Health Consultation

Former Dakota County Nike Airbase Site

1462 260th Street
Farmington, Minnesota

Dakota County, Minnesota

March, 1997

Prepared by:

The Minnesota Department of Health
Under Cooperative Agreement with the
Agency for Toxic Substances and Disease Registry

FOREWORD

This document summarizes potential public health concerns at the Former Dakota County Nike Airbase located in Dakota County in Minnesota. It is based on a formal site evaluation prepared by the Minnesota Department of Health (MDH). A number of steps are necessary to do such an evaluation:

- **Evaluating exposure:** MDH scientists begin by reviewing available information about environmental conditions at the site. The first task is to find out how much contamination is present, where it's found on the site, and how people might be exposed to it. Usually, MDH does not collect its own environmental sampling data. We rely on information provided by the Minnesota Pollution Control Agency (MPCA), U.S. Environmental Protection Agency (EPA), and other government agencies, businesses, and the general public.

- **Evaluating health effects:** If there is evidence that people are being exposed—or could be exposed—to hazardous substances, MDH scientists will take steps to determine whether that exposure could be harmful to human health. The report focuses on public health—the health impact on the community as a whole—and is based on existing scientific information.

- **Developing recommendations:** In the evaluation report, MDH outlines its conclusions regarding any potential health threat posed by a site, and offers recommendations for reducing or eliminating human exposure to contaminants. The role of MDH in dealing with individual sites is primarily advisory. For that reason, the evaluation report will typically recommend actions to be taken by other agencies—including EPA and MPCA. However, if there is an immediate health threat, MDH will issue a public health advisory warning people of the danger, and will work to resolve the problem.

- **Soliciting community input:** The evaluation process is interactive. MDH starts by soliciting and evaluating information from various government agencies, the organizations responsible for cleaning up the site, and the community surrounding the site. Any conclusions about the site are shared with the groups and organizations that provided the information. Once an evaluation report has been prepared, MDH seeks feedback from the public. ***If you have questions or comments about this report, we encourage you to contact us***.

Please write to: Community Relations Coordinator
Site Assessment and Consultation Unit
Minnesota Department of Health
121 East Seventh Place/Suite 220
Box 64975
St. Paul, MN 55164-0975

OR call us at: (612) 215-0916 ***or*** 1-800-657-3904
(toll free call—press "4" on your touch tone phone)

I. SUMMARY OF BACKGROUND AND HISTORY

Introduction

The Minnesota Department of Health (MDH) prepared this health consultation to evaluate potential human health hazards from the former Dakota County Nike Airbase and make recommendations to protect public health. This report was prepared after discussions with staff from the former U.S. Bureau of Mines (USBM), Dakota County, the U.S. Army Corps of Engineers and the Minnesota Pollution Control Agency (MPCA). The site is currently being addressed under the MPCA Voluntary Investigation and Cleanup (VIC) program. The portion of the site that includes the former waste water treatment plant (WWTP) is also being addressed under the U.S. Army Corps of Engineers' Formerly Used Defense Sites (FUDS) cleanup program.

The former Dakota County Nike Airbase is located at 1462 260th Street approximately 7 miles southeast of Farmington, Minnesota and 30 miles south of downtown St. Paul (Figure 1). The Airbase is located in a predominately rural area on the outskirts of the Minneapolis/St. Paul Metropolitan area. Dakota County lies in the outer ring suburbs of the metropolitan area and is experiencing rapid population growth.

The Dakota County Nike Airbase was constructed in 1959 in order to intercept high flying enemy aircraft with Nike Missiles armed with a single nuclear warhead. The airbase is one of four constructed to defend the Twin Cities. The battery control area (radar, guidance, electronic and communication systems) for the Dakota County Airbase was located approximately 1 mile northwest of the airbase and is not discussed in this report. The base closed in the 1972 and in 1973 the USBM received ownership and used the base as a research center, referred to as the High Energy Test Site. In fall 1995 the High Energy Test Site was closed. The base is enclosed by a chain link fence with barbed wire atop. Two or three hundred yards south of the enclosed base is the former WWTP used by the U.S. Army.

MDH first became aware of the site in May 1996 when MDH staff responsible for the Hazardous Substances Emergency Events Surveillance System, also managed in cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR), received a hazardous material incident report from the Minnesota Duty Officer. The report was from a local high school teacher whose student observed metallic mercury at the WWTP while off road cycling. Staff from Dakota County Environmental Management visited the site, verified the complaint and contacted the property owners, the U.S. Bureau of Mines. The source of the mercury was a broken mercury bearing in the old trickling filter.

Geology and Hydrogeology

Based on the supply well log, the geology for the main complex consists of glacial drift which extends approximately 20 to 25 feet below ground surface (bgs). Underlying this is the Platteville Limestone formation, which is approximately 10 feet thick on the northern portion of

the main complex and is underlaid by the Glenwood shale formation which is also approximately 10 feet thick. The St. Peter sandstone formation is located below these two formations. At the WWTP the Platteville and Glenwood formations are eroded. Approximately 15 feet of glacial drift is located over the St. Peter Sandstone which extends for approximately 140 feet. Groundwater was found within glacial drift at depths of 10 to 15 feet. Surficial groundwater flow is thought to flow south. Groundwater in the St. Peter Sandstone was detected at 75 feet bgs near the WWTP. The St. Peter Sandstone is the first aquifer encountered capable of producing significant water volume for supply purposes.

Environmental Investigations

MDH completed a report in January 1997 discussing the mercury spill and the subsequent environmental investigation and cleanup being conducted by the USBM and the U.S. Army Corps of Engineers (Appendix I). The report concluded areas likely to have been impacted by the mercury source (the broken mercury bearing) were sampled and analyzed and remediation efforts appear to have addressed or will address any health concerns related to mercury.

In late January 1997 MDH received further soil and groundwater data collected from both the WWTP and the main complex from the USBM (USBM, 1997).

Environmental Investigation at the WWTP

In July and August 1996, mercury sampling was conducted at and near the WWTP to determine the existence and extent of contamination and recommend appropriate remedial activities. Mercury data from this investigation is discussed in Appendix I; all other data are discussed below.

The WWTP consists of three structures in various states of disrepair: the Imhoff tank, the trickling filter, and the final settling tank or clarifier (Figure 2). When operational, waste water flowed from the plant to the imhoff tank for primary settling before processing by the trickling filter. Sludge from the imhoff tank flowed to the sludge drying beds. Water flowed through crushed rock associated with the trickling filter before flowing to the clarifier for secondary settlement and chlorination. After chlorination the wastewater entered manhole 15 which leads to an outfall approximately 1 mile southwest of the WWTP near 270th St. and Akron Ave. (Figure 1).

Samples were collected from the on-site well (water only), Imhoff tank (water and sludge), drying beds (soil), clarifier (water and sludge), sewer treatment plant outfall (soil) and the three hydropunches (FHP 1, 2, 3) identified on Figure 2 (soil and water). Constituents analyzed for in each sample are listed on Table 1.

Groundwater

Detections of contaminants in groundwater at the WWTP are summarized in Table 2. The water sample from the well was taken before it was sealed and abandoned. The well had a depth of 155 feet and was screened in the Prairie du Chein. In addition to the well, groundwater was sampled from the three hydropunches (FHP1, FHP2 and FHP3) identified in Figure 2. Water from FHP 1 was sampled in the surficial aquifer at a depth of approximately 16 feet. Since no water was encountered in the surficial unit from FHP 2 and 3, these samples were taken at approximately 75-80 feet below ground and are from the St. Peter Sandstone Aquifer.

Manganese was detected above its MDH drinking water standard called a Health Risk Limit (HRL). Manganese is found naturally in Minnesota soils. Often manganese can leach from soils into groundwater due to the naturally occurring geo-chemical conditions of the aquifer. Although man-made pollutants can create these geo-chemical conditions, data in this area indicate the manganese is naturally occurring.

