Wurlitzer "Area B" Inactive Hazardous Waste Site

North Tonawanda, New York
Site No. 9-32-041

FEASIBILITY STUDY REPORT

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Prepared by:

New York State Department of Environmental Conservation
Division of Environmental Remediation

GEORGE E. PATAKI, *Governor* JOHN P. CAHILL, *Commissioner*

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Section 1 - Introduction

1.1 Objectives & Overview

A Remedial Investigation (RI) has been performed on the Wurlitzer Area B site. The complete results of the RI are contained in the December 1998 *RI Report* prepared by the New York State Department of Environmental Conservation (NYSDEC). This report presents the Feasibility Study (FS), which has been prepared in order to develop and evaluate appropriate remedial alternatives to address the contamination present on the site.

This FS report has been prepared in accordance with the United States Environmental Protection Agency's (USEPA) *Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA*, Interim Final, Oct. 1988, the National Oil and Hazardous Substance Pollution Contingency Plan (NCP), and the NYSDEC's Technical and Administrative Guidance Memorandum (TAGM) 4030: *Selection of Remedial Actions at Inactive Hazardous Waste Sites.*

The FS report has been organized into seven sections. Section 1 includes a summary of the site history as well as a summary of the results of the Remedial Investigation. It also presents an assessment of the potential environmental and human health threats. Section 2 contains a development of remedial alternatives, including the remedial action objectives, general response actions, volume and extent of media requiring remediation, and an identification of Standards, Criteria, and Guidelines (SCGs) for the site. Section 3 presents an identification of technology types and process options to address site contamination. Section 4 presents a screening of the identified technology types and process options. Section 5 presents a detailed analysis of four remedial alternatives assembled to address site contamination. Section 6 details the comparison of the four remedial alternatives considered, and section 7 presents the recommended remedial alternative for the Wurlitzer Area B site.

1.2 Results of the Remedial Investigation

1.2.1 Site Description and History

The Wurlitzer "Area B" site is a wooded 5.5 acre parcel of land which is situated in the north-west corner of the Wurlitzer Industrial Park complex in North Tonawanda, New York. The Wurlitzer Industrial Park is located at 908 Niagara Falls Boulevard and comprises a total area of approximately 44 acres. Figure 1-1 shows the site location.

The site is bounded on the north-west side by a former Conrail railroad line whose tracks have been removed. This line now includes a right-of-way for buried Oxbow co-generation power and steam lines. Wurlitzer Drive runs along the western side of the site and intersects with Fairmont Avenue to the northwest of the site. A residential neighborhood is situated to the north and west of the site. The nearest homes are those along the south side of Fairmont Avenue, near the intersection of Wurlitzer Drive. The back yards of these residences are separated from the site by the elevated former conrail line which contains the Oxbow right-of-way. See Figure 1-2 for site details.

The Area B site is wooded, and with the exception of numerous piles of fill, is relatively flat. An abandoned, elevated section of railroad track runs through the south-western corner of the site and ends just before Wurlitzer Drive (this spur was once continuous and connected the conrail track with the southern corner of the Wurlitzer plant property). The northern area of the site along the elevated Oxbow right-of-way is relatively low lying and rain water and snow melt accumulates along this side of the site. Occasional ponding of water occurs in both the northern and south-eastern side of the site.

The Industrial Park was owned and operated by Wurlitzer Industries between 1908 and 1977. The site's facilities were used for the manufacture of several products including automatic phonographs, player pianos, electric organs, and jukeboxes. During its operating history Wurlitzer Industries also utilized this facility for production processes related to several U.S. Defense Department contracts. The former Wurlitzer manufacturing building is currently owned by Irr Supply Centers, Inc. and Ancor Industrial Plastics, Inc. The building is currently used for manufacturing and as commercial rental space. Area B is currently owned by Blue Bird Industrial Park North, Inc. and Ancor Plastics, Inc.

The Wurlitzer plant property was listed as a suspected hazardous waste disposal site in June 1980. The property consisted of approximately 44 acres and included the former plant buildings, parking lots, and related grounds. In the late 1980s, attention was focused on two specific areas of the site, which became known as Area A and Area B. Area A was a parcel of vacant land on the north side of the former Conrail tracks which protruded into the adjacent residential neighborhood. Area A was believed to have been associated with loading and unloading of materials used in plant production. It was suspected that spillage of hazardous wastes may have occurred in Area A during plant operations. Area B was a wooded and densely overgrown parcel adjacent to the southwestern portion of the plant which contained numerous piles of fill and waste material.

A dirt access road runs through Area B starting from a gate on the northeast side of the site near the end of the former plant building. It runs parallel to the former Conrail line approximately 2/3 of the way toward Wurlitzer Drive. Aerial photos taken between 1958 and 1966 indicate activity within Area B along the southern side of this access road. This activity is believed to have included disposal of various waste materials. Based upon the nature of the manufacturing processes, wastes generated at the plant likely included scrap metal, metal sludges from plating operations, and degreasing wastes. It is not known which of these materials may have been disposed within the confines of Area B.

It appears that the access road was used to deposit various waste material within the confines of Area B. The disposal of fill and waste materials occurred in the western corner of the site as well as along either side of the access road along its length. The fill and waste materials observed on site includes soil, concrete rubble, asphalt rubble, roofing materials, cinders, scrap metal, metal buckets, scrap wood, wooden pallets, and brush. Numerous 55 gallon drum carcasses (crushed or empty) have also been observed throughout the site. In addition, several drums containing solid waste materials were included in the materials deposited on site.

During the 1990s, a foot path was observed through the brush along the overgrown former access road. In addition, several indications of site use were noted during site inspections in 1995. Among the signs of periodic site activity noted by the NYSDEC and the New York State Department of Health (NYSDOH) during site inspections: a tree stand (similar to those constructed for hunting purposes), a plywood shelter (i.e. children's play fort), a child's glove, and bottles. In November of 1995, the NYSDOH recommended that a fence be constructed around Area B to prevent possible direct human contact with any contaminated soils or wastes. In December 1995 one of the Area B site owners installed a temporary orange plastic construction fence around the site.

In March 1996, after concluding that waste and fill materials within Area B posed a significant threat to human health, the NYSDEC reclassified the Wurlitzer site from a Class 2a designation (a temporary classification assigned to a site which has inadequate data for another classification) to a Class 2 designation (signifying a significant threat to the public health or environment - action required) in the New York State Registry of Inactive Hazardous Waste Disposal Sites. In October 1996 the NYSDEC installed a permanent chain link fence around the perimeter of the Area B site.

In 1997, the NYSDEC began negotiations with several owners of the industrial park to undertake investigations of the remainder of the industrial park property. The NYSDEC re-designated Area A to include all parts of the industrial park, excluding Area B. In December 1998, a Consent Order was signed with one of the site owners which required a remedial investigation of Area A. The Area A RI report is being developed during the summer of 1999 and is expected to be submitted to the NYSDEC by the end of 1999.

1.2.2 Scope of the Area B Remedial Investigation

Beginning in 1989, several limited scope investigations and sampling events were conducted at the Wurlitzer Area B site. The most recent site activity was the Remedial Investigation which was performed during 1997-1998 to provide a more thorough characterization of the nature and extent of any site contaminants, and to obtain the data necessary to identify site media which may require remediation.

Non-investigative tasks performed as part of the Remedial Investigation included: site clearing and grubbing of brush and small trees; disposal of drummed and containerized wastes remaining on site; performance of a site topographic survey; and replacement of a damaged portion of fence to further restrict unauthorized site access.

Investigative tasks performed as part of the Remedial Investigation included: a geophysical survey to investigate the possibility of buried wastes; collection and analysis of groundwater samples from existing monitoring wells; collection and analysis of basement sump water samples from homes along Fairmont Avenue; collection and analysis of soils samples at 50' x 50' grid intervals throughout the site; and completion of test pits and sampling within fill/waste piles to determine composition of the on site materials.

1.2.3 Nature and Extent of Area B Site Contamination

From the data collected and interpreted during the Remedial Investigation, site contamination is limited to waste and fill solids which have been disposed on the surface of the site. Both organic and inorganic contaminants were detected in the on-site waste and fill materials significantly above soil guidance criteria contained in NYSDEC *Technical and Administrative Guidance Memorandum 4046: Determination of Soil Cleanup Objectives and Cleanup Levels* (TAGM 4046). Those organic contaminants of concern include: benzo[a]anthracene, chrysene, benzo[b]fluoranthene, benzo[k]fluoranthene, benzo[a]pyrene, indeno[1,2,3-cd]pyrene, and dibenz[g,h,i]perylene. Those inorganic contaminants of concern include: arsenic, barium, cadmium, chromium, lead, and zinc. Figures 2 and 3 indicate locations and concentrations of inorganic and organic contaminants detected above soil cleanup guidance levels.

In an effort to more thoroughly examine the consistency and depth of the various fill piles, 39 test pits were excavated throughout the site. Most fill piles contained a black "cinder type" waste. Depth to native soils in the non-filled areas of the site is generally between 1 - 3 feet. Test pit excavations indicate that fill materials were disposed only on the surface of the site, and that wastes and fill were not buried below the surface of native soil.

Several samples of material were obtained from the fill areas during the test pits in order to further assess fill material characteristics. The results from the test pit samples indicate similar contaminant concentrations as the samples from grid locations within fill areas. Samples were taken from 10 of the 39 test pits and analyzed for VOCs, semi-volatiles, and metals. In addition, 3 of the test pit samples were submitted for Toxic Characteristic Leaching Procedure (TCLP) testing (TCLP is a testing procedure design to measure the leachability of contaminants from a waste or soil sample). The results of the TCLP analysis confirms the presence of significant levels of inorganics in some of the fill/waste materials on site (see Table 1). Significant concentrations of organics were not detccted in the TCLP samples. The inorganic TCLP concentrations detected in some of the fill/waste material are above TCLP action levels, and therefore some of the fill/waste material is considered hazardous waste (Cadmium TCLP concentrations cause some of the waste to be classified as a D006 waste according to 6NYCRR Part 371).

Soil samples taken outside the waste and fill disposal areas do not indicate elevated concentrations of identified site contaminants. Groundwater samples taken from monitoring wells at the site and nearby residential basement sumps indicate that the deposition of fill and waste materials on site has not had a significant effect on the groundwater quality.

1.2.4 Environmental Threat Assessment

The site is a wooded 5 acre parcel of disturbed land located between residential and commercial/industrial properties. Despite some periodic standing water on site, there are no wetlands, streams or other significant surface water features on site. Numerous animal holes and burrows have been observed throughout the site. Squirrels, chipmunks, snakes, and various bird species have been observed on site. Although there is currently a 6 foot high chain link fence surrounding the property, deer have also been observed on the site. Due to the nature and extent of the contamination present at the site, it is unlikely that the site poses a significant threat to the environment at this time. Any impacts would likely be limited to those burrowing animals living on or in contaminated waste/fill which may contact and ingest site contaminants.

1.2.5 Human Health Exposure Assessment

Since the extent of site contamination is limited to the waste and fill material solids found on the surface of the site, the primary potential human exposure pathways are those which would result through direct contact with the waste and fill materials.

Completed pathways which are either known to or may exist include:

- Dermal (skin) contact with contaminated waste/fill materials by former or future site users or trespassers;

- Incidental ingestion of contaminated waste/fill materials by former or future site users or trespassers.

These potential exposure pathways were addressed in the interim through the installation of a chain link fence around the perimeter of the site. During the remedial investigation, the fence gate and damaged fence sections near the former Wurlitzer plant building were replaced to provide better site control. However, while the site is currently fenced, the above exposure pathways may be still considered "complete" since exposure potential remains for site trespassers and future site users.

