OhioEPA

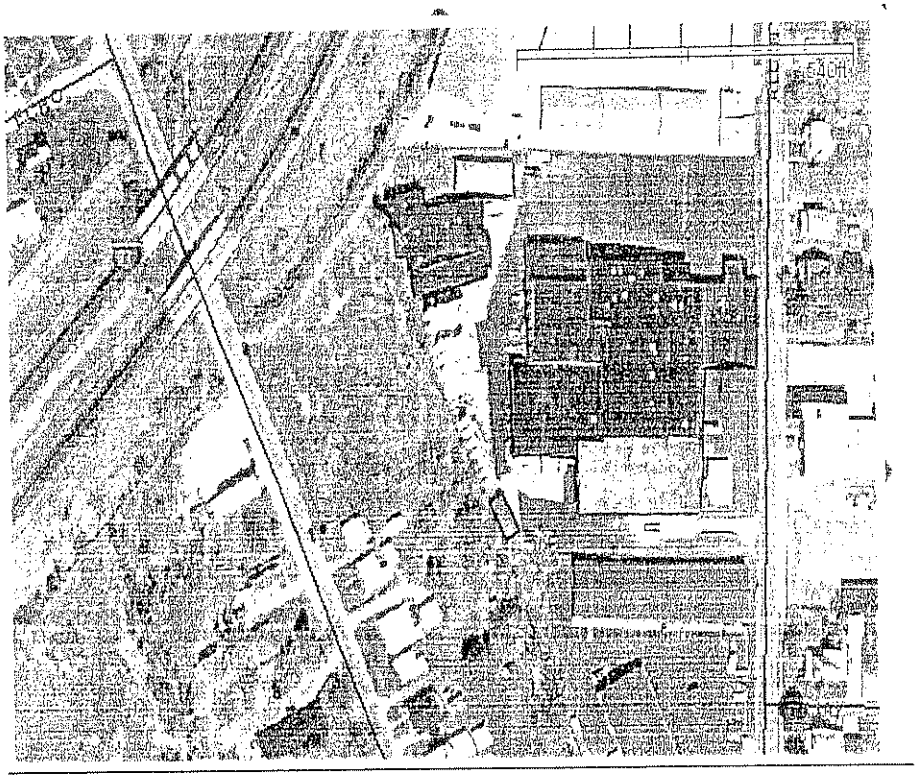
State of Ohio
Environmental Protection Agency

Division of Emergency and Remedial Response

DECISION DOCUMENT FOR THE REMEDIATION OF

Former Bison Corporation
Stark County, Ohio

prepared by
THE OHIO ENVIRONMENTAL PROTECTION AGENCY



March 2008

Ted Strickland, Governor
Chris Korleski, Director, State of Ohio Environmental Protection Agency

DECLARATION

SITE NAME AND LOCATION

Former Bison Corporation
Canton, Stark County, Ohio

STATEMENT OF BASIS AND PURPOSE

This Decision Document presents the selected remedial action for the Former Bison Corporation Site in Canton, Ohio, chosen in accordance with the policies of the Ohio Environmental Protection Agency, statutes and regulations of the State of Ohio, and the National Contingency Plan, 40 CFR Part 300.

ASSESSMENT OF THE SITE

Actual and threatened releases of industrial solvents at the Site, if not addressed by implementing the remedial action selected in the Decision Document, constitute a substantial threat to public health and are causing soil, ground water, air, and surface water contamination. The former Bison Corporation facility manufactured grinding and buffing wheels for use in the metal plating industry, and stored industrial solvents in bulk for distribution to commercial and industrial customers. Historical operations at the facility released industrial solvents and metals into the environment. Interim actions consisting of sub-slab ventilation systems in residential and commercial structures are in place.

DESCRIPTION OF THE SELECTED REMEDY

The selected remedial action includes:

- Removing an estimated 3,800 tons of source area soils from the former Bison Corporation facility;

- Installing a series of air sparging wells into the affected saturated zone beneath the former Bison Corporation facility portion of the Site;

- Installing a soil vapor extraction system to operate in concert with the air sparging wells on the former Bison Corporation facility portion of the Site to recover the contaminated air stream generated through air sparging;

- Altering the natural hydraulic gradient of the Site, in order to cause ground water to flow more quickly away from buildings currently affected by indoor air contamination and removal of contaminated ground water from the aquifer, followed by pretreatment, as necessary, with disposal to the City of Canton wastewater treatment system;

- Implementing institutional controls to prohibit use of ground water within the Site; restrict use of the former Bison Corporation facility to commercial and industrial uses; and limiting the construction of buildings to certain areas of the former facility; and

- Periodic sampling of ground water and indoor air to evaluate the progress of remedial activities.

STATUTORY DETERMINATIONS

The selected remedial action is protective of human health and the environment, complies with legally applicable state and federal requirements, is responsive to public participation and input and is cost-effective. The remedy uses permanent solutions and treatment technologies to the maximum extent practicable to reduce toxicity, mobility, and volume of hazardous substances at the Site. The effectiveness of the remedy will be reviewed regularly.

4/7/08

Chris Korleski, Director Date

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For Former Bison Corporation Site
Stark County, Ohio

1.0 SUMMARY OF SITE CONDITIONS

1.1 Site History

The former Bison Corporation facility is located at 1935 Allen Avenue SE in Canton, Stark County, Ohio. A map showing the location of the former facility is included as Figure 1. The Bison Corporation Site (the "Site") includes the property located at this address, as well as the residential and commercial/industrial neighborhood to the west/southwest of the former facility, where contaminants have migrated through ground water and into surface water through storm sewers that run along Kimball Road SE to Allen Avenue SE. The former Bison Corporation facility is approximately 6.05 acres in size; however, the area of the entire Site, which includes the entire ground water plume, is approximately 77.1 acres and is illustrated in Figure 2.

The facility was owned by Morelli Realty Corporation since 1961. The former Bison Corporation operated on the facility from the early 1960s until 2003. Bison Corporation is currently in receivership because of dissolution of Bison Corporation and Morelli Realty Corporation.

The former Bison Corporation facility manufactured grinding and buffing wheels for use in the metal plating industry, and stored industrial solvents in bulk for distribution to commercial and industrial customers. In addition to industrial solvents, Bison sold a variety of chemicals utilized in the metallurgy industry including zinc, nickel, brass, and copper bar stock. The former facility consists of three (3) buildings. Abbott Electric Inc., an electrical contractor, signed a lease agreement with the Court appointed Receiver for use of the buildings in 2006. Abbott Electric Inc. has made significant renovations to the roof and structural integrity of the buildings on the property.

Site investigations conducted by Bison Corporation in 2001 and 2002 showed that contaminated ground water from the facility migrated in a southwest direction under residences located down gradient from the facility. An indoor air modeling report prepared in 2002 estimated that indoor air inhalation exposures in homes located down gradient from Bison might exceed Ohio EPA and U.S. EPA acceptable risk goals. Based on this information, Ohio EPA and Canton City Health Department sampled indoor air in homes along Kimball Road SE. Elevated concentrations of chlorinated volatile organic compounds (VOCs) were initially detected in eight (8) single family residences and one (1) four unit apartment building located on Kimball Road SE in December 2002.

On February 7, 2003, Director's Final Findings and Orders (DFFOs) were finalized requiring an interim action to address the indoor air contamination in affected homes. The DFFOs required the installation of sub-slab ventilation systems in residences containing elevated concentrations of chlorinated VOCs in air and ongoing periodic testing of indoor air, to ensure the effectiveness of the systems. In 2003, eight (8) single family residences and one (1) four unit apartment building had sub-slab ventilation systems installed. Five (5) additional residences, one (1) located on Kimball Road SE and four (4) located on Allen Avenue SE, had sub-slab ventilation systems installed in 2006. The source of chlorinated VOCs inside homes on Allen Avenue SE, located adjacent to the Thurman Munson Stadium, has been primarily attributed to the migration of chlorinated VOCs along the storm sewers that run from Kimball Road SE to Allen Avenue SE. In 2006, a sub-slab ventilation system was also installed in the northwestern and southwestern portions of Building 1 of the former Bison Corporation facility.

On August 18, 2004, a Consent Order and Final Judgment Entry was issued by the Stark County Court of Common Pleas for Case No. 2003CV01396 involving State of Ohio, *ex rel.* Jim Petro, Attorney General of Ohio (Plaintiff) vs. Virginia Gallagher, et al. (Plaintiff-Intervenors) vs. Bison Corporation and Morelli Realty Corporation (Defendants). The Consent Order and Final Judgment Entry required the following: 1) Dissolution of Bison Corporation and Morelli Realty Corp. and implementation of Defendants' Consent Order requirements through a Receiver; 2) Partial resolution of the Plaintiff-Intervenors claims in the Court of Common Pleas, Stark County, Case No. 2003CV1396; 3) Implementation of an Interim Action; 4) Completion of a Remedial Investigation and Feasibility Study; 5) Selection of a remedy; and 6) Implementation of any additional work to accomplish the objectives of the Remedial Design and Remedial Action.

1.2 Summary of the Remedial Investigation

The Remedial Investigation (RI) was conducted by Bison Corporation and the City of Canton with Ohio EPA oversight to identify the nature and extent of Site-related chemical contaminants. The tasks included sampling of soil, ground water, surface water, sediment, and indoor air. The data obtained from the investigation were used to conduct a baseline risk assessment and to determine the need to evaluate remedial alternatives.

1.2.1 Soil Contamination

Source areas on the former Bison Corporation facility were investigated as part of the RI. These source areas were termed "Identified Areas" (IAs) and are numbered from 1 to 18 as summarized in Table 1. Figure 3 shows the location of each IA. The primary Contaminants of Concern (COCs) at this Site include VOCs and metals. Most of the contaminated soils are located in IA 16, where

the bulk storage tanks and manifold system/pump house were formerly located. Refer to Section 7.0 Glossary for definitions of terms in Table 1 below:

Table 1. Summary of Identified Areas

IA	Description	Location	COCs Analyzed
1	NW Shipping/Receiving Area	Northwestern Portion of Building 1	VOCs, Metals
2	Interior Dock Area	Northern Portion of Building 1	VOCs, SVOCs, TPH, Metals
3	Southwest Receiving Area	Southwestern Portion of Building 1	VOCs, Metals
4	Filling Room	Central Portion of Building 1	Metals, PCBs (Wipes)
5	Glue Room	Southeastern Portion of Building 1	VOCs
6	Pressure Wash Area	Eastern Portion of Building 1	VOCs, SVOCs, TPH, Metals
7	Chemical Storage Area	South-central Portion of Building 1	VOCs, Metals
8	Exterior Drum Storage Area	Southwestern Portion of Building 1	VOCs, Metals
9	Dry Filling Area	Southeastern Portion of Building 1	VOCs, SVOCs, TPH, Metals
10	Pole-Mounted Transformers	Northeastern and Southeastern Portions of Facility	PCBs (Soil)
11	Former Gasoline UST Location	Northern Exterior Wall of Building 1	VOCs, SVOCs, TPH, Metals
12	UST Located Beneath Tool Room of Building 1	Northwestern Exterior of Building 1	VOCs, SVOCs, TPH, Metals
13	Former Diesel Fuel AST	Along Northern Facility Line	VOCs, SVOCs, TPH
14	Quonset Hut	Northern Portion of Facility	VOCs, SVOCs, PCBs (Soil), Metals
15	Building 2	Northwestern Portion of Facility	VOCs, SVOCs, TPH, PCBs (Soil)
16	Bulk Storage Tanks and Manifold	Western and Southwestern Portions of Facility	VOCs, SVOCs, Metals
17	Lean-To	Southwestern Portion of Facility	VOCs, SVOCs, Metals
18	Off-Facility	Down-gradient from Facility	VOCs, SVOCs, Metals

1.2.2 Ground Water Contamination

Ground water sampling was performed over a period from October 2000 through February 2006. The ground water monitoring locations are shown on Figure 4. Samples were collected from temporary well points, which were abandoned in February 2006, and from monitoring wells. A total of twenty-three (23) ground water samples were collected from twelve (12) temporary well points, located both on the western portion of the former Bison Corporation facility and in the residential area to the west/southwest of the former facility. A total of 77 ground water samples were collected from 52 monitoring wells located within the boundaries of the former Bison Corporation facility, as well as in the residential and commercial areas to the north, west, and south of the former facility. Ground water samples were analyzed for VOCs and metals. A comprehensive summary of ground water analytical results are contained in the RI report. Figure 5 shows the distribution of total VOCs in the uppermost saturated ground water zone.

Seven (7) VOCs were detected in ground water samples and included 1,1,1-Trichloroethane, 1,1-Dichloroehtane, 1,1-Dichloroethene, cis-1,2-Dichloroethene, Tetrachloroethene, Trichloroethene, and Vinyl Chloride. Concentrations of contaminants detected within these wells ranged from 15 micrograms per liter (ug/L) for Tetrachloroethene, detected in WP-07 (February 2006), to 70,700 ug/L for Trichloroethene, detected in WP-12 (August 2001). The highest concentrations of VOCs were detected in wells located to the south and southwest of the former facility. The distribution of total VOCs in the uppermost ground water zone are shown in Figure 5.

Thirteen (13) of the ground water samples collected were analyzed for metals. Results were compared to State of Ohio Water Quality Standards [Aquatic Life Outside Mixing Zone Averages (OMZA)] for the Ohio River Basin. All of the metals concentrations were below these standards, with the exception of chromium in monitoring well MW-04 and lead in monitoring well MW-11. However, MW-04 is located upgradient from the former Facility and the elevated level of chromium detected in MW-04 is not likely related to operations conducted on the facility. Lead was detected at a maximum concentration of 0.066 mg/L (MW-11). Neither of these metals was detected at concentrations significantly above the Water Quality Standards and considering that both of these locations are a significant distance away from Nimishillen Creek, they are not expected to impact surface waters.

Ground water samples were collected from 22 locations and analyzed for natural attenuation parameters to determine whether or not biodegradation of contaminants in the aquifer could be utilized as part of the Site remediation. Although biodegradation appears to be possible, it was determined that enhanced treatment would be a preferable option.

