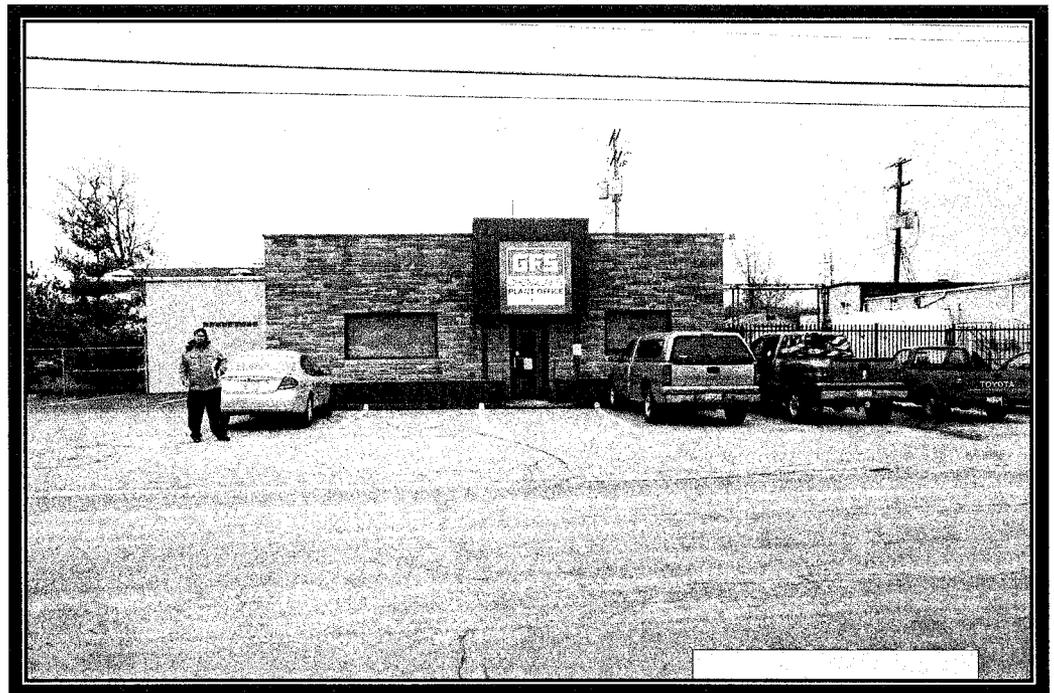


**Division of Emergency and Remedial Response**

**Site Reassessment**

**G. Frederick Smith Chemical Company  
Columbus, Ohio**



**March 31, 2006**

Bob Taft, Governor  
Joseph P. Koncelik, Director

May-23-2006 02:37pm From-

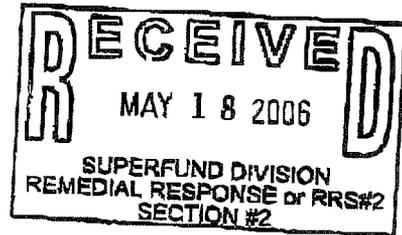
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OHIO ENVIRONMENTAL PROTECTION AGENCY (OHIO EPA)

DIVISION OF EMERGENCY & REMEDIAL RESPONSE (DERR)

SITE ASSESSMENT REPORT

Smith Frederick Chem Co  
aka G. Frederick Smith Chemical Company, ed  
Franklin County  
DERR ID 125-000745  
U.S. EPA OHD004284188



Prepared by: [Signature] Date: 3/24/06  
Site Coordinator

Reviewed by: [Signature] Date: 3/28/06  
Manager

Approved by: [Signature] Date: 5/24/2006  
Site Assessment Manager



**Site Reassessment Report**  
for  
**G. Frederick Smith Chemical Company**  
851 McKinley Avenue  
Columbus, Ohio

**Executive Summary**

This Site Reassessment was completed by the Ohio Environmental Protection Agency (Ohio EPA) under a cooperative agreement with the United States Environmental Protection Agency (US EPA), Region 5. US EPA asked Ohio EPA to evaluate eight facilities throughout Ohio that were identified as having manufactured or handled perchlorate compounds. US EPA's objective is to determine how many of these sites might qualify for the National Priorities List (NPL).

G. Frederick Smith Chemical Company (GFS) is a leading manufacturer of perchlorate compounds, particularly perchloric acid and magnesium perchlorate. GFS began manufacturing perchlorate compounds in 1928 at the Columbus site. They also manufacture several other specialty chemicals, including organics, rare earth fluorides, trichloromelamine, mercuric nitrate, mercuric sulfate, and reagents.

Currently, GFS operates with air and water permits, and they are a large quantity generator of hazardous waste (Resource Conservation and Recovery Act (RCRA) regulated facility). They have a National Pollutant Discharge Elimination System (NPDES) permit for discharge of non-contact cooling water and storm water to the storm sewers; air pollution control permits for all identified air emissions; a Spill Pollution Control and Countermeasures Plan; and a Risk Management Plan for potential explosive hazards. They also submit annual release data for the Toxic Release Inventory Database.

Ohio EPA has no environmental sampling data that documents an observed release at GFS; however, the potential for a release is likely due to the long history of manufacturing perchlorate compounds at this site. If perchlorate releases occurred, the overall threat is low, mainly because of the lack of a nearby target population for the drinking water pathway.

## Site Description and History

GFS is located at 800-879 McKinley Avenue, which is 1 mile west of downtown Columbus in a mixed industrial/residential area (Latitude: 39° 57' 46"; Longitude: 83° 01' 27") (Figure 1). GFS consists of 17 buildings and occupies a total area of approximately 12 acres (Figure 2). The site is bounded by commercial/industrial facilities, an old cemetery, the Scioto River, and the Norfolk and Southern railroad tracks. A mixed residential/commercial area is located 300-400 feet south of GFS on the other side of the railroad tracks.

GFS began operations in 1928 at the Columbus site. From its inception, the company specialized in the manufacture of perchlorate compounds, mainly magnesium perchlorate and perchloric acid. Currently, perchloric acid is their main production chemical and is sold to customers worldwide. They manufacture perchloric acid by dissolving ammonium perchlorate in water and then mixing the solution with hydrochloric acid and sulfuric acid. The reaction takes place in large vessels in the Perchloric Acid Plant, which is located at the west end of the facility. They store the perchloric acid in large above-ground plastic tanks and repackage it for shipment in the main building. The precise manufacturing process and chemical engineering is proprietary information.

GFS uses perchloric acid in the production of magnesium perchlorate and other perchlorate salts. They manufacture magnesium perchlorate in the Magnesium Perchlorate Plant or "Maggy Building" and store it in stainless steel drums. In addition to perchlorate compounds, GFS manufactures organic chemicals, rare earth fluorides, trichloromelamine, mercuric nitrate, mercuric sulfate, sulfites, Karl Fischer Watermark Reagents, and other specialty chemicals. Most specialty chemicals are produced in small batches.

GFS is a large quantity generator of hazardous waste and is regulated under RCRA. They generate approximately 70,000 pounds of hazardous waste per year. The majority of the hazardous wastes are listed D and F wastes and consist mainly of non-halogenated organic solvents that are generated in the production of organic chemicals. They also generate listed inorganic wastes including mercury, cadmium, chromium, lead, and silver. Hazardous waste is stored at satellite areas and a 90-day accumulation area. GFS was cited for RCRA violations by Ohio EPA's Division of Hazardous Waste Management (DHWM) in 1994 and was issued Director's Findings and Orders on March 14, 1997. The violations were related to storing characteristic mercury waste beyond 90 days. They are currently on the list for possible RCRA Subtitle C corrective action; however, according to DHWM, no corrective actions are planned and may not be necessary. They also file a Spill Pollution Control and Countermeasures Plan with Ohio EPA.

GFS discharges non-contact cooling water to the storm sewer. Past discharges to the storm sewer were acidic and resulted in storm sewer damage. Since 1979, the

discharge has been permitted (NPDES Permit #41E00006). The NPDES Permit also covers storm water runoff. The water quality is measured once per month for pH, chemical oxygen demand, and flow rate. GFS also treats acidic wastewater with limestone in lined pits before discharge to the city of Columbus sanitary sewer system. The pretreatment system is located at the west end of the Perchloric Acid Plant.

GFS operates with air pollution control permits that cover all potential air emissions. They are currently in compliance with their permit requirements. Ohio EPA has received complaints concerning stack emissions, but none of the complaints resulted in fines or enforcement actions. In addition, GFS is required to submit annual releases for the Toxic Report Release Inventory Database, and they submit a Risk Management Plan (RMP) for potential explosive hazards.

Since 1980, Ohio EPA has documented 19 emergency response releases at GFS. Most of the releases were reported by the company and were contained or released to the air. Chemicals released include waste water, nitric acid, chlorine, nitrous oxide, caustic soda, and phenyl hydrazine.

Ohio EPA has received complaints concerning leaking drums, drums in poor condition, improper storage of hazardous materials, stack emissions, and explosive hazards due to the presence of ammonium perchlorate. Ohio EPA did not initiate any enforcement actions against GFS for any of these complaints.

