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Public Health Assessment for

SKINNER LANDFILL
WEST CHESTER, BUTLER COUNTY, OHIO
CERCLIS NO. OHD063963714
AUGUST 10, 1993

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
PUBLIC HEALTH SERVICE
Agency for Toxic Substances and Disease Registry

PUBLIC HEALTH ASSESSMENT

SKINNER LANDFILL

WEST CHESTER, BUTLER COUNTY, OHIO

CERCLIS NO. OHD063963714

PREPARED BY

The Ohio Department of Health
Division of Preventive Medicine
Bureau of Epidemiololgy and Toxicology
Under Cooperative Agreement with the
Agency for Toxic Substances and Disease Registry

THE ATSDR PUBLIC HEALTH ASSESSMENT: A NOTE OF EXPLANATION

This Public Health Assessment was prepared by ATSDR pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA or Superfund) section 104 (i)(6) (42 U.S.C. 9604 (i)(6), and in accordance with our implementing regulations 42 C.F.R. Part 90). In preparing this document ATSDR has collected relevant health data, environmental data, and community health concerns from the Environmental Protection Agency (EPA), state and local health and environmental agencies, the community, and potentially responsible parties, where appropriate.

In addition, this document has previously been provided to EPA and the affected states in an initial release, as required by CERCLA section 104 (i)(6)(H) for their information and review. The revised document was released for a 30 day public comment period. Subsequent to the public comment period, ATSDR addressed all public comments and revised or appended the document as appropriate. The public health assessment has now been reissued. This concludes the public health assessment process for this site, unless additional information is obtained by ATSDR which, in the Agency's opinion, indicates a need to revise or append the conclusions previously issued.

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TABLE OF CONTENTS

SUMMARY 1

BACKGROUND 3
- Site Description and History 3
- Site Visit 5
- Demographics, Land Use, and Natural Resource Use 5
- Health Outcome Data 7

COMMUNITY HEALTH CONCERNS 8

ENVIRONMENTAL CONTAMINATION AND OTHER HAZARDS 8
- On-site Contamination 8
- Off-site Contamination 15
- Quality Assurance and Quality Control 18
- Physical Hazards 18
- Toxic Chemical Release Inventory (TRI) 18

PATHWAYS ANALYSES 19
- Environmental Pathways 19
- Human Exposure Pathways 21

PUBLIC HEALTH IMPLICATIONS 23
- Toxicological Evaluation 23
- Health Outcome Data Evaluation 29
- Community Health Concerns Evaluation 33

CONCLUSIONS 44

RECOMMENDATIONS 46

PREPARERS OF REPORT 48

REFERENCES 50

GLOSSARY 52

APPENDICES 54

LIST OF TABLES

Table		Page
1.	Demographic Information	6
2.	On-Site Subsurface Soil Data	10
3.	On-Site Groundwater Data	12
4.	Leachate Sampling Data	13
5.	On-Site Surface Water and Sediment Data	15
6.	1986 Off-Site Groundwater Data	16
7.	1991 Residential Well Sampling Data	17
8.	Potential Human Exposure Pathways	22
9.	Average Annual Percentage of Children Born with Birth Defects, West Chester, Ohio	29
10.	West Chester Pediatric Cancer Incident Cases 1977-1991	31
11.	Type I Diabetes (IDDM) in the U.S. Compared to West Chester, Ohio Among Children 0-19	32

LIST OF FIGURES

Figure		Page
1.	Site Location Map	A-1
2.	Land Use Map	A-2
3.	Major Contaminant Source Areas	A-3
4.	Soil Sampling Sites	A-4
5.	Groundwater Monitoring Stations	A-5
6.	Surface Water Sampling Stations	A-6
7.	Off Site Residential Well Sample Locations	A-7

SUMMARY

The Skinner Landfill is a former landfill in West Chester, Butler County, Ohio. The landfill began operations in 1934 with the disposal of general municipal garbage and later solid waste and demolition debris. The landfill ceased operations in August 1990. On-site soil, groundwater, and surface water are contaminated with volatile organic compounds (VOCs), semivolatile organic compounds, pesticides, arsenic, and lead. Off-site contamination is minimal.

The Skinner Landfill site poses an indeterminate public health hazard. This conclusion does not mean that there are not hazardous materials at the site or that people are not at risk of exposure, but that additional data are needed to fully characterize the hazard potential of the site. The available data do not indicate that humans are being or have been exposed to levels of contamination that would be expected to cause adverse health effects. However, additional off-site groundwater data along the southwestern border are needed to accurately determine if aquifers on site are hydrologically connected to off-site water sources. This is necessary to determine the potential for movement of contaminated groundwater off-site. Limited data indicate that off-site private wells may have been impacted by the landfill.

There is also an operating day care center on the property near the landfill entrance and an elementary school across Cincinnati-Dayton Road from the site. Only part of the landfill is fenced and the site is still accessible to the public. Potential exposure pathways of concern are the ingestion of surface soils containing lead and the ingestion of VOCs in groundwater. Groundwater is a potential exposure pathway because there are uncertainties concerning the potential for contaminated groundwater to move off site. On-site workers or trespassers are the most likely persons to be exposed to lead in the soil. There may be some risk to those children at the day care center because of the close proximity to the landfill. The potential risks from exposure to chemicals in soil should be reevaluated if remediation includes excavation of the deep, contaminated soils. Those at risk under these circumstances would be site workers, possibly the children at the day care center, and children at the school. Proper personal protective equipment and procedures should minimize exposure to on-site workers. Members of the surrounding community are concerned about chemicals moving off site, a possible link between the site and birth defects among children born to teachers at a nearby elementary school, and increased rates of cancer and diabetes. Available health outcome data do not indicate higher than expected numbers of pediatric cancer cases, higher incidence of juvenile diabetes, or children born with birth defects from the West Chester area.

ATSDR's Health Activities Recommendation Panel (HARP) has evaluated the Skinner Landfill Public Health Assessment for appropriate follow-up activities. The Ohio Department of Health (ODH) and HARP have determined that area residents may need information about understanding the potential for exposure to site-related chemicals. The need for additional follow-up activities will be reevaluated when the additional monitoring data are collected.

ODH in cooperation with ATSDR will provide additional information to the community about their potential for exposure to site-related chemicals as requested.

BACKGROUND

Site Description and History

The Skinner Landfill site is in West Chester, Butler County, Ohio (Figure 1, Appendix A). The 78 acre site is in a forested, hilly section of southwestern Ohio. The landfill operators and property owners' live in a residence on the property (just east of the landfill)(Figure 2, Appendix A). Two other residences, one with children and one operating as a day care center, are on the property near the landfill entrance. The landfill ceased accepting all waste in August 1990. Portions of the site were fenced in an interim remedial action. Site access by the main road is limited but not restricted, because the landfill owners' residence is very close to the site. The site is accessible to trespassers through areas other than the main road. The terrain on site is hilly with natural hills and elevated areas of waste and debris. The site also is a junk yard with a variety of junked rusted vehicles and other rusted metal debris. The disposal area of the landfill is bordered on the west by Skinner Creek and by the East Fork of Mill Creek on the south (Figure 2, Appendix A). Previous sand and gravel operations at the site created three small ponds on site.

Elevations at the site range from a high of nearly 800 feet above Mean Sea Level to the northeast, sloping southwestward, to a low of 645 feet near the confluence of Skinner Creek and the East Fork of Mill Creek. The natural topography of the site is obscured by piles of solid waste that cover large areas of the site. Major waste disposal areas include the metal storage area, the buried lagoon area, which overlooks the East Fork of Mill Creek, and the former active landfill area, immediately adjacent to and northeast of the buried lagoon area (Figure 3, Appendix A). The buried lagoon is covered with grasses and weeds. The remainder of the past disposal areas are sparsely vegetated.

The Skinner Landfill site, originally a sand and gravel mining operation, began landfill operations in 1934 with the disposal of general municipal garbage in abandoned sand and gravel pits. A document from the Butler County Board of Health (BCBH) in 1959 indicated that general trash and other materials from a nearby paper plant and scrap metal from various sources were disposed at the landfill. In 1963, the operators of the landfill received permission from the BCBH to use the site as a sanitary landfill. The site also accepted solid waste and demolition debris. Little detail is known about the materials disposed of in the landfill from 1934 to the present.

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The Skinner Landfill has had a long history of state and local involvement. This site history is summarized in the following list of actions.

June, 1963. Local residents petitioned the BCBH to refuse to permit Skinner Landfill as a sanitary landfill, alleging that the landfill received and disposed of chemical wastes from a number of local industries.

April, 1976. The Southwestern Ohio Air Pollution Control (SOAPC) received citizens complaints concerning heavy smoke, odors, and eye irritations resulting from burning at the Skinner Landfill. Fire-fighters on site noticed black, oily liquids in a waste lagoon at the landfill. These incidents, and allegations that a corporation in nearby Hamilton, Ohio had disposed of chemical wastes at the site, prompted an investigation of the landfill by the Ohio Environmental Protection Agency (OEPA).

April-May, 1976. Initial investigations of the Skinner Landfill by representatives of OEPA, SOAPC, and BCBH indicated the presence of a number of 55-gallon drums marked "chemical wastes" on site. They also noted the presence of the recently graded waste lagoon area. The landfill operator stated that nerve gas, mustard gas,incendiary bombs, phosphorus, cyanide ash, and explosive devices were buried on site. The landfill operator later retracted the claim, under oath, that bombs were buried on site. Sampling of lagoon wastes and drums was undertaken.

July 1976-July 1977. Skinner Landfill owners retained the H. C. Nutting Company to conduct shallow geological investigations of the Waste Lagoon area.

August, 1977. The State of Ohio initiated legal proceedings against the Skinner Landfill owners, getting a court order denying further acceptance of chemical wastes at the site, but failing to mandate removal of the hazardous wastes from the site.

July, 1982. A field investigation team (FIT), under contract to the United States Environmental Protection Agency (U.S. EPA), investigated the site, drilled four monitoring wells on site, and sampled on-site potable water sources in order to determine the extent of groundwater contamination at the site.

December, 1982. U.S. EPA placed the Skinner Landfill on the National Priorities List (NPL) of Superfund hazardous waste sites.

1986-1988. Field investigations during the Phase I Remedial Investigation (RI) included the drilling and sampling of 18 groundwater monitoring wells, the sampling of on-site surface water, and soils, as well as a biological survey of the East Fork of Mill Creek and Skinner Creek. The Phase I RI was completed by WESTON in December, 1988.

1988. ATSDR completed a Preliminary Health Assessment on Skinner Landfill which recommended additional characterization of the site.

1989. Phase II of the RI was performed by WW Engineering & Science, Inc. This work provided additional information to more fully characterize the extent of contamination on site, the potential for migration of site contaminants off site, and the hydrogeology of the site.

1991. A Feasibility Study (FS) to determine the best method of clean-up for the site based on the information from the RI.

1993. The buried lagoon and part of the former active landfill area were fenced. Eight of nine homeowners in the area of the landfill were offered an alternative water supply. A radiation survey of the site was completed with results within the normal background range (Appendix B).

1993. ODH released the public health assessment for public comment. Comments and ODH response are included in Appendix D.

Site Visit

Ohio Department of Health staff accompanied by the Ohio EPA site coordinator, made a site visit on April 23, 1990. Other people on site included U.S. EPA contractors and one of the site's owners. The close proximity of the operating day care center was noted during this visit. The site was not fenced. Due to the amount of waste on site, it is impossible to ascertain whether people have trespassed on the site. Visible waste included junked vehicles and rusted metal objects, construction debris, tires, and rusted barrels. Only one of the ponds was visibly impacted by the site. The Trilobite pond was aqua in color, which is unusual for surface water in Ohio. The site owner indicated during the visit that he wanted to stock the pond with trout and open a pay to fish pond. It is unlikely that the pond would support any aquatic life.

Demographics, Land Use, and Natural Resource Use

Demographics

There are approximately 6,831 people within 1 mile of the site. West Chester is an unincorporated township and specific population estimates are difficult to obtain. West Chester includes the majority of Union Township. The population of West Chester has increased by 68% since 1980. Population estimates by age are given in Table 1. The largest percentage of Union Township (including most of West Chester) residents are over 18 years of age. West Chester, where the site is located, has approximately 29,480 people. In 1980, there were approximately 100-160 people within one-half mile of the landfill. More specific demographic information are not readily available.

Table 1
Demographic Information For West Chester and Union Township

1990 Census data, unless otherwise noted

State of Ohio	10,847,115
Butler County	291,479
Union Township	39,703
under 18 years old	12,056 (30% of Union)
18 years and older	27,647 (70% of Union)
West Chester	Approximately 29,480

Land Use

There are residential areas northeast and southeast of the site, and along Cincinnati-Dayton Road and Station Road, within 2,500 feet of the site (Figures 1 and 2, Appendix A). The Union Township Elementary School is immediately west (across Cincinnati-Dayton Road) of the landfill (Figure 2, Appendix A). A United States Post Office is located immediately adjacent to and north of the site. There is another residential area, including the Freedom Elementary School and a golf course complex, off Tylersville Road, 1 mile northwest of the site.

The site is bordered on the north and south by wooded and agricultural land, the east by the Conrail railroad tracks, and the west by West Chester, consisting of residences and small businesses along the Cincinnati-Dayton Road. Interstate 75, a major north-south interstate highway in the area, is 2,000 feet west of the site.

Future land use may be limited because of the hilly terrain, construction debris, and scrap metal debris on site. It may, however, be possible for the area to be developed for residential use.

Natural Resource Use

The Skinner Landfill lies 1.5 miles east of the floodplain of Mill Creek, a major south-flowing tributary of the Ohio River. Skinner Creek and the East Fork of Mill Creek flow towards the southwest from the Skinner site into Mill Creek. Skinner Creek and the East Fork of Mill Creek are classified by the Ohio Revised Code 3745-1-13 (OEPA,1987) as warm water, agricultural, and industrial waters, suitable for primary contact recreational uses. Warm water streams are capable of supporting moderately diverse, stable populations of aquatic life, including fish, invertebrates, and aquatic plants. Agricultural waters are suitable for watering livestock and crop irrigation. Industrial waters can be used for commercial and industrial purposes, with or without treatment. The Primary Contact classification indicates that these surface waters may be

suitable for full-body contact recreational purposes, including swimming and canoeing, with minimal risk to public health.

Both Skinner Creek and the East Fork of Mill Creek are small, shallow streams with normal water depths averaging less than 1 foot deep. Both streams rapidly swell to near channel capacity after heavy rainfalls. At these times, both streams may scour sediments from channel beds and banks and transport them downstream. These streams are not popular places for fishing and recreation. They support fish populations dominated by minnows and shiners, but lack suitable habitats for larger game fish (WESTON, 1988). Both streams are too shallow for canoeing or other boating activities. A water quality review of the East Fork of Mill Creek concluded that there was no observed impairment of the fish community downstream of the site.

A third on-site stream, Dump Creek, borders the former active landfill area on the east. This intermittent stream is a small tributary flowing south into the East Fork of Mill Creek. No information was available on its physical characteristics.

There are three small ponds on site (Figure 3, Appendix A). The largest of these, called the Duck Pond, is 150 feet at its widest point. It straddles the northern property line in the northeast corner of the site, upgradient from the site. The Diving Pond is near the northern property line, just east of Skinner Creek and downgradient from the metal storage area. The third pond on site is the Trilobite Pond (Figure 3, Appendix A). It originally consisted of two ponds that were combined into a single pond. It is excavated into bedrock and is roughly 8 feet deep. There is no other physical information available on these ponds in terms of water depths, bottom characteristics, and aquatic biota.

There are three private wells on site, but only one is used by the residents living on the property (just west of the actual landfill) for drinking water. Local aquifers typically have low yields and consist largely of perched aquifers that are isolated from the major regional aquifers in the area. Most of the local residents off site have used the county's public water system since 1963. (Butler County Department of Sewer and Water, 1991). There are at least seven other private wells in the area used for drinking water. Public water has been offered to eight residences with private wells.

Health Outcome Data

Citizens from West Chester requested an evaluation of the rates of birth defects, pediatric cancer incidence, and incidence of diabetes provided by Children's Hospital. This evaluation is included in the Health Outcome Data Evaluation portion of the Public Health Implications section.

COMMUNITY HEALTH CONCERNS

Community concerns were gathered during an Ohio Department of Health Public Involvement Session and a (U.S.EPA) Public Meeting. A list of concerns and responses gathered from both meetings are in the Community Concerns Evaluations portion of the Public Health Implications section. Concerns dealt with the off-site migration of chemicals, the possibility of exposures during remediation, data gaps, and reported illnesses of area residents.

ENVIRONMENTAL CONTAMINATION AND OTHER HAZARDS

The field investigators collected on-site soil, groundwater, leachate, surface water, off-site groundwater (residential wells), and stream samples. This section is not a complete listing of all of the chemicals found at the site. A complete listing can be found in the RI report. Chemicals presented in this Section will be discussed in further detail in other sections of the public health assessment. Chemicals listed in these Data Tables are not necessarily a threat to human health and may be eliminated in other sections of the public health assessment.

Comparison values are used as guides to aid in the determination of the chemicals of concern. A chemical is not automatically included as a chemical of concern if it exceeds the comparison value, because people must also be exposed to the chemical or have the potential to be exposed. Comparison values for the chemicals that do not cause cancer are either ATSDR's Environmental Media Evaluation Guides (EMEGs) or are calculated by ODH when no EMEGS exist for a chemical. The calculated values used the U.S. EPA standard Reference Doses (RfD), adult and/or child body weights, and ingestion rates. If exposure to a child is not likely to occur the comparison value will be given only for adults. Cancer Guides are used to assist in the evaluation of the cancer potential for a chemical. They are calculated using the U.S.EPA cancer slope factors, adult body weights and ingestion rates. The formulas used for these calculations are in Appendix C. The comparison value for dioxin was based on the RfD for one dioxin isomer, 2,3,7,8-tetrachlorodibenzo-p-dioxin (2,3,7,8 TCDD). The comparison values for drinking water are either the U.S. EPA Maximum Contaminant Level (MCL) or ATSDR EMEGs, which ever is the lowest number.

On-site Contamination

Subsurface Soil

The focus of the soil investigation centered on the buried lagoon, the buried pit, and the area surrounding monitoring well GW-38 (downgradient from the waste lagoon). The field investigation team took 65 samples in the buried waste lagoon (near the surface to a

depth of 45 feet). Soil samples were taken from borings in the buried pit (0-10 feet), five groundwater monitoring well borings (1-45 feet), and three hand auger borings (0.5-2 feet, north of the former active landfill). Sample locations are shown in Figure 4, Appendix A.

Field personnel noted visible waste in the waste lagoon area and mounded debris such as wood, plastic, metal, brick, wire, glass, paper, and rubber during sampling. Waste included tar-like material, oily sediments, and sticky liquids the color of raspberries and turquoise.

Soil samples from the buried waste lagoon, buried pit, monitoring wells, and hand auger samples contained volatile organic compounds (VOCs), semivolatile organic compounds, pesticides, dioxins, arsenic, lead, and mercury (Table 2). Samples from the buried waste lagoon contained the greatest number of chemicals at the highest concentrations. The concentrations in soil samples from the monitoring wells and the hand auger samples are generally lower than in the buried waste lagoon and buried pit. Toluene, xylene, and ethylbenzene were present in most of the soil samples. Common semivolatile organic compounds included PAHs (polynuclear aromatic hydrocarbons) and hexachlorobenzene.

Although there is extensive soil contamination at the site, there is very little surface soil contamination. Lead was the only chemical of concern detected in surface soils (24.1 mg/kg-1030 mg/kg). Surface soil was sampled with hand augers. Most of the soil contamination occurred at depths below 25 feet. There is minimal near surface contamination (1-2 feet) including PAHs, lead, and dioxins.

TABLE 2
ON-SITE SUBSURFACE SOIL DATA
SKINNER LANDFILL, WEST CHESTER, OHIO

CHEMICAL	CONCENTRATION (mg/kg)	COMPARISON VALUE (mg/kg)
1,2-dichloroethane	0.003-210	77[1]
Carbon Tetrachloride	0.04-160	70[1]
1,2-dichloropropane	0.14-340	60,000[2]
Trichloroethene	0.006-140	600[1]
Benzene	0.007-60	241[1]
Toluene	0.001-31,000	140,000[2]
Ethylbenzene	0.0008-98	70,000[3]
Hexachlorobenzene	0.0009-1,800	600[2]
Hexachlorocyclopentadiene	0.17-4,300	5,000[3]
PAHs	0.035-1,250	2800-210,000[3]
1,4-dichlorobenzene	0.13-180	NA
Heptachlor	0.01-52	2[1]
Aldrin	0.64-11	0.4[1]
Dieldrin	1.7-1.9	4[1]
Chlordane	1.8-53	5[1]
Dioxins and Furans	*0.0008-15.1	*0.0007[3]
Arsenic	2-100	200[2]
Lead	3.7-4,360	NA
Mercury	0.1-5.3	200[3]

reference - WW Engineering & Science, 1990
mg/kg = milligrams per kilogram; equivalent to parts per million (ppm)
* = µg/kg (micrograms per kilogram); equivalent to parts per billion (ppb)
[1] = Cancer Risk Evaluation Guide
[2] = ATSDR EMEG
[3] = Comparison Value Calculated by ODH
NA = None Available

Soil Gas

The soil gas survey of the buried waste lagoon detected hot spots of benzene (1.2-50 ppm), toluene (1.7-768 ppm), and methylene chloride (2.2-868 ppm). Analysis was performed in the field for only these three chemicals.

Groundwater

Twenty-eight groundwater monitoring wells were sampled, 13 new wells, 13 wells drilled in 1986, and two wells drilled in 1982. Ten of the new wells are screened in the bedrock aquifer and three are screened in the unconsolidated sediments. Seven of the 1986 wells are screened in glacial sediment, four in bedrock, and two at the interface. Two wells (GW-20 and B-5, Figure 5, Appendix A) adjacent to and downgradient from the waste lagoon contained the majority of the VOCs and semivolatile organic compounds. Two additional wells GW-17 and 18 (Figure 5, Appendix A) along the northern boundary of the landfill contained high levels of benzene and a few semivolatile organic compounds. The concentration of semivolatile organic compounds are generally very low, probably because of the low water solubility of these types of chemicals (Table 3). Concentrations of most of these chemicals were below the comparison values (Table 3). Wells in the unconsolidated sediments contained most of the VOCs, with semivolatile organic compounds present in both sediment wells and bedrock wells.

Nearly all the VOCs and semivolatile organic compounds in the sediment wells were present in soil samples from the buried lagoon. The groundwater monitoring wells 20 and B-5 (Figure 5, Appendix A) are in the same general location as the most contaminated soil boring (WL-14, Figure 4, Appendix A).

