DOCUMENTATION OF ENVIRONMENTAL INDICATOR DETERMINATION

RCRA Corrective Action
Environmental Indicator (EI) RCRA Info code (CA725)
Current Human Exposures Under Control

Facility Name: Arch Chemical, Inc.
Facility Address: 100 McKee Road, Rochester, New York
Facility EPA ID #: NYD002220804

BACKGROUND

Definition of Environmental Indicators (for the RCRA Corrective Action)

Environmental Indicators (EIs) are measures being used by the RCRA Corrective Action program to go beyond programmatic activity measures (e.g., reports received and approved, etc.) to track changes in the quality of the environment. The two EIs developed to-date indicate the quality of the environment in relation to current human exposures to contamination and the migration of contaminated groundwater. An EI for non-human (ecological) receptors is intended to be developed in the future.

Definition of "Current Human Exposures Under Control" EI

A positive "Current Human Exposures Under Control" EI determination ("YE" status code) indicates that there are no "unacceptable" human exposures to "contamination" (i.e., contaminants in concentrations in excess of appropriate risk-based levels) that can be reasonably expected under current land- and groundwater-use conditions (for all "contamination" subject to RCRA corrective action at or from the identified facility (i.e., site-wide)).

Relationship of EI to Final Remedies

While Final remedies remain the long-term objective of the RCRA Corrective Action program the EIs are near-term objectives which are currently being used as Program measures for the Government Performance and Results Act of 1993, GPRA). The "Current Human Exposures Under Control" EI are for reasonably expected human exposures under current land- and groundwater-use conditions ONLY, and do not consider potential future land- or groundwater-use conditions or ecological receptors. The RCRA Corrective Action program's overall mission to protect human health and the environment requires that Final remedies address these issues (i.e., potential future human exposure scenarios, future land and groundwater uses, and ecological receptors).

Duration / Applicability of EI Determinations

EI Determinations status codes should remain in RCRAInfo national database ONLY as long as they remain true (i.e., RCRAInfo status codes must be changed when the regulatory authorities become aware of contrary information).

1. Has **all** available relevant/significant information on known and reasonably suspected releases to soil, groundwater, surface water/sediments, and air, subject to RCRA Corrective Action (e.g., from Solid Waste Management Units (SWMU), Regulated Units (RU), and Areas of Concern (AOC)), been **considered** in this EI determination?

__X__ If yes - check here and continue with #2 below.

_____ If no - re-evaluate existing data, or

_____ If data is not available skip to #6 and enter "IN" (more information needed) status code.

Background - enter info below

Facility Information:

Location

The Arch Chemical plant is located on a fifteen-acre parcel at 100 McKee Road in a commercial/industrial area of the City of Rochester (see Figure 1). Arch (formerly Olin Corporation prior to 1999) has produced specialty chemicals at this location since 1954. The active manufacturing complex is comprised of a number of facilities including the main manufacturing plant, a chemical tank farm, a waste pretreatment building, and a large warehouse. Surrounding land uses are industrial and commercial. The nearest residential neighborhoods are about 2000 feet east (Mt. Read Blvd.) and west (Varian Lane) of the site. Significant physical features include the Erie Canal and the Gates Dolomite quarry, located about 1000 feet west and 4000 feet southwest, respectively, of the site.

Site History

Industrial use of the site began in 1948, when Genesee Research, a fully-owned subsidiary of the Puritan Company, established a manufacturing facility for automotive specialty products (e.g., brake fluids, polishes, anti-freeze, and specialty organic chemicals). In 1954, Mathieson Chemical Corporation acquired Puritan and merged with Olin Industries to become Olin Mathieson Chemical Corporation. Production of brake fluid and anti-freeze continued for a time but in the early 1960s, production of specialty organic chemicals, such as Zinc Omadine® and chloropyridine began. In 1969, Olin Mathieson changed its name to Olin Corporation (Olin) and in 1999, Olin spun off its specialty chemicals business to form an independent company known as Arch Chemicals, Inc. (Arch). The Arch Rochester plant is the sole manufacturer of chloropyridines in the United States. The primary product line is Omadine® biocides, used in anti-dandruff shampoos and by the metalworking industry. Other products include more than 60 specialty organic chemicals used in personal care products, crop protection, rubber and plastic additives, and the textile industry.

Contamination Summary

Past releases of hazardous wastes have resulted in soil and groundwater contamination which pose a significant threat to the environment and/or public health. Accordingly, the site was assigned Site No. 828018A and listed as a Class 2 site on the New York State Registry of Inactive Hazardous Waste

Disposal Sites. As detailed and referenced in the September 2005 CA750, multiple investigations and ongoing monitoring (Groundwater Monitoring Report #43 was submitted in March 2010) show significant subsurface soil and groundwater contamination at the four main areas on concern onsite (see Fig. 2).

Contaminants include multiple VOCs (principally, carbon tetrachloride, chloroform, methylene chloride, tetrachloroethene, and trichloroethene) and a semi-volatile suite of chloropyridines. Onsite contamination exists in pure phase (DNAPL), dissolved phase, sorbed phase, and vapor phase. Dissolved-phase contaminants are most widespread which for VOCs, are contained largely onsite whereas for chloropyridines, a bedrock groundwater dissolved plume extends 4500 feet southwest and discharges into the Gates Dolomite quarry (see Figs.1 & 3). Contaminated groundwater (~ 200 ppb chloropyridines) seeps (small waterfalls) into the southeast corner of the quarry and flows directly into two quarry-wide collection lagoons which are pumped to a surface drainage ditch (< 10 ppb) which flows to the Erie Canal (< 5 ppb; see Fig. 1).