Section 2 - Identification of Remedial Action Objectives and General Response Actions

This section presents the Remedial Action Objectives for the site, identifies General Response Actions for remediation of the contaminated media, describes the volume and areal extent of media requiring remediation, and identifies the New York State Standards, Criteria, and Guidelines (SCGs) applicable to the site

2.1 Remedial Action Objectives

Remedial action objectives are specific goals designed to protect human health and the environment. They specify contaminants of concern, exposure routes, receptors, and acceptable contaminant levels for each exposure route. These objectives are based upon available information and SCGs. SCGs as used herein include the federal program concepts of Applicable or Relevant and Appropriate Requirements (ARARs).

The Remedial Investigation Report identified the following two potential human exposure pathways:

- Dermal (skin) contact with contaminated waste and/or fill materials by former or future site users or trespassers;

- Incidental ingestion of contaminated waste and/or fill materials by former or future site users or trespassers.

Based upon these exposure pathways and existing site conditions, Remedial Action Objectives for groundwater are unnecessary. The following Remedial Action Objective has been developed for the soils and wastes at the Wurlitzer Area B site:

- Eliminate, to the extent practicable, future human exposures to site contaminants.

2.2 General Response Actions

General response actions describe those actions that will satisfy the remedial action objectives. General response actions address effected site contamination and may include excavation, treatment, disposal, containment, extractions, institutional actions, or a combination of these. The general response actions which are applicable for contaminated wastes, fills, and soils on site include: no action, institutional controls, excavation, treatment, disposal, and containment.

2.3 Volume and Extent of Media Requiring Remediation

Site conditions, the nature and extent of site contamination, potential human exposure routes, and acceptable exposure levels were taken into consideration to define the areas and volumes of the material to be addressed by the general response actions. Soil samples taken outside of the areas of material disposal did not indicate elevated concentrations of identified site contaminants. Groundwater samples taken from monitoring wells at the site and nearby residential basement sumps indicate that the deposition of fill and waste materials on site has not had a significant effect on the groundwater quality.

Fill and waste material was disposed on the surface of the site and is concentrated in two general areas. Figure 4 shows the general limits of the two disposal areas where significant contaminants (above SCGs) were detected. The first area of contaminated material, designated as Fill/Waste Area I in Figure 4, is the area along both sides of the old roadway which runs from the northeast end of the site to the southwest corner of the site near Wulitzer Drive. The second area of contaminated material, designated as Fill/Waste Area II in Figure 4, is a larger area at the end of the old roadway in the southwestern portion of the site. The volume of contaminated material above SCGs was estimated by applying SURFER® (version 6) software to a site contour map prepared from site survey data (see Appendix A).

Fill/Waste Area I

This area encompasses roughly 1 acre in size and the volume of material exhibiting contaminant concentrations above SCGs in this area is estimated at approximately 1,900 cubic yards. Significant semi-volatile organic contaminants were detected at sporadic locations within the mounds located near the old roadway. The semi-volatile contaminants detected in this vicinity include: benzo[a]anthracene, chrysene, benzo[b]fluoranthene, benzo[k]fluoranthene, benzo[a]pyrene, indeno[1,2,3-cd]pyrene, and dibenz[g,h,i]perylene. Inorganic contaminants detected in the fill and waste material along the old roadway include: arsenic, barium, chromium, lead, and mercury. In general, concentrations of inorganics in this portion of the site are substantially lower than those detected in the southwestern portion of the site (Fill/Waste Area II).

Fill/Waste Area II

This area is also roughly 1 acre in size, and the volume of material exhibiting contaminant concentrations above SCGs in this area is estimated at approximately 1,300 cubic yards. Semi-volatile organic contaminants were detected in much lower concentrations in this portion of the site, and their presence was not as widespread as those detected along the roadway. However, significant inorganic contamination was detected throughout the fill and waste materials in this portion of the site. Inorganic contaminants detected in this portion of the site include: arsenic, barium, cadmium, chromium, lead, zinc, and mercury.

Within Fill/Waste Area II there are two relatively small areas of fill and waste which were found to exhibit very high concentrations of inorganic contaminants (see Figure 4). The total volume of waste contained in these two smaller areas is estimated at approximately 650 cubic yards. Some of the material contained in these two smaller areas is identifiable by its distinctive colorations (including white, red, orange, green, blue, etc.).

2.4 Identification of Standards, Criteria, and Guidelines (SCGs)

Compliance with SCGs is intended to ensure adequate protection of human health and the environment. For purposes of evaluation, SCGs are divided into three categories: (1) Action Specific; (2) Chemical Specific; and (3) Location Specific. Action specific SCGs are usually activity based requirements or limitations on potential remedial actions taken. These requirements generally set performance or design standards for specific remedial activities such as physical treatment of contaminated media. Chemical specific SCGs are usually health based or risk based numerical limitations which are applied to site conditions and result in the establishment of acceptable concentrations of site contaminants. Location specific SCGs are usually restrictions placed on certain activities due to special locations (such as wetlands or unique habitats). Tables 2-1 and 2-2 indicate potential action specific SCGs and chemical specific SCGs, respectively. No relevant and appropriate location specific SCGs were identified for the Wurlitzer Area B site.

Section 3 - Identification of Remedial Technologies and Process Options

The purpose of this section is to identify remedial technologies and processes which may be applicable for the contaminated media present at the site.

3.1 No Action

Inclusion of a no action response is required under Federal statute (National Contingency Plan). It would not require the implementation of any type of remedial actions at the site.

3.2 Institutional Controls

The objective of institutional controls is to limit contact with contaminated waste and fill materials. Since a fence already exists around the perimeter of the site, institutional controls could include enhancements to the fence such as increasing its height, or the addition of barbed wire on the top of the fence to further restrict possible trespassers. Institutional controls for the Wurlitzer Area B site could also include property deed restrictions to limit future uses of the site. Institutional controls are considered applicable for the Wurlitzer Area B site.

3.3 Containment

Containment of contaminated waste and fill materials could be accomplished through covering and capping technologies. Covering typically includes grading of site material to facilitate drainage. This is usually followed by the placement of one or more layers of clean material over the contaminated material to both prevent direct contact with the contaminated material and to prevent erosion and off site transport of any contaminated materials. Similarly, capping also prevents direct contact with contaminated material and prevents erosion and off site transport of contaminated material. However capping also reduces the infiltration of water (rainwater or snow melt) into the contaminated material by incorporating a low permeability layer. Both covering and capping technologies are considered applicable for the Wurlitzer Area B site.

3.4 Physical/Chemical Treatment

Soil Washing/Chemical Extraction

Soil washing and chemical extraction involve physical separation and rinsing of contaminated materials with water and/or other chemical extractants. Typically, the first step is the removal of large objects and debris from the contaminated waste/fill material. In the soil washing step, the contaminated material is vigorously mixed, washed, rinsed, and often further separated. Water and/or acids, solvents, and other chemicals can be used as the washing fluid. Treatment of heavy metal wash fluids by precipitation and clarification is usually required to remove metal contaminants and fine soil or waste particles prior to disposal. Soil washing/chemical extraction is considered an applicable technology for contaminants present at the Wurlitzer Area B site.

Solidification/Stabilization

Contaminated solid materials can be stabilized and solidified through physical mixing of materials in combination with stabilizers and cement based solidification agents. The resulting product can be rendered into either a granular or solid monolithic form depending upon the amount of solidification desired. Solidification/stabilization is considered an applicable technology for the treatment of contaminants at the Wurlitzer Area B site.

3.5 Biological Treatment

Biological treatment would typically consist of supplying nutrients and air to the fill and waste material to enhance the biodegradation of organic contaminants by indigenous soil bacteria. It would not be applicable to inorganic (metals) contaminants. In addition, high concentrations of metals within the waste and fill materials may inhibit the soil microbes ability to degrade organic contaminants. Since the majority of Wurlitzer Area B contaminants are in inorganic form, biological treatment is not considered applicable at the site.

3.6 Off-Site Disposal

Contaminated waste and fill materials could be removed from the site and disposed of at an appropriate off-site facility. However, some 650 cubic yards of the most highly contaminated material present in Fill/Waste Area II would likely have to be treated before it could be disposed at an off-site location. This treatment could either occur on site or at a licensed off-site treatment/disposal facility. The types of treatment which would be applicable for these waste materials include the solidification/stabilization and soil washing/extraction technologies which are discussed above. Off-site disposal of both treated and untreated contaminated materials is considered applicable for the Wurlitzer Area B site.

Land Disposal Restrictions Considerations

Federal Land Disposal Restrictions (LDRs) require that prior to land disposal at a permitted facility, characteristic hazardous wastes must be treated in order to reduce the toxicity, mobility, and/or volume of the hazardous constituents in the waste. In order to determine whether LDRs apply to a particular waste material, the material is usually subjected to a Toxicity Characteristic Leaching Procedure (TCLP) test. This test measures the amount of leachable contaminants within the waste material. By definition, if the waste material exceeds TCLP concentration action levels, it is classified as a characteristic hazardous waste. LDRs require treatment of a characteristic hazardous waste to the higher of the following two concentration levels prior to land disposal: either a 90% reduction in TCLP concentrations from the waste; or a contaminant concentration level equal to 10 times the listed Uniform Treatment Standard (UTS concentrations provided in the LDRs). This essentially means that if the TCLP concentrations of a particular characteristic hazardous waste are lower than 10 x UTS, under LDRs the waste can be land disposed without prior treatment.

TCLP testing of select fill/waste samples (see Table 1) during the Remedial Investigation indicate that on the basis of inorganic contaminants, some of the material on site would be classified as a characteristic hazardous waste (D006 classification due to cadmium levels, and other material may receive D007 classification due to high chromium levels). Therefore, in order to determine the potential for LDRs to apply to other on site materials, the waste/fill samples on site with the highest inorganic contaminant concentrations were evaluated with respect to potential TCLP concentrations.

Using data from analysis of gross contaminant concentrations in each of the site samples, inferred maximum TCLP concentrations can be estimated for each of the inorganic compounds. The inferred maximum TCLP concentration has been estimated as the product of the gross contaminant concentration and a 1/20 dilution factor used in laboratory analysis. For example, sample CS-150-550 had a gross cadmium concentration of 3590 mg/kg. The resulting inferred maximum TCLP concentration for cadmium is estimated at 18 mg/l (since 3590 times 1/20 = 18). It should be noted that this method of estimation is conservative, and the actual results of a TCLP analysis on waste/fill materials would likely reveal much lower concentrations of contaminants than the inferred maximum TCLP concentrations that were estimated using the gross contaminant concentrations. The site samples exhibiting the highest inorganic contaminant concentrations were evaluated in this manner to determine inferred maximum TCLP concentrations.

Table 3 provides a summary of the inferred maximum TCLP concentrations for site sample locations which exhibited the highest gross inorganic contaminant concentrations. It also lists the concentrations which result from the factor of 10 x UTS which are used for comparison with the estimated inferred maximum TCLP concentrations. If the estimated inferred maximum TCLP concentration for an inorganic contaminant substantially exceeded the corresponding value listed for 10 x UTS, the contaminant in the sample would likely cause the material to be subject to LDRs. Since the estimation method for TCLP concentrations gives maximum TCLP concentrations and is very conservative, only those samples whose maximum TCLP concentrations are significantly above 10 x UTS are likely to be subject to LDRs.

Based upon the results of the estimates of maximum TCLP inorganic concentrations, six sample locations within Area II (see Figure 4) contain material which is likely subject to LDRs. The extent of this material corresponds to sample locations CS 150-550, CS 150-600, CS 200-550, CS 250-600, CS 300-250, CS 400-550, and the volume of fill/waste subject to LDRs is estimated at 650 cubic yards.

Section 4 - Screening of Technology Options

This section presents a preliminary screening of the technology options determined in the previous section to be applicable to the Wurlitzer Area B site. The objective of this preliminary screening is to narrow the list of potentially applicable technologies prior to developing remedial alternatives which are then evaluated in further detail. Screening of technologies is done by evaluating each technology with respect to its overall effectiveness and its technical and administrative implementability.