1.2.3 Surface Water Contamination

Storm water discharges via a storm sewer into Sherrick Run, which intersects with Nimishillen Creek. Surface water samples were collected from the Nimishillen Creek, Sherrick Run, and the storm sewer that enters Sherrick Run. The results summarized in the RI report were compared to the OMZA. The OMZA was exceeded at the storm sewer outfall into Sherrick Run for 1,1,1-Trichlorothane, Tetrachloroethene, and Trichloroethene.

1.2.4 Sediment Contamination

Sediment samples were collected from Sherrick Run and Nimishillen Creek. The data in the RI report indicate that VOCs were not detected in any of the sediment samples. The metal concentrations detected in sediment were compared to Ohio EPA's Division of Emergency and Remedial Response's (DERR) *Ecological Risk Assessment Guidance Document* (February, 2003) *Level II Sediment Reference Values for the Erie/Ontario Lake Plain (EOLP) Ohio Ecoregion* in accordance with this guidance. Limited exceedances of Ohio EPA's Sediment References Values have been detected for nickel and zinc in Sherrick Run. In Nimishillen Creek, exceedances of Ohio EPA's Sediment References Values have been detected for cadmium, chromium, lead, nickel, and zinc. The sediment samples collected from Nimishillen Creek exhibited the highest concentrations of metals and do not appear to be Site related. Nimishillen Creek has many other impacts from upgradient sources and the Site ground water results do not indicate impacts from metals.

1.2.5 Indoor Air Contamination

Indoor air sampling was conducted both on the former Bison Corporation facility and at off-Facility residential locations. The results are summarized in the RI report. Elevated concentrations of chlorinated VOCs were initially detected in eight (8) single family residences and one (1) four unit apartment building located on Kimball Road SE in December 2002. Due to the elevated concentrations of chlorinated VOCs detected in residences, sub-slab ventilation systems were installed in affected homes in February through April 2003 in accordance with the February 2003 DFFOs.

Sub-slab ventilation systems were installed in five (5) additional residences, one (1) located on Kimball Road SE and four (4) located on Allen Avenue SE, in 2006. The source of chlorinated VOCs inside these homes has been primarily attributed to the migration of chlorinated VOCs along the storm sewers that run from Kimball Road SE to Allen Avenue SE.

Following installation of sub-slab ventilation systems in affected homes, the indoor air has been periodically sampled in each home. Chlorinated VOCs are either no longer detected or are within the acceptable risk-based concentrations.

In December 2006, due to the occupancy of the former Bison Corporation facility by Abbott Electric, Inc., a sub-slab ventilation system was installed inside Building 1 in the former Northwest Receiving Area (IA1) and Southwest Receiving Area (IA3).

1.3 Interim Actions Taken to Date

On February 7, 2003, the DFFOs were finalized. The DFFOs required the installation of sub-slab ventilation systems in residences containing elevated concentrations of chlorinated VOCs in air and ongoing periodic testing of indoor air to ensure the effectiveness of the systems.

1.4 Site Risks and Need for Remedial Action

A baseline Human Health Risk Assessment (HHRA) was conducted for the Site. The overall Site consists of the former Bison Corporation facility ("On Facility") and the residential and commercial/industrial areas located off the former Bison Corporation facility ("Off Facility") where contamination has migrated via the ground water and along the storm sewers. Potential impacts from storm water entering Sherrick Run and ground water migrating to Nimishillen Creek were also evaluated using the OMZA criteria in the Ohio Water Quality Standards.

1.4.1 Risks to Human Health

The objectives of the baseline human health risk assessment were as follows:

- To determine the Site-specific Contaminants of Concern (COCs);
- To evaluate the complete exposure pathways with respect to current and future conditions;
- To estimate the exposures to current and future receptors via the complete exposure pathways; and
- To estimate current and future cancer risks and non-cancer hazards associated with the COCs for each receptor.

In evaluating the data for the human health risk assessment HHRA presented in Section 4.0 in the RI report, some of the On-Facility IAs were combined rather than assessing each IA individually. Throughout the Site, primary COCs are the chlorinated VOCs. Arsenic was the only metal detected in soils at elevated concentrations in several localized portions of IAs on the facility. IAs were combined taking into consideration the concentrations of chlorinated VOCs detected, historical use of the IAs, locations, and environmental media contaminated (i.e., soil and ground water, soil only, ground water only). As a

result of this data analysis, the following IAs were combined for assessment in the HHRA:

1. **Identified Areas 1 and 2** – low concentrations of VOCs in soil, limited impacts from VOCs in ground water.

2. **Identified Areas 3, 16, and 17** - high concentrations of VOCs in soil and ground water, VOC source area.

3. **Identified Area 10** - no PCBs detected, no further risk evaluation warranted.

4. **Identified Areas 4-9 and 11-15** - low level or non detect VOCs in soil, limited arsenic detects in soils.

5. **Identified Area 18** – Off-Facility VOC contamination, down-gradient ground water contamination migrating off facility and along storm sewers.

The current and reasonably anticipated future land use on the former Bison Corporation facility is commercial or industrial. As a result, the direct contact soil depth, known as the soil point of compliance, used in the HHRA is from a soil depth of zero (0) to four (4) feet below ground surface. For the construction/excavation workers On-Facility, the maximum concentration detected in soil from the surface to the depth of ground water (approximately 11 feet below ground surface) was used in the HHRA. The current and reasonably anticipated future land use off the former Bison Corporation facility is residential and commercial. The receptor populations and exposure pathways assessed in this HHRA are summarized in Table 2 below:

Table 2. Receptor Populations and Exposure Pathways

On-Facility	Current and Future Exposed Populations	Media and Exposure Pathway Assessed
	Commercial/Industrial Workers	➢ Direct Contact to Soil ➢ Inhalation of Vapors from Soil to Indoor Air ➢ Inhalation of Vapors from Ground water to Indoor Air
	Construction/Excavation Workers	➢ Direct Contact to Soil
Off-Facility		
	Residents (Child and Adult)	➢ Direct Contact to Soil ➢ Ingestion/Direct Contact to Ground water ➢ Inhalation of Vapors from Ground water to Indoor Air ➢ Inhalation of Vapors from Soil to Indoor Air
	Commercial/Industrial Workers (Peoples Services, Inc.)	➢ Inhalation of Vapors from Ground water to Indoor Air

Cancer risk and non-cancer hazard values were calculated for each of the different types of receptors identified using U.S. EPA and Ohio EPA risk assessment guidance. Exposure to multiple chemicals and pathways was taken into account in these calculations.

Ohio EPA requires that remedial alternatives be proposed for a Site if it is determined that unacceptable risk exists. For cancer-causing contaminants, the total excess lifetime cancer risk goal, with all contaminants evaluated together, is set at $1X10^{-5}$. This is equal to a 1 in 100,000 chance of developing cancer from Site-related contaminants and is in excess of the background cancer risk that people incur through exposure to carcinogens in everyday life (e.g., cigarette smoke, exposure to gasoline fumes, etc.). For non-cancer compounds, the hazard goal is equal to a Hazard Index (HI) of 1. The HI is determined by adding, as appropriate, multiple hazard quotient (HQ) values which are calculated for each individual contaminant and receptor exposure combination as evaluated in the baseline risk assessment.

Cumulative (total) risks were calculated for each receptor population. A summary of the potential risks posed to On-Facility and Off-Facility receptor populations are summarized in Table 3 below:

Table 3. Baseline Human Health Risk Characterization Summary

Receptor Population	Cancer Risk	Non-Cancer Risk (HI)
Commercial/Industrial Worker Identified Areas 1,2	**5×10^{-5}**	0.1
Commercial/Industrial Worker Identified Areas 4-9, 11-15	3×10^{-6}	1
Commercial/Industrial Worker Identified Areas 3,16,17	**6×10^{-3}**	**30**
Construction/Excavation Worker Identified Areas 1,2	2×10^{-7}	0.02
Construction/Excavation Worker Identified Areas 4-9, 11-15	2×10^{-8}	0.06
Construction/Excavation Worker Identified Areas 3,16,17	**1×10^{-4}**	**5**
Off-Facility Residential VOCs in Ground water to Indoor Air (if sub-slab systems are not running)	**2×10^{-3}**	**4**
Ground water Potable Use	**5×10^{-1}**	**400**
Off-Facility Commercial (Peoples Services, Inc.)	5×10^{-6}	0.02

Values in **bold** represent risk in excess of acceptable cancer risk and/or non-cancer hazard goals.

As summarized above, the human health cumulative excess lifetime cancer risk goal of 1×10^{-5} and cumulative non-cancer hazard goal equal to a HI of 1 were met for both On-Facility Commercial/Industrial Workers and Construction/Excavation Workers in IAs 4-9 and 11-15. The risk goal exceedances calculated in IAs 1 and 2 are primarily due to the presence of PCE and TCE detected in soil below the building slab. Risk goal exceedances in IAs 3, 16, and 17 were due to elevated concentrations of chlorinated VOCs present in both soil and ground water. Elevated concentrations of arsenic were detected on the facility in portions of IAs 1, 7, 12, and 16.

The human health cumulative excess lifetime carcinogenic risk goal of 1×10^{-5} and cumulative non-cancer hazard goal equal to a HI of 1 was met for Off-Facility Residential direct contact with soil and VOCs in soil to indoor air. Only low concentrations of VOCs were detected in soils in the backyards of homes located adjacent to the facility on Kimball Road SE. The risk goal exceedances calculated for the residential area located along Kimball Road SE are due to the intrusion of vapors from ground water to indoor air. The chlorinated VOC contamination detected in homes along Allen Avenue has been attributed to migration of chlorinated VOCs from ground water to the storm sewers along Kimball Road SE to Allen Avenue.

Currently, all residences and businesses within the area of the Site are connected to the City of Canton's public water supply. The contaminated ground water at the Site is not used for potable purposes. However, as part of this baseline HHRA, the cancer risk and non-cancer hazard were calculated for potable ground water use. Due to the significant exceedances of the human health cumulative excess lifetime carcinogenic risk goal of 1×10^{-5} and cumulative non-cancer hazard goal equal to a HI of 1, it will be important to ensure the ground water is not used for potable purposes in the future until the risk goals and Maximum Contaminant Levels (MCLs) are met.

The human health cumulative excess lifetime carcinogenic risk goal of 1×10^{-5} and cumulative non-cancer hazard goal equal to a HI of 1 were met for Off-Facility Commercial Workers at Peoples Services, Inc.

1.4.2 Risks to Ecological Receptors

Potential impacts from the migration of chlorinated VOCs to Sherrick Run via the storm sewers and migration of VOCs via ground water to Nimishillen Creek were evaluated. Surface water samples collected from the storm sewer located adjacent to the Facility, and from the outfall of that storm sewer to Sherrick Run (Sewer outfall) (see Table 37 in the RI report), were compared to Ohio River Basin Aquatic Life OMZA standards and Human Health Non-drink concentrations for COCs, as outlined in Ohio Administrative Code (OAC) 3745-1 (updated July 2005). The maximum concentrations of VOCs detected in Storm-1, Storm-2, and the Sewer Outfall are shown in the table below. In addition, the highest VOC concentrations in wells located along the periphery of Nimishillen Creek (MW-17, MW-36 and MW-38) are shown in the table below. VOC values from direct discharge and from the potential ground water discharge to surface water are compared to the OMZA and/or Non-drink standards are shown in Table 4 below:

Table 4. Comparison of VOC Concentrations to Applicable Standards

VOCs detected in storm water and ground water (µg/l)	OMZA	Non-	Storm 1 (up gradient of Facility)	Storm (down gradient of Facility)	Storm Sewer Outfall	MW	MW-	MW-
,1-Dichloroethane	2000	990	<5	59	27	<5	<5	11
1,1-Dichloroethene	210	32	<5	**42**	28	<5	<5	<5
Cis-1,2-Dichloroethene	970	-	14	260	99	12	40	35
1,1,1-Trichloroethane	76	-	8	**710**	**260**	<5	32	28
Tetrachloroethene	53	89	17	**460**	**170**	<5	14	**61**
Trichloroethene	220	810	9	**880**	**430**	43	70	40

Bolded values exceed OMZA and/or Non-drink standards

Ground water samples were collected and analyzed for metals. Results were compared to Ohio River Basin Aquatic Life OMZA standards. The data in Table 23 in the RI report indicate that in all of the ground water samples, metals concentrations were detected below these standards, except chromium and lead. Chromium was detected at a maximum concentration of 1.06 mg/L (MW-04). The MW-04 well is located upgradient from the Facility and the elevated level of chromium detected in MW-04 is not likely to be related to operations conducted on the Facility. Lead was detected at a maximum concentration of 0.066 mg/L (MW-11), which exceeds the 0.034 mg/L. Considering MW-11 is approximately 1200 feet from Nimishillen Creek and 1900 feet from Sherrick Run, it is not expected that the ground water containing lead concentrations will impact surface waters.

Sediment samples were collected from Sherrick Run and Nimishillen Creek. VOCs were not detected in any of the sediment samples. The concentrations of metals detected in sediment samples collected from Sherrick Run and Nimishillen compared to Ohio EPA Sediment Reference Values are shown in Table 5 below.

Table 5. Comparison of Sediment Results to Applicable Standards

Analytical Parameter All concentrations in mg/kg	Ohio EPA Sediment Reference Values	Nimishillen Creek	Sherrick Run			
		NSED-2	SSED-1	SSED-2	SSED-3	SSED-4
Arsenic	25.0	7.800	10.50	6.290	8.760	8.880
Barium	190	107.0	112.0	52.00	104.00	41.10
Cadmium	0.79	**0.957**	<0.500	<0.490	<0.490	<0.490
Chromium	29.0	**49.00**	13.30	11.10	14.70	9.610
Lead	47.0	**88.40**	**89.20**	33.80	40.20	41.40
Mercury	0.12	<0.098	<0.100	<0.096	<0.104	<0.104
Nickel	33.0	**45.70**	**44.50**	**35.80**	**49.60**	25.30
Zinc	160	**259.0**	**168.0**	**169.0**	**204.0**	133.0

Bolded values exceed Ohio EPA's Sediment Reference Values

SSED-4 is located upgradient of the storm sewer outfall to Sherrick Run. SSED-3 is located directly below the storm sewer outfall to Sherrick Run. Limited exceedances of Ohio EPA's Sediment References Values have been detected for nickel and zinc in Sherrick Run. SSED-2 was collected at a sharp bend where impacts from the storm sewer outfall would be expected to be greatest. However, concentrations at SSED-2 were lower than at SSED-1 located at the confluence with Nimishillen Creek. In Nimishillen Creek, exceedances of Ohio EPA's Sediment References Values have been detected for cadmium, chromium, lead, nickel, and zinc. The sediment samples collected from Nimishillen Creek exhibited the highest concentrations of metals and do not appear to be related to the Site. Nimishillen Creek has many other impacts from

upgradient sources and the Site ground water results do not indicate a potential for impacts from metals.