Current human exposures are under control for all four phases of contamination. Human exposure to DNAPL, sorbed-phase and dissolved-phase contamination at and beneath the site is limited by security, perimeter fencing and sensors, lack of access (under pavement and buildings), deed restrictions, a soil management plan, and personal protection equipment when necessary (e.g., well sampling and maintenance, any excavations, and/or waste handling). Vapor intrusion investigations show that vapor phase contamination, while quite elevated in the subsurface at source areas, is below levels of concern outdoors and within onsite and offsite structures. Exposure to offsite dissolved-phase contamination is controlled by:

- City of Rochester prohibition on groundwater use;
- notification of landowners and lack of groundwater use over the plume;
- restricted access at the quarry (security/fencing/vertical cliffs);
- notification of the quarry owners and workers;
- isolated contaminated seepage at the inactive SE corner of the quarry;
- quarry discharge to surface drainage ditch (chloropyridines < 10 ppb) is below levels of concern (human health risk-based level for total chloropyridines = 37 ppb);
- access to surface drainage ditch is restricted (flows eastward along fenced Conrail RR to fenced interstate I-390 southward and then by subsurface culvert to the Erie Canal; see Fig. 1); and
- Erie Canal is incised in bedrock (vertical cliff) and surface water is below levels of concern chloropyridines < 5 ppb).

Remedial History

1981 - Chloropyridines discovered offsite in Ness (now Lexington) Company wells; onsite groundwater investigation revealed significant groundwater contamination.

1983 - Several perimeter overburden monitoring wells were converted to pumping wells in an effort to contain shallow groundwater.

1984 - US Environmental Protection Agency completes site inspection; confirms soil and groundwater contamination.

1985 - Site listed on New York Sate (NYS) Registry of Inactive Hazardous Waste Sites as a Class 2A; in 1986, changed to a Class 2 site: significant threat to public health and/or environment.

1987 - Olin signs order to investigate bedrock groundwater.

1988-1990 - Groundwater investigation reveals significant contamination in bedrock; five bedrock wells are converted to pumping wells.

1993 - Olin and New York State Department of Environmental Conservation (NYSDEC or DEC) sign consent order to conduct a Remedial Investigation/Feasibility Study.

1993-1997 - Multi-phased Remedial Investigation conducted; contamination, primarily chloropyridines, tracked offsite to the Dolomite Products Quarry in the Town of Gates and the Erie Canal.

1999 - Three bedrock extraction wells (PW-10, 11, and 12) added to groundwater extraction system. Annual volume of pumped groundwater exceeds 10 million gallons per year with contaminant mass removal estimated at over 1000 pounds per year.

1999-2001 - Feasibility Study completed; remedy divided into two Operable Units (OU-1 Source Areas and OU-2 Groundwater).

2002 - Record of Decision (ROD) for OU-2 (Groundwater) issued. For on-site, the ROD specified; onsite enhancement of the existing groundwater extraction system; treatment and discharge to the sanitary sewer; institutional controls; and long-term monitoring. For offsite, the ROD specified; groundwater pumping at the quarry rim, treatment if necessary to meet discharge criteria, natural attenuation, annual notification of property owners, groundwater use limitations, and long-term monitoring.

2003-2004 - Remedial Design and ROD modification request by Arch to eliminate offsite pumping well at quarry due to declines in chloropyridines in quarry seeps and discharge. Request is being evaluated with additional data gathering.

2005 - New extraction wells (PW-13 and PW-14) installed and onsite vapor intrusion (VI) investigation began (six sub-slab/indoor air locations; significant sub-slab vapors/minimal indoor air detections; annual re-sampling instituted). CA750 (Groundwater Migration Under Control) completed.

2006 – Onsite and offsite VI investigations completed. Offsite work included the two closest buildings to Arch (Firth-Rixson and ARM); no site-related VOC vapors were detected at levels of concern.

2007 – The potential for offsite VI of chloropyridines assessed by sampling soil vapor at six locations on the site perimeter. Results showed low potential for VI but two locations were saturated; another round requested. Onsite VI sampling was consistent with previous rounds. PW-10 (partial borehole collapse) replaced by PW-15 and PW-14 was rehabilitated.

2008 - Onsite VI sampling consistent with previous rounds; 4 years of monitoring indicates that vapor intrusion is not a significant exposure pathway for Arch workers.

2009 – Perimeter soil vapor sampling was generally consistent with 2007 results and indicates that VOCs and chloropyridines related to past releases at the Arch facility do not pose a significant exposure risk to neighboring properties via the vapor intrusion pathway. To address concerns about low pumping rates and incomplete capture, all pumps, controllers, lines and several boreholes were cleaned and BR-127 was added as a pumping well. Overall groundwater extraction rate increased from 20-25 GPM to over 40 GPM (> 20 million GPY) with further improvements to O&M program under development.

References:

Hydrogeological Investigation at Olin - Rochester Plant Site (September 1982)

Groundwater Investigation - Olin Chemicals Group - Rochester Plant Site (September 1990)

Phase I Remedial Investigation (RI) Report (August 1995)

Supplemental Human Health Risk Evaluation (November 1996)

Final Phase II RI Report (October 1997)

Feasibility Study Report (January 2000)

Record of Decision (March 2002)

Quarterly/Semi-Annual Monitoring Reports (1995 – 2010; most recent is SAM Report #43 dated March 2010)

Onsite Vapor Intrusion Investigation Report (June 2005)

2006 Onsite Vapor Intrusion Sampling Report (May 2006)

Offsite Vapor Intrusion Sampling at Firth-Rixson and ARM (June 2006)

2007 Onsite Vapor Intrusion Sampling Report (June 2007)

2007 Soil Vapor Sampling at Arch Chemicals – Tech. Memo (January 2008)

2008 Onsite Vapor Intrusion Sampling Report (May 2008)

2009 Soil Vapor Sampling at Arch Chemicals – Tech. Memo (October 2009)

2. Are groundwater, soil, surface water, sediments, or air **media** known or reasonably suspected to be **"contaminated"**[1] above appropriately protective risk-based "levels" (applicable promulgated standards, as well as other appropriate standards, guidelines, guidance, or criteria) from releases subject to RCRA Corrective Action (from SWMUs, RUs or AOCs)?

