US Army Corps of Engineers
Buffalo District
BUILDING STRONG®

PROPOSED PLAN
FOR THE
FORMER GUTERL SPECIALTY STEEL
CORPORATION SITE

LOCKPORT, NEW YORK

AUTHORIZED PROJECT UNDER THE
FORMERLY UTILIZED SITES REMEDIAL ACTION PROGRAM

July 2021

Prepared by:

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ACRONYMS, ABBREVIATIONS, AND UNITS OF MEASURE

AEC	Atomic Energy Commission
ac	acre
ARARs	applicable or relevant and appropriate requirements
ATI	Allegheny Technologies Incorporated
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
cm^2	square centimeters
COC	constituent of concern
DCGL	derived concentration guideline level
DOE	U.S. Department of Energy
dpm	disintegrations per minute
EPA	Environmental Protection Agency
FS	feasibility study
FUSRAP	Formerly Utilized Sites Remedial Action Program
Guterl Site	Former Guterl Specialty Steel Corporation Site
ha	hectare
MCL	maximum contaminant level
mg/kg	milligrams per kilogram
MNA	monitored natural attenuation
mrem/yr	millirem per year
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
O&M	operations and maintenance
pCi/g	picocuries per gram
PRG	preliminary remediation goal
PRG-CW	preliminary remediation goal-construction worker protection
PRG-GW	preliminary remediation goal-groundwater protection
RAO	remedial action objective
Simonds	Simonds Saw and Steel Company
SOR	sum of ratios
Th	thorium
^{232}Th	thorium-232
U	uranium
^{234}U	uranium-234
^{235}U	uranium-235
^{238}U	uranium-238
µg/L	micrograms per liter
VOC	volatile organic compound

CORPS OF ENGINEERS ANNOUNCES PROPOSED PLAN

The public is invited to review and comment on this *Proposed Plan for the Former Guterl Specialty Steel Corporation Site*. The U.S. Army Corps of Engineers prepared this document as part of investigations under the Formerly Utilized Sites Remedial Action Program (FUSRAP). This program was initiated in 1974 to identify, investigate, and if necessary, clean up or control sites that were contaminated from activities associated with the Nation's early atomic energy program. The Corps of Engineers executes FUSRAP in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended, and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP).

The purpose of this document is to present the Corps of Engineers preferred remedial alternative and solicit comments from the public and stakeholders regarding the preferred remedial alternative from the Feasibility Study (FS) to address contaminated buildings, soil, and groundwater at the Former Guterl Specialty Steel Corporation Site (Guterl Site). The preferred alternative is Site-Wide Alternative 3, which includes:

- Dismantlement and Off-Site Disposal of Buildings 1, 2, 3, 4/9, 5, 6, 8, 24, and 35.
- Complete Soil Removal to the Soil Preliminary Remediation Goal for Groundwater Protection (Soil PRG-GW) and Off-Site Disposal.
- Groundwater Recovery Using Extraction Wells and a Rubblized Trench with *Ex Situ* Treatment, with Environmental Monitoring.

The preferred site-wide alternative may be modified based on any new information acquired during the designated public comment period. Therefore, the public is encouraged to review and comment on all of the alternatives presented in this proposed plan.

<u>Public Comment Period</u>

July 12, 2021 – September 10, 2021

The Corps of Engineers will accept written comments on the proposed plan during the public comment period. Please email comments to fusrap@usace.army.mil or mail comments to the district office address below. Oral comments may be presented for consideration at the virtual public meeting.

Virtual Public Meeting

Thursday, July 29, 2021, at 7 p.m.

The meeting will be conducted via Webex. Please email fusrap@usace.army.mil to register by Wednesday, July 28, 2021, at 4 p.m.

For more information, the administrative record file, which contains documents used in the decision-making process for the Guterl Site, is publicly accessible on the project website at:

https://www.lrb.usace.army.mil/Missions/HTRW/FUSRAP/Guterl-Steel-Site/Guterl-Admin-Record/

Supporting documents are available on the Guterl Steel Site FUSRAP website at:

https://www.lrb.usace.army.mil/Missions/HTRW/FUSRAP/Guterl-Steel-Site/

Comments may be submitted via email to *fusrap@usace.army.mil*. Please refer to this proposed plan, or the Guterl Site, in any comments you make. Written comments may be mailed to the following address:

U.S. Army Corps of Engineers, Buffalo District
Special Projects Branch, Environmental Project Management Section
1776 Niagara Street
Buffalo, NY 14207-3199

If there are any questions regarding the comment process or the proposed plan, please direct them to the addresses noted above or telephone 1-800-833-6390 (Option 4).

SITE HISTORY

From 1948 to 1956, Simonds Saw and Steel Company (Simonds) performed rolling mill operations on uranium metal and, to a much smaller extent, thorium metal. The uranium and thorium metal operations were initially performed from 1948 to 1952 under contracts with the New York Operations Office of the Atomic Energy Commission (AEC). The AEC was the predecessor to the U.S. Department of Energy (DOE) and Nuclear Regulatory Commission. Simonds continued the work from 1952 to 1956 under a subcontract to National Lead of Ohio.

Simonds was acquired in 1966 by the Wallace-Murray Corporation, who continued to operate as a specialty steel mill until 1978, when the Guterl Specialty Steel Corporation acquired the property.

The Guterl Specialty Steel Corporation filed for Chapter 11 bankruptcy protection in 1982 through the U.S. Bankruptcy Court for the Western District of Pennsylvania. The Allegheny Ludlum Corporation purchased the Guterl Specialty Steel Corporation assets at auction in 1984 using industrial development bonds received through the Niagara County Industrial Development Agency. The purchase included all of the Guterl Specialty Steel Corporation property, with the exception of land that later became known as the Excised Area, and the equipment used during AEC-related operations at the Guterl Site. As a result, the Excised Area and equipment therein remains under ownership of Guterl Specialty Steel Corporation. The prior Chapter 11 bankruptcy was changed to a Chapter 7 bankruptcy in 1990.

In 1996, the Allegheny Ludlum Corporation merged with Teledyne Incorporated to form Allegheny Technologies Incorporated (ATI). The Guterl Site, with the exception of the Excised Area, is currently owned and operated by ATI under the name ATI Specialty Materials. The DOE declared the Guterl Site eligible for FUSRAP in May 2000, after which the Corps of Engineers investigated the Guterl Site and developed this proposed plan for remediation.

SITE CHARACTERISTICS

The Guterl Site is located in the City of Lockport, Niagara County, New York, approximately 32 kilometers (20 miles) northeast of Buffalo, New York (Figure 1). The approximately 28-hectare (ha) (70-acre [ac]) site is bordered by Ohio Street on the south and east, residential and commercial properties to the north near New York State Route 31 (West Avenue), and New York State Route 93 on the west. The Erie Canal is south-southeast of the Guterl Site boundary. The Guterl Site is grouped into two areas (Figure 2):

- The 24.5-ha (60.6-ac) ATI Specialty Materials property, where an active specialty steel manufacturing facility operates in the southwest portion of the property. Four of the five buildings owned by ATI Specialty Materials (Buildings 14, 17, 37, and 47) were constructed after the termination of AEC activities. Building 24, currently owned by ATI Specialty Materials, was partially constructed during AEC activities and was expanded northward after AEC activities ended.
- The 3.6-ha (9-ac) Excised Area owned by Guterl Specialty Steel, which includes nine abandoned buildings that existed during the AEC activities (Buildings 1, 2, 3, 4/9, 5, 6, 8, and 35).

The Guterl Site is currently zoned for industrial use and is anticipated to remain so in the future. The Corps of Engineers has conducted a remedial investigation and a feasibility study (FS) at the Guterl Site. The remedial investigation and FS identified: 1) the types, quantities, and locations of contaminants; 2) the potential risk the contaminants pose to human health and the environment; and 3) ways to address the potential risk posed by the contamination. This proposed plan addresses FUSRAP-related constituents of concern (COCs) in buildings, soil, and groundwater. Surface water (water in utility trenches, drains, pits, and catch basins) and sediment on the Guterl Site, as well as surface water and sediment off site in the nearby Erie Canal, were also investigated and evaluated. No FUSRAP-related constituents of concern were identified in surface water and sediment on the Guterl Site, nor in the Erie Canal immediately downstream from the site, that warrant remediation.

What are the "Constituents of Concern"?

The Corps of Engineers has identified two FUSRAP-related constituents of concern that pose a potential risk to human health at the Guterl Site.

Thorium: Thorium is a naturally occurring radioactive metal found at very low levels in soil, rocks, and water. It has several different isotopes, all of which are radioactive. The principal concern from low to moderate level exposure to ionizing radiation is increased risk of cancer. Studies have shown that inhaling thorium dust causes an increased risk of developing lung cancer and pancreatic cancer. Bone cancer risk is also increased because thorium may be stored in bone.

Uranium: Uranium is a naturally occurring radioactive element commonly found in very small amounts in rocks, soil, water, plants, and animals (including humans). Uranium is weakly radioactive and contributes to low levels of natural background radiation in the environment. Intake of uranium can lead to increased cancer risk, kidney damage, or both.

SOIL

The radiologic COCs for soil are thorium-232 (^{232}Th) and total uranium (including isotopes uranium-234 [^{234}U], uranium-235 [^{235}U], and uranium-238 [^{238}U]). COC concentrations were at or near background levels in the active ATI Specialty Materials production areas and in historically undisturbed areas of the Guterl Site.

Contaminated soil volumes were estimated using the two different preliminary remediation goals (PRGs): PRG-CW (construction worker) and PRG-GW (groundwater). The construction worker soil preliminary remediation goal was developed to protect site workers from the radiation dose they would receive when directly exposed to contaminated site soils. For the construction worker scenario, the Soil PRG-CW is 23 picocuries per gram (pCi/g) for ^{238}U and 6.6 pCi/g for ^{232}Th. The Soil PRG-GW is 11 milligrams per kilogram (mg/kg) total uranium (equivalent to 3.66 pCi/g ^{238}U), which is a remedial goal more protective of groundwater. Workers would also be protected from direct exposure to radiation in soil if the Soil PRG-GW were used as the cleanup goal. The PRG-CW remediation goal does not include background soil levels for ^{238}U and ^{232}Th; the PRG-CW would be added to background concentrations. The PRG-GW remediation goal values include the background soil levels for ^{238}U; no additional adjustment to the PRG-GW would be made based on background concentrations of uranium.

The estimated volume of contaminated soil to be removed under the Soil PRG-CW is approximately 3,800 cubic meters (m^3) (5,000 cubic yards [yd^3]). Under the PRG-GW, approximately 44,000 m^3 (58,000 yd^3) of contaminated soil would be removed.

The COC contamination was found to be greatest in and around the former AEC support operations handling areas in the Excised Area and in the portions of the property where miscellaneous land disposal of AEC-related materials occurred. COCs were found in soils beneath or adjacent to each of the Excised Area buildings and in several localized outdoor areas of the undeveloped parcel (i.e., the area north of Buildings 14, 24, and 37, including the inactive hazardous waste disposal site). Horizontal and vertical distributions of COCs within these areas varied due to historical site activities.

BUILDINGS

The COCs for buildings include ^{232}Th and ^{234}U, ^{235}U, and ^{238}U. Buildings on the Guterl FUSRAP site are not sequentially numbered and divided into the Excised Area and the active ATI property. Buildings 1, 2, 3, 4/9, 5, 6, 8, and 35 are located in the Excised Area and are currently abandoned, these buildings are included in the remedial action. Also included in the remedial action is Building 24; located on ATI's property and actively used as a storage facility. Buildings 14, 17, 37, and 47 are part of the ATI property and are not included in this remedial action, since these buildings were constructed after AEC activities occurred on the Guterl Site. Exposure to building materials and contaminated soils beneath Building 8 posed the greatest potential human health risks of any areas on the Guterl Site. Most notably, a site risk assessment estimated that potential lifetime cancer risks and yearly radiological dose rates received by someone trespassing in Building 8 (for 4 hours a week for 6 months of the year for 10 years) could exceed acceptable targets.

The vast majority of contamination on interior building surfaces is fixed on typical materials including miscellaneous metal, wood, electrical, machinery, overhead cranes, and other miscellaneous materials and surfaces. Fixed thorium contamination exists in all of the buildings included in this remedial action except the exterior of Building 8. Fixed uranium contamination exists in all of the buildings except the exterior of Building 6. Removable thorium contamination exists in Building 3.

GROUNDWATER AND SEEPS

The COC for groundwater is limited to total uranium since thorium and radium were observed at background levels in groundwater during the remedial investigation.

The shallow groundwater plume exhibits uranium transport from the northwest portion of the Guterl Site to the southeast portion of the Guterl Site towards the Erie Canal. The deep groundwater plume follows the same northwest to southeast path towards the Erie Canal, except the deep groundwater plume is smaller and less concentrated than the shallow groundwater plume. Groundwater sample results vary from low-level impacts of uranium (less than 10 micrograms per liter [µg/L]) to more elevated concentrations in the center of the Guterl Site. The highest uranium concentration detected in shallow groundwater was 304 µg/L in MW-605D located near the center of the Guterl Site.

Groundwater underlying the Guterl Site is of sufficient quality and quantity to be considered potable for drinking water purposes. There were no functioning groundwater wells (for domestic consumption) identified within a half-mile radius of the Guterl Site (see Appendix C of the FS) and the surrounding community is on a public water supply system. Uranium is a FUSRAP-related COC in groundwater at the Guterl Site. The U.S. Environmental Protection Agency (EPA) primary drinking water regulation Maximum Contaminant Level (MCL) of 30 µg/L for uranium is relevant and appropriate to groundwater underlying the Guterl Site.

Groundwater discharges into surface waters of the Erie Canal through seeps on the cliff face of the canal. The seeps closest to the Guterl Site show low-level uranium concentrations; seeps located downstream in the canal have even lower concentrations of uranium which are below the MCL. This low-level uranium seepage does not adversely impact the canal or recreational users, since the majority of groundwater seep locations are inaccessible and not anticipated to provide a pathway for future human exposure. Groundwater seeps will not cause an exceedance of the uranium MCL in surface waters of the Erie Canal at any time between present and the next 1,000 years (Appendix D of the FS). All surface water samples from the canal met the MCLs for drinking water.

SCOPE AND ROLE OF THE RESPONSE ACTION

The proposed alternatives will address impacted buildings, soil, and groundwater at the Guterl Site. The Corps of Engineers is authorized under FUSRAP to remediate only those COCs that result from work performed as part of the Nation's early atomic energy program (FUSRAP-related), which for the Guterl Site only include radioactive residuals. Constituents that are not FUSRAP-related may be remediated only if commingled with FUSRAP-related COCs. If these constituents are commingled with FUSRAP-related COCs, they will be remediated and addressed for proper disposal or other actions. The remedial alternatives developed for the Guterl Site will address ^{232}Th and uranium (including ^{234}U, ^{235}U, and ^{238}U) in buildings and soils, and elemental (total) uranium in groundwater.

SUMMARY OF SITE RISKS

The Corps of Engineers conducted both a human health baseline risk assessment and a screening-level ecological risk assessment to determine the current and potential future effects of FUSRAP-related constituents on human health and the environment. The Corps of Engineers determined that the preferred alternative identified in this proposed plan, or one of the other active measure alternatives considered in this proposed plan, is necessary to protect human health and the environment from actual or threatened releases of hazardous substances into the environment.

HUMAN HEALTH RISKS

The human health risk assessment modeled human health risks from exposure to radioactive contaminants in the buildings within the Excised Area, soils, and groundwater at the present time and 1,000 years into the future. A period of 1,000 years was evaluated in the human health risk assessment because the relevant and appropriate requirements being followed for this remedial action require that the remedial action consider whether or not radiological doses could increase over that time frame due to radiological decay of the parent radionuclides and ingrowth of daughter radionuclides, or transport of radioactive contamination at the site, for example leaching of soil contaminants into groundwater (Title 10 of the Code of Federal Regulations, Part 20, Subpart E 10 CFR 20.1402: Radiological Criteria for Unrestricted Use, as indicated in the applicable or relevant and appropriate requirements section of this proposed plan).

Simultaneously, the potential for noncarcinogenic health effects from exposure to uranium, which primarily targets the kidney, was assessed by estimating the hazard index from oral intakes. The assessment modeled cancer risks, radiological doses, and non-cancer hazard indices to different potential human receptors from exposure to FUSRAP-related contamination in:

- Building materials within the Excised Area.
- Surface and subsurface soil.
- Groundwater.
- Sediment and surface water within utilities, ditches, trenches, etc.
- Surface water and sediment within the Erie Canal.

The potential routes of exposure included ingestion of all media, inhalation of particulates, and exposure to external gamma radiation. The potential current and future human receptors included in the risk analysis are as follows:

- Construction worker
- Juvenile Trespasser
- On-site worker
- Hypothetical on-site resident

Only long-term chronic risks and exposure were evaluated, as the contamination is not present at levels that would pose acute or immediate risks.

Surface water and sediment samples collected from the Erie Canal did not indicate FUSRAP-related impacts.

Sediment and surface water sampled from within utilities and ditches on the site would not pose risks to people encountering this material.

The greatest potential unacceptable human health risks at the Guterl Site were found to be exposure to building materials and contaminated soils beneath Building 8 and a localized area of elevated activity in the railroad right-of-way.

Uranium in groundwater below some areas of the site could pose unacceptable risks if the site groundwater were to be used as a source of potable drinking water.

Although hypothetical future residential exposure to on-site contamination was evaluated, the reasonable future land use at the site is assumed to remain industrial. Under this land use, the risk analysis identified the critical group of receptors used to develop the PRG is the construction worker. The critical group is defined as the individual receiving a dose that is representative of the members of the population who are subject to the higher exposures. As the contamination is not present at levels that would pose immediate risk, it is long-term chronic exposure that was analyzed to determine the critical group. Of the current and future potential receptors analyzed, the construction worker would receive long-term exposure on this industrial site. Details of the risk assessment are in the Baseline Risk Assessment as part of the Remedial Investigation Report.