4.1 No Action

The no action option is defined as undertaking no further actions to contain and/or treat contaminated materials other than those actions already performed during the Remedial Investigation phase (drummed waste removal, fence repair, etc.).

Effectiveness

No action would not meet the remedial action objective, and as such would be severely limited in its effectiveness.

Implementability

No actions at the site would not pose any technical or administrative implementability difficulties.

Conclusion

In order to provide a benchmark for comparison with other remedial options, this option will be retained for inclusion in the detailed analysis of options section.

4.2 Institutional Controls

Institutional controls would involve continued maintenance (and possible enhancements) of the Area B site fence, as well as periodic sampling and analysis of site groundwater to ensure that groundwater quality is not effected by site waste and fill materials. Institutional controls could also include deed restrictions to prevent inappropriate future site uses.

Effectiveness

While institutional controls could not prevent all trespassers from gaining site access, these controls would be effective in deterring trespassers from entering the site and would reduce the potential for contact with contaminated waste and fill materials.

Implementability

Institutional controls would be technically and administratively implementable.

Conclusion

This option will be retained in the detailed analysis of options section.

4.3 Containment

The objectives of the containment option is to prevent direct human contact, possible incidental ingestion of contaminated site materials, and mobilization of contaminants through erosion.

Effectiveness

Both the cover option and the capping option (which includes a low permeability layer) would be effective in achieving the remedial action objectives.

Implementability

Partial site clearing, grubbing, and grading would be required to implement either a cover or a cap. Most of the larger debris like wooden pallets, scrap roofing materials, re-enforced concrete rubble, etc. would have to be segregated from the waste and fill which was incorporated under a cover or cap. This larger debris could be removed from the site and disposed at an appropriate facility. These requirements could be readily implemented. Design and construction of a cover or cap could be readily implemented, as these types of containment systems are commonly constructed.

Conclusion

Due to the nature and extent of site contamination, and the fact that the main threat the site poses is from direct human contact with contaminated waste and fill, a low permeability cap is not considered necessary. Therefore only a soil cover system will be retained for detailed analysis.

4.4 Soil Washing/Chemical Extraction

The objective of soil washing is to physically remove the most significant site contaminants from the waste and fill materials through handling and rinsing processes. The washed material can then be disposed of off-site or can remain on site.

Effectiveness

Soil washing has been proven effective at removing heavy metals such as lead, copper, mercury, arsenic, and zinc from soils at a number of hazardous waste sites. Soil washing processes typically use particle segregation methods to separate fine particles from larger particles. This separation can reduce the total volume of soil which would require further treatment and disposal since inorganic contaminants typically adhere to finer particles. Even after soil washing/extraction, finer particles may require secondary solidification/stabilization processes prior to disposal in order to prevent the material from exhibiting hazardous waste characteristics. If chemicals are used to enhance extraction, the liquid waste stream from the rinsing process must be handled and disposed at an appropriate facility. Metals extracted during the washing or extraction process would require subsequent precipitation from the wash stream, and off-site disposal.

Some highly contaminated waste/fill (approximately 650 cubic yards) is present on the site. The majority of inorganic site contamination (approximately 3,200 cubic yards), while above NYSDEC soil cleanup guidance, is much less concentrated in other site materials. Due to the relatively low inorganic concentrations in much of the material, it is difficult to assess the effectiveness of soil washing on this material.

Soil washing of contaminated materials at the Wurlitzer Area B site will be further complicated by the fact that various waste materials are mixed and co-mingled in the piles. Some of the highest metals concentrations are associated with clumps and granular waste products mixed in with other fill material. It would be very labor intensive to segregate concentrated wastes from other fill materials. Bench scale or pilot scale testing of soil washing would also be required to determine removal efficiencies of the metal contaminants from the waste materials.

Implementability

Soil washing would be implementable either on site or at a licensed treatment and disposal facility. There is sufficient space available on the site to locate necessary equipment and soil stockpile areas. Subsequent treatment of fines (through stabilization/solidification) could also be implemented on site. However, off-site disposal of wash water may be required since on-site chemical precipitation and discharge to the City sanitary sewer would depend upon City approvals.

Conclusion

Due to the relatively low inorganic concentrations in the majority of the fill and waste material of concern, the effectiveness of soil washing on all of the material above SCGs would be questionable. It is likely that soil washing would only be applicable for the 650 cubic yards of highly contaminated material. As discussed above, the highly contaminated waste material contains clumps and other co-mingled materials which would complicate the soil washing process. In addition, it would not be cost effective to mobilize the necessary equipment and resources to undertake on-site soil washing of such a limited quantity of material. Therefore, soil washing will not be retained for detailed analysis as an on-site treatment option, but will be considered as a treatment option in conjunction with off-site treatment/disposal of those contaminated materials which may be subject to Land Disposal Restrictions.

4.5 Solidification/Stabilization

The objectives of the Solidification/Stabilization option is to bind the metals and organic contaminants into a stable form. Solidification/Stabilization substantially reduces contaminant mobility in wastes and can often render contaminated material into a form whereby it no longer poses risks to human health through direct human contact. Solidified material can be disposed of off-site or can remain on site.

Effectiveness

Solidification/stabilization is a process frequently used for treating soils and other granular materials contaminated with heavy metals. The site contaminants of concern (i.e. arsenic, barium, cadmium, chromium, lead and zinc) have all been successfully treated with solidification/stabilization processes at other sites.

Implementability

Solidification/stabilization technology is readily available from numerous hazardous waste treatment vendors. There is sufficient space on the site for necessary equipment, and material staging and screening areas (although some additional tree clearing and waste/fill relocation would be necessary). Electrical power could be readily supplied to the site as necessary for equipment. Substantiative requirements of an air permit may be necessary for particulate control during the mixing phase. Contaminated waste and fill materials would require some physical screening to limit the maximum particle size to between 3/4 - inch to 3 inches.

Conclusion

Commercial hazardous waste treatment and disposal facilities routinely stabilize material with similar levels of inorganic contamination. It would therefore not be cost effective to mobilize the equipment and resources to undertake on-site solidification/stabilization on the relatively small volume of highly contaminated site material. Therefore, solidification/stabilization will not be retained for detailed analysis as an on-site treatment option, but will be considered as a treatment option in conjunction with off-site treatment/disposal of those materials which may be subject to Land Disposal Restrictions.

4.6 Off-Site Disposal

Much of the contaminated waste and fill materials could be removed from the site and disposed of at an appropriate off-site facility without treatment. However, some of the more highly contaminated material will likely require treatment before it can be disposed of at an off-site location. Treatment would occur at the licensed off site treatment/disposal facility.

Effectiveness

Off-site disposal of the contaminated materials (in excess of NYSDEC soil cleanup guidance) would be effective in eliminating possible human health exposure pathways for both trespassers and future site users. Removal of the approximately 3,200 cubic yards of contaminated material to a licensed disposal facility would require hauling approximately 250 truckloads of material from the site. Off-site disposal of this material in a secure disposal facility will prevent potential migration of the contaminants of concern in the material. Of the 3,200 cubic yards of material above SCGs, approximately 650 cubic yards of the most heavily contaminated materials would require treatment at a licensed facility prior to land disposal. Treatment prior to off-site disposal (with solidification/stabilization or other technologies) would effectively reduce the contaminant mobility within this material.

Implementability

Off-site disposal would be readily implementable. There are local facilities which can dispose of the contaminated materials (above NYSDEC soil cleanup guidance) in secure landfills. Local treatment and disposal facilities are available which can readily treat and dispose of the most heavily contaminated site materials which are subject to Land Disposal Restrictions.

Conclusion

Off site disposal will be retained for detailed analysis.

Section 5 - Detailed Analysis of Alternatives

In this section, technologies which passed the initial screening phase (Section 4) have been combined into remedial alternatives. A detailed analysis of the remedial alternatives are presented in this section, which provides the basis for comparison and selection of a remedial alternative for the site.

5.1 Evaluation Criteria

The following detailed analysis has been prepared in accordance with NYSDEC TAGM 4030, *Selection of Remedial Actions at Inactive Hazardous Waste Sites.* It also follows the general process specified in the USEPA document *Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA*, Interim Final, dated October 1988.

The remedial alternatives considered for the site must satisfy certain objectives. These include:

- Attaining Standards, Criteria, and Guidance (SCGs), or explanation of why SCG compliance is not necessary to protect human health and the environment
- Satisfy the preference for treatment that significantly and permanently reduces toxicity, mobility, or volume of hazardous wastes
- Protection of human health and the environment
- Be cost effective

To meet these goals a series of seven criteria are used to address the requirements and considerations listed above. These evaluation criteria serve as the basis for conducting the detailed analysis during the FS and for subsequently selecting an appropriate remedial action. The evaluation criteria are:

Compliance with SCGs

This criterion is used to determine how each alternative complies with applicable or relevant and appropriate standards, criteria, and guidelines. Compliance with SCGs will be discussed relative to action specific and chemical specific SCGs only, since no location specific SCGs were identified as applicable or relevant and appropriate.

Short-term impacts and effectiveness

This criterion addresses the effects of the alternative during the construction and implementation phase until the remedial actions have been completed and the selected level of protection has been achieved. Each alternative is evaluated with respect to: effects on the community and on-site workers during the remedial action; environmental impacts resulting from implementation of the alternative; and the amount of time required until protection is achieved.

Long-term effectiveness and performance

This evaluation criterion addresses the results of a remedial action in terms of its permanence and the nature and quantity of waste or residuals remaining at the site after the remedial action objectives have been met. The primary focus of this evaluation is to determine the extent and effectiveness of the controls that may be required to manage the risk posed by waste or residuals remaining at the site. The factors evaluated include the magnitude of the remaining risk and the adequacy, suitability, and long-term reliability of controls which are used to manage residuals or wastes remaining at the site.

Reduction of toxicity, mobility, or volume

This criterion addresses the preference for selecting remedial actions which employ treatment technologies that permanently and significantly reduce toxicity, mobility or volume of the contaminants. The factors to be evaluated include the treatment process to be employed, the amount of hazardous material destroyed or treated, the degree of reduction expected in toxicity, mobility or volume, the degree to which treatment is irreversible, and the type and quantity of treatment residuals.

Implementability

This criterion addresses the technical and administrative feasibility of implementing an alternative and the availability of various services and materials required during the implementation. Technical feasibility considers construction and operational difficulties, reliability, ease of undertaking additional remedial action (if needed), and the ability to monitor its effectiveness. Administrative feasibility considers activities needed to coordinate with other agencies (state and local) in regard to obtaining permits or approvals for implementing remedial actions. The availability of services and materials such as off-site treatment, storage and disposal capacity, and necessary equipment and skilled operators are considered in this evaluation.

Overall protection of human health and the environment

This criterion provides a final check to assess whether each alternative meets the requirement that the remedial action is protective of human health and the environment. The overall assessment of protection is based on a composite of factors assessed under other evaluation criteria, especially long-term effectiveness and performance, short term effectiveness, and compliance with SCGs.

Cost

This criterion addresses the capital costs, annual operation and maintenance costs, potential future capital costs, and potential costs of future land use. The total costs of each remedial action are calculated in a present worth analysis so that relative costs of each remedial alternative can be compared.

5.2 Remedial Alternatives

Based upon the screening of technology options, four remedial alternatives have been developed for a detailed analysis with respect to the seven evaluation criteria. These alternative are:

- Alternative 1- No action
- Alternative 2- On site containment
- Alternative 3- Off site treatment and disposal of waste/fill materials above LDRs; on site containment of other waste/fill materials above SCGs
- Alternative 4- Off site treatment/disposal of all waste/fill materials above SCGs

5.2.1 Alternative 1- No Action

The no action alternative is included as required to serve as a benchmark for comparison with other remedial alternatives. It would leave the site in its current physical state, relying on the fence to reduce direct human contact and incidental ingestion of any site contaminants.

Compliance with SCGs

As no actions would be taken under this alternative, action specific SCGs would not apply. The no action alternative would not comply with chemical specific SCGs, since contamination above SCGs would remain in site materials.