TABLE 3
ON-SITE GROUNDWATER DATA
SKINNER LANDFILL, WEST CHESTER, OHIO

CHEMICAL	CONCENTRATION (µg/L)		
	Sediment Wells	Bedrock Wells	CV*
Vinyl Chloride	8-48	ND	0.2[1]
1,2-dichloroethane	5-4,500	ND	4[1]
1,2-dichloropropane	21-370	ND	5[2]
Trichloroethene	2-71	ND	5[2]
Benzene	1-20,000	690-890	5[2]
Ethylbenzene	7-24	5	700[2]
Toluene	530-3,100	0.24	1000[2]
bis(2-chloroethyl) ether	1-240	ND	0.3[1]
1,4-dichlorobenzene	10	8-11	75[2]
Hexachlorobenzene	0.2	0.24	1[2]
Hexachlorobutadiene	0.015-0.019	0.087	700[3]
Hexachlorocyclopentadiene	ND	0.065	50[2]
Arsenic	0.002-0.06	0.04-0.05	11[4]
Lead	ND	ND	15[5]
Mercury	0.0002-0.003	0.0003-0.0004	2[2]

reference - WW Engineering & Science, 1990
CV = Comparison Value
ND = Not Detected
µg/L = micrograms per liter; equivalent to parts per billion (ppb)
[1] = Cancer Risk Value Calculated by ODH
[2] = U.S.EPA MCL
[3] = Comparison Value Calculated by ODH
[4] = ATSDR EMEG
[5] = U.S.EPA Action Level

Leachate

Investigators sampled two leachate seeps along the East Fork of Mill Creek and one along Skinner Creek. While comparison values have been developed specifically for surface water and groundwater which could be used as a drinking water source, comparison values have not been developed for chemicals in leachate. This is due to the uncertainties in determining possible exposure to leachate. The two seeps along the East Fork of Mill Creek are downgradient from the buried waste lagoon and originate from the unconsolidated glacial sediment groundwater. Leachate water contained low concentrations of VOCs, however, these chemicals were also present in soil and groundwater (Table 4). Leachate sediments contained site-related chemicals at very low concentrations. The VOCs were only found in one leachate seep along the East Fork of Mill Creek and the semivolatile organic compounds were in both seeps along Mill Creek. The chemicals in the leachate samples, with the exception of lindane, are also present in soils, and groundwater on site.

TABLE 4
LEACHATE SAMPLING DATA
SKINNER LANDFILL

CHEMICAL	CONCENTRATION RANGE	
	Water (µg/L)	**Sediment (mg/kg)**
Benzene	9-11	ND
1,1-dichloroethane	2-2	ND
Chloroethane	9-9	ND
Toluene	ND	0.02
PAHs (Total)	ND	2.3
Hexachlorobenzene	ND	1.3
Hexachlorobutadiene	0.012-0.016	1.6-47
Hexachlorocylopentadiene	ND	ND
Lindane	ND	0.04
Arsenic	0.007-0.01	5.8-11
Lead	ND-0.07	13.2-78.3
Mercury	ND	ND

reference - WW Engineering & Science, 1990
ND = Not Detected
µg/L = micrograms per liter; equivalent to parts per billion (ppb)
mg/kg = micrograms per kilogram; equivalent to parts per million (ppm)

Additional leachate (water) samples taken in 1992 detected 33 ug/L bis(2-chloroethyl)ether, 26 ug/L benzene, and 9 ug/L 1,1-dichloroethane. These seeps are along the East Fork of Mill Creek and were sampled during a dry period. Benzene and 1,1-dichloroethane were detected in previous leachate sampling events.

Surface Water and Sediment

Surface water and sediment samples taken on site contained site-related chemicals (Table 5). Comparison values have not been developed specifically for sediment and nonpotable surface water, because of the uncertainties of determining exposure to surface water and sediment. On-site surface water sampling areas are shown in Figure 6, Appendix A. Field investigators noted an "oily sheen" and petroleum smell during the sampling of the Diving Pond. Toluene and xylene were detected in a single surface water sample collected from the East Fork of Mill Creek, downgradient from the site. East Fork of Mill Creek, Dump Creek, and Skinner Creek sediment samples contained PAHs (polynuclear aromatic hydrocarbons). The Skinner Creek samples containing semivolatile organic compounds were collected near the buried pit and downstream of the site on the western side of the main access road. The other semivolatile organic compounds listed in Table 5 were present in the Diving Pond, sediments from East Fork of Mill Creek, Skinner Creek, and the Duck Pond. The metals were not present in surface water (or not above low background levels) and lead was detected in sediment from the Diving Pond and Skinner Creek.

TABLE 5
ON-SITE SURFACE WATER AND SEDIMENT DATA
SKINNER LANDFILL, WEST CHESTER, OHIO

CHEMICAL	CONCENTRATION	
	Water (µg/L)	**Sediment (mg/kg)**
Xylene	3.0	0.04
Toluene	47.0	ND
PAHs	ND	3.8-7.8
Hexachlorobenzene	0.03	0.0009-0.03
Hexachlorobutadiene	0.003-0.01	0.002-0.03
Hexachlorocyclopentadiene	ND	0.05-0.07
Arsenic	ND	0.36-9.2
Lead	ND	0.25-401
Mercury	ND	ND

reference - WW Engineering & Science, 1990
µg/L = micrograms per liter; equivalent to parts per billion (ppb)
mg/kg = milligrams per kilogram; equivalent to parts per million (ppm)
ND = Not Detected

Off-site Contamination

Off-site samples included groundwater (residential wells), surface water, and sediment.

Groundwater

Groundwater samples were collected from seven residential wells during the Phase I Remedial Investigation in 1986 (Table 6) and four wells (two of these wells are on the landfill owners' property, west of the former disposal area) during Phase II in 1990. One Phase I well was hand dug, shallow, and stagnant. Two other Phase I wells were also stagnant. The 1986 well results are shown in Table 6 and the locations are shown in Figure 7, Appendix A.

TABLE 6
1986 OFF-SITE GROUNDWATER RESULTS
SKINNER LANDFILL, WEST CHESTER, OHIO

CHEMICAL	CONCENTRATION µg/L	COMPARISON VALUE (µg/L)
PAHs (Total)	3.7	0.2[1]
Phenol	140	21,000[2]
4-methylphenol	210	NA
Benzoic Acid	45	140,000[2]
Dieldrin	0.24-0.69	0.02[3]
BHC (Total Lindane)	16.3	0.2[1]
Methoxychlor	0.52	40[1]
DDT	0.06-0.46	1.0[3]
PCBs	0.2	0.05[3]

reference - WW Engineering & Science, 1990
µg/L = micrograms per liter; equivalent to parts per billion (ppb)
[1] = U.S.EPA MCL
[2] = Noncancer Comparison Value Calculated by ODH
[3] = Cancer Risk Comparison Value Calculated by ODH
PCBs = Polychlorinated biphenyls

Most of the chemicals in Table 6 were found in three stagnant wells (RW02, RW06, RW10, Figure 7, Appendix A). PCBs and DDT were detected in RW05, west of the site. None of the Phase I wells are used as a source of drinking water and exposure is not likely to occur. Two of the pesticides, lindane and dieldrin, were present in on-site soil and leachate.

Four additional wells were sampled in 1990. Two of the four residential wells sampled in 1990, (not the landfill owners' wells) are screened in shale and sandstone, respectively. The other two residential wells (landfill owners' wells) are screened in the unconsolidated glacial sediments. One of these wells, located on the landfill owners' property, contained a very low level (0.73 µg/L) of naphthalene. The other wells tested in 1990 did not contain any site-related chemicals.

A third round of residential well sampling of five wells in 1991 detected contaminants only in the well on the landfill owners' property, east of the former disposal area. This well contained a number of VOCs (Table 7). A fourth round of residential well sampling of eight wells in 1992 detected no chemicals in seven of the wells and only very low levels of trichloroethene and diethyl ether in one well.

Table 7
1991 RESIDENTIAL WELL SAMPLING RESULTS
SKINNER LANDFILL, WEST CHESTER

CHEMICAL	CONCENTRATION µg/L	COMPARISON VALUE (µg/L)
1,1-dichloroethane	0.4-0.7	3,500[1]
1,2-dichloroethane	0.3	4[2]
1,1,1-trichloroethane	0.5-1.2	200[3]
1,1,2-trichloroethane	0.4-1.0	5[3]
Trichloroethene	0.8-1.3	5[3]
1,2-dichloropropane	0.8-1.3	5[3]
Chlorobenzene	0.1	700[1]
1,4-dichlorobenzene	0.1	75[3]
1,2-dichlorobenzene	0.1	600[3]
1,2-dichloroethene*	0.3-0.3	70-100[3]

reference - WW Engineering & Science, 1990
* = Both isomers present
µg/L = micrograms per liter; equivalent to parts per billion
[1] = Comparison Value Calculated by ODH
[2] = Cancer Risk Evaluation Guide
[3] = U.S.EPA Maximum Contaminant Level

Surface Water and Sediment

Off-site stream samples were collected in the East Fork of Mill Creek, upstream and downstream of the landfill (Figure 6, Appendix A). Chemicals were detected at very low concentrations in off-site surface water samples. One sediment sample contained arsenic at a high concentration of 3,090 mg/kg (downstream from the site). This was the only sampling station where high levels of arsenic were detected in both the 1989 and 1986 sampling. Hexachlorobenzene was also detected in sediment samples (0.0004-0.005 mg/kg). This chemical was found in both upstream and downstream sediment samples, although concentrations were greater downstream from the site. This chemical was also present in on-site samples. PAHs were detected in stream sediments both upstream and downstream (16.3 mg/kg in one downstream station). The concentrations of PAHs in 1989 did not greatly differ from sediment samples taken in 1986.

The Ohio EPA sampled soil from the baseball field behind the Union Township Elementary School. The samples were analyzed for dioxin, VOCs, semivolatile organic compounds, and metals. Dioxin and the other chemicals were not detected above health-related standards.

Data Gaps

Additional data are needed to fill gaps in the environmental data. The off-site groundwater monitoring data consisted of seven residential well samples in 1986, four in 1990, five in 1991, and eight in 1992. Only four wells were sampled more than once. Different wells (other than the landfill owner's wells) were sampled in 1986, 1990, and 1991. Data from the 1986 sampling indicated possible contamination of groundwater off site. Residential well sampling in 1991 indicated that a private well closest to the site (landfill owners' well) contained site-related chemicals. Additional off-site groundwater data along the southwestern border are needed to accurately determine if aquifers on site are hydrologically connected to off-site water sources. This is necessary to determine the potential for movement of contaminated groundwater off site.

There are no air monitoring data available to determine the potential for exposure to chemicals through ambient air. However, since surface soil contamination was limited, ambient air concentration levels would also be expected to be low. This could change if remediation includes the excavation of contaminated soil. This should be confirmed with air monitoring during the remediation if that process significantly disturbs contaminated soil.

Quality Assurance and Quality Control

In preparing this public health assessment, the Ohio Department of Health and ATSDR relied on the information provided in the referenced documents and assumed that adequate quality control and quality assurance measures were followed with regard to chain-of-custody, laboratory procedures, and data reporting. The validity of the analysis and conclusions drawn for this public health assessment is determined by the completeness and reliability of the referenced information.

Physical Hazards

Scrap metal, junked vehicles, construction debris, and steep slopes at the site are physical hazards to site owners and trespassers at the site. In addition, the three ponds and three streams on site may present a drowning risk to children.

Toxic Chemical Release Inventory (TRI)

TRI data for 1991 were searched to identify possible facilities that could contribute contaminants to the environment near the Skinner Landfill. TRI is developed by the U.S. EPA from the chemical release information provided by certain industries. The TRI data base for West Chester listed one facility for which chemicals were also present in on-site samples. Small amounts of lead and xylene were released into the air from one facility.

PATHWAYS ANALYSES

The Pathways Analyses Section contains discussions of how chemicals move in the environment and how people can be exposed to the chemicals. For example, chemicals in a landfill can move through the landfill into the groundwater or seep out of the landfill at the surface (leachate). Chemicals in soil can be blown off site by wind or can be carried away from the site in rain water runoff. A chemical may be in groundwater or soil, but people may not come in contact with the water or the dirt. If people are not in contact with the contaminated water or dirt, they will not be exposed to the chemicals.

The environmental pathways or the way chemicals move away from the Skinner Landfill are through soil and groundwater. Chemicals that were dumped on-site either onto the soil or into the lagoon can move through the soil into the groundwater. Groundwater at the Skinner Landfill also creates seeps or leachate at the surface.

The potential human exposure pathway or how people may be exposed to site-related chemicals is through ingestion, inhalation, and dermal contact with contamination in groundwater, ingestion of lead in surface soil, and inhalation of lead contaminated dusts. The contamination in leachate and pond samples is minimal and therefore, ingestion of or direct contact with contaminants in leachate and pond water are not important or significant human exposure pathways.

Environmental Pathways

The disposal of hazardous materials at the Skinner Landfill contaminated soils on site. Most of the contamination is 15 feet below the surface and is covered by dirt, fill, and various debris. Lead was the only chemical detected in on-site surface soil. The near surface soil contamination at the landfill is minimal, containing chemicals that bind to soil. The buried lagoon soils are the most contaminated. Soil contamination is outlined in the Environmental Contamination Section of this public health assessment.

Soils at the Skinner Landfill are quite variable throughout the site, which may alter the movement of chemicals through the soil. The unconsolidated glacial sediments that underlie the Skinner Landfill are a mixture of soil types which change both horizontally and vertically, from clay-rich to gravel-rich soils. Soils under the northern and western part of the buried waste lagoon consist of largely impermeable silty clays. The soils underlying the southern and southeastern parts of the buried lagoon are more permeable silty sand and gravel deposits (WW Engineering and Science, 1990). Soil boring samples in the buried lagoon area (Figure 3, Appendix A) show that the highest levels of organic chemicals are at the southern part of the lagoon. The more permeable soils in this part of the lagoon may aid in the movement of chemicals through the soil into the groundwater. Those chemicals, such as VOCs and a few semi-

volatile organic compounds, are mobile and can be transported through the permeable sand and gravel soils in parts of the buried lagoon. It is clear from the groundwater monitoring data that chemicals from the lagoon are moving through the soil and waste into the on-site groundwater.

Soils in the area of two contaminated groundwater monitoring wells (GW-17 and GW-18, Figure 4, Appendix A) and in the metal storage area are permeable silt or gravel-rich sands. These permeable, sandy soils increase the possibility that chemicals can leach into the groundwater.

The natural soils in the former active landfill area and buried pit have been extensively altered by disposal activities. Soils in the former active landfill area were mixed with fill materials changing the soil from relatively impermeable silty clays to more permeable mixtures of soil and fill. Soils at the buried pit area (Figure 3, Appendix A) consist of mixtures of fill (mostly construction debris) and native sand and gravel deposits. These mixed soil types create areas where chemicals can move into groundwater.

Groundwater at the site is contained in both the glacial sediment aquifer and the bedrock aquifer. Groundwater flow at the Skinner site is complicated by the site's geology, especially the extreme variability in the nature of the sediments that comprise the unconsolidated glacial materials underlying most of the site. Depth of the water table on site varies from as shallow as 4-6 feet below the surface in the Skinner Creek valley, to as deep as 30-40 feet on the south end of the east hill, south of the buried lagoon area. The porous and permeable sand and gravel deposits on site readily store and transmit groundwater, which may contribute to migration of site contaminants. The surrounding impermeable silty clays, as well as the underlying shale-limestone bedrock, are poor transmitters and producers of groundwater, limiting movement of groundwater. Groundwater movement is restricted by site geology in all directions except towards the southwest.

There is a potential for contaminated groundwater to move off site, southwest towards West Chester through a band of more permeable glacial materials. Local well log information (Ohio Department of Natural Resources well log and Drilling Reports) and the Sand and Gravel Resource Map for Butler County (Struble, 1986, Ohio Division of Geological Survey) indicate that the band of glacial sediment extends northeast through West Chester and the Skinner Landfill. There are no monitoring well data for the area along the southwestern border of the landfill where this band first intersects Skinner Landfill. This sand and gravel band may be a conduit for movement of contaminated groundwater off site. Groundwater flow in the vicinity of the former active landfill and buried waste lagoon areas is south towards the East Fork of Mill Creek. There is also a groundwater divide on the west hill, with groundwater either flowing southeast into the central valley and then into the East Fork of Mill Creek, or west to discharge to Skinner Creek.

Contaminated groundwater also discharges in a series of leachate seeps along the valley of the East Fork of Mill Creek and along the west side of the west hill above Skinner Creek. Leachate contained low concentrations of site-related chemicals.

Hydrogeologic information (WESTON, 1988; WW Engineering, 1990) indicates that on-site aquifers also discharge into on-site surface waters, which may serve as a mechanism for transport of chemicals off site. Monitoring data indicated the presence of site-related chemicals in on-site surface water and very low levels in off-site surface water. The type of chemicals found, VOCs and semivolatile organic compounds behave differently in the environment. VOCs tend to evaporate or volatilize from surface water and are diluted in the larger volume of air. These chemicals generally do not last long in air, but break down. Semivolatile organic compounds such as PAHs, are not very mobile in the environment and generally adsorb to sediments and soils.

Human Exposure Pathways

The potential human exposure pathways associated with the contamination at the Skinner Landfill are shown in Table 8. A pathway is defined as a potential exposure pathway when exposure has not or is not occurring, but may occur in the future. Table 8 outlines the potential chemicals of concern, how a person may be exposed to these chemicals, and the number of people who may be exposed. It is not known how many people have the potential to be exposed to site-related chemicals, but the number is likely small since exposure is limited to people on the site and public water will be supplied to potentially affected people. These chemicals were chosen from the list of chemicals at the site because they are a health concern (lead) or the concentration exceeded levels of concern. If on-site groundwater reaches private wells additional chemicals could be added to this list. **The data evaluated for this public health assessment do not indicate that people are being exposed to site-related chemicals at levels which would impact their health.**

Groundwater monitoring data indicates that a well just west of the former disposal area contains low levels of VOCs. Although the levels are very low and below any health-related standards, individuals using this water may be exposed to a number of chemicals. There is also a potential for private wells southwest of the site to be impacted by the landfill. There are at least seven residences downgradient from the site that use private wells as a source of drinking water, however, these residents will be supplied with an alternative water source. If all the current residents potentially downgradient from the landfill are placed on public water, the risk of exposure is eliminated. Until it is determined that groundwater on site is not hydrogeologically connected to off site groundwater, this potential pathway cannot be completely eliminated. The information available for review for this public

health assessment indicated that during the 1986 monitoring, private wells (not used for drinking water) contained chemicals which were also detected on site. There is a potential for people using groundwater contaminated with these chemicals to be exposed through direct ingestion, skin contact, and inhalation of vapors released from the water during household use. There is no indication that people other than the landfill owners are now using contaminated groundwater.

Soils on site were extensively contaminated with many different chemicals. There is a potential for site workers, trespassers such as children, or curious onlookers to have been exposed to lead in surface soils. There may be some risk to those children at the day care center because it is close to the landfill. People on site may be exposed to lead in soil through direct ingestion of dirt and dust, and inhalation of dust. The routes of exposure associated with lead in soil are shown in Table 8.

There also exists a potential for on-site workers, trespassers, and nearby residents to be exposed to chemicals in soil, primarily VOCs, if remediation includes excavation of the deep, contaminated soils. The children at the day care center located near the entrance of the landfill and those attending the elementary school near the site could be exposed to site-related chemicals under these circumstances. If there is no possibility of exposure the exposure pathway is eliminated.

Table 8
Potential Human Exposure Pathways
Skinner Landfill, West Chester, Ohio

Chemical	**Route of Exposure**			
	Ingestion	Inhalation	Skin	Exposed People
Lead	X	X	NA	Unknown
Benzene	X	X	X	Unknown
Vinyl Chloride	X	X	X	Unknown
1,2-dichloroethane	X	X	X	Unknown
1,2-dichloropropane	X	X	X	Unknown
Trichloroethene	X	X	X	Unknown
Toluene	X	X	X	Unknown
bis(2-chloroethyl)ether	X	X	X	Unknown

NA = Not Applicable

PUBLIC HEALTH IMPLICATIONS

Environmental investigations at the Skinner Landfill Superfund site detected chemicals which may have been disposed of at the landfill in soils and groundwater.

Toxicological Evaluation

This section includes discussions of what is known about the chemicals to which human exposure is possible at the Skinner Landfill. There is often little information about the health effects caused by low level environmental exposures. Most human exposure studies use information from industrial exposures, where the doses are much higher. Industrial exposure data normally do not include precise information about the exact dose, the purity of the chemicals, their interactions with other substances, and the duration of the exposure. Animals do not necessarily show the same responses that humans or other animals do when exposed to toxic substances. However, in animal experiments using carefully controlled doses and time periods, researchers observe health effects in animals that they believe are indicative of the responses shown by humans. When human information is unavailable, pertinent animal data will be incorporated into this section. Unless otherwise mentioned, the information in this section will be taken from the ATSDR toxicological profiles.

Lead

Lead exposure could occur at the Skinner Landfill through the eating dirt or inhalation dust containing lead. The effects of lead in the body are the same no matter how it has entered. Lead exposure is most dangerous in young children and fetuses (ATSDR 1990). Recent research suggests that lead may exert effects even before conception. Lindbohm et.al. (1991) have shown that there may be an association between current parental lead exposure and the risk of spontaneous abortion. These authors also reviewed information from older studies showing increased numbers of still-births, spontaneous abortions, and postnatal deaths in the families of male lead workers.

Pregnant women who have had lead exposure will pass lead to their unborn children. Unborn children can be harmed during fetal development or pregnancy. Lead exposure in a pregnant woman may result in premature birth, low birth weight, or even miscarriage. Young children absorb lead through the digestive tract more readily than do adults and they are more sensitive to its effects. Lead exposure in young children can decrease their intelligence (IQ) scores, cause hearing problems, and slow their growth. These effects may last as they get older and interfere with their performance in school (ATSDR 1990). Exposure to lead levels that

are expected to be much higher than those at the Skinner Landfill may also be harmful to adults. It can damage the brain and kidneys of children and adults, and may increase blood pressure in adults.

Benzene

The potential routes of exposure to benzene may be through drinking contaminated water, inhaling vapors released from water during household use, and coming in contact with the water through showering. The are no data which indicate that people are being exposed to benzene.

Animal studies have shown that nearly all of an ingested dose of benzene is absorbed. The chief target systems for benzene are the blood and the immune systems (ATSDR 1989a). There is epidemiologic research suggesting that low level human exposure to benzene is associated with a type of leukemia, however, this information is too limited to substantiate a causal relationship at levels as low as 1-10 ppm (Austin et al., 1988).

In occupational studies, where concentrations generally are higher than those which occur through environmental exposures, studies have shown that benzene is a human carcinogen. Although the level and manner of exposure were difficult to access, the levels were believed to have been in the 10-100 ppm range. Leukemia, a cancer of the tissues that form the white blood cells, has occurred in workers who have been exposed to benzene for periods of approximately 5 to 30 years (ATSDR 1989a). If a person were to ingest water containing benzene at the highest level found in on-site groundwater for a lifetime, the estimated dose would increase the risk of developing cancer. This estimate does not incorporate exposures that may occur through skin contact and inhalation of vapors released from water during household use (ATSDR 1989a).