Ohio EPA obtained historic aerial photographs dating to 1946 from the Ohio Department of Transportation to determine if GFS had any centrally located disposal areas that could be a significant source of contamination. No disposal areas are apparent in the aerial photographs.

On February 8, 2006, Ohio EPA visited GFS to document current site conditions (See Attachment A). Ohio EPA was escorted to all areas of the site by Michael J. Carter, Plant Engineer and Maintenance Supervisor. GFS appears to be a well-maintained facility. The site is mostly paved or graveled with very little exposed soil or vegetation and is fenced. Ohio EPA did not observe indications of past releases during the site visit.

# Pathway Analysis

## Ground Water Migration Pathway

**Hydrogeology.** The geology in the area consists of approximately 60-70 feet of unconsolidated clay till with sand and gravel lenses that overlies Devonian dolomitic limestone bedrock (Columbus Limestone). Ground water occurs in the unconsolidated sand and gravel lenses and from the fractured limestone bedrock. Depth to the upper most water-bearing zone is approximately 8 feet feet below ground surface. Overlying the upper aquifer is moderately permeable Medway-Genessee Association Soils. Yield from the sand and gravel is reported to be between 25-100 gallons per minute (gpm), and yield from the limestone aquifer is between 100-500 gpm. The upper aquifer is likely hydraulically connected to the Scioto River, and ground water flow is likely east to the Scioto River.

**Potential for Release to Ground Water.** If perchlorate and other mobile chemicals were released to soil, they would likely migrate fairly quickly to the upper aquifer. The native soil is moderately permeable Medway-Genessee complex, which has been extensively re-worked. Ohio EPA's Division of Drinking and Ground Water conducted a site-specific pollution potential evaluation based upon the available data and concluded that there is a high pollution potential at the site (See Attachment B). Since at least 1955, very little soil has been exposed at the surface; therefore, most releases would migrate to the storm sewer.

**Potential Drinking Water Targets (Figure 3).** The nearest known potable-use water well is located approximately 1.6 miles to the southwest at Greenlawn Cemetery Chapel. Another potable-use well is located 1.75 miles to the southeast at Herman Falter Meat Packing Company, which uses ground water in meat processing. Based on water well log locations on file at the Ohio Department of Natural Resources, the nearest potential residential well is located at least 2.5 miles south of GFS. Ohio EPA identified ten public water supply (PWS) wells within a 4 mile radius of GFS. The nearest designated PWS is located 3000 feet south of GFS at Mt. Carmel Medical Center West, but these wells are not in use. The nearest PWS wells in use are located 1.9 miles to the west at The Marfo Company, upgradient of GFS. The nearest downgradient PWS wells are located 2.1 miles to the south at Strawser and Allen Partnership. Ohio EPA also identified several industrial water wells in the area, including six wells on GFS property. The GFS wells were drilled to the bedrock aquifer, and the water is used for non-contact cooling water. There are no well-head protection areas within a 4-mile radius of GFS.

**Drinking Water Threat.** The threat to potable use water wells is low because of

the distance to the nearest wells (nearly 2 miles). In addition, Ohio EPA's evaluation of the ground water hydrology determined that contaminated ground water in the upper aquifer would flow easterly toward the Scioto River, away from populated areas to the south. Therefore, despite the high ground water pollution potential, perchlorate or other contamination in ground water from releases at the GFS are not likely to impact potable use wells.

## **Surface Water/Sediment Pathway**

**Hydrology.** The nearest surface water body is the Scioto River, which is located approximately 300 feet east of GFS. The Scioto River is a major tributary to the Ohio River. It flows 235 miles through central and south-central Ohio and discharges into the Ohio River at Portsmouth, Ohio. The Scioto River Basin drains 6,517 square miles. The annual mean stream flow at Columbus is approximately 1,500 cubic feet per second. In Columbus, the Scioto River flows through a modified channel reinforced with concrete and is partially impounded behind three low-head dams. Flooding in Columbus is contained by a levee and a flood wall on the west bank of the Scioto River.

The topography at GFS is flat with a slight slope to the south away from the Scioto River (Figure 4). Storm water runoff is directed to several storm drains in the parking lots and along the roads. The general direction of flow is to the south. The storm water sewers combine with a 24-inch diameter storm sewer at Souder Avenue. This storm sewer trends southerly for three miles and outfalls in the Scioto River (See Figure 5).

**Potential for a Release to Surface Water.** Ohio EPA has no documentation of an observed release to the Scioto River; however, there exists a potential for past releases of perchlorate to the storm sewer and Scioto River. Potential sources include disposal of wastewater and other waste to storm sewers, spills, leaks, and flood potential (GFS is within the 100 year flood plain). The probable point of entry to the Scioto River is the storm water outfall, 3 miles south of GFS. There is also the potential for contaminated ground water to migrate east to the Scioto River and leach contaminants into the river.

**Drinking Water Targets and Threat (Figure 5).** The Scioto River is designated as an agricultural water supply and industrial water supply along the 15-mile target distance limit (TDL). The nearest drinking water intake in the Scioto River is ½ mile upstream of GFS. There are no surface water drinking water intakes along the TDL; therefore, the threat is limited to potential resources.

**Human Food Chain Threat.** The Scioto River is designated a primary contact recreation water body and is a fishery. If perchlorate was released to the river, it would not bioaccumulate in fish tissue; therefore, the threat to humans is low.

**Environmental Targets and Threat (Figure 5).** The Scioto River is designated an aquatic life warm water habitat. The substrate from Columbus downstream consists mainly of silt/muck to sand and coarse gravels. In Columbus, the Scioto River is ecologically impaired because of the combination of channelization, combined sewer overflows, and the existence of the low head dams. The water quality and habitat improves considerably south of Columbus, where the river has a more natural flow. Two state endangered species, Goldeye and Shortnose Gar, were identified along the TDL. There are no designated federal/state natural areas and no identified unique biotic communities along the TDL. Sensitive environments are limited to small wetland areas in the floodplain south of Columbus. There is no threat to environmental targets because perchlorate is not considered ecotoxic and does not bioaccumulate.

### **Soil Exposure Pathway**

**Soil Type.** Native soils are classified as Medway-Genesee Association. Medway-Genesee soils occur in level areas near streams that are occasionally flooded. They consist of moderately permeable silt-clay loams to gravelly-sandy loams. Very little native soil is exposed at GFS due to buildings, pavement, and gravel.

**Land-Use (Figure 6).** Surrounding land-use within 200 feet of GFS is commercial/industrial, railroad, and an old cemetery. The nearest resident is located approximately 300 feet south of GFS on the south side of the railroad tracks. There are no agricultural areas nearby and no terrestrial sensitive environments.

**Potential for a Release to Soil.** Potential releases directly to soil are minimized because of the lack of exposed soil at GFS and surrounding area. Aerial photographs indicate that GFS did not operate a disposal unit, and there is no documentation that suggests GFS routinely disposed of waste on the ground. Potential releases to soil would therefore be located in relatively small areas where spills and leaks occurred.

**Potential Soil Targets and Threat (Figure 6).** GFS employs approximately 60 people that work three shifts daily. The nearest resident population is approximately 300 feet south of GFS. Perchlorate contaminated soil would not likely migrate from GFS to within 200 feet of the residential population because of the direction of surface water drainage and the higher elevation of the railroad would act as a barrier to dust. Therefore, the threat to nearby populations is low because of the resident target population is greater than 200 feet from GFS and because of the relatively small workplace target population.

## **Air Pathway**

There are no identified potential sources of unregulated gas or particulates to the air at GFS. Currently, all emissions are permitted and regulated, and GFS has several air pollution control devices to control emissions. Ohio EPA has received complaints concerning stack emissions and chlorine in storm sewers, but none of the complaints resulted in fines or enforcement actions. GFS is required to submit annual releases for the Toxic Report Release Inventory Database, and they submit a Risk Management Plan (RMP) for potential explosive hazards. Therefore, the threat to target populations from exposure due to air releases is low.

## References

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ITRC Perchlorate Team, Overview of Issues, Status, and Remedial Options, September 2005.

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Ohio EPA, Division of Emergency and Remedial Response Files.

Ohio EPA, Division of Emergency and Remedial Response, Geographic Information System Data.

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US EPA, HRS Quickscore, Version 2.2

US EPA, Memorandum from Susan Parker Bodine, Assistant Administrator, Assessment Guidance for Perchlorate, Dated January 26, 2006.

US EPA, *Improving Site Assessment, PreCERCLIS Screening Assessments*, EPA-540-F-98-039, OSWER 9375.2-11FS, PB98-963310, October 1999.