2.0 REMEDIAL ACTION OBJECTIVES

A Feasibility Study (FS) was prepared by HzW as a contractor of the Ohio Environmental Protection Agency on behalf of Bison Corporation to partially fulfill the requirements of the Consent Order and Final Judgment Entry (the "Order") dated August 18, 2004, filed in the Court of Common Pleas Stark County, Ohio. The FS submitted by HzW defined and analyzed appropriate remedial alternatives. The FS was conducted with input and oversight by Ohio EPA, and was approved in March 2007. The RI/FS is the basis for the selection of Ohio EPA's preferred remedial alternative.

As part of the RI/FS process, remedial action objectives (RAOs) were developed in accordance with the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), codified at 40 CFR Part 300 (1990), as amended, which was promulgated under the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA), 42 U.S.C. §9601 et. seq., as amended, and U.S. EPA guidance. The RAOs are goals that a remedy must achieve in order to ensure the protection of human health and the environment. The goals are designed specifically to mitigate the potential adverse effects of Site contaminants present in the environmental media.

The RAOs developed for the Site are detailed below.

1. Reduce or eliminate direct contact exposure to COCs in soils on the former Bison Corporation facility portion of the Site to a human health cumulative excess lifetime carcinogenic risk goal of 1×10^{-5} and a cumulative non-cancer hazard goal equal to a HI of 1;

2. Reduce or eliminate human health exposure to COCs in indoor air from soils and ground water within the boundaries of the Site to a human health cumulative excess lifetime carcinogenic risk goal of 1×10^{-5} and a cumulative non-cancer hazard goal equal to a HI of 1;

3. Reduce or eliminate unacceptable risks to human health and the environment from COCs in surface water emanating from the storm water conveyance at Sherrick Run;

4. Reduce or eliminate COCs in ground water from entering Sherrick Run and Nimishillen Creek to meet OMZA concentrations in surface waters.

5. Reduce or eliminate the migration of COCs via soils, ground water, and air from the former Bison Corporation facility portion of the Site to a human

health cumulative excess lifetime carcinogenic risk goal of 1 x 10^{-5} and a cumulative non-cancer hazard goal equal to a HI of 1; and

6. Reduce or eliminate unacceptable risks to human health due to direct contact with and/or ingestion of ground water. There are no current uses of potable ground water at the Site.

The following risk goals were established for the former Bison Corporation Site, in order to address risk posed by direct contact with contaminated soils and potential exposure to contaminants via indoor air:

- **Human health cumulative excess lifetime carcinogenic risk goal of $1x10^{-5}$.** Site-specific risk goals were established for the former Bison Corporation, in compliance with the National Oil and Hazardous Substances Pollution Contingency Plan ("NCP", U.S. EPA, 1994) and Ohio EPA's Division of Emergency and Remedial Response guidance. The NCP identifies a human health carcinogenic risk range of $1x10^{-4}$ (1 in 10,000) to $1x10^{-6}$ (1 in 1,000,000) that must be met following Site remediation. As previously discussed, the risk accounted for within the Site-specific goal is that which is in excess of normal everyday risks to which people are exposed.

- **Cumulative non-cancer hazard goal equal to a HI of 1.** This hazard goal was established for the Site in compliance with requirements specified under the NCP and DERR guidance.

Chemical specific Risk Based Concentrations (RBCs) were calculated for the primary COCs for each receptor population where risk goals were exceeded. The RBCs presented in the tables below are single chemical, media specific and will need to be adjusted, as appropriate, to meet cumulative risk goals.

Table 6. RBCs for Direct Contact to Soil On-Facility for Primary COCs

Compound	Commercial/Industrial Workers Direct Contact RBC (mg/Kg)	Construction/Excavation Workers Direct Contact RBC (mg/Kg)
1,1,1-Trichloroethane	1400 *	1400 *
1,1-Dichloroethane	1730	2300 *
1,1-Dichloroethene	356	594
Naphthalene	157	262
Tetrachloroethene	19.5	370 *
trans-1,2-Dichloroethene	154	256
Trichloroethene	63	800 *
Vinyl chloride	4.84	154

* RBC is based upon chemical specific soil saturation values calculated using the U.S. EPA soil saturation equation.

Table 7.
RBCs for Soil to Indoor Air & Ground Water to Indoor Air On-Facility Primary COCs

Compound	Soil to Indoor Air RBC (mg/kg)	Ground water to Indoor Air RBC (mg/L)
1,1-Dichloroethane	235	151
1,1-Dichloroethene	94	11.2
Tetrachloroethene	2.23	0.6
1,1,1-Trichloroethane	468	240
Trichloroethene	6.58	2.57
Vinyl chloride	1.5	0.131

Table 8.
RBCs for Indoor Air & Ground Water to Indoor Air Off-Facility for Primary COCs

Compound	Indoor Air RBC ($\mu g/m^3$)	Ground water to Indoor Air RBC (mg/L)
1,1-Dichloroethane	500	8.05
1,1-Dichloroethene	200	0.607
Tetrachloroethene	4.12	0.027
1,1,1 Trichloroethane	2200	13
Trichloroethene	12.17	0.115
Vinyl chloride	2.8	0.00592

Both the cancer and non-cancer human health risk and hazard goals for this Site include risks posed by direct contact of soil and the inhalation of VOCs in indoor air. Concentrations of arsenic that pose a direct contact risk will be addressed by maintaining a four-foot (4) direct contact point of compliance on the facility. The risk posed by the ingestion of ground water will be eliminated through institutional controls prohibiting the extraction of ground water for any purpose other than for Site remediation and sampling. Engineering controls, in the form of a slip lining of the storm sewer along Allen Avenue SE, will be installed to eliminate the discharge of COCs via ground water from entering Sherrick Run and Nimishillen Creek.

3.0 SUMMARY OF REMEDIAL ALTERNATIVES

A total of nine (9) remedial alternatives were considered in the FS. A description of the major features of each of the remedial alternatives follows. More information about these alternatives can be found in the FS.

3.1 Alternative 1 – No Action

The NCP requires evaluation of a "no action" alternative to establish a baseline for the comparison of other remedial alternatives. The No Action alternative provides a baseline for comparing other alternatives. Because no additional remedial activities would be implemented with the No Action alternative, long-term human health and environmental risks for the Site essentially would be the same as those identified in the baseline risk assessment. For the former Bison Corporation Site, the No Action alternative assumes that all COCs would remain in place and would be available for direct contact, inhalation, ingestion, migration to ground water, and migration to surface waters of Sherrick Run and Nimishillen Creek.

3.2 Alternative 2 - Monitoring Combined with Institutional and Engineering Controls

This alternative would include the following activities:

- The long-term maintenance and operation of existing sub-slab ventilation systems in residential and commercial structures;
- Periodic air sampling at impacted residences and Building 1 on the former Bison Corporation facility until such time as remedial activities have resulted in a reduction of the concentrations of COCs in soil and ground water to RBCs for the soil/ground water to indoor air pathways;
- Long-term ground water periodic monitoring at selected wells;
- The implementation of a Site-wide institutional control to prohibit the extraction of ground water for any purpose from any saturated zone beneath the Site and prohibit the use or drilling of water wells at the Site except for ground water monitoring and/or remediation;
- The implementation of institutional controls on the former Bison Corporation facility limiting the facility to a commercial/industrial land use, and prohibiting construction of buildings on certain portions of the property through an Environmental Covenant;
- The implementation of institutional controls on the former Bison Corporation facility through an Environmental Covenant to prohibit the extraction of ground water for potable or non-potable use, except for ground water monitoring and/or remediation;
- The installation of a pavement engineering control on a portion of the former Bison Corporation facility to eliminate potential direct contact risks;
- The implementation of a risk mitigation plan (RMP) for future construction/excavation activities on portions of the former Bison Corporation facility;
- The installation of an engineering control in the 42-inch brick storm sewer system within the Kimball Road SE/Allen Avenue right-of-way from the Interstate 77 overpass over Kimball Road SE south to the point where the construction of this sewer changes from brick to steel (near the outlet with Sherrick Run). The storm sewer will be slip lined to prevent contaminated ground water from entering the storm sewer; and
- The implementation of an Operation and Maintenance (O&M) Plan to provide continued operation of the remedy until RAOs are met.

The only other remedial "activity" under this alternative would be the ongoing natural processes occurring at the Site (e.g., on-going leaching of COCs from soil to ground water, or natural degradation of the COCs within the ground water "plume").

3.3 Alternative 3 – Removal of Accessible Soils on the former Bison Corporation facility Portion of the Site that Exceed Direct Contact RBCs and Calculated Leach-Based RBCs for COCs; In Situ Treatment of Ground Water Containing COCs in Excess of RBCs through Chemical Oxidation, and Implementation of Selected Institutional and Engineering Controls

Alternatives 3, 3A, and 3B all contemplate the removal of all accessible soils on the former Bison Corporation facility portion of the Site that exceed calculated leach-based RBCs for COCs. "Accessible" is defined as those soils located outside the existing footprints of buildings on the former Bison Corporation facility portion of the Site, taking into consideration required foundational "setbacks" to maintain building integrity. The only variation in these three remedial alternatives is the method of how concentrations of COCs are reduced in ground water beneath the Site. Therefore, this section provides the most detailed description of this remedial alternative, with Sections 3.4 and 3.5 amplifying only the alternative ground water treatment options.

The HHRA identified RBCs for soil direct contact on the former Bison Corporation facility portion of the Site. Under this alternative, all soils On-Facility that exceed these RBCs would be removed through physical excavation, transported from the Site, and treated and/or disposed off-Site at a licensed facility.

In addition, the HHRA identified target RBCs for ground water that would need to be met to be protective of human health for the ground water to indoor air pathway for both residential and commercial/industrial exposure scenarios. Derivation of the results of a linear model (SESOIL) was used to "back calculate" target concentrations of COCs in soil on the former Bison Corporation facility portion of the Site, such that future leaching of COCs from soil to ground water would not exceed these RBCs. These derived "leach-based" concentrations for COCs in soil are considered RBCs for the former Bison Corporation facility portion of the Site.

Under this alternative, the proposed remedial technology for ground water that contains concentrations of COCs in excess of RBCs is *in situ* chemical oxidation. This alternative would rely upon the migration of the injected chemical oxidants through the affected saturated zone to reduce concentrations of COCs in ground water to below RBCs

Alternative 3 would involve implementing the following activities, in addition to those specified within Alternative 2:

- Excavation and removal of an estimated 7,150 tons of soil (to depths of up to 8 feet) containing chlorinated VOCs in excess of derived leach-based soil concentrations from the former Bison Corporation facility portion of the Site, thus effectively removing a potential on-going source area for future impacts to ground water in excess of RBCs. These soils would be removed from the Site for off-Site incineration and/or disposal at a licensed facility;

- Multiple injections of a chemical oxidant (hydrogen peroxide or permanganate) into the uppermost saturated zone at a series of injection points along the 320-foot long facility boundary of the former Bison Corporation facility portion of the Site to reduce VOC concentrations in ground water up-gradient of the affected residences;

- Multiple injections of a chemical oxidant (hydrogen peroxide or permanganate) into the uppermost saturated zone at a series of injection points along a 400-foot long line situated on the east side (north-bound lanes) of Kimball Road to reduce VOC concentrations in ground water;

- Multiple injections of a chemical oxidant (hydrogen peroxide or permanganate) into the uppermost saturated zone at a series of injection points along a 400-foot long line situated on the Peoples Services, Inc. facility, west of the affected residences on Kimball Road to reduce VOC concentrations in ground water; and

- The implementation of an O&M Plan to provide continued operation of the remedy until RAOs are met.

This alternative may require the closure of a portion of the northbound lane of Kimball Road throughout the remediation period, to protect the injection points.

3.4 Alternative 3A – Removal of Accessible Soils on the Former Bison Corporation Facility Portion of the Site that Exceed Direct Contact RBCs and Calculated Leach-Based RAOs for COCs; In Situ Treatment of Ground Water Containing COCs in Excess of RBCs through Enhanced Anaerobic Bioremediation, and Implementation of Selected Institutional and Engineering Controls

Alternative 3A proposes the removal of all accessible soils on the former Bison Corporation facility portion of the Site that exceed calculated leach-based RBCs for COCs. Again, "accessible" is defined as those soils located outside the existing footprints of buildings on the former Bison Corporation facility portion of the Site, taking into consideration required foundational "setbacks" to maintain building integrity. Alternative 3A only varies from Alternative 3 in the method of

how concentrations of COCs are reduced in ground water beneath the Site. The purpose of this section is to amplify how the ground water treatment strategy varies from that outlined in Section 3.3.

Under this alternative, the proposed remedial technology for ground water that contains concentrations of COCs in excess of RBCs is enhanced anaerobic bioremediation. Under this alternative, instead of the use of a chemical oxidant, a compound or reagent that further strips dissolved oxygen from the affected saturated zone is used. These compounds enhance the growth of anaerobic bio-organisms that further degrade the COCs present in the saturated zone.

There are two proprietary compounds/processes available which drive this anaerobic process. The first is Hydrogen Release Compound, or HRC, which – per its name – slowly releases hydrogen into the saturated zone, thereby encouraging the growth and multiplication of anaerobic bio-organisms. The second is a proprietary process that uses whey and molasses solutions that: 1) reduce the oxygen content of the aquifer; and 2) provide a carbohydrate source that enhances the growth of anaerobic bio-organisms in the saturated zone.