No other contaminants were detected above the HRLs with the exception of chloromethane which does not have an established HRL. The estimated concentration of chloromethane was below the U.S. Environmental Protection Agency's health advisory for chloromethane. This advisory recommends water with 3 µg/l or greater not be consumed on a long term basis (U.S. EPA 1993).

Nitrogen (nitrate/nitrite) was detected in FHP 1. Nitrogen in groundwater is often associated with fertilizers and manure. Nearby farm fields and the proximity of the sample to the surface suggest this contaminant is due to agricultural practices in the area.

Soil

Soils at a depth of 15-16 feet were analyzed from hydropunch FHP 1 and 9-11 feet from FHP 2. Surface soil samples from the sludge drying beds (FS1 and FS2) and from FHP 3 were collected between 0-0.5 feet. Soil samples were also conducted at depth from FS 1 and FS 2. In addition, a soil sample was taken from a depth of 6 to 12 inches the at the discharge point for the sewage treatment plant approximately 1 mile southwest of the WWTP.

The soil data was compared to MPCA's health based draft Soil Reference Values (SRVs). SRVs were established by the MPCA as a working draft in April 1996. They are used to determine acceptable concentrations of contaminants for unrestricted land use by both adults and children. The average soil contaminant concentration for a given exposure area is not to exceed its SRV. SRVs consider exposure pathways for incidental soil/dust ingestion, dermal contact and inhalation of vapors and suspended particulates. At a site with multiple chemicals present, the cumulative risk must be evaluated for carcinogens or chemicals with similar toxicological target endpoints if SRVs are used to determine safe cleanup levels. Cumulative risk for multiple soil contaminants was not evaluated in this document. SRVs are used in these documents for comparison with detected concentrations in order to better identify those contaminants which are more likely to represent a health concern, not to establish clean-up levels.

Only manganese and mercury were detected at concentrations greater than MPCA's Draft SRVs (Table 3). Manganese was detected above its SRV at a depth of approximately 10 feet from FHP 1. This sample is unlikely to represent a health concern given the depth at which it was detected and is likely to represent levels of manganese naturally found in the soil. The mercury detections are discussed in Appendix 1.

Soils were also analyzed for Diesel Range Organics (DRO). Surface soil at FS2 was detected above levels based on MPCA guidelines. As part of the remediation efforts at the WWTP, this soil is to be removed and properly disposed.

Water and Sludge in Imhoff and Clarifier Tanks

Mercury and other metals were detected in the sludge of both the clarifier and the Imhoff tank at concentrations that exceeded criteria values identified by the USBM (USBM 1997). A planned removal and proper disposal of both the sludge and the water is anticipated to occur in spring 1997.

Environmental Investigation at the Main Complex

Groundwater

Nine hydropunches were completed at the main complex in areas where groundwater contamination was thought to be most likely to exist. In addition, the 420 foot water supply well for the main complex was sampled. This well, which is currently not being used, has on open hole in the Jordan Aquifer.

FHP 4, 5, 6, 10, 11 and 12 were completed near discharge wells which accept water pumped from sumps within the missile pits (Figure 4). The discharge wells are believed to exist within the Platteville formation at a depth greater than 37 feet (MDH 1997). Five of these borings were drilled to the Platteville Limestone Bedrock to ensure sufficient groundwater for sampling. FHP 11, despite encountering bedrock, did not yield groundwater for sampling. The sixth boring, FHP 12, encountered sufficient groundwater at 20 feet below ground surface (bgs) in glacial drift material. All six borings were completed to a depth of between 20 and 25 feet bgs.

Hydropunches FHP 7 and 8 were conducted in the area of a septic tank and drain field installed by the USBM. FHP 7 was drilled to a depth of 17 feet bgs where water was encountered in glacial drift material. FHP 8 was drilled to a depth of 25 feet bgs where groundwater within the Platteville Limestone Bedrock was sampled. Finally, FHP 9 was drilled 30 feet east of an acid neutralizing pit containing limestone media. This pit is located near Building 156 - the former warhead building (Figure 4). FHP 9 was drilled to a depth of 15 feet bgs and water was sampled from within glacial drift materials.

The constituents groundwater samples were analyzed for are listed in Table 1. No contaminants were detected above the HRLs (Table 1).

Soils

Soil samples were collected from five of the borings drilled for the hydropunches (FHP 7, 8, 9, 10, 11). Chemical analysis was conducted on surface soil (0-0.5 feet) for FHP 10 and 11. Soil samples from FHP 7, 8 and 9 were at depths from 4 to 11 feet bgs. An additional surface soil sample (FS3) was collected in a ditch down gradient of the discharge wells (Figure 4). No contaminants were detected above MPCA Draft SRVs (Table 5).

Photoionization detector (PID) readings were conducted on soil samples during the drilling of FHP 4, 5, 6, and 8. The highest detection was 3 ppm from a soil sample collected at FHP 5 from a depth of approximately 5 feet.

II. Discussion

Available data indicate exposure to site contaminants at levels of health concern is unlikely. With the exception of mercury in sludge and soil at the WWTP, little or no contamination was detected in groundwater and surface soil samples from areas where contamination is most likely to exist given our knowledge of past site activities. These results agree with investigations at other Nike Airbases where typically no contamination or contamination on a very localized scale has been detected (LES, no date). The clean-up of mercury contamination has already begun and is expected to be completed in spring 1997.

It should be noted that there are numerous instances at Nike Airbases similar to the Former Dakota County Airbase where convenient, open areas on or near the site were used for dumping of any and all waste. Excess wastes, including hazardous wastes, that were on hand during base closings but not inventoried were routinely dumped (ES&E 1984). Therefore, although areas most likely to be contaminated were investigated, the possibility of contamination existing at other areas on or near the site cannot be entirely discounted.

Groundwater contamination detected in hydropunches at both the main complex and the WWTP was well below levels of health concern. Contaminants detected in surface soil and soil at depth are unlikely to present a health concern, nor do they indicate a potential for serious groundwater contamination. The nearest drinking water wells are likely to be residential wells approximately a half mile or more from the site. Given the distance from the base and the low levels of contaminants found in groundwater, these residential wells are unlikely to be impacted by the site.

At least one of the discharge wells associated with the sump pump system for the missile bunkers was reportedly obstructed (MDH 1997a). This well may be obstructed due to a collapsed casing. Those wells with a collapsed casing should be properly abandoned as stated in the MDH Well Code.

Lead paint (paint with lead concentrations $\geq$ 5,000 ppm) was detected in many of the buildings within the main complex. Depending on the future use of these buildings, restoration may need

to be conducted to ensure occupants are not exposed to unsafe concentrations of lead. In addition, asbestos was identified in buildings on the main complex. Damaged floor tile in several building will reportedly be removed (MDH 1997b). Any asbestos management plan conducted by future owners will need to comply with MDH Asbestos Abatement Rules.

Nuclear warheads were stored at the airbase during is operation. Periodic wipe test were required to ensure radioactive leaks were not occurring from the warheads. Radioactive material was reportedly removed in accordance with U.S. Atomic Energy Commission requirements. No instances of radioactive releases from any Nike Airbase were reported (ES&E, 1984 and LES, no date).

III. Conclusions

< The former Dakota County Nike Airbase is located approximately 7 miles southeast of Farmington, Minnesota and 30 miles south of downtown St. Paul. The Airbase is located in a predominately rural area on the outskirts of the Minneapolis/St. Paul Metropolitan area. The airbase is one of four constructed in the Twin Cities Area around 1960 in order to intercept high flying enemy aircraft with Nike Missiles armed with a single nuclear warhead. The base closed in the 1972 and in 1973 the USBM received ownership and used the base as a research center until fall 1995 when the USBM was closed. Two or three hundred yards south of the enclosed base is the former WWTP used by the U.S. Army.