Constituents of concern which pose an unacceptable risk to the construction worker in site media are as follows:

- ***Buildings* —** Exposure to uranium and ^{232}Th in building materials posed potential health risks to workers. The maximum estimated radiological dose rate to a worker exposed to the interior of Building 8 was up to 765 mrem/year, with an associated incremental lifetime cancer risk of approximately 1 in 100. Exposure routes contributing to unacceptable risk are incidental ingestion of building materials, inhalation of dust, and external radiation. Possible ingestion of building materials by construction workers could occur as building materials are disturbed; if particulates become airborne during decontamination activities (power washing, scabbling, etc.), building demolition, and disposal. Otherwise, the vast majority of contamination on interior building surfaces is not easily removed (fixed). Incidental ingestion of uranium contamination in these building materials could result in a hazard index well above 1, indicating possible adverse health effects (e.g., kidney toxicity) could occur to workers who come into long-term contact with the building materials.
- ***Soil* —** Exposure to uranium and ^{232}Th in soils, especially contaminated soils found in soils beneath or adjacent to each of the buildings in the Excised Area could pose health risks to workers. Exposure routes contributing to unacceptable health risks include incidental ingestion of soils, inhalation of fugitive dust, and external radiation. The maximum radiological dose from exposure to soil was estimated to occur 58 years into the 1,000 year evaluation period. This is due to the leaching of the soil contamination

into groundwater, and incidental ingestion of groundwater by the construction worker (splashing drops of contaminated groundwater during excavation activities that encounter groundwater). The maximum radiological dose rate to the construction worker to areas of soil contamination could be up to 653 mrem/year, with an associated incremental lifetime cancer risk of approximately 2 in 10,000. Incidental ingestion of uranium contamination in soil could result in a hazard index above 1, indicating possible adverse health effects (e.g., kidney toxicity) could occur to workers who come into long-term contact with the uranium contamination in soil.

- ***Groundwater*** — Groundwater underlying the Guterl Site is of sufficient quality and quantity to be considered potable for drinking water purposes. Potential health risks occur if the Guterl Site groundwater were to be used as a source of potable water, as receptors could consume uranium contaminated groundwater at uranium concentrations above the national primary drinking water regulation MCL for uranium of 30 μg/L. As indicated above, leaching of uranium from soil to groundwater and incidental ingestion of the groundwater by the construction worker contributes to the worker health risks. The groundwater is not contaminated with thorium-232.

ECOLOGICAL RISKS

Some habitat exists on both the terrestrial and aquatic areas of the Guterl Site, allowing relevant ecological receptors to either reside on the Guterl Site or use it as a forage base. Therefore, a screening level ecological risk assessment was performed in order to assess the potential risks to the ecological receptors (plants and animals) from contamination in the environment. Some potential risks to terrestrial ecological receptors at the Guterl Site were identified based on this evaluation. However, the Guterl Site is not currently managed for ecological resources. Although some limited patches of habitat exist on abandoned portions of the Guterl Site, much of the Guterl Site is actively disturbed or occupied by buildings and paved areas. Sensitive habitats, such as wetlands, are not present on site. The creation of an ecological preserve on site in the future is unlikely, given the current land use of the Guterl Site (industrial) and the current land use surrounding the Guterl Site (private residences, small farms, and light industrial).

Future redevelopment of the abandoned site is most likely to be industrial or commercial, which would further preclude the need for ecological management goals in addressing site contamination. Since the radiological standards (dose rate limits) for protection of human health are generally more conservative than recommended dose rate standards for protection of ecological populations, it is generally assumed that the environment is protected when remedial actions are taken to protect people from exposure to radioactive waste. Further assessment and considerations of ecological risk are therefore not necessary to ensure that the environment will be protected as a result of the proposed remedial action.

What is "risk" and how is it calculated?

A FUSRAP baseline risk assessment is an estimate of the likelihood of health problems occurring if no cleanup action were taken at a site. The Corps of Engineers follows the risk assessment process developed by the U.S. Environmental Protection Agency:

Step 1: Analyze Contamination: Hazard identification occurs during the remedial investigation phase. The Corps of Engineers collects samples from site soils, groundwater, sediments, surface water, and building materials, where appropriate. These samples are analyzed for hazardous substances that are likely present as a result of past FUSRAP-related activities. For example, if a site processed uranium compounds, the site would be tested for uranium and the hazardous materials uranium decays to, such as thorium-230.

Step 2: Estimate Exposure: Exposure assessment considers different ways people might be exposed to the radionuclides and chemicals identified in Step 1. The risk assessor develops a conceptual site model that identifies current and potential future land users and maps out the different ways each could be exposed to hazardous materials at the site. Stakeholder input informs this step. For example, someone who traverses the site occasionally could be exposed approximately two hours a day, up to seven days a week. He or she would likely not encounter groundwater or soils below a certain depth. By comparison, a construction worker might come in contact with deeper soils through excavation activities. The exposure assessment considers the concentrations that people might be exposed to in environmental media, and the potential frequency and duration of exposure. Using this information, the risk assessor identifies reasonable and likely future land use scenarios, and computes reasonable maximum exposure values for them, which is the highest level of human exposure that could reasonably be expected to occur.

Step 3: Assess Potential Health Dangers: Toxicity assessment by the risk assessor compiles information on the toxicity of each chemical or radionuclide to assess potential health risks. The risk assessor considers two types of health risk (cancer risk and non-cancer risk), as well as radiological dose (total effective dose equivalent). The likelihood of the occurrence of cancer resulting from exposures at remediation sites is generally expressed as an upper bound probability. For example, a 1 in 10,000 (1×10^{-4}) chance of cancer occurrence over a lifetime. In other words, for every 10,000 people that could be exposed at the reasonable maximum exposure level, at most, one additional cancer may be expected to occur over a lifetime. An additional cancer case means that one more person could get cancer than would normally be expected from all other causes. For non-cancer health effects, the risk assessor calculates a hazard index, which represents the ratio of a receptor's potential exposure to contaminants compared to a safe level at which no adverse health effects are expected. The total effective radiological dose equivalent is calculated as the sum of radiological doses from external exposure (gamma radiation) and committed effective dose from internal exposure, thereby taking into account all known exposures to radioactivity from the FUSRAP contamination.

Step 4: Characterize Site Risk: Risk characterization combines, evaluates, and summarizes the results of the three previous steps. The risk assessor determines whether the potential health risks are acceptable for people at or near the site according to relevant benchmarks issued by the U.S. Environmental Protection Agency or other agencies such as the Nuclear Regulatory Commission.

APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

The Corps of Engineers identified the following federal regulations as applicable or relevant and appropriate requirements (ARARs) for the Guterl Site:

- Title 10 of the Code of Federal Regulations, Part 20 (10 CFR 20), Subpart E
  - 10 CFR 20.1402: *Radiological Criteria for Unrestricted Use*
- Title 40 of the Code of Federal Regulations, Part 141 (40 CFR 141), Subpart G
  - 40 CFR 141.66: *Maximum Contaminant Levels (MCLs) for Radionuclides*

These ARARs specify criteria for developing remedial action objectives (RAOs) and PRGs for radionuclides in buildings, soil, and groundwater, respectively.

REMEDIAL ACTION OBJECTIVES

The RAOs developed for the Guterl Site are:

- Prevent exposure to uranium and ^{232}Th in soil and buildings and uranium in groundwater, such that a construction worker does not receive a total effective dose exceeding 25 mrem/yr above background from all pathways.

- Prevent human ingestion of groundwater that exceeds the uranium MCL of 30 μg/L.

PRELIMINARY REMEDIATION GOALS

The PRGs for the Guterl Site were developed to be protective of human health for the current and reasonable future industrial land use. Preliminary remediation goals for soil were developed based on two endpoints:

1. Protection of direct soil exposures to the critical group (a construction worker) for the reasonable future land use (industrial) (PRG-CW).

2. Protection of groundwater (i.e., removal of enough uranium in soil to enhance attenuation of uranium in groundwater to meet the U.S. EPA MCL for protection of drinking water) (PRG-GW).

The PRGs and background concentrations for each FUSRAP-related COC in soil are included in the following table:

PRELIMINARY REMEDIATION GOALS FOR RADIONUCLIDES IN SOIL AT THE GUTERL SITE

FUSRAP-Related COC	Units	Average Background Concentration	PRG-CW[a]	PRG-GW[b]
Thorium-232 [c]	pCi/g	0.644	6.6	Not separately defined[d]
Uranium-238 [e]	pCi/g	0.74	23	3.66
Total Uranium	mg/kg	2.2	69	11
Total Uranium	pCi/g	1.5	47 [f]	7.5

Notes: Values represent minimum of RESidual RADioactivity (RESRAD) calculated PRG at Years 0 or 1,000 (year of peak dose per nuclide group). Based on 10 CFR 20.

mg/kg: milligrams per kilogram N/A: Not Applicable
pCi/g: picocurie(s) per gram (amount of radioactivity)

a. These cleanup goals represent activity levels above the average site background activity corresponding to 25 mrem/yr dose to a construction worker. Since a mixture of radionuclides (i.e., U and Th) is present, the preliminary remediation goals for the construction worker (PRG-CW) values for soil would utilize the following sum of ratios (SOR) equation:

$$SOR = \frac{^{232}Th}{6.6} + \frac{^{234}U + ^{235}U + ^{238}U}{47}$$

b. These cleanup goals represent activity levels developed to protect against continued impacts to groundwater above the MCL of 30 µg/L for uranium.
c. PRG-CW for ^{232}Th includes ^{228}Ra and ^{228}Th decay contribution to dose at time zero.
d. Removal of soil that exceeds the ^{238}U PRG-GW will include the removal of the collocated soil with activity concentrations that exceed the ^{232}Th soil PRG-CW. Since ^{232}Th is not a COC for groundwater, a separate ^{232}Th PRG for soil is not required for groundwater protection.
e. A conversion factor of 0.333 was used to convert uranium mass to ^{238}U activity.
f. PRG for total uranium includes contribution to dose from ^{234}U, ^{235}U, and ^{238}U, assuming natural activity abundance of uranium isotopes (in ratio of ^{234}U (1): ^{235}U (0.046): ^{238}U (1).

The soil PRG-GW is not a radiological dose-based PRG, it is based on protection of groundwater at the safe drinking water level (i.e., would be remediated as a heavy metal) and should be addressed as a “not-to-exceed” value throughout the Guterl Site. The calculation of this groundwater protection PRG for soil, designated as soil PRG-GW, was performed using groundwater models. These models were used to determine the effect that residual uranium distributions in soil would have on groundwater concentrations and then “back calculate” a soil PRG protective of groundwater. The objective was to develop a soil PRG-GW that could be used as a lower threshold (“not-to-exceed”) value for soil removal that could be coupled with a separate remedial action for the groundwater plume. Basically, this determines how much uranium soil source needs to be removed to prevent future MCL exceedances in groundwater for the protection of drinking water. This threshold soil value for uranium would ensure future leaching will not result in regrowth of a uranium plume greater than the MCL after 30 years of remedy implementation. Since the PRG-GW remediation goal is lower than the PRG-CW, the construction worker is adequately protected from direct exposure to contaminated soil and groundwater via application of this cleanup goal. The PRG for thorium is not separately defined for the protection of groundwater because thorium is not a COC in groundwater.

The ^{232}Th found on site is collocated with ^{238}U, so removal of soil that exceeds the ^{238}U soil PRG-GW includes the removal of the ^{232}Th-impacted soil.

The Corps of Engineers also developed project-specific derived concentration guideline levels (DCGLs) for buildings. These DCGLs are the measured surface contamination concentrations in disintegrations per minute (dpm) per 100 square centimeters (cm^2) that will result in 25 mrem/yr dose limit to the critical group (construction worker). The dpm is a unit representing the gross measurement of the amount of radioactivity on the contaminated surface. The DCGLs for the Guterl Site buildings are included in the following table:

PROJECT-SPECIFIC DCGLS FOR RADIONUCLIDES IN BUILDINGS AT THE GUTERL SITE

	DCGL[a]	
	Total	**Removable**
Alpha (α) dpm/100 cm^2	2,391	240
Beta (β) dpm/100 cm^2	2,515	252

a. DCGLs are derived in Appendix H of the Former Guterl Specialty Steel Site FS report.
dpm: disintegrations per minute

SUMMARY OF SITE-WIDE REMEDIAL ALTERNATIVES

Site-wide remedial alternatives for the Guterl Site are presented below. The alternatives are numbered to correspond with the numbers in the FS.

The Corps of Engineers identified four site-wide remedial action alternatives for detailed analysis to address FUSRAP-related COCs in buildings, soil, and groundwater above PRGs at the Guterl Site. These alternatives were developed by combining general response actions, technology types, and process options retained from the screening process. The following site-wide alternatives were identified in the FS to be carried forward through the detailed evaluation.

SITE-WIDE ALTERNATIVE 1: NO ACTION

The no action alternative is considered in the detailed analysis in accordance with requirements in the NCP [40 CFR §300.430(e)(6)] as a baseline against which all other alternatives are compared. Since no actions are taken, it is not considered protective of human health and the environment.

Under this alternative, no remedial action would be taken to address FUSRAP-related COCs in buildings, soil, or groundwater at the Guterl Site. It was assumed that all activities, including basic site maintenance and environmental monitoring currently performed, would be discontinued under this alternative. Engineering controls (i.e., fencing) currently in place would not be maintained. Figures 3-1 and 3-2 represent the shallow and deep groundwater plume if no action was taken (modeling results of groundwater Alternative G1 in the FS). The construction, operations and maintenance, and present worth costs for Site-Wide Alternative 1 are zero. Present worth cost is the total cost of an alternative over time in terms of today's dollar value.

The Guterl Site-specific groundwater model predicts it would take more than 1,000 years under the no action alternative for uranium concentrations in groundwater to reach the MCL.

Site-Wide Alternative 2: Dismantlement and Off-Site Disposal of Buildings 1, 2, 3, 4/9, 5, 6, 8, 24, and 35; Complete Soil Removal to the Soil PRG-GW and Off-Site Disposal; Monitored Natural Attenuation with Environmental Monitoring

Site-Wide Alternative 2 requires the dismantlement and off-site disposal of Buildings 1, 2, 3, 4/9, 5, 6, 8, 24, and 35 (Figure 4), excavation and off-site disposal of soil above the PRG-GW remediation goals, with monitored natural attenuation (MNA) to address groundwater.

All buildings except Building 24 are available for dismantlement and removal upon commencement of the remedial action. Building 24 is utilized and the dismantlement of Building 24 and the remediation of underlying soils is intended to occur at the time of the site-wide remedial action with property owner's consent. If Building 24 is not available or the property owner does not consent to its dismantlement at the time of the site-wide remedial action the inaccessible underlying soil and Building 24 would remain while the other buildings and contaminated soil are removed. If Building 24 becomes available prior to the completion of the site-wide remedial action, then it would be dismantled, and underlying soil removed at that time.

Once Building 24 and underlying soils were deemed accessible, the Corps of Engineers would dismantle the building and excavate the soils to mitigate predicted groundwater impacts and preclude remedy modifications (i.e., long-term monitoring of Building 24 groundwater to ensure predictions are accurate for the below-MCL plume and associated effects on remedy durations).

All impacted soil exceeding the PRG-GW would be excavated and disposed in an off-site facility permitted to receive such materials. The estimated volume of soil removal for this alternative is 44,000 m^3 (58,000 yd^3). The excavations would be restored with clean backfill and reseeded. Fencing and signage around the contaminated area would be maintained during the period of the remedial action.

Impacted groundwater would be addressed through MNA. Monitored natural attenuation is a systematic approach of modeling, predicting, monitoring, and measuring the rate at which the natural attenuation of contaminants occurs in a groundwater system. This rate is used to determine if RAOs will be achieved according to the ARAR. Uranium in groundwater underlying the Guterl Site is influenced by the MNA processes of dispersion, sorption, intrinsic bioremediation (natural biological activity that degrades or immobilizes contaminants), and chemical transformation (*in situ* chemical reduction to precipitate uranium as insoluble minerals). These processes commonly reduce COC exposure to acceptable levels over time.

Groundwater monitoring would be conducted in accordance with the monitoring program after soil source removal. The groundwater model may vary significantly from field results due to the significant changes that will occur on site due to remediation (e.g., soil disturbances and building dismantlement). Therefore, groundwater data will be assessed following the completion of the soil removal. This data collection will provide a dataset with sufficient statistical power to assess the efficacy of the MNA process to achieve RAOs. Reviews allow evaluation of the effectiveness of remediation as well as data obtained from ongoing monitoring to assess the presence and behavior of remaining contaminants. If monitoring demonstrates changes to environmental conditions or the attenuation process is not proceeding as expected, then decisions regarding what actions are necessary will be made at that time based on the data and information gathered during the monitoring program.

The frequency of groundwater well sampling would occur semi-annually for years 1–3; annually for years 4–30; and every five years for years 35–120. The existing 16 shallow and 10 deep monitoring wells on site would be sampled. Five groundwater seep locations along the Erie Canal (if five seeps are active and available to collect groundwater from) would be sampled, annually for 120 years. Sampling frequency could change depending on groundwater response to soil source removal.

Groundwater modeling predicts it would take approximately 120 years under Site-Wide Alternative 2 for the uranium concentrations in groundwater to achieve the MCL. Figures 5-1 and 5-2 represent the shallow and deep groundwater plume reduction with MNA processes (modeling results of groundwater Alternative G3 in the FS). The soil removal action for the PRG-GW requires approximately 58 weeks to implement and building remedial actions approximately 40 weeks. The time estimate to implement the soil removal action, building remedial action, implementation and final documentation of the remedy is approximately 136 weeks (32 months). The entire remedial action including groundwater remediation would take approximately 122 years and 8 months.

The construction (capital) cost of Site-Wide Alternative 2 is $180.1 million. The present worth cost for operations and maintenance, assuming a 120-year period, is estimated at $5.2 million. O&M includes MNA groundwater sampling, environmental sampling, maintenance of fencing and signage, and performance of five-year reviews until unlimited use and unrestricted exposure is achieved. The total present worth cost, assuming a 120-year period, is estimated to be $186.1 million.

SITE-WIDE ALTERNATIVE 3: DISMANTLEMENT AND OFF-SITE DISPOSAL OF BUILDINGS 1, 2, 3, 4/9, 5, 6, 8, 24, AND 35; COMPLETE SOIL REMOVAL TO THE SOIL PRG-GW AND OFF-SITE DISPOSAL; GROUNDWATER RECOVERY USING EXTRACTION WELLS AND A RUBBLIZED TRENCH WITH *EX SITU* TREATMENT, WITH ENVIRONMENTAL MONITORING

Site-Wide Alternative 3 requires the dismantlement and off-site disposal of Buildings 1, 2, 3, 4/9, 5, 6, 8, 24, and 35 (Figure 6), the excavation and off-site disposal of all soil above the PRG-GW remediation goals, groundwater treatment using extraction wells and a rubblized trench with extraction pumps and an on-site treatment facility. Operation and maintenance includes environmental monitoring of groundwater remediation.

All buildings except Building 24 are available for dismantlement and removal upon commencement of the remedial action. Building 24 is utilized and the dismantlement of Building 24 and the remediation of underlying soils is intended to occur at the time of the site-wide remedial action with property owner's consent. If Building 24 is not available or the property owner does not consent to its dismantlement at the time of the site-wide remedial action the inaccessible underlying soil and Building 24 would remain while the other buildings and contaminated soil are removed and the groundwater treatment and recovery system is installed.