Human and animal studies indicate that benzene harms the immune system. It lowers the body's defense against tumors and increases the chance for infections. Benzene exposure has also been linked with genetic effects in both animals and humans. Animal studies show that benzene adversely effects the unborn. These effects include low birth weight, delayed bone formation, and bone marrow damage. Some of these effects can occur at benzene levels as low as 10 parts of benzene per million parts of air. Long-term exposure to benzene may also affect blood production, possibly resulting in anemia and internal bleeding.

1,2-Dichloroethane

The potential routes of exposure to 1,2-dichloroethane may be through drinking contaminated water, inhaling vapors released from water during household use, and coming in contact with the water through showering. There are no data which indicate that people are being exposed to 1,2-dichloroethane.

No information was located about the human absorption of 1,2-dichloroethane. Low levels of 1,2-dichloroethane in drinking water in combination with other VOCs, have been associated with congenital heart defects (Bove et al., 1992). However, this study would not provide sufficient evidence to demonstrate that 1,2-dichloroethane causes this adverse effect, because the people were exposed to more than one chemical and it is difficult to determine which chemical or combination of chemicals would be associated with the this defect. Further, information on heart defects was not included in this study.

Studies in animals indicate that absorption after oral intake is rapid and complete. The lungs, liver, and kidneys are the primary target organs in humans and animals. The health effects of low-level ingestion of 1,2-dichloroethane in both humans and animals is unknown (ATSDR 1989b). In experiments where animals breathed higher levels than would be expected at the Skinner Site,(between 100 and 400 ppm) long-term exposure resulted in liver, kidney, and heart disease. Blood disorders, liver disease, and reduced ability to fight infection have also occurred in experimental animals that ingested 1,2-dichloroethane. However, these dosage levels were much higher than the doses that would be anticipated in groundwater (ATSDR 1989b).

1,2-Dichloroethane causes cancer when large doses are given orally (ATSDR 1989b). If a person were to ingest water containing 1,2-dichloroethane at levels found in on-site groundwater for a lifetime, the estimated dose may increase the risk of developing cancer. This estimated dose does not incorporate exposures that may occur through skin contact and inhalation of vapors released from water during household use.

1,2-Dichloropropane (1,2-D)

The potential routes of exposure to 1,2-D may be through drinking contaminated water, inhaling vapors released from water during household use, and coming in contact with the water through showering. There are no data which indicate that people are being exposed to 1,2-D. No studies were located about the human absorption of 1,2-D. Rat studies show that the substance is readily absorbed from the digestive tract. It is also rapidly removed from the body. The substance has a chloroform-like odor with a threshold of 10 ppb, thus, people consuming water containing this substance may have a warning that their water is contaminated (ATSDR 1989c).

No reports exist of health effects in humans from low-level exposure to 1,2-D. If a person were to ingest groundwater containing dichloropropane at levels found in on-site groundwater, the estimated dose would not exceed safe levels, even though levels in on-site groundwater exceeded the U.S.EPA MCL (ATSDR 1989c).

When 1,2-D is given to animals during both short and long-term periods, damage to the liver and kidneys occurs at low doses. Long-

term oral exposure in animals has produced liver cancer in mice and breast cancer in female rats. The significance of these animal studies to humans is not well understood. The substance has not been reported to cause birth defects in either humans or animals, but a delay in bone growth has been seen in fetal rats following the exposures of their mothers (ATSDR 1989c).

1,2 Dichloropropane may add to the effects of 1,2-dichloroethane when both substances are given orally to rats (ATSDR 1989c). No populations have been identified as unusually susceptible.

Trichloroethene (TCE)

The potential routes of exposure to TCE may be through drinking contaminated water, inhaling vapors released from water during household use, and coming in contact with the water through showering. There are no data which indicate that people are being exposed to TCE.

TCE absorption following oral exposure is quite rapid. The principal target organs of TCE in both humans and animals are the bone marrow, brain, spinal cord, liver, and kidney. No information is available about the effects of TCE to humans in the exposure level range that might potentially occur at the Skinner Landfill (ATSDR 1992).

TCE in drinking water in combination with other VOCs has been associated with congenital mouth and nervous system defects and very low birth weight (Bove et al., 1992), and childhood leukemia, deaths around the time of birth, childhood disorders, and congenital abnormalities (Lagakos, 1986). TCE has also been associated with leukemia and recurrent infections (Byers et al., 1988), and heart disease (Goldberg, 1990). These studies, however, did not provide sufficient evidence that TCE causes these harmful health effects, because the people were exposed to more than one chemical simultaneously. It is difficult to determine which chemical or combination of chemicals would be associated with the various adverse effects. Moreover, information on other risk factors for these adverse effects was not included in this study.

Studies in animals have shown that TCE ingestion may result in liver and kidney damage, nervous system changes, effects on the blood, and cancer of the kidney, liver, lung, and male sex organs. Other animal studies have shown that leukemia may occur after exposure to TCE. TCE exposure can also affect unborn and newborn animals (ATSDR 1992). There is not sufficient information to determine whether similar effects can happen in people.

Based upon studies in animals, if a person were to ingest groundwater containing trichloroethane at levels found in on-site groundwater for a lifetime, the estimated dose may increase the risk of developing cancer. This estimated dose does not incorporate exposures that may occur through skin contact and inhalation of

vapors released from water during household use. TCE levels in on-site groundwater also exceed the U.S.EPA MCL.

Vinyl Chloride

The potential routes of exposure to vinyl chloride may be through drinking contaminated water, inhaling vapors released from water during household use, and coming in contact with the water through showering. There are no data which indicate that people are being exposed to vinyl chloride through the groundwater at or near the Skinner site.

Rat studies indicate that vinyl chloride is rapidly and completely absorbed from the digestive tract. The chief target organ for orally exposed animals is the liver. Studies of the effects of low levels of vinyl chloride in humans have not been conducted (ATSDR 1989f). Animals have shown liver effects after chronic exposures to low vinyl chloride levels. Male animals that breathed air containing vinyl chloride showed effects on the testis, but there is not sufficient information to determine whether humans exposed to vinyl chloride develop these effects (ATSDR 1989f).

An increased risk of developing liver cancer and possibly several other cancers has been linked with occupational inhalation exposure. Laboratory animals develop cancer in several tissues after they eat food or breath air that contained vinyl chloride. Vinyl chloride is regarded worldwide as a chemical that causes cancer in humans, however, the exposure levels necessary to cause cancer in humans is not known (ATSDR 1989f). If a person were to ingest groundwater containing vinyl chloride at levels found in on-site groundwater for a lifetime, the estimated dose may increase the risk of developing cancer. This estimated dose does not incorporate exposures that may occur through skin contact and inhalation of vapors released from water during household use.

Bis(2-Chloroethyl)Ether, BCEE

The potential routes of exposure to BCEE may be through drinking contaminated water and coming in contact with the water through showering. There are no data which indicate that people are being exposed to BCEE. BCEE is a manufactured compound chiefly used in the production of pesticides and other chemicals. BCEE evaporates relatively slowly, and little information exists about the possibility of inhalation exposure through evaporation from water (ATSDR 1989d).

BCEE easily enters the body after being swallowed in water, or after being inhaled in air. It can also enter by crossing the skin. Most BCEE that enters the body is removed within two or three days. It does not tend to accumulate in the body. The long-term health effects of ingesting low-levels of BCEE in either humans or animals is unknown (ATSDR 1989d). People exposed to higher levels experienced irritation of the eyes and nose. The effects of BCEE on

other organs and body functions have not been well studied. It is unknown whether BCEE can impair reproduction or fetal development (ATSDR 1989d).

Mice given repeated oral doses of BCEE have developed liver tumors. However, no cases of cancer due to BCEE have been reported in either people or rats (ATSDR 1989d). If a person were to ingest groundwater containing BCEE at levels found in on-site groundwater, the estimated dose should not exceed safe levels, even though BCEE levels in on-site groundwater exceeded the U.S.EPA MCL.

Toluene

The potential routes of exposure to toluene may be through drinking contaminated water, inhaling vapors released from water during household use, and coming in contact with the water through showering. There are no data which indicate that people are being exposed to toluene.

Toluene enters the body by passing through the skin, breathing its vapors, or drinking contaminated water. Most of the toluene that enters the body leaves within 12 hours (ATSDR 1989e). The health effects resulting from long-term exposure to levels of toluene that might be anticipated to occur from drinking contaminated water around the Skinner Landfill in either humans or animals are unknown.

If a person were to ingest groundwater containing toluene at levels found in on-site groundwater, the estimated dose should not exceed safe levels, even though levels in on-site groundwater were above the U.S.EPA MCL. Long-term human exposure to low and moderate amounts has been associated with slight effects on the kidneys in some people, but in this case the people were also exposed to other solvents at the same time (ATSDR 1989e). Inhalation exposure at levels higher than those that would result from the Skinner Site can result in depression of the function of the brain and spinal cord and symptoms such as fatigue, confusion, incoordination, impairments in reaction time, perception, and motor control. It is not known whether toluene can harm an unborn child when a pregnant woman drinks water or breaths air containing toluene (ATSDR 1989e).

Occupation studies, where concentrations generally are higher than those expected to occur at landfills, have suggested that exposure to toluene and ethanol may increase the potential for changes in the liver (ATSDR 1989e). Populations that may be unusually susceptible to toluene exposure are: asthmatics, people having respiratory difficulties, those with cardiovascular or liver disease, the elderly, cigarette smokers, and alcohol drinkers (ATSDR 1989e).

Health Outcome Data Evaluation

The Ohio Department of Health evaluated birth defects data for West Chester. In addition, we collected the available cancer incidence and juvenile diabetes data from Children's Hospital in Cincinnati.

The city of West Chester, Ohio has an average of 2.9% of children born with birth defects (Table 9). The rest of Butler County (not including West Chester residents) has 2.7% of births with birth defects. The percent of births with defects in Ohio counties range from a high of 7.2% in Gallia County to a low of .57% in Geauga County in 1990. For the entire state of Ohio from 1989 to 1990, the average percentage of birth defects is 2.4%. The percent of birth defects in West Chester during this time period is not statistically different from the rest of Butler County or Ohio. Based on these figures, West Chester does not appear to have an unusual percentage of children born with birth defects.

TABLE 9
AVERAGE ANNUAL PERCENTAGE OF CHILDREN BORN WITH BIRTH DEFECTS
WEST CHESTER, OHIO

Comparison of Local, County and State	1989-1990 Average Annual Percentage		
	Number of Birth Defects[2]	Number of Births[1]	% of Births with Defects
West Chester, Ohio	27	938	2.9%
Rest of Butler County	211	7,752	2.7%
All of State of Ohio	7,932	329,902	2.4%

1 Births include all birth certificates registered within West Chester, Ohio (based on residence of mother) during 1989 and 1990.

2 Birth defects are those anomalies coded in the "International Classification of Diseases" (ICD) from 740 through 759, such as: Down's syndrome, club foot, cleft lip or palate, heart malformations, and spina bifida.

The above figures represent the average annual percentage of birth defects over a two year period (1989 and 1990) based on available Ohio birth certificate data. In 1989, the birth certificate form was updated to include more specific information on pregnancy and

birth abnormalities; therefore, 1989 and 1990 represent the only two years for which reliable and comparable data are available.

The most significant factors which may influence the estimation of percentages include consistency in reporting and small number of people and birth defect cases. Some physicians or geographical areas may be more likely or less likely to properly complete certificates which can contribute to artificial differences in rates. In general, the state of Ohio appears to have a lower rate of birth defects than other parts of the nation; this is likely to be due to under-reporting of cases rather than a lower rate of occurrence of birth defects in Ohio.

The ODH was able to collect pediatric cancer cases from Children's Hospital in Cincinnati through their tumor registry (Table 10). These are cancer cases which have been diagnosed since 1977. There were a total of 11 cases from West Chester up to and including age 19, who resided within the zip code including West Chester. This zip code covers an area virtually equal to the Union Township boundaries.

Cancer incidence refers to the number of newly diagnosed cases within a certain time period and geographical location. This differs from cancer mortality which refers to the number of people who have died of cancer. Incidence is more indicative of the present occurrence of cancer in the area. The ability to diagnose early and to adequately treat or cure each cancer will influence the difference between cancer incidence and cancer mortality.

There were fewer reported cancer cases among West Chester children than would be expected on a national basis (Table 10). Since there are no Ohio-based incidence data available at this time, the national SEER rates were used for comparison. It is possible that some West Chester children were taken to other hospitals which do not currently have tumor registries and therefore, are not included in this study.

TABLE 10
WEST CHESTER PEDIATRIC CANCER INCIDENT CASES
1977-1991[1]

TYPE OF CANCER:	TOTALS	
	Expected[2] Number	Observed[3] Number
BRAIN	5.7	4
LEUKEMIA	7.6	4
HODGKIN'S	2.8	1
OTHERS[4]	14.8	2
ALL CANCERS	30.9	11

1 Pediatric cancer includes children of both genders, ages 0-19.

2 Expected numbers were calculated based on the National SEER average annual cancer incidence rates for whites of both sexes, 1983-1987.

3 Observed numbers were reported by the Children's Hospital Medical Center, Department of Hematology/Oncology in Cincinnati, Ohio which serves an area including West Chester, Ohio.

4 Others are all those cancer types not listed separately.

The annual incidence of insulin-dependent diabetes mellitus (IDDM) in the Unites States is about 18.2 new cases per 100,000 children ages 0-19. The risk of developing IDDM is higher than most chronic diseases of childhood. Incidence rates are about equal for males and females, but are 1.5 times higher in whites than in blacks. Siblings of diabetic children have a 7 to 18-fold greater risk of developing IDDM than children in the general population.

Risk factors for IDDM include a family history of diabetes, maternal age, genetic markers, viruses, and autoimmunity and islet cell antibodies.

In 1990, the Census showed a population of 13,036 children ages 0-19 in West Chester, Ohio. There were a total of 33 juvenile IDDM cases reported by the Cincinnati Children's Hospital since 1973 (Table 11). Based on national averages, it would be expected that 39 children in West Chester would have IDDM. The incidence of children

ages 0-19 with IDDM in the United States is 18.2 per 100,000. From the cases received from Cincinnati Children's Hospital for those living in the West Chester zip code of 45069, the incidence was calculated at 15.1 per 100,000, which is less than national incidence rated of IDDM.

TABLE 11
TYPE I DIABETES (IDDM)
IN THE U.S. COMPARED TO WEST CHESTER, OHIO
AMONG CHILDREN 0-19

WEST CHESTER CHILDREN Union Twp., Butler County, Ohio TYPE I DIABETES (IDDM)* ONSET 1973-1993			
Age Groups:	**Total Cases**	**Males**	**Females**
0-4	3	1	2
5-9	18	7	11
10-14	12	8	4
15-19	0	0	0
Totals	33	16	17

*Cases received from the Cincinnati Children's Hospital on 4/29/93.

Community Health Concerns Evaluation

1. Concerned about the release of chemicals into the groundwater outside of the site.

Response: To date, the environmental monitoring data does not indicate extensive off-site contamination. There were some stagnant wells which did contain chemicals some of which were found on site. It is not clear that these chemicals originated from the landfill. Additional sampling in 1991 did show limited off-site migration of chemicals in the groundwater. This well is located just west of the former disposal area. We are concerned about future contamination of drinking water supplies. We have also recommended additional sampling of groundwater. A more detailed description of the environmental monitoring data is addressed in the Environmental Contamination Section of this public health assessment; refer to the Off site Section.

2. Which chemicals were above the background levels?

Response: Chemicals such as VOCs and most semivolatile organic compounds are not naturally occurring chemicals. Their presence in the environment is most likely related to human activity. There is some indication that lead and arsenic are present above background levels. As mentioned previously, there is very little off-site contamination. A more detailed discussion is included in the Environmental Contamination Section of this public health assessment.

3. Are the levels of arsenic, benzene, dichloroethane, and PCBs in the groundwater elevated?

Response: Benzene and dichloroethane are present in on-site groundwater at concentrations exceeding levels of concern. The levels of arsenic are not above any health-related standards. PCBs were detected at very low levels in one off-site, stagnant well. The results for groundwater are detailed in the Environmental Contamination Section of this public health assessment, refer to the Groundwater Section. This information can also be obtained in the Remedial Investigation Report.

4. Which VOCs existed in elevated levels in Mill Creek?

Response: On-site surface water did contain toluene (47 µg/L) and xylene (3.0 µg/L). This information was also addressed in the Environmental Contamination Section under Surface Water.

5. What are the pathways that contaminants in Mill Creek might take?

Response: Surface water on site and surface water impacted by the site contained site-related chemicals. The type of chemicals found including VOCs and semivolatile organic compounds, behave differently in the environment. VOCs tend to evaporate or

volatilize from surface water and are diluted in the larger volume of air. Toluene and xylene are normally found in urban air. These chemicals generally do not last long in air, but are degraded. Semivolatile organic compounds such as PAHs, are not very mobile in the environment and generally adsorb to sediments and soils.

6. Has the site been monitored for radiation?

Response: Yes the site has been monitored for radiation (Appendix B). Radiation levels were within the background range. In addition, workers on site during remediation will monitor for radioactive compounds

7. Which are the most contaminated portions of the site?

Response: There are a number of areas on the site which contain site-related chemicals. The buried lagoon soils contained the greatest number of chemicals and the highest concentration levels. In addition, monitoring wells adjacent to and downgradient from the buried waste lagoon and along the northern boundary of the landfill contained the greatest number of groundwater contaminants.

8. Are there substances such as pesticides, dioxin, and heavy metals in the site or under the lagoon? Can they travel off site?

Response: These types of chemicals were present in soils and to some extent in groundwater on site. The chemicals and concentrations are presented in the Environmental Contamination Section of this public health assessment; refer to the On site discussion. In general, most of the pesticides and dioxin, if adsorbed to soil, are not easily transported. They can be transported attached to dust particles, however, surface soils were not extensively contaminated with these chemicals.

9. The area should be fenced. Portions of it are close to such public areas as roads and a school.

Response: Yes we agree. Portions of the site have been fenced. We recommend that site access be restricted with a complete fence around the site.

10. What are the chemicals of concern at the site?

Response: Lead is a potential chemical of concern in soil. This means that there is a potential for people to be exposed to lead. The other chemicals of potential concern in groundwater include benzene, vinyl chloride, 1,2-dichloroethane, 1,2-dichloropropane, trichloroethene, toluene, and bis(2-chloroethyl) ether. These chemicals are included because they are present on site at levels of public health concern and there is a potential for chemicals to migrate off site. The chemicals of concern are also discussed in the Toxicological Evaluation Section of this public health assessment.

11. How do the levels of these chemicals compare to standards such as the MCLs?

Response: Maximum Contaminant Levels are U.S. EPA drinking water standards and can only be used for comparison of chemicals in drinking water and groundwater. Tables 3, 6, and 7 in the Environmental Contamination Section lists the chemicals in groundwater which had high concentrations and were above the MCL or other levels of concern.

12. Are Mill Creek and Skinner Creek contaminated?

Response: These two creeks near or on the landfill property contained site-related chemicals. Most of the contamination is in the sediments and not the surface water. Chemicals included VOCs and semivolatile organic compounds. One on-site sediment sample contained relatively high concentrations of lead. The off-site contamination is limited, including PAHs. A water quality review of the East Fork of Mill Creek concluded that there was no observed impairment of the fish community downstream of the site.This information is discussed in detail in the Environmental Contamination Section; refer to the Surface Water discussions for on site and off site.

13. Are the fish in the creek alive?

Response: The East Fork of Mill Creek and Skinner Creek both contained living fish.

14. What are the past and future fire dangers and explosions at the site and what precautions need to be taken? Are the frequent fires burning toxins into the air? Can the local fire fighters deal with toxic fires?

Response: Information in the Remedial Investigation report stated that fires did occur in 1976. It was at that time that fire fighters noted the lagoon waste material. There is nothing to indicate that fires have occurred recently at the landfill. Fires in the past may have contributed to local air pollution and to chemicals found on the site, such as dioxins. The local fire chief indicated that the department has a hazardous materials response team trained to respond to these types of situations.

15. There have been rumors of mustard gas, cyanide, etc. in canisters that have not yet been listed by the EPA. Is it possible that these chemicals have just not started to leak yet, so have not been detected? With this in mind, shouldn't the site be cleaned up instead of capped?

Response: The landfill operator retracted the claim under oath, that bombs were buried at the site. Some information as to what is contained in the landfill is based primarily on rumor. Contact the U.S. EPA for additional information collected during their

investigation of this concern. The laboratory analyses for priority pollutant scans, for metals, VOCs, pesticides, and PCBs will detect the majority of chemicals present at the site. The U.S. EPA and Ohio EPA carefully consider all options and environmental problems before a remedial plan is chosen.

16. What is the list of chemicals found on the site? What are the acceptable levels and what are the levels found on the site?

Response: The list of chemicals found on the site is quite extensive and there is not room to list them all here. The chemicals presented in the Environmental Contamination Section of this public health assessment did not include all the chemicals detected on the site, but those at levels of concern. A complete listing of chemicals can be found in the Remedial Investigation report at the Union Township Library.

17. Should kids stay out of area creeks and avoid eating the fish?

Response: In this type of situation, we generally tell parents that if they are concerned they may want to tell their children to stay out of the water and avoid eating the fish. However, one must keep in mind that off-site stream contamination is minimal, posing little, if any risk.

18. If it is decided to dig up the lagoon and the rest of the site, isn't is possible that stuff will seep out into the creek and water wells and become a greater danger than it is now?

Response: This may occur, however, the environmental data already indicates that materials in the lagoon have moved through lagoon materials and soils into the groundwater on site. The U.S. EPA and Ohio EPA look very carefully and consider the benefits and consequences of any remediation chosen for a site.

19. Is the concentration of dioxin in breast milk being studied?

Response: At this point we do not see a need to perform this type of study. The information we evaluated for this public health assessment did not indicate extensive dioxin contamination at the site and we do not think that people have been exposed to this chemical from the Skinner Landfill.

20. Are there dairy cows or other meat animals on the property?

Response: To the best of our knowledge, no.

21. What are the long term dangers of the contamination, say, over the next 50 or more years?

Response: The available data do not indicate that humans are being, or have been exposed to, levels of contamination that would be expected to cause adverse health effects. Toxicological information

is presented in the Toxicological Evaluation Section of this public health assessment. One must keep in mind that most toxicological information is gathered from studies using laboratory animals and does not necessarily mean that the same adverse effects will occur in humans. A person must be exposed to the contamination and at a dose or amount that causes the adverse effect. Toxicology is not a clear cut science; it contains a lot of uncertainties.

22. After the clean-up, what use would the land have? Could housing, etc. be placed on the site in the future?

Response: Deed restrictions can be used to restrict further development of the property. Future land use was addressed in the Demographics, Natural Resources, and Land Use Section of this public health assessment.