< The site is currently being address under the MPCA Voluntary Investigation and Cleanup (VIC) program. The portion of the site that includes the former WWTP is also being addressed under the U.S. Army Corps of Engineers' Formerly Used Defense Sites (FUDS) cleanup program.

< MDH completed a report in January 1997 discussing the mercury spill and the subsequent environmental investigation and cleanup being conducted by the USBM and the U.S. Army Corps of Engineers. The report concluded areas likely to have been impacted by the mercury source (the broken mercury bearing) were sampled and analyzed and remediation efforts appear to have addressed or will address any health concerns related to mercury. MDH received further soil and groundwater data collected from both the WWTP and the main complex from the USBM which is summarize and evaluated in this report.

< Available data indicate exposure to site contaminants in soil and groundwater at levels of health concern is unlikely. With the exception of mercury in sludge and soil at the WWTP, little or no contamination was detected in groundwater and surface soil samples conducted in areas where contamination is thought most likely to exist. The clean-up of mercury contamination has already begun and is expected to be completed in spring 1997.

< Groundwater contamination detected in hydropunches at both the main complex and the WWTP were well below levels of health concern. The nearest drinking water wells are likely to be residential wells approximately a half mile or greater from the site. Given their distance from the base and the low levels of contaminants found in groundwater, these residential wells are unlikely to be impacted by the low levels of contamination detected on site.

< Potential exposure to lead in lead paint and asbestos in building materials exists for those on site. Depending on the future use of these buildings, restoration may need to be conducted to ensure occupants are not exposed to unsafe concentrations of lead or asbestos.

< Nuclear warheads were stored at the airbase during is operation. No instances of radioactive leaks at the base were reported during its operation and radioactive material was reportedly properly removed upon base closure.

IV. Recommendations

< MDH will complete a fact sheet summarizing this report and the MDH Summary Document discussing the mercury release at the WWTP. This fact sheet will be distributed to residences near the base as well as other interested individuals or organizations.

< MDH will distribute this document to the USBM and appropriate county and state officials as well as others who request it.

< MDH will determine the potential for a mercury release from WWTPs associated with the other two nike airbases in Minnesota.

< Those discharge wells associated with the sump pump system for the missile bunkers that have collapsed should be properly abandoned as stated in the MDH Well Code.

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Bob Dempsey
U.S. Army Corps of Engineers
tel: (612) 290-5443

V. Documents Reviewed

Conestoga-Rovers & Associates (CRA) 1996. Evaluation of Potential Mercury Impact Former Sewer Treatment Plant. September 18, 1996.

Environmental Science and Engineering Inc. (ES&E) 1984. Historical Overview of the Nike Missile System, December 1984.

Law Environmental Services (LES) no date. The NIKE Missile Site Investigation Program. Atlanta, Georgia.

Minnesota Department of Health (MDH) 1996a. Phone Conversation with Bob Dempsey, U.S. Army Corps of Engineers. December 12, 1996.

MDH 1996b. Phone Conversation with Jim Olson, Department of Interior, December 13, 1996.

MDH 1996c. Memo: Nike Airbase Site Visit. July 24, 1996.

MDH 1997a, Personal communication with Vanessa Olson, Dakota Co. February 10, 1997.

MDH 1997b. Personal communication with Jim Olson, USBM. February 10, 1997.

Minnesota Pollution Control Agency (MPCA) 1996. Draft Site Screening Evaluation Guidelines. April 1996.

United States Bureau of Mines (USBM) 1997. Phase II Environmental Site Assessment USBM Facilities - Twin Cities Research Center, Building 201 Laboratory, High Energy Test Site. January 1997.

U.S. Environmental Protection Agency (EPA) 1993. Drinking Water Regulations and Health Advisories. May 1993.

CERTIFICATION

This Former Dakota County Nike Airbase site Health Consultation was prepared by the Minnesota 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 health consultation was begun.

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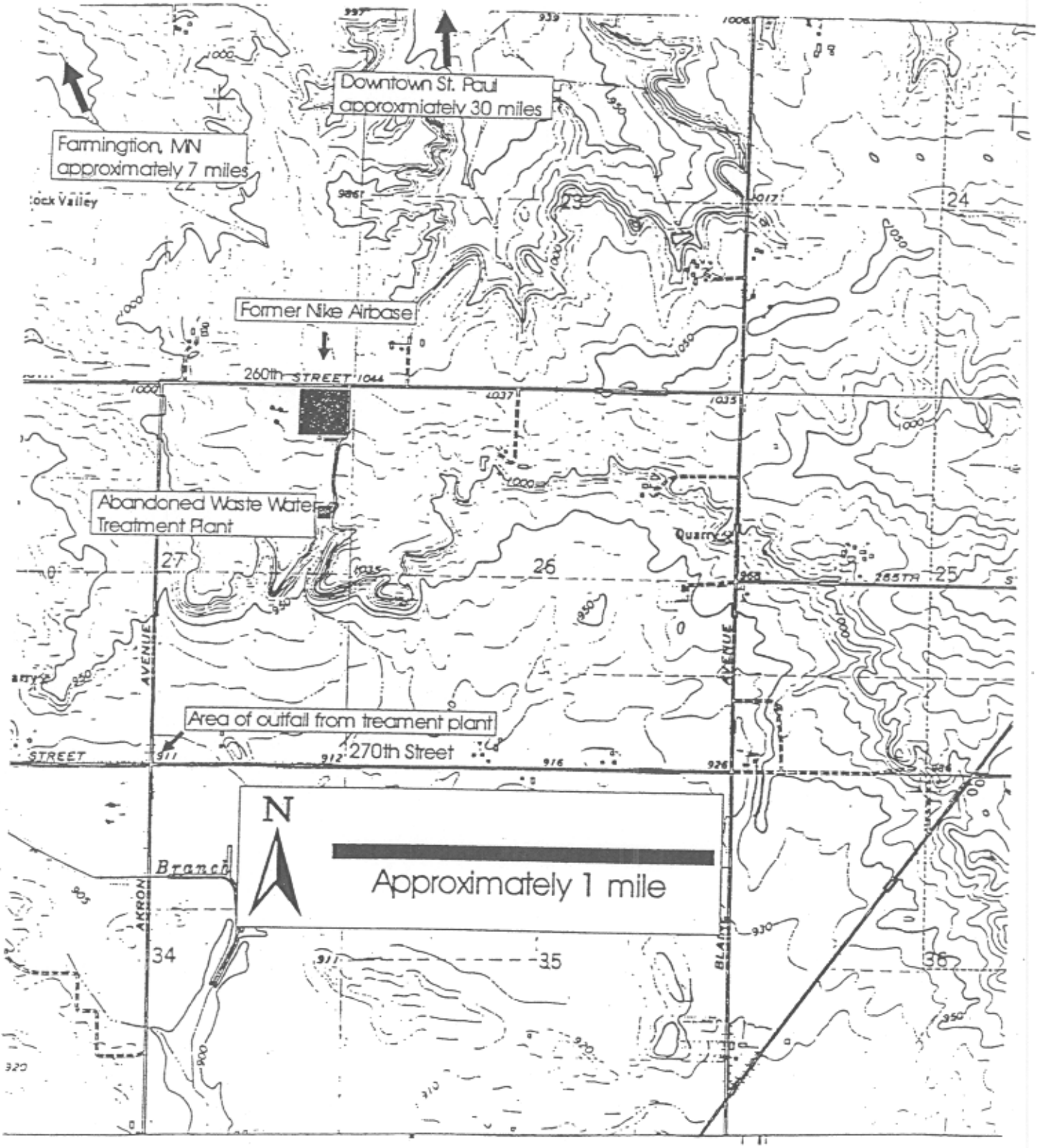
Technical Project Officer
Superfund Site Assessment Branch (SSAB)
Division of Health Assessment and Consultation (DHAC)
ATSDR