If Building 24 becomes available prior to the completion of the site-wide remedial action then it would be dismantled, and underlying soil removed at that time.

Once Building 24 and underlying soils were deemed accessible, the Corps of Engineers would dismantle the building and excavate the soils to mitigate predicted groundwater impacts and preclude remedy modifications (i.e., long-term monitoring of Building 24 groundwater to ensure predictions are accurate for the below-MCL plume and associated effects on remedy durations).

All impacted soil exceeding the PRG-GW would be excavated and disposed in an off-site facility permitted to receive such materials. The estimated volume of soil removal for this alternative is 44,000 m^3 (58,000 yd^3). The excavations would be restored with clean backfill and reseeded. Uranium in groundwater would be addressed through environmental monitoring. Preliminary groundwater contaminant transport models estimated an extended remedial timeframe of up to 115 years following the completion of the removal of impacted soil exceeding the PRG-GW. The groundwater model may vary significantly from field results due to the significant changes that will occur on site due to remediation (e.g., soil disturbances and building dismantlement). Therefore, groundwater data will be assessed following the completion of the soil removal to determine the reaction of the plume. Groundwater monitoring would be conducted in accordance with the monitoring program. Groundwater recovery will be implemented using a series of vertical extraction wells and a rubblized trench along the southern Excised Area boundary to extract contaminated groundwater. Fencing and signage around the contaminated area would be maintained during the period of the remedial action.

The frequency of groundwater well sampling would occur semi-annually for years 1–3; annually for years 4–5; and every five years for years 10–30. After installation of additional groundwater monitoring wells, approximately 26 shallow and 14 deep monitoring wells on site and estimated installation of five trench extraction sumps/wells would be sampled at that frequency. Five groundwater seep locations along the Erie Canal (if five seeps are active and available to collect groundwater from) would be sampled, annually for 30 years. Sampling frequency could change depending on groundwater response to soil source removal.

The placement of the rubblized trench at the southern boundary of the excised area within the uranium plume, rather than downgradient of the plume, is due to a volatile organic compound (VOC) plume that is partially collocated with the uranium plume that both flow under site-owner occupied buildings. This VOC plume is discussed in the FS report, specifically Section 2.4.4 and Appendix A that provides sampling data and maps showing the VOC distribution on the site. The rubblized trench is placed in a location north of Building 17 to preclude the enhanced migration of the VOCs below Building 17, which would increase the risk of vapor intrusion into the owner occupied building during uranium remediation. This trench configuration will truncate the uranium plume and produce an orphaned portion downgradient of the trench, which will naturally attenuate and discharge to the canal for approximately 10 years. The locations of all groundwater extraction locations will be reassessed during the remedial design phase for optimized contaminant capture.

The extracted groundwater would undergo *ex situ* treatment that would first treat the VOC contaminants via carbon filtration, or alike media, and then employ an ion exchange process to remove uranium. The treated effluent would be discharged to the City of Lockport publicly-owned treatment works, in accordance with approved acceptance criteria of the publicly-owned treatment works.

The groundwater model predicts it would take approximately 30 years under Site-Wide Alternative 3 for the uranium concentrations in groundwater to achieve the MCL. Figures 7-1 and 7-2 represent the shallow and deep groundwater plume reduction with a trench and treatment system (modeling results of groundwater Alternative G5 in the FS). The soil remedial action for the PRG-GW would require approximately 58 weeks and the building removal action would require approximately 40 weeks. The actions including soil removal, building remediation, installing the groundwater recovery system, and final documentation would require approximately 135 weeks (31 months). The entire remedial action including the groundwater remediation would take approximately 32 years and 7 months.

The construction (capital) cost of Site-Wide Alternative 3 is $189.3 million. The present worth operations and maintenance cost, assuming a 30-year period, is estimated at $16.3 million. Operations and maintenance include long-term operation of the groundwater recovery and treatment system, groundwater sampling, environmental sampling, maintenance of fencing and signage, and performance of five-year reviews until unlimited use and unrestricted exposure is achieved. The total present worth cost, assuming a 30-year period, is estimated at $205.6 million.

SITE-WIDE ALTERNATIVE 4: DECONTAMINATION OF BUILDING 1; DISMANTLEMENT AND OFF-SITE DISPOSAL OF BUILDINGS 2, 3, 4/9, 5, 6, 8, AND 24; COMPLETE SOIL REMOVAL TO THE SOIL PRG-CW AND OFF-SITE DISPOSAL; MONITORED NATURAL ATTENUATION WITH ENVIRONMENTAL MONITORING

Site-Wide Alternative 4 requires the dismantlement and off-site disposal of Buildings 2, 3, 4/9, 5, 6, 8, and 24 (Figure 8), excavation and off-site disposal of contaminated soil above the PRG-CW remediation goal, MNA to address groundwater, and environmental monitoring to monitor the remedial action.

All buildings except Building 24 are available for dismantlement and removal upon commencement of the remedial action. Building 24 is utilized and the dismantlement of Building 24 and the remediation of underlying soils is intended to occur at the time of the site-wide remedial action with property owner’s consent. If Building 24 is not available or the property owner does not consent to its dismantlement at the time of the site-wide remedial action the inaccessible underlying soil and Building 24 would remain while the other buildings and contaminated soil are removed. If Building 24 becomes available prior to the completion of the site-wide remedial action then it would be dismantled, and underlying soil removed at that time.

Once Building 24 and underlying soils were deemed accessible, the Corps of Engineers would dismantle the building and excavate the soils to mitigate predicted groundwater impacts and preclude remedy modifications (i.e., long-term monitoring of Building 24 groundwater to ensure predictions are accurate for the below-MCL plume and associated effects on remedy durations).

Building 1 would be decontaminated and all interior contents and materials above the DCGLs would be disposed off site. The soil underlying Building 1 and Building 35 are not above the soil PRG-CW, therefore the buildings will not be dismantled and no underlying soil will be excavated. Additionally, the contents and surfaces of Building 35 are not above the DCGLs therefore, Building 35 is not addressed under this alternative.

All impacted soil exceeding the PRG-CW, developed to protect the on-site construction worker from unacceptable radiologic dose from all exposure pathways, would be excavated and disposed in an off-site facility permitted to receive such materials. The estimated volume of soil removal for this alternative is 3,800 m^3 (5,000 yd^3). The excavations would be restored with clean backfill and reseeded. Fencing and signage around the contaminated area will be maintained during the period of the remedial action.

Although the Soil PRG-CW was developed to be protective of the construction worker, removal of soil above this value would address a portion of the uranium present in soils, which acts as a continuing or residual source for groundwater contamination. Impacted groundwater would be addressed through MNA. MNA is a systematic approach of modeling, predicting, monitoring, and measuring the rate at which the natural reduction of contaminants occurs in a groundwater system. This rate is used to determine if RAOs will be achieved according to the ARAR. Uranium in groundwater underlying the Guterl Site is influenced by the MNA processes of dispersion, sorption, intrinsic bioremediation (natural biological activity that degrades or immobilizes contaminants), and chemical transformation (*in situ* chemical reduction to precipitate uranium as insoluble minerals). These processes commonly reduce COC exposure to acceptable levels over time.

Groundwater monitoring would be conducted, in accordance with the monitoring program after soil source removal, to document the extent and levels of contamination along with the reduction in uranium concentration. This data collection will provide a dataset with sufficient statistical power to assess the efficacy of the MNA process to achieve RAOs. Reviews allow evaluation of the effectiveness of remediation as well as data obtained from ongoing monitoring to assess the presence and behavior of remaining contaminants. If monitoring demonstrates changes to environmental conditions or the attenuation process is not proceeding as expected, then decisions regarding what actions are necessary will be made at that time based on the data and information gathered during the monitoring program. The frequency of groundwater well sampling would occur semi-annually for years 1–3; annually for years 4–30; and every five years for years 30–660. Five groundwater seep locations along the Erie Canal (if five seeps are active and available to collect groundwater from) would be sampled, annually for 660 years. Sampling frequency could change depending on groundwater response to soil source removal.

The groundwater modeling predicts a MNA period will take approximately 660 years under Site-Wide Alternative 4 for the uranium concentrations in groundwater to achieve the MCL. Figures 9-1 and 9-2 represent the shallow and deep groundwater plume reduction with MNA processes (modeling results of groundwater Alternative G2 in the FS). The PRG-CW soil removal action would take approximately 10 weeks to implement and the building remedial action would require approximately 40 weeks to complete. Soil removal, building remediation and completing the final site documentation would require approximately 88 weeks (21 months). The entire remedial action, including the groundwater remediation timeframe, is approximately 661 years and 9 months.

The construction (capital) cost of Site-Wide Alternative 4 is approximately $104.4 million and the operations and maintenance cost, over a 660-year period, is estimated at $5.2 million. O&M includes MNA groundwater sampling, environmental sampling, maintenance of fencing and signage, and performance of five-year reviews until unlimited use and unrestricted exposure is achieved. The total present worth cost, assuming a 660-year period, is estimated at $109.7 million.

EVALUATION OF ALTERNATIVES

Nine criteria are used to evaluate the different remedial alternatives individually and against each other in order to select a remedy. The nine evaluation criteria are summarized below. The detailed analysis of alternatives can be found in the FS.

Two threshold criteria, 1) overall protectiveness of human health and the environment, and 2) compliance with ARARs, must be met by any remedial alternative for it to be considered a viable remedy.

Five balancing criteria, 1) long-term effectiveness and permanence, 2) short-term effectiveness, 3) reduction of toxicity, mobility, or volume through treatment, 4) implementability and 5) cost, are the primary criteria upon which the detailed analysis was based.

The remaining two of the nine CERCLA criteria, 1) state acceptance and 2) community acceptance, are modifying criteria evaluated following the public comment period on the proposed plan and will be addressed during preparation of the record of decision.

The following table briefly explains the nine CERCLA criteria.

EVALUATION CRITERIA FOR CERCLA REMEDIAL ALTERNATIVES
Overall Protectiveness of Human Health and the Environment determines whether an alternative provides adequate protection and describes how risks posed are eliminated, reduced, or controlled through treatment, engineering remedies or land use controls.
Compliance with ARARs evaluates whether the alternative meets cleanup criteria, standards of control, or other requirements from other environmental laws and regulations that have been determined to be applicable or relevant and appropriate, or whether a waiver is justified.
Long-Term Effectiveness and Permanence considers how well the proposed remedial actions in the alternative will meet the remedial objectives over time.
Reduction of Toxicity, Mobility, or Volume of Contaminants through Treatment evaluates an alternative's use of treatment to reduce the harmful effects of principal contaminants, their ability to move in the environment, and the amount of contamination present.
Short-Term Effectiveness considers the length of time needed to implement an alternative and the risks the alternative poses to workers, residents, and the environment during implementation of the remedial action.
Implementability considers the technical and administrative feasibility of implementing the alternative, including factors such as the relative availability of goods and services.
Cost includes estimated capital cost, annual operations and maintenance costs, as well as present worth cost. Capital costs consist of construction and overhead costs associated with the remedial action. Annual operations and maintenance costs (O&M) are post-construction costs necessary to ensure the continued effectiveness of the remedial action. Present worth cost is the total cost of an alternative over time in terms of today's dollar value. Cost estimates are expected to be accurate within a range of +50 to –30%.
State/Support Agency Acceptance considers whether the state agrees with the Corps of Engineers' analyses and recommendations, as described in the remedial investigation/feasibility study and proposed plan.
Community Acceptance considers whether the local community agrees with the Corps of Engineers' analyses and preferred alternative. Comments received on the proposed plan are an important indicator of community acceptance.

This section of the proposed plan profiles the relative performance of each alternative against the first seven criteria, noting how it compares to the other alternatives under consideration. State and public acceptance criteria will be evaluated after comments on the proposed plan are received.

1. Overall Protection of Human Health and the Environment

All remedial alternatives, except Site-Wide Alternative 1, are protective of human health and the environment. If no action is taken, the risks to construction workers or other users of the Guterl Site would exceed the NCP acceptable risk range within the 1,000-year evaluation period. Site-Wide Alternatives 2, 3, and 4 effectively prevent exposure to FUSRAP-related COCs in buildings and soil above the PRGs, and prevent exposure to uranium in groundwater above the MCL.

Since Site-Wide Alternative 1 is not protective of human health and the environment, it is excluded from consideration as a viable alternative under the remaining eight criteria.

2. Compliance with ARARs

Site-Wide Alternatives 2, 3, and 4 would comply with ARARs since they will meet the ARAR-based performance standards. Site-Wide Alternative 1 does not meet the ARARs.

3. Long-Term Effectiveness and Permanence

Under Site-Wide Alternative 1, the no-action alternative, contaminated buildings, soil, and groundwater would remain in place with no controls to prevent exposure. Based on the groundwater fate and transport model, due to contributions from soil leachate, the existing shallow groundwater plume persists at concentrations above MCL for approximately 780 years and for over 1,000 years, the total duration of modeling simulations, in deep groundwater. Site-Wide Alternative 1 would not be effective in the long term.

The building and soil remedial actions are the same for Site-Wide Alternatives 2 and 3, which are protective of groundwater contamination by reducing the soil-based source of uranium to a level that reduces the impact to groundwater. Residual risk from contamination remaining on site is minimized due to the larger volume of contaminated soil being removed, removing more of the soil-based source of uranium, for Site-Wide Alternatives 2 and 3 (compared to Alternative 4). The building and soil remedial actions would be considered effective in the long term because they would remove, for permanent off-site disposal, all soils above the PRG-GW and all building materials above the project-specific DCGLs.

The groundwater model for Site-Wide Alternatives 2 and 3 may vary significantly from field results due to the significant changes that will occur on site due to remediation (e.g., soil removal and building dismantlement). Therefore, groundwater data will be assessed following the completion of the soil removal to determine the reaction of the plume. Groundwater monitoring would be conducted in accordance with the monitoring program after soil source removal. This data collection will provide a dataset with sufficient statistical power to assess the efficacy of the groundwater remediation process to achieve RAOs. Monitoring and reviews allow evaluation of the effectiveness of remediation as well as data obtained from ongoing monitoring to assess the presence and behavior of remaining contaminants. If monitoring demonstrates changes to environmental conditions or the process is not proceeding as expected, then decisions regarding what actions are necessary will be made at that time based on the data and information gathered during the monitoring program.

Preliminary groundwater contaminant transport models for Site-Wide Alternative 3 estimated an extended remedial timeframe of up to 115 years following the completion of the removal of impacted soil exceeding the PRG-GW. The actual groundwater response may vary significantly from preliminary model results due to the significant changes that will occur on site after soil remediation and building dismantlement. Therefore, groundwater data will be assessed following the completion of the soil removal to determine the reaction of the plume. Groundwater monitoring would be conducted in accordance with the monitoring program. This data collection will provide a dataset with sufficient statistical power to assess the efficacy of the remediation process to achieve RAOs. Monitoring and reviews allow evaluation of the effectiveness of remediation as well as using the data obtained from ongoing monitoring to assess the presence and behavior of contaminants. Groundwater recovery will be implemented using a series of vertical extraction wells and a rubblized trench along the southern Excised Area boundary to extract contaminated groundwater.

Site-Wide Alternative 4 (soils are removed to the soil PRG-CW) is protective of the critical user group, the construction worker, and the anticipated future industrial use of the Guterl Site. The PRG-CW soil remedial goal is based on limiting the radiological dose to the construction worker (which results from direct exposure to contaminated soil and groundwater) to levels specified by the Nuclear Regulatory Commission in 10 CFR 20. The PRG-CW alternative is not specifically designed to reduce uranium groundwater concentrations to the MCL stipulated by the U.S. EPA for community drinking water supplies. The residual contamination of groundwater makes Site-Wide Alternative 4 possibly less effective in the long term due to the uncertainty that the MNA groundwater remediation will remain effective over the long timeframe. The time to reach the MCL is significantly longer in Site-Wide Alternative 4 than Alternatives 2 and 3, although Alternative 4 will eventually result in compliance with the MCL after 660 years.

Site-Wide Alternative 4 has greater uncertainty associated with its effectiveness since the 660-year MNA timeframe is dependent upon future site use that may affect groundwater recharge and flow. The groundwater model assumed building removal, the backfill of excavations with like soils, and minimal storm-water management, similar to the conditions currently observed in northern portion of the site. Long-term site transformations may affect the MNA period by enhancing or reducing recharge through the residual uranium in soils or change the vertical distribution of leachable uranium in site soils via subsurface construction. Storm-water management collection would affect groundwater recharge and uranium leaching rates that influence the MNA timeframe. Thus, the 660-year remedial timeframe may shorten or lengthen depending on future site uses, reconfiguration of soils, and building layouts. Consequently, Alternative 4 has the greatest uncertainty in attaining MCLs, and achieving remedial goals.

All remedial alternatives include some decontamination of buildings and contents to provide risk reduction. Since the building materials, contents, and soil are disposed of off site, these actions are considered a permanent reduction in risk. Buildings 1 and 35 remain on site under Site-Wide Alternative 4, as the soils beneath are not above the soil PRG-CW; however, Building 1 will undergo some decontamination to achieve building DCGLs.

The soils under Building 24 are approximately 590 bank cubic yards, which is about 1% of the total 44,000 m^3 (58,000 yd^3) (*in situ*) to be removed for the PRG-GW. Bank cubic yards (BCY) is the material as it lies in its natural state. After the material is excavated it is measured in loose cubic yards (LCY) where the material which has been excavated in some way has swelled as a result of the disturbance. This small-scale source for uranium in groundwater will sit dormant unless aerially exposed due to building removal where the roof, walls and floor slab are removed to recharge groundwater (i.e., the building exterior is an inhibitor and prevents further infiltration into the soils). A groundwater simulation was examined to reflect unimpeded leaching from uranium impacts only below Building 24, which assumes the balance of the site is remediated to PRG-GW. Once this residual soil was exposed to recharge (infiltration into groundwater) and generated a small-scale uranium plume, the groundwater modeling indicated the contamination is attenuated (diluted) to below the 30 μg/L MCL in the aquifer immediately downgradient of the soil-based inputs. The plume is attenuated to below the MCL within the excised area boundary due to the small footprint of soil impacts under Building 24, the associated concentrations relative to the balance of site (low), and the dilution capability of the aquifer (four-fold dilution and dispersion of leachate). This plume with concentrations below the MCL is predicted to persist approximately 150 years after the balance of site is remediated to PRG-GW. Since the groundwater concentration does not exceed the MCL (the RAO for groundwater) and contributes minor inputs to the groundwater system, the residual plume will not affect the timeframe or performance of the preferred remedy (i.e., concentration would not exceed the MCL during remedial timeframes and in the long term after remedy completion). If Building 24 and soil were removed at the same time, the plume impact would not adjust the groundwater remediation timeframe indicated in the alternatives and modeling. The eventual removal of inaccessible soils below Building 24 will ensure remedial consistency (site cleaned up to a uniform standard) and minimize the risk to the beneficial use of groundwater.