23. Is there a relationship between the landfill site and the increased number of birth defects among the children of Union Elementary School teachers?

Response: The Ohio Department of Health is not aware of a link between the chemicals at the landfill and an increased rate of birth defects. Environmental data evaluated for this public health assessment did not indicate significant movement of chemicals off site. Health outcome data collected for this public health assessment did not indicate a significantly higher number of children born with birth defects in West Chester.

24. Is the State Health Department committed to doing the health assessment and health statistics?

Response: Yes, the Ohio Department of Health is committed to doing a public health assessment. There are very little health statistics information available for the area around West Chester. We have evaluated the birth defects data as a part of this health assessment. These type of data are only readily available for 1989 and 1990 and did not indicate a significantly higher rate for West Chester when compared to Butler County or Ohio. ODH also collected data on the number of pediatric cancer cases and juvenile diabetes cases collected by Children's Hospital from the West Chester area. The number of cancer and juvenile diabetes cases collected by the hospital, from this area, was less than what would be expected.

25. I feel that all of the remedial investigation has been unsubstantiated by the vital statistics record.

Response: The focus of the RI is to determine the environmental impact of hazardous waste disposal. The objectives of the RI have been met. The RI does not evaluate health statistics. As stated in the previous response, Ohio does not have a great deal of health statistic information for the area around West Chester and we have looked at the available data. These data do not indicate an

increased number of children born with birth defects, children with cancer or children with diabetes.

26. There are several cases of idiopathic juvenile diabetes in the area. The children's diabetic clinic stated that there is a pocket of this type of diabetes.

Response: Data obtained from the Cincinnati Children's Hospital reported that there were a total of 33 juvenile IDDM cases from West Chester since 1973. Based on the national average, there should be 39 children in West Chester with IDDM. The incidence of children ages 0-19 with IDDM in the United States is 18.2 per 100,000. From the cases received from the hospital for those living in the West Chester zip code of 45069, the incidence was calculated at 15.1 per 100,000, which is less than national incidence rates of IDDM.

While there has been limited evidence that Vietnam veterans who handled Agent Orange had a higher than expected incidence of diabetes, adult and juvenile diabetes have different causes. Adult diabetes is often a result of lifestyle (obesity) and juvenile diabetes is most often linked to genetics and inherited from parents.

27. I am also concerned about the unusual number of children's suicides.

Response: Data obtained from death certificates showed that there were no suicides for children ages 10-14 and nineteen suicides for the age group 15-19 in Butler County. The calculated rate for suicide in the 15-19 age group was about the same as for Hamilton County and for the State of Ohio. Suicide is difficult to understand for any person and especially so for children. It does not appear that Butler County rates differ significantly from Hamilton County or Ohio.

28. I think that the parents with children in the school should educate themselves about the risk.

Response: We agree with this recommendation. The Ohio Department of Health and the Agency For Toxic Substances and Disease Registry recommend that information about potential exposures be provided to the community. It may be possible to provide specific information to parents of children who attend the school.

29. There is a gap in the environmental monitoring data (air and radioactive).

Response: The site has been monitored for radiation. Radiation levels were within the background range. In addition, workers on site during remediation will monitor for radioactive compounds. The lack of air monitoring data has been identified as a data gap in the public health assessment. In addition, air monitoring is

recommended if remediation entails the excavation of the buried, contaminated soils.

30. What about possible exposures during remediation. A lot of people may be exposed.

Response: The U.S.EPA and Ohio EPA develop health and safety plans for every site that is investigated. These plans are to provide a safe operating environment for all site workers. They are very detailed and plans are outlined for all realistic scenarios. Measures are used to control off-site movement of dust and dirt. In addition, on-site monitoring during remediation will alert workers about significant releases of gaseous materials. In the event that this occurs, community notification and protective procedures are included with the site Health and Safety Plan. There will be monitoring with a radiation detector and limited air monitoring with a photoionization detector during remedial activities. A photoionization detector does have limited uses and additional air monitoring is recommended if remediation entails the excavation of the buried, contaminated soils.

31. The Phase III RI is a snapshot in history. Do we evaluate trends or how these data change in time?

Response: We do evaluate trends in the environmental data if historical data are available. We have been able to look at some trends for this public health assessment.

32. Would residents/citizens have any recourse for any exposures?

Response: This issue would be one that a person should discuss with their lawyer or a lawyer familiar with environmental exposures. The environmental data obtained during the course of the RI did not indicate off-site contamination.

33. There is no sign to alert people that there is a Superfund site. Potential residents need to be informed.

Response: We have recommended that site access be restricted. We will also recommend that signs be placed at the site and checked periodically because of citizen concern.

34. I have heard that there is property very near Skinner being cleared for single family dwellings.

Response: Citizens may want to discuss these planning and zoning issues with Township trustees or local authorities.

35. Do we gear the health outcome data to the specific chemicals?

Response: In some ways the type of health outcome data evaluated is dependant on the type of chemicals at a site, but other factors are also taken into consideration. The inclusion of health outcome data

in the health assessment is dependant on the presence of completed exposure pathways, the chemicals, their concentration and toxicology, community concerns about adverse health outcomes, and the availability of the data. The health outcome data were evaluated because of community concern. Completed exposure pathways are those pathways where site-related chemicals have moved off site and are present where humans are exposed. **For example**, site-related moving off site in groundwater at levels of public health concern in private water supplies; is a hypothetical completed exposure pathway. Information on human health effects for specific chemicals is somewhat limited, and is largely based on occupational data.

36. People said that this area in SW Ohio has been presented as a high cancer area. People are concerned, not only about contaminants from the Superfund site, but also about additive effects from exposures to other substances that may be producing these high cancer rates.

Response: The cancer mortality rates for Warren, Butler, Hamilton, and Clermont counties range from 206-236 per 100,000 people (1986-1988). Rates for all counties in Ohio range from 146 to 236 per 100,000 people. Clermont County has the highest rate, however, this is largely attributable to smoking-related cancers. The rate for Butler County is 206, per 100,000, which is the lowest among these counties. One must keep in mind that smoking-related cancers account for 30% of all cancers.

Cancer has explainable (lifestyle, smoking, diet, genetics, etc.) and unexplainable causes. It is impossible to say whether or not an individual exposed to any carcinogenic or possibly carcinogenic substance will ever get cancer, because the processes behind cancer development are not completely understood. It is difficult to determine if and how chemicals interact. There is very little information available to determine if chemical interactions increase a person's risk of developing cancer. We do know that some exposures such as smoking and asbestos exposure increases one's risk of developing lung cancer. Multiple chemical exposures may indeed increase the risk of cancer.

37. They are concerned about increasing respiratory problems, for example, in those having chronic bronchitis.

Response: Currently the Ohio Department of Health does not have any statistics to address the incidence of respiratory problems. While there is a history of complaints of burning and odors at the landfill, it is very difficult to determine if an event 10 or 20 years ago has had an effect on the health of area citizens today.

38. They are concerned about cancer/intestinal cancer in children playing in the streams coming from the landfill.

Response: There were fewer reported cancer cases among West Chester children than would be expected on a national basis (Table 10). It

is possible that some West Chester children were taken to other hospitals which do not currently have tumor registries and therefore, are not included in this study. One must keep in mind that off-site stream contamination is minimal, posing little if any risk. It is impossible to say whether or not an individual exposed to any carcinogenic or possibly carcinogenic substance will ever get cancer because the processes behind cancer development are not completely understood.

39. People were concerned about the day care facility near the landfill. They also thought that some children may be playing within feet of the lagoon.

Response: We at the Ohio Department of Health are also concerned about the closeness of this center to the landfill. However, it is an unlicensed center and is not under the regulation of any state or local agency. It may be possible for someone in the community to make a facility available for the center to continue operating, but in a safer environment. In addition, we have recommended that soil samples (particularly lead) be taken near the day care center. The buried lagoon is some distance from the center and it is unlikely that any of these children would wander into this area. In addition, we have recommended that site access be restricted which would limit those entering the site. If area children have spent appreciable amounts of time in this area, they may have been exposed to site-related chemicals from contaminated soils. If this is the case, it is important that we know the number of children and the amount of time they have spent on the site. Area citizens may be able to provide this information to us.

40. A woman that lived near the site, (Barett Rd) said that the water had backed up into her yard several times over a period of time. Her sons, relatives, and area children became ill after playing in the yard, or in the water. The symptoms included headaches, temperature, vomiting, and dehydration. The boys sometimes played downstream from the site. Her daughter, who never played in this area, did not have these symptoms when the boys did.

Response: It is difficult to say whether or not the water that backed up in your yard contained any site-related chemicals. However, this part of the East Fork of Mill Creek is upstream from the Skinner Landfill and contamination at the time of the RI was minimal. We are not able to say with any certainty whether or not these illnesses resulted from exposure to chemicals. It is best that these concerns be discussed with a family physician. We can provide information on specific chemicals if necessary.

41. About 4.5 years ago the University of Cincinnati found toxic levels of lead and mercury in her boys. She did not know where they could have gotten these levels, except from the landfill. She did not believe they received them from paint or from their household. The boy that had been exposed the most (she at first didn't realize that the boys were becoming ill after playing in the area of

possible site runoff) is short and not growing as fast as normal. She was also concerned that this might be a symptom of poisoning.

Response: The average range of lead in children is 8-10 µg/dl and for mercury 2-20 parts per billion in urine. Everyone is exposed to these metals in their life, either through work, the household, or from leaded gasoline. The most common sources of lead are lead paint and lead water pipes. People can be exposed to mercury through paint, eating fish containing mercury, and through mercury in dental fillings. It is best that health problems be discussed with a family physician. We can provide information on specific chemicals if necessary.

42. She also mentioned that there was a bad odor near the creek most of the time (on Barret Rd., east of the site). She said after there had been run-off, there would be a sickeningly sweet odor in the area. An agency took air samples in the area, however, she did not believe these samples were taken properly.

Response: We are not aware of the results of this sampling. Odors from the site may have been a significant problem during the periods when burning was reportedly occurring. At this time, off-site migration of chemicals is probably minimal because surface soil contamination at the landfill is minimal. We have no way of knowing if past contamination was much higher than current levels of contamination.

43. They think asbestos had been hauled into the landfill.

Response: We are unaware of the presence of asbestos at the Skinner Landfill. It is possible that asbestos was a part of the demolition debris dumped at the site. Capping the site would prevent dispersion of any asbestos on site.

44. People had once seen an orange cloud that extended from the site over to the school.

Response: The County Health Department and the Southern Ohio Air Pollution Control Agency have received reports dating back to the 1960's about reported burning at the landfill. If a great deal of burning had occurred at the site, smoke could have moved away from the landfill. The presence of smoke does not necessarily mean that anyone was exposed to levels of chemicals that would result in health effects.

45. There were concerns about the odors, dust, etc. around the school during the clean-up period.

Response: Prevailing winds are west to east, in the opposite direction of the school. The U.S.EPA and Ohio EPA develop health and safety plans for every site that is investigated. These plans are to provide a safe operating environment for all site workers.

They are very detailed and plans are outlined for all realistic scenarios. Measures are used to control off-site movement of dust and dirt. In addition, on site monitoring during remediation will alert workers of significant releases of gaseous materials. In the event that this occurs, community notification and protective procedures are included with the site Health and Safety Plan.

46. Citizens did not want the presence of the children near the site to be used as a "political football."

Response: The Ohio Department of Health is only concerned with the safety of area residents, including children. Although we can not respond for the Ohio EPA and the U.S. EPA, our experience with these agencies assures us that they also consider the safety of the community as a top priority.

47. One of the citizens noticed late night deliveries and bull-dozers going at night. Some of the trucks contained asbestos and construction debris. Many of the trucks were covered and looked suspicious.

Response: Unfortunately, "nighttime" dumping has been one of the legacies of our industrialized society. We have read reports provided by the Butler County Health Department discussing this problem in relation to the Skinner Landfill. However, the environmental sampling done during the Remedial Investigation entailed a comprehensive list of chemical analysis. The vast majority of chemicals would have been detected at the site.

48. Children's Hospital in Cincinnati collects information on rates of cancer in children.

Response: The ODH was able to collect pediatric cancer cases from Children's Hospital in Cincinnati through their tumor registry (Table 10). These are cancer cases which have been diagnosed since 1977. There were a total of 11 cases from West Chester up to and including age 19 who resided within the zip code including West Chester. The data are included in Table 10 of the Health Outcome Data Evaluation Section of this document. Briefly, the number of observed cases from this area (West Chester and Union Township) were less than what would be expected, based on national data. It is possible that some West Chester children were taken to other hospitals which do not currently have tumor registries and therefore, are not included in this study.

CONCLUSIONS

The Skinner Landfill represents an indeterminate public health hazard. This conclusion does not mean that there are not hazardous materials at the site, but that additional data are needed to fully characterize the hazard potential of the site. In addition, the available data do not indicate that humans are being, or have been exposed to, levels of contamination that would be expected to cause adverse health effects. Available health outcome data do not indicate higher than expected numbers of pediatric cancer cases or children born with birth defects from the West Chester area. Additional off-site groundwater data along the southwestern border are needed to accurately determine if aquifers on site are hydrologically connected to off-site water sources. This is necessary to determine the potential for movement of contaminated groundwater off site. Interim remedial measures will include an alternative water supply to eight residents with private wells in the area.

On-site groundwater contained a number of chemicals (VOCs) which, based on their chemical properties, have the potential to migrate off site. A number of these chemicals exceeded the U.S. EPA MCLs as shown in Table 3. Groundwater is a potential exposure pathway for two reasons. There is inconclusive evidence from the off-site groundwater monitoring data to state with certainty, that there is no off-site movement of chemicals in the groundwater. There is also a potential for migration of chemicals off site in the future. Exposure to VOCs in water can occur through ingestion, inhalation of chemicals released from water during household use, and through contact with the skin.

On-site surface soil contains lead, however, there is no direct evidence people have been exposed. On-site workers or trespassers may be exposed to lead through the ingestion and inhalation of dirt and dust containing high levels of lead. There is a small risk to those children at the day care center because it is close to the landfill. Additional soil samples are needed near the day care center to characterize the potential risk these children. The potential risks from exposure to chemicals in soil should be reevaluated if remediation includes excavation of the deep, contaminated soils. Those at risk under these circumstances would be site workers and possibly the children attending the day care center. Proper personal protection equipment and procedures should minimize exposure to on-site workers. Protective measures must also be put in place during remediation for protection of the children in the day care center near the site and the elementary school across from the site. The day care center should be relocated during the remediation to minimize any potential risk to the children.

Community concerns dealt primarily with the off-site migration of chemicals, the type of chemicals on site, and the concern over reported health effects in area residents. The chemicals of concern

include lead and the VOCs listed in Table 8 in the Human Exposure Pathways Section and the Toxicological Information Section. The potential for off-site migration and the concern at Union Elementary can be addressed jointly. To date, there is very little environmental monitoring data which indicate significant off-site migration of chemicals from the landfill. There is minimal contamination of stream sediments with PAHs and hexachlorobenzene, which pose very little risk. Data collected during Phase I of The Remedial Investigation indicated that private wells off site contained some chemicals which were also present on site. All but one of these wells are not used for drinking water. The bulk of residents in the area were placed on public water supplies in 1963. Public water will be provided to eight residents in the area that use private wells.

RECOMMENDATIONS

1. Restrict site access by erecting a complete fence around the site boundary and place warning signs at entrance or areas where people may enter the site.

2. Monitor off-site groundwater along the southwestern border of the landfill to determine the potential for and the extent of off-site movement of chemicals.

3. Relocate the day care center during remediation in order to minimize the potential risks to children at the center.

4. Monitor on-site air during remediation to determine the impact on ambient air. This should include monitoring air in the vicinity of the elementary school near the site.

5. Monitor soils near the day care center. Lead is the chemical of concern.

6. The data and information developed in the Skinner Landfill Public Health Assessment have been evaluated for appropriate follow-up activities. ODH and the Health Activities Recommendation Panel (HARP) have determined that follow-up activities are indicated. ODH and ATSDR concluded that area residents may need information about understanding the potential for exposure to site-related chemicals. At this time, the data do not indicate that people are being or have been exposed to levels of chemicals that would be expected to affect their health. However, additional environmental monitoring data are needed to determine potential for off-site migration of site-related chemicals. The need for additional follow-up activities will be reevaluated when the additional monitoring data are collected.

PUBLIC HEALTH ACTIONS

The following Public Health Action Plan (PHAP) for the Skinner Landfill site contains a description of actions to be taken by ATSDR and/or ODH at and in the vicinity of this site subsequent to the completion of this public health assessment. The purpose of the PHAP is to ensure that this public health assessment not only identifies public health hazards but also provides a plan of action designed to mitigate and prevent adverse human health effects resulting from exposure to hazardous substances in the environment. Included in this plan is a commitment on the part of ATSDR/ODH to follow up on this plan to ensure that it is implemented.

ODH in cooperation with ATSDR will provide additional information to the community about their potential for exposure to site-related chemicals as requested. ODH has provided information to the community in the form of public meetings and fact sheets during the process of developing this public health assessment.

This PHAP will be evaluated annually unless additional information warrants more frequent evaluation.

PREPARERS OF REPORT

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ATSDR Regional Representative:
Louise Fabinski
Senior Health Scientist
Region V

ATSDR Technical Project Officer
Richard Kauffman
Division of Health Assessment
and Consultation
Remedial Program Branch

CERTIFICATION

This Skinner Landfill Public Health Assessment was prepared by the Ohio Department of Health under a cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR). It is in accordance with approved methodology and procedures existing at the time the public health assessment was begun.

Richard R. Kauffman, M.S.
Technical Project Officer
State Programs Section
Remedial Programs Branch
Division of Health Assessment and Consultation (DHAC)
ATSDR

The Division of Health Assessment and Consultation, ATSDR, has reviewed this public health assessment, and concurs with its findings.

Robert C. Williams, P.E., DEE
Director, DHAC, ATSDR

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GLOSSARY

Ambient air: The air or atmosphere surrounding the site.

Aquifer: A permeable body of rock capable of yielding large amounts of water.

Bedrock: The continuous solid rock that forms the earth's crust.

Biota: All the living organisms of a particular area; the combined plants and animals of a region.

Cancer incidence: The number of new cases of cancer occurring during a certain period of time.

Carcinogen: Any substance that produces cancer.

Cardiovascular: Pertaining to the heart and blood vessels.

Chronic exposure: An exposure over a period of time.

Epidemiology: The study of the spread of diseases.

Groundwater: Water stored beneath the surface in an aquifer.

Groundwater Divide: A boundary that separates the direction of groundwater flow.

Hydrology: The study of water.

Hydrogeology: The geology of groundwater, with particular emphasis on the chemistry and movement of water.

Immune system: The body's natural defense system that protects against harmful disease agents.

Ingest: To take into the body, as by swallowing or absorbing.

Leachate: Any liquid that has percolated through, or drains from, an accumulation of buried or underground waste.

Leukemia: A group of often fatal diseases characterized by an uncontrolled increase in leukocytes or white blood cells.

Maximum Contaminant Level, MCL: A concentration level determined by the U.S. EPA to be the maximum amount of a chemical allowable in public drinking water.

Perched aquifer: An aquifer, recharged by infiltrating rain water, that is underlain by an impermeable or low permeability layer of soil or rock, causing its water to usually discharge to the surface.

Permeable: Allows water to flow through.

Polynuclear Aromatic Hydrocarbons, PAHs: A group of organic chemicals that share a similar chemical structure. They are commonly associated with the burning of fossil fuels, coal, and coal byproducts.

Porous: Soil or rock composed of grains with tiny air or water-filled spaces in between.

Postnatal: Occurring shortly after birth.

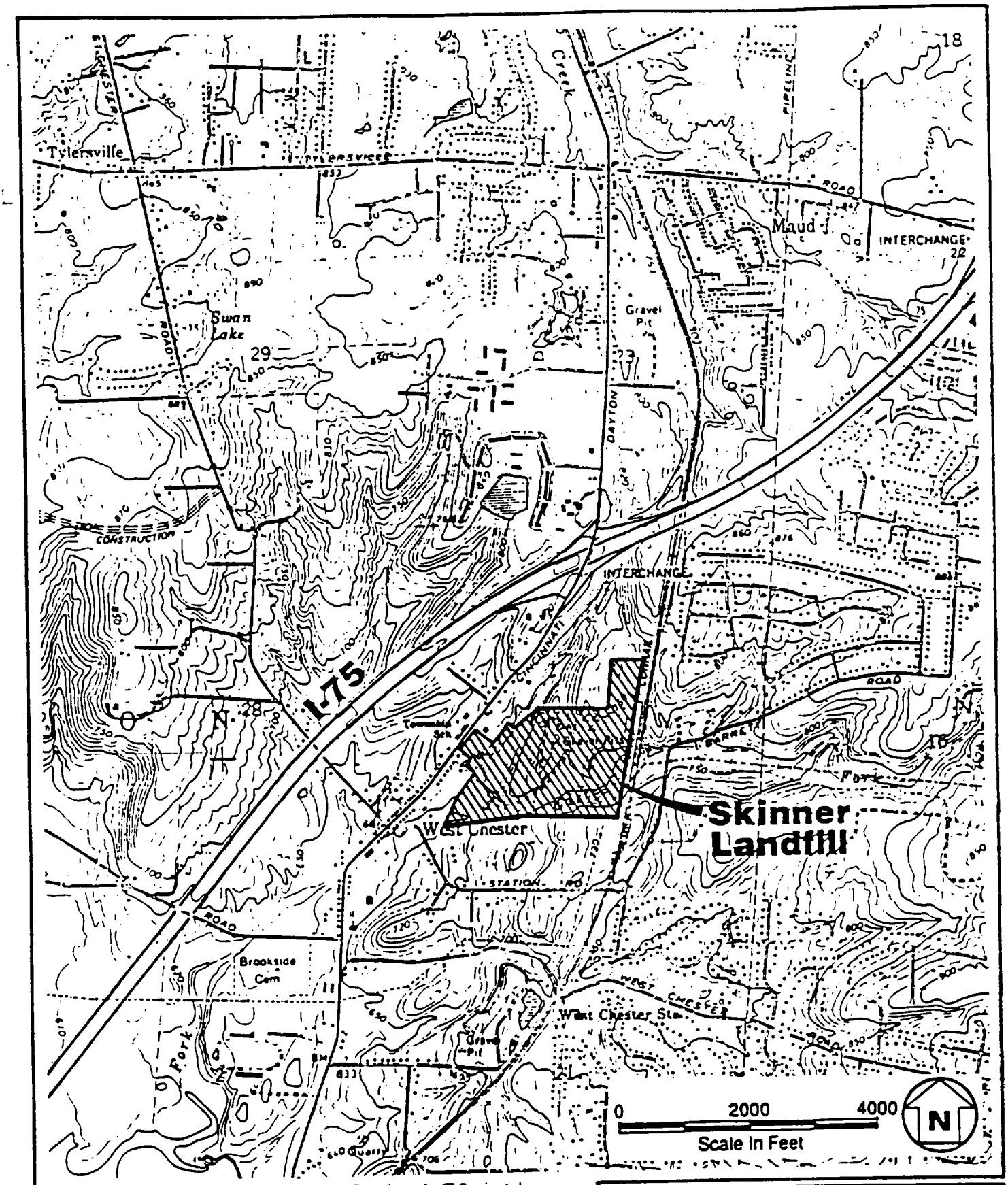
Topographic: Of or pertaining to land forms, i.e., the lay of the land.