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

Richard E. Gillig, M.C.P.
Chief, SPS, SSAB, DHAC, ATSDR

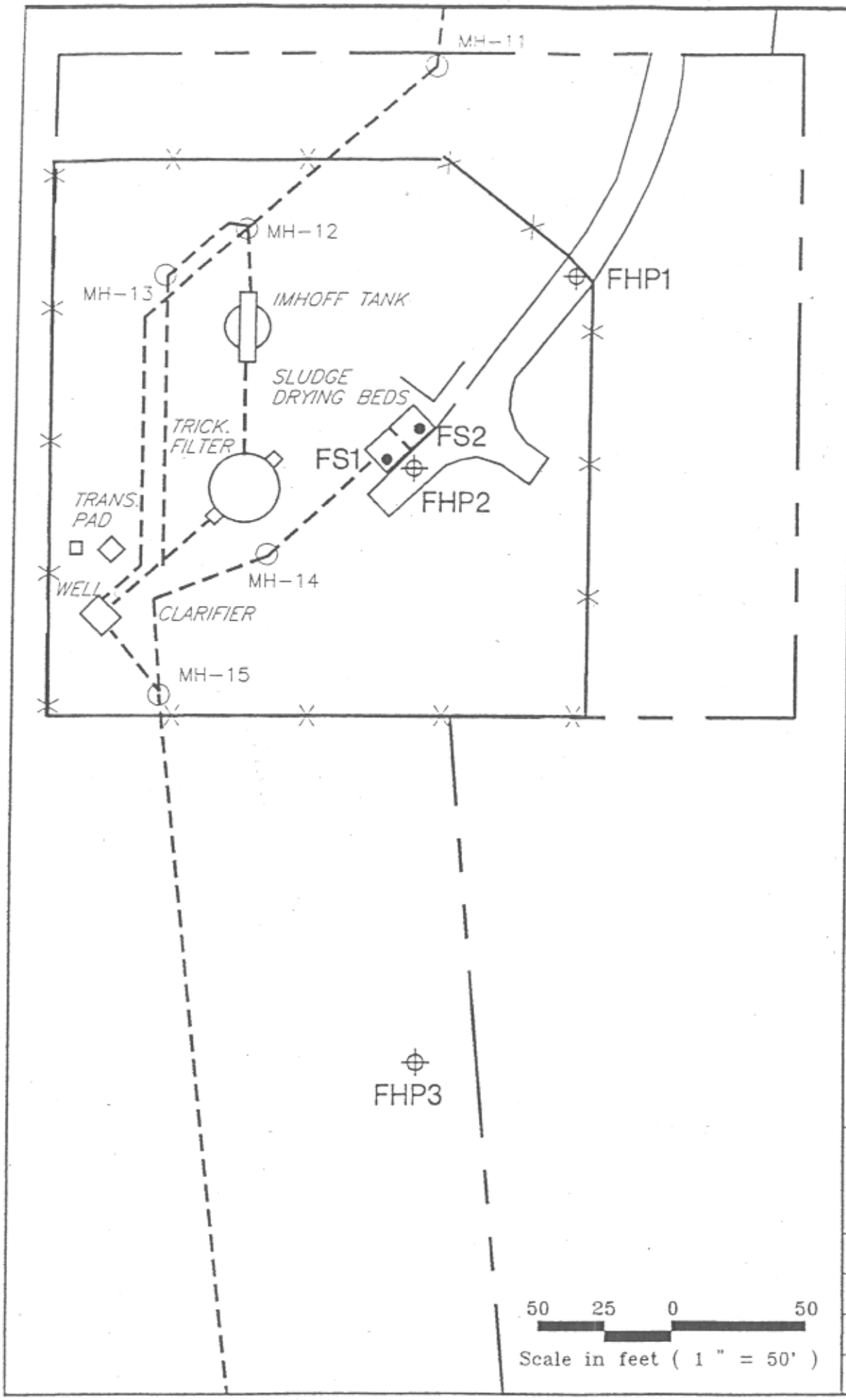
Figure 1: Former Dakota County Nike Airbase and Surrounding Arec



* Map Derived from USGS Quandrangle Map, 1974

Figure 2: Location of Hydropunches and Soil Samples Conducted at the WTTP *

*Figure from USBM 1997



RANI ENGINEERING, INC.
ST. PAUL, MN

U.S. BUREAU OF MINES
FARMINGTON SEWAGE TREATMENT PLANT
SOIL / WATER / SEDIMENT SAMPLE LOCATIONS

NORTH

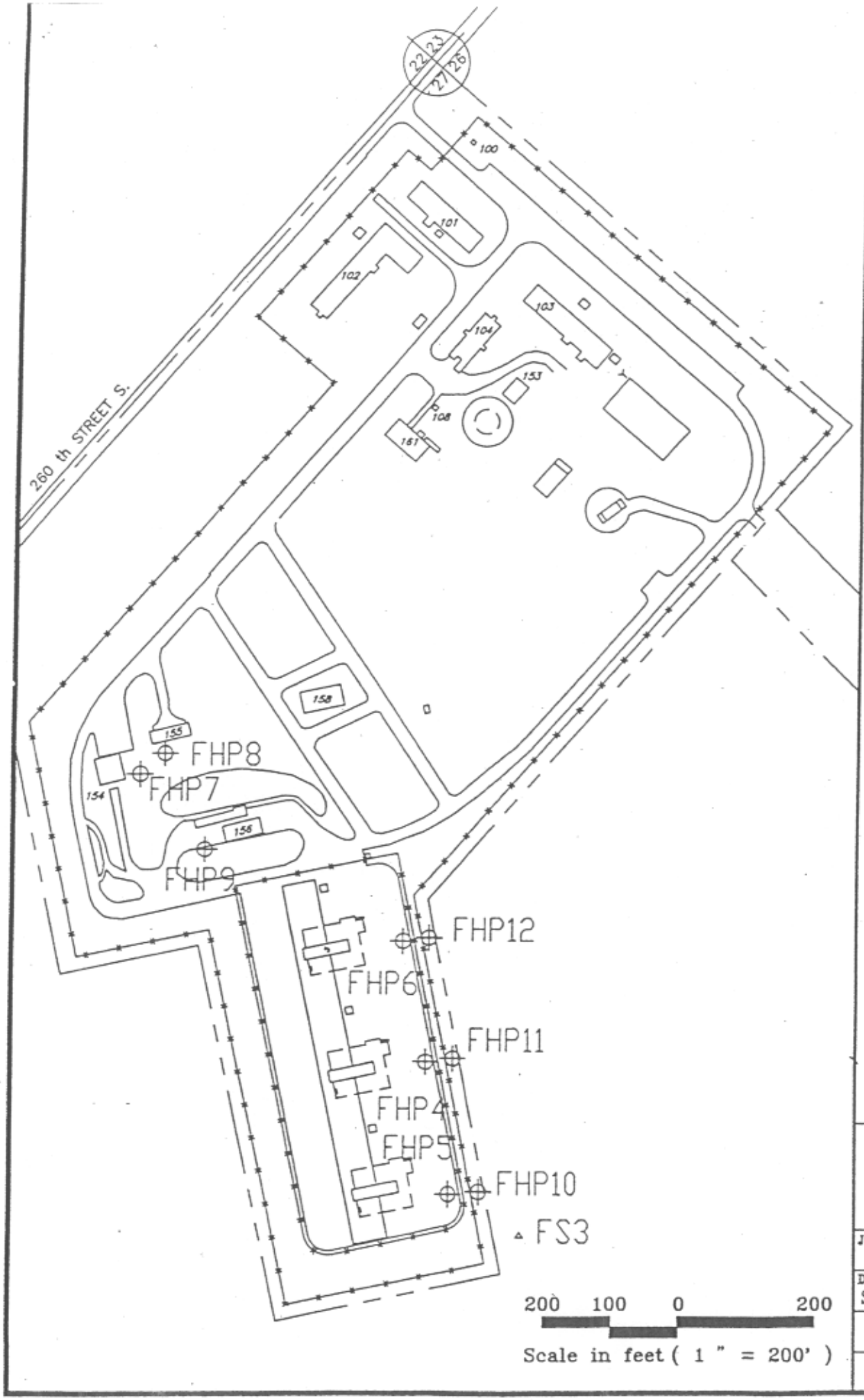
JOB NO. 60310

DATE SEPT. 1996

FIG 38

Figure 3: Location of Hydropunches and Soil Samples Conducted at the Main Complex *

