
Microfiche Number: LF8, 10-H1 Title: Focused Remedial Investigation Report Date: March 15, 1992 Author: Engineering-Science
Document Number: Hard Copy on File Title: Letter from USEPA to WPAFB - Approving Focused Remedial Investigation Report Date: May 7, 1992 Author: USEPA
Document Number: Hard Copy on File Title: Letter from OEPA to WPAFB - Approving Focused Remedial Investigation Report Date: May 13, 1992 Author: OEPA

Microfiche Number: LF8, 10-H4 Title: Focused Feasibility Study Date: August 28, 1992 Author: Engineering-Science:
Microfiche Number: LF8, 10-H5 Title: Proposed Plan for Source Control Operable Unit Date: September 1, 1992 Author: WPAFB
Document Number: Hard Copy on File Title: Letter from EPA to WPAFB - Approving Focused Feasibility Study Date: September 24, 1992 Author: USEPA
Document Number: Hard Copy on File Title: Letter from EPA to WPAFB - Approving the Proposed Plan for Source Control Operable Unit Date: September 29, 1992 Author: USEPA
Document Number: Hard Copy on File Title: Letter from OEPA to WPAFB - Approving the Proposed Plan for Source Control Operable Unit Date: October 1, 1992 Author: OEPA
Document Number: Hard Copy on File Title: Letter from OEPA to WPAFB - Approving the Focused Feasibility Study Date: October 20, 1992 Author: OEPA
Document Number: Hard Copy of Public Comments on File Title: Public Comment Period under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Section 117 Date: October 23 - December 23, 1992 Author: Various Authors
Document Number: M-N4 Title: Transcript of Public Meeting Held under CERCLA Section 117 Date: November 10, 1992 Author: WPAFB
Microfiche Number: MI1 Title: Remedial Investigation/Feasibility Study Work Plan for 39 Sites As Amended Date: June 30, 1990 Author: Engineering-Science
USEPA Document Number: EPA/540/P-91/001 Title: Conducting Remedial Investigations/Feasibility Studies for CERCLA Municipal Landfill Sites Date: February, 1991 Author: USEPA

<p>USEPA Document Number: OSWER Directive 9355.3-02 Title: Decision Documents: The Proposed Plan and Record of Decision, Draft Guidance on Preparing Date: March, 1988 Author: USEPA</p>
<p>USEPA Document Number: OSWER Directive 9285.7-01B Title: Risk Assessment Guidance for Superfund, Volume 1-Human Health Evaluation Manual (Part B, Development of Preliminary Remediation Goals) Interim Date: December 13, 1991 Author: USEPA</p>
<p>Document Number: Hard Copy on File Title: Proposed Plan for the Off-Source Operable Unit at Landfills 8 & 10 Date: December, 1993 Author: WPAFB</p>
<p>Document Number: Hard Copy on File Title: Letter from OEPA to WPAFB-OEPA Approval of the Proposed Plan for the Off-Source Operable Unit at WPAFB Landfills 8 and 10 Date: January 13, 1994 Author: OEPA</p>
<p>Document Number: Hard Copy on File Title: Letter from USEPA to WPAFB-Off-Source Operable Unit Final Proposed Plan Date: January 14, 1994 Author: USEPA</p>
<p>Document Number: Hard Copy on File Title: Video Tape and Overhead Briefing Slides for the Public Meeting for the Off-Source Operable Unit Proposed Plan Date: January 25, 1994 Author: WPAFB</p>

Attachment 3
Citizens' Comment Letters

276
28 Jan 94

1304 Horizon Drive
Fairborn, OH 45324-5816
January 27, 1994

Florence Brown
Environmental Public Affairs Specialist
645 ABW/EMPA Bldg 89
5490 Pearson Road
Wright-Patterson AFB, OH 45433-5332

To Whom It May Concern,

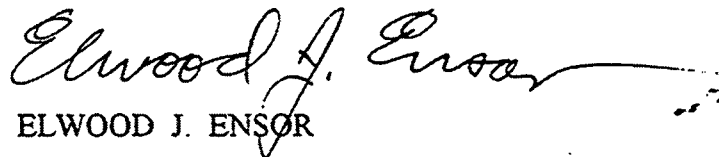
This letter is about Landfills 8 and 10 at WPAFB and the proposed plan to solve problems caused by these two landfills. Overall the project is good and should proceed as planned.