If the Guterl Site does not achieve unlimited use and unrestricted exposure after completion of the remedial action, five-year reviews will be required. Site-Wide Alternatives 2, 3, and 4 all include environmental monitoring and maintenance of signage and fencing surrounding the site to prevent exposure to impacted media during the remedial action. Given that the site-wide remedial alternatives achieve the RAOs once complete, and result in no risk to human health or the environment, additional land use controls would not be necessary.

Both Site-Wide Alternatives 2 and 3 are rated high for long-term effectiveness and permanence and Site-Wide Alternative 4 is rated moderate. Site-Wide Alternative 1 is rated as low.

4. Reduction in Contaminant Volume, Toxicity, or Mobility through Treatment

Site-Wide Alternatives 2, 3, and 4 will achieve some reduction in material volume through limited decontamination of building materials/contents during dismantlement and prior to off-site disposal. Additionally, the treatment of characteristically hazardous waste, as required for disposal purposes, may reduce the toxicity and mobility of these constituents in soils.

Site-Wide Alternatives 2 and 4 include MNA, which is considered a passive groundwater remedy that relies on the natural processes of dispersion, adsorption, and biodegradation. There is no active recovery or active treatment for groundwater. Site-Wide Alternative 3 is more effective at reducing the toxicity, mobility, and volume of the uranium in groundwater through extraction (extraction wells and trench) and treatment.

Site-Wide Alternative 1, the no-action alternative, would not reduce contaminant toxicity, mobility, or volume using treatment because no treatment would occur. Site-Wide Alternative 1 is rated low. Site-Wide Alternatives 2 and 4 are rated low, whereas Site-Wide Alternative 3 is rated moderate for this criterion.

5. Short-Term Effectiveness

Short-term effectiveness includes four analysis factors for evaluation: protection of community during remedial action, protection of workers during remedial action, environmental impacts, and time until RAOs are achieved.

Site-Wide Alternatives 2 and 3 have similar short-term risks to site workers and the surrounding community. These short-term risks include the potential for accidents and exposure to contaminated media associated with the excavation/removal and transportation of the larger volume of soil and building material included with the PRG-GW. Short-term risks may be mitigated by following proper health and safety procedures. The transportation risks would be mitigated by packaging shipped materials in accordance with Department of Transportation regulations to ensure the contents remain safely enclosed.

Construction equipment would be used to dismantle the buildings. This approach would require standard dismantlement practices with dust suppression to contain any potential airborne activity. Control materials, such as silt fences and straw bales, would be installed to contain material. The safety of remediation workers, on-site employees, and the general public would be addressed in a site-specific health and safety plan, in coordination with the on-site property owner, which addresses potential exposures and monitoring requirements to ensure protection during remedial action.

There is no impact to human health and the environment during MNA in Site-Wide Alternative 2, as there is currently no exposure pathway to groundwater on site. Site-Wide Alternative 3 may have additional physical risks associated with installation and maintenance of the rubblized trench and groundwater treatment system.

The construction of the trench will require the actuation of subsurface directional explosives to fracture/rubblize the bedrock aquifer, which creates the high-permeability collection trench in the bedrock. This action, along with subsequent test drilling and extraction well installation, will have safety risks (e.g., utility impacts and building foundation protection) that will be mitigated during the design process.

Site-Wide Alternative 3 may have additional risks associated with installation and maintenance of the rubblized trench and groundwater treatment system. The safety of contractors, ATI Specialty Materials employees, and the general public would be addressed in a site-specific health and safety plan, including potential exposures and monitoring requirements to ensure protection. Implementation of the rubblized trench, also referred to as blast fractured trenches, would consider risks to both on- and off-site roads, utilities and buildings; potential disruptions to adjacent property owners, including ATI Specialty Materials operations; and potential geotechnical requirements because of the proximity to the Erie Canal. There would be moderate risks, including those related to blasting (e.g., misfires, damage to buildings, flying rocks, and handling of explosive munitions), to the contractors performing the trench installation, and neighboring ATI Specialty Materials personnel during blasting of the rubblized trench. Rubblized trenches are reliable and have been sufficiently demonstrated to be effective in similar site settings. There would be low risk for contractors operating the groundwater treatment plant, which will generate a spent treatment media high in uranium concentration, which will require handling and disposal. There would be low risk to the contractors and the surrounding community during well drilling, well installation, and groundwater sampling activities.

Site-Wide Alternative 3 has the potential to enhance the transport of non-FUSRAP volatile organic compounds (VOCs) that are contained in groundwater observed south of the Excised Area. This non-FUSRAP related VOC contamination could pose a short-term risk to human health during the period of active groundwater treatment, if the rubblized trench with extraction wells were placed down gradient of Building 17, which is actively used by ATI Specialty Materials. The trench could draw the VOC plume beneath the building. Consequently, the rubblized trench and associated extraction wells would be installed along the southern boundary of the Excised Area that is north of Building 17. The individual extraction wells installed south of the building would capture uranium between the Guterl Site and Erie Canal. This configuration will assist in capturing the groundwater before encountering the actively used building(s). Challenges during the remedial design phase include effectively capturing the uranium plume in a reasonable timeframe, while minimizing transport of volatiles, especially under any current or future buildings.

Site-Wide Alternative 4 has a greater short-term effectiveness than Site-Wide Alternatives 2 or 3 due to the smaller soil volume being removed to achieve the soil PRG-CW, which results in a shorter construction timeframe. The shorter timeframe and smaller soil volume being disturbed decreases the exposure risk of the community, construction workers, and ATI workers and results in less impact to the environment. Short-term risks may be mitigated by following proper health and safety procedures. MNA of the groundwater contamination has no impact to human health and the environment as there is currently no exposure pathway to groundwater on site.

Remedial timeframes to achieve the RAOs are also considered in the short-term effectiveness criterion. There is a large difference in time to achieve RAOs between these remedial alternatives, which influences the rating of each alternative for this individual analysis factor. Site-Wide Alternative 4 has the longest remedial timeframe of approximately 660 years to achieve the RAO to comply with the groundwater MCL which decreases the rating. Site-Wide Alternative 2 is modeled to achieve the RAOs in approximately 120 years and Site-Wide Alternative 3 will take approximately 30 years, which in comparison would increase the ratings for this analysis factor for this alternative.

Under the no-action alternative, because there is no remediation or treatment being implemented, there would be no associated short-term increase in potential risk to site workers, the community, or the environment. Site-Wide Alternative 1 is rated as high.

After weighing the analysis factors, this results in Site-Wide Alternative 4 rated as moderate overall for short-term effectiveness and Site-Wide Alternatives 2 and 3 are also rated moderate overall.

6. Implementability

Site-Wide Alternatives 2 and 3 have similar implementability risks for the volume of soil to be removed and building remedies. Although the excavation/removal of soils above the PRG-GW and building materials above the project DCGL use common equipment, materials, and supplies, there may be technical challenges to detect the low PRG-GW (11 mg/kg of total uranium or 3.66 pCi/g of ^{238}U) using currently-available field screening instrumentation to guide the soil excavation. Site-Wide Alternative 4 is easier to implement due to the smaller soil volume estimated for removal under the soil PRG-CW and the capability of field instruments to guide the excavation and detect 23 pCi/g of ^{238}U.

Groundwater remedies for Site-Wide Alternatives 2 and 4 rely on a passive MNA process, which is easily implemented. Long-term groundwater monitoring is necessary for all alternatives until MCLs are achieved.

Site-Wide Alternative 3 uses a rubblized trench and vertical extraction wells to effectively capture the uranium in groundwater for *ex situ* treatment. Vertical extraction wells designed to intercept fractures in both the shallow and deep groundwater zones may require multiple borings to optimize the pumping location. The effectiveness will be governed primarily by the ability to pump sufficient groundwater from the deep zone to reduce concentrations. The highly fractured nature of the bedrock aquifer, diverging groundwater flow under the Guterl Site, and preferential uranium transport pathways indicate that Site-Wide Alternative 3 will be more difficult to implement than a passive MNA remedy. Additionally, since the rubblized trench is created by subsurface blasting, the location of on-site and off-site buildings, roadways, and utilities will need to be considered. Therefore, the trench-based extraction system is considered reasonably complex to implement.

Under Site-Wide Alternative 1, there would be no technology or engineering controls to implement under this alternative. There would be no services required, no permits to obtain, no administrative approvals, and no resources involved. Implementability is rated as high for Site-Wide Alternative 1 due to no actions taken.

Site-Wide Alternative 2 is rated moderate for implementability, Site-Wide Alternative 3 is rated low, and Site-Wide Alternative 4 is rated high.

7. Cost

Site-Wide Alternative 4 has the lowest capital, operation and maintenance, and present worth costs over the period of performance. Site-Wide Alternative 2 has the next highest capital and present worth costs. Site-Wide Alternative 3 has the highest capital and present worth costs, due to the installation of a groundwater treatment system and higher operation and maintenance costs over the period of performance. Site-Wide Alternative 1 has zero costs associated.

8. State/Support Agency Acceptance

State/support agency acceptance of the preferred site-wide alternative will be evaluated after the public comment period ends and will be considered in the record of decision for the Guterl Site.

9. Community Acceptance

Community acceptance of the preferred alternative will be evaluated after the public comment period ends and will be described in the record of decision for the Guterl Site.

The table below summarizes the comparative analysis of the four remedial alternatives.

NCP Evaluation Criteria	Site-Wide Alternative 1	Site-Wide Alternative 2	Site-Wide Alternative 3	Site-Wide Alternative 4
Threshold Criteria				
Overall Protection of Human Health and the Environment	Not Protective	Protective	Protective	Protective
Compliance with ARARs	Not Compliant	Compliant	Compliant	Compliant
Balancing Criteria				
Long-Term Effectiveness and Permanence	Low	High	High	Moderate
Reduction in Toxicity, Mobility, and Volume Through Treatment	Low	Low	Moderate	Low
Short-Term Effectiveness	High	Moderate	Moderate	Moderate
Implementability	High	Moderate	Low	High
Cost				
Capital Cost (non-discounted)	$0	$180.9 M	$189.3 M	$104.4 M
Present Worth Operations and Maintenance Cost	$0	$5.2 M	$16.3 M	$5.2 M
Total Present Worth Cost	$0	$186.1 M	$205.6 M	$109.7 M

Note: High represents a favorable rating for the specific criteria whereas Low represents the least favorable rating. Present Worth discount rate used is 3.5%. M=million

SUMMARY OF THE PREFERRED ALTERNATIVE

The Corps of Engineers preferred alternative is Site-Wide Alternative 3 to address soils, buildings, and groundwater at the Guterl Site. Site-Wide Alternative 3 consists of:
1) dismantlement and off-site disposal of Buildings 1, 2, 3, 4/9, 5, 6, 8, 24, and 35; 2) complete soil removal to the soil PRG-GW and off-site disposal; 3) groundwater recovery using extraction wells and a rubblized trench with *ex situ* treatment (if required), with environmental monitoring.

Site-Wide Alternative 3 is considered protective of human health and the environment by removing all contaminated soils above the PRG-GW concentration (Figure 6) and dismantling building materials exceeding project-specific DCGLs, then shipping them off site for disposal at a licensed or permitted disposal facility.

The decisions regarding Building 24 apply to all site-wide alternatives (except the no action alternative). FUSRAP-related contaminated soil underneath Building 24 is determined to be inaccessible, since the contaminants are located underneath an actively used building by the property owners. The dismantlement of Building 24 and the remediation of underlying soils is intended to be conducted at the time of the site-wide remedial action with the property owner's consent. If Building 24 is not available or the property owner does not consent to its dismantlement at the time of the site-wide remedial action, the inaccessible underlying soil and Building 24 will remain while the other buildings and contaminated soil are removed. Dismantlement of Building 24 will be deferred until a later date when the building is no longer actively used. If Building 24 becomes available prior to the completion of the site-wide remedial action then it would be dismantled, and underlying soil removed at that time.

Once Building 24 and underlying soils were deemed accessible, the USACE would dismantle the building and excavate the soils to mitigate predicted groundwater impacts and preclude remedy modifications (i.e., long-term monitoring of Building 24 groundwater to ensure predictions are accurate for the below-MCL plume and associated effects on remedy durations).

If Building 24 remains in place, the contamination under Building 24 would sit dormant unless aerially exposed due to building removal, where the roof, walls and floor slab are removed to facilitate infiltration into groundwater. Once this residual soil was exposed to infiltrate groundwater and generated a small-scale uranium plume, the groundwater modeling indicated the contamination is diluted to below the 30 µg/L MCL in the aquifer within the excised area boundary due to the small footprint of soil impacts under Building 24. This below-MCL plume is predicted to persist approximately 150 years after the balance of site is remediated. Since the groundwater concentration does not exceed the MCL (the RAO for groundwater) and contributes minor inputs to the groundwater system, the residual plume will not affect the timeframe or performance of the preferred remedy. If Building 24 and soil were removed at the same time, the plume impact would not adjust the groundwater remediation timeframe indicated in the alternatives and modeling. The eventual removal of inaccessible soils below Building 24 will ensure remedial consistency (site cleaned up to a uniform standard) and minimize the risk to the beneficial use of groundwater should the prediction underestimate the residual plume.

Additionally, uranium in groundwater would be assessed through environmental monitoring conducted in accordance with the monitoring program. The groundwater model may vary significantly from field results due to the significant changes that will occur on site due to remediation (e.g., soil removal and building dismantlement). Therefore, groundwater data will be assessed following the completion of the soil removal to determine the reaction of the plume. This data collection will provide a dataset with sufficient statistical power to assess the efficacy of the remediation process to achieve RAOs. Monitoring and reviews allow evaluation of the effectiveness of remediation as well as using the data obtained from ongoing monitoring to assess the presence and behavior of contaminants. Groundwater recovery will be implemented using a series of vertical extraction wells and a rubblized trench for reduction of contaminants through groundwater treatment. The overall groundwater extraction and treatment system will be designed around several broadly described components that are discussed in greater detail in the FS report. These components include the following:

- Rubblized Trench: A linear subsurface feature constructed within the dolomitic bedrock aquifer using an array of borings through the uranium-impacted zone that will be outfitted with directional blasting explosives designed to highly fracture or rubblize the bedrock in a controlled manner. This rubblized zone will reflect a high-permeability trench that will enhance the capture zones of a minimized set of wells placed in the rubblized zone or trench. The rubblization zone is intended to stretch across the upper and lower plumes to an approximate depth of 40 feet into the bedrock. This technology minimizes capital and maintenance costs while achieving optimal plume remediation.

- Vertical Extraction Wells: Ten extraction wells screened within the upper and lower water-bearing zones and two larger extraction wells (or sumps) screened within the rubblized trench were simulated for a total of 12 wells operating on the site. The 10 extraction wells located outside the trench capture portions of the plume least influenced by the rubblized trench (Figure 6). Seven of these wells are screened in the upper aquifer zone to about 20 feet deep and the remaining three in the secondary water-bearing zone to approximately 35 feet deep. All 12 wells are predicted to cumulatively extract 83 gallons per minute. The well number, screening depths, pumping rates, and placement may vary during the design optimization process, yet this array appears conservative for this plume size and the resulting alternative analyses presented in the FS which led to a preferred alternative.

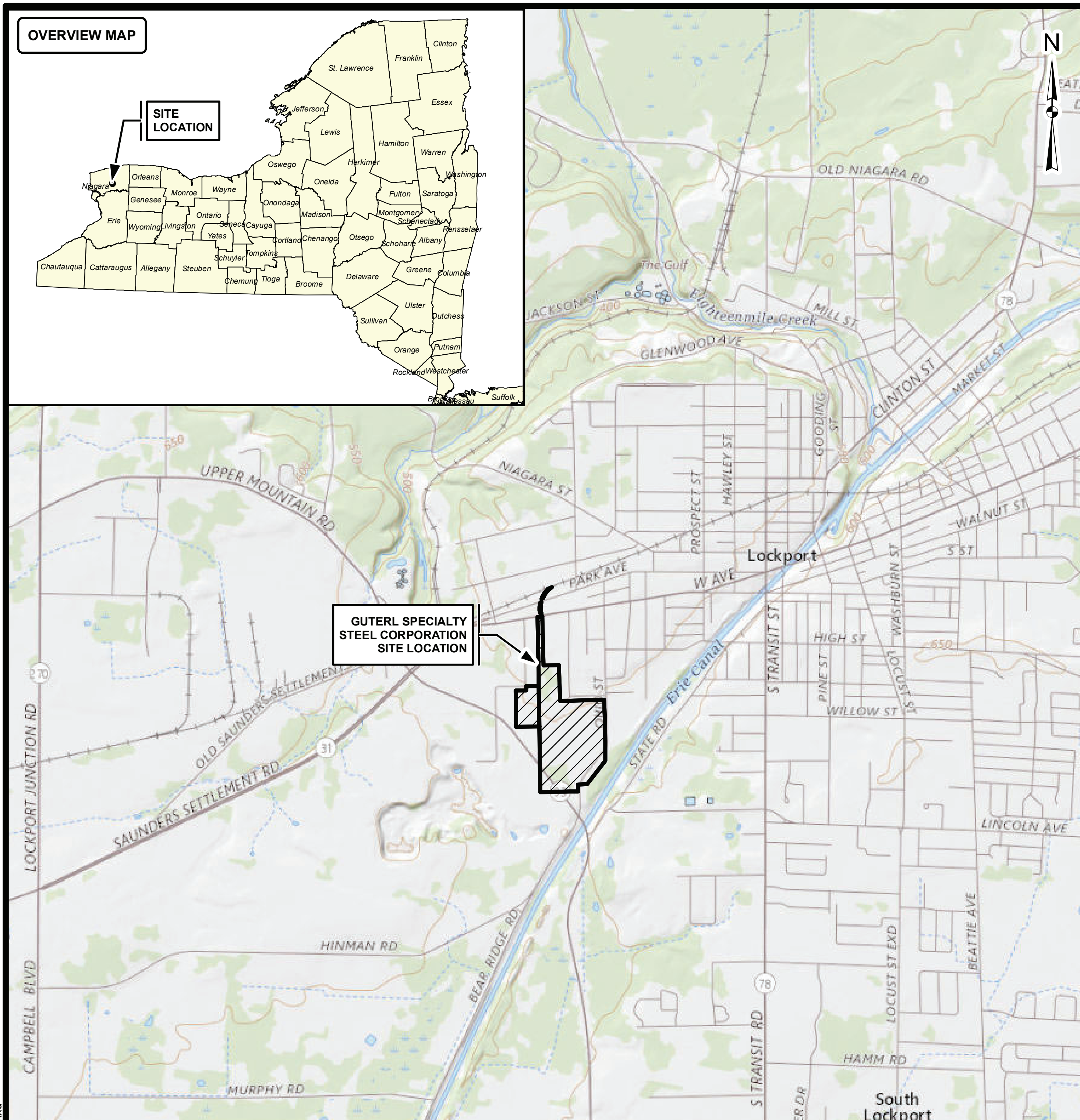
- Utility Piping and Treatment System Concept: The predicted extraction wells (12) will contain *in situ* pumps that will be regulated to optimize plume capture per subsequent remedial design modeling and field verification (e.g., pumping tests). Groundwater discharge from each well will be coalesced into an interconnected piping system that will transmit groundwater to a singular treatment system. The treatment system will be housed in a heated structure (e.g., Morton building) that will contain appropriately sized influent tanks to homogenize the groundwater input, particulate filters to remove suspended solids, VOC pre-treatment with activated carbon filtration, uranium-exchange resin beds or alike technology designed to accommodate site geochemistry, and discharge infrastructure connected to the near-site public sewerage system. The effluent will be regulated via a local municipal sewerage discharge permit. Sample ports and water-quality sondes/sensors will be integrated into the system for on-site and remote monitoring of influent and effluent changes that will indicate maintenance requirements. Maintenance inspections will occur on a routine basis pending manufacturer's requirements. The FS report conservatively estimated these costs for alternative comparisons.