	YES	NO	?	Rationale/Key Contaminants
Groundwater	X			Several reports and 30 years of groundwater monitoring (VOCs and chloropyridines)
Air (indoors)[2]		X		Multiple VI assessments showed minimal and acceptable levels (OSHA for onsite workers).
Surface Soil (e.g., <2 ft)		X		Fenced 15 acre site; mostly paved with a dense array of structures, tanks, and piping.
Surface Water	X			Quarry seeps (isolated and very limited; see CA750); discharge is below risk-based levels.
Sediment		X		
Subsurface Soil (e.g., >2 ft)	X			RI reports show significant contaminant levels in source areas.
Air (outdoors)		X		

____ If no (for all media) - skip to #6, and enter "YE," status code after providing or citing appropriate "levels," and referencing sufficient supporting documentation demonstrating that these "levels" are not exceeded.

_X_ If yes (for any media) - continue after identifying key contaminants in each "contaminated" medium, citing appropriate "levels" (or provide an explanation for the determination that the medium could pose an unacceptable risk), and referencing supporting documentation.

____ If unknown (for any media) - skip to #6 and enter "IN" status code.

Rationale and Reference(s):

Groundwater and soil contaminants include multiple VOCs (principally, carbon tetrachloride, chloroform, methylene chloride, tetrachloroethene, and trichloroethene and daughter/breakdown products) and a semi-volatile suite of chloropyridines (principally, 2-chloropyridine, 3-chloropyridine, 4-chloropyridine, and 2,6-dichloropyridine).

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[1] "Contamination" and "contaminated" describes media containing contaminants (in any form, NAPL and/or dissolved, vapors, or solids, that are subject to RCRA) in concentrations in excess of appropriately protective risk-based "levels" (for the media, that identify risks within the acceptable risk range).

[2] Recent evidence (from the Colorado Dept. of Public Health and Environment, and others) suggests that unacceptable indoor air concentrations are more common in structures above groundwater with volatile contaminants than previously believed. This is a rapidly developing field and reviewers are encouraged to look to the latest guidance for the appropriate methods and scale of demonstration necessary to be reasonably certain that indoor air (in structures located above (and adjacent to) groundwater with volatile contaminants) does not present unacceptable risks.

Most site-related VOCs have a groundwater (6NYCRR Part 703) and drinking water (NYSDOH Part 5) standard of 5 micrograms/liter (or 5 ppb). The chloropyridines have been assigned a generic guideline (unspecified organic contaminant; UOC) of 50 ppb whereas the site-specific Human Health Risk Assessment concluded that total chloropyridine concentrations of 37 ppb or less are protective of human health. Groundwater concentrations of many site-related contaminants are several orders of magnitude higher than groundwater standards and guidelines.

General soil cleanup objectives (SCOs) for the various organic contaminants vary but are in the general range of 1 ppm (see 6NYCRR Part 375 for generic tables and site-specific methods). Investigations showed several areas onsite that exceed SCOs by several orders of magnitude.

3. Are there **complete pathways** between "contamination" and human receptors such that exposures can be reasonably expected under the current (land- and groundwater-use) conditions?

Summary Exposure Pathway Evaluation Table

	Potential **Human Receptors** (Under Current Conditions)						
"Contaminated" Media	Residents	Workers	Day-Care	Construction	Trespassers	Recreation	Food[3]
Groundwater	NO	YES (onsite)	NO	YES (onsite)	---	---	NO
Air (indoors)	NO	NO	NO	NO	---	---	NO
~~Soil (surface, e.g., <2 ft)~~	—	—	—	—	—	—	—
Surface Water	NO	YES (offsite)	---	---	NO	NO	NO
~~Sediment~~	—	—	---	---	—	—	—
Soil (subsurface e.g., >2 ft)	---	---	---	YES (onsite)	---	---	NO
~~Air (outdoors)~~	—	—	—	—	—	---	---

Instructions for Summary Exposure Pathway Evaluation Table:

1. Strike-out specific Media including Human Receptors' spaces for Media which are not "contaminated" as identified in #2 above.

2. enter "yes" or "no" for potential "completeness" under each "Contaminated" Media -- Human Receptor combination (Pathway).

Note: In order to focus the evaluation to the most probable combinations some potential "Contaminated" Media - Human Receptor combinations (Pathways) do not have check spaces ("_---_"). While these combinations may not be probable in most situations they may be possible in some settings and should be added as necessary.

_____ If no (pathways are not complete for any contaminated media-receptor combination) - skip to #6, and enter "YE" status code, after explaining and/or referencing condition(s) in-place, whether natural or man-made, preventing a complete exposure pathway from each contaminated medium

[3] Indirect Pathway/Receptor (e.g., vegetables, fruits, crops, meat and dairy products, fish, shellfish, etc.)

(e.g., use optional Pathway Evaluation Work Sheet to analyze major pathways).

__X__ If yes (pathways are complete for any "Contaminated" Media - Human Receptor combination) - continue after providing supporting explanation.