I do have some minor concerns about the clay cap being placed over the land fill. I have no problem with the clay cap per se but I do object to having the cap covering and blocking the existing WPAFB Bikeway. If it is necessary to cover the bikeway then a new asphalt bikeway should be built closer to Kauffman Avenue. It is important to connect the streets in Woodland Hills without having to use Kauffman Avenue.

The proposed plan should not affect the proposed Kauffman Avenue Bikeway Extension. The Kauffman Avenue Bikeway will stay on the North side of Kauffman Avenue and then cross at National Road to the South side of the street. Test holes or shallow wells that were drilled in this area were place so that they would not interfere with the proposed Kauffman Avenue Bikeway.

The Environmental Office at WPAFB is doing a very good job and should be commended for their work.

Sincerely,


ELWOOD J. ENSOR

Atch: Map of Bikeways

RECEIVED

JAN 28 1994

645 ABW/EMX
EMPA

**Tamarron
Corporation**

535 Windsor Park Dr.
Centerville, Ohio 45459
Phone (513) 438-9050
(513) 294-2420

February 9, 1994

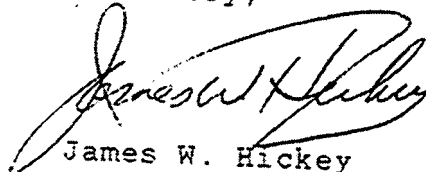
Florence Brown
Environmental Public Affairs Specialist
645 ABW/EMPA Bldg. 89
5490 Pearson Rd.
Wright-Patterson AFB, OH 45433-5332

Dear Ms. Brown:

Tamarron Corporation owns land adjacent to Landfill Number 8 on Wright-Patterson Air Force Base. In our environmental studies for usage of the property we have found some underground water contamination at subsurface levels.

Enclosed you will find a report from our environmental engineers indicating the problem. I am forwarding this report to you as a comment on the Off-Source Operable Unit Proposed Plan for the remediation of the problem at Wright-Patterson AFB. I would like this concern on record so that if the proposed measures do not alleviate the problem at least the Wright-Patterson AFB has been made aware of the existence of the problem and that they may bear additional responsibilities for the cleanup should the proposed methods not work as anticipated.

Sincerely,


James W. Hickey

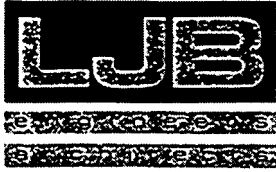
Enclosed: Groundwater contamination issue prepared by Lockwood Jones and Beals

RECEIVED

FEB 09 1994

645 ABW/EMX

EMPA



GROUNDWATER CONTAMINATION ISSUES

**Tamarron Corporation Property
National Road & Reese Drive
Fairborn, Ohio**

Prepared For:

**Jim Hickey
Tamarron Corporation
7041 Corporate Way
Centerville, OH 45459**

January 25, 1994

Prepared By:

**LOCKWOOD, JONES AND BEALS, INC.
1563 East Dorothy Lane
Kettering, Ohio 45429**

Project No. 8514.E0

GROUNDWATER CONTAMINATION ISSUES

**Tamarron Corporation Property
National Road & Reese Drive, Fairborn, Ohio**

INTRODUCTION

This report presents information concerning potential impacts of contamination from WPAFB on property owned by Tamarron Corporation and located east of National Road and directly south of Landfill 8. Unless these issues are resolved, there is no assurance that the proposed remediation plan for Landfill 8 will be adequate to protect the Tamarron property from adverse effects from WPAFB contamination.