Components of the extraction system may be modified during remedial design to optimize contaminant capture.

This predicted timeframe may vary once the buildings and soil are remediated. The groundwater model assumed building and soil removal, the backfilling of excavations with like soil textures, and minimal storm-water management, similar to the northern portion of the site. This anticipated condition was modeled using more uniform groundwater recharge rates throughout the site, which would change if storm water is managed differently under future site uses. For example, storm-water collection and off-site routing would decrease groundwater recharge that would reduce plume attenuation while flowing to the extraction wells or capture trench. This condition would require a longer extraction system operation. This may be oppositely true if storm-water controls enhance groundwater recharge; attenuation may increase and lower plume concentrations entering the extraction system, thereby reducing operational timeframes. These types of site-use uncertainties indicate the predicted 30-year remedial timeframe may span between 25 and 35 years depending on future site uses and layouts.

Site-Wide Alternative 3 complies with the identified ARARs and provides the best balance among the five balancing criteria (i.e., long-term effectiveness and permanence; reduction of toxicity, mobility, and volume through treatment; short-term effectiveness; implementability; and cost).

FIGURES



US Army Corps of Engineers Buffalo District

U.S. ARMY ENGINEER DISTRICT
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BUFFALO, NY

SITE LOCATION MAP

Document Name: 181018_SiteLocationMap.mxd
Drawn By: H5TDESPM
Date Saved: 23 Apr 2019
Time Saved: 4:12:49 PM

GUTERL SPECIALTY STEEL CORPORATION
LOCKPORT, NEW YORK

FIGURE 1

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Legend

Excised Area Boundary

ATI Specialty Materials Boundary

Buildings

0 125 250 500 Feet

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SITE PLAN

GUTERL SPECIALTY STEEL CORPORATION
LOCKPORT, NY

Date:	Scale:	Figure No. :
06/06/2017	1 inch = 500 feet	2

Document Path: K:\Guterl\GIS\ArcMap\Groundwater\2015\FS\300115FS F1-1.mxd Date: 10/18/2018 Time: 9:50:47 AM

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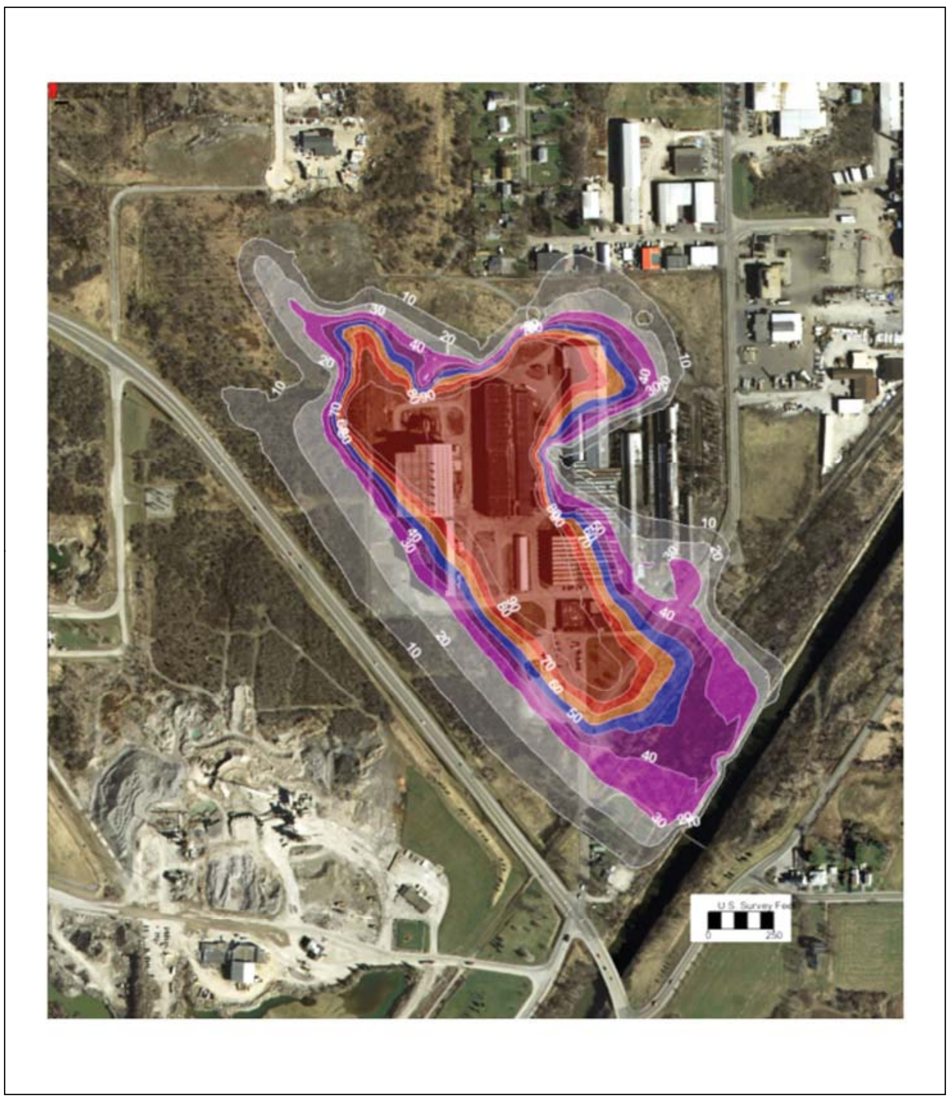
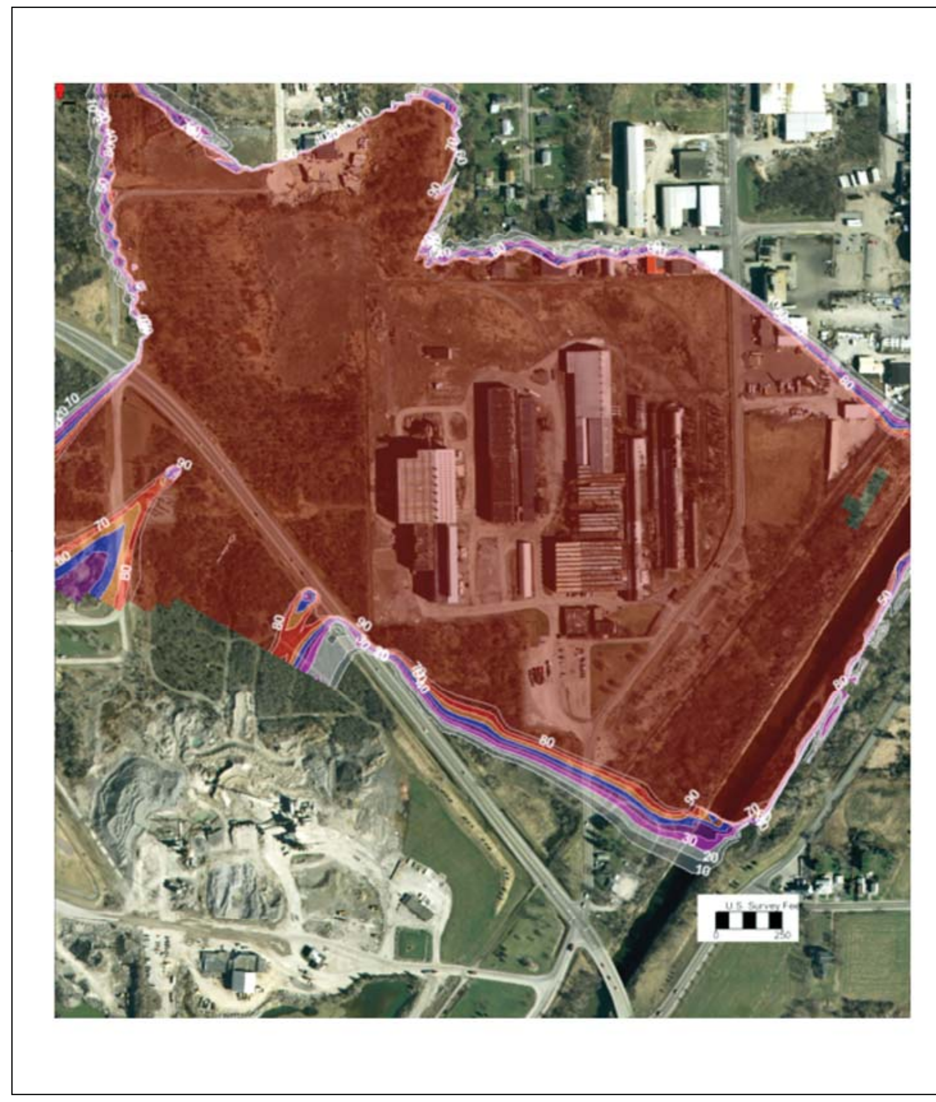
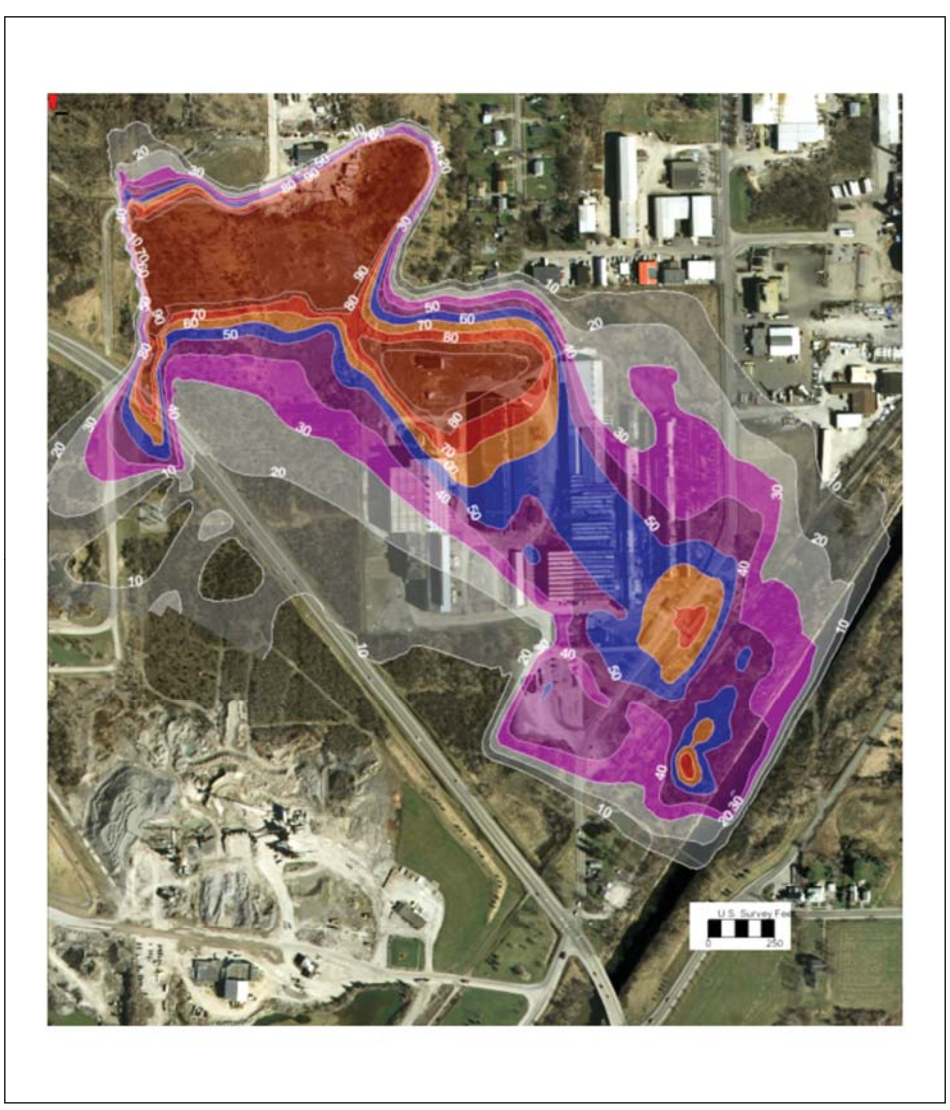
YEAR 1 - CURRENT PLUME



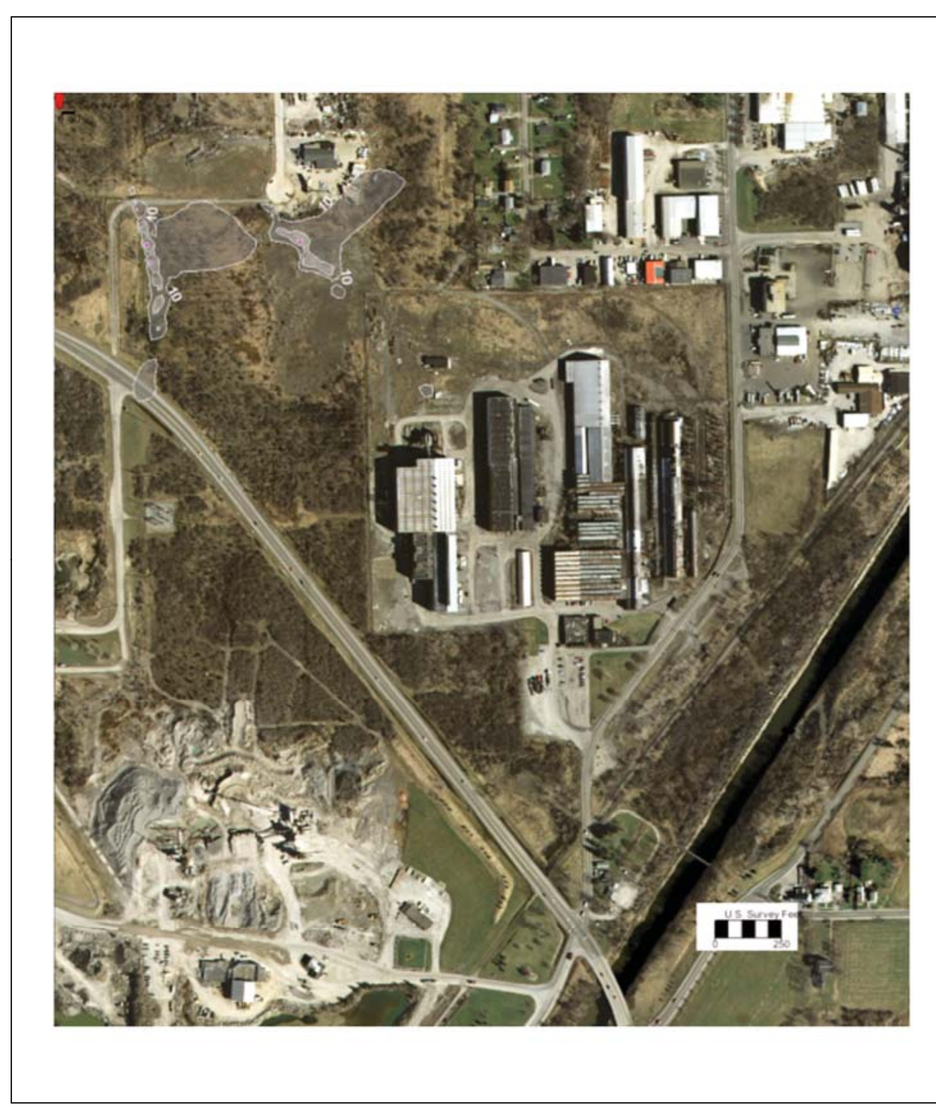
YEAR 320 - MAXIMUM EXTENT



YEAR 600 - DEGRADED PLUME



YEAR 780 - MCL ACHIEVED



Legend

Uranium (µg/L) 300 180 90 60 30 10

N

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CORPS OF ENGINEERS
BUFFALO, NY

SITE-WIDE ALTERNATIVE 1: NO ACTION
NO ACTION PLUME PREDICTION
SHALLOW AQUIFER

Document Name: 070620_FSFig4-5.mxd
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GUTERL SPECIALTY STEEL CORPORATION
LOCKPORT, NEW YORK