* Figure from USBM 1997



RANI ENGINEERING, INC.
ST. PAUL, MN

U.S. BUREAU OF MINES
FARMINGTON ADMINISTRATION / FORMER MISSILE STORAGE
SOIL / WATER SAMPLE LOCATIONS

NORTH

JOB NO. 60310

DATE SEPT. 1996

FIG 36

Table 1: Analytical Summary of Sampling Conducted at Site *

* Table from USBM 1997

[redacted]

Sample Analytical Summary

Sampling Locations	Sampling Numbers	VOC (full)	VOC (BTEX only)	BNA (full)	BNA (PAH only)	Pesticides & PCB	PCB only	Pesticides Only	Diesel Range Organics (DRO)	Metals	Metals (Lead Only)	General Chemistry	Cyanide (Total)
BUILDING 201													
Unregistered Wells													
1) Groundwater	BH1	X		X					X	X		X	X
FARMINGTON													
Sewage Treatment Plant													
1) Sludge (Imhoff)		X				X			X	X		X	X
2) Sludge (Clarifier)		X								X			
3) Soil (Drying bed surface)	FS1, FS2	X		X				X	X	X		X	X
4) Soil (Drying bed subsurface)	FS1, FS2	X		X						X			
5) Soil (Boring)	FHP1,2,3	X		X		X			X	X		X	X
6) Sediment (Outfall pipe)		X								X			
7) Water (Imhoff)		X		X				X	X	X		X	X
8) Water (Clarifier)		X		X				X	X	X		X	X
9) Groundwater	FHP1,2,3	X		X				X	X	X		X	X
Well Abandonment													
1) Groundwater	Treatment Plant Well	X		X				X	X	X		X	X
Missile Storage Drainage System (sumps)													
1) Soil (Surface)	FS3	X		X				X	X	X		X	X
2) Soil (Boring)	FHP10,11	X		X		X			X	X		X	X
3) Groundwater	FHP4-6,10,12	X		X				X	X	X		X	X

[redacted]

Sample Analytical Summary

Sampling Locations	Sampling Numbers	VOC (full)	VOC (BTEX only)	BNA (full)	BNA (PAH only)	Pesticides & PCB	PCB only	Pesticides Only	Diesel Range Organics (DRO)	Metals	Metals (Lead Only)	General Chemistry	Cyanide (Total)
Septic System (Builiding 154)													
1) Soil (Boring)	FHP7,8	X		X		X			X	X		X	X
2) Groundwater	FHP7,8	X		X				X	X	X		X	X
Acid Neutralizing Pit (Building 156)													
1) Soil (Boring)	FHP9	X		X		X			X	X		X	X
2) Groundwater	FHP9	X		X				X	X	X		X	X
Supply Well (Building 153)													
1) Groundwater		X		X				X	X	X		X	X

Notes:

BNA	Base Neutral Acids
BTEX	Benzene, Toluene, Ethylbenzene, Xylenes
General Chemistry	Chloride, Nitrogen, and Sulfate
PAH	Polynuclear Aromatic Hydrocarbons
PCB	Polychlorinated Biphenyls
VOC	Volatile Organic Compounds

Table 2: Contaminants Detected in Groundwater at the WWTP (µg/l)

Contaminant	MDH HRL	Sealed Well	FHP 1	FHP 2	FHP 3
Bis(2-ethylhexyl)phthalate*	20	14	N/D	12	11
Manganese	100	N/D	N/D	1100	360
Pyrene	200	N/D	N/D	1.9**	N/D
Nitrogen (Nitrate/Nitrite)	10,000	N/D	5000	N/D	N/D
Acetone	700	N/D	N/D	51	41
Benzene	10	N/D	N/D	0.48**	2.2
Methyl Ethyl Ketone	4000	N/D	N/D	4.3**	5.2
Chloromethane	N/E	N/D	N/D	N/D	0.59**

N/D = None Detected
N/E = None Established
* Common Laboratory Contaminant
** Estimated Concentration

Table 3: Contaminants Detected in Soils at the WWTP (mg/kg)

Contaminant Detected	MPCA Draft SRV	FHP 1	FHP 2	FHP 3	FS 1	FS 2	Outlet Pipe
Benzo(a)pyrene	20	N/D	N/D	0.2 **	N/D	N/D	N/A
Benzo(a)anthracene	20	N/D	N/D	0.2 **	N/D	N/D	N/A
Benzo(b)fluoranthene	20	N/D	N/D	0.9 **	N/D	N/D	N/A
Benzo(g,h,i)perylene	N/E	N/D	N/D	0.2 **	N/D	N/D	N/A
Benzo(k)fluoranthene	200	N/D	N/D	0.2 **	N/D	N/D	N/A
Bis(2-ethylhexyl)phthalate	N/E	N/D	N/D	0.3 **/*	N/D	N/D	N/A
Chrysene	2000	N/D	N/D	N/D	0.4 **	N/D	N/A
Fluoranthene	1080	N/D	N/D	N/D	0.5 **	N/D	N/A
Indeno(1,2,3-cd)pyrene	20	N/D	N/D	N/D	0.2 **	N/D	N/A
Phenanthrene	N/E	N/D	N/D	N/D	0.2 **	N/D	N/A
Pyrene	800	N/D	N/D	N/D	0.5 **	N/D	N/A
Aluminum	30,000	2091	7572	9287	6187	6404	6110
Arsenic	12	6.4	5.6	5.3	4.7	4.5	3.3
Barium	2300	37	123	102	412	274	62
Cadmium	26	N/D	N/D	N/D	3.4	6.1	N/D
Chromium (total)	126 (Chromium VI)	6.0	12	13	46	33	10
Cobalt	2000	N/D	7.4	6.0	N/D	N/D	N/D
Copper	1300	5.1	10	9.8	357	273	11
Lead	400	N/D	N/D	N/D	250	150	N/D
Manganese	1100	583	**1207**	574	658	380	453
Mercury	1	N/D	N/D	N/D	**51**	**29**	0.58
Nickel	520	9.6	16	12	31	17	11
Selenium	174	N/D	N/D	N/D	6.2	1.3	N/D
Silver	174	N/D	N/D	N/D	8.6	4.7	N/D
Vanadium	210	12	25	24	N/D	17	17
Zinc	10,000	22	47	48	716	852	59

N/D = None Detected
N/E = None Established
* Common Laboratory Contaminant
** Estimated Concentration

Table 4: Contaminants Detected in Groundwater at the Main Complex (µg/l)