_____ If unknown (for any "Contaminated" Media - Human Receptor combination) - skip to #6 and enter "IN" status code

Rationale and Reference(s):

Surface Water (offsite) - Significant groundwater discharge (small waterfalls, in places; see Figure 7) is evident along a bedding-plane fracture in the east wall of the Gates Dolomite quarry. This influx of groundwater flows to two dewatering ponds in the SE corner of quarry, which collect groundwater, precipitation, and runoff from the whole quarry. From the dewatering collection ponds, water is pumped up to a surface drainage channel which drains eastward along the Conrail RR to a roadside drainage channel along I-390, thence southward to a subsurface culvert, thence eastward under I-390 just north of Chili Avenue to a concrete outfall at the Erie Canal (see Figure 1). The quarry ponds are pumped at up to 2000 gallons per minute for several hours per day during times of high precipitation and average 700,000 gallons per day. The quarry acts as a very large collector well (roughly 2000 feet by 1000 feet by 100 feet deep) which influences groundwater over a considerable area.

The 1997 phase II RI report and subsequent semi-annual monitoring reports have documented detections of chloropyridines in samples from the Gates Dolomite quarry seeps (SE corner), the quarry dewatering ponds, the quarry discharge channel along I-390, the quarry discharge point at the Erie Canal, and the Erie Canal. In recent years, chloropyridine concentrations have been relatively stable at about 200 ppb in the Gates Dolomite quarry seeps, less than 10 ppb in the quarry discharge channel and the quarry discharge point at the Erie Canal, and less than 5 ppb (largely non-detect) in the Erie Canal near the discharge point.

The Human Health Risk Assessment (1996, 1997) concluded that total chloropyridine concentrations of 37 ppb or less are protective of human health. The only near-surface sampling point currently above this level is the quarry seep location in the SE corner of the quarry. The quarry owners and workers have been advised to avoid direct contact with this cascading seepage and its very wet location in an inactive and relatively inaccessible area of the quarry discourages such contact.

Subsurface Soils & Groundwater (onsite) – Given significant levels of multiple contaminants in subsurface soils and groundwater onsite, Arch maintains worker health and safety policies and a soil management plan which govern any invasive activity and control potential exposures. These measures also apply during routine groundwater sampling events and equipment maintenance.

4. Can the **exposures** from any of the complete pathways identified in #3 be reasonably expected to be **"significant"**[4] (i.e., potentially "unacceptable" because exposures can be reasonably expected to be: 1) greater in magnitude (intensity, frequency and/or duration) than assumed in the derivation of the acceptable "levels" (used to identify the "contamination"); or 2) the combination of exposure magnitude (perhaps even though low) and

[4] If there is any question on whether the identified exposures are "significant" (i.e., potentially "unacceptable") consult a human health Risk Assessment specialist with appropriate education, training and experience.

contaminant concentrations (which may be substantially above the acceptable "levels") could result in greater than acceptable risks)?

__X__ If no (exposures can not be reasonably expected to be significant (i.e., potentially "unacceptable") for any complete exposure pathway) - skip to #6 and enter "YE" status code after explaining and/or referencing documentation justifying why the exposures (from each of the complete pathways) to "contamination" (identified in #3) are not expected to be "significant."

___ If yes (exposures could be reasonably expected to be "significant" (i.e., potentially "unacceptable") for any complete exposure pathway) - continue after providing a description (of each potentially "unacceptable" exposure pathway) and explaining and/or referencing documentation justifying why the exposures (from each of the remaining complete pathways) to "contamination" (identified in #3) are not expected to be "significant."

_____ If unknown (for any complete pathway) - skip to #6 and enter "IN" status code

Rationale and Reference(s):

See explanations in item #3 above.

5. Can the "significant" **exposures** (identified in #4) be shown to be within **acceptable** limits?

_____ If yes (all "significant" exposures have been shown to be within acceptable limits) - continue and enter "YE" after summarizing and referencing documentation justifying why all "significant" exposures to "contamination" are within acceptable limits (e.g., a site-specific Human Health Risk Assessment).

___ If no (there are current exposures that can be reasonably expected to be "unacceptable")- continue and enter "NO" status code after providing a description of each potentially "unacceptable" exposure.

_____ If unknown (for any potentially "unacceptable" exposure) - continue and enter "IN" status code

Rationale and Reference(s): N/A

6. Check the appropriate RCRA Info status codes for the Current Human Exposures Under Control EI event code (CA725), and obtain Supervisor (or appropriate Manager) signature and date on the EI determination below (and attach appropriate supporting documentation as well as a map of the facility):

__X__ YE - Yes, "Current Human Exposures Under Control" has been verified. Based on a review of the information contained in this EI Determination, "Current Human Exposures" are expected to be "Under Control" at the Arch Chemical, Inc. facility, EPA ID #: NYD002220804 located at 100 McKee Road, Rochester, New York under current and reasonably expected conditions. This determination will be re-evaluated when the Agency/State becomes aware of significant changes at the facility.

_____ NO - "Current Human Exposures" are NOT "Under Control."

_____ NO - "Current Human Exposures" are NOT "Under Control."

_____ IN - More information is needed to make a determination.

Completed by: _____ Date: 3-30-2010
James H. Craft – Engineering Geologist II
Division of Environmental Remediation - Region 8

Supervisor: _____ for BHP Date: 3-30-2010
Bartholomew Putzig, P.E. - RHWRE
Division of Environmental Remediation - Region 8

Director: _____ Date: 3-30-2010
Robert J. Phaneuf, P.E. - Acting Director
Bureau of Hazardous Waste and Radiation Management
Division of Solid and Hazardous Materials

Locations where References may be found:

New York State Department of Environmental Conservation
Division of Environmental Remediation - Region 8
6274 East Avon-Lima Road
Avon, New York 14414-9519