FIGURE 3-1

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Buffalo District

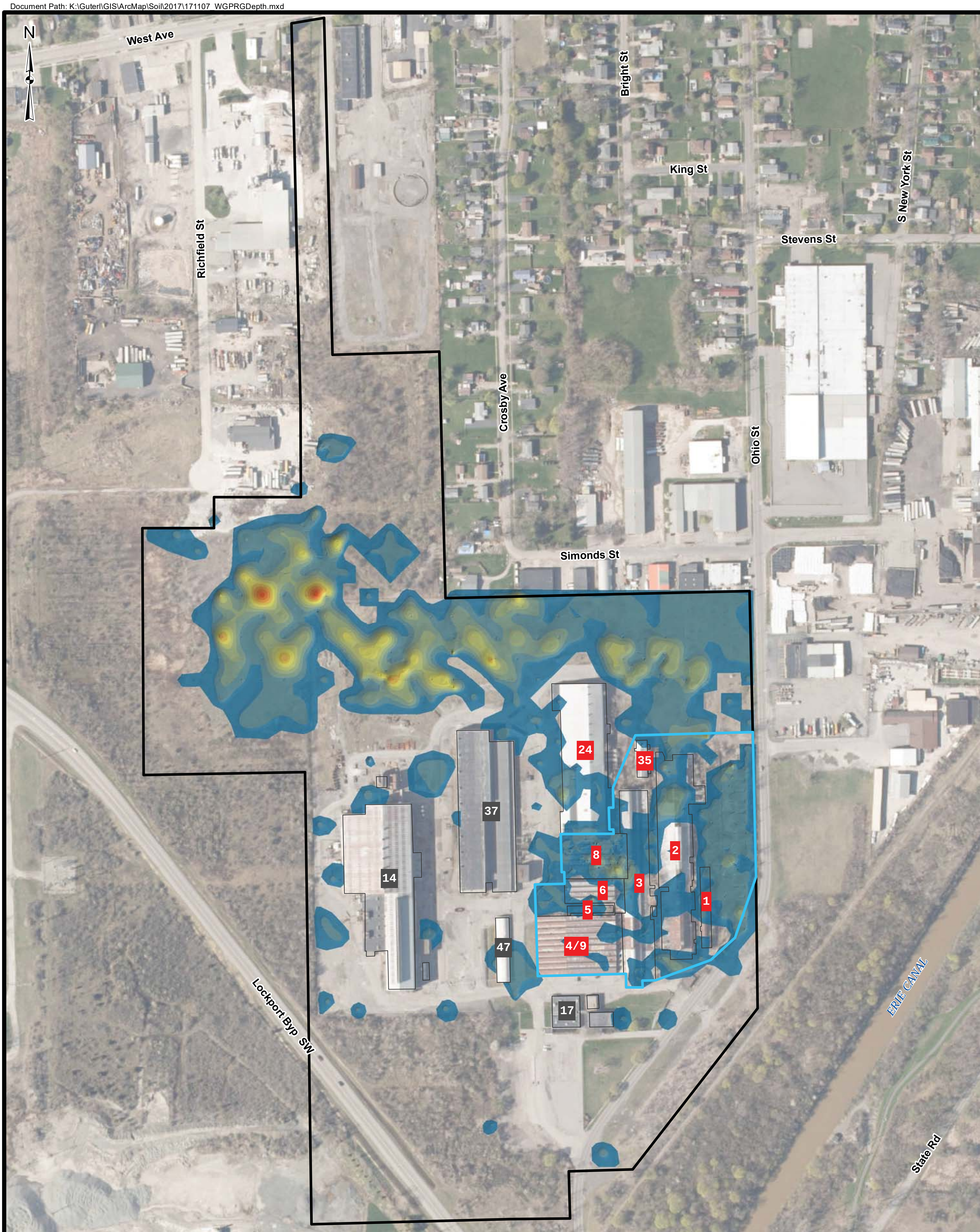
SITE-WIDE ALTERNATIVE 1: NO ACTION
NO ACTION PLUME PREDICTION
DEEP AQUIFER

Document Name: 070620_FSFig4-6.mxd
Drawn By: H5TDESPM
Date Saved: 20 Jun 2017
Time Saved: 1:35:44 PM

GUTERL SPECIALTY STEEL CORPORATION
LOCKPORT, NEW YORK

FIGURE 3-2

Document Path: K:\Guterl\GIS\ArcMap\Soil\2017\171107_WGPRGDepth.mxd



Legend

Depth of Contaminated Soils (ft bgs)

- < 1
- 1 - 2
- 2 - 3
- 3 - 4
- 4 - 5
- 5 - 6
- 6 - 7
- 7 - 8
- 8 - 9
- 9 - 10
- > 10

- ATI Specialty Materials Boundary
- Guterl Excised Area Boundary
- Buildings Identified for Complete Dismantlement
- Buildings Not Addressed

Total Volume - 57,611.15 yd³

0 150 300 600 Feet

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U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS BUFFALO, NY

SITE-WIDE ALTERNATIVE 2
COMPLETE SOIL REMOVAL TO THE GROUNDWATER PRG;
DISMANTLEMENT OF BUILDINGS 1, 2, 3, 4/9, 5, 6, 8, 24 AND 35 AND OFF-SITE DISPOSAL
MONITORED NATURAL ATTENUATION GROUNDWATER TREATMENT

Document Name: 171107_WGPRGDepth.mxd
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Time Saved: 10:40:18 AM

GUTERL SPECIALTY STEEL CORPORATION
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FIGURE 4

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SITE-WIDE ALTERNATIVE 2
GROUNDWATER PROTECTION PRG AND MNA
SHALLOW AQUIFER

Document Name: 070620_FSFig4-9.mxd
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Date Saved: 20 Jun 2017
Time Saved: 1:52:32 PM

GUTERL SPECIALTY STEEL CORPORATION
LOCKPORT, NEW YORK

FIGURE 5-1

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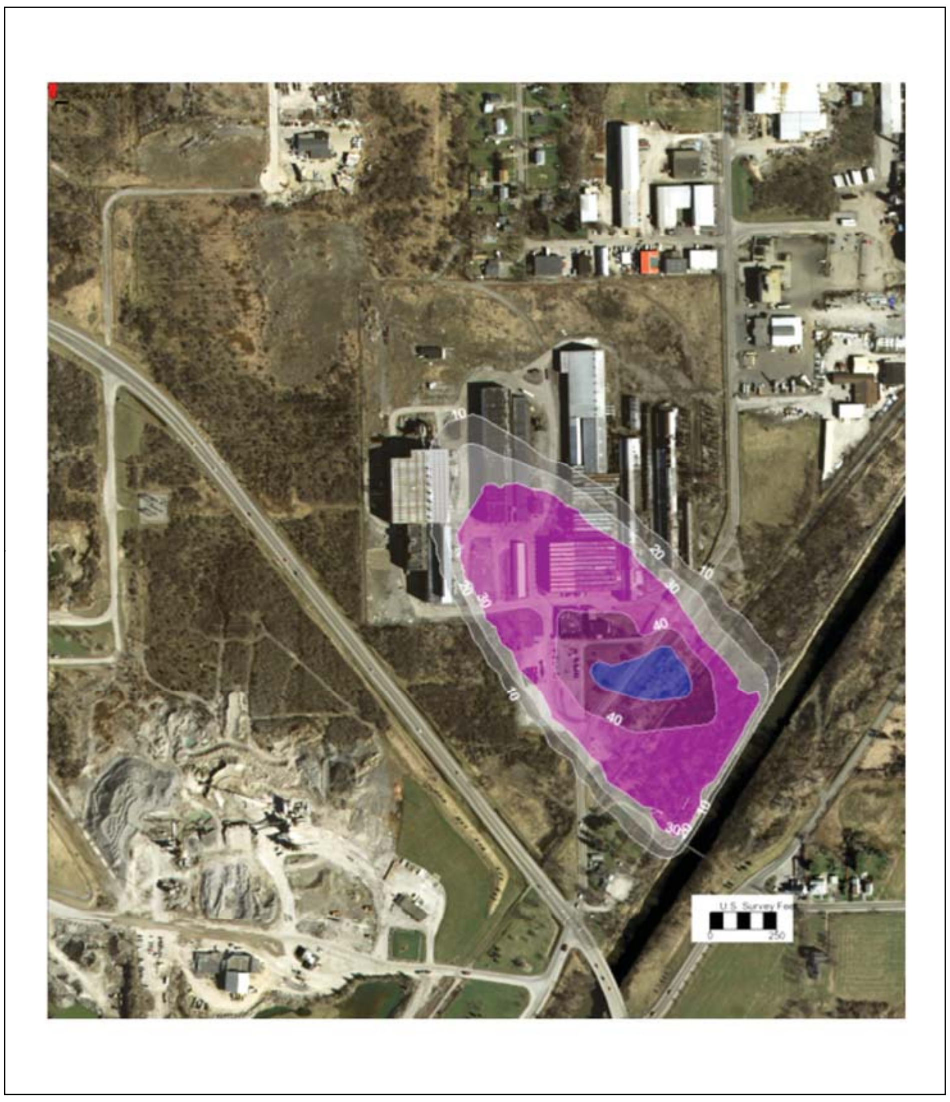
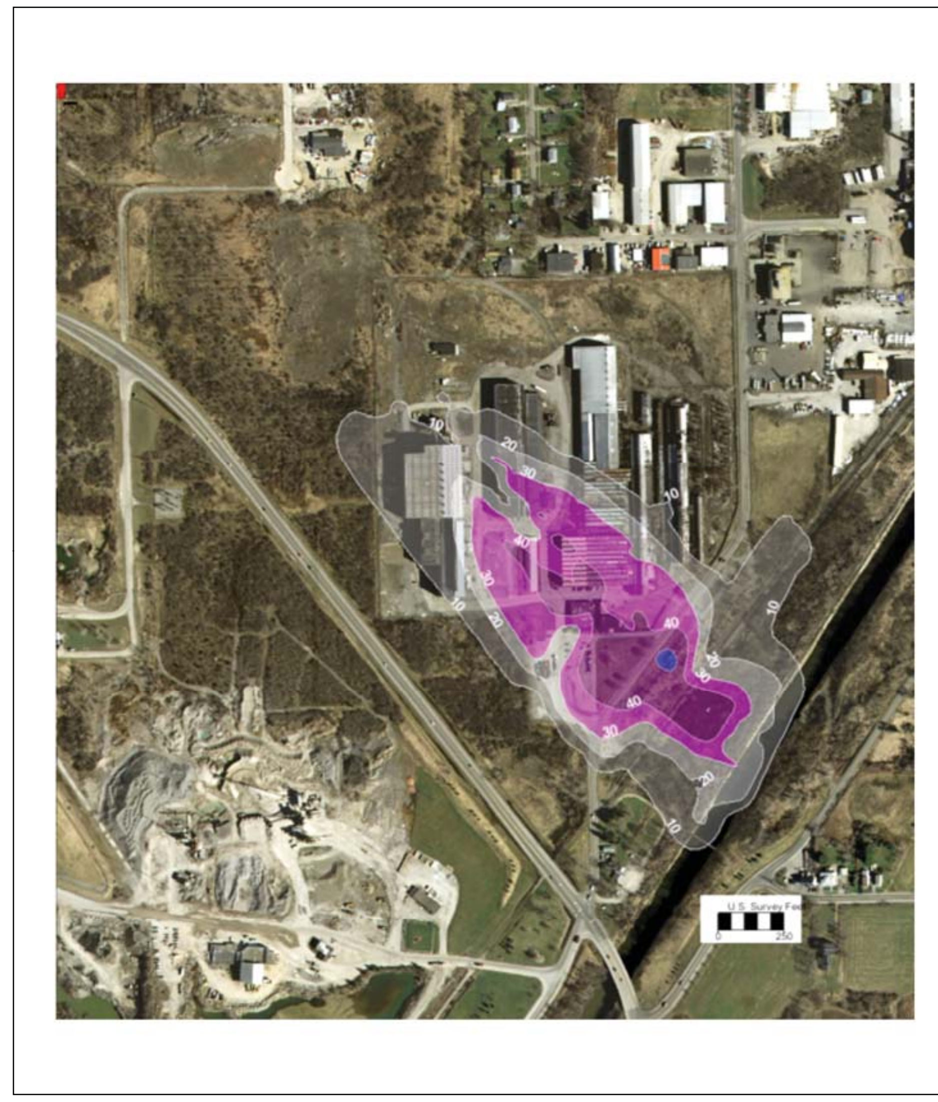
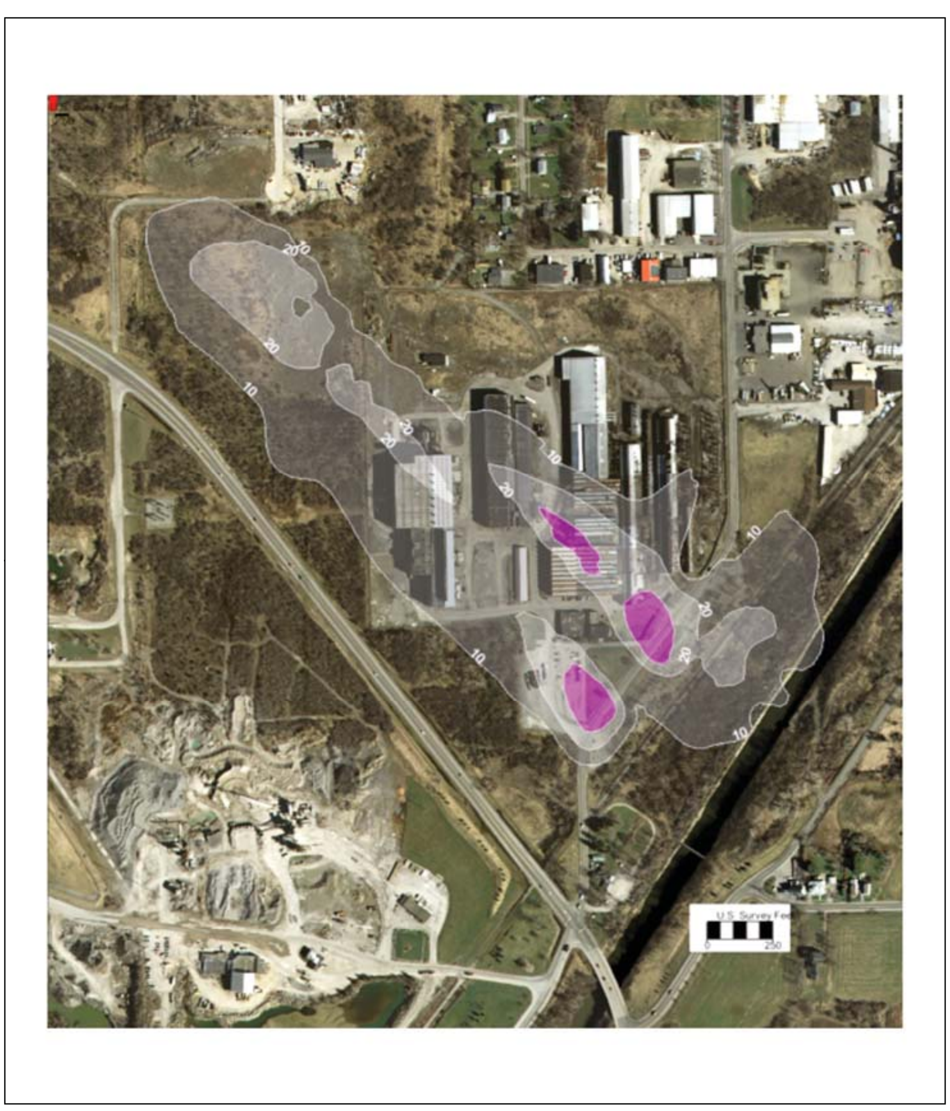
YEAR 1 - CURRENT PLUME



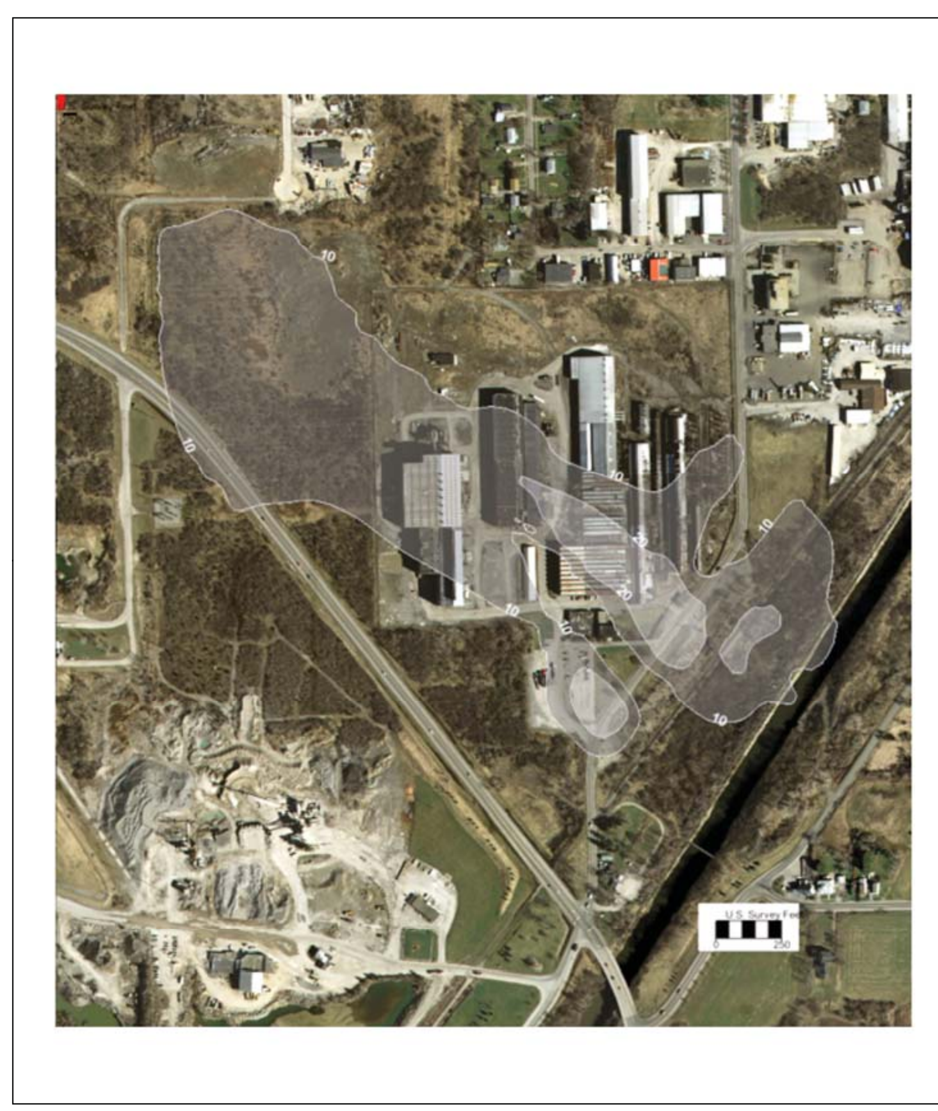
YEAR 10 - DEGRADED PLUME



YEAR 60 - DEGRADED PLUME



YEAR 120 - MCL ACHIEVED



Legend

Uranium (µg/L) 300 180 90 60 30 10

N

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SITE-WIDE ALTERNATIVE 2
GROUNDWATER PROTECTION PRG AND MNA
DEEP AQUIFER

Document Name: 070620_FSFig4-10.mxd
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Date Saved: 20 Jun 2017
Time Saved: 1:54:44 PM