## Figures

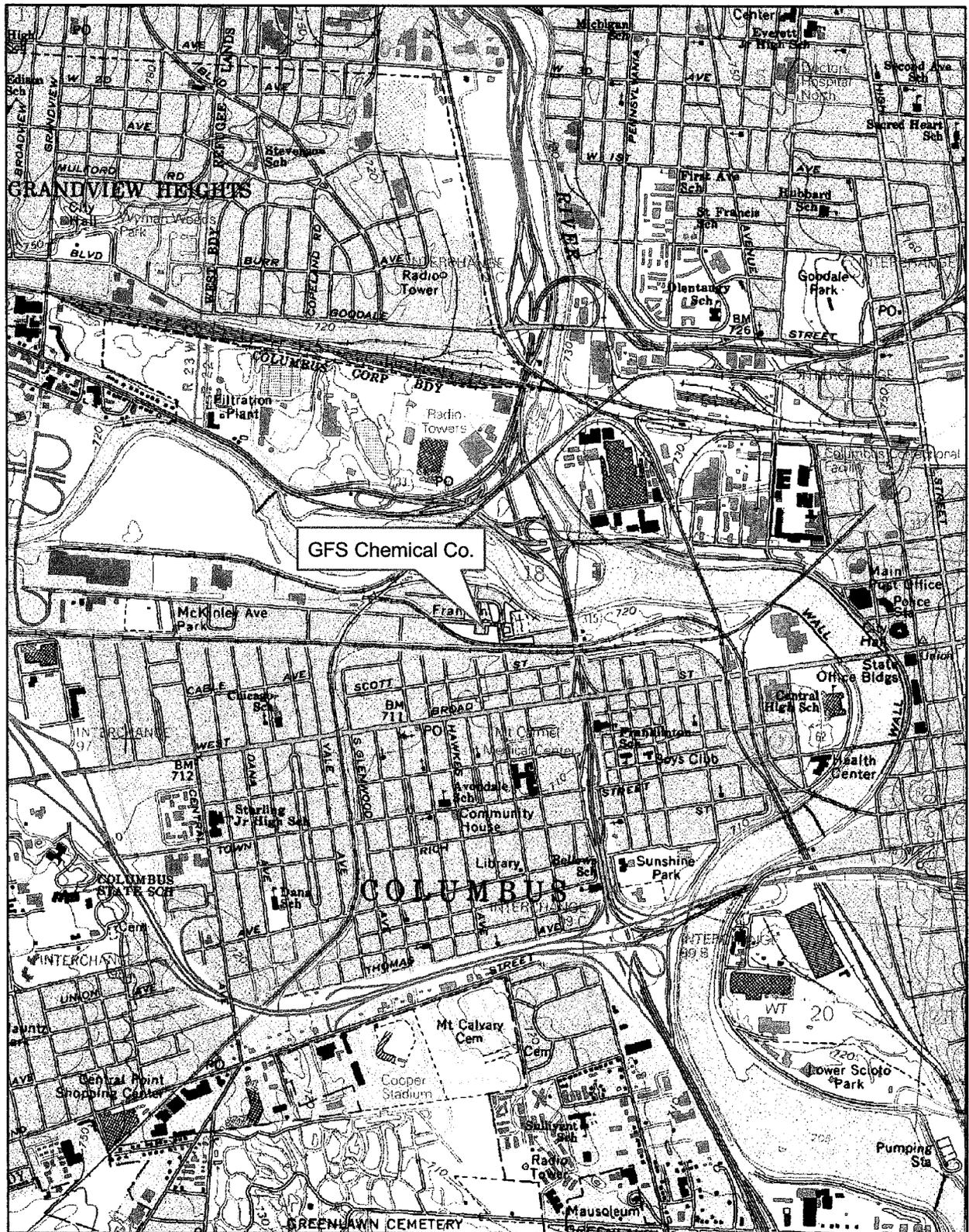
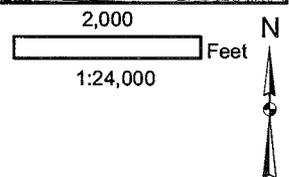
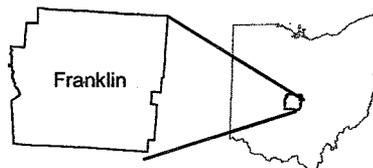


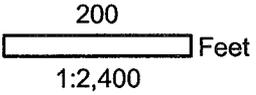
Figure 1:  
 Site Location Map  
 G. Frederick Smith Chemical Company  
 Columbus, Franklin County, Ohio  
 PreCERCLIS Screening Assessment



Building	Use
B01	Perchloric Acid Packaging/R&D
B02	Magnesium Perchlorate Plant
B04	Acid Distillation, Heavy Metals Plant
B05	Indicators and Dyes
B06	Shipping and Receiving
B07	Pole Barn
B08	Perchloric Acid Plant
B09	Rare Earth Fluoride Plant
B10	Karl Fischer Reagent Plant
B12	Trichloromelamine Plant
B13	Maintenance Shop
B14	Offices
B15	Ferro Process
B16	Shipping
B17	Organic Chemical Plant



Figure 2  
 Site Features  
 G. Frederick Smith Chemical Company  
 Columbus, Ohio  
 PreCERCLIS Screening Assessment



2003 Aerial Photograph

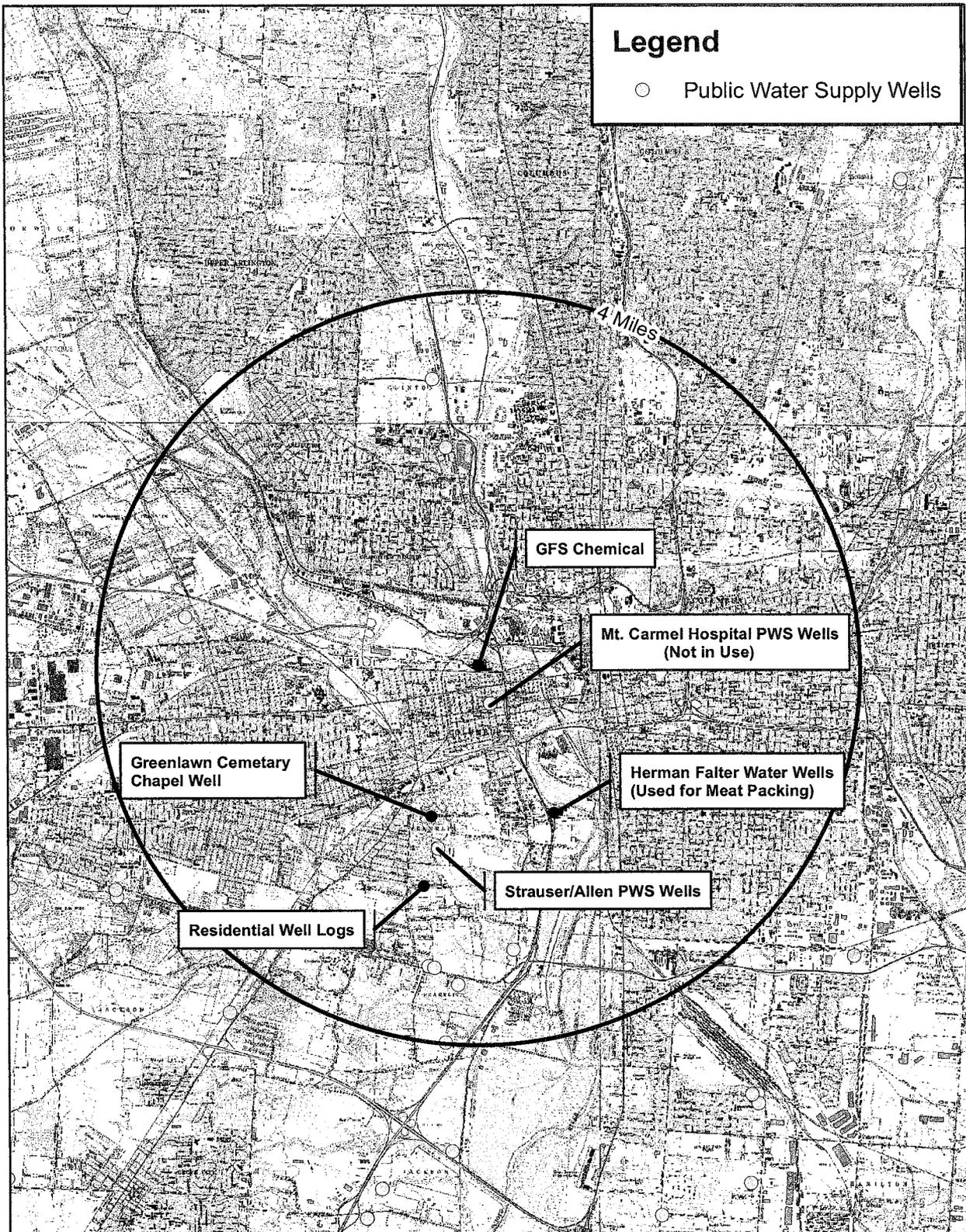


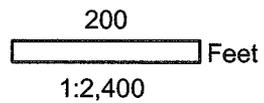
Figure 3:  
 Ground Water Targets  
 G. Frederick Smith Chemical Company  
 PreCERCLIS Screening Assessment