The primary difference between these two compounds/processes is ease of use, particularly at remote injection points or galleries which is the means of reagent introduction into the affected saturated zone at the Site. Costs between the two compounds/processes are comparable. HRC is more portable and, therefore, easier to use. HRC does not require a physical plant with electrical controls, mixing tanks, automatic injection systems, etc. However, the molasses process does require such facilities. Therefore, for the purposes of this alternative, HRC was selected as the reagent of choice, given its portability and Site-specific constraints on injection locations. It should be noted that enhanced anaerobic bioremediation has the potential to result in aggressive degradation of Site COCs in ground water, although another COC – vinyl chloride – can be generated as the end product of the degradation process. Vinyl chloride does not respond favorably to anaerobic degradation; rather, it is more amenable to aerobic degradation. Use of chemical oxidants, such as those contemplated in Alternative 3, avoid this potential generation of vinyl chloride, although chemical oxidants are more difficult compounds to use (very corrosive to metal and the exposed skin of the workers handling the materials) and have to overcome natural oxidation demand in the saturated zone (such as ferrous iron demand).

From this, it is clear that chemical oxidants and reagents that enhance anaerobic bioremediation have advantages and disadvantages associated with their use. The most effective remedial strategy at a given Site when choosing between chemical oxidants and enhanced anaerobic biodegradation reagents is typically determined through pilot testing to see how each responds to Site-specific conditions. Otherwise, their migration rate through a saturated zone following injection is comparable, all other factors being considered equal.

Alternative 3A would involve implementing the following activities, in addition to those presented in Alternative 2:

- Excavation and removal of an estimated 7,150 tons of soil (to depths of up to 8 feet) containing chlorinated VOCs in excess of derived leach-based soil concentrations from the former Bison Corporation facility portion of the Site, thus, effectively removing a potential on-going source area for future impacts to ground water in excess of RBCs. These soils would be removed from the Site for off-Site incineration and/or disposal at a licensed facility;

- Multiple injections of HRC into the uppermost saturated zone at a series of injection points along the 320-foot long facility boundary of the former Bison Corporation facility portion of the Site, upgradient of the affected residences;

- Multiple injections of HRC into the uppermost saturated zone at a series of injection points along a 400-foot long line situated on the east side (north-bound lanes) of Kimball Road;

- Multiple injections of HRC into the uppermost saturated zone at a series of injection points along a 400-foot long line situated on the Peoples Services, Inc. facility, west of the affected residences on Kimball Road; and

- The implementation of an O&M Plan to provide continued operation of the remedy until RAOs are met.

This alternative may require the closure of a portion of the northbound lane of Kimball Road throughout the remediation period, to protect the injection points.

3.5 Alternative 3B - Removal of Accessible Soils on the Former Bison Corporation Facility Portion of the Site that Exceed Direct Contact RBCs and Calculated Leach-Based RBCs for COCs; Ex Situ Treatment of Ground Water Containing COCs in Excess of RBCs through Modification of the Hydraulic Gradient and Aboveground Treatment and/or Disposal, and Implementation of Selected Institutional and Engineering Controls

As with Alternatives 3 and 3A, Alternative 3B also contemplates the removal of all accessible soils on the former Bison Corporation facility portion of the Site that exceed calculated leach-based RBCs for COCs. The term "accessible" is defined as those soils located outside the existing footprints of buildings on the former Bison Corporation facility portion of the Site, taking into consideration required foundational "setbacks" to maintain building integrity. Alternative 3B only varies from Alternatives 3 and 3A in the method of how concentrations of COCs are reduced in ground water beneath the Site. The purpose of this section

is to amplify how the ground water treatment strategy varies from that outlined in Sections 3.3 and 3.4.

Under this alternative, the proposed remedial technology for ground water that already contains concentrations of COCs in excess of RBCs is through modification of the hydraulic gradient via extraction of ground water from the impacted saturated zone at two locations: the former Bison Corporation facility and the Peoples Services, Inc. facility. Under this alternative, the natural movement of ground water would be accelerated from beneath affected residences by pumping ground water from two series of extraction wells. Extracted ground water would be discharged directly to the City of Canton sanitary sewer system and may require pre-treatment.

The primary objective for this proposed remedial alternative is to accelerate the ground water flow from an area with occupied dwellings to another area where dwellings do not exist. This would be done through modification of the hydraulic gradient. While "pump-and-treat" remedial technologies are somewhat outdated, there is no scientific debate about the fact that the physical extraction of ground water from a saturated zone accelerates ground water flow toward the extraction wells through modification of the hydraulic gradient. Application of this technology would cause ground water with higher concentrations of COCs to move beyond the existing residential area, thereby lowering the risk to residents due to inhalation of VOCs present in indoor air. The contaminated ground water would then be removed from the aquifer and disposed off-Site.

Alternative 3B would involve implementing the following activities, in addition to those outlined in Alternative 2:

- Excavation and removal of an estimated 7,150 tons of soil (to depths of up to 8 feet) containing chlorinated VOCs in excess of derived leach-based soil concentrations from the former Bison Corporation facility portion of the Site, thus, effectively removing a potential on-going source area for future impacts to ground water in excess of RBCs. These soils would be removed from the Site for off-Site treatment and/or disposal at a licensed facility;

- Installation of a series of five (5) six- to eight-inch diameter ground water extraction wells into the affected ground water interval along the 320-foot long facility boundary of the former Bison Corporation facility portion of the Site, upgradient of the affected residences. These wells would be fitted with 4-inch diameter submersible pumps, and the wells connected by above ground plumbing to a common manifold connected to the City of Canton sanitary sewer (either with or without pretreatment);

- Installation of a series of seven (7) six- to eight-inch diameter ground water extraction wells into the affected ground water interval along a 400-

foot long line situated on the Peoples Services, Inc. facility, west of the affected residences on Kimball Road SE. These wells would be fitted with 4-inch diameter submersible pumps, and the wells connected by above ground plumbing to a common manifold connected to the City of Canton sanitary sewer (either with or without pretreatment); and

- The implementation of an O&M Plan to provide continued operation of the remedy until RAOs are met.

3.6 Alternative 4 - Removal of Primary Source Area Soils on the Former Bison Corporation Facility Portion of the Site that Exceed Direct Contact RBCs for COCs; In Situ Soil and Ground Water Treatment of Residual Impacted Media via Air Sparging and SVE on the Former Bison Corporation Facility Portion of the Site; In Situ Ground Water Treatment in Other Portions of the Site via Chemical Oxidation; and Implementation of Selected Institutional and Engineering Controls

Alternatives 4, 4A, and 4B are all parallel variations of Alternatives 3 through 3B, except for two important distinctions related to the former Bison Corporation facility portion of the Site. Under the "Alternative 4 through 4B scenarios," only those soils that exceed RBCs for commercial/industrial direct contact exposure are removed from the former Bison Corporation facility portion of the Site. This is a smaller volume of material than that contemplated under Alternatives 3 through 3B. To compensate for residual COCs that may leach to ground water following excavation, Alternatives 4 through 4B all contemplate the use of a combined air sparging and SVE system to reduce concentrations of COCs to below leach-based RBCs. Otherwise, Alternatives 4 through 4B address off-facility ground water contamination in the same fashion as Alternatives 3 through 3B.

It is estimated that following removal of those soils containing concentrations of COCs in excess of RBCs, a total area of approximately 40,000 square feet will remain on-Site where soils may contain concentrations of COCs in excess of the derived leach-based soil concentrations discussed in Alternatives 3 through 3B, above. These remaining soils must be addressed in order to eliminate direct contact exposures. In addition, there is the need to reduce concentrations of COCs in ground water that exceed COCs both on the former Bison Corporation facility, as well as in other areas of the Site.

To address this 40,000 square foot area of remaining soil and ground water contamination on the former Bison Corporation facility portion of the Site, Alternative 4 proposes to install an air sparging system within this 40,000 square foot area. As stated in Table 1 in the FS report, air sparging is a technique by which air is injected into a series of points installed through the affected saturated zone. The air serves to "bubble" or "strip" volatile COCs from the affected saturated zone within the treatment area. The "stripped" volatile COCs migrate upward to the top of the saturated zone in the vapor phase. Air sparging is

combined with a SVE system, which consists of a series of air extraction points located solely within the contaminated soil column. This SVE system applies a vacuum to the affected soil column, reducing concentrations of volatile COCs both within the soil column while also capturing those volatile COCs generated as a part of the ground water sparging process. The air stream from the SVE system is collected via a manifold system, and treated by passing the extracted air through a chamber (or series of chambers) containing granulated activated charcoal (GAC). The volatile COCs are adsorbed onto the GAC, which is monitored and changed out periodically to assure effective capture of the volatile COCs in the SVE air stream.

This air sparging/SVE remedy would only be used on the former Bison Corporation facility portion of the Site, since this is the only portion of the Site with contaminated soils that contain COCs in excess of derived leach-based RBCs. Further, this is the only portion of the Site capable of supporting an active ground water remedy such as air sparging.

Under Alternative 4, the proposed remedial technology for ground water that contains concentrations of COCs in excess of RBCs off the former Bison Corporation facility portion of the Site is in situ chemical oxidation. The nature of chemical oxidants injected into affected ground water zones was discussed in greater detail under Alternative 3, above.

Alternative 4 would involve implementing the following activities, in addition to those outlined in Alternative 2:

- Excavation and removal of an estimated 3800 tons of soil (to depths of up to 8 feet) containing chlorinated VOCs and inorganic COCs (primarily, arsenic) in excess of RBCs for commercial/industrial soil direct contact. These soils would be removed from the Site for treatment and/or disposal at a licensed facility;

- Installation of a series of air sparging wells into the affected saturated zone beneath the former Bison Corporation facility portion of the Site. These wells would be installed to a depth of approximately 21-25 feet below ground surface. The exact screened interval will be determined as part of the Remedial Design phase of the project. These wells would either be manifolded to a common air blower system, or each well would be equipped with its own air blower to create the sparging effect within the affected saturated zone;

- Installation of a SVE system to operate in concert with the air sparging wells on the former Bison Corporation facility portion of the Site. The SVE system would recover the contaminated air stream generated through air sparging. The exact configuration of the SVE system will be determined as part of the Remedial Design phase of this project. The SVE system

would be manifolded to a common blower system and the extracted air would be treated by passing it through a chamber (or series of chambers) containing GAC, as discussed above.

- Multiple injections of a chemical oxidant (hydrogen peroxide or permanganate) into the uppermost saturated zone at a series of injection points along a 400-foot long line situated on the east side (north-bound lanes) of Kimball Road;

- Multiple injections of a chemical oxidant (hydrogen peroxide or permanganate) into the uppermost saturated zone at a series of injection points along a 400-foot long line situated on the Peoples Services, Inc. facility, west of the affected residences on Kimball Road; and

- The implementation of an O&M Plan to provide continued operation of the remedy until RAOs are met.

This alternative may require the closure of a portion of the northbound lane of Kimball Road throughout the remediation period, to protect the injection points.

3.7 Alternative 4A - Removal of Primary Source Area Soils on the Former Bison Corporation Facility Portion of the Site that Exceed Direct Contact RBCs for COCs; In Situ Soil and Ground Water Treatment of Residual Impacted Media via Air Sparging and SVE on the Former Bison Corporation Facility Portion of the Site; In Situ Ground Water Treatment in Other Portions of the Site via Enhanced Anaerobic Bioremediation; and Implementation of Selected Institutional and Engineering Controls

Alternative 4A is identical to Alternative 4 except that it relies upon enhanced anaerobic bioremediation of ground water containing COCs in excess of RBCs in the portion of the Site downgradient of the former Bison Corporation facility, rather than chemical oxidation. The nature of enhanced anaerobic bioremediation (using HRC) was discussed in greater detail under Alternative 3A.

This alternative would involve implementing the following activities, in addition to those outlined in Alternative 2:

- Excavation and removal of an estimated 3800 tons of soil to depths of up to 8 feet containing chlorinated VOCs and inorganic COCs (primarily, arsenic) in excess of RBCs for commercial/industrial soil direct contact. These soils would be removed from the Site for off-Site treatment and/or disposal at a licensed facility;

- Installation of a series of air sparging wells into the affected saturated zone beneath the former Bison Corporation facility portion of the Site.

These wells would be installed to a depth of approximately 21-25 feet below ground surface. The exact screened interval will be determined as part of the Remedial Design phase of the project. These wells would either be manifolded to a common air blower system, or each well would be equipped with its own air blower to create the sparging effect within the affected saturated zone;

- Installation of a SVE system to operate in concert with the air sparging wells on the former Bison Corporation facility portion of the Site. The SVE system would recover the contaminated air stream generated through air sparging. The exact configuration of the SVE system will be determined as part of the Remedial Design phase of this project. The SVE system would be manifolded to a common blower system and the extracted air would be treated by passing it through a chamber (or series of chambers) containing GAC, as discussed above.

- Multiple injections of HRC into the uppermost saturated zone at a series of injection points along a 400-foot long line situated on the east side (north-bound lanes) of Kimball Road SE;

- Multiple injections of HRC into the uppermost saturated zone at a series of injection points along a 400-foot long line situated on the Peoples Services, Inc. facility, west of the affected residences on Kimball Road SE; and

- The implementation of an O&M Plan to provide continued operation of the remedy until RAOs are met.

This alternative may require the closure of a portion of the northbound lane of Kimball Road throughout the remediation period, to protect the injection points.

3.8 Alternative 4B - Removal of Primary Source Area Soils on the Former Bison Corporation Facility Portion of the Site that Exceed Direct Contact RBCs for COCs; In Situ Soil and Ground Water Treatment of Residual Impacted Media via Air Sparging and SVE on the Former Bison Corporation Facility Portion of the Site; Ex Situ Treatment of Ground Water Containing COCs in Excess of RBCs through Modification of the Hydraulic Gradient and Above-Ground Treatment and/or Disposal in Other Portions of the Site; and Implementation of Selected Institutional and Engineering Controls

Alternative 4B is identical to Alternatives 4 and 4A except that it relies upon ground water extraction and modification of the hydraulic gradient at the Peoples Services, Inc. portion of the Site, rather than enhanced anaerobic bioremediation or chemical oxidation. As stated in the description of Alternative 3B, ground water is extracted from the affected zone to accelerate the movement of ground water from beneath the affected residences. Extracted water would be

discharged directly to the City of Canton sanitary sewer system and may require pre-treatment.