GUTERL SPECIALTY STEEL CORPORATION
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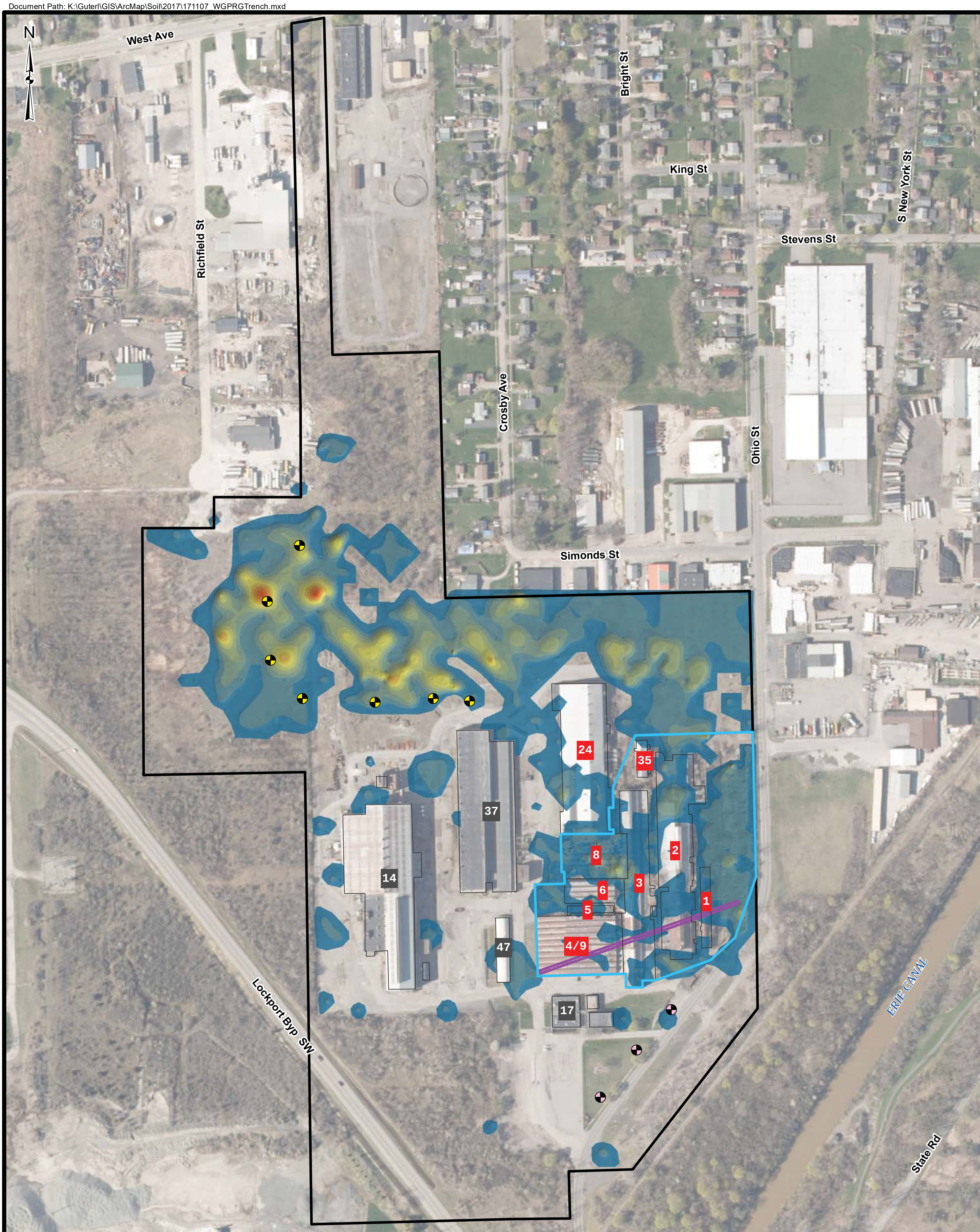
FIGURE 5-2

Document Path: K:\Guterl\GIS\ArcMap\Soil\2017\171107_WGPRGTrench.mxd



Legend

Depth of Contaminated Soils (ft bgs)

- < 1
- 1 - 2
- 2 - 3
- 3 - 4
- 4 - 5
- 5 - 6
- 6 - 7
- 7 - 8
- 8 - 9
- 9 - 10
- > 10

- ATI Specialty Materials Boundary
- Guterl Excised Area Boundary
- 1 Buildings Identified for Complete Dismantlement
- Buildings Not Addressed
- Shallow Extraction Well
- Deep Extraction Well
- Rubblized Trench

Total Volume - 57,611.15 yd³

0 150 300 600 Feet

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SITE-WIDE ALTERNATIVE 3
COMPLETE SOIL REMOVAL TO THE GROUNDWATER PRG;
DISMANTLEMENT OF BUILDINGS 1, 2, 3, 4/9, 5, 6, 8 24 AND 35 AND OFF-SITE DISPOSAL
GROUNDWATER TREATMENT USING EXTRACTION WELLS AND RUBBLIZED TRENCH

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Time Saved: 11:12:00 AM

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FIGURE 6

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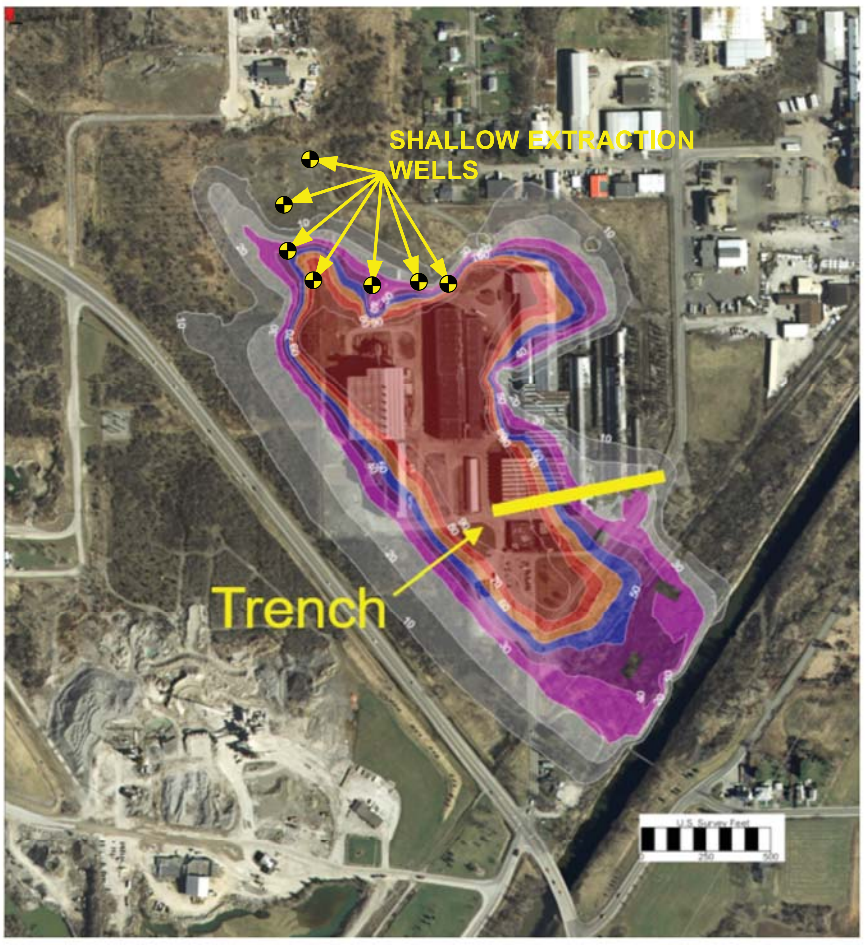
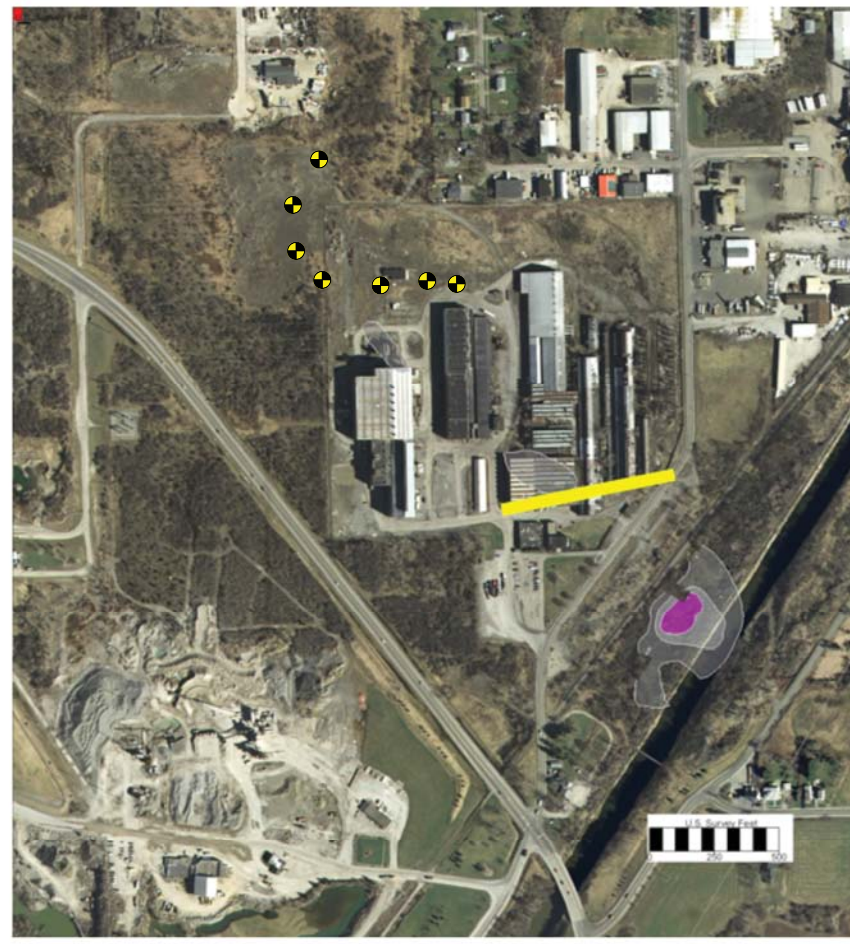
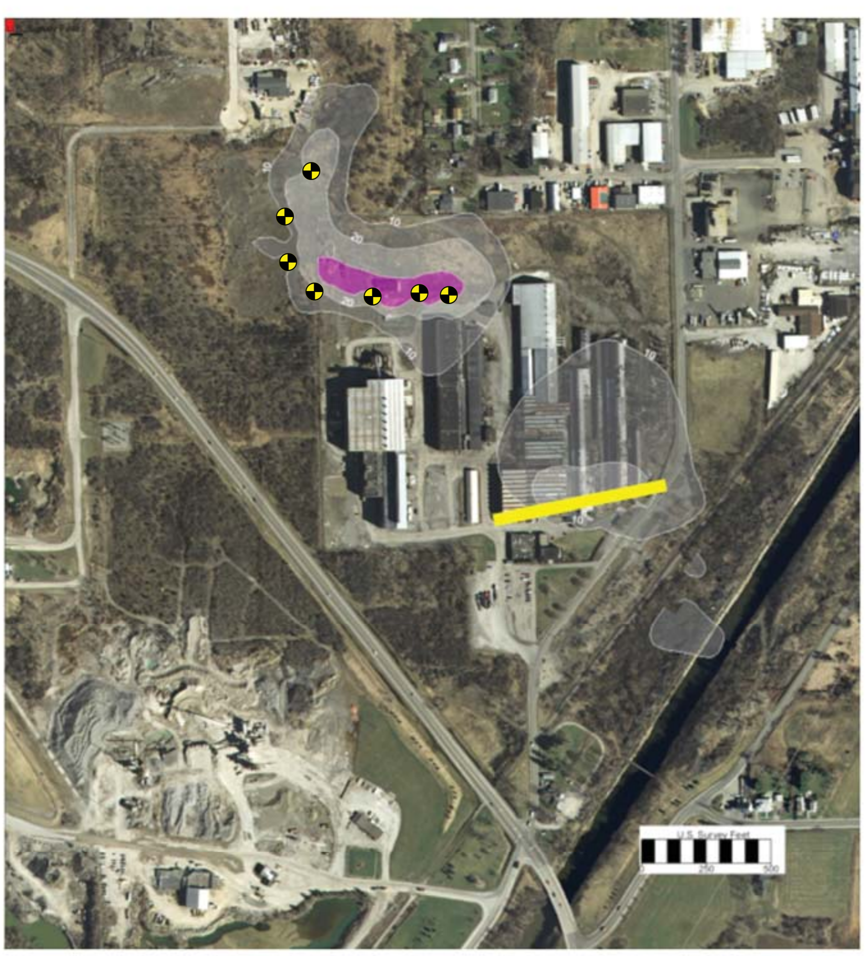
YEAR 1 - CURRENT PLUME



YEAR 10 - DEGRADED PLUME



YEAR 20 - DEGRADED PLUME



YEAR 30 - MCL ACHIEVED

Legend

Uranium (ug/L) 300 180 90 60 30 10

Extraction Well

Rubblized Trench

N

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Buffalo District

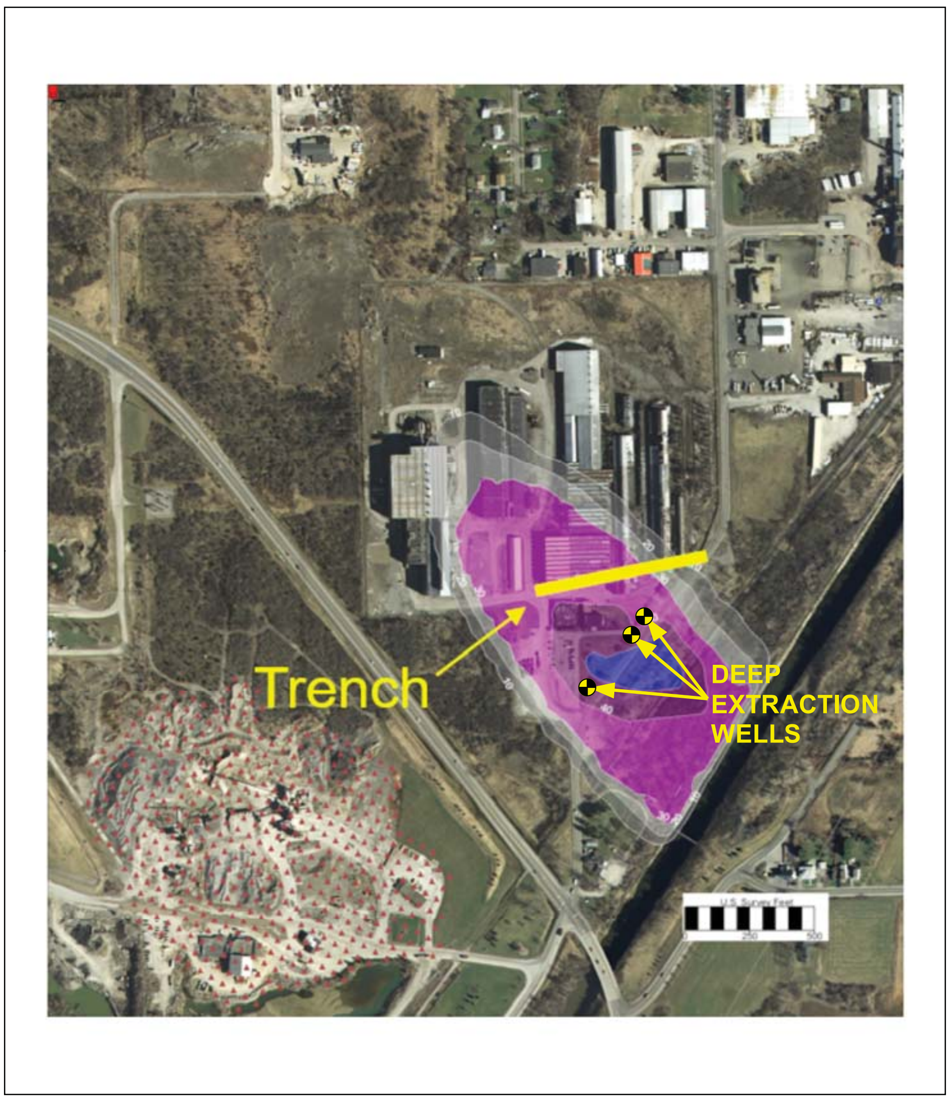
SITE-WIDE ALTERNATIVE 3
GROUNDWATER PROTECTION PRG, RUBBLIZED TRENCH AND EXTRACTION WELLS
SHALLOW AQUIFER

Document Name: 070620_FSFig4-13.mxd
Drawn By: H5TDESPM
Date Saved: 12 Oct 2018
Time Saved: 9:40:19 AM