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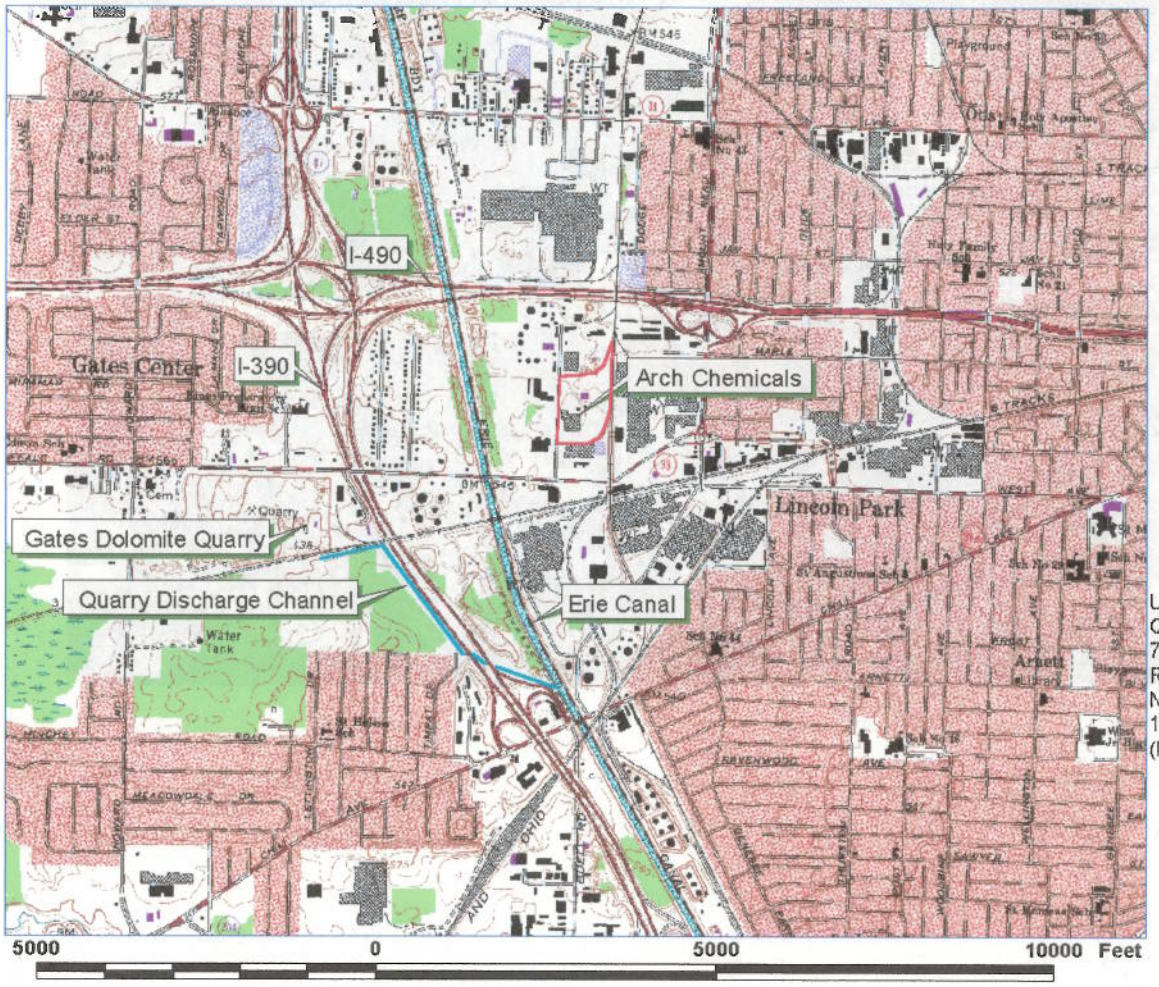
FINAL NOTE: THE HUMAN EXPOSURES EI IS A QUALITATIVE SCREENING OF EXPOSURES AND THE DETERMINATIONS WITHIN THIS DOCUMENT SHOULD NOT BE USED AS THE SOLE BASIS FOR RESTRICTING THE SCOPE OF MORE DETAILED (E.G., SITE-SPECIFIC) ASSESSMENTS OF RISK.

FIGURES

Figure 1 - Arch (former Olin) Chemicals Site Location Map



Base Map:

USGS Topographic Quadrangle
7.5 Mintue Series
Rochester West, New York
1971
(Photorevised 1978)