This alternative would involve implementing the following activities, in addition to those in Alternative 2:

- Excavation and removal of an estimated 3,800 tons of soil to depths of up to 8 feet containing chlorinated VOCs and inorganic COCs (primarily, arsenic) in excess of RBCs for commercial/industrial soil direct contact. These soils would be removed from the Site for off-Site treatment and/or disposal at a licensed facility;

- Installation of a series of air sparging wells into the affected saturated zone beneath the former Bison Corporation facility portion of the Site. These wells would be installed to a depth of approximately 21-25 feet below ground surface. The exact screened interval will be determined as part of the Remedial Design phase of the project. These wells would either be manifolded to a common air blower system, or each well would be equipped with its own air blower to create the sparging effect within the affected saturated zone;

- Installation of a SVE system to operate in concert with the air sparging wells on the former Bison Corporation facility portion of the Site. The SVE system would recover the contaminated air stream generated through air sparging. The exact configuration of the SVE system will be determined as part of the Remedial Design phase of this project. The SVE system would be manifolded to a common blower system and the extracted air would be treated by passing it through a chamber (or series of chambers) containing granulated activated charcoal (GAC), as discussed above.

- Installation of a series of seven (7) six- to eight-inch diameter ground water extraction wells into the affected ground water interval along a 400-foot long line situated on the Peoples Services, Inc. facility, west of the affected residences on Kimball Road SE. These wells would be fitted with 4-inch diameter submersible pumps, and the wells connected by above ground plumbing to a common manifold connected to the City of Canton sanitary sewer (either with or without pretreatment); and

- The implementation of an O&M Plan to provide continued operation of the remedy until RAOs are met.

3.9 Alternative 5 - Removal of Primary Source Area Soils on the Former Bison Corporation Facility Portion of the Site that Exceed Direct Contact RBCs for COCs; In Situ Soil and Ground Water Treatment of Residual Impacted Media via Air Sparging and SVE on the Former Bison Corporation Facility Portion of the Site (First Stage); In Situ Treatment of Downgradient Ground

Water through Chemical Oxidation (Second Stage); Ex Situ Treatment of Ground Water Containing COCs in Excess of RBCs through Modification of the Hydraulic Gradient and Aboveground Treatment and/or Disposal in Other Portions of the Site; and Implementation of Selected Institutional and Engineering Controls

Alternative 5 is a modification of Alternative 4B. In essence, all aspects of Alternative 4B would be implemented as "first stage" activities. Following completion of *in situ* soil and ground water treatment on the former Bison Corporation facility portion of the Site via air sparging/SVE, a "second stage" ground water treatment would be employed by injecting chemical oxidants along the 320-foot boundary between the former Bison Corporation facility portion of the Site and the downgradient affected residences. The purpose of this "second stage" treatment is to enhance first phase treatment of ground water which would further reduce the concentrations of VOCs migrating from the facility under residential properties.

This alternative would involve implementing the following, in addition to the activities presented in Alternative 4B:

Following discontinuation of air sparging/SVE activities on the former Bison Corporation facility portion of the Site, a chemical oxidant (hydrogen peroxide or permanganate) would be injected into the uppermost saturated zone at a series of injection points along the 320-foot long facility boundary of the former Bison Corporation facility portion of the Site, upgradient of the affected residences (under the influence of a modified hydraulic gradient).

4.0 COMPARISON AND EVALUATION OF ALTERNATIVES

4.1 Evaluation Criteria

In selecting a remedy for a contaminated Site, Ohio EPA considers the following eight evaluation criteria as outlined in U.S. EPA's NCP promulgated under CERCLA (40 CFR 300.430):

1. Overall protection of human health and the environment - Remedial alternatives shall be evaluated to determine whether they can adequately protect human health and the environment, in both the short- and long-term, from unacceptable risks posed by hazardous substances, pollutants, or contaminants present at the Site.

2. Compliance with all applicable or relevant and appropriate requirements (ARARs) - Remedial alternatives shall be evaluated to determine whether a remedy will meet all of the applicable or relevant and appropriate requirements of state and federal environmental laws.

3. Long-term effectiveness and permanence - Remedial alternatives shall be evaluated to determine the ability of a remedy to maintain reliable protection of human health and the environment over time once pollution has been abated and RAOs have been met. This includes assessment of the residual risks remaining from untreated wastes, and the adequacy and reliability of controls such as containment systems and institutional controls (*i.e.*, environmental covenant).

4. Reduction of toxicity, mobility, or volume through treatment - Remedial alternatives shall be evaluated to determine the degree to which recycling or treatment are employed to reduce toxicity, mobility, or volume, including how treatment is used to address the principal threats posed by the Site.

5. Short-term effectiveness - Remedial alternatives shall be evaluated to determine the following: (1) short-term risks that might be posed to the community during implementation of an alternative; (2) potential impacts on workers during remedial action and the effectiveness and reliability of protective measures; (3) potential environmental impacts of the remedial action and the effectiveness and reliability of mitigative measures during implementation; and (4) time until protection is achieved.

6. Implementability - Remedial alternatives shall be evaluated to determine the ease or difficulty of implementation and shall include the following as appropriate: (1) technical difficulties and unknowns associated with the construction and operation of a technology, the reliability of the technology, ease of undertaking additional remedial actions, and the ability to monitor the effectiveness of the remedy; (2) administrative feasibility, including activities needed to coordinate with other offices and agencies and the ability and time required to obtain any necessary approvals and permits from other agencies (for off-Site actions); and (3) availability of services and materials, including the availability of adequate off-Site treatment, storage capacity, and disposal capacity and services; the availability of necessary equipment and specialists, and provisions to ensure any necessary additional resources; the availability of services and materials; and the availability of prospective technologies.

7. Cost - Remedial alternatives shall evaluate costs and shall include the following: (1) capital costs, including both direct and indirect costs; (2) annual O&M costs; and (3) net present value of capital and O&M costs. The cost estimates include only the direct costs of implementing an alternative at the Site and do not include other costs, such as damage to human health or the environment associated with an alternative. The cost estimates are based on figures provided by the FS.

8. Community acceptance - Remedial alternatives shall be evaluated to determine which of their components interested persons in the community

support, have reservations about, or oppose. This assessment is not completed until comments on the Preferred Plan are considered.

Evaluation Criteria 1 and 2 are threshold criteria required for acceptance of an alternative that has accomplished the goal of protecting human health and the environment and has complied with the law. Any acceptable remedy must comply with both of these criteria. Evaluation Criteria 3 through 7 are the balancing criteria used to select the best remedial alternative(s) identified in the Preferred Plan. Evaluation Criteria 8, community acceptance, is a modifying criterion that is evaluated through public comments on the alternatives received during the comment period (see Section 2.0).

4.2 Analysis of Evaluation Criteria

This section examines how each of the evaluation criteria is applied to each of the remedial alternatives found in Section 3.0 and compares how the alternatives achieve the criteria.

4.2.1 Overall Protection of Human Health and the Environment

Evaluation of the overall protectiveness of the alternatives focused on whether each alternative achieves adequate protection of human health and the environment and identifies how Site risks posed through each pathway being addressed are eliminated, reduced, or controlled by the alternative. This evaluation also includes consideration of whether the alternative poses any unacceptable short-term or cross-media impacts.

Alternatives 3, 3A, 3B, 4, 4A, 4B, and 5 are all protective of human health and the environment. Remedial measures performed under these alternatives would result in the reduction of COCs in ground water to levels that meet Site-specific RBCs. Direct contact with contaminated soils would be limited through excavation.

Alternative 2 is protective of human health for commercial and industrial use purposes only, through the establishment of institutional controls and development of a RMP to limit exposure to Site-related contaminants during construction and excavation activities. It is not protective of the environment, since this alternative would do nothing to prohibit contaminants from migrating toward Nimishillen Creek.

Alternative 1 is not protective of human health or the environment.

4.2.2 Compliance with ARARs

Alternatives 3, 3A, 3B, 4, 4A, 4B, and 5 all meet chemical-specific, location-specific, and action-specific ARARs, as long as future use of the

former Bison Corporation facility is restricted to commercial and industrial use. These alternatives all meet Site RAOs through removal and treatment of contaminated media.

Alternatives 1 and 2 do not meet ARARs for the Site.

4.2.3 Long-Term Effectiveness and Permanence

Alternatives 3B, 4B, and 5 are the most effective and permanent of the remedial alternatives evaluated. Soil excavation and off-Site disposal will address direct contact risks and will reduce the amount of contaminants leaching into ground water. Ground water risks would be eliminated through extraction and treatment of contaminants. Alternative 5 adds chemical oxidant injection as a second stage, which enhances the reliability of the remedy over Alternative 4B.

Alternatives 3, 3A, 4, and 4A also adequately address direct contact risks through excavation and off-Site disposal of contaminated soils. Ground water treatment under these alternatives has a degree of uncertainty due to the passive injection of chemicals into the aquifer underlying the Site. In addition, Alternatives 3A and 4A utilize HRC to degrade contaminants in the aquifer, which may result in the generation of vinyl chloride as a byproduct. Vinyl chloride is a known human carcinogen.

Alternative 2 only addresses direct contact and ground water risks through the establishment of engineering and institutional controls, which will require on-going maintenance and monitoring. The reliability of this alternative is questionable, especially since property owners will be required to maintain sub-slab ventilation systems within buildings

Alternative 1 does not meet the requirement of long-term effectiveness and permanence, since no remedial action is performed.

4.2.4 Reduction of Toxicity, Mobility, or Volume by Treatment

Alternatives 4B and 5 are both extremely effective in reducing the toxicity, mobility, and volume of contaminants by treatment. Under these alternatives, contaminated soils will be removed (and may be incinerated depending on concentrations of COCs). Contaminated ground water will be extracted from the aquifer and treated off-Site. Soil vapors extracted by the SVE system will be treated with GAC carbon filters

Alternatives 3, 3A, 3B, 4, and 4A also satisfy this requirement. Contaminated soils will be removed and disposed and/or treated off-Site. Treatment of ground water would either result in the production of non-toxic carbon dioxide or toxic vinyl chloride, depending on the alternative.

Alternatives 1 and 2 do not satisfy this requirement, since neither of these alternatives involves treatment of Site-related COCs.

4.2.5 Short-Term Effectiveness

Alternatives 3B, 4A, and 4B are equal in their short-term effectiveness. Potential risks exist to the community due to soil removal and the related increased truck traffic, as the contaminated material is removed from the Site for disposal. Potential exposure of Site workers to contaminants during soil excavation, extraction well installation, and SVE point installation may occur. Potential storm water impacts to Sherrick Run and Nimishillen Creek may occur during storm sewer lining activities and soil removal. Ambient air may also be impacted during soil removal. All short-term activities would be completed within a two (2) to four (4) month period under these alternatives.

Alternative 3A poses the same potential risks as 3B, 4A, and 4B. In addition, partial closure of Kimball Road SE, in order to protect well injection points, may pose increased risk to local residents. Short-term activities should be completed within two (2) to four (4) months.

Alternatives 3, 4, and 5 have the same potential risks as 3B, 4A, and 4B. In addition, since chemical oxidant injection will be performed under each of the three (3) alternatives, additional potential risk exists to Site workers who may come into contact with the chemical oxidant. Alternative 3 also requires the partial closure of Kimball Road SE, posing additional potential risks to local residents. Short-term remedial activities should be completed within two (2) to four (4) months.

Alternatives 1 and 2 do not meet the requirement for short-term effectiveness, since no increased or decreased protection would be obtained under either of these alternatives.

4.2.6 Implementability

Alternatives 3, 3A, 3B, 4, 4A, 4B, and 5 are all readily implementable. Underground Injection Control (UIC) permits will be required for Alternatives 3, 3A, 4, 4A, and 5. Air permits will be required for SVE discharge for Alternatives 3B, 4, 4A, 4B, and 5. The City of Canton has already approved acceptance of the extracted ground water for Alternatives 3B, 4B, and 5.

Alternative 2 is readily implementable. Institutional controls can be placed on the property through an Environmental Covenant. The installation of

the engineering control can be implemented. No permits are required for this alternative.

Implementability does not apply to Alternative 1, since there are no remedial actions under this alternative.

4.2.7 Cost

Total costs (2007) for each remedial alternative are presented below. A breakdown of costs, including Project Cost and O&M are summarized below:

Alternative #	Project Cost	O&M Cost
1	$ 0	$ 0
2	$ 1,101,447.00	$ 790,125.00
3	$ 9,410,236.00	$ 408,930.00
3A	$ 6,955,092.00	$ 408,930.00
3B	$ 4,847,832.00	$ 1,752,863.00
4	$ 6,431,688.00	$ 470,120.00
4A	$ 5,423,698.00	$ 470,120.00
4B	$ 3,886,747.00	$ 1,950,301.00
5	$ 4,386,075.00	$ 1,950,303.00

4.3 Summary of Evaluation Criteria

A summary of the eight (8) remedial alternatives and the criteria used to evaluate them are presented in Table 9 of this document.

Table 9. Evaluation of Remedial Alternatives for Former Bison Corporation Site

Evaluation Criteria	*Alternative 1*	*Alternative 2*	*Alternative 3*	*Alternative 3A*	*Alternative 3B*	*Alternative 4*	*Alternative 4A*	*Alternative 4B*	*Alternative 5*
(1) Overall protection of human health and the environment	□	◘	■	■	■	■	■	■	■
(2) Compliance with ARARs	□	□	■	■	■	■	■	■	■
(3) Long term effectiveness and permanence	□	□	■	■	■	■	■	■	■
(4) Reduction of toxicity, mobility or volume through treatment	□	□	■	■	■	■	■	■	■
(5) Short term Effectiveness	□	□	◘	◘	◘	◘	◘	◘	◘
(6) Implementability	■	■	■	■	■	■	■	■	■
(7) Project Cost	$0	$1,101,447	$9,410,236	$6,955,092	$4,847,832	$6,431,688	$5,423,698	$3,886,747	$4,386,075
(8) Community acceptance	□	□	■	■	■	■	■	■	■

■ Fully meets criteria ◘ Partially meets criteria □ Does not meet criteria

5.0 SELECTED REMEDIAL ALTERNATIVE

Ohio EPA's selected remedial alternative is Alternative 4B and is summarized in Figure 6. This alternative was selected because it will immediately address the direct contact exposure to contaminated soils on the former Bison Corporation facility and will significantly reduce or eliminate the leaching of soil contaminants into ground water. Receptors will continue to be protected from indoor air exposure by the sub-slab ventilation systems that are already in place. The implementation of institutional controls via an Environmental Covenant and engineering controls will ensure that receptors continue to be protected. It is estimated that this remedial alternative will meet the Site-specific RAOs within approximately 12 years, which is comparable to other treatment/removal based alternatives, all of which cost significantly more than Alternative 4B.