It is the assertion of this writer that WPAFB has not conclusively delineated the full impact of its landfills on the Tamarron property and therefore cannot be certain that the proposed remediation program will be effective at remediating the contamination on the subject property. This report provides the basis for these assertions.

The intent of this document is to present sufficient information to raise a reasonable concern that important issues remain unresolved and that they should be resolved prior to finalizing a remediation plan. The burden of proof should lie with WPAFB that a problem does not exist rather than lie with Tamarron that there is a problem.

As a working hypothesis this report assumes that all raw data collected so far by all parties are accurate so as to determine what inconsistencies, if any, exist in those data. The second step involves re-examining inferred assumptions that Engineering-Science made in interpreting the raw data. The premise is that interpretations should change to fit the data rather than disregarding data that don't fit the interpretations.

DISCOVERY OF CONTAMINATED GROUNDWATER

Concern over possible contamination of the Tamarron property from WPAFB and particularly Landfill 8 first arose during a site inspection of the property on September 17, 1992. During the site visit several groundwater seeps were observed along the stream flowing northeasterly across the northwest corner of the Tamarron property and at the detention basin in the northeast corner of the property.

Because of the proximity of WPAFB Landfill 8, it was prudent to sample these seeps and this was done on October 2 & 4, 1992. The intention of the sampling was to provide an inexpensive, first approximation screening to determine whether components of concern were present. The samples were not intended to fully characterize or delineate possible contamination. A more complete description of the screening investigation process for the groundwater seeps is attached as Appendix A.

The analytical results for the groundwater samples, summarized in Table A-1, show elevated levels of heavy metals and of COD, well above natural background levels. For comparison, Table 1 also includes results of selected samples from previous investigations at WPAFB. The similarities in the patterns of sample constituents indicate that Landfill 8 is the presumptive source of the contaminants in the absence of any other known or suspected source.

INITIAL INTERACTIONS WITH WPAFB

The sample results from the groundwater seeps were of sufficient concern that contact was made with WPAFB and the Ohio EPA to provide them with this information and request their assistance in further investigations to define the extent of the problem.

A site walk-over survey was held on November 3, 1992 which included representatives of WPAFB, WPAFB consultants, Ohio EPA, LJB, and Tamarron Corporation. During this meeting, the analytical results from the groundwater seeps were provided to the relevant parties, the sampling locations were observed, and additional information available to WPAFB was discussed. The outcome of the site meeting was that WPAFB would consider the analytical data provided to them and would supply Tamarron with information being prepared for WPAFB on Landfill 8 and on the Earth Fill Disposal Zones west of National Road.

WPAFB responded to Tamarron Corporation by letter dated November 17, 1992 from Ronald J. Lester (copy attached) which included excerpts from the Site Investigation (SI) Report for Eight Earthfill Disposal Zones (EFDZ) and the draft Off-Source Remedial Investigation (OSRI) Report on Landfills 8 and 10. In that letter, WPAFB took issue with the reliability of the sample results and stated that they did not believe the contaminants found on the Tamarron property were migrating from Landfill 8 or the EFDZ's west of Landfill 8. On November 30, 1992, LJB requested additional information from WPAFB which was supplied on January 22, 1993.

ISSUES TO BE RESOLVED

Based on the information provided above and based on review of the data supplied by WPAFB, three specific issues affecting the Tamarron property have been identified. Adequate resolution of these issues should precede finalization of the remediation plans to ensure that any contamination impacting the Tamarron property is properly addressed. The specific issues identified are the following:

1. Do the analytical results for the two grab samples taken on the Tamarron property indicate a reasonable probability that groundwater contamination has been discovered?
2. Is there a reasonable probability that contaminants from Landfill 8 have migrated onto the Tamarron property?
3. Is there a reasonable possibility that contamination from an unidentified WPAFB source west of National Road has migrated onto the Tamarron property?