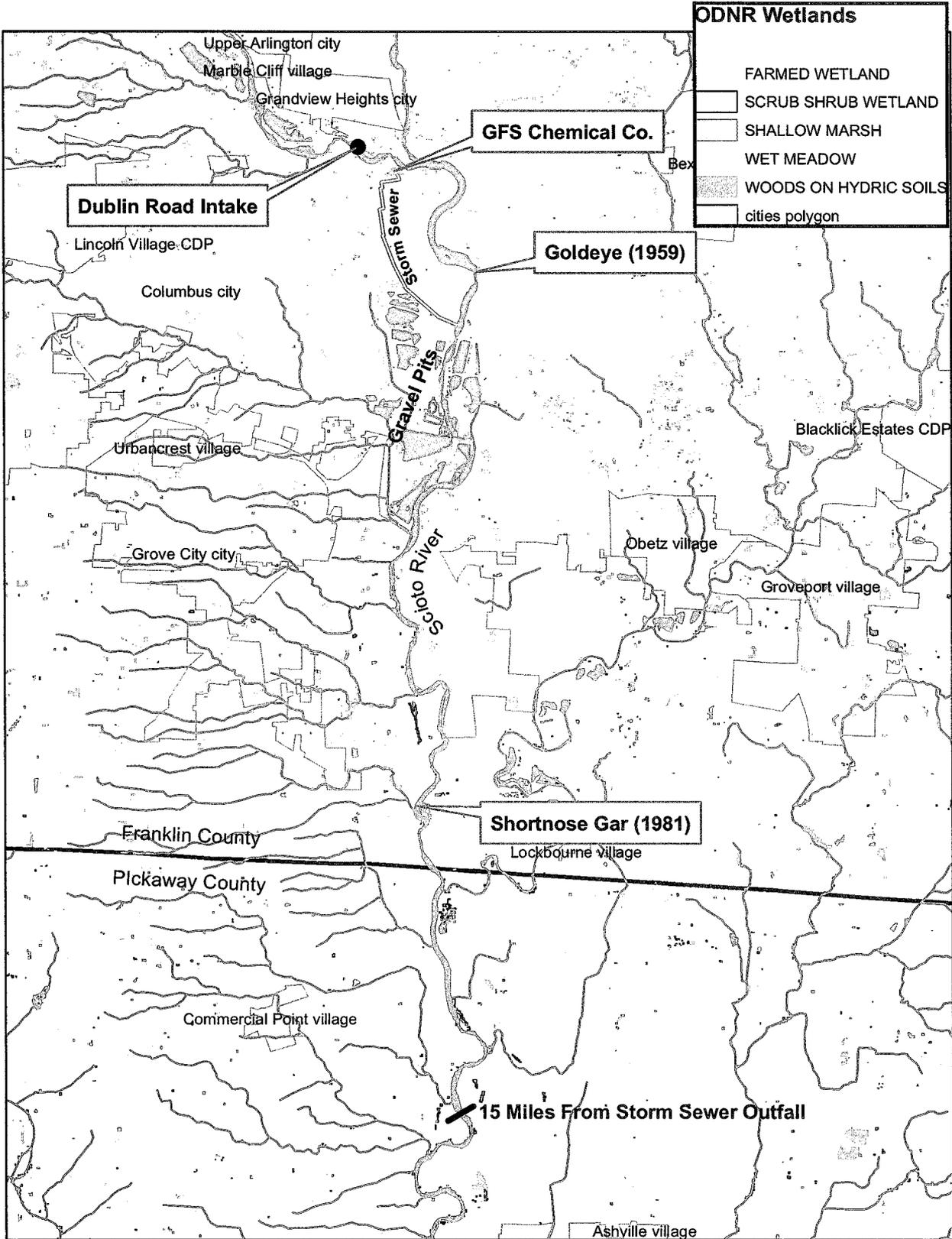
8,000  
 Feet  
 1:96,000





Figure 4  
 Surface Water Pathway  
 NPDES Outfalls and Drainage  
 G. Frederick Smith Chemical Company  
 PreCERCLIS Screening Assessment





Figures 5  
 Surface Water Targets  
 G. Frederick Smith Chemical Co.  
 PreCERCLIS Screening Assessment

0 0.5 1 2 3 4 5 Miles





Figure 6  
Soil Targets  
G. Frederick Smith Chemical Co.  
PreCERCLIS Screening Assessment

500  
1:3,000 Feet



Attachment A  
Field Activity Report

**Ohio EPA/DERR  
FIELD ACTIVITY REPORT**

Date: February 8, 2006

Time: 1:30 PM

Site: G. Frederick Smith Chemical Company

DERR I.D. # 125-0754

Location: McKinley Avenue, Columbus

County: Franklin

Weather: Cloudy

Temperature: 30° F

Ohio EPA personnel: Fred Myers, DERR; Chris Bulinski, DHWM

Other personnel: Mike Carter, GFS Chemical

Protection level: D

Purpose: PreCERCLIS Screening Assessment Site Reconnaissance

Findings/Recommendations:

We looked at the surrounding land use and mixed residential/commercial area south of the railroad tracks the area surrounding GFS. The area around GFS is mostly paved over with asphalt and cement with some graveled areas. The production facilities are fenced with a high chain-link fence and gates are locked.

Chris and I met Mr. Carter at the main office of the plant at 1:00 PM. We discussed our purposes of the visit. We toured the facility beginning with the Organics Building and working our way west through the main manufacturing area to the Perchloric Acid Plant. The facility is mostly paved with either asphalt or concrete. There are some graveled areas and small patches of vegetation. All chemical products and hazardous waste are contained in tanks and drums. Large plastic tanks of perchloric acid are on the east side of the main building and adjacent to the Maggy Building. Several bags of ammonium perchlorate were being stored in plastic bags south of the main building. We went inside of the perchloric acid plant and looked at a reaction vessel where the perchloric acid is produced. We went inside the building where they dissolve the ammonium perchlorate, and we went inside of the Maggy building, where magnesium perchlorate is produced. We looked around the storage & shipping buildings and around the GFS property north of McKinley Avenue. Overall, it appears the facility is well-maintained. I did not see any indications of contamination or past disposal areas. The production facilities are fenced with locked gates.