Contaminant Detected	MDH HRL	Supply Well (Bldg 153)	FHP4	FHP5	FHP6	FHP7	FHP8	FHP9	FHP10	FHP12
bis(2-ethylhexyl) phthalate *	20	N/D	N/D	N/D	6.8 **	N/D	N/D	N/D	11 ** (duplicate only)	N/D
Benzo(a) anthracene	N/E	N/D	N/D	N/D	N/D	N/D	N/D	N/D	1.2**	N/D
Barium	2000	N/D	N/D	N/D	N/D	220	N/D	N/D	N/D	N/D
Cyanide (total)	100 (free cyanide)	N/D	N/D	N/D	N/D	9.0	N/D	6.0	N/D	N/D
Manganese	100	28	N/D	42	N/D	N/D	N/D	N/D	24	41
Acetone *	700	7.1 **	1.4 **	35	3.7 **	1.8 **	10	2.4 **	N/D	4.9 **
Benzene	10	N/D	N/D	3.0	N/D	N/D	N/D	N/D	N/D	N/D
Ethyl benzene	700	N/D	N/D	1.1	N/D	N/D	N/D	N/D	N/D	N/D
Methyl ethyl ketone *	4000	N/D	N/D	4.0 **	N/D	N/D	N/D	N/D	N/D	N/D
Methylene Chloride	50	N/D	N/D	N/D	N/D	N/D	1.1	N/D	N/D	N/D

N/D = None Detected
N/E = None Established
* Common Laboratory Contaminant
** Estimated Concentration

Table 5: Contaminants Detected in Soils at the Main Complex (mg/kg)

Contaminant Detected	MPCA Draft SRV	FHP 7	FHP 8	FHP 9	FHP 10	FHP 11	FS3
Anthracene	8000	N/D	N/D	N/D	0.242**	N/D	0.273 **
Benzo(a) anthracene	20	N/D	N/D	N/D	1.209	0.198 **	0.675 **
Benzo(a)pyrene	2	N/D	N/D	N/D	1.814	0.260 **	0.498
Benzo(b) fluoranthene	20	N/D	N/D	N/D	2.418	0.371 **	0.983
Benzo(g,h,i) perylene	N/E	N/D	N/D	N/D	1.064	0.173 **	0.438
Benzo(k) fluoranthene	200	N/D	N/D	N/D	0.846	0.148 **	0.237 **
Acenapththene	2000	N/D	N/D	N/D	N/D	N/D	0.076 **
Bis(2-ethylhexyl) phthalate *	625	N/D	N/D	N/D	0.544 **	0.297 **	N/D
Carbazole	N/E	N/D	N/D	N/D	0.218 **	N/D	0.088 **
Chrysene	2000	N/D	N/D	N/D	1.693	0.272 **	0.581
Dibenzo(a,h) anthracene	N/E	N/D	N/D	N/D	0.254 **	N/D	0.055 **
Fluoranthene	1080	N/D	N/D	N/D	3.990	0.655	1.422
Fluorene	1140	N/D	N/D	N/D	N/D	N/D	0.078 **
Indeno(1,2,3-cd) pyrene	20	N/D	N/D	N/D	0.943	0.161 **	0.379 **
Phenanthrene	N/E	N/D	N/D	N/D	1.814	0.260 **	0.889
Pyrene	800	N/D	N/D	N/D	2.660	0.408	1.185
Aluminum	30,000	3388	3275	12,069	13,301	13,844	6813
Arsenic	12	6.9	2.6	8.7	6.7	6.7	5.5
Barium	2300	77	34	140	97	98	81
Chromium (total)	126 (Chromium VI)	9.8	10	18	20	21	12
Cobalt	2000	7.8	N/D	8.1	7.4	9.4	6.2

Table 5 (continued): Contaminants Detected in Soils at the Main Complex (mg/kg)

Contaminant Detected	MPCA Draft SRV	FHP 7	FHP 8	FHP 9	FHP 10	FHP 11	FS3
Copper	1300	12	13	11	13	13	11
Lead	400	N/D	N/D	N/D	28	14	25
Manganese	1100	814	170	580	520	444	466
Nickel	520	30	15	18	16	19	12
Selenium	174	N/D	N/D	0.61	N/D	N/D	N/D
Vanadium	210	17	17	34	36	38	22
Zinc	10,000	32	326	46	351	145	480

N/D = None Detected
N/E = None Established
* Common Laboratory Contaminant
** Estimated Concentration

Appendix I: Draft Summary Document for the Former Dakota County Nike Airbase Site

Summary Document

Former Dakota County Nike Airbase Site

1462 260th St.
Farmington, Dakota County, Minnesota

December 1996

Prepared by:

The Minnesota Department of Health Under Cooperative Agreement with the Agency for Toxic Substances and Disease Registry

Site History and Background

The former Dakota County Nike Airbase is near 1462 260th Street approximately 7 miles southeast of Farmington, Minnesota and 30 miles south of downtown St. Paul (Figure 1). The Airbase is located in a predominately rural area on the outskirts of the Minneapolis/St. Paul Metropolitan area. Dakota County lies in the outer ring suburbs of the metropolitan area and is experiencing rapid population growth.

The Nike Airbase was constructed in 1959 in order to intercept enemy air attacks. The base closed in the 1972 and in 1973 the U.S. Bureau of Mines (USBM) received ownership and used the base as a research center until fall 1995 when the USBM was closed. Two or three hundred yards south of the enclosed base is an abandoned waste water treatment plant used by the army (WWTP). Environmental investigations are being conducted on both the base and the WWTP.

The Minnesota Department of Health (MDH) first became aware of the site in May 1996 when MDH staff responsible for the Hazardous Substances Emergency Events Surveillance System, also managed in cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR), received a hazardous material incident report from the Minnesota Duty Officer. The report was from a local high school teacher whose student observed metallic mercury at the WWTP while off road cycling. The source of the mercury was a broken mercury bearing in the old trickling filter.

The mercury spill is being addressed under the U.S. Army Corps of Engineers' Formerly Used Defense sites (FUDS) clean-up program. This document will address clean-up activities related to the mercury spill only. Other site related issues at the WWTP and the base itself will be addressed as environmental investigations are completed and more data is available. Staff from Dakota County, the U.S. Department of Interior, the U.S. Army Corps of Engineers, the Minnesota Pollution Control Agency (MPCA) and Conestoga-Rovers & Associates (CRA) were consulted for this report.

Environmental Investigations

In July and August 1996, mercury sampling was conducted at and near the WWTP to determine the extent of mercury contamination and recommend appropriate remedial activities (CRA, 1996). The WWTP consists of three structures in various states of disrepair: The imhoff tank, the trickling filter, and the final settling tank or clarifier (Figure 2). When operational, waste water flowed from the plant to the imhoff tank for primary settling before processing by the trickling filter. Sludge from the imhoff tank would flow to the sludge drying beds. Water would flow through crushed rock associated with the trickling filter before flowing to the clarifier for secondary settlement and chlorination. After chlorination the wastewater entered manhole 15 which leads to an outfall approximately 1 mile southwest of the WWTP near 270th St. and Akron Ave. (Figure 1).

Total mercury samples were completed from the on-site well (water only), Imhoff tank (water and sludge), drying beds (soil), clarifier (water and sludge), sewer treatment plant outfall (soil) and the three hydropunches identified on Figure 2 (soil and water). Sludge samples were reported on a wet basis and converted to dry weight. The results are summarized on Table 1.

Mercury was detected in the sludge from both the clarifier and the imhoff tank and top six inches of the drying bed. Mercury was detected in a few soil samples from the sludge drying beds at depths greater than 6 inches. These samples were detected as high as 1 mg/kg.

Toxicity characteristic leaching procedure (TCLP) was conducted on sludge from the clarifier. No mercury was detected. No mercury was detected in soil samples taken from two hydropunches at depth and a third at the surface. Mercury was detected at 0.57 mg/kg in a single soil sample near the outfall.

No mercury was detected in the water samples from hydropunches or the on-site well which has since been properly abandoned. Mercury was detected at low levels in water from the imhoff and clarifier tanks.