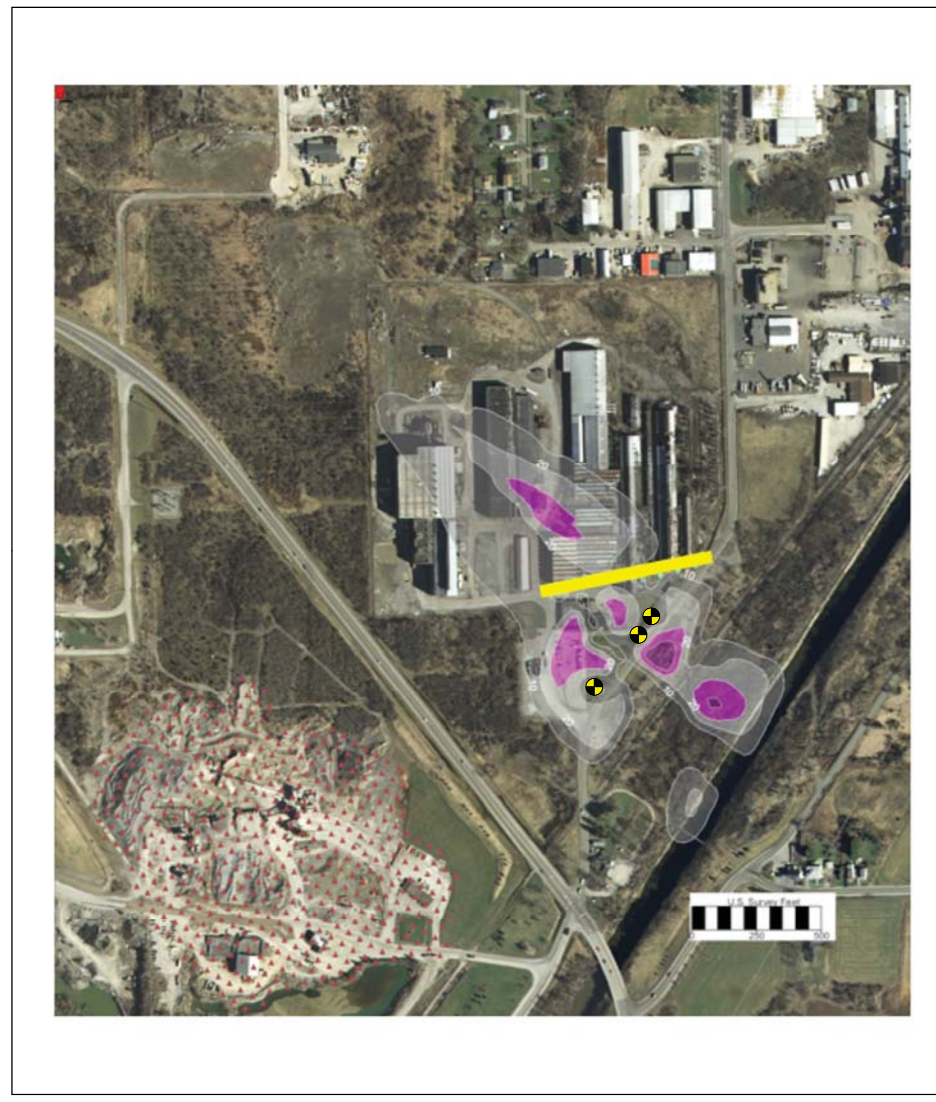
GUTERL SPECIALTY STEEL CORPORATION
LOCKPORT, NEW YORK

FIGURE 7-1

YEAR 1 - CURRENT PLUME

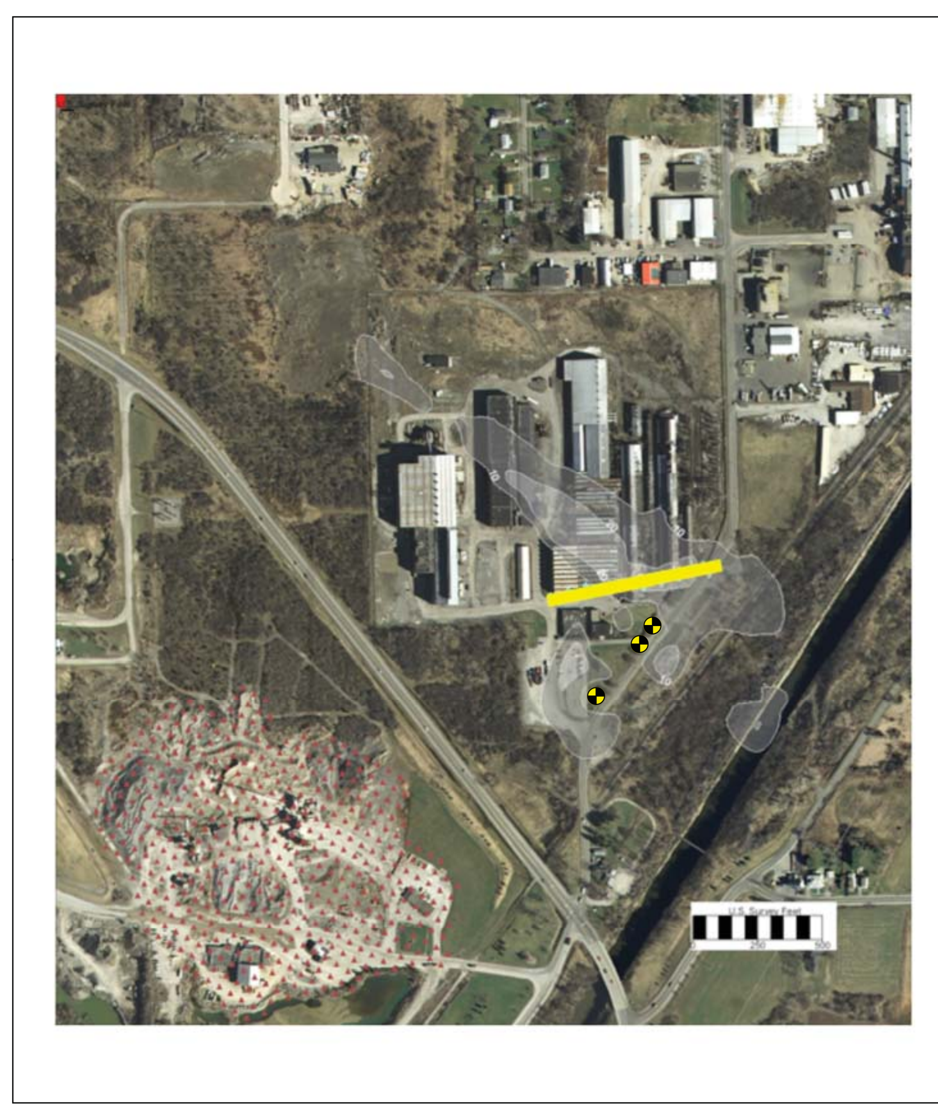


YEAR 10 - DEGRADED PLUME



YEAR 20 - DEGRADED PLUME

YEAR 30 - MCL ACHIEVED



Legend

Uranium (µg/L) 300 180 90 60 30 10

Extraction Well

Rubblized Trench

N

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SITE-WIDE ALTERNATIVE 3
GROUNDWATER PROTECTION PRG, RUBBLIZED TRENCH AND EXTRACTION WELLS
DEEP AQUIFER

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GUTERL SPECIALTY STEEL CORPORATION
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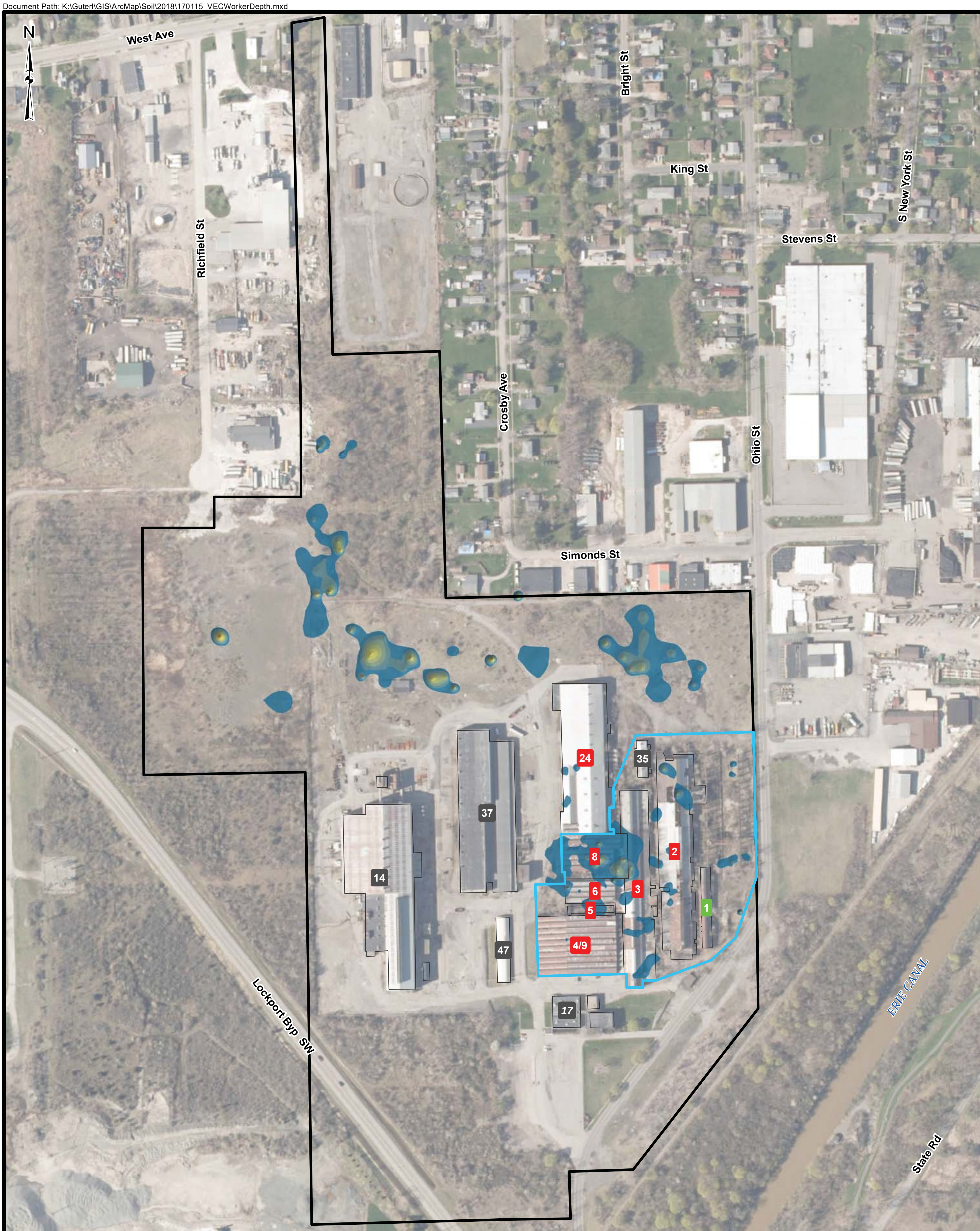
FIGURE 7-2

Document Path: K:\Guterl\GIS\ArcMap\Soil\2018\170115_VECWorkerDepth.mxd



Legend

Depth of Contaminated Soils (ft bgs)

- <= 1
- 1 - 2
- 2 - 3
- 3 - 4
- 4 - 5
- 5 - 6
- 6 - 7
- 7 - 8
- 8 - 9
- > 9

- ATI Specialty Materials Boundary
- Guterl Excised Area Boundary
- 1 Buildings Identified for Decontamination
- 2 Buildings Identified for Complete Dismantlement
- Buildings Not Addressed

Total Volume - 5,013.1 yd³

0 150 300 600 Feet

US Army Corps of Engineers Buffalo District

U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
BUFFALO, NY

SITE-WIDE ALTERNATIVE 4
COMPLETE SOIL REMOVAL TO THE CONSTRUCTION WORKER PRG; DECONTAMINATION OF BUILDING 1; DISMANTLEMENT OF BUILDINGS 2, 3, 4/9, 5, 6, 8, AND 24; MONITORED NATURAL ATTENUATION GROUNDWATER TREATMENT

Document Name: 170115_VECWorkerDepth.mxd
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Date Saved: 18 Oct 2018
Time Saved: 9:17:19 AM

GUTERL SPECIALTY STEEL CORPORATION
LOCKPORT, NEW YORK

FIGURE 8

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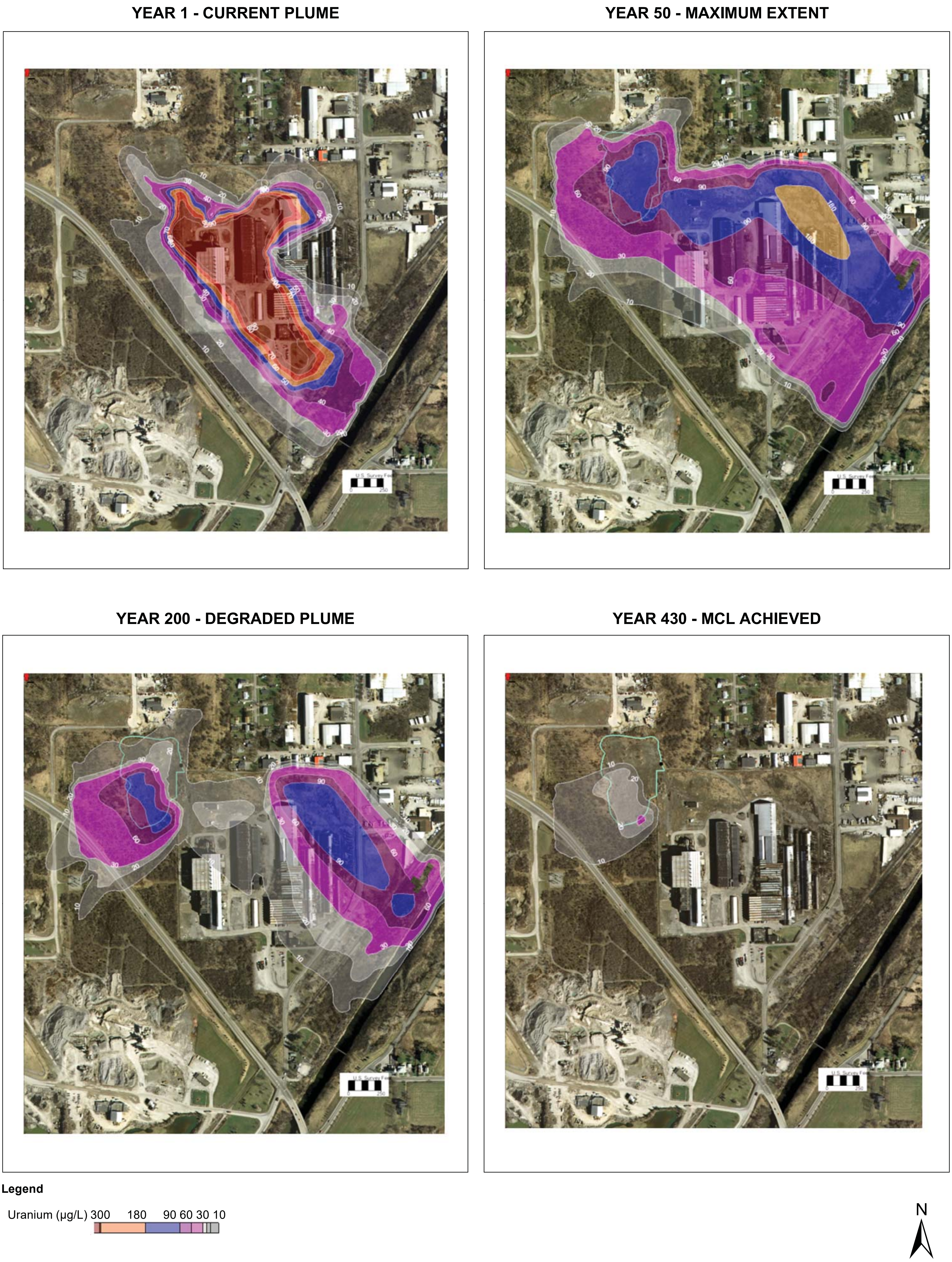

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BUFFALO, NY

SITE-WIDE ALTERNATIVE 4
CONSTRUCTION WORKER PRG AND MNA
SHALLOW AQUIFER

Document Name: 070620_FSFig4-7.mxd
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Time Saved: 1:44:54 PM

GUTERL SPECIALTY STEEL CORPORATION
LOCKPORT, NEW YORK

FIGURE 9-1

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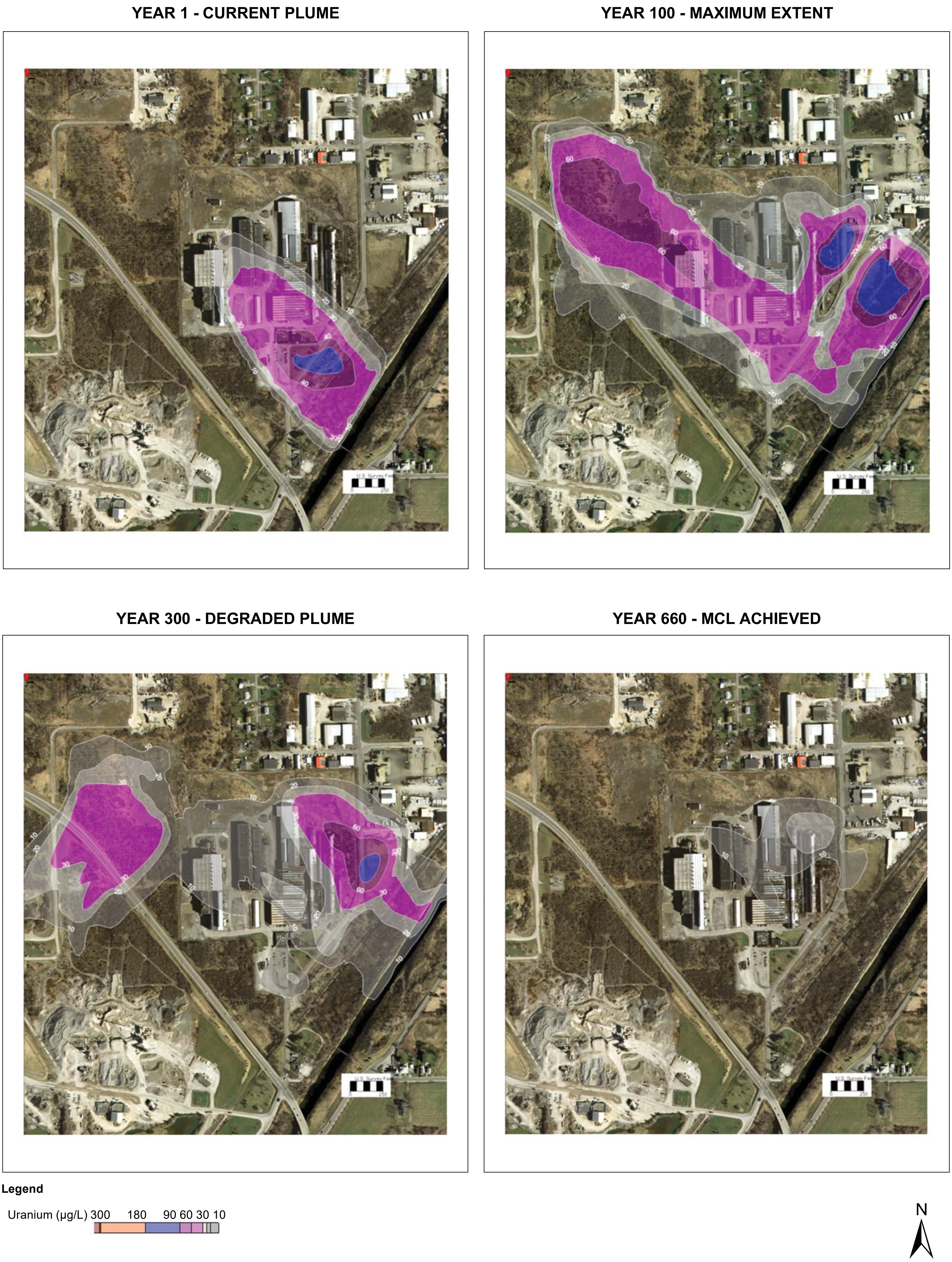

U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
BUFFALO, NY

SITE-WIDE ALTERNATIVE 4
CONSTRUCTION WORKER PRG AND MNA
DEEP AQUIFER

Document Name: 070620_FSFig4-8.mxd
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FIGURE 9-2