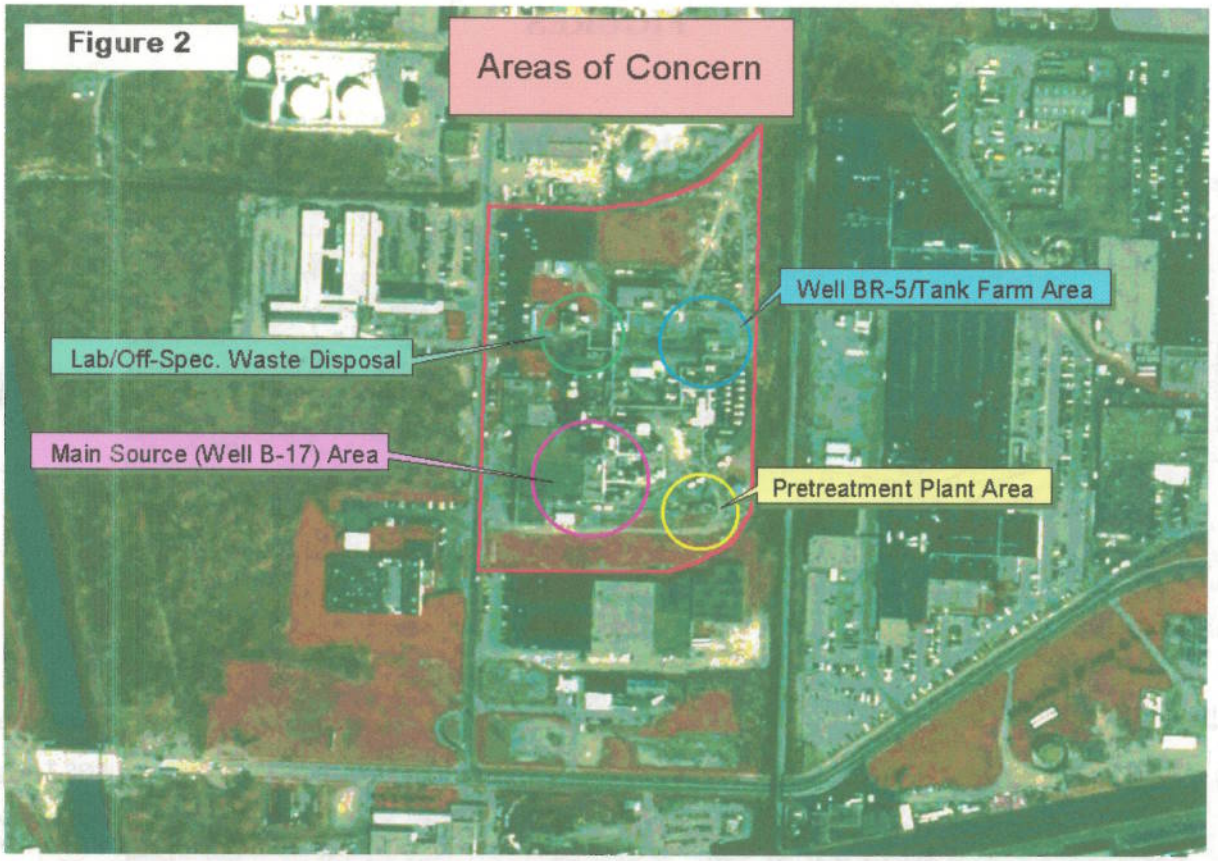


Figure 2
Areas of Concern
Well BR-5/Tank Farm Area
Lab/Off-Spec. Waste Disposal
Main Source (Well B-17) Area
Pretreatment Plant Area