Based on information currently available, Ohio EPA believes the selected alternative meets the threshold criteria and provides the best balance of tradeoffs among the other alternatives with respect to balancing and modifying criteria. Ohio EPA expects the preferred alternative to satisfy the following requirements: 1) be protective of human health and the environment; 2) comply with ARARs; 3) be cost-effective; 4) utilize permanent solutions and alternative treatment technologies (*e.g.*, innovative) to the maximum extent practicable; and 5) satisfy the preference for treatment as a principal element. Ohio EPA's preferred alternative consists of the following:

- Excavation and removal of an estimated 3800 tons of source area soils in the former bulk storage tank area (identified area 16) on the former Bison Facility to depths of up to 8 feet containing chlorinated VOCs and inorganic COCs (primarily arsenic). These soils will be removed from the Site for off-Site treatment and/or disposal at a licensed facility. Clean soils will be placed back into the excavation to assure that the direct contact soil RBCs are met to the depth of the point of compliance;

- Installation of a series of air sparging wells into the affected saturated zone beneath the former Bison Corporation facility portion of the Site. These wells will be installed to a depth of approximately 21-25 feet below ground surface. The exact screened interval will be determined as part of the Remedial Design phase of the project. These wells will either be manifolded to a common air blower system, or each well will be equipped with its own air blower to create the sparging effect within the affected saturated zone;

- Installation of a SVE system to operate in concert with the air sparging wells on the former Bison Corporation facility portion of the Site. The SVE system will focus on removal of the air stream injected as part of air sparging (this air stream will contain VOCs "sparged" from ground water) as well as removal of VOCs from selected soils on the Bison Corporation facility

portion of the Site that are not addressed as part of excavation and removal. The SVE system may be configured as a horizontal pipe design, or conventional vertical points. The optimal layout of the SVE system will be determined as part of the Remedial Design phase of this project. The SVE extraction points (whether horizontal or vertical) will be manifolded to a common blower system and the extracted air treated by passage through a chamber (or series of chambers) containing granulated activated charcoal (GAC);

- Installation of a series of seven (7) six- to eight-inch diameter ground water extraction wells into the affected ground water interval along a 400-foot long line situated on the Peoples Services, Inc. facility, west of the affected residences on Kimball Road. These wells will be fitted with 4-inch diameter submersible pumps, and the wells connected by above ground plumbing to a common manifold connected to the City of Canton sanitary sewer (either with or without pretreatment);

- Installation of an engineering control in the 42-inch brick storm sewer system within the Kimball Road/Allen Avenue SE right-of-way from the Interstate 77 overpass over Kimball Road south to the point where the construction of this sewer changes from brick to steel (near the outlet of Sherrick Run). The storm sewer will be slip lined to prevent infiltration of ground water into the storm sewer;

- Implementation of a Site-wide institutional control to prohibit the extraction and use of ground water for any purpose from any saturated zone beneath the Site except for ground water monitoring and/or remediation;

- Implementation of institutional controls on the former Bison Corporation facility through an Environmental Covenant to prohibit the extraction of ground water for potable or non-potable use, except for ground water monitoring and/or remediation;

- Implementation of an institutional control on the former Bison Corporation facility through an Environmental Covenant limiting the facility to a commercial/industrial land use;

- Implementation of an institutional control on the former Bison Corporation facility through an Environmental Covenant restricting the construction of new buildings in certain areas (i.e., areas where active remediation is occurring);

- Periodic air sampling at impacted residences and Building 1 on the former Bison Corporation facility to monitor the progress of the remedy; and

- Periodic ground water monitoring of selected wells to evaluate the progress of the remedy.

The sub-slab ventilation systems that are currently in place within commercial and residential structures will continue to operate until RBCs have been met for indoor air.

After construction of the remedial systems, an evaluation period will be required to ensure that the remedy is operational and functional. At the end of the evaluation period, which will include additional sampling to demonstrate that the remedy is effective, a construction completion report will be submitted to Ohio EPA.

Continued operation of the installed remedial systems and continued monitoring of the remedy will be conducted in accordance with an approved O&M Plan until the RAOs are met.

5.1 Soil Excavation and Disposal

An estimated 3,800 tons of contaminated soils will be removed from depths of up to eight (8) feet from the source area in the former bulk storage tank area (identified area 16) on the former Bison facility. Soils in this area are highly contaminated with VOCs and contain metals. To protect the integrity of buildings during excavation, only "accessible" soils will be removed. Accessible soils are defined as those soils located outside the existing footprints of buildings on the former Bison Corporation facility portion of the Site, taking into consideration required foundational "setbacks" to maintain building integrity. Soils will be excavated and hauled from the Site in tarp-covered trucks, in order to limit the potential for contamination of areas off-facility. Air monitoring will be performed at the former facility boundaries during the excavation to ensure that local residents are protected. Depending on the concentrations of contaminants, soils will be incinerated or placed in a licensed hazardous or solid waste landfill.

Performance Standard

Excavation of soils in the source area of the former bulk storage tank area (identified area 16) on the former Bison Corporation facility will be performed until the remaining soils meet RBCs. Confirmatory samples will be collected in accordance with an approved work plan to ensure removals are complete.

5.2 Soil Treatment

Certain residual contaminated soils and contaminated ground water on the former Bison Corporation facility will be treated using Air Sparging and SVE. Air will be injected at the base of the shallow contaminated ground water zone through a system of air sparging wells, which may extend to a depth of 21 to 25 feet below ground surface. Air will then be extracted as it migrates upward from the injection

zone via a SVE system. The exact depths and locations of the air sparging wells and the SVE extraction system will be determined during remedial design activities. Contaminated air generated during sparging and captured via SVE will be treated with GAC before it is released, under an Ohio EPA air discharge permit.

Performance Standard

The Air Sparging and SVE systems will operate throughout the evaluation period, following installation. Operation of these systems will continue until the On-Facility soil and ground water RBCs in Table 7 are met.

5.3 Ground Water Extraction System

A series of seven (7) extraction wells will be installed on the Publix, Inc. property, located west/southwest of the residences along Kimball Road. These extraction wells will be six (6) to eight (8) inches in diameter and fit with four (4) inch submersible pumps. Ground water will be extracted from the wells and, depending on the contaminant concentration, may be pumped directly into the City of Canton's wastewater treatment system. If direct discharge is not possible, the water will be pre-treated prior to disposal into the City's wastewater treatment system.

The goal of the ground water extraction system is to increase the hydraulic gradient of the contaminated ground water within the area located immediately below the former Bison Corporation facility and residences along Kimball Road and Allen Avenue SE. This will cause the contaminated ground water to move from a location beneath occupied buildings, into an adjacent open area where it would not cause indoor air impacts. The contaminated ground water will be extracted and treated as part of this process, which will permanently remove the COCs from the aquifer.

Performance Standard

Operation of the ground water extraction system will continue until Site-specific indoor air RBCs are met in currently affected residents. Ground water will be monitored to determine that concentrations in selected wells will not exceed a value above State of Ohio Water Quality Standards (OMZA) for Nimishillen Creek. Sampling of affected buildings and ground water wells will be performed on a scheduled basis, which will be identified in the approved Remedial Design documents submitted prior to construction of the remedy.

5.4 Storm Sewer Engineering Control

The portion of the storm sewer which runs along the boundary of the former Bison Corporation facility will be slip lined. This type of reconstruction of a storm sewer

is typically accomplished by the installation of a resin-impregnated flexible tube, which is tightly formed to the original sewer.

Performance Standard

After construction of the slip lining is complete and after a construction completion certification report has been submitted to Ohio EPA, the performance standard will be met.

5.5 Institutional Control Implementation

5.5.1 Ground Water Use

Institutional controls established to prohibit the extraction of ground water for potable and non-potable purposes within the boundaries of the entire Site, with the exception of ground water remediation and monitoring.

Performance Standard

Institutional controls will be established as part of the remedial action. Acceptable institutional control mechanisms include a Canton City Ordinance or a Canton City Health Department Policy (Memorandum). For the Bison Corporation facility itself, an Environmental Covenant in accordance with Ohio Revised Code (ORC) §§5301.80-5301.92 is required to be filed with the Stark County Recorder's Office.

5.5.2 Land Use Institutional Control On Facility

Institutional controls restricting the use of the former Bison Corporation facility to commercial and industrial land uses through an Environmental Covenant in accordance with ORC §§5301.80-5301.92 is required.

Performance Standard

Institutional controls will be established as part of the remedial action. An Environmental Covenant (ORC §§5301.80-5301.92) will be filed with Stark County Recorder's Office restricting the use of the former Bison Corporation facility to commercial and industrial land use.

5.6 Operation & Maintenance

Continued operation and maintenance of the installed remedial systems, including the existing sub-slab ventilation systems, ground water gradient control, and SVE/Air sparging systems, will be performed in accordance with an approved O&M Plan.

Performance Standard

O&M of the remedial systems will be conducted until applicable RAOs and RBCs are met. Periodic sampling of the systems will be performed to measure the effectiveness of the remedy.

6.0 RESPONSIVENESS SUMMARY

For Former Bison Corporation
Stark County, Ohio

Ohio EPA held a public hearing regarding the March 15, 2007 *Preferred Plan for Remediation of the Former Bison Corporation* site on May 17, 2007, at the Edward Peel Coleman Community Center, located at 1400 Sherrick Road, SE, in Canton. Oral comments were received during the public hearing from the following individuals: 1) Jim Adams, Director of Administration for the Canton City Health Department; 2) Brent Fatzinger, Chief Financial Officer for Abbott Electric, Inc.; 3) Steve Katz, Senior Vice President with the Canton Regional Chamber of Commerce; 4) Douglas Sibila, Vice President of Publix, Inc.; and 5) Rick Zengler, Planning Analyst for the City of Canton. All of the oral comments received during the public hearing supported Ohio EPA's Preferred Plan with the preferred alternative for remediation of the Former Bison Corporation. In addition, written comments that also supported Ohio EPA's Preferred Plan were received from Douglas Sibila, Vice President of Publix, Inc., whose tenant is Peoples Express, Inc.; and Allison Knowles, EHS Manager of Von Roll America, Inc. No comments were received that recommended a different remedial alternative for the Site or that recommended changes be made to the *Preferred Plan of the Former Bison Corporation* Site.

7.0 GLOSSARY

Aquifer - An underground geological formation capable of holding and yielding water.

ARARs - Applicable or relevant and appropriate requirements. Those rules which strictly apply to remedial activities at the Site, or those rules whose requirements would help achieve the remedial goals for the Site.

Baseline Risk Assessment - An evaluation of the risks to humans and the environment posed by a Site.

Carcinogen - A chemical that causes cancer.

CERCLA - Comprehensive Environmental Response, Compensation and Liability Act of 1980, as amended, 42 U.S.C. 9601 et seq. A federal law that regulates cleanup of hazardous substances Sites under the U.S. EPA Superfund Program.

Contaminants of Concern (COCs) - Chemicals identified at the Site which are present in concentrations that may be harmful to human health or the environment.

Decision Document - A statement issued by Ohio EPA giving the Director's selected remedy for a Site and the reasons for its selection.

DRO - Diesel range organic compounds found in petroleum products.

Ecological Receptor - Animals or plant life exposed or potentially exposed to chemicals released from a Site.

Environmental Covenant - A servitude arising under an environmental response project that imposes activity and use limitations and that meets the requirements established in section 5301.82 of the Revised Code.

Exposure Pathway - Route by which a chemical is transported from the Site to a human or ecological receptor

Feasibility Study - A study conducted to ensure that appropriate remedial alternatives are developed and evaluated such that relevant information concerning the remedial action options can be presented to a decision-maker and an appropriate remedy selected.

Final Cleanup Levels - Final cleanup levels are identified in the Decision Document along with the RAOs and performance standards.

GRO - Gasoline range organic compounds found in petroleum products.

Hazardous Substance - A chemical that may cause harm to humans or the environment.

Hazardous Waste - A waste product, listed or defined by the RCRA, which may cause harm to humans or the environment.

Human Receptor - A person or population exposed to chemicals released from a Site.

Leachate - Water contaminated by contact with wastes.

LOE Contractor - Level of Effort Contractor. A person or organization retained by Ohio EPA to assist in the investigation, evaluation, or remediation of a Site.

Maximum Contaminant Level (MCL) - The highest level of a contaminant that is allowed in a public drinking water supply. The level is established by U.S. EPA and incorporated into OAC 3745-81-11 and 3745-81-12.

NCP - National Oil and Hazardous Substances Pollution Contingency Plan, codified at 40 C.F.R. Part 300 (1990), as amended. A framework for remediation of hazardous substance Sites specified in CERCLA.

O&M - Operation and Maintenance. Long-term measures taken at a Site, after the initial remedial actions, to assure that a remedy remains protective of human health and the environment.

PAHs - Polycyclic aromatic hydrocarbons. Class of semi-volatile chemicals including multiple six-carbon rings. Often found as residue from coal-based chemical processes.

PCBs - Polychlorinated biphenyls. An oily chemical typically used in electrical equipment.

PCE - Tetracholoethene or Perchloroethylene. A common industrial solvent and cleaner, often used for dry cleaning.

Performance Standard - Measures by which Ohio EPA can determine if RAOs have been met.

Preferred Plan - The plan that evaluates the preferred remedial alternative chosen by Ohio EPA to remediate the Site in a manner that best satisfies the evaluation criteria.

Preliminary Remediation Goal (PRG) - Initial cleanup goals that (1) are protective of human health and the environment and (2) comply with ARARs. They are developed early in the process (scoping) based on readily available information and are modified to reflect the results of the baseline risk assessment (termed Site-specific PRGs at this point in time). They are also used during the analysis of remedial alternatives in the remedial investigation/feasibility study (RI/FS).

RCRA - Resource Conservation and Recovery Act of 1976 codified at 42 U.S.C. 6901 et seq., as amended. A federal law that regulates the handling of hazardous wastes.

Remedial Action Objectives (RAOs) - Specific goals of the remedy for reducing risks posed by the Site.