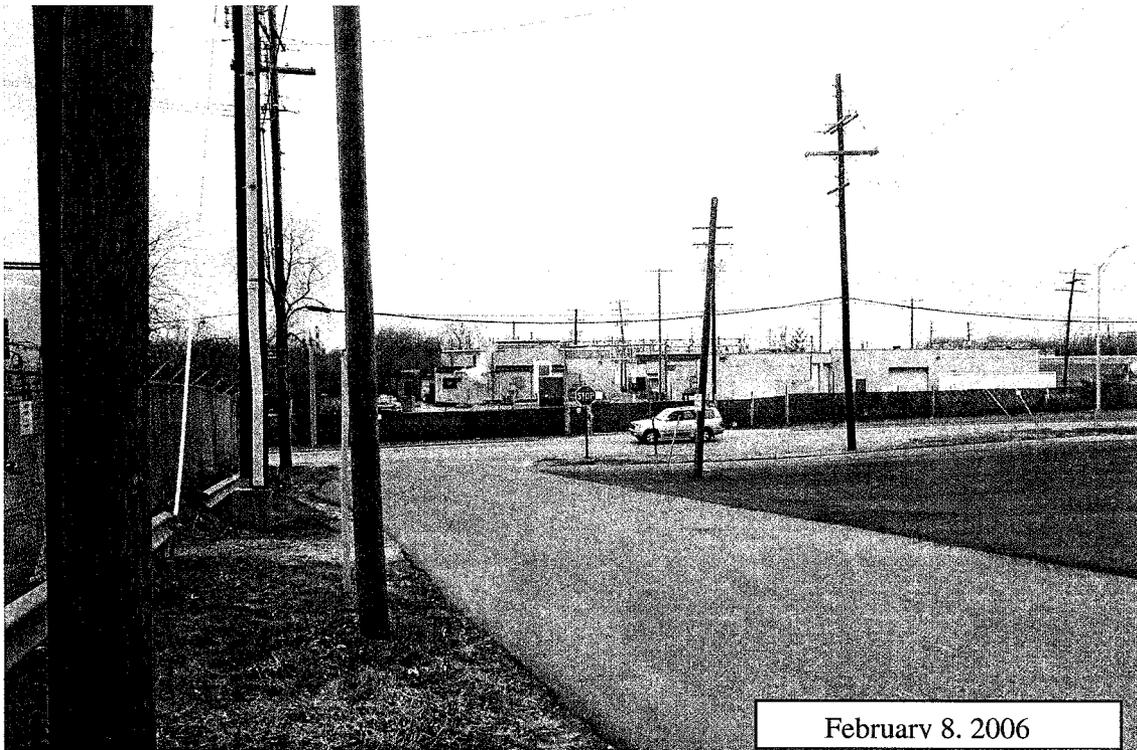
Prepared by: Fred Myers

Date: 2/9/06

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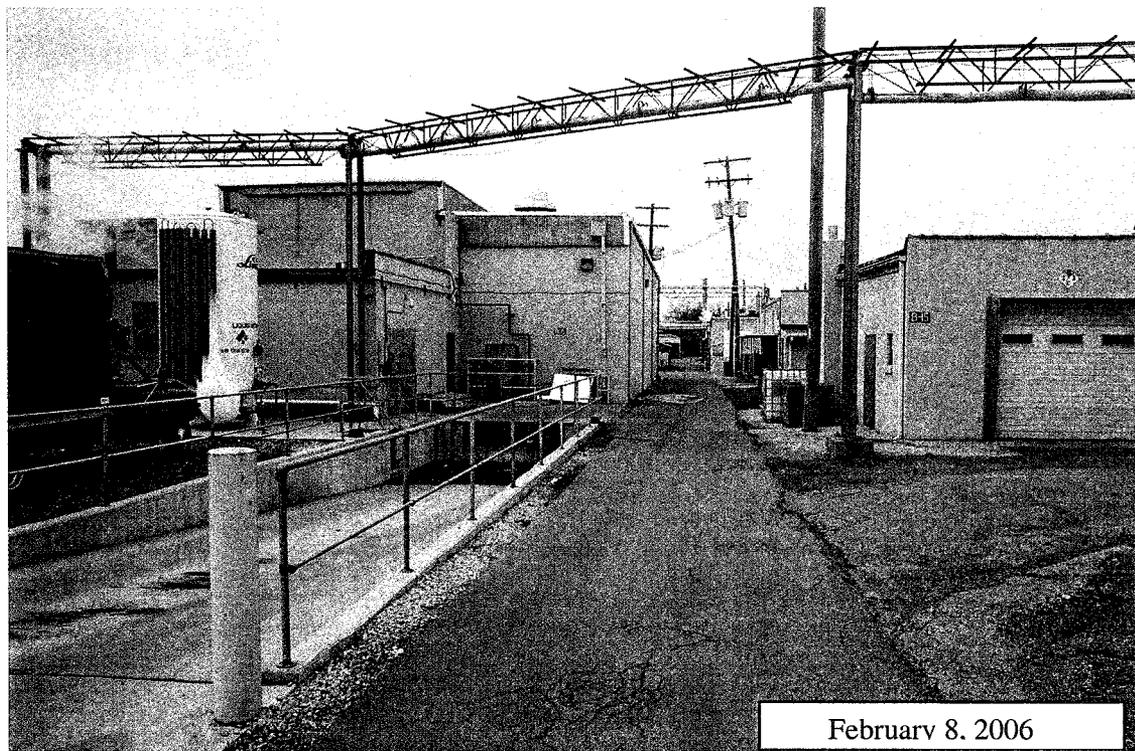
**Figure 1: Office at 851 McKinley Avenue**



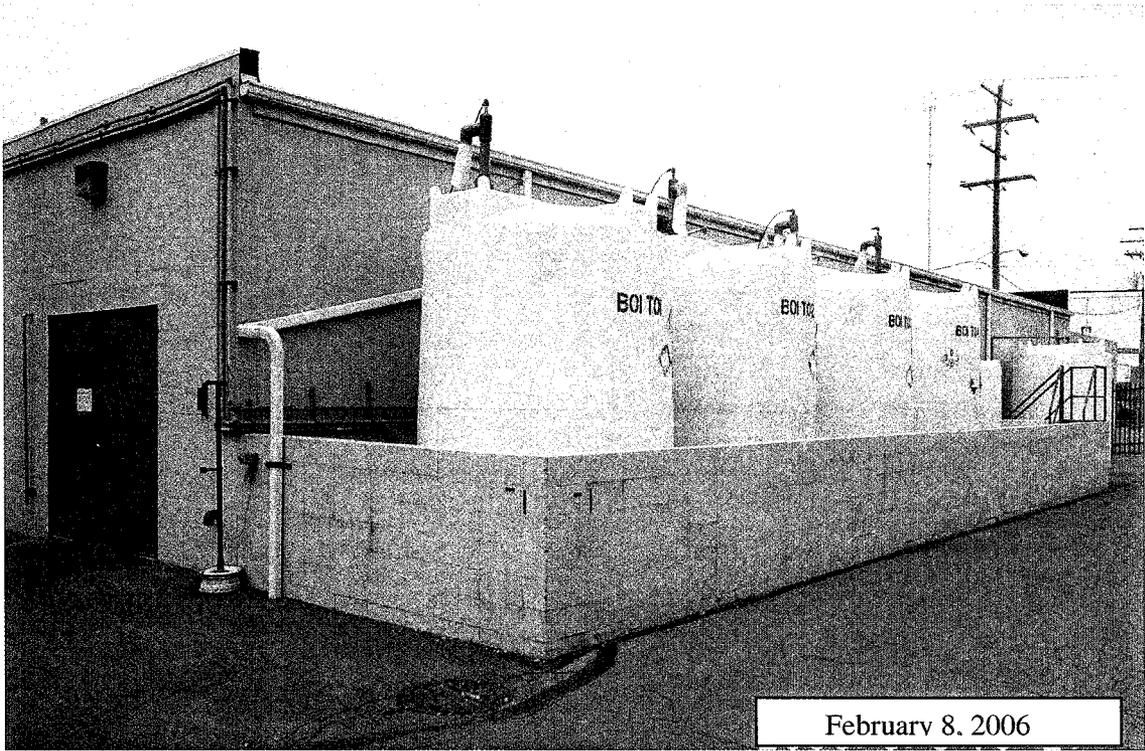
**Figure 2: View of GFS main plant area from the east side of Souder Avenue adjacent to the Organics Building.**



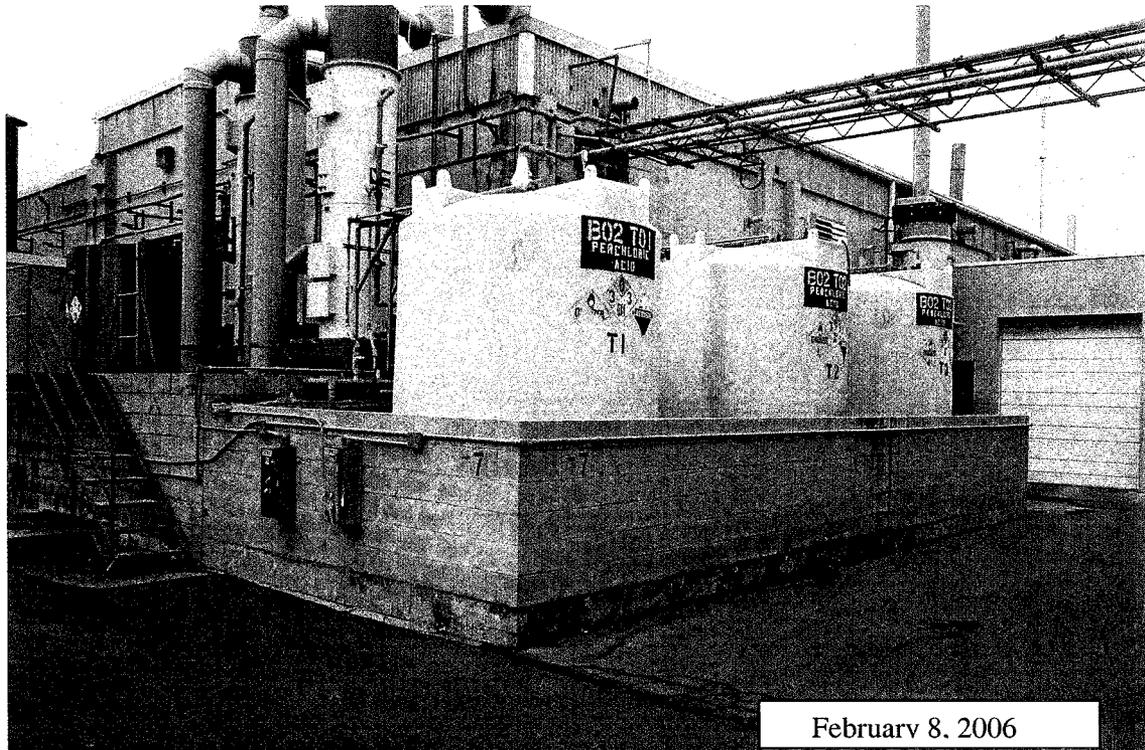
**Figure 3: Looking West across Souder Ave. down McKinley Avenue. GFS main plant area is on left behind the green fence.**