Short-term impacts and effectiveness

The no action alternative would not present any added short term risks to the community. Since the perimeter fence was repaired during the Remedial Investigation, the no action alternative would continue to be effective (in the short-term) at reducing site trespassing and preventing direct human exposures to site contaminants. The no action alternative would not pose any added short term impacts to the environment, however nor would it reduce any native animal contact and potential exposure to site contaminants. The no action alternative would essentially achieve its level of protection immediately, as the fence is already in place.

Long-term effectiveness and permanence

The no action alternative would provide some limited long term effectiveness by relying on the existing fence to reduce human contact with site contaminants. While it could not prevent trespassers and future site users from coming into contact with site contamination, it would deter most unauthorized access to the site for as long as the fence remained in satisfactory condition. Fallen trees, vandalism, etc. could reduce the long term effectiveness and permanence of the existing controls. Without any action, the site could not be utilized for future commercial development without addressing site contaminants which would remain.

Reduction of toxicity, mobility, or volume

The no action alternative would not significantly reduce the toxicity, mobility, or volume of the site contaminants. Over time, some natural biodegradation would likely reduce the concentrations of the organic contaminants found in the site materials, but would not significantly effect the concentrations of metals.

Implementability

As no actions would be required, no implementability issues would be encountered.

Overall protection of human health and the environment

The no action alternative would not be fully protective of human health. While the perimeter fence would help to reduce human contact with site contaminants, it would not prevent trespassers and future site users from direct contact or incidental ingestion of site contaminants. Therefore the no action alternative would not meet the Remedial Action Objectives identified for the site. While the site is not believed to pose a significant threat to the environment, the no action alternative would not offer any positive benefit to the native animals which may live in and around contaminated site materials.

Cost

There would be no capital costs nor operation and maintenance costs for the no action alternative. As such, there would also be no present worth costs associated with the no action alternative.

5.2.2 Alternative 2- On Site Containment

On site containment would consist of grading and covering all waste and fill materials which contain contaminants in concentrations above SCGs. The contaminated material could be consolidated so that the cover system would be placed over a relatively small portion of the site, thereby allowing future site development on the remaining portion of the property. Figure 5 represents a conceptual 2 acre cover system located on the western portion of the site (this western area roughly corresponds to the area of highly contaminated material, however this material could be relocated and the cover system could be constructed anywhere within Area B).

The cover system would consist of layers of clean soil and vegetated topsoil (grass) over the contaminated waste and fill materials. Figure 6 shows a conceptual cover system design consisting of a 6" layer of vegetated topsoil, overlaying a 12" layer of clean soil barrier which overlays the fill/waste material above SCGs. The conceptual cover system design also includes a synthetic geotextile fabric layer between the clean soil barrier layer and the contaminated fill/waste material. The purpose of the fabric layer is two-fold: it would prevent the co-mingling of clean soil and fill/waste material during barrier layer compaction and settlement; and it would provide an identifiable visual barrier should future site activities result in excavation into the cover area. Prior to placement of the cover, the waste and fill materials would be graded so that the finished cover would improve site drainage. The resulting cover system would resemble a relatively flat topped mound which would be several feet in height. Additional drainage features would be added as appropriate to prevent surface water "ponding" on the cover and around the perimeter.

Compliance with SCGs

The containment alternative would meet identified action specific SCGs. The containment alternative would not meet chemical specific SCGs because contaminated material would remain on site in concentrations significantly above DEC TAGM 4046 soil cleanup guidance.

Short-term impacts and effectiveness

Site grading, waste consolidation, and cover system construction would not have any significant short term adverse impacts upon the community, the workers, or the environment. Dust controls and monitoring would be employed to prevent particulate migration during construction. Standard personal protective measures and monitoring would be employed to protect workers and the community. Construction of the cover system (not including design and contractor procurement periods) would likely take less than 6 months, at which time the remedy would be effective at preventing direct human contact and incidental ingestion of site contaminants. The containment alternative may also offer some short term environmental benefit by reducing potential for native animal contact with site contaminants.

Long-term effectiveness and permanence

While all contaminants would remain on site, the containment alternative would be an effective and permanent means of meeting the remedial action objectives as long as the cover system was maintained. Since some wastes and fill with high metals and SVOC concentrations would remain on site, future site development could be effected. However the cover system could be designed and located so as to reduce potential future site development limitations.

Reduction of toxicity, mobility, or volume

The containment alternative would isolate the site contaminants from possible human contact, and would reduce the long term mobility of site contaminants by preventing contaminant transport via erosion. However, containment would not reduce the volume of the site contaminants. Over time, some natural biodegradation would likely reduce the concentrations of the organic contaminants found in the site materials, but no significant reductions in inorganic concentrations would likely occur. As such, the containment alternative would not reduce the toxicity of the inorganic site contaminants.

Implementability

Waste containment is a common component of remedies at inactive hazardous waste disposal sites. Construction methods are common and there are numerous local contractors available who are experienced with this type of work. No administrative difficulties would be expected.

Overall protection of human health and the environment

The containment alternative would be protective of human health. It would not pose any significant short-term impacts, and while it would not meet chemical specific SCGs, the soil cover would effectively prevent direct human contact and incidental ingestion of site contaminants as long as the cover was maintained. Deed restrictions would be necessary to ensure that future site uses and development are compatible with the cover system. The containment alternative may also offer some environmental benefit by reducing future native animal contact with site contaminants.

Cost

The capital costs to construct a 2 acre soil cover system consisting of a 18 inch thick vegetated layer of clean soil, geotextile fabric, and appropriate drainage controls is estimated at $202,000 (see Appendix B). Operation and maintenance costs for the containment alternative are estimated at $6,700 per year, and include cover maintenance and annual groundwater monitoring. The total present worth costs for the containment alternative is $305,200 (see Appendix C).

5.2.3 Alternative 3- Off Site Treatment/Disposal of Contaminated Materials Above LDRs; On Site Containment of Remaining Contaminated Materials Above SCGs

This alternative would consist of removal and off site treatment/disposal of the most highly contaminated waste and fill materials. This material has been identified as likely having concentrations in excess of LDRs. The total estimated volume of this material is approximately 650 cubic yards, and the approximate limits are shown in Figure 4. The remainder of contaminated waste and fill materials with contaminants exceeding SCGs would be consolidated and placed under a soil cover system similar to that described in the containment alternative (Alternative 2).

Compliance with SCGs

This alternative would meet identified action specific SCGs. Proper waste hauling permits would be required. All material exceeding LDRs would require treatment by a permitted facility prior to land disposal. This alternative would not meet chemical specific SCGs for materials which would remain on site under the cover system.

Short-term impacts and effectiveness

Removal of the estimated 650 cubic yards of material from the site would have some limited short term impacts on the community. This material would be hauled off site in trucks to a licensed facility. An estimated 50 truck loads of material would be hauled from the site. This hauling would not likely pose any significant impacts since trucks could access the site from Wurlitzer drive and would not need to enter the neighborhood. In addition, the duration of hauling for this amount of material would be very limited. Hauling from the site could likely be completed in a matter of a few days. Site grading, waste consolidation, and cover system construction would not have any significant short term adverse impacts upon the community, the workers, or the environment. Dust controls and monitoring would be employed to prevent particulate migration during construction. Standard personal protective measures and monitoring would be employed to protect workers and the community. Construction of the cover system (not including design and contractor procurement periods) for the remaining materials above SCGs would likely take less than 6 months, at which time the remedy would be effective at preventing direct human contact and incidental ingestion of the remaining site contaminants. Removal and off-site treatment/disposal of the most highly contaminated soils would also offer some short term environmental benefit by eliminating native animal contact with the most highly contaminated materials.

Long-term effectiveness and permanence

The removal of the most highly contaminated material would be an effective and permanent means of reducing the total volume of contaminated material. Containment of the remaining material above SCGs would be an effective and permanent means of meeting the remedial action objectives as long as the cover system was maintained. Since some wastes and fill with high metals and SVOC concentrations would remain on site, future site development could be effected. However the cover system could be designed and located so as to reduce potential future site development limitations.

Reduction of toxicity, mobility, or volume

The treatment and subsequent secure disposal of material at an off-site facility would reduce the toxicity, mobility and volume of a significant amount of contaminated material. Containment of the remaining material above SCGs would isolate the site contaminants from possible human contact and reduce the contaminant mobility by preventing erosion, but would not reduce the volume of this material. Over time, some natural biodegradation would likely reduce the concentrations of the organic contaminants found in the site materials, but no significant reductions in the concentrations of inorganics would likely occur. As such, this alternative would not reduce the toxicity of the inorganic site contaminants.

Implementability

Licensed treatment and disposal facilities are available locally (e.g. Chem Waste Management in Model City). Appropriate hazardous waste permitting would be required for the transport and disposal of the characteristic hazardous waste material. Appropriate solid waste transport and disposal permitting would be required for the non-regulated hazardous wastes. Waste containment through use of cover systems are a common component of remedies at many inactive hazardous waste disposal sites. Construction methods are common and there are numerous local contractors who are experienced with this type of work. No administrative difficulties would be expected.

Overall protection of human health and the environment

This alternative would be protective of human health. The most highly contaminated waste and fill materials would be removed from the site and properly treated and disposed at on off-site facility. Short term impacts from waste removal would be very limited, primarily those associated with loading and hauling. While the remaining contaminants would not meet chemical specific SCGs, the soil cover would prevent direct human contact and incidental ingestion of remaining site contaminants as long as the cover was maintained. Deed restrictions would be necessary to ensure that future site uses and development are compatible with the cover system. This alternative may provide for some limited environmental benefits resulting from the removal of approximately 650 cubic yards of highly contaminated materials. This benefit would likely be limited to burrowing animals which may live in or around the waste and fill piles.

Cost

The total capital costs to transport, treat, and dispose of the 650 cubic yards of characteristic hazardous waste, and to construct a 2 acre soil cover system over the remaining site contaminants (similar to alternative 2) is estimated at $373,700 (see Appendix B). Operation and maintenance costs for this alternative are estimated at $6,700 per year, and include cover maintenance and annual groundwater monitoring. The total present worth costs for the containment alternative is $476,900 (see Appendix C).

5.2.4 Alternative 4- Off Site Treatment/Disposal of all Contaminated Materials Above SCGs

This alternative would consist of removal and off site treatment/disposal of all waste and fill materials which contain contaminants above SCGs. The cleanup criteria would be NYSDEC TAGM 4046 soil cleanup guidance. The total volume of this material is estimated at 3200 cubic yards, and the approximate limits of this material are shown in Figure 4.

Compliance with SCGs

This alternative would meet identified action specific SCGs. All material exceeding LDRs would require treatment by a permitted facility prior to land disposal. All other material would have to be disposed at a licensed facility in accordance with applicable State and Federal regulations. This alternative would also meet all identified chemical specific SCGs since all fill and waste materials containing contaminants in excess of NYSDEC soil cleanup guidance would be removed from the site and properly disposed.

Short-term impacts and effectiveness

Removal of the estimated 3200 cubic yards of material from the site would have some limited short term impacts on the community. This material would be hauled off site in trucks to a licensed facility. An estimated 250 truck loads of material would be hauled from the site. This hauling would not likely pose any significant impacts since trucks could access the site from Wurlitzer drive and would not need to enter the neighborhood. In addition, the duration of hauling for this amount of material would be limited. Hauling from the site could likely be completed in a matter of a few weeks to a month, at which time the remedy will have permanently eliminated threats posed by significant site contaminants, and will have fully achieved the remedial action objectives. Dust controls and monitoring would be employed to prevent particulate migration during waste removal. Standard personal protective measures and monitoring would be employed to protect workers and the community. Removal and off-site treatment/disposal of all materials with contaminants above SCGs would also offer some short term environmental benefit by eliminating native animal contact with all significantly contaminated materials.