Volatile Organic Compounds, VOCs: Organic compounds that are grouped together based on similar properties. There are many chemicals which are considered VOCs.

Water table: The level below which underground soil or rock is filled or saturated with groundwater.

APPENDICES

APPENDIX A



Map copied in part from USGS Glendale Quadrangle (7.5 minute)

Figure 1

Site Location Map

Skinner Landfill

West Chester, Ohio

February, 1989

04003.01

WW Engineering & Science

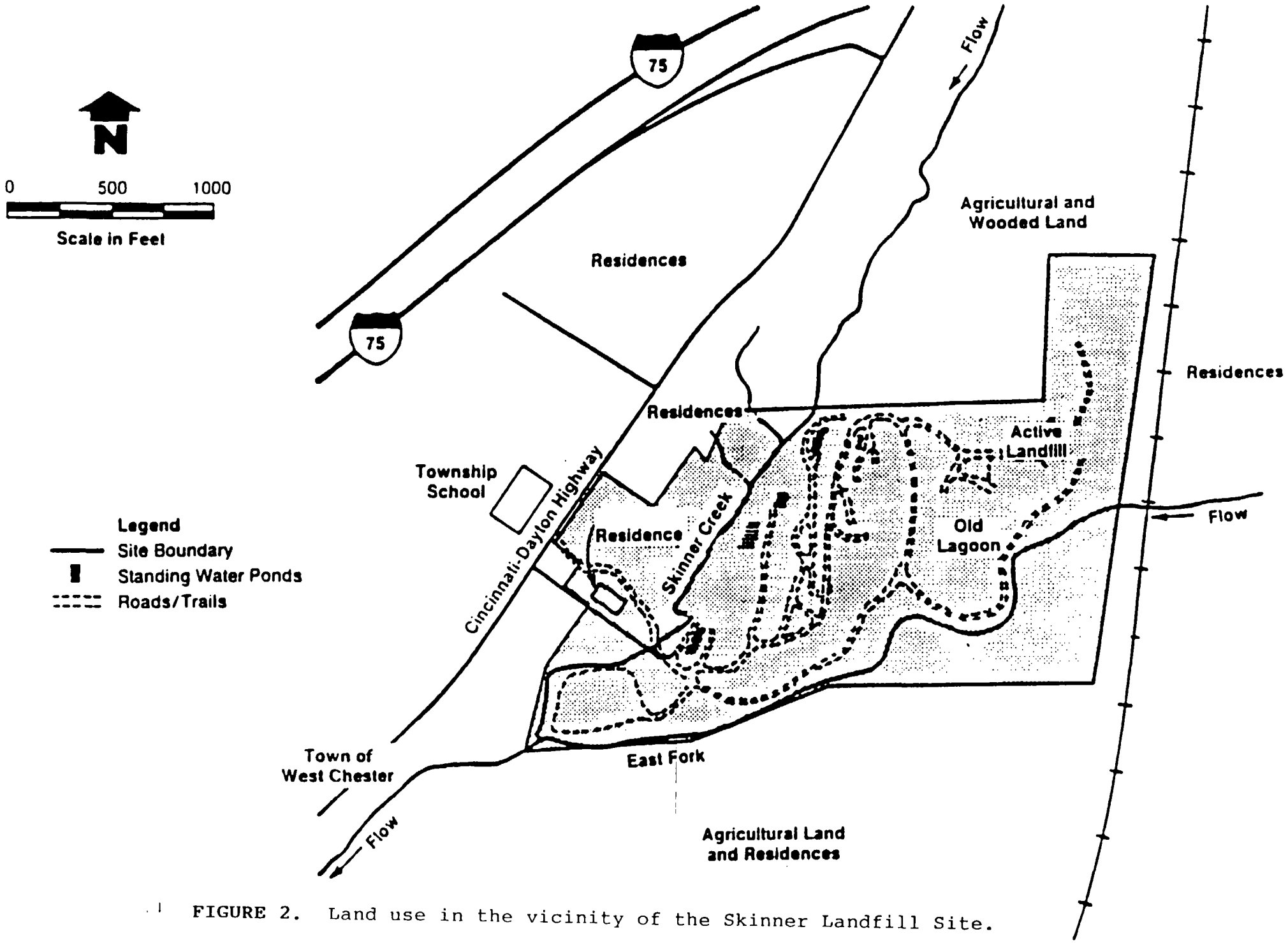


FIGURE 2. Land use in the vicinity of the Skinner Landfill Site.

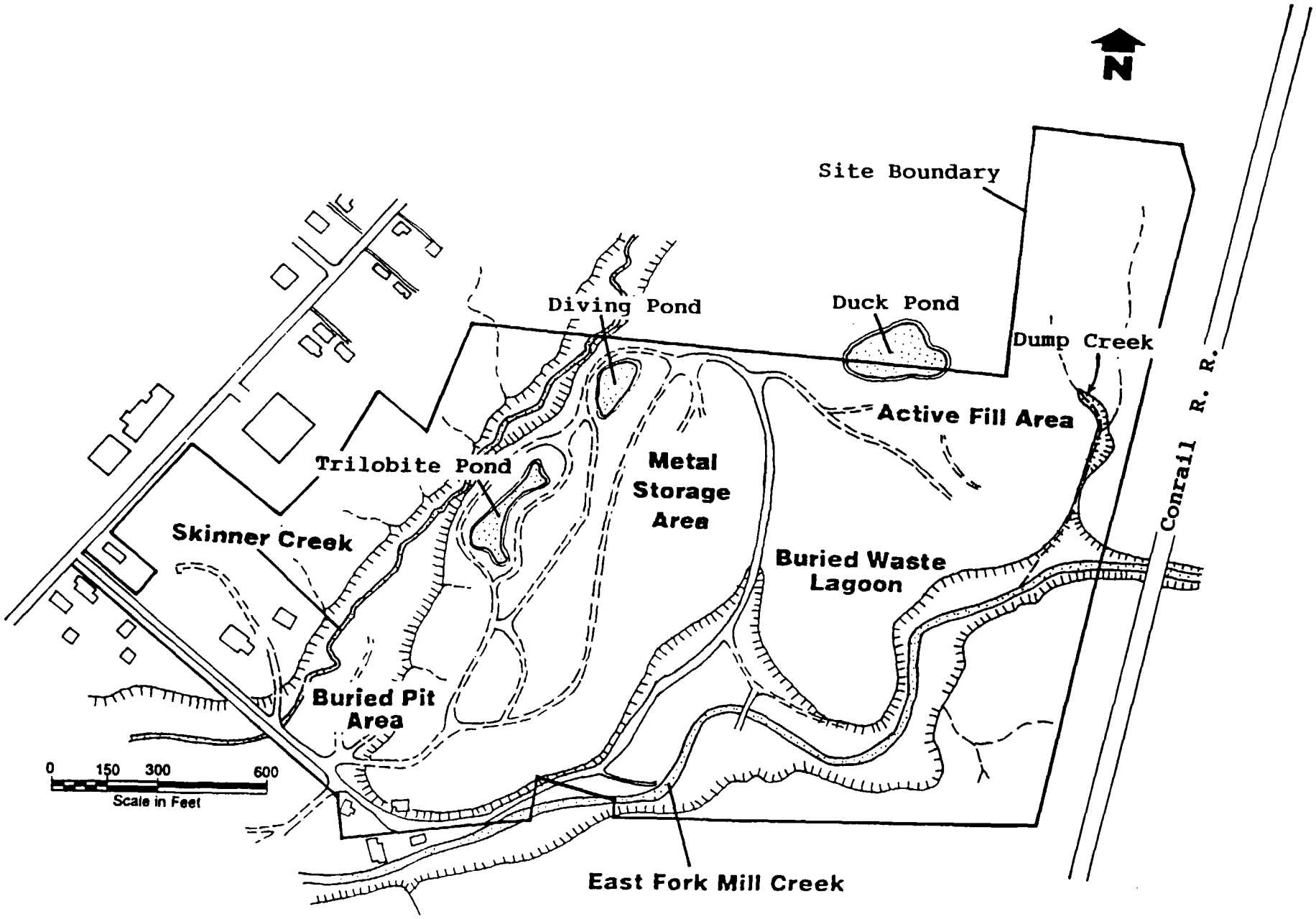


FIGURE 3. Major contaminant source areas and site topography, Skinner Landfill Site, Butler County, Ohio.

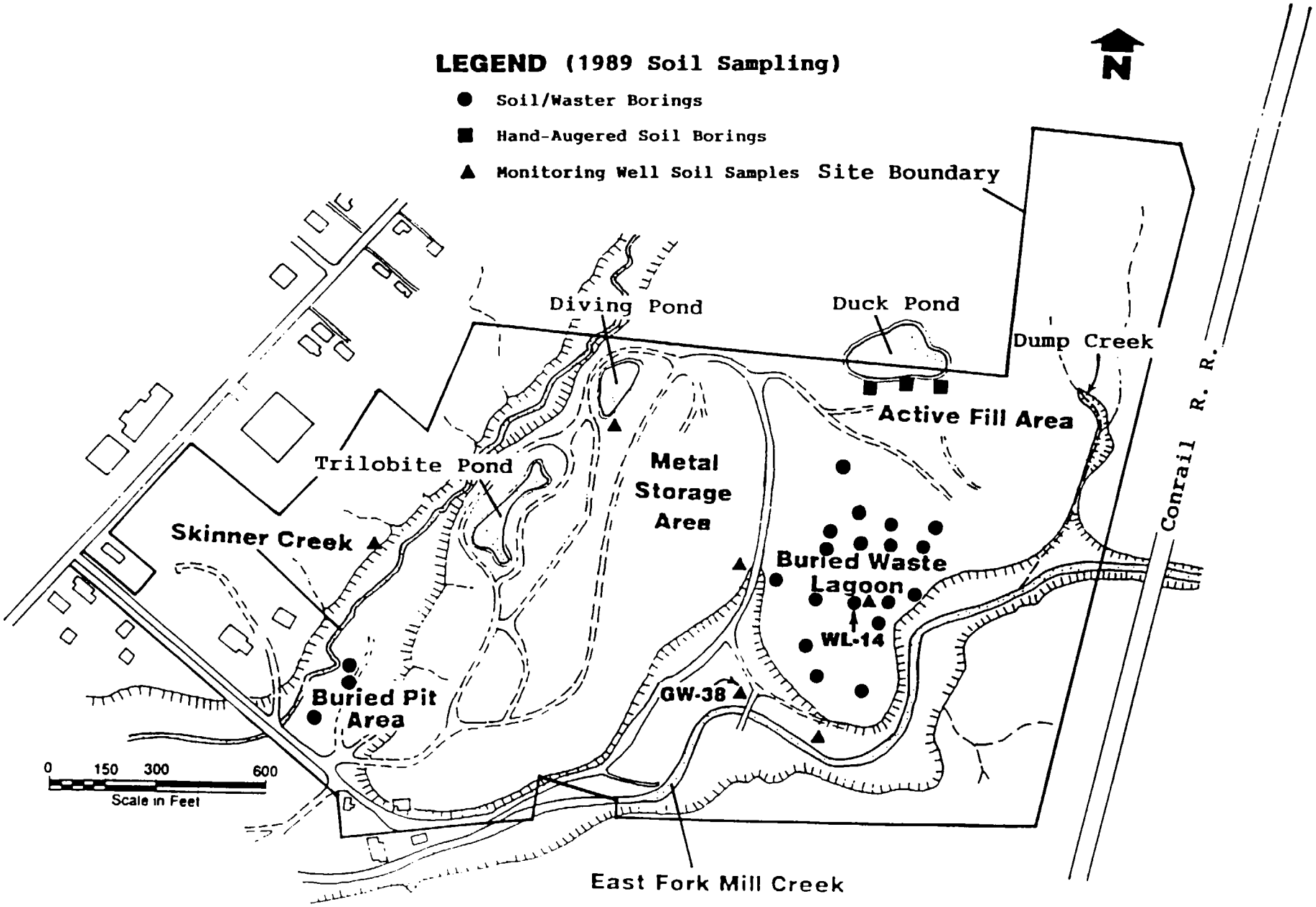


FIGURE 4. Soil sampling sites, Skinner Landfill Site.

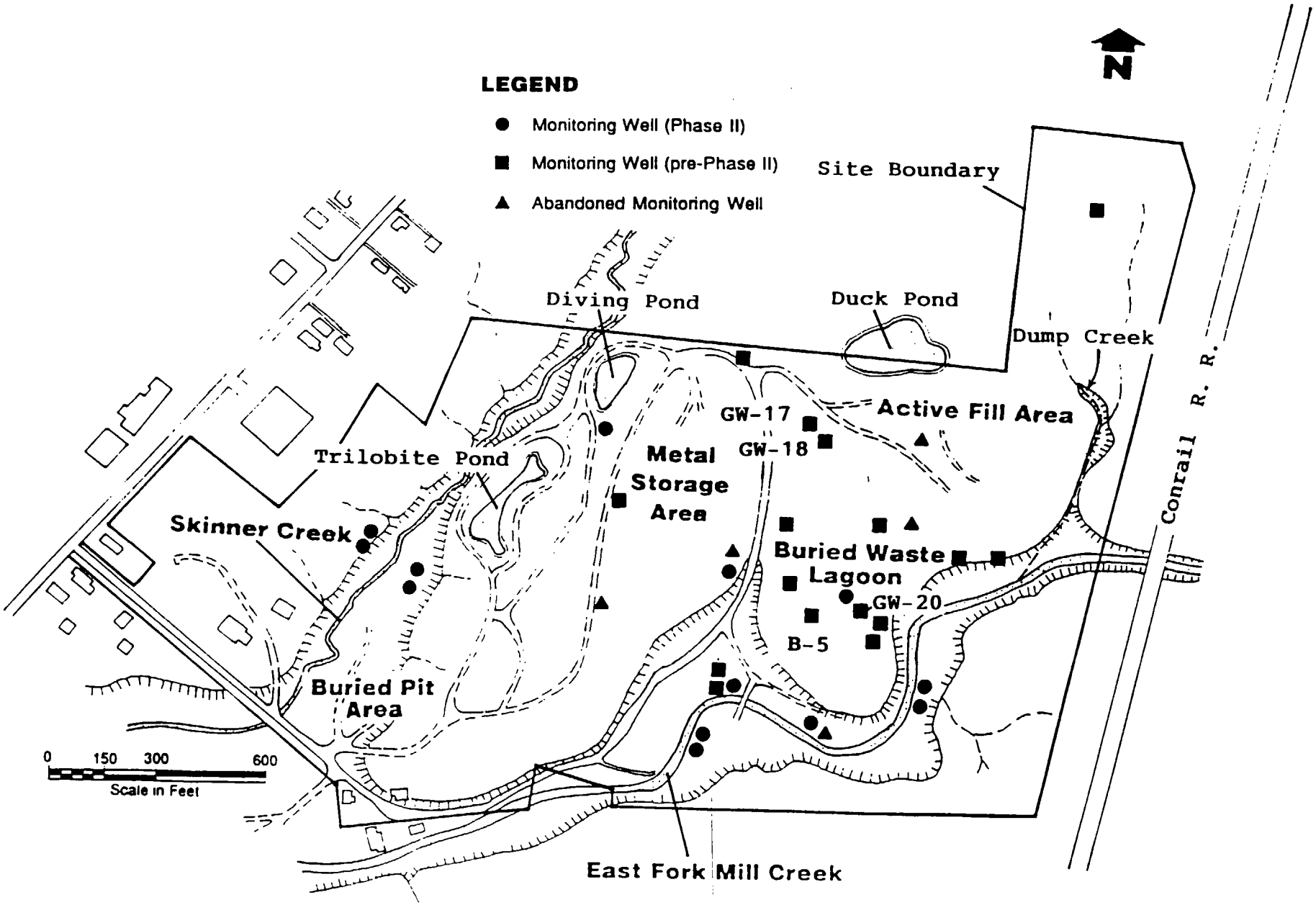


FIGURE 5. Ground water monitoring stations, Skinner Landfill Site.

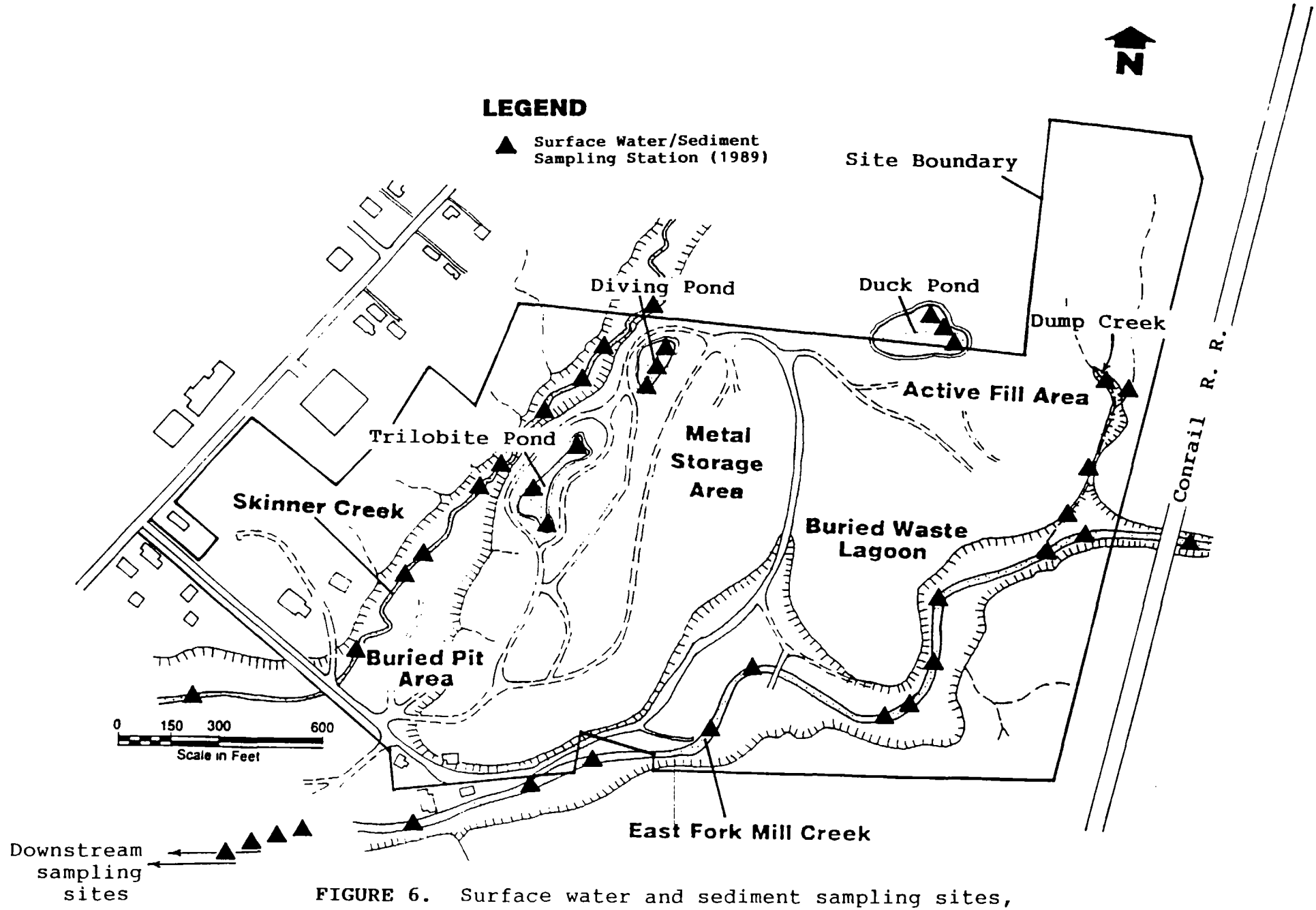


FIGURE 6. Surface water and sediment sampling sites, Skinner Landfill Site.

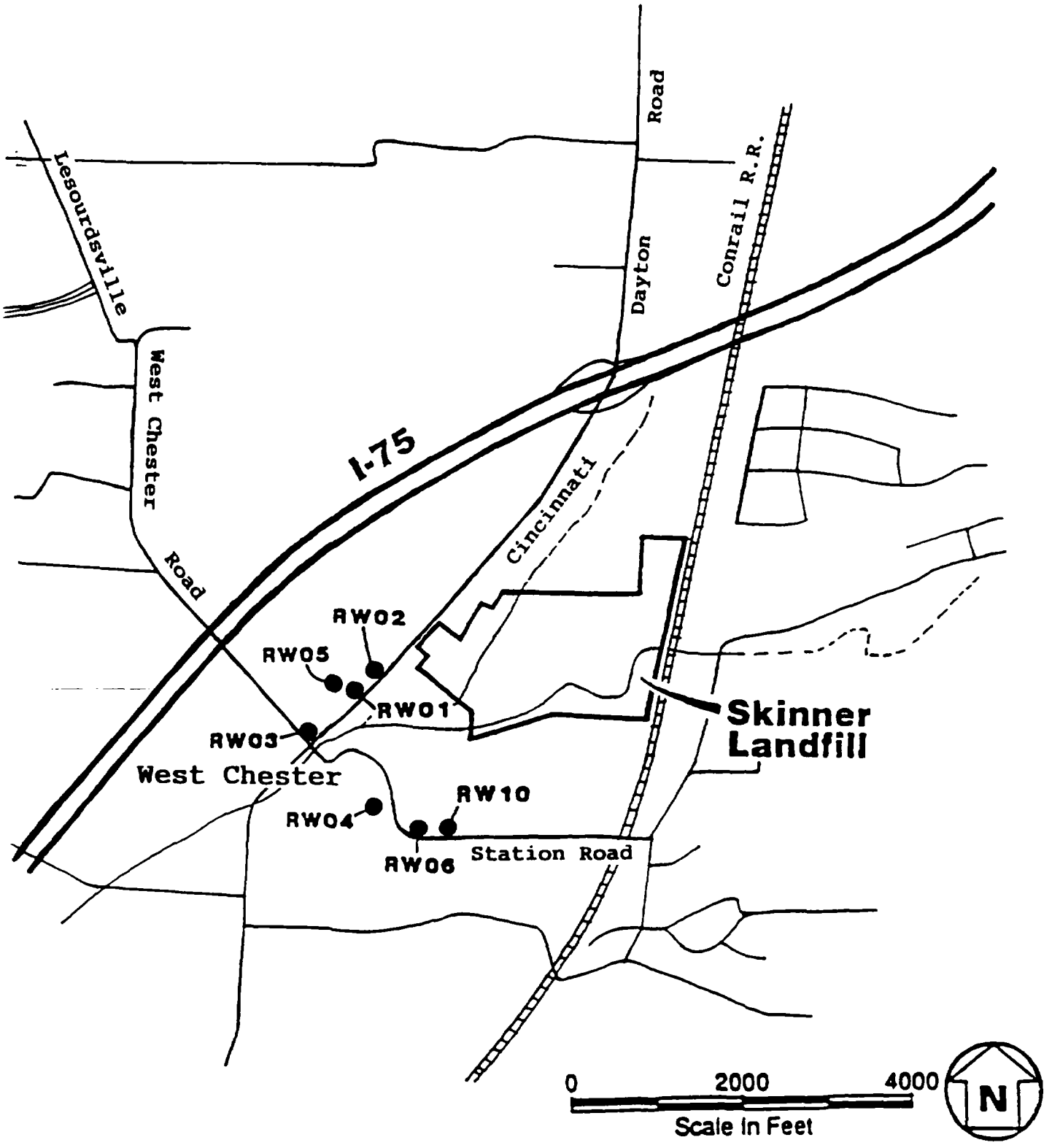


FIGURE 7. Off-site residential wells sampled in the 1986 Phase I Remedial Investigation.