Unless all three of these concerns can be conclusively shown to be invalid, then the probable contamination of the Tamarron property must be fully and adequately addressed in the proposed Landfill 8 remediation plan.

Based on review of the information supplied by WPAFB, it is our belief that the possibility of contaminant migration from WPAFB is significant and fully consistent with the primary data provided by WPAFB. In the sections which follow each of the issues is addressed to demonstrate that it is reasonable to expect that WPAFB undertake additional investigation

regarding contamination of the Tamarron property, and its remediation and protection from additional contamination.

ISSUE 1. GRAB SAMPLE RESULTS

In October 1992 as part of an Environmental Site Assessment conducted for Tamarron Corporation, Lockwood, Jones and Beals (LJB) installed very shallow monitoring wells in order to sample groundwater creating two seeps on the property. One seep was located in the storm water detention basin near the northeast corner of the property and the second seep was one of many along the stream in the northwest corner of the Tamarron property located east of National Road and directly south of WPAFB Landfill 8.

One water sample was taken from each location and sent unfiltered to the laboratory for analysis. The intention of the sampling was to provide an inexpensive first approximation screening to determine whether components of concern were present. The samples were not intended to fully characterize or delineate possible contamination. Well installation and sampling procedures are attached to this report. The analytical results were provided to WPAFB.

Ronald J. Lester in his letter to Jim Hickey of Tamarron Corporation dated November 17, 1992, questioned the analytical results obtained for the two water samples taken by LJB. We certainly agree that interpretation of the results depends on the manner in which the samples were collected and analyzed. However, we disagree that the results can be rejected; they are direct evidence of a possible problem and are not contradicted by other evidence.

We also agree that the sampling procedures, number of samples, and quality control for the two grab samples were not at the level needed to positively quantify the contamination level; they were never intended for this purpose. Rather, the samples were taken for screening purposes. We do contend that the samples and analytical results are adequate to show probable contamination worthy of additional investigation.

The heavy metal and COD concentrations are far too high for trace contamination from sampling equipment or sample handling to have affected the analytical results to the point where it would be reasonable to conclude there was not contamination.

The results have also been reviewed for the possibility that by using unfiltered samples the high metals concentrations were due to the background levels in the soil particles constituting the unfiltered suspended solids. The maximum contribution from soil particles can be calculated from estimating the solids concentration in the groundwater samples and using the WPAFB data for background soil concentrations.

From experienced observation, the concentration of suspended solids in the water sample was well under 100 mg/l which can be taken as a very conservative upper limit. From Table 6.2.30, Data Summary for Background Surface Soil, of the OSRI Report, the maximum levels detected were used to calculate the maximum possible contribution to the metals concentration from the suspended solids.

The calculations show that for the heavy metals arsenic, barium, chromium, cobalt, and copper which were found in the unfiltered grab samples, the maximum possible contribution from background soil particles was 1.0%. That is, 1.0% or less of the measured amount of

these metals in the groundwater samples can be attributed to background soil particles in the water samples; the remaining 99% or more of each metal was in the groundwater itself.

In summary, the presumption must be that the contaminant levels in the grab samples are sufficiently high that there is a problem worth investigating further. Generalized complaints about sampling procedures and QA/QC cannot obscure the obvious concern raised by the high levels found in the immediate proximity of Landfill 8.

ISSUE 2. CONTAMINANT MIGRATION FROM LANDFILL 8 ONTO THE TAMARRON PROPERTY.

The possibility that contamination from Landfill 8 has migrated onto the Tamarron property is actually demonstrated directly by the data provided by WPAFB. Plates 5, 6 and 7 of the OSRI Report actually show flow lines from Landfill 8 onto the Tamarron property in exactly the area where the seeps into the stream in the northwest corner of the property were observed. Therefore, WPAFB's own data show that the contaminated seeps are likely to have originated at Landfill 8.