Long-term effectiveness and permanence

The removal of all materials above SCGs would be an effective and permanent means of meeting the remedial action objectives. With the removal of all significant site contaminants, the site could be delisted from the Registry of Inactive Hazardous Waste Disposal Sites, and no impediments to future site use and development would remain.

Reduction of toxicity, mobility, or volume

The removal of waste and fill with contaminants above SCGs from the site would eliminate all significant contaminants from the site

Implementability

Removal of soil and waste material from the site would be readily implementable. Proper waste hauling permits would be required. Any facility to receive contaminated waste and fill materials would have to be properly permitted. Contractors are available locally who could readily perform the work. No administrative difficulties would be expected.

Overall protection of human health and the environment

This alternative would be fully protective of human health. It would fully satisfy all SCGs. Short term impacts would be limited primarily to those associated with the loading and hauling of material from the site. This alternative may also provide for some environmental benefits resulting from the removal of all significantly contaminated materials. This benefit would likely be limited to burrowing animals which may live in or around the waste and fill piles.

Cost

The total capital costs to transport, treat, and dispose of the 650 cubic yards of characteristic hazardous waste, and to transport and dispose of the 2550 cubic yards of non-hazardous contaminated material is estimated at $340,700 (see Appendix B). Since all contaminated material above SCGs would be removed from the site, there would be no long term operation and maintenance costs for this alternative. The total present worth costs for this alternative is therefore also $340,700 (see Appendix C).

Section 6 - Comparison of Alternatives

In this section, the relative performance of the four remedial alternatives are compared with respect to their ability to achieve the seven criteria. The advantages and disadvantages of each alternatives relative to one another are detailed so that one alternative may be selected and recommended for implementation.

Compliance with SCGs

All four alternatives would comply with identified action specific SCGs. Of the four alternatives, only Alternative 4 would fully meet chemical specific SCGs. Alternative 3 would remove the most highly contaminated waste and fill from the site, but a significant amount of material would remain on site with contaminant concentrations above NYSDEC TAGM 4046 soil cleanup guidance. Alternative 1 and Alternative 2 would leave all contaminants on site, and thus would not even partially meet chemical specific SCGs.

Short-term impacts and effectiveness

Alternative 1 would have no short term impacts. It would provide for some limited short term effectiveness through reliance on the existing perimeter fence to deter unauthorized site access. Alternatives 2, 3, and 4 would require active handling of contaminated wastes, but would not pose any significant short term adverse impacts upon the community, the site workers, or the environment. Dust controls and monitoring would be employed to prevent particulate migration. Alternatives 3 and 4 would require loading and hauling of contaminated wastes from the site, however the period associated with this work would be of limited duration, and trucks hauling waste would not pass through the residential neighborhood. Construction work/field operations would likely last less than 6 months (not including design and contractor procurement) for alternatives 2, 3 and 4.

Long-term effectiveness and permanence

Alternative 1 would provide for very limited long-term effectiveness and permanence. It's effectiveness depends upon the continued integrity of the fence and that effectiveness could easily be diminished by fallen trees, vandalism, etc. Alternatives 2 and 3 would provide for much greater long term effectiveness and permanence than alternative 1. The effectiveness and permanence of these two alternatives would rely on deed restrictions and long term operation and maintenance of a cover system. As contaminated wastes would remain on site, future site development potential under Alternatives 2 and 3 may be limited. Alternative 3 would be more effective and permanent than alternative 2, since 650 cubic yards of the most highly contaminated material would be removed from the site. Alternative 4 would provide for the greatest long-term effectiveness and permanence by removing all significant contaminants from the site. After all significant contaminants were removed, the site could be de-listed from the

Registry of Inactive Hazardous Waste Disposal Sites and future site use and development impediments would be removed.

Reduction of toxicity, mobility, or volume

Alternative 1 would not provide for any reduction in toxicity, mobility, or volume of the site contaminants. Alternative 2 would not reduce the toxicity or volume of site contaminants. It would reduce the potential for contaminant mobility through construction of a cover system. Alternative 3 would offer a similar reduction of potential contaminant mobility, but would also offer a reduction in the toxicity and volume of site contaminants by removing, treating, and properly disposing of the most highly contaminated material. Alternative 4 would offer the greatest reduction of toxicity, mobility, and volume of contaminants since all contaminants above SCGs would be removed from the site.

Implementability

All of the alternatives would be readily implementable. Contractors are available locally who could readily perform all work required in each alternative. Off-site treatment and disposal facilities are available locally (within the County) to treat and/or dispose of the contaminated materials removed from the site under Alternatives 3 and 4. No administrative difficulties would be expected in any of the alternatives.

Overall protection of human health and the environment

Alternative 1 would not be fully protective of human health since trespassers and future site workers may come into contact with contaminated materials. Alternative 2 would offer protection of human health by preventing direct human contact with contaminants through construction of a cover system. Alternative 3 would offer better long term human health protection than alternative 2, since it would remove the most highly contaminated materials from the site, and utilize a cover system for the remaining contaminants. Alternative 4 would provide for the highest level of protection of human health by completely removing significant site contaminants. Alternatives 3 and 4 may also provide for some limited environmental benefit to native animals by removing some or all of the contaminated materials from the site.

Cost

Alternative 1 has no cost. The capital costs of alternative 4 are higher than alternative 3, but since alternative 4 has no long term operation and maintenance costs, the total present worth costs of alternative 4 are only slightly higher than alternative 3. Appendix A and B contain detailed cost estimates for each alternative. The costs for alternative 2, 3 and 4 are summarized below.

	Capital Costs	Annual O&M Costs	Total Present Worth Costs
Alternative 2	$202,200	$6,700	$305,200
Alternative 3	$373,700	$6,700	$476,900
Alternative 4	$340,700	$0	$340,700

Section 7 - Recommended Alternative

The recommended remedial alternative for the Wurlitzer Area B site is Alternative 4: Removal and off-site treatment and disposal of all materials above SCGs. The rationale for this recommendation is as follows:

1. Of the four alternatives evaluated, Alternative 4 is the only alternative which fully achieves SCGs.

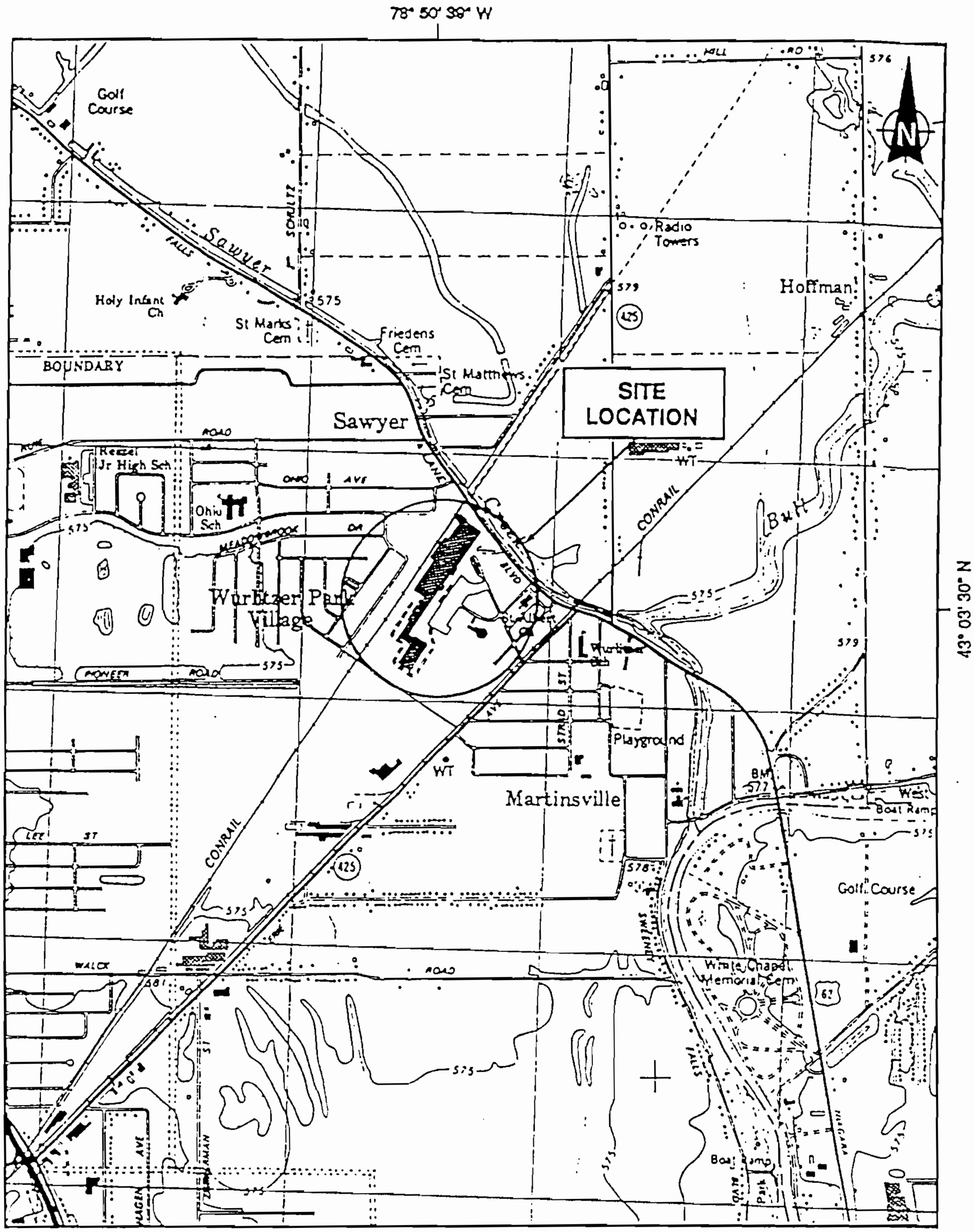
2. Alternative 4 offers the greatest long term, permanent, and effective remedy.

3. Alternative 4 achieves the highest level of protection for human health and the environment.

4. Alternative 4 would not pose any future land use restrictions. It would also allow the site to be de-listed from the Registry of Inactive Hazardous Waste Disposal Sites.

5. Alternative 4 requires no long term operation and maintenance, and total present worth costs for Alternative 4 are only slightly greater than alternative 3.