APPENDIX B

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

REPLY TO THE ATTENTION OF:

HSRM-6J

April 5, 1993

Tracey Shelley, M.S.
Chief, Health Assessment Branch
Bureau of Epidemiology and Toxicology
P.O. Box 118
Columbus, Ohio 43266-0118

RE: ***Draft Health Assessment, Concerns about Radioactivity***

Dear Ms. Shelley:

This is in response to your request that I describe the testing which has been performed at the Skinner Landfill site for radioactivity.

During the performance of the Phase II Remedial Investigation, gamma logging was performed on the existing wells. Gamma logging is a geophysical technique, which relies upon the fact that all natural soils are radioactive to some degree. Differences in the lithology of the subsurface materials are measured as variations in the levels of background radioactivity. No abnormal levels of radioactivity were observed.

During the performance of the Remedial Investigation, radiological monitoring was performed as a standard health and safety precaution during the drilling activities. No abnormal levels of radioactivity were observed.

I am told that Mark Lehar (formerly of the Ohio EPA) walked over the surface of the site with a Geiger Counter, and that he did not encounter any levels of radioactivity above background.

Radiological monitoring and testing will be included as part of any construction or site characterization activities associated with the performance of the final remedy at this site. This is included only as a precaution. There has been no indication of the presence of radioactive materials at this site.

Printed on Recycled Paper

If you have any questions, please call me at 312-353-9309.

Sincerely,

James K. Van der Kloot
Remedial Project Manager
U.S. EPA

DUNN CORPORATION

Engineers, Geologists, Environmental Scientists
12 Metro Park Road
Albany, New York 12205
Tel: 518/458-1313
Fax: 518/458-2472

May 4, 1993

FACSIMILE

Mr. Larry I. Bone, Ph.D.
Manager, Environmental Remediation
The Dow Chemical Company
2030 Willard H. Dow Center
Midland, MI 48674

Dear Larry:

Subject: Radiation Survey
Skinner Landfill Project

The purpose of this letter is to provide a brief summary of the radiation survey conducted by Dunn Corporation at the Skinner Landfill Site (Site) on April 6, 1993. The survey was conducted using a Bicron micro-analyst micro radiation survey meter. This instrument is equipped with an internal NaI scintillation detector capable of detecting gamma and X-ray radiation. The detection range for the instrument is from 0 to 5000 micro roentgens per hour (uR/h). The instrument was calibrated at the factory using Cs^{137}.

The Site was divided into 27 survey areas as shown on Figure 1. The survey was conducted by traversing the individual areas on foot while carrying the instrument and noting the high, low and apparent average readings. Radiation readings from the site ranged from 4 to 20 uR/h. The average radiation level was determined to be 10 uR/h. The average natural background radiation resulting form radionuclides found in soils and high cosmic energy from outer space is approximately 10 to 20 uR/h. The attached table presents the readings in uR/h from each area.

If you have any questions, or require any additional information, please call me at (518) 458-1313.

Very truly yours,

DUNN CORPORATION

Lorraine Gregory for

William J. Hall
Chief Operating Officer

Attachment
c: J. Van der Kloot
K. Fox

Post-it™ brand fax transmittal memo 7671	# of pages ▸ 3
To Kathy Fox	From Lorraine Gregory
Co. OEPA	Co. Dunn Corp
Dept.	Phone # 518-458-1313
Fax # 513-285-6404	Fax # 518-458-2472

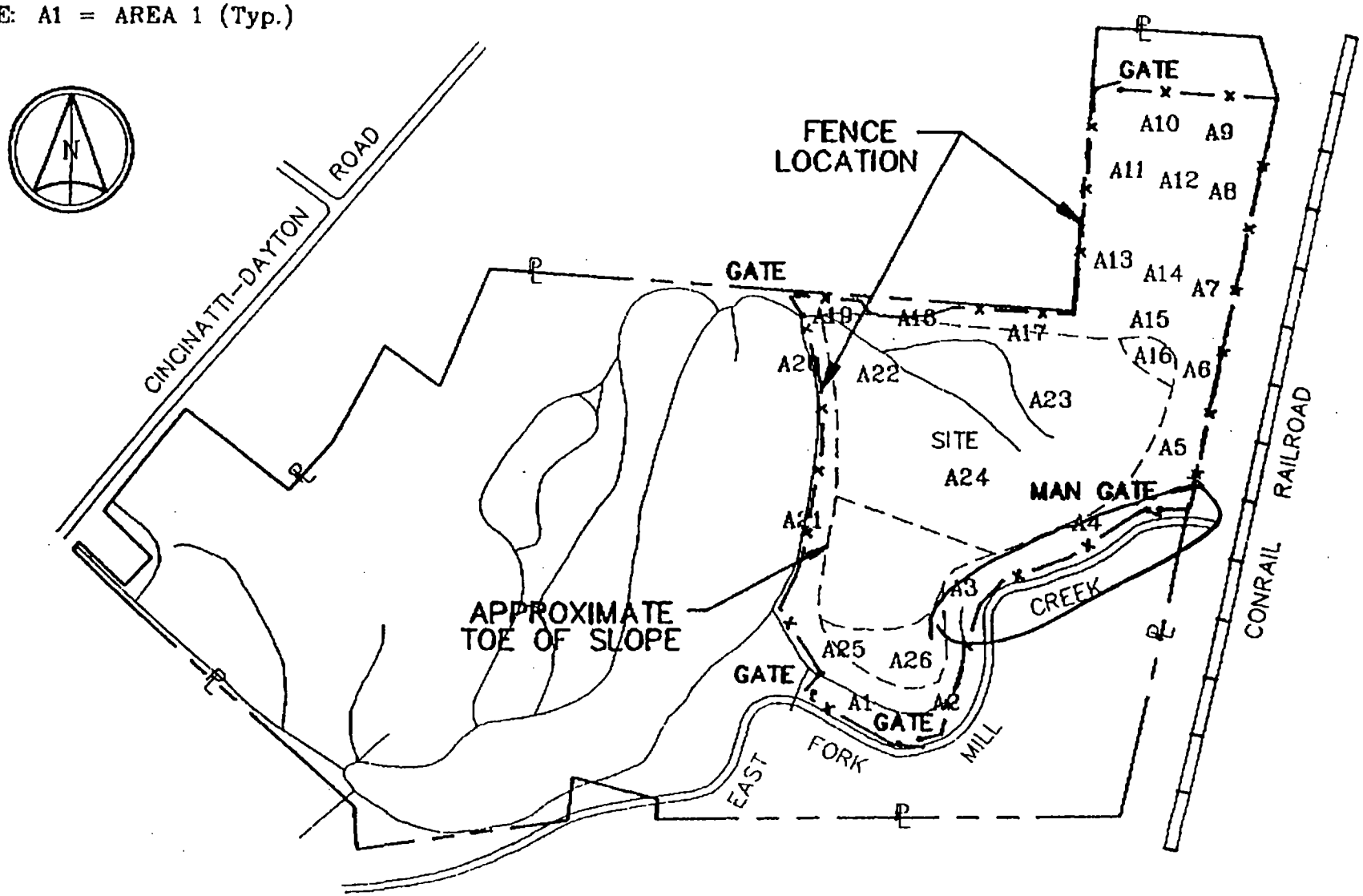
RADITAION SURVEY

SKINNER LANDFILL, OHIO

Location	Low uR/h	High uR/h	Average uR/h
1 Cin-Day. Rd.	5	7	6
2 Cin-Day. Rd.	3	7	5
A	7	16	11
A2	4	15	7
A3	6	15	8
A4	6	14	10
A5	5	15	10
A6	7	18	13
A7	8	18	13
A8	8	20	13
A9	8	20	12
A10	8	20	13
A11	7	16	11
A12	8	15	12
A13	5	15	10
A14	5	15	10
A15	5	12	8
A16	7	14	8
A17	5	13	9
A18	4	15	8
A19	5	15	10
A20	4	13	7
A21	5	15	8
A22	5	12	9
A23	4	14	7
A24	5	14	7
A25	7	15	10
A26	5	11	7

Locations 1 Cin-Day Rd. and 2 Cin-Day Rd. represent readings from the parking lot on Cincinnati-Dayton Road and at the entrance to the landfill access road.

NOTE: A1 = AREA 1 (Typ.)



DUNN CORPORATION
12 Metro Park Rd.
Albany, N.Y. 12205

RADIATION SURVEY LOCATIONS

SKINNER LANDFILL
WEST CHESTER, OHIO

PROJECT NO. 03215-02691	DATE 8APR93	DWG. NO. 2A9268_5	SCALE 1"=400'	FIGURE NO. 1

APPENDIX C

Calculations for Chemicals that do not cause cancer:

$$\text{Comparison Value} = \frac{\text{U.S. EPA RfD} \times \text{Body Weight}}{\text{Ingestion Rate}}$$

$$\text{Exposure Dose} = \frac{\text{Medium Concentration} \times \text{intake rate} \times \text{exposure factor}}{\text{Body Weight}}$$

Medium Concentration = the concentration of the chemical in water or soil.

Intake Rate = The amount of water or soil a person would drink or eat.

Exposure Factor = The amount of time in years that a person would be exposed to the specific chemical. No exposure factor is used if the exposure occurs over a person's lifetime.

Body Weight = The amount a person weights. Generally 70 kilograms is used for an adult and 10-15 kilograms for a child.

==========

Calculation of risk for those chemicals that may cause cancer:

$$\text{Comparison Value} = \frac{\text{Risk}}{\text{Slope Factor}} \times \frac{\text{Body Weight}}{\text{Ingestion Rate}}$$

Lifetime Excess Cancer Risk =

Annual exposure dose x slope factor x exposure factor in years

Dose is in mg/kg/day

Slope factor = The U.S.EPA cancer slope factor, mg/kg/day-1

Exposure factor = The amount of time in years that a person would be exposed to the specific chemical.

APPENDIX D

RESPONSE TO THE DUNN CORPORATION COMMENTS
(Comments begin page D-7)

I) Response To General Comments, see enclosed letter:

The Public Health Assessment for the Skinner Landfill site assesses current conditions at the site based on current site information (Phase II RI, WW Engineering, 1990) and past conditions at the site based on historical information. The latter includes Butler County Health Department files, records of the Southwest Ohio Air Pollution Control, the US EPA Site Assessment (WESTON, 1988), the Phase I RI (WESTON, 1988), and antidotal evidence from the community (ODH community information meeting, Sept. 26, 1991). Recommendations are made in order to limit possible human exposure, fill data gaps, or plan follow-up actions. The actions undertaken in the proposed Interim Remedial Measures (IRM) will be noted in the public health assessment in the Public Health Actions Section of the document.

II) Response To Comments On the Recommendations in the public health assessment.

Comment #1: Restrict Site Access.

Response: While the Buried Waste Lagoon and Active Landfill areas have been identified as major contaminant source areas, evidence of environmental contamination has been found outside of these areas. These include the Buried Pit area, the Trilobite Pond, leachate seeps along the EFMC and Skinner Creek, and sediments in both streams on-site. These are just the contaminant areas identified in the RI. As this site was an unrestricted and uncontrolled landfill that accepted hazardous waste, it is not known for certain whether all of the existing contaminant sources have been identified.

In addition, a site visit by ODH staff (April, 1990) indicated that the entire site is a junkyard with mountains of demolition debris, junked autos, trucks, large tanks, appliances, and railroad cars piled throughout the site. All of this debris, plus the on-site ponds, poses a physical hazard to children or adults who may trespass onto the site.

Due to the possibility of other contaminant source areas existing on-site and these physical hazards on-site, it is our recommendation that the entire Skinner site be fenced, not just the two eastern disposal areas.

Comment #2: Placement of groundwater monitoring wells in the area southwest of the Skinner site and east of Cincinnati-Dayton Road.

Response: On-site monitoring wells have provided hydrogeological information for that part of the Skinner Landfill site east of Skinner Creek and north of the EFMC (the identified contaminant

area of West Chester west of Cincinnati-Dayton Road and the area south of Station Road, south of the site (the potentially-exposed population). We do not, however, have any hydrogeological information for the intervening area in the vicinity of the junctions of Skinner Creek and the EFMC. While the Dunn Corporation may be correct in their assertions that groundwater in the perched aquifers in the eastern half of the site discharges into the EFMC, the complex glacial stratigraphy at this site makes predictability of the hydrogeology of this area uncertain. It is also uncertain how aquifers on the western half of the site are connected to areas south and west of the site.

The absence of hydrogeological information for the area connecting the identified source areas with the potentially-exposed population is a data gap that needs to be filled in order to more accurately determine the health risks associated with this site. Installation of monitoring wells in this area would fill this gap.

Comments #3-5: Monitoring residential wells, relocation of day care center during remedial activities, monitoring of on-site air during remedial activities.

Response: We have made the appropriate corrections in the recommendations of the assessment. Recommendations made in the public health assessment were made prior to the Interim Remedial Action.

The U.S. EPA (Fact Sheet, December 22, 1992) has indicated that a decision on major aspects of clean-up at this site (incineration, capping, groundwater treatment, etc.) is delayed pending further public input. This suggests that future clean-up activities at the site are still uncertain at this time. Consequently, our recommendations remain unchanged until proposed remedial activities at the site actually are implemented.

Comment #4. Relocation of the day care center is no longer necessary because incineration of the waste has been eliminated as a remedial action.

Response: Regardless of the exact type of remediation chosen for the site, it will still involve a lot of truck traffic going in and out of the site. Site remediation may still involve transporting or moving soils or waste in order to prepare the site for a final remedy. Under both of these circumstances the children at the day care center may still be a risk of exposure and should not be in an area that is under remediation.

Comment #6 Lead levels in on-site surface soils do not pose a risk:

Lead levels in surface soils in the central shoulder area between the Active Landfill and the Buried Waste Lagoon were actually up to 1030 mg/kg (Phase I RI, 1988, SS07-01, Table F17). We recognize that it is unlikely that children from the day care center would

wander in these areas, however, neighborhood children may wander onto the site. Lead was identified as a chemical of concern because it was the only chemical present in surface soil samples. In addition, we are concerned about the soils near the day care center because of its proximity to the access road and no surface soil samples have been taken along the access road leading into the disposal areas. So, we have no idea as to what surface soil lead levels (or levels of anything else) are in the vicinity of the day care center.

Comment #7: Need for additional environmental monitoring
See response to #3-5.

III) Comments on selected issues.

Issue A: The potential lead pathway is really not of concern.

Response: As was stated in a previous response, the highest concentration of lead in surface soil was 1030 mg/kg. We recognize that it is unlikely that children from the day care center would wander in these areas, however, neighborhood children may wander onto the site, because site access is not restricted. Lead was identified as a chemical of concern because it was the only chemical present in surface soil samples. In addition, we are concerned about the soils near the day care center because of its proximity to the access road and no surface soil samples have been taken along the access road leading into the disposal areas. So, we have no idea as to what surface soil lead levels (or levels of anything else) are in the vicinity of the day care center.

In addition, public health assessments attempt to determine if people have been exposed in the past, are currently being exposed, or could be exposed in the future. Fencing and cleaning-up the waste limits future exposures, but can do nothing to prevent exposures that may have occurred in the past. The ODH does not use U.S.EPA clean-up levels for lead in soil, because the Center For Disease Control has stated that a number for safe levels of lead in soil may not be appropriate.

B) Potential of exposure to contaminated groundwater:

Response: We consider your comment that "the waste disposal areas have not been and are not likely to be sources of significant groundwater contamination" and the statement that "groundwater data at the site simply do not show the presence of chemicals attributable to the buried lagoon materials or the landfill area" to be unfounded. Our conclusion is based on the sampling and hydrogeological data presented in the U.S. EPA Site Assessment (1988), the Phase I RI (1988), and the Phase II RI (1990).

In terms of your comments on the reliability of the data used in this health assessment, only those chemical concentrations that lacked "J", "R", or "U" qualifiers were used by ODH in

determinations of the chemicals of concern in groundwater at the Skinner site. As far as your comments regarding the consistency of contaminant levels in sampled wells, many factors can seasonally affect the concentrations of contaminants in groundwater contained in "perched" aquifers such as those at the Skinner site. These include fluctuations in rainfall, rising and falling of the water levels in these aquifers, microstratigraphic and pedological variability within these aquifers, and chemical changes within the lagoon wastes themselves. VOCs, by their very nature, are hard to predict in terms of their movement through various environmental media. This does not take into account changing laboratories and laboratory procedures over the past seven years. Based on our experiences with the other 14 hazardous waste sites we have worked on here in Ohio, stable, consistent concentrations of VOCs in any type of aquifer (but especially in these "perched" glacial aquifers) would be the exception, not the rule.

Monitoring wells #54 and #55, situated just south and downgradient from the Buried Waste Lagoon area and sampled by the TAT (WESTON, February, 1986), contained 21 organic contaminants including benzene (1163-1270 ppb), 1,1 DCA (1780-1963 ppb), 1,2 DCA (65-102 ppb), 1,2 DCE (788-968 ppb), 1,2 dichloropropane (805-1376 ppb), 1,1,1 TCA (176-274 ppb), and toluene (3231-3393 ppb), among others.

Subsequent sampling of monitoring wells that ring the Buried Waste Lagoon area have consistently indicated the presence of highly mobile VOCs like benzene, 1,2 DCA, and 1,2 dichloropropane, along with less mobile organic compounds like toluene, generally at levels several orders of magnitude above the MCLs (Phase I RI, WESTON, 1988; Phase II RI, WW Engineering, 1990). Historical sampling of these wells during the course of the RI was prevented, in part, by subsequent destruction of some of these wells by various activities at the site. The surviving wells that do provide a historical record (GW-17, GW-18, GW-20) indicate consistently high concentrations of benzene in groundwater in the vicinity of the Buried Waste Lagoon. Prior to its destruction, monitoring well GW-22 indicated consistently high levels of benzene in the Active Landfill area to the northeast (Phase I RI, 3 sampling rounds, 1986-1988). Monitoring well GW-20, roughly 100 ft south and downgradient of the Buried Waste Lagoon area, in both Phase I and Phase II sampling rounds, contained many of the same contaminants found in the TAT wells that were drilled in the same area as part of the site assessment. These include benzene, 1,2 DCA, 1,2 dichloropropane, toluene, bis(2-chloroethyl) ether, and arsenic. Well B-05, also roughly 100 ft south and downgradient from the Buried Waste Lagoon, also contained benzene, 1,2 DCA, 1,2 dichloropropane, and bis(2-chloroethyl) ether, as well as TCE and vinyl chloride (Phase II RI, 1990).

A soil gas survey conducted by WESTON (1987) using a portable ambient air analyzer identified benzene at levels 1.2-50 ppm in gas probes located in the Buried Waste Lagoon area. Toluene was also detected at levels of 1.7-768 ppm in the same area.

Soil samples taken from borings along the perimeter of the Buried Waste Lagoon (Phase II RI, 1990) indicated benzene, toluene, ethylbenzene, xylenes, and pesticides in B01 and 1,2 DCA, 1,2 dichloropropane, tetrachloroethene, trichloroethene, xylene, and pesticides in B02. These two sample stations are at the south end of the Buried Waste Lagoon area. Waste lagoon borings indicated the presence of a host of VOCs in waste lagoon soils, including 1,2 DCA, 1,2 dichloropropane, toluene, TCE, tetrachloroethene, ethylbenzene, and xylene, along with a multitude of pesticides and pesticide-related compounds.

Field screening of soil borings in the Buried Waste Lagoon indicated elevated organic vapor readings (up to 10,000 ppm) in subsurface soils, adjacent to and up-gradient of monitoring wells #54, #55, GW-20, and B-05 (borings WL-8, WL-10, WL-12, WL-14). These contaminated soils are situated in the same stratigraphic units in which these monitoring wells are screened (Phase II RI, 1990, Figs. 5.1, 5.2, 5.5).

Leachate seeps south (Phase I: SD-12; Phase II: LW/LS 01) and just to the east of the Buried Waste Lagoon (Phase I: SD-13), both in the valley of the EFMC, contained benzene, chloroform, toluene, bis (2-chloroethyl) ether, metals, and pesticide residues in leachate water and leachate sediment. Recent sampling along the EFMC (OEPA, 1992) indicated the continued presence of benzene and bis(2-chloroethyl) ether, as well as 1,1 DCA in the leachate water.

The Buried Waste Lagoon area is not capped. It is covered with 11-20 ft of demolition debris, followed in some places by an oily sludge, and then a graded soil cover. Demolition debris and bulldozed disturbed soils do not form an impermeable cap. Precipitation is not prevented from infiltrating into the Buried Lagoon waste.

The Buried Waste Lagoon is underlain by less permeable silt and clay only along the northern end (Phase II RI, Figs. 5.1, 5.2, 5.5). Water level contour maps in the Phase II RI (and enclosed with your comments) indicate groundwater in the vicinity of the Buried Waste Lagoon flows to the south towards the valley of the EFMC. At the south end of the former waste lagoon area, the underlying soil material is more permeable silty sand and gravel. Wells in which significant VOCs were detected (B-05 and GW-20) are both south and downgradient of the waste lagoon area and are screened in this silty sand and gravel unit.

All of this data indicates that the Buried Waste Lagoon is the source of the VOCs that currently and historically have contaminated groundwater just south of the waste lagoon. There is a clear indication that water is infiltrating the buried lagoon waste, moving downgradient through the permeable silty sand and gravel unit at the south end of the waste lagoon area, and discharging as a series of leachate seeps along the north bank of the EFMC. VOCs in the groundwater, especially benzene, 1,2 DCA, 1,2 dichloropropane,

toluene, and bis(2-chloroethyl) ether, have functioned as tracers, clearly defining this "plume."