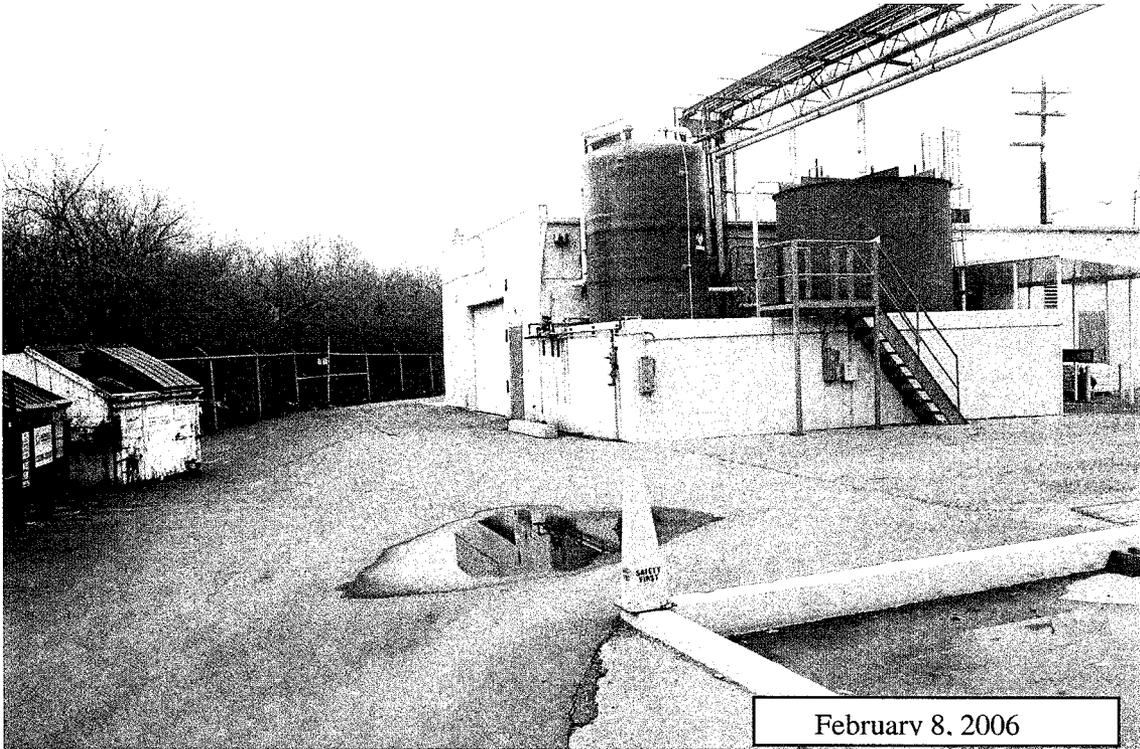
**Figure 4: Looking West down the alley that transects the main plant Area. The trichloromelamine plant is on the right and the former organics plant is on the left.**



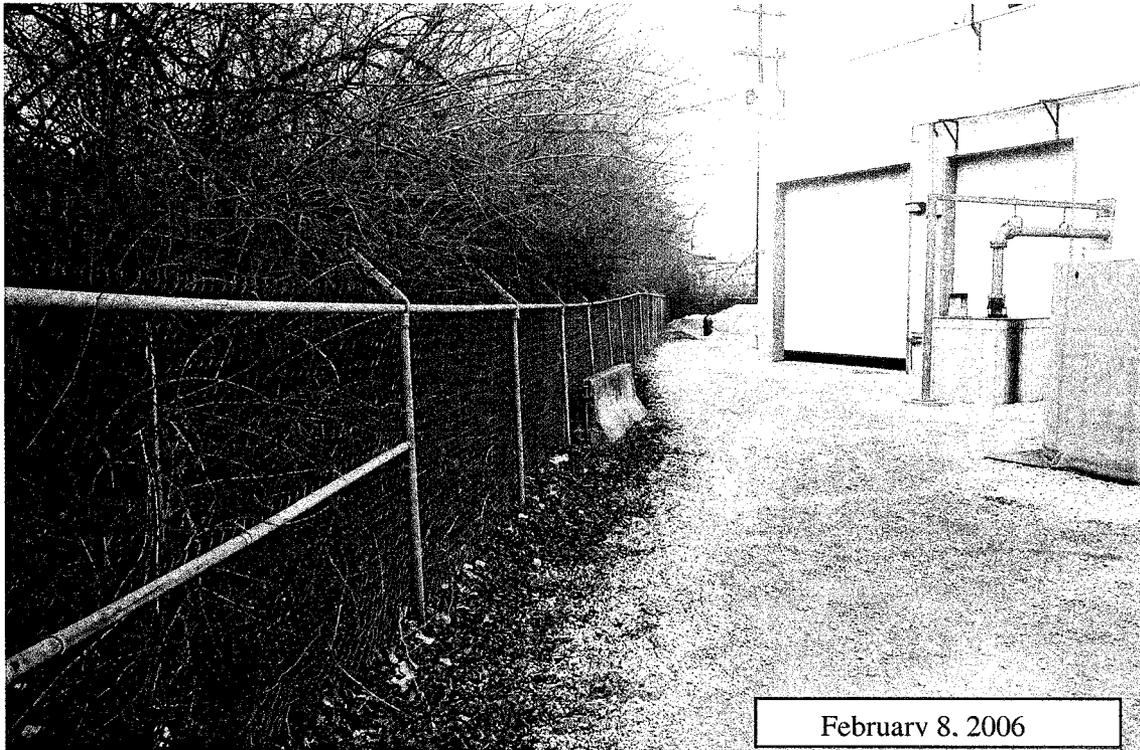
**Figure 5: Perchloric acid tanks on the East side of the Main Building**



**Figure 6: Perchloric acid tanks at the southeast side of the Magnesium Perchlorate Plant.**



**Figure 7: View of the east side of the perchloric acid manufacturing plant.**

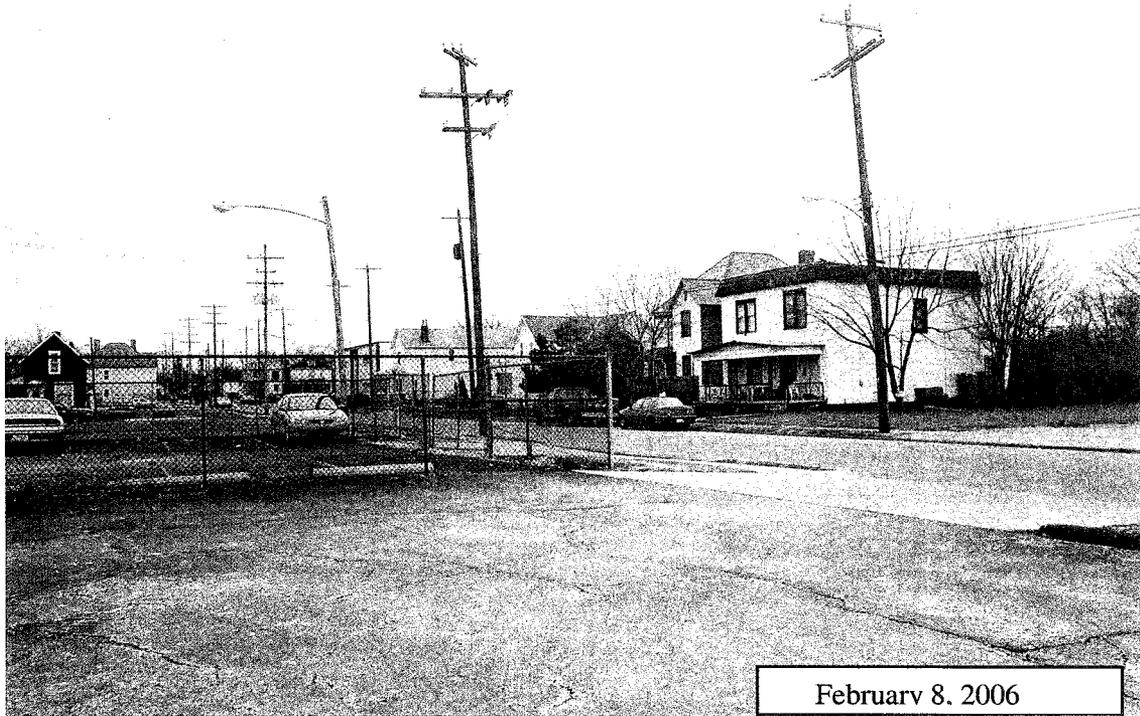


**Figure 8: South side of the perchloric acid manufacturing plant.**



February 8, 2006

**Figure 9:** Wastewater treatment tank on the west side of the perchloric acid plant. The wastewater is discharged to the sanitary sewer system after treatment.



February 8, 2006

**Figure 10:** View of the residential area located 400 feet to the South of GFS.

Attachment B  
Ground Water Evaluation

# Ohio EPA

## Central District Office

3232 Alum Creek Drive \* Columbus, Ohio 43207-3417 \* 614-728-3778

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# **INTEROFFICE MEMORANDUM**

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**TO:** Fred Myers through Ken Schultz, DERR-CDO

**FROM:** <sup>JR</sup> Jason Reed through <sup>LS</sup> Linnea Saukko, DDAGW-CDO

**DATE:** February 3, 2006

**SUBJECT:** G. Frederick Smith Chemical Company (Franklin County)  
Preliminary Site Assessment

---

The Division of Emergency and Remedial Response (DERR) requested that the Division of Drinking and Ground Waters (DDAGW) conduct a preliminary site assessment for the G. Frederick Smith Chemical Company (GFS Chemical), including an evaluation of the potential for perchlorate and other contaminants to migrate from the site to potable use wells.

## **BACKGROUND**

GFS Chemical Company is a chemical manufacturing facility that has operated since 1928. The facility manufactures laboratory, industrial, and reagent chemicals, including: perchloric acid, magnesium perchlorate, trichloromelamine, and rare-earth fluoride. The facility stores drums of cerium hydrate and ammonium perchlorate outside of two of the buildings on-site.

In October 1989, Ohio EPA personnel visited the site and identified a number of issues related to the construction of the four production wells located on-site. All four wells were located in poorly sealed well pits which could facilitate the introduction of contaminants to the subsurface. Ohio EPA instructed GFS Chemical to perform corrective measures on the wells to prevent ground water contamination from occurring. GFS Chemical completed corrective measures in March 1990 including raising the casings and/or sealing the well pits to prevent the introduction of contaminants from the surface.