Figures



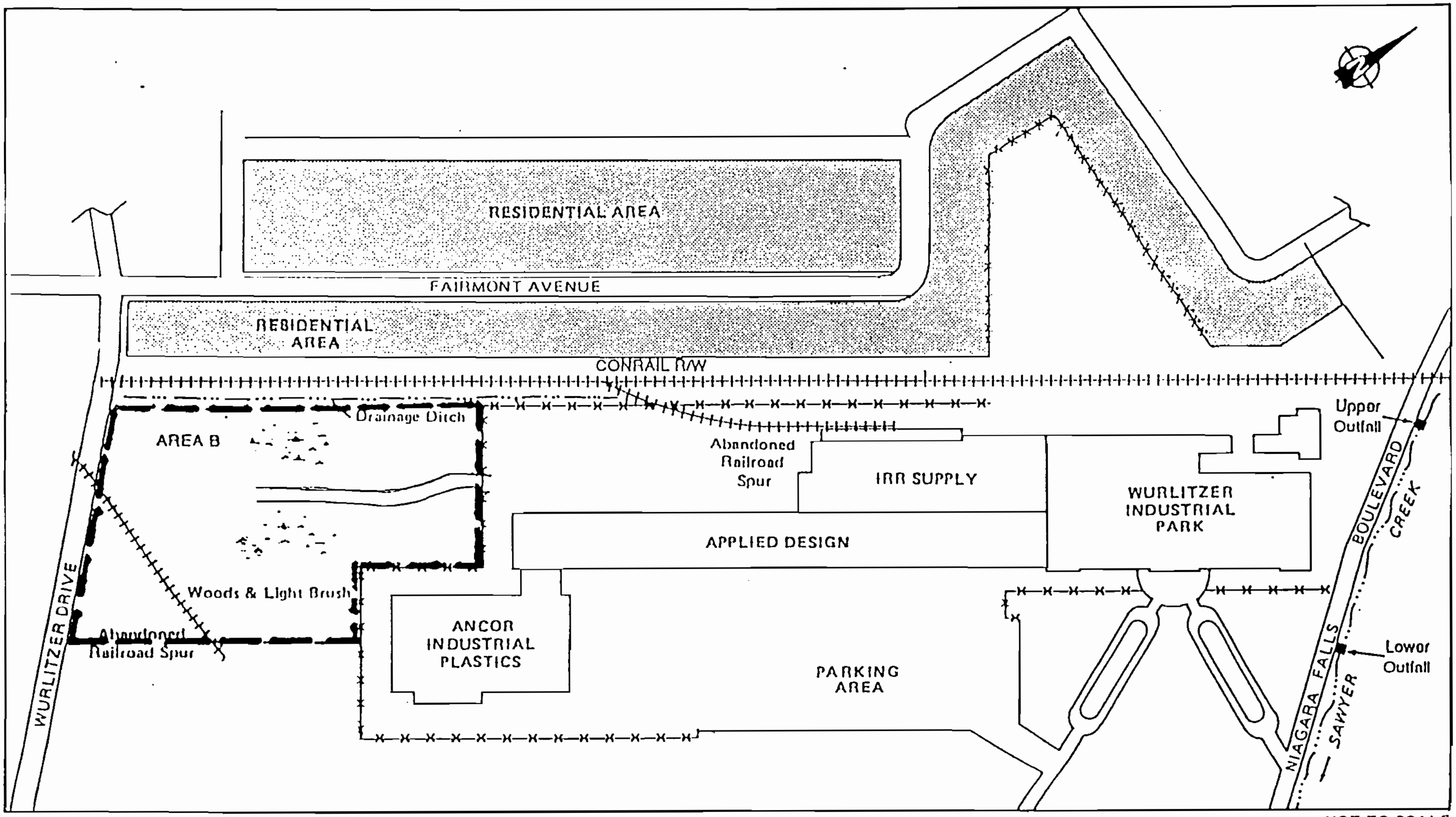
SOURCE: USGS 7.5 Minute Series (Topographic) Quadrangle, Tonawanda East, NY 1980.

SCALE 1:24,000

0 ½ 1 Mile

0 .5 1 Kilometer

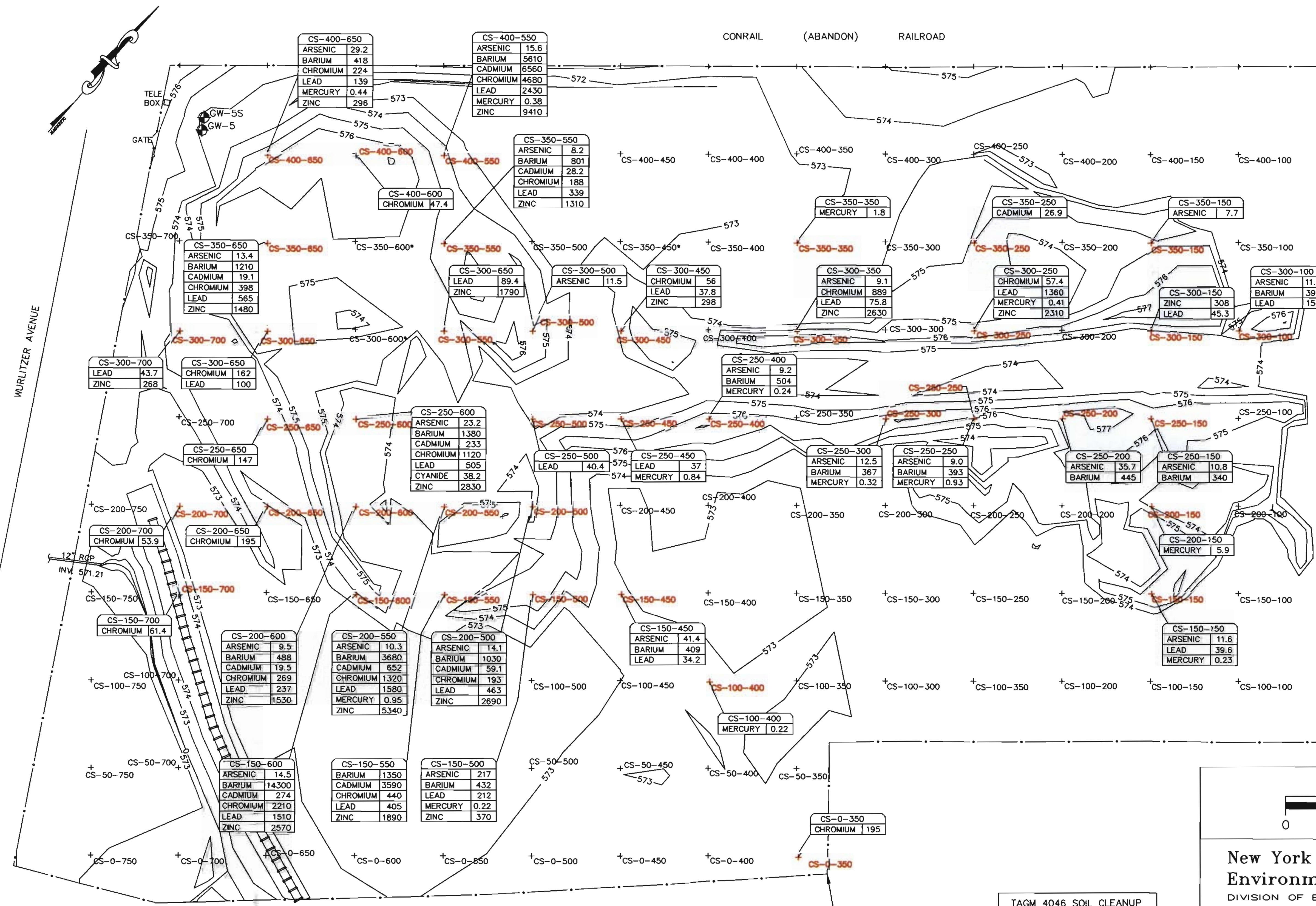
Figure 1-1
WURLITZER SITE LOCATION MAP



SOURCE: Ecology and Environment Engineering, P.C.

NOT TO SCALE

Figure 1-2
WURLITZER SITE MAP



LEGEND:

- △ JCL CONTROL POINT
- CHAIN LINK FENCE
- MONITORING WELL
- RAILROAD RAILS
- 573 CONTOURS (ft msl)
- OUTFALL PIPE
- \+ SOIL SAMPLE
- CS-150-150 SAMPLE WITH INORGANICS GREATER THAN CLEANUP GUIDANCE

CS-100-100		← SAMPLE IDENTIFICATION
CADMIUM	7.6	← CONCENTRATION IN mg/Kg
CHROMIUM	56	
LEAD	120	

NOTES:

1. BASE MAP PREPARED BY LU ENGINEERS, INC. OF PENFIELD, NY. UNDER CONTRACT WITH MALCOLM PIRNIE, INC.
2. HORIZONTAL DATUM IS LOCAL WITH ASSUMED COORDINATES AND MAGNETIC NORTH.
3. VERTICAL DATUM IS LOCAL BASED ON THE RISER ELEVATION ON GW-5 AS 575.88. THIS IS PREFERENCED TO A PLAN THAT WAS DONE (BY OTHERS) IN 1991 AND SUPPLIED TO LU ENGINEERS, INC. BY MALCOM PIRNIE, INC.
4. UNLESS OTHERWISE NOTED BY AN "*", ALL SAMPLE LOCATIONS WERE ANALYZED, HOWEVER, ONLY ELEVATED ANALYTICAL RESULTS ARE PRESENTED IN THE FIGURE.

TAGM 4046 SOIL CLEANUP GUIDANCE VALUES (mg/Kg)	
ARSENIC	7.5 or SB
BARIUM	300 or SB
CADMIUM	10 or SB
CHROMIUM	50 or SB
LEAD	SB
MERCURY	0.10
ZINC	20 or SB

SB = SITE BACKGROUND

SCALE IN FEET
0 30 60 120

New York State Department of Environmental Conservation
DIVISION OF ENVIRONMENTAL REMEDIATION

WURLITZER "AREA B"
NORTH TONOWANDA, NEW YORK
NIAGARA COUNTY

PROPOSED REMEDIAL ACTION PLAN
SOIL SAMPLING RESULTS
INORGANICS

DATE	SITE NO.	
OCT. 1999	9-32-041	FIGURE 2

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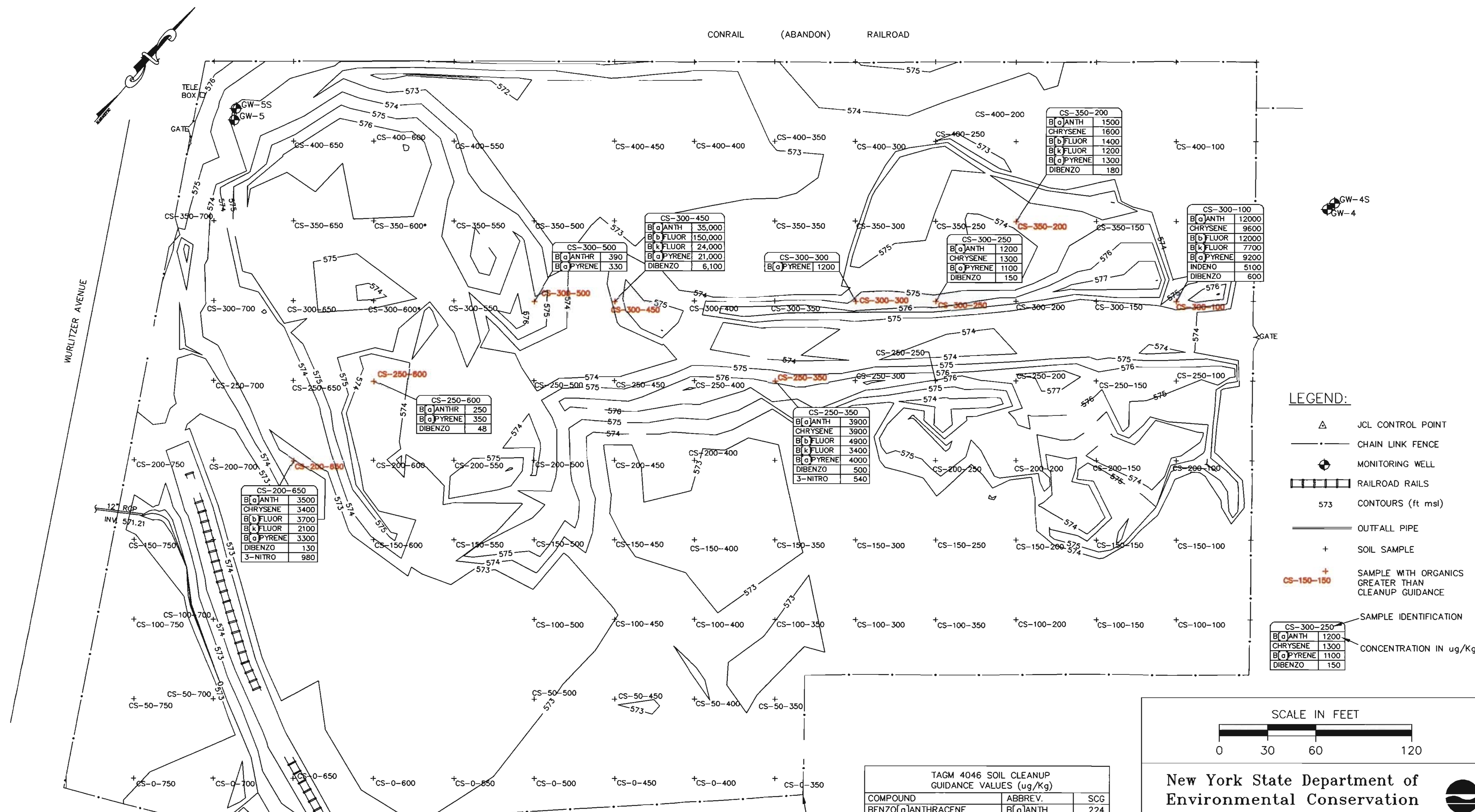
7/16/99



SCALE IN FEET

0 30 60 120

TAGM 4046 SOIL CLEANUP GUIDANCE VALUES (ug/Kg)		
COMPOUND	ABBREV.	SCG
BENZO[a]ANTHRACENE	B[a]ANTH	224
CHRYSENE	CHRYSENE	400
BENZO[b]FLUORANTHENE	B[b]FLUOR	1100
BENZO[k]FLUORANTHENE	B[k]FLUOR	1100
BENZO[a]PYRENE	B[a]PYRENE	61
INDENO[1,2,3-cd]PYRENE	INDENO	3200
DIBENZO[a,h]ANTHRACENE	DIBENZO	14
3-NITROANILINE	3-NITRO	500

NOTES:

1. BASE MAP PREPARED BY LU ENGINEERS, INC. OF PENFIELD, NY. UNDER CONTRACT WITH MALCOLM PIRNIE, INC.
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4. UNLESS OTHERWISE NOTED BY AN "*", ALL SAMPLE LOCATIONS WERE ANALYZED, HOWEVER, ONLY ELEVATED ANALYTICAL RESULTS ARE PRESENTED IN THE FIGURE.