In all likelihood, the Dunn Corporation is correct in its assertions that on-site aquifers discharge into either Skinner Creek or the EFMC. The available on-site hydrogeological data indicate that these are "perched" aquifers, isolated from regional water supply aquifers to the southwest and west (West Chester and the Mill Creek valley). Unfortunately, as indicated in response #2 above, we have no knowledge of the hydrogeology of the area southwest of the site, between it and private wells used for drinking water or other purposes in the village of West Chester. Private wells producing from shallow sand and gravel aquifers occur as little as 1000-2000 ft to the west and southwest of the site (ODNR well records).

The lack of hydrogeological information for the area southwest of the site, the unrestricted nature of this landfill, the complex stratigraphy of the glacial soils in the vicinity of the site, and suggest it would be prudent to install monitoring wells in this area in order to eliminate any question of on-site groundwater contaminants moving off-site to area water supply wells.

DUNN CORPORATION

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March 5, 1993
Project No. 03215-02691

Ms. Tracy Shelly
The Ohio Department of Health
Bureau of Epidemiology and Toxicology
246 North High Street
Columbus, Ohio 43266

Subject: Comments on the Draft Public Health Assessment
Skinner Landfill, West Chester, Ohio

Dear Ms. Shelly:

This letter presents technical comments on behalf of the Skinner Landfill PRP Group with respect to the Draft Pubic Health Assessment (the Assessment) dated February 8, 1993 for the Skinner Landfill site. The PRP Group appreciates the time and effort that has clearly been taken in preparing the Assessment. In particular, the information that addresses community concerns regarding rates of cancer incidence and other potential health effects is helpful information not previously available.

Although the PRP Group can not concur entirely with some of the statements and conclusions presented in the Assessment, we do agree with the principal finding that there are currently no exposures to levels of contamination that would be expected to cause adverse health effects. As discussed below in the detailed comments, we feel that this statement applies both on-site and off-site.

As you know, U.S.EPA had initially identified excavation and on-site incineration of the buried waste lagoon as its preferred remedial action. Some of the potential public health issues related to this alternative were discussed in the Assessment. However, through the public comment process, U.S.EPA has revised its preferred remedy to one that involves capping the waste disposal areas (the buried lagoon and landfill), with the possible collection and treatment of landfill/soil gases and groundwater. In addition, U.S.EPA identified, and the PRP Group is now implementing, an Interim Remedial Measure (IRM) which includes fencing the waste disposal areas, offering an alternative public water source to all homes with groundwater wells in the downgradient area, installing additional groundwater monitor wells , and performing quarterly groundwater monitoring at the site. These changes affect the public health issues and considerations that need to be addressed for the site in general and during implementation of the remedial action. We believe these changes should be reflected in the final health assessment.

The comments presented below have been organized into two sections. The first section presents each of the Assessment's recommendations ***in bold italics*** followed by the PRP Group's comment on that recommendation. The second section presents comments made in response to some of the statements and conclusions made in the body of the Assessment.

Offices in Albany, NY. Atlanta, GA. Buffalo, NY. Chicago, IL. Concord, NH. Denver, CO. Harrisburg, PA. New York, NY. and Parsippany, NJ

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Comments on Recommendations

1. ***Restrict site access and place warning signs at entrance or areas where people may enter the site.*** This recommendation is being addressed as part of the Interim Remedial Measures (IRM) being conducted at the site. U.S.EPA identified the IRM in August 1992, and signed the Record of Decision (ROD) on September 30, 1992. The PRP Group's Draft Work Plan was submitted on December 18, 1992, and the Final Work Plan was recently approved. The IRM called for fencing of the eastern portion of the site where past waste disposal activities have occurred. The approximate location of this fencing is shown in Figure 1 (attached). Note that the metal storage area on the western hill is not considered a waste disposal area, and that the fenced area is more than 1000 feet away from the home used for day care. Gates through the fence will be kept locked and warning signs will be posted at regular intervals along the fence.

2. ***Monitor off-site groundwater along the southwestern border of the landfill to determine the potential and the extent of off-site movement of chemicals.*** This recommendation is also being addressed, through the installation of two monitor wells along the main access road to the site, as part of the IRM being conducted at the site. However, the installation of these wells is really not necessary to monitor for potential migration of contaminants from the waste disposal areas. Examination of groundwater flow patterns based on water level maps presented in the RI report (Figure 2 attached) clearly show that the groundwater that might be affected by the waste disposal areas (the areas being enclosed by the fencing) must necessarily discharge to Mill Creek no farther downstream than the location of monitor wells GW-06, GW-07 and GW-38. Groundwater flowing across the southwestern boundary of the site comes from an area bounded by Cincinnati-Dayton Road on the west and the "western" hill on the east. A series of downgradient wells along Mill Creek are being sampled on a quarterly basis as part of the IRM. The purpose of this activity is to monitor groundwater quality before it discharges into Mill Creek.

3. ***Monitor residential wells previously sampled and any wells not identified during the RI in the direction of groundwater flow.*** Monitoring these wells to address potential public health problems is unnecessary because, as part of the IRM being conducted at the site, existing public water supplies are going to be extended to all homes within a specified distance "downgradient" of the site that are not yet on the public system. The PRP Group has also offered to properly seal and abandon these wells so they are permanently taken out of service. These actions remove the potential for exposure.

4. ***Relocate the day care center during remediation in order to minimize the potential risks to children at the center.*** The change of the preferred remedy from the excavation and on-site incineration alternative to the containment alternative eliminated the need for disturbance of the waste materials in the buried lagoon and the potential for exposure to the chemicals in these materials. This change also eliminates the potential airborne migration of these chemicals. Appropriate air monitoring criteria should be determined as part of the remedial design process. The relocation of the day care center is not necessary due to the change in preferred alternative.

5. ***Monitor on-site air during remediation to determine the impact on ambient air. This should include air monitoring in the vicinity of the elementary school near the site.*** The PRP Group supports air monitoring requirements that are consistent with and appropriate to the remedial activities being performed. The appropriate level of air monitoring necessary during implementation of the remedial action will be considered in

the remedial design phase of the project. These requirements will be considered for each specific activity of the remediation because different activities will warrant different levels of monitoring. As stated above, the change from the excavation and on-site incineration alternative to the containment alternative eliminates the potential airborne migration of contaminant from the primary waste disposal area.

6. *Monitor soils near the day care center. Lead is the chemical of concern.* Waste disposal at the site occurred within the eastern half of the property and more than 1000 feet away from the day care center. Access to potentially affected soils will be restricted by the installation of a fence surrounding the areas where waste disposal occurred. It should be noted that the highest level for lead in surface soils cited in the Public Health Assessment is 169 ppm, which is well below U.S.EPA's residential clean-up guideline of 500 to 1,000 ppm (OSWER Directives 9355.4-02 and 9355.4-02A). Furthermore, the surface soil sample having this concentration of lead was collected along the north side of the landfill near the Duck Pond, which is nearly 2000 feet away from the day care center. The existing characterization has been sufficient and adequate to address the site concerns.

7. ***The data and information developed in the Skinner Landfill Public Health Assessment have been evaluated for appropriate follow-up activities. ODH and the Health Activities Recommendation Panel (HARP) have determined that follow-up activities are indicated. ODH and ATSDR concluded that area residents may need information about understanding the potential for exposure to site-related chemical. At this time, the data do not indicate that people are being or have been exposed to levels of chemicals that would be expected to affect their health. However, additional environmental monitoring data are needed to determine potential for off-site migration of site-related chemicals. The need for additional follow-up activities will be reevaluated when the additional monitoring data are collected.***

The Skinner Landfill site has been adequately characterized with respect to the potential for exposure to chemicals that could cause health effects, and with respect to the potential for off-site migration of chemicals from the waste disposal areas (the buried lagoon and landfill). Thus, there is really no need to collect additional data to address these issues. Nevertheless, as part of the IRM being conducted at the site, two new monitor wells will be installed along the southwestern boundary of the site, and regular sampling and analysis of groundwater from these wells, and from selected existing monitor wells closer to the disposal areas, will be conducted.

Comments on Selected Issues

The Draft Public Health Assessment identifies only two potential exposure pathways as being of concern: (1) ingestion/inhalation of lead-contaminated dirt/dust, and (2) ingestion/inhalation/dermal adsorption of volatile organic compounds (VOCs) from groundwater. As discussed above, the potential lead pathway is really not of concern because:

(a) the concentrations in surface soil are well below applicable clean-up guidelines,

(b) there is a substantial distance between the waste disposal areas (where the concentrations could be expected to be greatest) and the most sensitive potential receptors – children at the day care center,

(c) the areas where waste disposal occurred are being fenced, reducing or eliminating the potential for casual contact with affected soils,

(d) the containment remedy will involve significantly less disturbance of materials in the waste disposal areas than the excavation and on-site incineration alternative, and

(e) Capping will permanently eliminate the potential exposure from dirt and dust.

In addition, to the extent that dust generation could occur during implementation of the capping remedy, dust control measures can and will be taken.

The potential for exposure of human populations to chemicals migrating away from the site through groundwater is equally doubtful. The Draft Public Health Assessment does not appear to have fully considered either the reliability of the chemical detections in groundwater, or the spatial relationship of the detections to the source materials. As discussed below, these considerations would show that the waste disposal areas have not been, and are not likely to be, sources of significant groundwater contamination.

As presented to the Skinner Landfill Coalition and in the PRP Group's Comments on U.S.EPA's December 1992 Fact Sheet, an evaluation of the analytical data for groundwater samples collected from the on-site monitor wells during the RI shows that only three volatile organic compounds (the most environmentally mobile kind of chemicals present in the waste disposal areas) were reliably detected in sampling that spanned five years and included repeated sampling of the same wells. We do not consider it appropriate to assume or postulate a potential health effect based on data which do not show the consistent presence of specific chemicals (those alleged to be posing a hazard) in specific wells.

Similarly, as presented in the PRP Group's September 12, 1992 Technical Comment Report, the groundwater data for the site simply do not show the presence of chemicals attributable to the buried lagoon materials or the landfill area. If the buried lagoon materials and landfill area were sources of contaminants for groundwater, a plume -- a coherent, consistent pattern of contamination -- would be present. The absence of an identifiable groundwater plume is a strong indication that the buried lagoon materials have very little current or future environmental mobility, and that the landfill area is not a significant source of releases to the environment. Given the setting of the buried lagoon materials at the site (above the water table and below 15 feet of demolition debris), this lack of mobility means that there is no mechanism for exposing individuals or organisms to these materials, and the lack of exposure means that there is no risk to human health and the environment.

We do not concur with the Public Health Assessment's interpretation of regional (Ohio Geological Survey publications) and site-specific data regarding the presence and significance of permeable soils at the site, and the implications drawn from analytical data for groundwater samples collected from residential wells. As discussed below, the site geology data do not support the conclusion that there is a continuous lens of sandy soil connecting the waste disposal area to off-site groundwater resources, and the data obtained from residential wells is at best equivocal.

The Public Health Assessment refers to a map published by the Ohio Geological Survey which shows sandy materials extending from the southwestern part of the Skinner property, between the southern end of the "western" hill and the bluff along the south side of Mill creek, to and under the location of the buried waste lagoon. However, the shape of the sandy deposit shown in the map, which is described as occurring in a buried bedrock valley, is incompatible with the bedrock topography map derived during the RI from detailed on-site data. Interpretation of the geologic data presented in the RI also shows that sandy materials present at the location of GW-06, GW-07 and GW-38 are restricted to a small closed depression in the bedrock surface and are not connected to the silty soils at the southern end of the buried lagoon.

In addition, the Public Health Assessment contains several discussions of the presence of silty and sandy soils around the waste disposal areas that might represent routes of preferential or facilitated contaminant migration. However these discussions sometimes overlook the fact that groundwater occurs below the elevation of the silty/sandy soils (meaning that they are not a route of lateral migration in groundwater) and that no surficial wastes overlie the sandy soils to contribute contaminants by percolation (e.g., at GW-17 and GW-18). Additionally, the monitor wells in proximity to the buried lagoon have not indicated the presence of a significant plume of chemicals in the groundwater coming from the buried lagoon area. Since this has not occurred after more than 15 years of uncontrolled infiltration of precipitation, it is unlikely that it will occur after the installation of a cap over the site.

The Public Health Assessment uses analytical data from groundwater samples collected in residential wells to support the hypothesis that there is a potential for off-site migration of contaminants. However, as the Assessment specifically acknowledges, some of the data -- notably that which showed the presence of "site-related" chemicals -- came from wells having stagnant water that were not purged before sample collection. It is highly unlikely that the source of these chemicals is the Skinner Landfill site. Monitor wells even a short distance from the buried lagoon do not indicate the presence of these chemicals. Furthermore, since groundwater in the vicinity of the waste disposal areas discharges to Mill Creek more than 1000 feet away from the southwestern boundary of the site (as described above based on groundwater flow patterns), and since all potentially affected residences should be connected to public water systems, there is no way for contaminants in the waste disposal area to get into the groundwater around these wells, and there will be very limited potential for human exposures to this water. Again, we would like to note that the PRP Group has offered to permanently seal these wells.

Summary

The PRP Group appreciates the opportunity to comment of the Draft Public Health Assessment for the Skinner Landfill site, and recognizes that considerable time and effort have clearly been taken in preparing it. In general, we feel that the Assessment would benefit from incorporating the effects of the IRM currently being conducted at the site and the change in U.S.EPA's preferred remedy. In addition, we do not concur with the rationale for or the interpretation of the site data leading to much of the recommended data collection. Nevertheless, groundwater data from the area along the southwestern boundary of the site will be obtained as part of the IRM.

The Assessment does contain some helpful information not previously available showing that the community does not have unusual rates of cancer incidence or other potential health effects attributable to the site. Similarly, the PRP Group agrees with the

Assessment's principal finding that there are currently no exposures to levels of contamination that would be expected to cause adverse health effects.

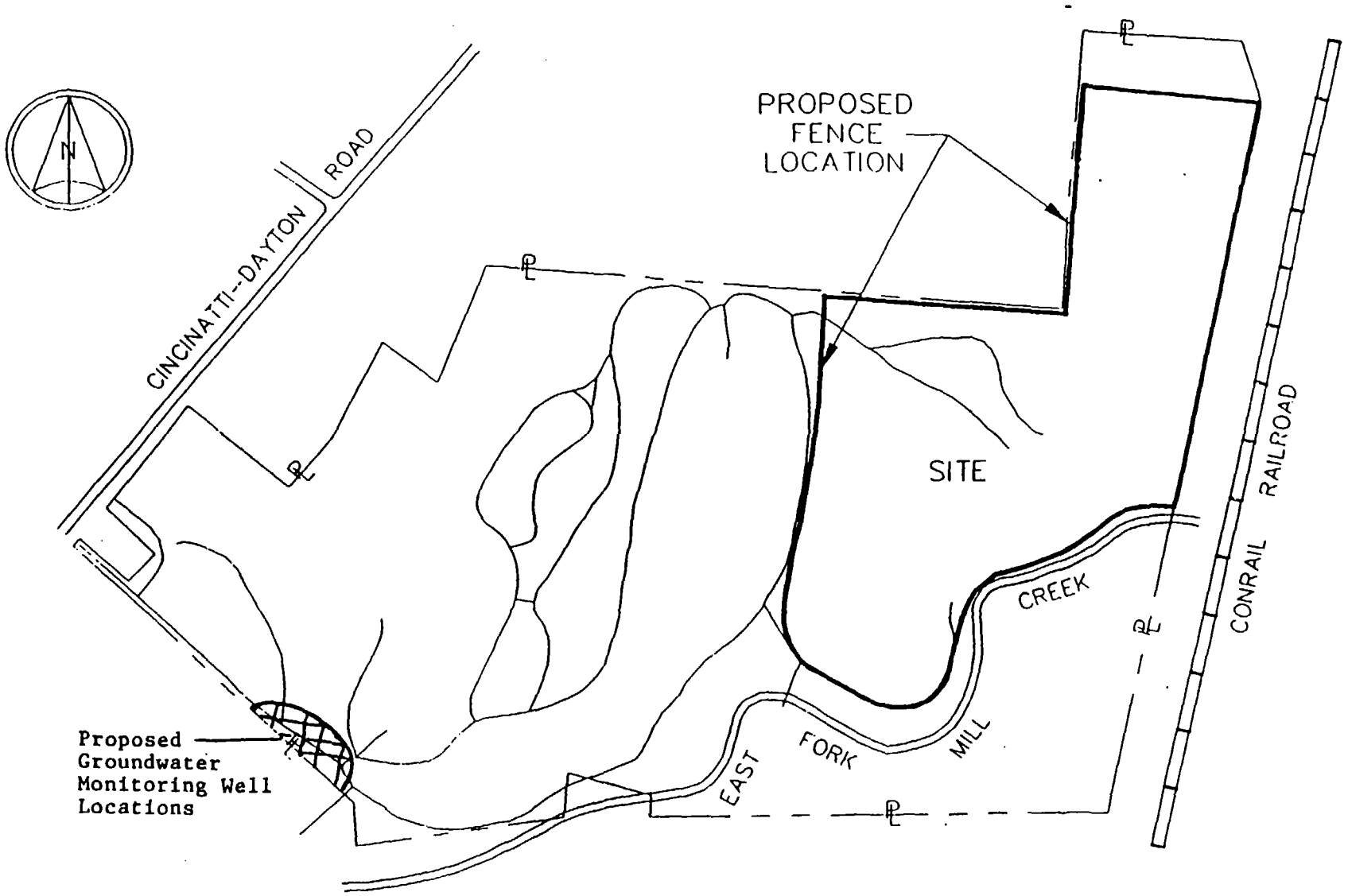
If you have any questions regarding these comments, we would be pleased to discuss them with you in more detail.

Very truly yours,

DUNN CORPORATION

William J. Hall

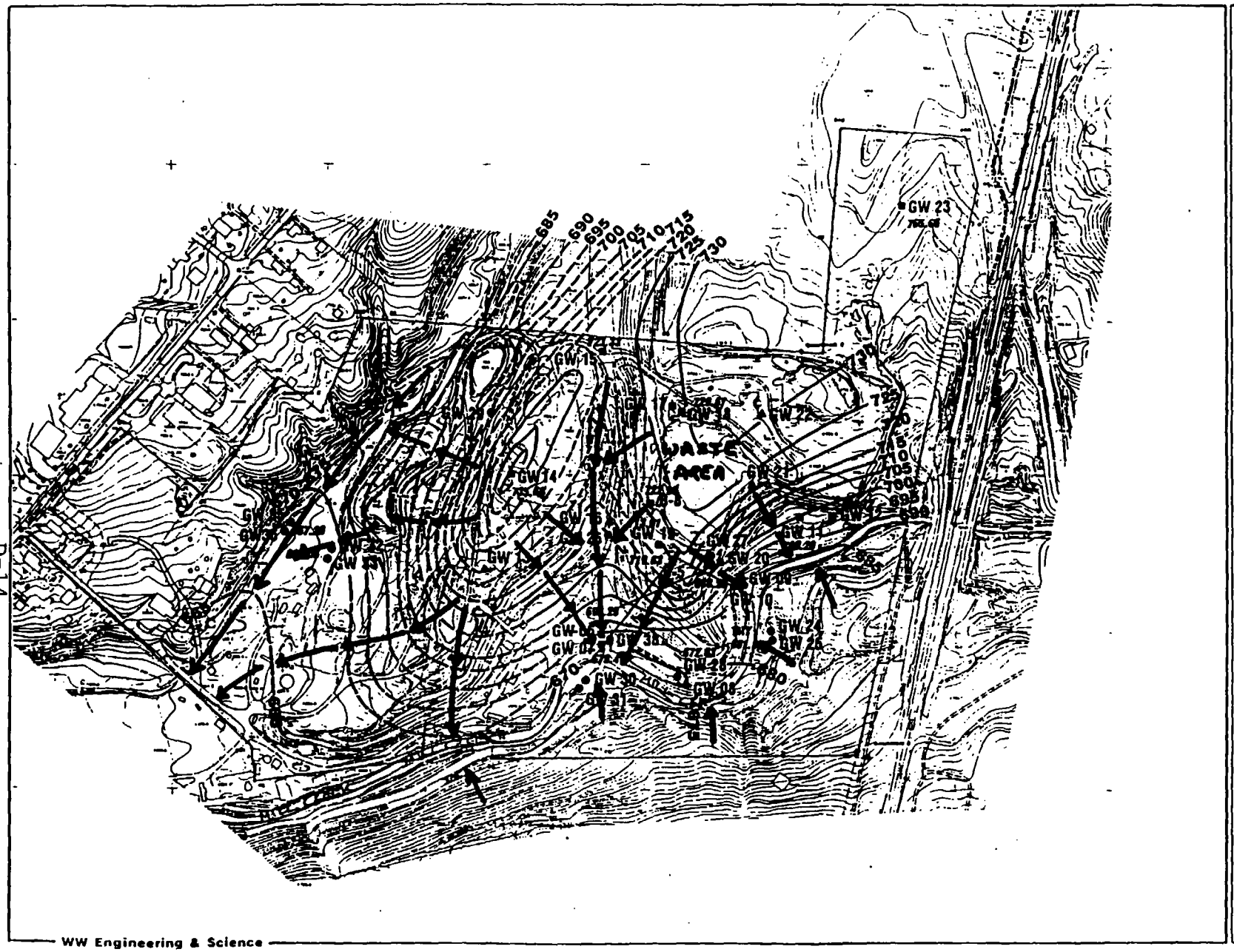
William J. Hall
Chief Operating Officer



DUNN CORPORATION
1333 BUTTERFIELD RD., SUITE 540
DOWNERS GROVE, IL 60515-5610

PROPOSED FENCE LOCATION
SKINNER LANDFILL
WEST CHESTER, OHIO

PROJECT NO. 80197-00439	DATE 29DEC92	DWG. NO. 2A9268	SCALE 1"=400'	FIGURE NO. 1



LEGEND

- ● Monitoring Well (Phase II)
- ■ Monitoring Well (pre-Phase II)
- ▲ Abandoned Monitoring Well

NOTE:

1. Elevation of pond water inferred from site survey. (Revised 6-14-90)
   Trilobite Pond: 682.1
   Diving Pond: 696.6
2. Contours are based upon water levels in existing unconsolidated sediment wells. Also included are bedrock wells GW 18 and GW 28 which are located where the water table drops into the bedrock. The remaining bedrock wells do not have the water elevations indicated.

N

0 150 300 600
Scale in Feet

FIGURE 2

WATER LEVEL CONTOUR MAP FOR MAY 6, 1990
Skinner Landfill
West Chester, Ohio

February, 1991 04003.14

WW Engineering & Science

COMMENTS FROM UNION TOWNSHIP TRUSTEES
(Comments begin page D-17)

Please see the following letter which discusses the comments in detail. The first page of the comments do not specifically address the Skinner Landfill Public Health Assessment and therefore we will not respond to these statements.

Page 1-Updating needs:

Response: We still maintain that there are data gaps in the investigation of the Skinner Landfill. Groundwater along the southwestern boundary of the site and surface soil near the day care center have not been sampled. If additional investigations at the landfill require changes in the health assessment to be made we will make those changes.