Figure 3 - Site Conceptual Model

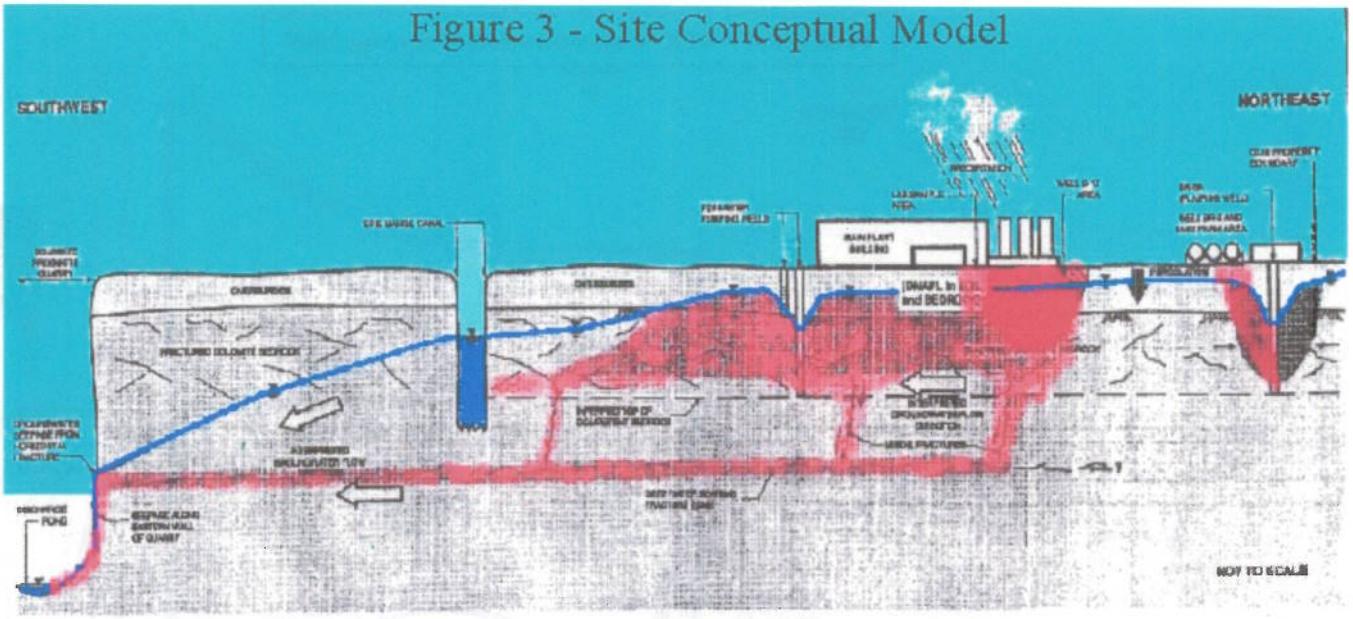


FIGURE 3
SITE CONCEPTUAL MODEL

FIGURE 4 – VOC Concentrations – Spring 2009

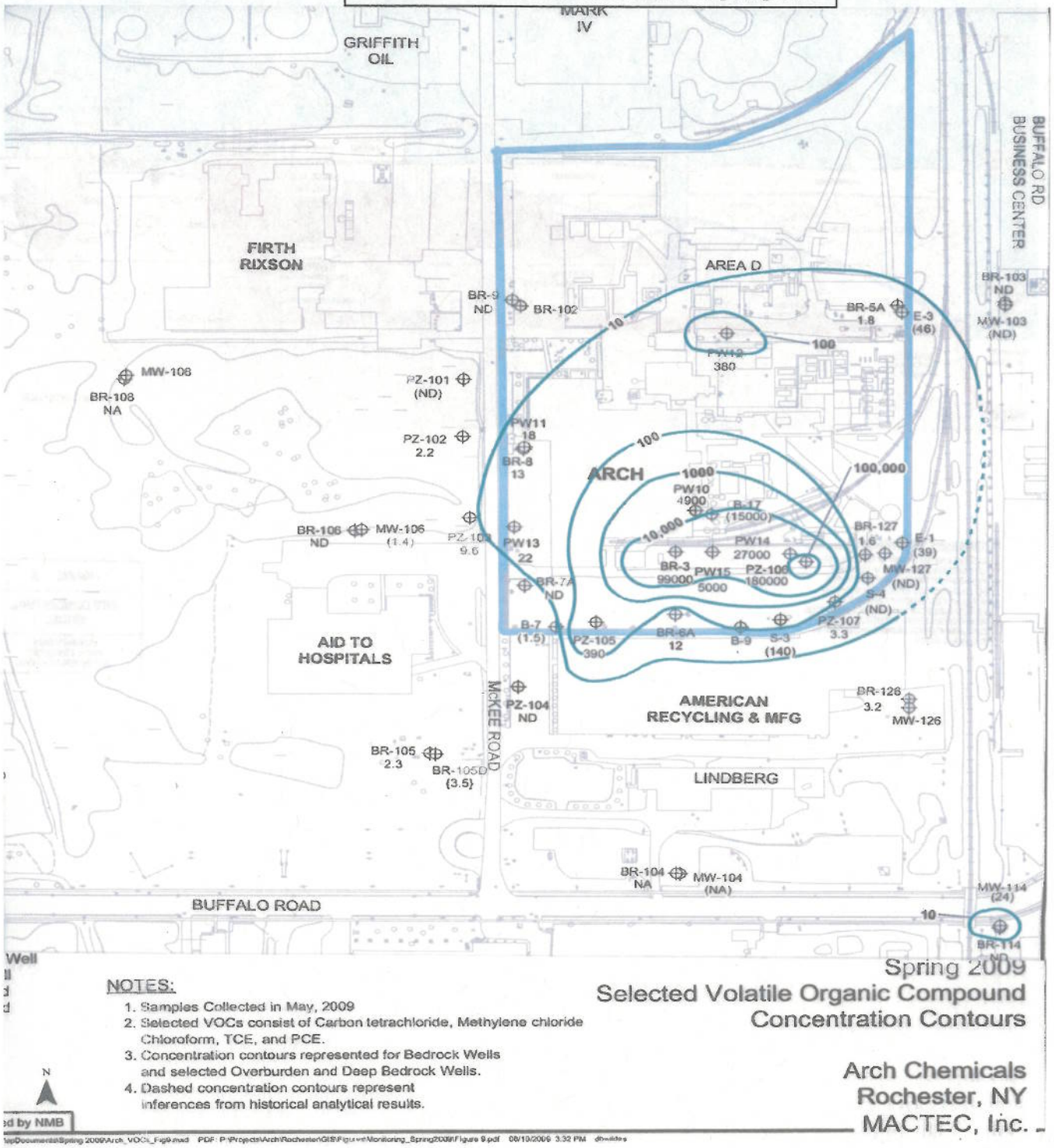


FIGURE 5 – Chloropyridine Concentrations – Spring 2009