Discussion

In November 1996 the mercury remaining in the trickling filter bearing and the crushed rock associated with the filter, were properly disposed. The crushed rock was contained in a six inch thick concrete basin which did not appear to be cracked. Mercury at the bottom of this basin was properly disposed of, along with the concrete basin itself (MDH 1996a).

Mercury is not very mobile in soil and therefore it is not surprising that detections of mercury dropped dramatically at depths greater than 6 inches in the sludge drying beds (ATSDR 1994). Detections at depths lower than 6 inches were at 1 mg/kg or less which is at or below its MPCA draft Soil Reference Value (SRV) of 1 mg/kg. SRVs are concentrations of contaminants in soil that can be used as guidelines for unrestricted land use (MPCA 1996).

Available data from sampling conducted in those areas likely impacted by the broken bearing indicate remediation efforts will address any health concerns related to mercury. Removal and proper disposal of the imhoff and clarifier tanks and approximately the top six inches of surficial soil from the sludge drying bed are expected to be completed early next year. Removal of the tanks will include proper disposal of the sludge and water within them and the soil in the sludge drying bed will be retested after disposal of the surficial soil layer to ensure significant concentrations of mercury do not remain (MDH 1996a).

The manhole will be closed as part of the clean-up plan (MDH 1996a). Mercury was detected in soil at the manhole outfall at 0.57 mg/kg. This is below the MPCA Draft SRV for mercury of 1 mg/kg but above the MPCA draft Ecological Soil Screening Criteria for direct contact of 0.1 mg/kg (MPCA 1996). It is likely the detection represents the highest concentration of mercury in

the area since it was taken near the outfall, however, it is not currently possible to substantiate this without further sampling. If mercury from the outfall could impact more than a half acre near this outfall it may influence area wildlife.

The planned removal of the clarifier and imhoff tanks, surficial soil on the sludge drying bed and the sealing of the manhole may be delayed till early next year due to frozen ground conditions. Both structures associated with the settling tanks have been secured to restrict access until their removal (MDH 1996b).

While clean-up efforts addressing the mercury release are being completed, soil and groundwater data for other metals and organics has been collected at the WWTP site and the airbase. These data have yet to be reviewed by MDH.

Conclusions

- The former Dakota County Nike Airbase is located, approximately 30 miles south of downtown St. Paul in a predominately rural area on the outskirts of the Minneapolis/St. Paul Metropolitan area (Figure 1). The base closed in the 1973 after which the USBM used the base as a research center until fall 1995. Two or three hundred yards south of the enclosed base is an abandoned WWTP. Environmental investigation are being conducted on both the base and the WWTP.

- In May 1996 when MDH staff responsible for the Hazardous Substances Emergency Events Surveillance System received a hazardous material incident report from the Minnesota Duty Officer about a metallic mercury spill at the WWTP. The mercury spill is being addressed under the U.S. Army Corps of Engineers' FUDS clean-up program.

- Mercury sampling was conducted at and near the WWTP to determine the extent of mercury contamination and recommend appropriate remedial activities. The results are summarized on Table 1. Mercury was detected in the sludge the from both the clarifier and the imhoff tank as well as the top six inches of the drying bed.

- Available data indicate areas likely to have been impacted by the mercury source (the broken mercury bearing) were sampled and analyzed. Remediation efforts appear to have addressed or will address any health concerns related to mercury.

- While clean-up efforts addressing the mercury release have been or will be completed, soil and groundwater data for other metals and organics have been collected for both the WWTP site and the airbase itself. These data have yet to be reviewed by MDH.

Recommendations

- MDH will review further groundwater and soil data for the former Dakota County Nike

Airbase when it becomes available. After this data has been reviewed MDH, will complete a Health Consultation summarizing the site as whole.

- MDH will complete a fact sheet summarizing the Health Consultation. This fact sheet will be distributed to local residences.

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Document Reviewed

Conestoga-Rovers & Associates (CRA) 1996. Evaluation of Potential Mercury Impact Former Sewer Treatment Plant. September 18, 1996.

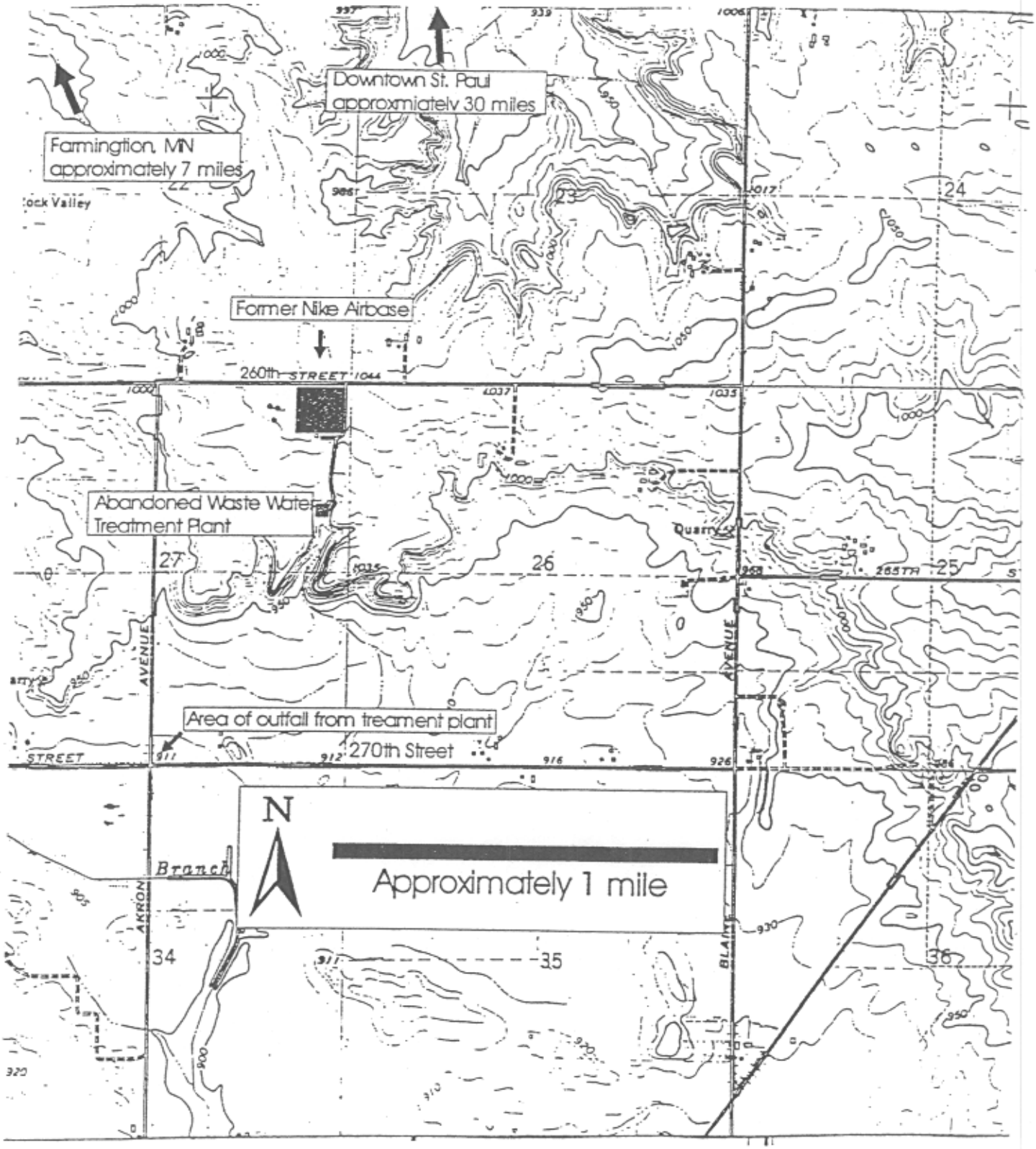
Minnesota Department of Health (MDH) 1996a. Phone Conversation with Bob Dempsey, U.S. Army Corps of Engineers. December 12, 1996.