For the purposes of this report the stream originating on WPAFB west of National Road, crossing National Road just north of Reese Drive, flowing northeasterly across the Tamarron property and entering WPAFB again near the southeast corner of Landfill 8 shall be referred to as "Branch A" of the un-named tributary of Hebble Creek.

The possibility that the seep found in the detention basin at the northeast corner of the Tamarron property also originated at Landfill 8 depends on whether Branch A actually serves as a hydrogeologic boundary. This in turn depends on two factors: 1) whether there is a good hydraulic connection between the stream and the permeable strata, and 2) whether there is another stronger sink for groundwater flow further from the source.

The OSRI Report assumed that Branch A served as a hydrogeologic boundary although there are no direct monitoring well data to verify this assumption as it relates to the Tamarron property. Although this assumption is commonly made, it must be explicitly verified especially when there is information which calls the assumption into question. Because such information is available regarding the Tamarron site, Branch A cannot be assumed to be a hydrogeologic boundary without verification.

Specifically, the stream branches located east of the Tamarron property (north of Peppertree Subdivision) are at a lower elevation and were observed during a field visit to contain strong seep activity where they cut into highly permeable materials. Therefore, there is a significant probability that these branch streams serve as a stronger sink than Branch A. The seep activity is strongest south of the WPAFB property but north of Peppertree. Additional seep activity is likely to be found beneath Peppertree where the original ravines were filled during construction of Peppertree. This is consistent with the substantial amount of dry weather flow observed discharging from the storm sewer systems at the upper end of the current stream channels.

The extent of the hydraulic connection between Branch A and the permeable strata can only be determined by locating monitoring wells on both sides of the stream and determining the true groundwater gradient. This was not done during the WPAFB investigations.

Furthermore, the analytical results from the LJB grab sample located in the Tamarron detention basin would be consistent with groundwater flow past Branch A. Until there is direct evidence to the contrary, the hypothesis that the detention basin seep originated from Landfill 8 cannot be rejected. Therefore, further investigation and protection during remediation is clearly indicated.

ISSUE 3. CONTAMINANT MIGRATION FROM UNIDENTIFIED SOURCE WEST OF NATIONAL ROAD.

A third issue is the possibility that contamination from an unidentified source west of National Road has migrated onto the Tamarron property. Close examination of the data provided by WPAFB shows that an important gap exists in the current information.

The information for Monitoring Well WP-EFDZ06-MW03 shows that two wells were set at this location, one screened from 73 to 78 feet (MW03A) and the other screened from 8 to 13 feet (MW03B). The permeable strata noted on the well logs from 21.5 to 22.5 feet and from 24.5 to 25.3 feet were not screened. Review of the various geologic cross-sections and boring logs provided by WPAFB shows that the unscreened permeable strata at MW03 are the most likely to be those hydraulically connected to the seeps in stream Branch A on the Tamarron property.

Because MW03 was not screened in the intervals from 21.5 to 25.3 feet, there is no information available on either groundwater levels or chemical constituents in these strata. Therefore, there is no certainty that the contaminants found in the grab samples on the Tamarron property did not originate west of National Road. Although, no such sources of contamination have been identified in the information made available to this writer, there is sufficient possibility that hitherto unknown sources of contamination exist at WPAFB that this possibility demands further investigation.

SUMMARY AND CONCLUSIONS

As shown in this report, there is significant evidence that contaminated groundwater from WPAFB, particularly from Landfill 8 is migrating beneath the property, owned by Tamarron Corporation, located immediately to the south. The major components of this evidence are the following.

1. Analysis of screening samples from two groundwater seeps on the Tamarron property has shown the groundwater to be contaminated with heavy metals.
2. WPAFB Landfill 8, located immediately to the north, is the only known or suspected source of contamination that could affect the Tamarron property.
3. Information provided by WPAFB shows groundwater from Landfill 8 migrating directly toward one of the two groundwater seeps.
4. The chemical profile of the two groundwater seeps is very similar indicating the likelihood they came from the same source.
5. The known hydrogeologic conditions are consistent with groundwater migration from Landfill 8 to both of the sampled groundwater seeps.