New York State Department of Environmental Conservation

DIVISION OF ENVIRONMENTAL REMEDIATION

WURLITZER "AREA B"
NORTH TONOWANDA, NEW YORK
NIAGARA COUNTY

PROPOSED REMEDIAL ACTION PLAN

SOIL SAMPLING RESULTS ORGANICS

DATE	SITE NO.	
OCT. 1999	9-32-041	FIGURE 3

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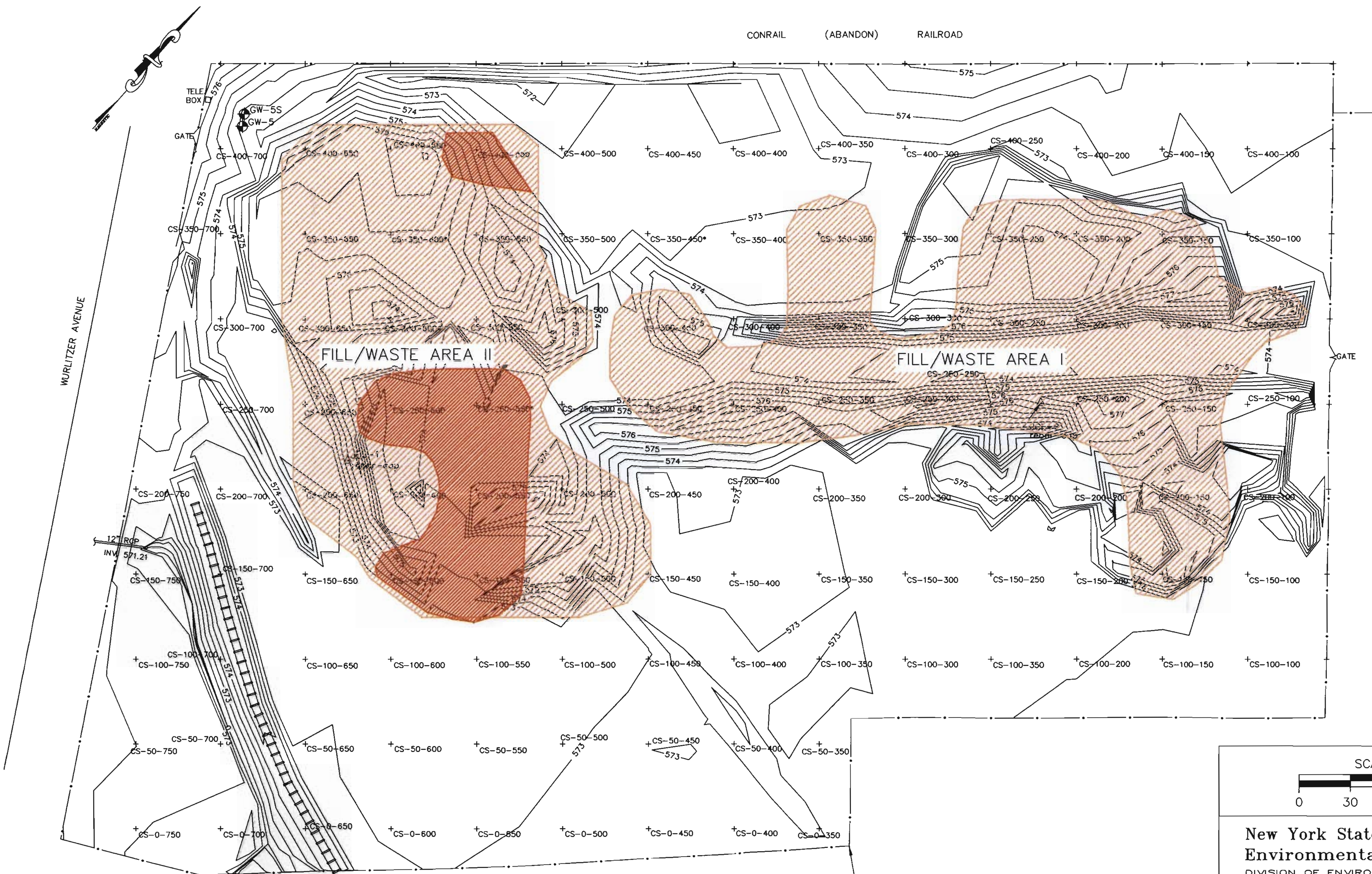
7/16/99



LEGEND:

- △ JCL CONTROL POINT
- CHAIN LINK FENCE
- MONITORING WELL
- RAILROAD RAILS
- 573 CONTOURS (ft msl)
- OUTFALL PIPE
- \+ SOIL SAMPLE
- CONTAMINANTS IN FILL/WASTE ABOVE NYSDEC SOIL CLEANUP GUIDANCE
- CONTAMINANTS IN FILL/WASTE LIKELY SUBJECT TO LAND DISPOSAL RESTRICTIONS

NOTES:

1. BASE MAP PREPARED BY LU ENGINEERS, INC. OF PENFIELD, NY. UNDER CONTRACT WITH MALCOLM PIRNIE, INC.
2. HORIZONTAL DATUM IS LOCAL WITH ASSUMED COORDINATES AND MAGNETIC NORTH.
3. VERTICAL DATUM IS LOCAL BASED ON THE RISER ELEVATION ON GW-5 AS 575.88. THIS IS PREFERENCED TO A PLAN THAT WAS DONE (BY OTHERS) IN 1991 AND SUPPLIED TO LU ENGINEERS, INC. BY MALCOM PIRNIE, INC.

SCALE IN FEET

0 30 60 120

New York State Department of Environmental Conservation

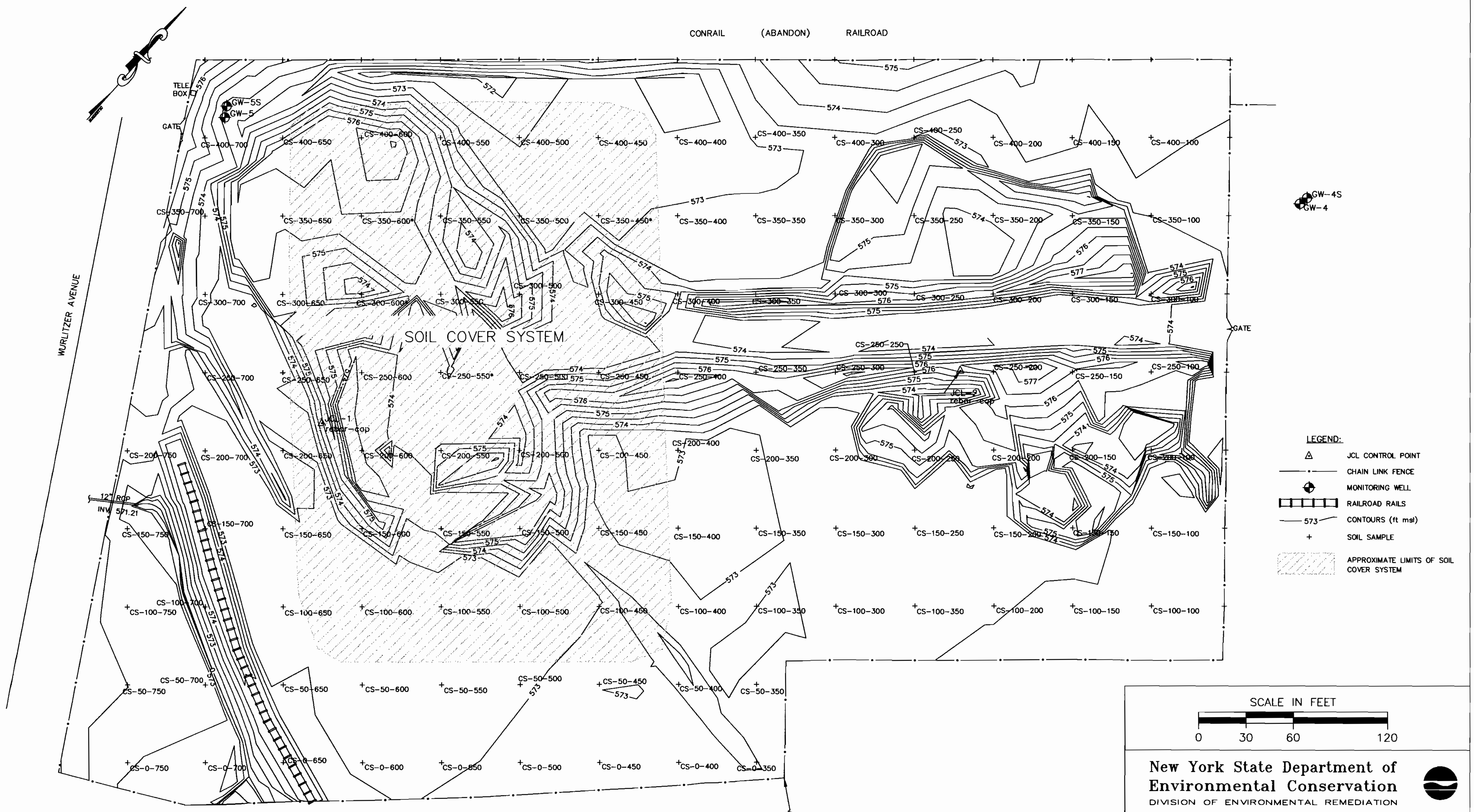
DIVISION OF ENVIRONMENTAL REMEDIATION

WURLITZER – AREA "B"
NORTH TONOWANDA, NEW YORK
NIAGARA COUNTY

PROPOSED REMEDIAL ACTION PLAN

FILL/WASTE CONTAMINANT AREAS

DATE	SITE NO.	
OCT. 1999	9-32-041	FIGURE 4



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2. HORIZONTAL DATUM IS LOCAL WITH ASSUMED COORDINATES AND MAGNETIC NORTH.
3. VERTICAL DATUM IS LOCAL BASED ON THE RISER ELEVATION ON GW-5 AS 575.88. THIS IS PREFERENCED TO A PLAN THAT WAS DONE (BY OTHERS) IN 1991 AND SUPPLIED TO LU ENGINEERS, INC. BY MALCOM PIRNIE, INC.
4. COVER SYSTEM LOCATION SHOWN TO INDICATE APPROXIMATE 2-ACRE SIZE ONLY. ACTUAL LOCATION WOULD BE A PRE-DESIGN DETERMINATION.