## **SITE LOCATION**

The site is located on several parcels between 800 and 879 McKinley Avenue, 777 West River Street, and 0 Sauder Avenue in Columbus as depicted on Figure 1. The site is approximately 300 feet southwest of the Scioto River just west of the confluence with the Olentangy River. The site elevation is approximately 710 feet above mean sea level (msl).

## SOILS

According to the "Soil Survey of Franklin County", soils at the site consist of Urban Land-Genessee complex. Genessee silt-loam consists of deep, well drained, moderately permeable soils formed in alluvium on flood-plains. However, the soils at the site have been significantly reworked as a result of the industrial development of the site. Well logs from the site indicate that sand and gravel may extend to the surface. According to the "Ground Water Pollution Potential of Franklin County, Ohio", the area around GFS Chemical was not mapped for pollution potential because of the pervasive alteration by human activities in the area. DDAGW conducted a site specific pollution potential evaluation based upon the data available. The results of the DRASTIC evaluation indicate that there is a high pollution potential at the site as indicated in the attached Table 1.

## GROUND WATER OCCURRENCE

The upper ground water bearing zone consists of sand and gravel from the surface to approximately 68 feet deep. According to the well log for the on-site well completed in sand-and-gravel, the static water level is approximately 8 feet deep. Ground water flow in the sand and gravel is most likely to the north or northeast toward the Scioto River, where the ground water discharges to the river.

Well logs from the site indicate that the lower ground water bearing zone consists of fractured limestone bedrock below 68 feet deep. Ground water flow in the fractured limestone bedrock is generally to the east but turns south as it approaches the Scioto River as indicated in Figure 2. The static ground water level for the wells completed in the fracture limestone bedrock is approximately 19 to 25 feet deep.

At least eleven process water wells have been installed at the various parcels that make up the GFS Chemical site. The diameter of the wells range from four inches to twelve inches with measured yields up to 226 gallons per minute. One four inch well was constructed in the sand and gravel zone all other wells were constructed in the fractured limestone bedrock. According to Ohio EPA records, all water for potable use at GFS Chemical is derived from the City of Columbus Municipal Water System. No wells used for potable purposes are known to exist between the site and the river.

Mount Carmel Medical Center West, located approximately 0.25 miles southeast of GFS Chemical, has 2 wells installed into the fractured limestone bedrock, which were formerly part of a public water system. According to Mount Carmel maintenance personnel, the wells are not tied into the potable water system, but they may be still be in use for boiler water.

The nearest known potable use wells to the GFS Chemical site are located approximately 1.6 miles to the south/southwest at Greenlawn Cemetery Chapel, and 1.75 miles southeast at the Herman Falter Packing Company at 386 Greenlawn Avenue. The potable well at the Greenlawn Cemetery may be abandoned in the near future to facilitate the urban setting designation requested for the nearby Harrisburg Pike Shopping Center. Herman Falter Packing currently has two ground water wells installed in sand and gravel to depths of 44 to 47 feet used in the processing of meat. The nearest public water system (PWS) well is the Strawser and Allen Partnership PWS located approximately 1.9 miles south at 1316 Stimmel Road. The locations of

these potable use wells listed above are depicted on the attached Figure 3.

## **GROUND WATER QUALITY**

According to Ohio EPA files, several semi-volatile chemicals (phthalates) have been detected in the effluent from the process water wells at the site (date unknown). GFS Chemical maintains that the chemicals were from the plastic piping and not from ground water contamination. In addition, ethyl-4-methyl benzenesulfonamide has also been detected, with no explanation of its source. Ohio EPA files contain no evidence of observed releases of hazardous materials or petroleum to ground water from this site.

## **PERCHLORATE FATE AND TRANSPORT**

DERR requested that DDAGW evaluate the potential for COCs, including perchlorate, to reach potable use if released at the site, in order to evaluate the need for additional investigation.

Perchlorate is highly soluble, has low sorption, and generally lacks natural degradation. The center of mass of a perchlorate plume moves at the same rate as ground water and dispersion may allow the contaminant front to move faster than ground water. Biodegradation of perchlorate only occurs in the presence of significant levels of organic carbon under anaerobic conditions. Since the properties of perchlorate make it the most likely COC to reach or impact downgradient ground water wells, other COCs were not separately evaluated.

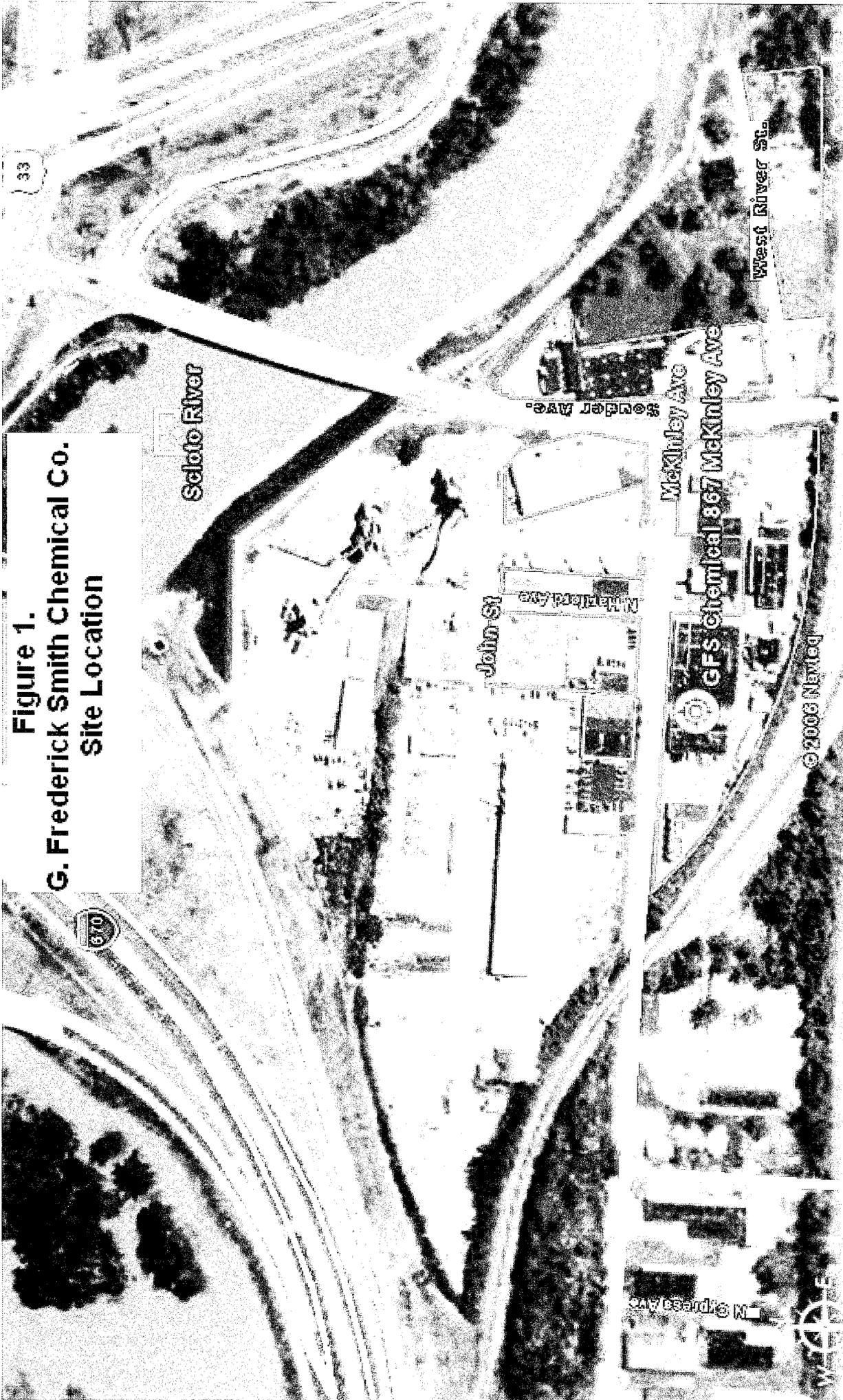
If perchlorate has leached into shallow ground water at the site, then it would most likely flow to the Scioto River to the north or northeast. Since no potable use wells are located between the GFS Chemical site and the river, perchlorate contamination would not be expected to affect potable use wells which includes the four wells south of the site as shown on Figure 3. The site is located over one-half mile downstream of the City of Columbus Public Water System Dublin Road Surface Water Intake. Therefore, no perchlorate contamination from the GFS Chemical site would be expected to reach the surface water intake.