Remedial Investigation - A study conducted to collect information necessary to adequately characterize the Site for the purpose of developing and evaluating effective remedial alternatives.

Responsiveness Summary - A summary of all comments received concerning the Preferred Plan and Ohio EPA's response to all issues raised in those comments.

Risk Management Plan (RMP) - A plan developed to address risk to workers on a Site during post-remedial activities

SVOC - Semi-volatile organic compounds

TCA - 1,1,1-Tricholorethane. A common industrial solvent and cleaner.

TCE - Trichloroethylene. A common industrial solvent and cleaner.

VOC - Volatile organic compound

Water Quality Criteria - Chemical, physical, and biological standards that define whether a body of surface water is impacted. These standards ensure that a body of water is safe for fishing, swimming, and as a drinking water source. These standards can be found in Chapter 3745-1 of the Ohio Administrative Code.

DECLARATION

SITE NAME AND LOCATION

Former Bison Corporation
Canton, Stark County, Ohio

STATEMENT OF BASIS AND PURPOSE

This Decision Document presents the selected remedial action for the Former Bison Corporation Site in Canton, Ohio, chosen in accordance with the policies of the Ohio Environmental Protection Agency, statutes and regulations of the State of Ohio, and the National Contingency Plan, 40 CFR Part 300.

ASSESSMENT OF THE SITE

Actual and threatened releases of industrial solvents at the Site, if not addressed by implementing the remedial action selected in the Decision Document, constitute a substantial threat to public health and are causing soil, ground water, air, and surface water contamination. The former Bison Corporation facility manufactured grinding and buffing wheels for use in the metal plating industry, and stored industrial solvents in bulk for distribution to commercial and industrial customers. Historical operations at the facility released industrial solvents and metals into the environment. Interim actions consisting of sub-slab ventilation systems in residential and commercial structures are in place.

DESCRIPTION OF THE SELECTED REMEDY

The selected remedial action includes:

- Removing an estimated 3,800 tons of source area soils from the former Bison Corporation facility;

- Installing a series of air sparging wells into the affected saturated zone beneath the former Bison Corporation facility portion of the Site;

- Installing a soil vapor extraction system to operate in concert with the air sparging wells on the former Bison Corporation facility portion of the Site to recover the contaminated air stream generated through air sparging;

- Altering the natural hydraulic gradient of the Site, in order to cause ground water to flow more quickly away from buildings currently affected by indoor air contamination and removal of contaminated ground water from the aquifer, followed by pretreatment, as necessary, with disposal to the City of Canton wastewater treatment system;

- Implementing institutional controls to prohibit use of ground water within the Site; restrict use of the former Bison Corporation facility to commercial and industrial uses; and limiting the construction of buildings to certain areas of the former facility; and

- Periodic sampling of ground water and indoor air to evaluate the progress of remedial activities.

STATUTORY DETERMINATIONS

The selected remedial action is protective of human health and the environment, complies with legally applicable state and federal requirements, is responsive to public participation and input and is cost-effective. The remedy uses permanent solutions and treatment technologies to the maximum extent practicable to reduce toxicity, mobility, and volume of hazardous substances at the Site. The effectiveness of the remedy will be reviewed regularly.

4/7/08

Chris Korleski, Director Date

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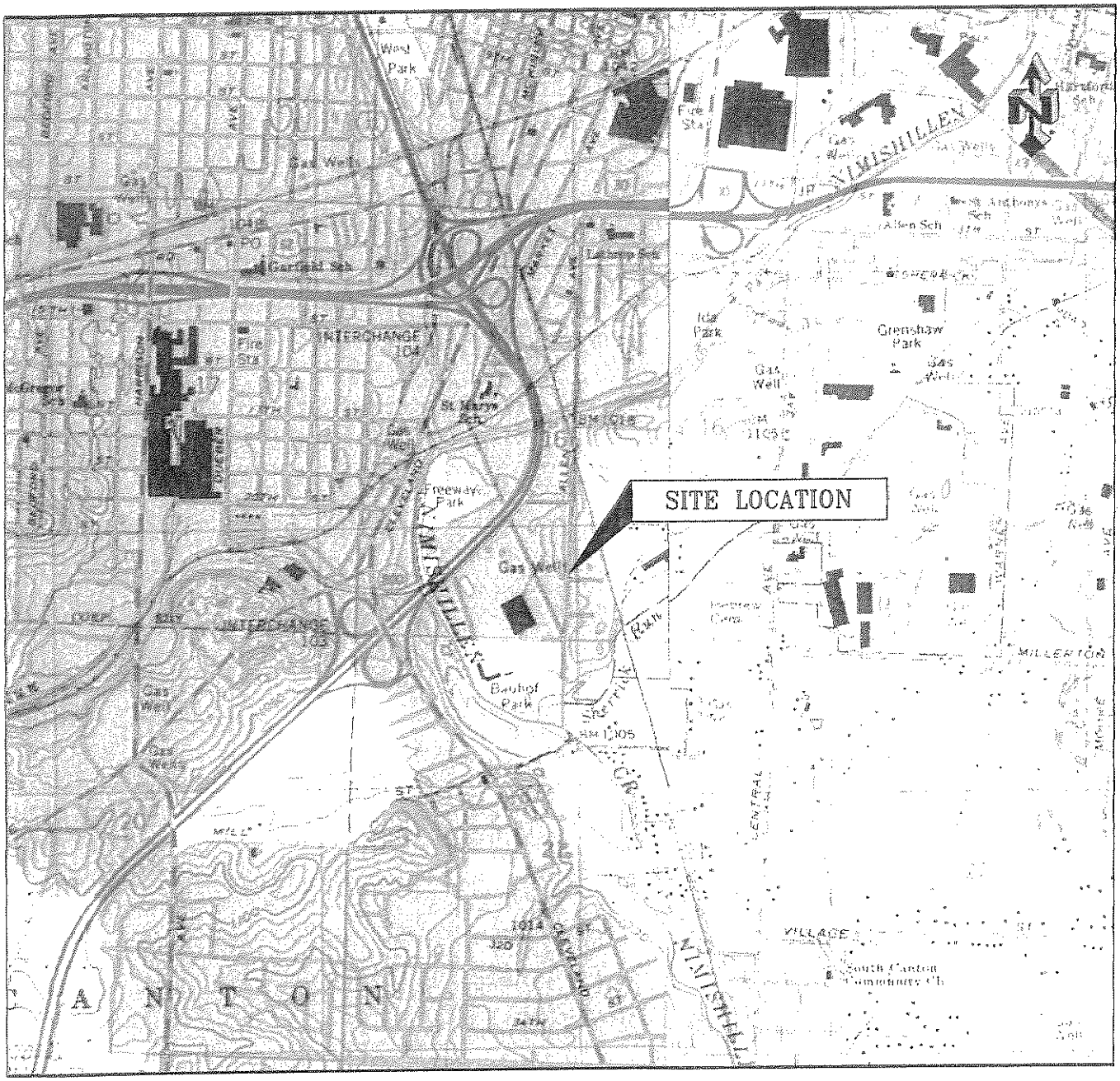
I:\HZW\HO702601\CAD\DWGS\BISON\FACILITY\F4-FIG1.DWG (DSV/GMB)

SITE LOCATION MAP

1994 CANTON WEST, OHIO USGS TOPOGRAPHIC QUADRANGLE



SCALE

1:24000

1 0 1 MILE

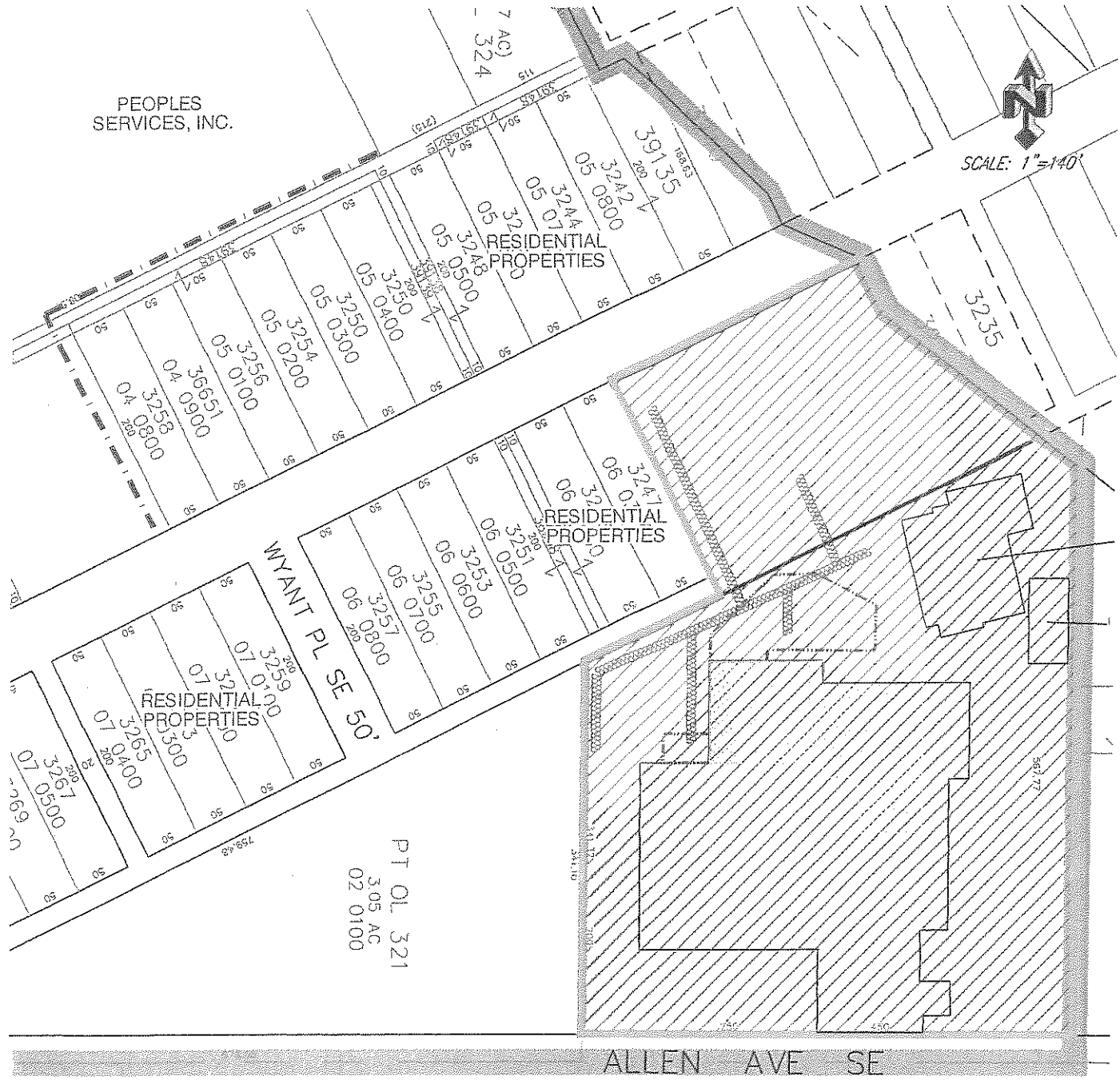
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

1 .5 0 1 KILOMETER

FIGURE 1

SITE LOCATION MAP
FORMER BISON CORPORATION SITE
CANTON, STARK COUNTY, OHIO

HZW ENVIRONMENTAL CONSULTANTS, LLC



MAINTENANCE/OPERATION OF SUB-SLAB VENTILATION SYSTEMS AND PERIODIC AIR MONITORING

GROUND WATER MONITORING AND INSTITUTIONAL CONTROLS AGAINST EXTRACTION OF GROUND WATER FOR ANY PURPOSE OTHER THAN MONITORING OR REMEDIATION, AND LIMITATION FOR COMMERCIAL/INDUSTRIAL USE ONLY

LOCATION OF POSSIBLE INSTITUTIONAL CONTROL AGAINST CONSTRUCTION OF NEW BUILDINGS (DEPENDENT UPON OUTCOME OF REMEDIAL EFFORTS)

EXCAVATION AND OFF-SITE TRANSPORT AND TREATMENT/DISPOSAL OF CONTAMINATED SOILS TO DEPTHS UP TO 8 FEET

LOCATION OF AIR SPARGING/SOIL VAPOR EXTRACTION SYSTEM

BOUNDARY OF FORMER BISON CORPORATION PROPERTY

OVERALL SITE BOUNDARY

EXCTRACTION WELL GALLERIES

HZW ENVIRONMENTAL CONSULTING, LLC
6105 Heisley Rd. • Mentor, OH 44060
440-357-1260 • Fax 440-357-1510

FIGURE 6

CONCEPTUAL OVERVIEW OF SELECTED REMEDIAL ALTERNATIVE

I:\HZW\2007\H0702601\CADDWGS\BISONLOCALFS--FIG2.DWG (DSV/GMB) 1/8/07

SCALE: 1"=220'

CITY OF CANTON

INTERSTATE 77 RIGHT-OF-WAY

PEOPLES SERVICES, INC.