6. The assumption made by Engineering-Science that the creek flowing across the northeast portion of the Tamarron property forms a hydrogeologic boundary has not been verified and is not consistent with the observed contamination pattern.

Although Landfill 8 is the likely source of the contamination found on the Tamarron property, close examination of the available data provided by WPAFB shows that there is also a possibility of contaminant migration from some unidentified WPAFB source west of National Road. The permeable strata most likely to be connected to the groundwater seeps were not sampled during previous investigations so the possibility of a contamination source cannot be excluded without additional investigation.

Based on the information presented in this report, it is concluded that:

1. Groundwater flow patterns south of Landfill 8 have not been adequately defined by the work done to date by WPAFB.
2. Contaminant migration south from Landfill 8 has not been properly delineated.
3. Previous investigations have not excluded the possibility of contamination migrating from an unidentified source west of National Road.

An adequate remedial action plan for Landfill 8 must include protection of the Tamarron property from further contamination from WPAFB and provide remediation of existing contamination on the Tamarron property. To insure adequate protection and remediation, the deficiencies identified above must be corrected.

APPENDIX A
Investigation of Groundwater Seeps

Investigation of Groundwater Seeps

Samples of groundwater were taken in two locations on Lot 7 north of the subject site following discovery of discolored groundwater seeps. The samples were authorized for screening purposes only and were not intended to fully characterize or delineate possible contamination.

The seeps were located in the detention basin in the northeast corner of the Tamarron property and along the north side of the creek (Branch A) flowing along the north edge of the property. At the time of the 1992 site visit and the site visit conducted with OEPA and WPAFB representatives, the eroded swale in the center of the detention basin contained a seep with a very dark brown-orange color and a slick appearance, above which the water in the swale was clear except for minor turbidity, and below which the standing water had an orange color and an oily surface sheen. The creek below the catchbasin outlet had orange bacterial growth in areas of calm water. This growth was similar to that noted in the unnamed creek described below.

Along the northern edge of the Tamarron property ran an unnamed creek, designated Branch A, which was tributary to Hebble Creek. The Branch A was fed by a large culvert passing under National Road and originating in Wright Patterson Air Force Base Area B and outflow from a concrete drainage channel serving National Road in the road easement west of the subject property. Along the north side of the creek in calm areas of water protected by the creek bank and in a concrete drainage channel on the west side of National Road, clumps of orange material resembling iron-stained bacterial growth were seen. An orange, rusty stain was also seen on the northwest side of the road easement concrete drainage channel.

The creek water and a small amount of standing water at the origin of the concrete drainage channel were reasonably clear. Near the double bow in the creek, a metal drum or wheel hub was noted; no staining or odors were noted in its vicinity. One abandoned drum in somewhat deteriorated condition was seen on the north side of the creek near the southwest corner of the WPAFB property. The vegetation around the drum was healthy, and no stains were noted. No seeps were noted in the area of the drum.

A total of four shallow groundwater monitoring wells were installed on Lot 7 on September 17, 1992. Wells LJB-TC1-A and LJB-TC1-B were located in the vicinity of the detention basin seep (see Figure 2), while wells LJB-TC2-A and LJB-TC2-B were located along the north side of the creek near the double bow. Two wells were put at each location to ensure an adequate sample volume.

The wells were each installed by boring with a hand auger to approximately 18 inches below the surface, inserting a 2" diameter PVC well riser with attached one-foot screen in the boring, backfilling with washed pea gravel to approximately six inches below the ground surface, and backfilling the remaining space with native soils. Well LJB-TC1-A was sampled on October 2, 1992, and well LJB-TC2-A was sampled on October 4, 1992. The water collected was sampled for Chemical Oxygen Demand (COD), Copper, Iron, Manganese, Arsenic, Selenium, Mercury, Barium, Cadmium, Chromium, Cobalt, Lead, and Silver, Volatile Organic Compounds, Semi-Volatile Organic Compounds including Acid and Base/Neutral Compounds, Pesticides, and Herbicides. Samples were preserved on blue ice in coolers until their delivery to NET Midwest, Inc. on October 5, 1992.