## **CONCLUSIONS**

No potable use wells are located in the immediate vicinity of the GFS Chemical site. Shallow ground water emanating from the GFS Chemical site probably discharges to the Scioto River to the north/northeast without encountering any known potable use wells. Therefore, despite the high ground water pollution potential, perchlorate or other contamination in ground water from releases at the GFS Chemical site are not likely to impact potable use wells.

cc: Jeff Patzke, DDAGW-CO  
Work Request # 833335725

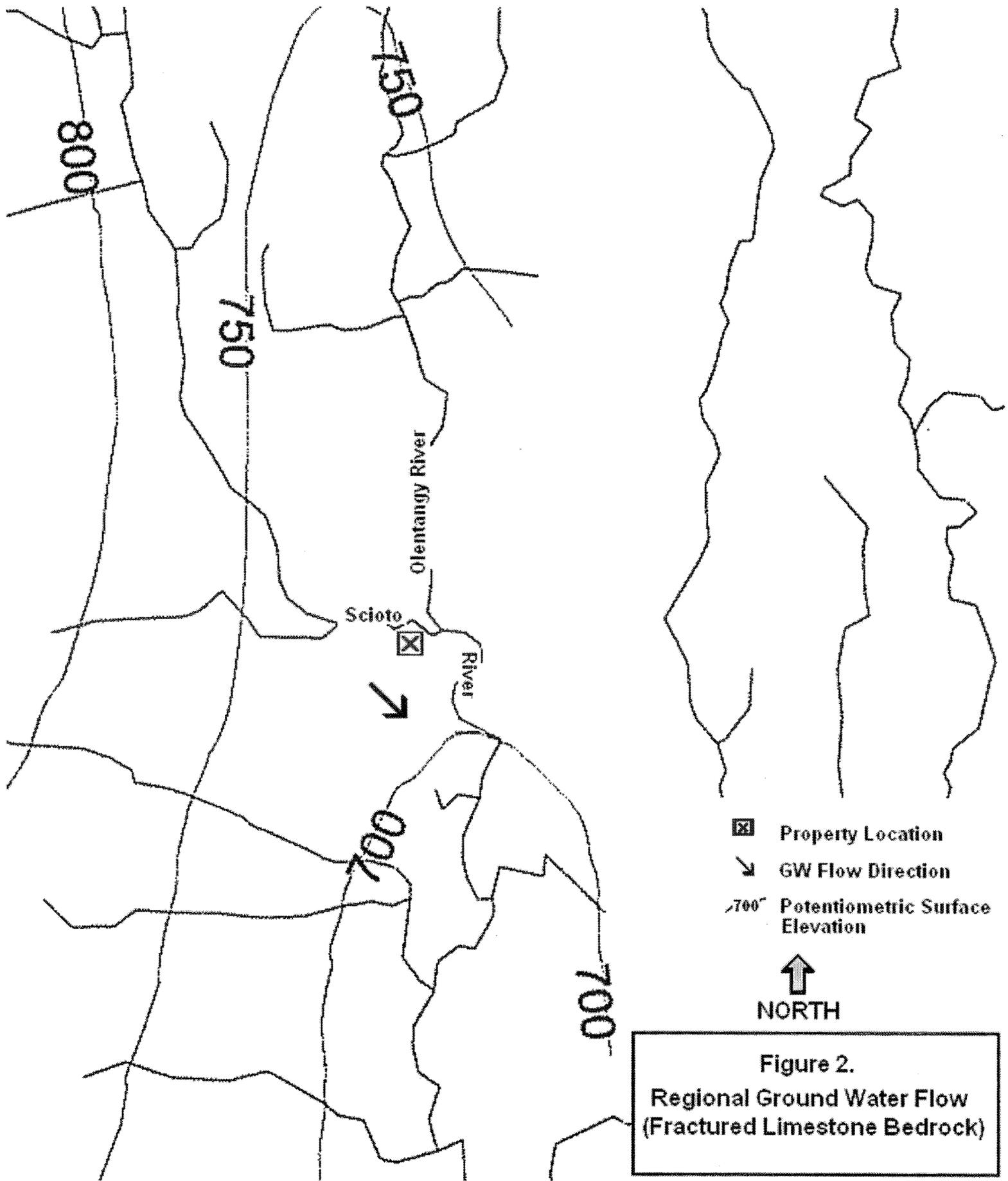
**Figure 1.**  
**G. Frederick Smith Chemical Co.**  
**Site Location**



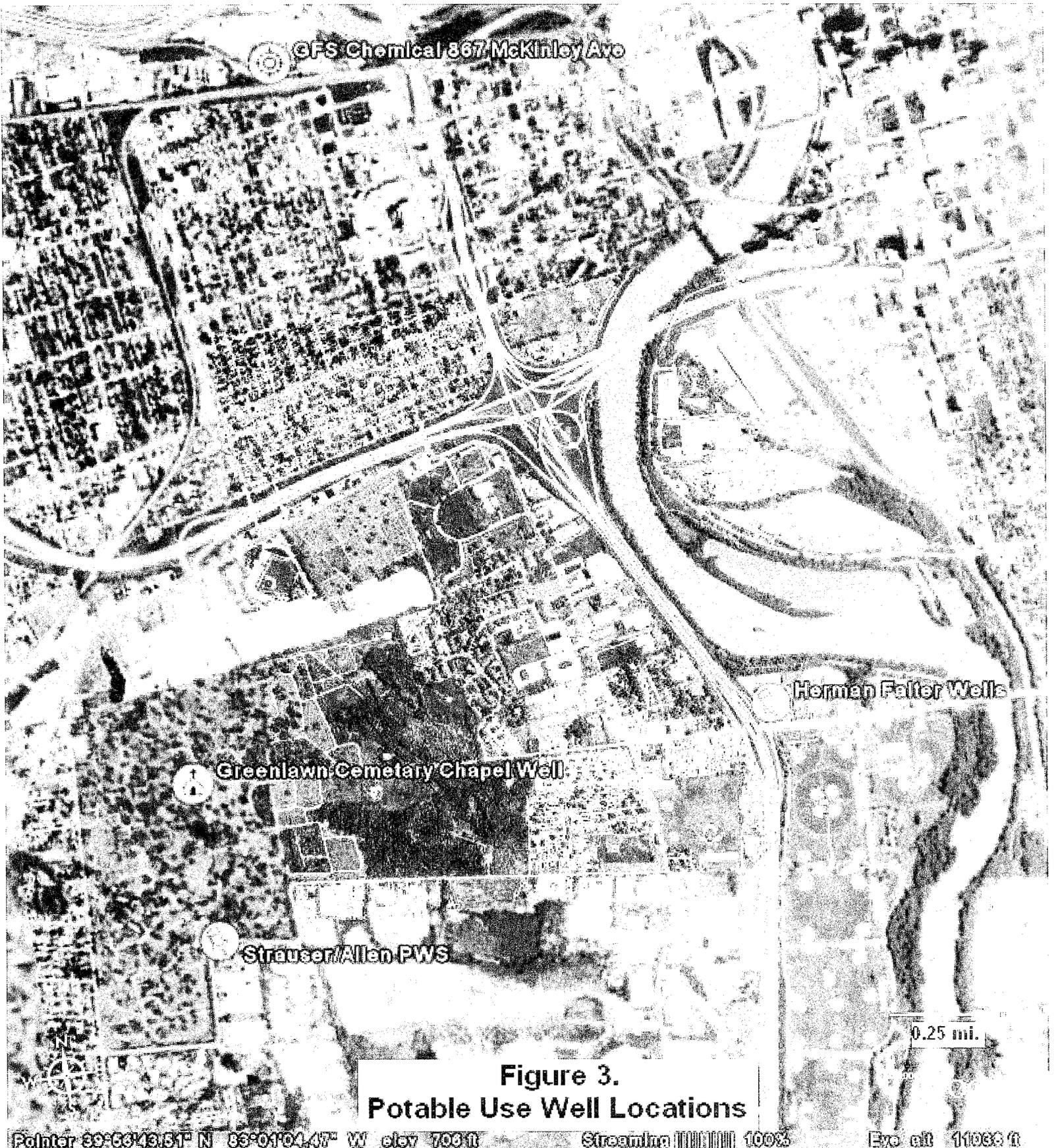
Eye alt 2994ft

Streaming 100%

Falmer 39° 57' 50.13" N 83° 01' 29.66" W elev 712ft



**Figure 2.**  
**Regional Ground Water Flow**  
**(Fractured Limestone Bedrock)**



**Figure 3.**  
**Potable Use Well Locations**

**Table 1. GFS Chemical - Pollution Potential Evaluation  
(DRASTIC Index)**

<b>Feature</b>		<b>Rating Assigned</b>	<b>General DRASTIC Weight</b>	<b>INDEX</b>
Depth to Water	8 ft	9	5	45
Net Recharge	Silty Sand-Sand & Gravel: 7-10 in**	6	4	24
Aquifer Media	Sand & Gravel	8	3	24
Soil Media	Silty Sand-Sand & Gravel	9	2	18
Topography	0-2 Percent Slope	10	1	10
Impact of Vadose Zone	Sand & Gravel with Significant Silt & Clay	6	5	30
Hydraulic Conductivity	$10^{-3}$ - $10^{-4}$ gpd/ft <sup>2</sup>	8	3	24
			<b>INDEX =</b>	<b>175</b>

\*\* Value derived from *Ohio EPA Derived Leach-Based Soil Values, 2nd Rev. 2002*

**Pollution Potential Index Range**

<b>Highest</b>	180-199
	160-179
	140-159
<b>to</b>	120-139
	100-119
	80-99
<b>Lowest</b>	<79