NIMISHILLEN CREEK

THURMAN MUNSON STADIUM AND PARKING AREAS (CITY OF CANTON)

23RD ST SE 25'

RESIDENTIAL

OTIS PL SE 50'

WYANT PL SE 50'

RESIDENTIAL

RESIDENTIAL

KIMBALL RD SE 60'

RESIDENTIAL

SHERRICK RUN

24TH ST SE 40'

BISON EXECUTIVE PARK

ALLEN AVE SE

ALLEN AVE SE

ST SE

HzW ENVIRONMENTAL CONSULTANTS, LLC
6105 Heisley Rd. • Mentor, OH 44060
440-357-1260 • Fax 440-357-1510

LEGEND

FACILITY BOUNDARY

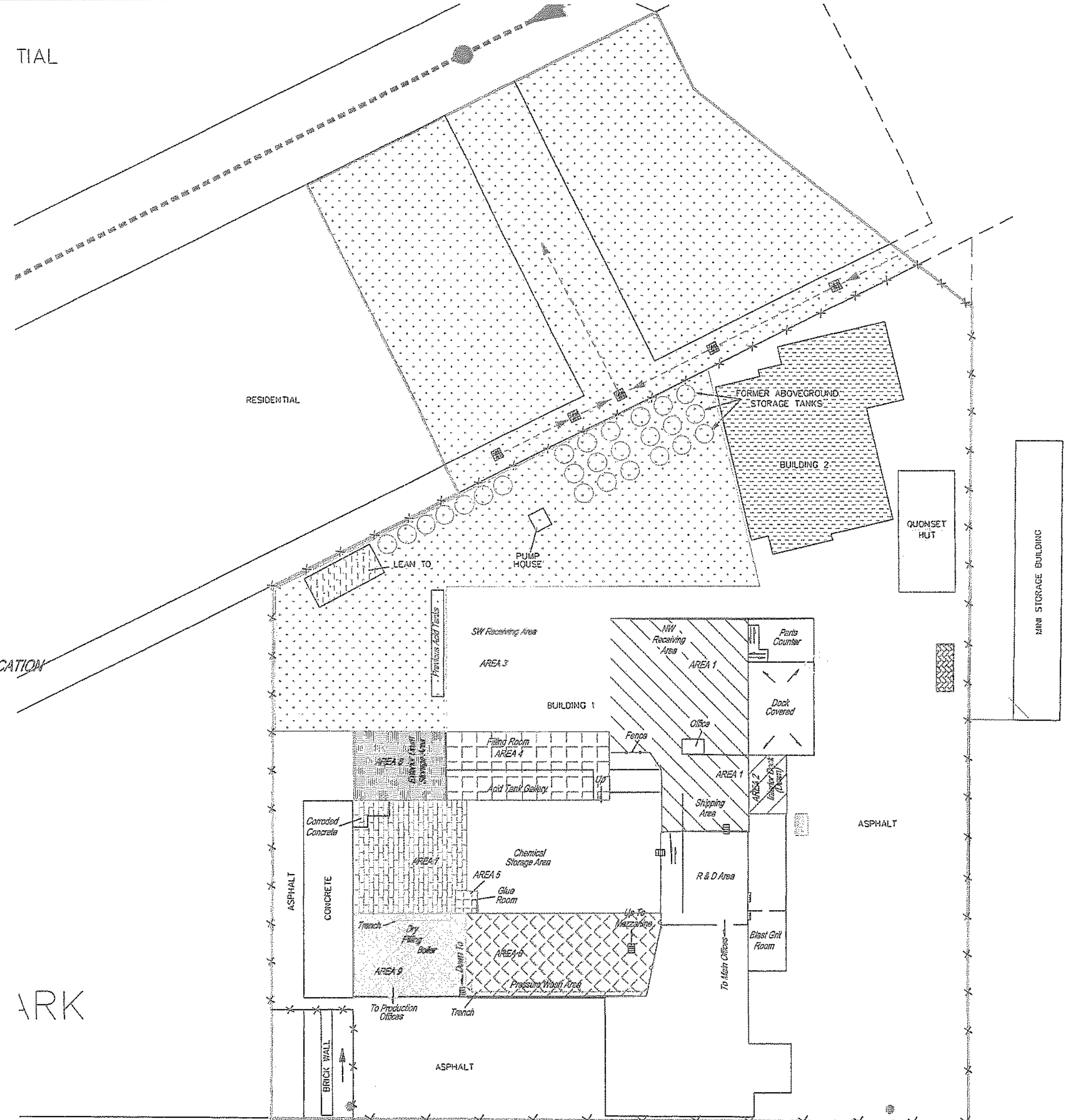
SITE BOUNDARY

FIGURE 2

LOCAL SETTINGS OF THE FORMER BISON CORPORATION SITE CANTON, STARK COUNTY, OHIO

I:\HZW\2007\H0702601\CADDWGS\BISONIDFIG6-FIG3.DWG (DSV/GMB) 1/8/07

SCALE: 1"=80'



LEGEND

- IDENTIFIED AREA #1-NORTHWEST SHIPPING AND RECEIVING AREA
- IDENTIFIED AREA #2- INTERIOR DOCK AREA
- IDENTIFIED AREA #3- SOUTHWEST RECEIVING AREA
- IDENTIFIED AREA #4-FILLING ROOM
- IDENTIFIED AREA #5-GLUE ROOM
- IDENTIFIED AREA #6- PRESSURE WASH AREA
- IDENTIFIED AREA #7-CHEMICAL STORAGE AREA
- IDENTIFIED AREA #8- EXTERIOR DRUM STORAGE AREA
- IDENTIFIED AREA #9-DRY FILLING AREA
- IDENTIFIED AREA #10-POLE MOUNTED TRANSFORMERS
- IDENTIFIED AREA #11-FORMER GASOLINE UNDERGROUND STORAGE TANK LOCATION
- IDENTIFIED AREA #12-FORMER UNDERGROUND STORAGE TANK LOCATION
- IDENTIFIED AREA #13-FORMER DIESEL FUEL ABOVEGROUND STORAGE TANK
- IDENTIFIED AREA #14-QUONSET HUT
- IDENTIFIED AREA #15- BRICK STORAGE BUILDING
- IDENTIFIED AREA #16- BULK STORAGE TANK AND MANIFOLD AREA
- IDENTIFIED AREA #17-LEAN-TO
- IDENTIFIED AREA #18-OFF-SITE GROUND WATER CONTAMINATION
- FACILITY BOUNDARY

LEGEND

STORM SEWER GATE   STORM SEWER

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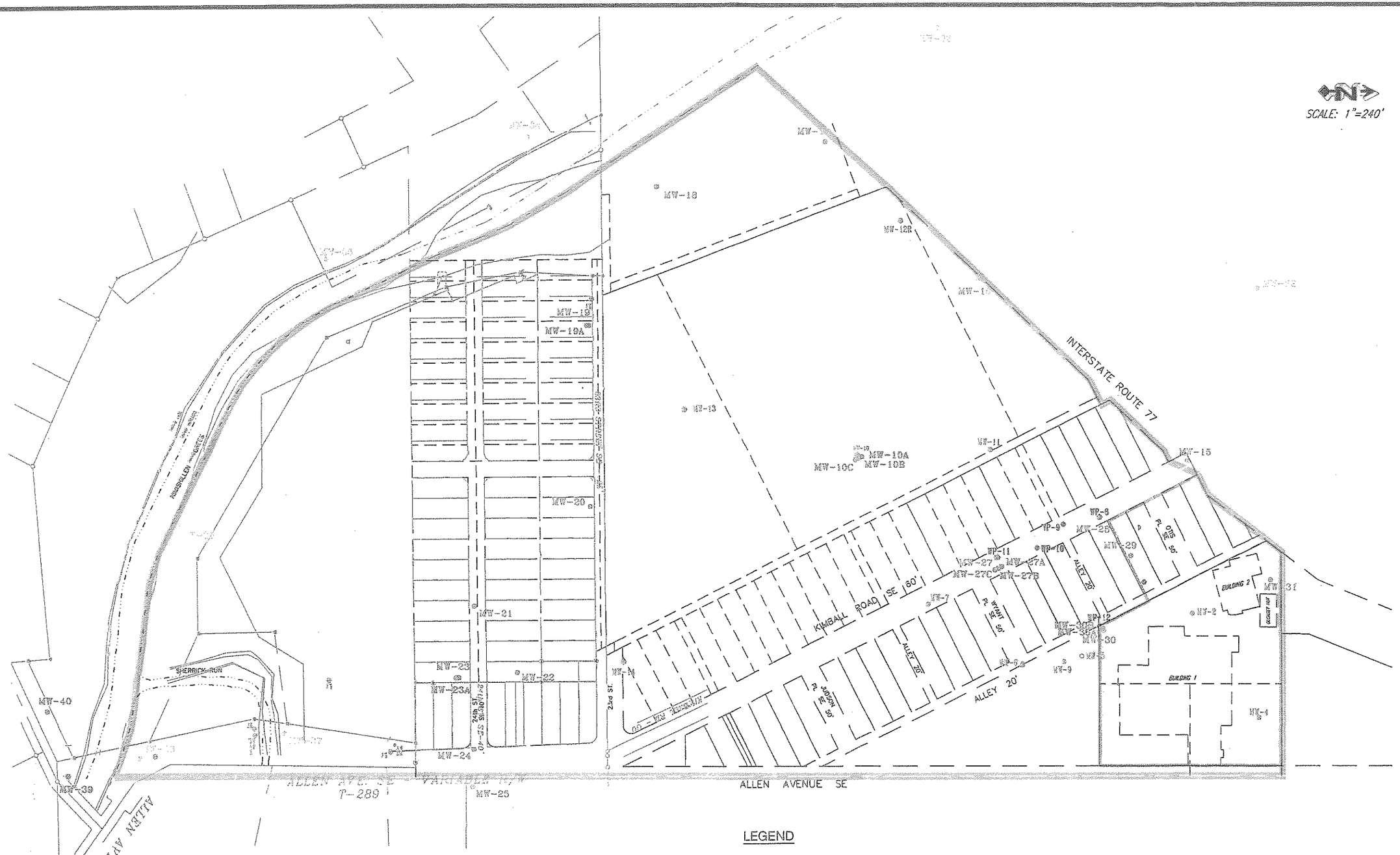
FIGURE 3

IDENTIFIED AREAS
FORMER BISON CORPORATION FACILITY
1935 ALLEN AVENUE SE
CANTON, STARK COUNTY, OHIO

I:\HZW\2007\H0702601\CADDWGS\BISONGWMDF8-FIG4.DWG (DSV/GMB) 12/8/06

SCALE: 1"=240'



LEGEND

- WELL POINT LOCATIONS INSTALLED SUMMER 2001
- MONITORING WELL LOCATION INSTALLED SEPTEMBER 2000
- MONITORING WELL LOCATION INSTALLED AUGUST 2001
- FACILITY BOUNDARY
- SITE BOUNDARY
- MONITORING WELL LOCATION INSTALLED SUMMER 2002
- MONITORING WELL LOCATION INSTALLED APRIL 2006
- MONITORING WELL LOCATION INSTALLED JUNE 2006
- MONITORING WELL LOCATION INSTALLED AUGUST 2006

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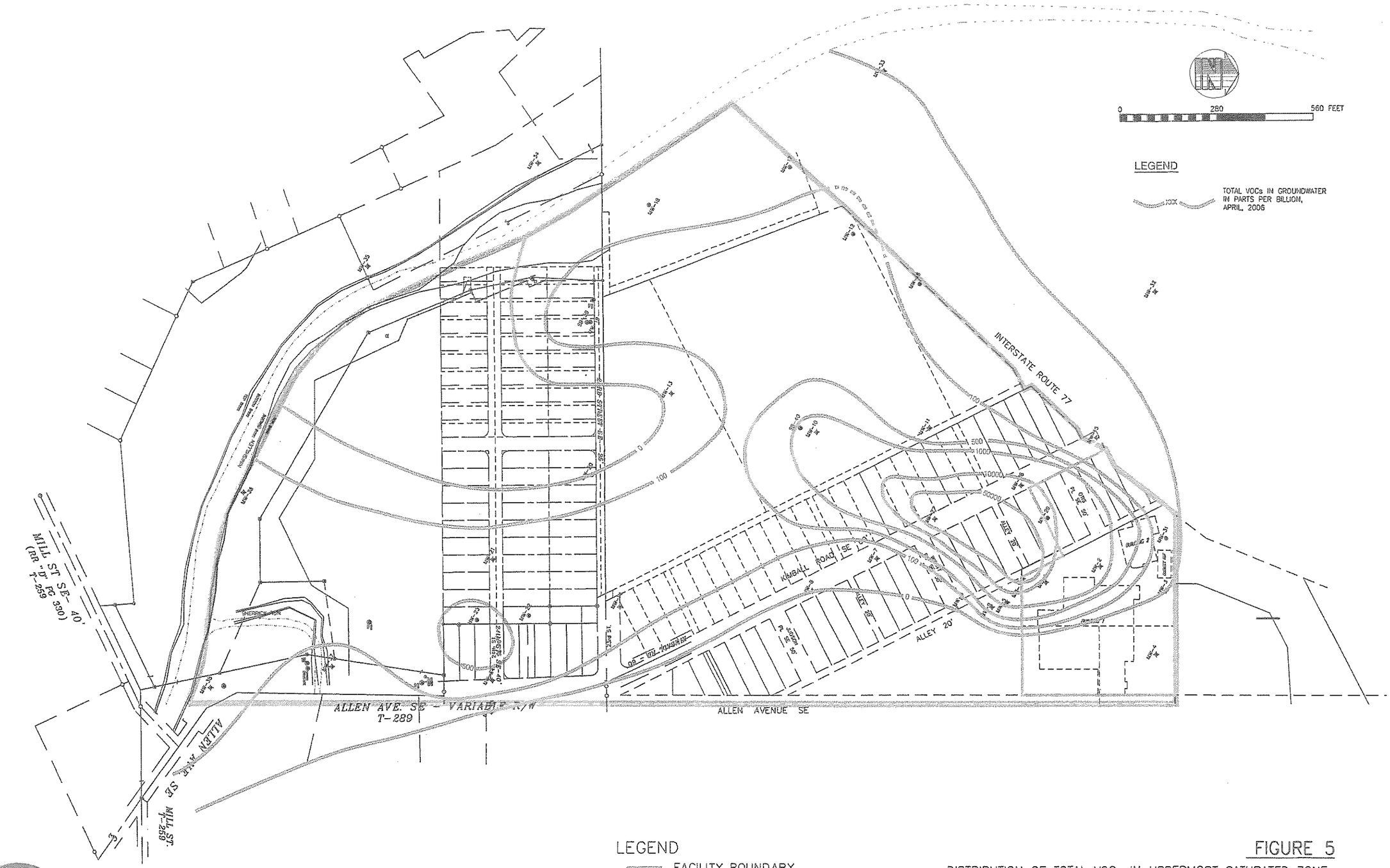
FIGURE 4

GROUND WATER MONITORING DEVICE LOCATIONS MAP
FORMER BISON CORPORATION SITE
1935 ALLEN AVENUE SE
CANTON, STARK COUNTY, OHIO

I:\HZW\2007\H0702601\CADDWGS\BISON PLUME F20-FIG5.DWG (GMB) 2/5/07



LEGEND

FACILITY BOUNDARY
SITE BOUNDARY

FIGURE 5

DISTRIBUTION OF TOTAL VOCs IN UPPERMOST SATURATED ZONE
FORMER BISON CORPORATION SITE
CANTON, STARK COUNTY, OHIO

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