The laboratory results for COD, metals, and acetone for both sample wells may be found in Table A-1 below. For comparison, sample results for the same compounds for

Table A-1 Laboratory Results for Wells LJB-TC1-A and LJB-TC2-A, and Reported Values for Related WPAFB Leachate Samples

Analyte	LJB-TC1-A ¹ 10/02/92	LJB-TC2-A ² 10/04/92	02-L01 1989	02-L10 1989	02-L11 1989	LS01-SW03 02/12/92	LS02-SW03 02/12/92
COD, mg/L	522	725	NA ³	NA	NA	NA	NA
Arsenic, mg/L	0.346	0.134	0.035	0.27	0.012	0.199	0.110
Barium, mg/L	4.05	1.95	0.25	0.86	0.28	1.35	1.01
Cadmium, mg/L	0.0058	0.0051	NA	NA	NA	0.013	0.008
Chromium, Total, mg/L	0.619	0.209	ND	0.043	ND ⁴	0.037	0.032
Cobalt, mg/L	0.392	0.121	ND	0.069	ND	0.026	0.027
Copper, mg/L	0.515	0.219	ND	0.089	ND	0.075	0.086
Iron, mg/L	593	168	1.9	93.1	9.9	143	103
Lead, mg/L	0.32	0.37	ND	0.052	0.0058	0.09	0.06
Manganese, mg/L	13.0	4.72	1.4	2.0	1.4	1.32	1.11
Mercury, mg/L	<0.0002	<0.0002	ND	ND	ND	ND	ND
Selenium, mg/L	<0.0050	0.0052	NA	NA	NA	R ⁵	R
Silver, mg/L	<0.0010	0.0016	NA	NA	NA	ND	ND
Acetone, ug/L	26.5	17.3	25 (Composite Value for Landfill 8, 1984)			ND	ND

¹ Detention Basin Seep

² Stream Seep

³ NA = Not Analyzed

⁴ ND = Not Detected

⁵ R = Sample Rejected by Lab for This Analyte

02-L01, L10, L11 from Phase II, Stage 2 Site Assessment Report by Weston, 1989
 LS01-SW03 and LS02-SW03 from Draft OSRI Report by Engineering-Science, Inc., 1992

APPENDIX B

November 17, 1994 WPAFB Letter



DEPARTMENT OF THE AIR FORCE

HEADQUARTERS, 645TH AIR BASE WING (AFMC)
WRIGHT-PATTERSON AIR FORCE BASE, OHIO

17 NOV 1992

FROM: 645 ABW/EMR
Wright-Patterson AFB OH 45433-5000

SUBJ: Environmental Data Collected in Conjunction with the Remedial Investigation (RI) of Landfills 8 and 10 in Woodland Hills

TO: Mr. James W. Hickey
Tamarron Corporation
535 Windsor Park Drive
Centerville OH 45459