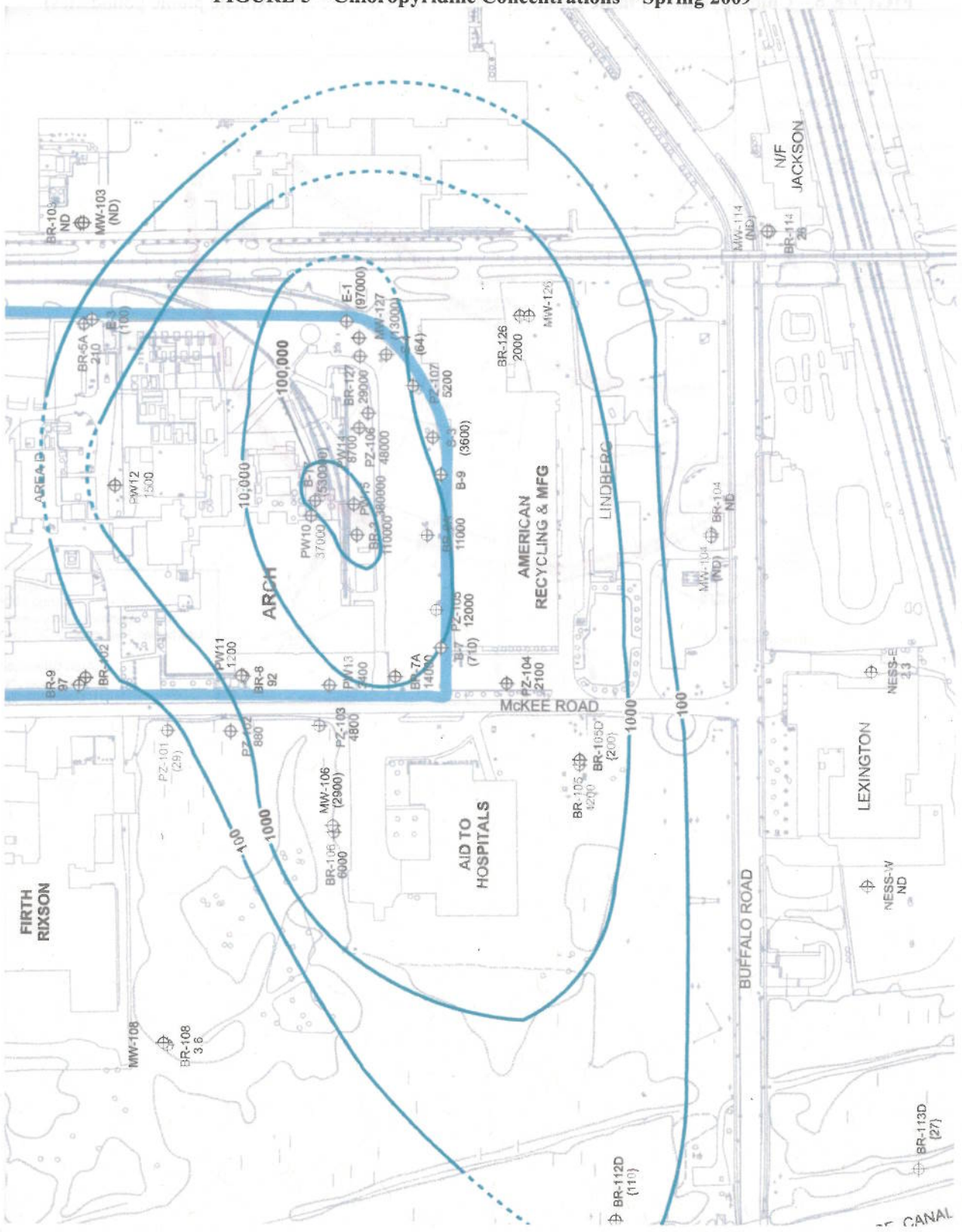


FIGURE 6 – Chloropyridine Plume Extent (broad red lines are the approximate plume boundaries)

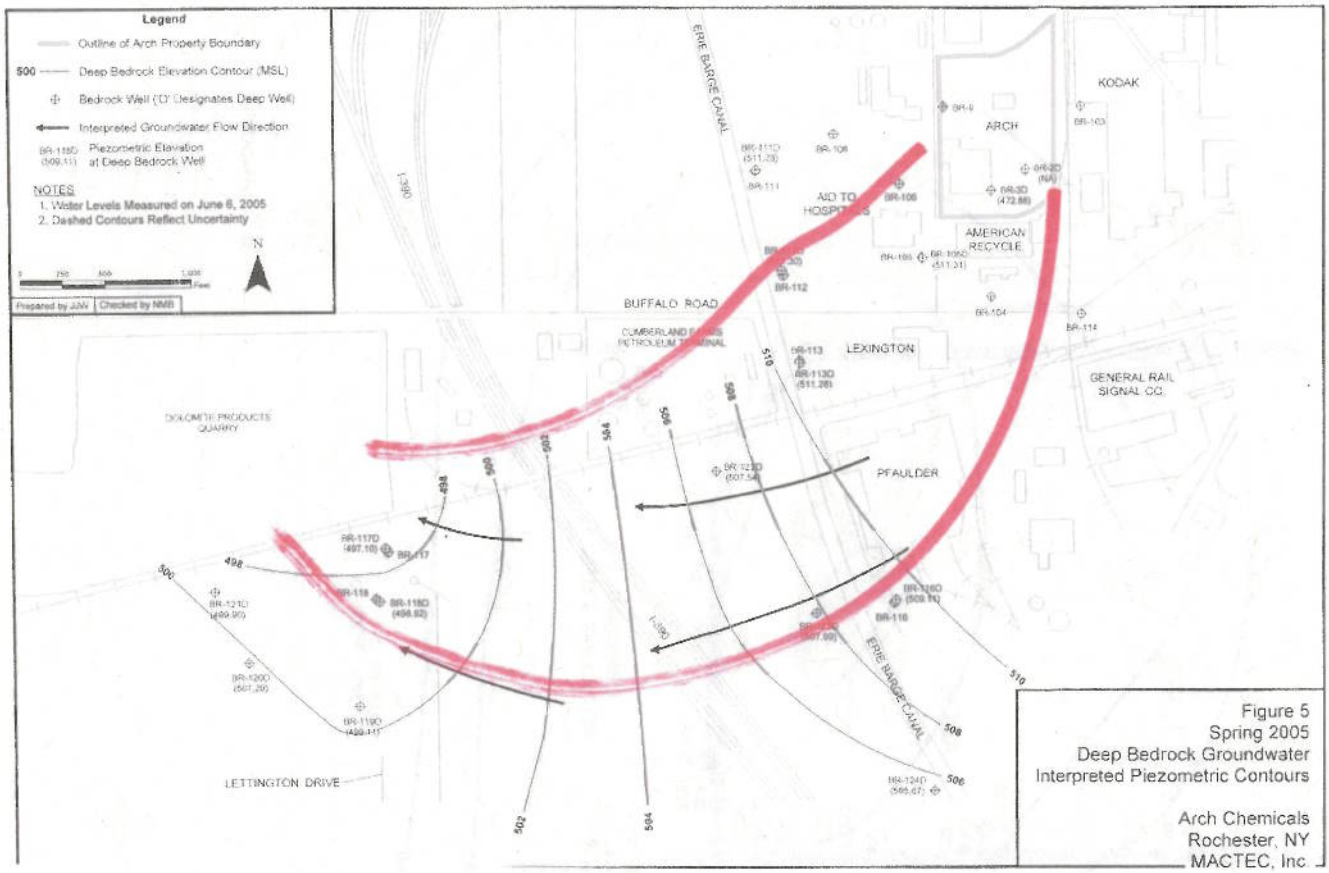


Figure 7 – Seeps on East Wall of Gates Dolomite Quarry (contaminated seeps are in the SE corner)