Page 1-Data Gaps:

Response: Please see above response.

Page 1-Radiation monitoring:

The site has been monitored for radiation, please see enclosed response from the U.S.EPA.

Page 1-Toxicological Data Gaps:

Response: It is true that there are more than eight chemicals present at the Skinner Site. The surface soils at the site are not very contaminated. Most of the soil contamination below 24 feet. It would be very difficult if not impossible for people off site to be exposed to these chemicals. The specific chemicals of potential concern were those chemicals in groundwater that were above levels of concern. It was also stated on page 20 of the health assessment that " If on-site groundwater reaches private wells additional chemicals could be added to this list". Chemicals are eliminated from the entire list of chemicals if the concentrations do not exceed levels of concern or if people will not likely be exposed to the chemicals. In addition, we evaluated pediatric cancer incidence because a citizen attending one of our meetings requested us to do so.

Page 2-Design Flaws

Response: Notice of our meetings was sent to all the local media, the media in Cincinnati, and individual letters were sent to those people on our mailing list.

Response: The population in the West Chester area has changed dramatically since 1980. In the last decade, West Chester has increased in size by approximately 68%.

Page 4-Identification of population:

Response: We encountered problems in determining the population estimates in West Chester. West Chester is an unincorporated and census figures are not available for this area, therefore we had to obtain this information through alternative means. The zip code population was used to offer a definitive area for the denominator in the health outcome calculations.

Page 4-paragraph 2:

Response: We did obtain the information from the Southwestern Ohio Air Pollution Control to gather historical information about the site.

Page 4-General comments:

We clearly defined from the beginning of our involvement at the site the goals of the health assessment. We made a point of explaining that health assessments are not health studies. Health studies being defined as a general survey of the health of the community. In addition, it was also stated from the beginning that recommendations may include a health study or may not recommend any follow-up at the site.

Office of the Trustees

UNION TOWNSHIP BUTLER COUNTY

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David R. Gully

Tracy Shelley, M.S.
Chief, Health Assessment Branch
Bureau of Epidemiology and Toxicology
Ohio Department of Health
P.O. Box 118
Columbus, Ohio 43266-0118

18 March 1993

Dear Ms Shelly,

Attached hereto are comments concerning the Public Health Assessment for the Skinner Landfill, West Chester, Butler County, Ohio; Cerclis No OHD063963714, dated 8 February 1993 presented to the Board of Union Township Trustees, Butler County, Ohio by Mrs. Lisa Whiteacre at their last regular meeting.

The Trustees have requested that I communicate to your agency that the Board endorses Mrs. Whiteacres comments and recommendations in total as contained therein, and forwards them to you with their endorsement.

If possible, the Board would like to be copied on any response you may have to these comments.

For The Board of Union Township Trustees:

David R. Gully, Administrator
Union Township, Butler County, Ohio

cc: Trustees, Clerk
Skinner Landfill Coalition
U.S. Rep. John Boehner
State Rep. Scott Nein
File - Twsp. / Library

General Background on Health Assessments

Agency for Toxic Substances and Disease Registry

ATSDR was created in 1980 as a "sister agency" to the U.S. EPA. Congress directed the Centers for Disease Control (CDC) and the Agency for Toxic Substances and Disease Registry (ATSDR) to conduct investigations at hazardous waste sites and to recommend appropriate action to protect public health. Since its inception, it has conducted nearly 1000 health assessments.

ATSDR has an annual budget of nearly $50 million which is paid by EPA out of EPA's Superfund budget. Nearly $30 million is spent on health assessments and studies each year.

Ohio Department of Health

In 1987, ATSDR made a commitment to having state health departments conduct health investigations and health assessments. Under its agreements with states ATSDR had provided funding to 23 states by the beginning of Fiscal Year 1990.

Health assessments

CERCLA section 104(i) requires health assessments to be "completed to the maximum extent practicable" before completion of the Remedial Investigation/Feasibility Study by the U.S. EPA. Health assessments are preliminary evaluations of risks to human heath by waste sites, based on the known health effects of the contaminants, and the potential paths of human exposure such as water, air, or food. The assessments are the basis for ATSDR recommendations to the EPA on any needed exposure-reduction measures, such as providing alternative water supplies or relocating residents. These assessments are also used by ATSDR to decide whether to conduct pilot health effects studies, epidemiological studies,, or establishment of exposure or disease registries.

In August of 1991, the U.S. General Accounting Office concluded that ATSDR assessments were often incomplete and of limited usefulness. Many of the assessments were so weak that they did not even provide enough information to determine whether further study was merited.

In May of 1992, The National Toxics Campaign Fund and The Environmental Health Network, two national, non-profit organizations, asked Congress to investigate the health assessments procedures conducted by ATSDR. Additionally, they recommended that Congress stop funding for studies which are designed to be inconclusive.

Skinner Landfill Health Assessment

Updating Needs

It is stated that a Feasibility Study is underway, to determine the best method of clean up. This was completed and made public in April 1992. Additionally, the results of residential well sampling, performed in July 1992, have not been included or considered in determining the hazard potential of the site.

Because these items are not reflected in the assessment, there is some question as to whether the referenced "data gaps" (p. 17) still exist.

Data Gaps

Because this assessment was not completed until after the RI/FS process, ODH was able to point out deficiencies in the EPA studies. It is difficult to understand how we have ventured this far into the process without the following data:

Hydrology of the site is still uncertain
In particular, a recommendation is made that "additional off-site groundwater data along the southwestern border are needed to accurately determine if aquifers on site are hydrologically connected to off-site water sources."

Radiation monitoring
The assessment indicates that there has been no monitoring of the site for radioactivity, and that this was stated at an EPA public meeting on June 20, 1991. As of September 1992, there was some doubt among EPA as to whether the site had been monitored for radioactivity. Without a definitive on whether surface soils and/or creeks are contaminated with radioactive materials, we may be overlooking serious contamination and possible health effects.

This type of data is vital to EPA and the public for designing a responsible cleanup remedy, and, would be helpful to ODH in determining the hazard potential of the site.

Toxicological data gaps:

According to the assessment, there are only eight "chemicals of concern", and lead contamination of the surface soils is the primary concern. (Due to the current remediation proposal for excavation and consolidation of contaminated site-wide soils, it is conceivable that people will be exposed during the remediation.)

Among these chemicals there are many diverse health effects, such as: pregnancy complications, neurological disorders, reproductive and infertility disorders, respiratory ailments, blood disorders, immunological deficiencies, and diseases which target specific organs.

In spite of the numerous types of possible ill-effects, the only real data which has been collected and entered into this assessment is the cancer incidence for children ages 0 - 19, and malformations which are visible at birth. The assessment points out that even this data may be incomplete and not truly reliable.

A more conclusive health investigation, if one were to be performed, should include the incidence of chronic illnesses and diseases, categorized by the various systems of the human body. Additionally, many birth defects are not recognized at birth because they are not physical malformations. Rather, they are neurological defects, diagnosed as the result of developmental delays in the nervous systems.

Lead, dioxins, furans, and pesticides are all neurotoxins. They bioaccumulate and wreak havoc on the brain and central nervous system. The assessment does point out that simultaneous exposure to several chemicals makes it difficult to determine which chemical or chemicals would be associated with various deleterious effects.

In this assessment, ODH states that toxicology is not a clear cut science and contains a lot of uncertainties. In many instances, health effects are evaluated by laboratory testing on animals. Where there are incidences of occupational exposure, it is possible for real data to be collected on human subjects. ODH states that it is very difficult to link environmental contaminants with disease outcomes in human populations.

These statements appear to be justifications for designing an assessment which provides no conclusions regarding the health threat posed by the site.

Design flaws

The study appears formal and scientific, but is actually "inconclusive by design".

<u>Inadequate contact with population being studied</u>
ODH conducted two meetings to gather residents' concerns. It is doubtful whether the potentially exposed population was informed of the meeting. EPA has stated repeatedly that the site poses no significant health risk at this time. One might guess that our community has placed its trust in statements like this.

ODH has stated that the transient nature of our community would make it difficult to perform a conclusive investigation. One

might assume this to be true, however, without actually contacting local residents, ODH is not aware of the families who have resided in the area for several decades.

A more conclusive health investigation, if one were to be performed, would require a notice be sent to residents, informing them that an investigation is underway. If the study were to target only several hundred homes, then cost for providing notice to West Chester families would be only a couple hundred dollars more than what has already been invested.

Reliance upon scientific and statistical methods incapable of drawing any reliable conclusions regarding environmental health problems

Standard statistical approaches used by epidemiology are not really suitable for hazardous waste sites. Even if the rate of cancer were double or triple the normal rate for the population, in a small sample this would not be high enough for statisticians to confirm the link between exposure and cancer. In fact the number of cases may have to be as many as eight times as high as the normal population before a connection would be drawn. We need to look at other possible diseases, as well as cancer.

A more conclusive investigation would determine a sample population of residents who live near the site and who are actually contacted by investigators who would collect health data.

These types of design flaws produce results which imply that there is no connection between disease and exposure to the sites.

In the assessment summary it is stated that additional data are needed to fully characterize the hazard potential of the site, yet it is not stated whether further study is even warranted.

Demographics and Exposure Potential

It is the job of ATSDR to conduct investigations that identify, enumerate, and characterize the population which may have been exposed and to make recommendations which prevent further public exposure. The recommendations which ODH has made are very good ones, however, they are the same recommendations which have been made repeatedly by the public and various local citizens groups.

Potential routes of exposure

The assessment states that fires may have contributed to air pollution in the past. Airborne particles, during periods of burning, would also have been collected in residential cistern water. Contamination of the stream sediments indicates that chemicals were disposed of in the creeks, or else the chemicals leached out of the dump during periods of rain.

Identification of the potentially exposed population
ODH has attempted to identify the population using various parameters. In one instance they refer to the number of people living within a mile radius. In another instance, data was gathered using the 45069 zip code which includes nearly all of Union Township.

The prevailing wind direction is in a northeasterly direction. Dalewood Subdivision is adjacent to the site, and in the direct wind path. Homeowners in 1953 complained about odors emanating from the landfill. Not all chemicals have an odor, but it is a sure indicator, that if one can smell it, then one has probably been exposed. Numerous complaints were filed with the Butler County Board of Health and the Southwestern Ohio Air Pollution Control Agency. It appears that there was no attempt to contact the residents who filed the complaints.

A more conclusive health investigation, if one were to be performed, should start with the residences which are within a couple thousand feet of the landfill. Logically, they are the population that would have been exposed to particulates during burning and to dust during earth moving.

Enumerate the potentially exposed population
ODH has identified 6800 people living within a mile of the landfill. According to the U.S. Geological maps there were probably several hundred houses in existence when the landfill generated the most nuisance complaints.

A more conclusive health investigation, if one were to be performed, should start with the older residences where people have probably been exposed for the greatest number of years.

Characterize the potentially exposed population
Real data, based upon actual diseases and dysfunctions of real people in a sample population, should be collected in order to determine whether there are trends in health impact, to determine whether further investigation is warranted, and to determine whether a Disease Registry should be established for the benefit of future populations.

It seems odd that a thousand of these assessments can be conducted, and we still are unable to draw conclusions about environmental exposures and diseases in surrounding neighborhoods. One might assume that if all the studies have been designed in the same manner as we have seen with this landfill, there is good reason to doubt the validity of these assessments.

People of West Chester should not rely on this assessment as the final word on whether they are at risk from toxic exposures or whether they have already been exposed.

Risk Assess. Guidance for Superfund (Interim Final) Human Health Eval Manual EPA/540/1-89/002 Dec. 1989

environment exists as a result of the site. Such a legal determination is called an endangerment assessment. For remedial sites, the process for analyzing whether there may be an endangerment is described in this *Human Health Evaluation Manual* and its companion *Environmental Evaluation Manual*. In the past, an endangerment assessment often was prepared as a study separate from the baseline risk assessment. With the passage of SARA and changes in Agency practice, the need to perform a detailed endangerment assessment as a separate effort from the baseline risk assessment has been eliminated.

For administrative orders requiring a remedial design or remedial action, endangerment assessment determinations are now based on information developed in the site baseline risk assessment. Elements included in the baseline risk assessment conducted at a Superfund site during the RI/FS process fully satisfy the informational requirements of the endangerment assessment. These elements include the following:

- identification of the hazardous wastes or hazardous substances present in environmental media;
- assessment of exposure, including a characterization of the environmental fate and transport mechanisms for the hazardous wastes and substances present, and of exposure pathways;
- assessment of the toxicity of the hazardous wastes or substances present;
- characterization of human health risks; and
- characterization of the impacts and/or risks to the environment.

The human health and environmental evaluations that are part of the RI/FS are conducted for purposes of determining the baseline risks posed by the site, and for ensuring that the selected remedy will be protective of human health and the environment. The endangerment assessment is used to support litigation by determining that an imminent and substantial endangerment exists. Information presented in the human health and environmental evaluations is basic to the legal determination of endangerment.

In 1985, EPA produced a draft manual specifically written for endangerment assessment, the *Endangerment Assessment Handbook*. EPA has determined that a guidance separate from the *Risk Assessment Guidance for Superfund* (*Human Health Evaluation Manual* and *Environmental Evaluation Manual*) is not required for endangerment assessment; therefore, the *Endangerment Assessment Handbook* will not be made final and should no longer be used.

2.2.2 ATSDR HEALTH ASSESSMENTS

CERCLA section 104(i), as amended, requires the Agency for Toxic Substances and Disease Registry (ATSDR) to conduct health assessments for all sites listed or proposed to be listed on the NPL. A health assessment includes a preliminary assessment of the potential threats that individual sites and facilities pose to human health. The health assessment is required to be completed "to the maximum extent practicable" before completion of the RI/FS. ATSDR personnel, state personnel (through cooperative agreements), or contractors follow six basic steps, which are based on the same general risk assessment framework as the EPA human health evaluation:

(1) evaluate information on the site's physical, geographical, historical, and operational setting, assess the demographics of nearby populations, and identify health concerns of the affected community(ies);

(2) determine contaminants of concern associated with the site;

(3) identify and evaluate environmental pathways;

(4) identify and evaluate human exposure pathways;

(5) identify and evaluate public health implications based on available medical and toxicological information; and

(6) develop conclusions concerning the health threat posed by the site and make

recommendations regarding further public health activities.

The purpose of the ATSDR health assessment is to assist in the evaluation of data and information on the release of toxic substances into the environment in order to assess any current or future impact on public health, develop health advisories or other health-related recommendations, and identify studies or actions needed to evaluate and prevent human health effects. Health assessments are intended to help public health and regulatory officials determine if actions should be taken to reduce human exposure to hazardous substances and to recommend whether additional information on human exposure and associated risks is needed. Health assessments also are written for the benefit of the informed community associated with a site, which could include citizen groups, local leaders, and health professionals.

Several important differences exist between EPA human health evaluations and ATSDR health assessments. EPA human health evaluations include quantitative, substance-specific estimates of the risk that a site poses to human health. These estimates depend on statistical and biological models that use data from human epidemiologic investigations and animal toxicity studies. The information generated from a human health evaluation is used in risk management decisions to establish cleanup levels and select a remedial alternative.

ATSDR health assessments, although they may employ quantitative data, are more qualitative in nature. They focus not only on the possible health threats posed by chemical contaminants attributable to a site, but consider all health threats, both chemical and physical, to which residents near a site may be subjected. Health assessments focus on the medical and public health concerns associated with exposures at a site and discuss especially sensitive populations, toxic mechanisms, and possible disease outcomes. EPA considers the information in a health assessment along with the results of the baseline risk assessment to give a complete picture of health threats. Local health professionals and residents use the information to understand the potential health threats posed by specific waste sites. Health assessments may lead to pilot health effects studies, epidemiologic studies, or establishment of exposure or disease registries.

EPA's *Guidance for Coordinating ATSDR Health Assessment Activities with the Superfund Remedial Process* (EPA 1987) provides information to EPA and ATSDR managers for use in coordinating human health evaluation activities. (Section 2.1, in its discussion of CERCLA, provides further information on the statutory basis of ATSDR health assessments.)

2.2.3 ATSDR HEALTH STUDIES

After conducting a health assessment, ATSDR may determine that additional health effects information is needed at a site and, as a result, may undertake a pilot study, a full-scale epidemiological study, or a disease registry. Three types of pilot studies are predominant:

(1) a symptom/disease prevalence study consisting of a measurement of self-reported disease occurrence, which may be validated through medical records if they are available;

(2) a human exposure study consisting of biological sampling of persons who have a potentially high likelihood of exposure to determine if actual exposure can be verified; and

(3) a cluster investigation study consisting of an investigation of putative disease clusters to determine if the cases of a disease are excessively high in the concerned community.

A full-scale epidemiological study is an analytic investigation that evaluates the possible causal relationships between exposure to hazardous substances and disease outcome by testing a scientific hypothesis. Such an epidemiological study is usually not undertaken unless a pilot study reveals widespread exposure or increased prevalence of disease.

ATSDR, in cooperation with the states, also may choose to follow up the results of a health assessment by establishing and maintaining national registries of persons exposed to hazardous substances and persons with serious diseases or

illness. A registry is a system for collecting and maintaining, in a structured record, information on specific persons from a defined population. The purpose of a registry of persons exposed to hazardous substances is to facilitate development of new scientific knowledge through identification and subsequent follow-up of persons exposed to a defined substance at selected sites.

Besides identifying and tracking of exposed persons, a registry also is used to coordinate the clinical and research activities that involve the registrants. Registries serve an important role in assuring the uniformity and quality of the collected data and ensuring that data collection is not duplicative, thereby reducing the overall burden to exposed or potentially exposed persons.

RESPONSE TO LETTER A

Please see Letter A (page D-27) for specific comments.

1. Response: The Health and Safety Plan developed for site remediation includes on-site monitoring and physical control of dust. These two functions of the remedial process will limit the possibility of off-site migration of site-related chemicals. In addition, we have recommended monitoring of on-site air and air at the elementary school during remediation. We have also recommended that the day care center on-site be relocated during site remediation.

There are several other reasons why we do not recommend that the school be closed.

1) Dioxin samples taken in the school yard indicated normal levels for urban soils.

2) Although groundwater at the site is contaminated the school is on public water. This area has been serviced by public water since 1963.

3) Surface soil at the site is minimally contaminated and therefore, there is limited opportunity for contaminated dust to blow off site.

4) The prevailing wind is in the opposite direction of the school.

2. Response: At one time the landfill accepted demolition debris and it is possible that asbestos was contained in the debris. However, capping of the areas would prevent any movement of asbestos off site.

LETTER A

Tracy Shelley
Bureau of Epidemiology and Toxicology
Ohio Department of Health
P.O. Box 118
Columbus, Ohio 43226-0118

Dear Ms Shelley:

We have read the draft Public Health Assessment for the Skinner Landfill and would like to have the following comments included in the public record:

1. Based on the information in the Health Assessment, the children at Union Elementary School should be relocated during the remediation work at the landfill. At the very least, excavation and restabiliztion of any soil or debris at the landfill should only take place during the weeks that the children are on summer break.

2. The Health Assessment has not adequately addressed the possibility that asbestos is present in the Skinner Landfill.

Sincerely,

RESPONSE TO LETTER B (page D-29)

1) and 2) Response: Please see Response number one above concerning Union Township Elementary School.

Certainly, it is true that to find a problem (if it exists) one must look where the highest probability of the health risk lies. Those at highest risk are those people at risk of exposure. However, off-site migration of chemicals is minimal. There may have been some off-site contamination during the 1960's when fires occurred on site. During this time the area was much less populated and the number of potentially exposed people is undoubtedly less than 100. As late as 1980 there were only about 160 people within a half mile radius of the site. A population of 100 people is far too small to use to reasonably study the occurrence of health effects with an extended latency period. Cancer is not a disease that is immediately evident, but rather has a long latency period. Even the single most common form of cancer, breast cancer, only occurs in 1 in 10 women over their lifetime. Risk factors for breast cancer usually do not lead to more than a 30% increase in risk. This means that instead of seeing 5 cases, there would be 6 or 7. Although each case of cancer is a tragedy, it would not be scientifically possible to say that 6 or 7 cases instead of 5 was statistically significant.

Further, it is unlikely that even half of these people could be identified today. Tracking down potential participants and getting them to participate in a study is difficult after 10 years or more so as time goes on.

In addition, pediatric cancer incidence and birth defects were evaluated by request of an area citizen.

4) Response: With the difficulties discussed in the above response, it would be impossible to obtain enough "susceptible" people to study.

5) Please see Response 1 in the response to Letter A.

3/4/93

LETTER B

Tracy Shelley
Bureau of Epidemiology and Toxicology
Ohio Department of Health
P.O. Box 118
Columbus, OH 43226-0118

Ms. Shelley,
The following are my Comments regarding the recent Draft of the Skinner Landfill Public Health Assessment. I am a private citizen and resident of the area of West Chester served by Union Elementary school (our house is about 1.5 miles from the site). I am not affiliated with CLEAN or any other such group.

1. I have serious concerns with the breadth of geographical focus in the assessment. By using Union Township as the potential risk area (instead of, say, a 1/4 mile radius + the elementary students), any "real" increased risk is diluted by at least an order of magnitude. Union Township has 25,000-35,000 residents and covers a significant area (it is served by about 7 elementary schools (hard to keep count as we keep building them), much of which is very far away from the Skinner site. A study to assess the landfill's true risk MUST focus only on the residents in close proximity and the students/employees at the elementary school. While I realize that this makes it more difficult to perform detailed statistical analyses, it is clear that the only way to find a problem (if it exists) is to look in the place (people) where the highest probability of health risk lies. One way to increase the base size is to look at more than 3 years data. The landfill has been there for decades.

2. The study also needs to look at the individuals that have lived near the site and attended Union Elementary school over the years. Not all health effects, like cancer, are immediately evident. The study MUST consider tracing previous students (some are graduated, some at now at Freedom Elementary) over a longer period of time to determine whether there have been long-term health effects. Also, by focusing on students that have attended the school for several years, the diluting effects of new students can be minimized. This will require more than just looking at statistics repositories.

3. The potential link to juvenile diabetes should not be ignored. We need data (similar to above guidelines) for this potential health risk as well.

4. I also need an assessment of potential increased risk for more susceptible population groups. For example, both of my children are asthmatics (my daughter was even hospitalized before she was a year old). Groups like this MUST be considered to give a true picture of the safety of the area, especially the school.

5. The above concerns make me very uncomfortable with the Public Health Assessment. I am a chemical engineer and have some knowledge of organic chemistry and safety issues/practices. When I moved into the area 13 months ago and became aware of the Skinner situation (realtors of course never mentioned it), I frankly was shocked that the elementary school had not been closed years before when the site was placed on the Superfund list. In my opinion, unless a more focused study with a longer-term view addressing the above concerns shows conclusively that there is no risk to students at the school, the school should be closed immediately and the Responsible Parties should replace it (they are already getting off with a cheaper remediation than originally expected).