1. During a telecon held on 28 Oct 92 between you and Ms Libby Domingue of my staff, you inquired about the remedial actions planned for Landfills (LF) 8 and 10 and the results of the Remedial Investigation/Feasibility Study (RI/FS). You also indicated that your A&E consultants, Lockwood, Jones and Beals (LJB), Inc., had conducted a limited site environmental assessment on your property located south of LF 8 and bordered on the west by National Road. This assessment was conducted in early Oct in anticipation of the sale of your property and was based on visual observations of existing environmental conditions and analytical results of two grab samples, one of which was collected from a large retention basin southeast of LF 8 and the other from the stream bed just south of LF 8.
2. In order to address your concerns about possible contaminant migration south of LF 8, we met with you on 3 Nov 92 and conducted a walk-over survey on your property and observed the sampling points established during the previous assessment by LJB, Inc. as well as other site features. In addition, we discussed the methodology used for collecting the grab samples. Several people, representing several different organizations were present during this survey: you; Mr Tim Glendenin and Ms Domingue from my staff; Ms Bonnie Buthker, Project Coordinator from Ohio EPA; Dr John Eastman and Ms Jennifer Miller from LJB; and project hydrogeologists from Martin-Marietta, Mr Tim Post and Mr Chris Wallen, who provide technical support to our program.
3. The attached data are provided for your information as discussed at the 3 Nov 92 meeting. These data include chemical analytical results together with hydrogeologic and lithologic information obtained from various locations north, east and west of your property. These data are excerpted from the draft Off-Source (OS) RI Report for Landfills 8 and 10 (Engineering-Science, Oct 92) which is presently undergoing review by OEPA and USEPA and the final Site Inspection (SI) Report for Eight Earthfill Disposal Zones (E-S, Aug 92). While the Focused RI and FS Reports for the Source Control Operable Unit at LFs 8 and 10 are available for public review in the Administrative Record housed at Wright State University, availability of the OSRI Report must await regulatory concurrence. The program which has generated these data is regulated by both OEPA and USEPA and has met rigorous quality assurance/quality control (QA/QC) standards set by these agencies.

**LIST OF ENVIRONMENTAL DATA PROVIDED
TO MR. JIM HICKEY OF
THE TAMARRON CORPORATION**

Excerpts from the Draft
OSRI Report for LFs 8 & 10
(E-S, Oct 92)

COMMENTS

✓Fig 2.6	Surface-Water, Leachate & Sediment Sampling Locations and Streamflow Measurement Locations Map
✓Fig 3.6	Bedrock Topography Map
✓Fig 3.7	Streamflow Measurements and Location Map
✓Fig 3.8	Cross-Section Location Map
✓Fig 3.9	North-South Trending Geologic Cross-Section, A-G
✓Fig 3.10	North-South Trending Geologic Cross-Section, B-F
✓Fig 3.14	East-West Trending Geologic Cross-Section, I-C
Plate 3	Groundwater and Leachate/Landfill Gas Monitoring Well Locations
Plate 5	Water Table & Generalized Groundwater Movement in Glacial Till (May 1991)
Plate 6	Water Table & Generalized Groundwater Movement in Glacial Till (September 1991)
Plate 7	Water Table & Generalized Groundwater Movement in Glacial Till (January 1992)

COMMENTS

TABLES 6.2.29, 6.2.30,
AND 6.2.31

CHEMICAL RESULTS FOR
GROUNDWATER SAMPLES

**VOLATILE ORGANIC
AND METALS ANALYSIS
SUMMARIES

EXCEPTS FROM THE
FINAL SITE INSPECTION
REPORT FOR 8EPDZs
(E-S. Aug 92)

✓Fig 2.2

✓Fig 3.24

✓Fig 3.30

Fig 4.10 & 4.9

Fig 4.11 & 4.12

DATA SUMMARY FOR BACKGROUND
SURFACE WATER, SURFACE SOIL,
AND STREAM SEDIMENT

✓p. N-1 Thru N-3
(SUMMARY OF DATA PRESENTATION)
✓p. N-223
✓p. N-251 Thru N-254
✓p. N-257 Thru N-263
✓p. N-421
✓p. N-268

✓p. N-52 Thru N-54
✓p. N-74 Thru N-82
✓p. N-304
✓p. N-86 & N-87

SAMPLING LOCATIONS
REPRESENTED:
SAME AS BORING/
WELL CONSTRUCTION
LOGS

Monitoring Well Locations

MW & Soil Boring Locations
for EPDZ 5

MW Locations for EPDZ 6

Preliminary Remediation Goal (PRG)
Comparison for EPDZ 5 Soil &
Groundwater

PRG Comparison for EPDZ 6 Soil &
Groundwater