MDH 1996b. Phone Conversation with Jim Olson, Department of Interior, December 13, 1996.

MDH 1996c. Memo: Nike Airbase Site Visit. July 24, 1996.

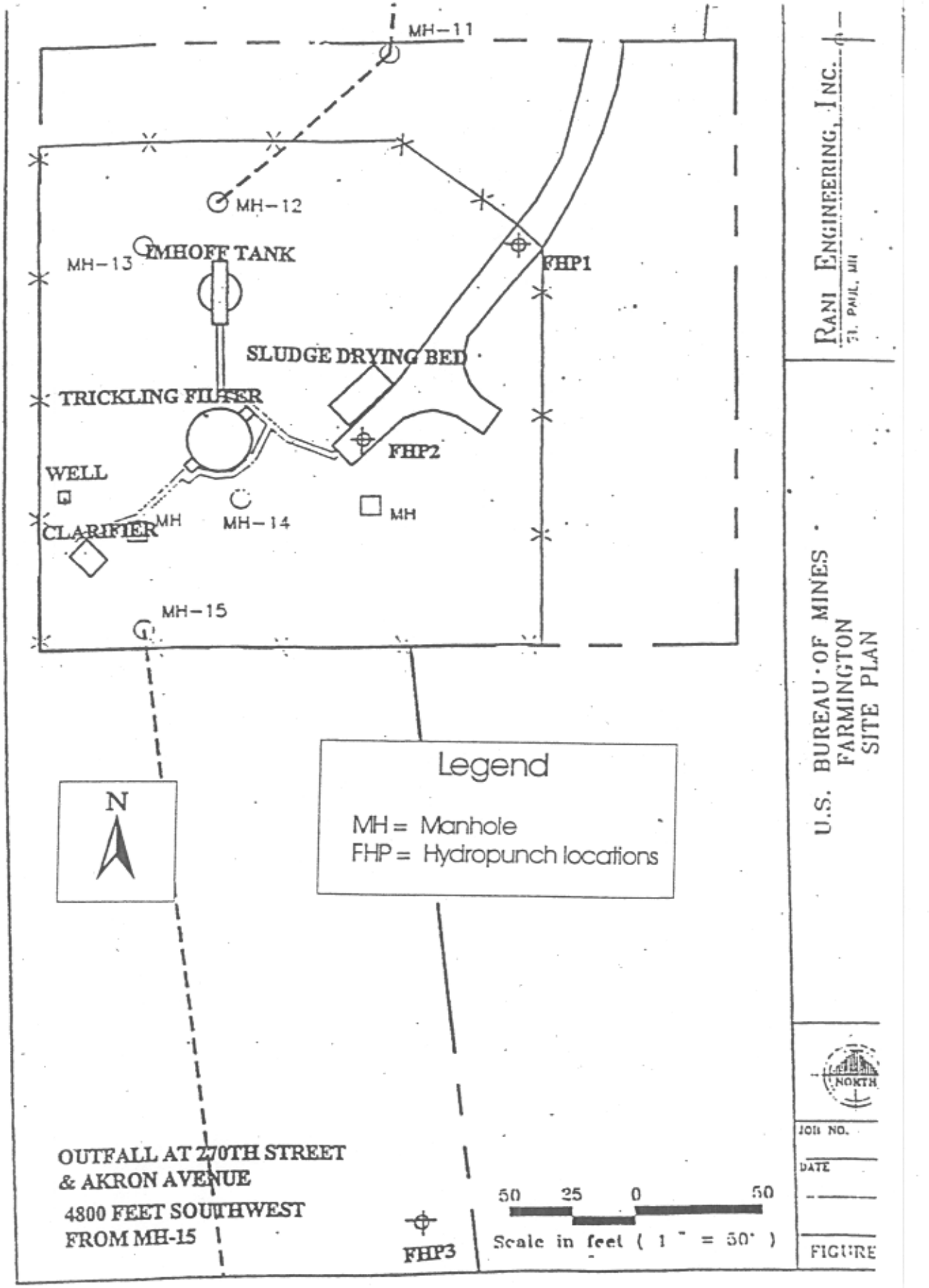
Minnesota Pollution Control Agency (MPCA) 1996. Draft Site Screening Evaluation Guidelines. April 1996.

Figure 1: Former Dakota County Nike Airbase and Surrounding Area



* Map Derived from USGS Quandrangle Map, 1974

Figure 2: Former Dakota County Waste Water Treatment Plant



* Map ~~Derived~~ from CRA 1996

Table 1: Mercury Analytical Result for Samples at and Near the WWTP *

* Table is reproduced from CRA, 1996

TABLE 1

SUMMARY OF MERCURY ANALYTICAL RESULTS
HIGH ENERGY TEST SITE - FORMER WATER TREATMENT AREA

Location	*Depth (bgs)*	*Date*	*Concentration*	
			Wet Basis	*Dry Basis*
Sludge (mg/kg)				
Clarifier (south side)	Tank bottom	7/25/96	158	6,752
Clarifier (north side)	Tank bottom	8/7/96	110	579
Imhoff Tank	Tank bottom	7/25/96	8.9	848
Imhoff Tank	Tank bottom	8/7/96	3.7	123
Screening Criterion (40 CFR 503)				17
Soil (mg/kg)				
North Drying Bed	0-0.5 feet	7/16/96	18.3	29.4
North Drying Bed	2-3 feet	7/24/96	1.0	1.0
North Drying Bed	3-4 feet	7/24/96	ND (0.1)	ND (0.1)
North Drying Bed	4-5 feet	7/24/96	ND (0.1)	ND (0.1)
South Drying Bed	0 - 0.5 feet	7/16/96	13.2	51.38
South Drying Bed	2-3 feet	7/24/96	ND (0.1)	ND (0.1)
South Drying Bed	3-4 feet	7/24/96	0.14	0.18
South Drying Bed	4-5 feet	7/24/96	ND (0.1)	ND (0.1)
FHP1	15-16 feet	7/17/96	ND (0.1)	ND (0.1)
FHP2	9-11 feet	7/16/96	ND (0.1)	ND (0.1)
FHP3	0 - 0.5 feet	7/26/96	ND (0.1)	ND (0.1)
Water treatment system outfall	0 - 1 feet	8/7/96	0.47	0.57
Screening Criterion (EPA Soil Screening Guidance*)				23
Sludge Leach (mg/l)				
Clarifier TCLP (south side)	Tank bottom	7/25/96	ND (0.002)	
Clarifier TCLP (north side)	Tank bottom	8/7/96	ND (0.002)	
Screening Criterion (40 CFR 261)			0.2	
Tank Water (mg/L)				
Clarifier (pump room)		7/16/96	0.005	
Clarifier (south side)		8/7/96	0.007	
Imhoff Tank (composite)		7/25/96	0.00087	
Imhoff Tank (upper portion)		7/16/96	ND (0.0002)	
Screening Criterion (MR 7050.0220)			0.0069	
Groundwater (mg/L)				
Water well for treatment system	90-154 feet	7/26/96	ND (0.0002)	
FHP1	12-17 feet	7/18/96	ND (0.0002)	
FHP2	78-81 feet	7/17/96	ND (0.0002)	
FHP3	75-80 feet	7/23/96	ND (0.0002)	
Screening Criterion (40 CFR 141)			0.002	

Notes:
ND - Not Detected
*Reference: EPA Soil Screening Guidance Technical Background Document, May 1996 for a Residential Ingestion Exposure Scenario.