SCALE IN FEET

0 30 60 120

New York State Department of Environmental Conservation
DIVISION OF ENVIRONMENTAL REMEDIATION

WURLITZER – AREA "B"
NORTH TONOWANDA, NEW YORK
NIAGARA COUNTY

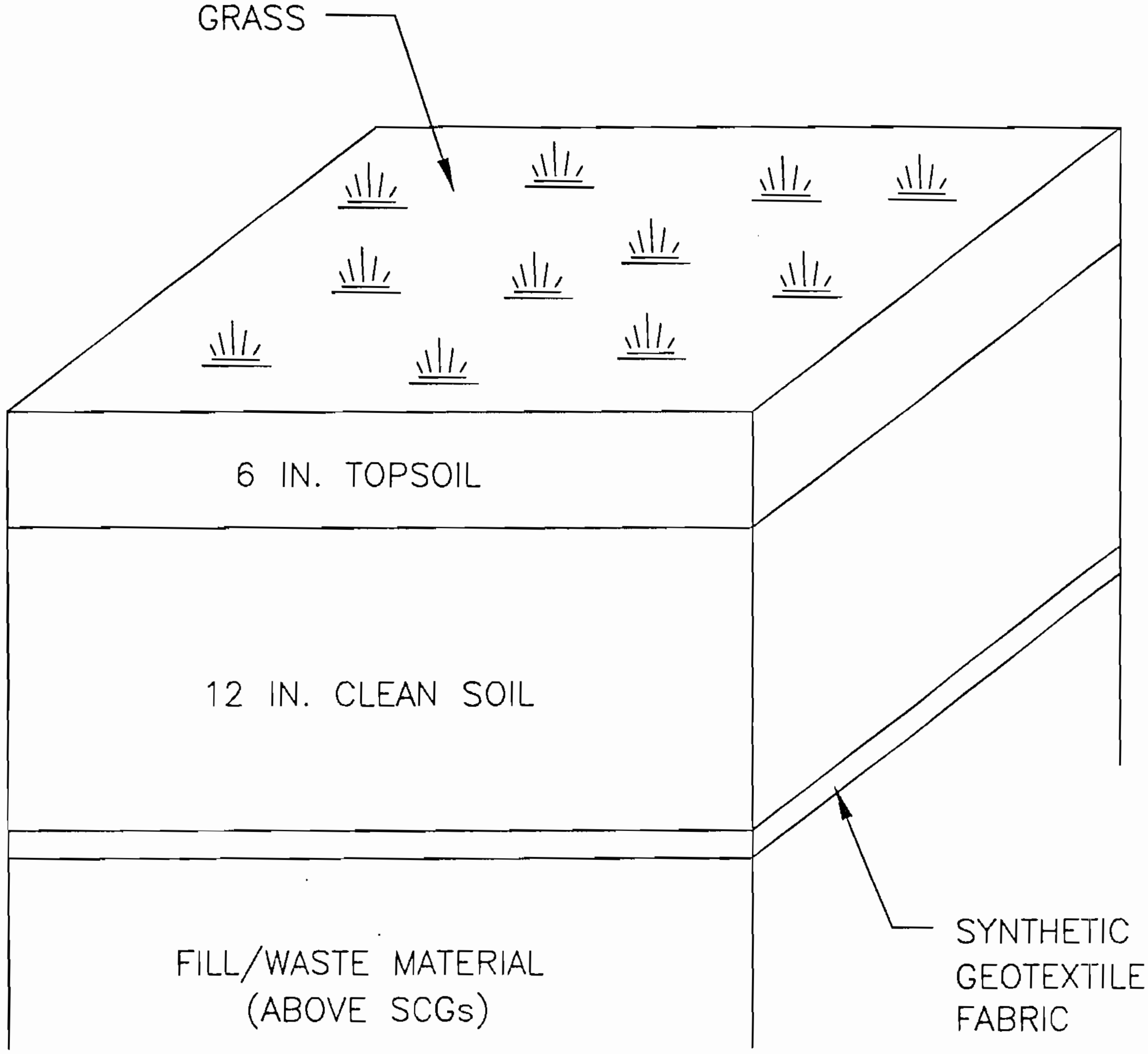
PROPOSED REMEDIAL ACTION PLAN
CONCEPTUAL TWO-ACRE SOIL COVER SYSTEM LIMITS

DATE	SITE NO.	
OCT. 1999	9-32-041	FIGURE 5

C:\1_PROJECTS\9-32-041\DWGS\SOILCOVR.DWG SF:60

6/17/99

FIGURE 6



WURLITZER "AREA B"
PROPOSED REMEDIAL ACTION PLAN

CONCEPTUAL SOIL COVER SYSTEM CROSS-SECTION

9-32-041
SEPT. 1999

New York State Department of
Environmental Conservation
DIVISION OF ENVIRONMENTAL REMEDIATION

Tables

Table 1
Wurlitzer Area B Site Feasability Study
Summary of TCLP Samples Taken from Test Pit Excavations

Sample Number Lab Sample No. Sampling Date	TCLP Regulatory Level (mg/l)	TP-8A 44051 4/21/98 Conc. (mg/l)	Q	TP-8B 44052 4/21/98 Conc. (mg/l)	Q	TP-11 44053 4/21/98 Conc. (mg/l)	Q
TLCP INORGANICS							
Arsenic	5.0	ND		0.0064	B	0.0128	
Lead	5.0	0.0577		0.523		0.0068	J
Barium	100.0	2.46		1.93		0.124	B
Cadmium	1.0	7.13		16		0.013	
Mercury	0.2	0.00097	J	0.00086	J	ND	
Selenium	1.0	0.0051		0.004	B	ND	
Silver	5.0	0.0033	B	ND		ND	
Chromium	5.0	0.0019	B	0.042		0.0059	B
TLCP SEMIVOLATILE ORGANIC COMPOUNDS							
Pyridine	5.0	ND		ND		ND	
1,4-Dichlorobenzene	7.5	ND		ND		ND	
2-Methylphenol	200	ND		ND		ND	
3+4-Methyphenols	200	ND		ND		ND	
Hexachloroethane	3.0	ND		ND		ND	
Nitrobenzene	2.0	ND		ND		ND	
Hexachlorobutadiene	0.5	ND		ND		ND	
2,4,6-Trichlorophenol	2.0	ND		ND		ND	
2,4,5-Trichlorophenol	400.0	ND		ND		ND	
2,4-Dinitrotoluene	0.13	ND		ND		ND	
Hexachlorobenzene	0.13	ND		ND		ND	
Pentachlorophenol	100.0	ND		ND		ND	
TLCP VOLATILE ORGANIC COMPOUNDS							
Vinyl Chloride	0.2	ND		ND		ND	
1,1-Dichloroethene	0.7	ND		ND		ND	
Chloroform	6.0	ND		ND		ND	
1,2-Dichloroethane	0.5	ND		ND		ND	
2-Butanone	200.0	ND		ND		ND	
Carbon Tetrachloride	0.5	ND		ND		ND	
Trichloroethene	0.5	ND		ND		ND	
Benzene	0.5	ND		ND		ND	
Tetrachloroethene	0.7	ND		ND		ND	
Chlorobenzene	100.0	ND		ND		ND	

Notes:
MDL = Method Detection Limit.
NV = No Value.
ND = Compound was analyzed for, but not detected.
J = Concentration has been estimated.
B = Inorganic concentration is above the instrument detection limit but below the contract required detection limit

Table 1
Wurlitzer Area B Site Feasability Study
Summary of TCLP Samples Taken from Test Pit Excavations

Sample Number Lab Sample No. Sampling Date	TCLP Regulatory Level (mg/l)	TP-8A 44051 4/21/98 Conc. (mg/l)	Q	TP-8B 44052 4/21/98 Conc. (mg/l)	Q	TP-11 44053 4/21/98 Conc. (mg/l)	Q
TCLP PESTICIDES							
gamma-BHC (Lindane)	0.4	ND		ND		ND	
Heptachlor	0.008	ND		ND		ND	
Heptachlor epoxide	0.008	ND		ND		ND	
Endrin	0.02	ND		ND		ND	
Methoxychlor	10.0	ND		ND		ND	
alpha-Chlordane	0.03	ND		ND		ND	
Toxaphene	0.5	ND		ND		ND	
TCLP HERBICIDES							
2,4-D	10.0	ND		ND		ND	
SILVEX	1.0	ND		ND		ND	
2,4,5-T	400.0	ND		ND		ND	

Notes:
MDL = Method Detection Limit.
NV = No Value.
ND = Compound was analyzed for, but not detected.
J = Concentration has been estimated.
B = Inorganic concentration is above the instrument detection limit but below the contract required detection limit

Table 2-1

Potential Action Specific SCGs
Wurlitzer Area B Site

SCG	Requirements	Applicability and Relevance to Site
6 NYCRR Part 364 - Waste Transporter Permits	Regulates collection, transport, and delivery of regulated waste	Off-site disposal alternatives for contaminated media
6 NYCRR Part 370 - Hazardous Waste Management System	Definitions and terms and general standards applicable to Parts 370-374 & 376	Defines terms used in various remedial alternatives
6 NYCRR Part 371 - Identification and Listing of Hazardous Wastes	Hazardous waste determinations	Off-site disposal alternatives for contaminated media
6 NYCRR Part 372 - Hazardous Waste Manifest System and Related Standards for Generators, Transporters and Facilities	Manifest system and record keeping, certain management standards	Off-site disposal alternatives for contaminated media
6 NYCRR Part 375 - Inactive Hazardous Waste Disposal Site Remedial Program	Requirements regarding remedial programs	Requirements and guidance for various remedial alternatives
6 NYCRR Part 376 - Land Disposal Restrictions	Identifies hazardous waste restricted from land disposal	Off-site disposal alternatives for contaminated media
NYSDEC TAGM HWR-92-4030 Selection of Remedial Actions at Inactive Hazardous Waste Sites	Remedy selection, evaluations, and criteria	Requirements and guidance for various remedial alternatives
NYSDEC TAGM HWR-92-4046 Determination of Soil Cleanup Objectives	Soil cleanup goals	Establishes soil cleanup objectives based upon protection of groundwater

Table 2-1

Potential Action Specific SCGs
Wurlitzer Area B Site

SCG	Requirements	Applicability and Relevance to Site
and Cleanup Levels		
NYSDEC TAGM HWR-92-4031 Fugitive Dust Suppression and Particulate Monitoring Program at Inactive Hazardous Waste Sites	Dust suppression requirements during site remedial actions	Requirements for dust and particulate monitoring during remedy implementations
29 CFR Part 1910.120 Hazardous Waste Operations and Emergency Response	Health and safety requirements on hazardous waste sites	Guidance for health and safety during remedy implementation

Table 2-2

Potential Chemical Specific SCGs
Wurlitzer Area B Site

SCG	Requirements	Applicability and Relevance to Site
6 NYCRR Part 371 - Identification and Listing of Hazardous Wastes	Hazardous waste determinations	Off-site disposal alternatives for contaminated media
NYSDEC TAGM HWR-92-4046 Determination of Soil Cleanup Objectives and Cleanup Levels	Soil cleanup goals	Establishes soil cleanup objectives based upon protection of groundwater
6 NYCRR Part 700-705 - NYSDEC Water Quality Regulations for Surface Waters and Groundwater	Definitions, sampling, testing, classifications, use of standards, etc.	Evaluation of site groundwater
6 NYCRR Part 700-705 - NYSDEC Water Quality Regulations for Surface Waters and Groundwater	Definitions, sampling, testing, classifications, use of standards, etc.	Evaluation of site groundwater

Table 3
Wurlitzer Area B Site - Feasibility Study
Inferred TCLP Concentrations and LDR Action Levels for Inorganic Contaminants in Soil Composite Samples

Sample Lab. ID No. Date	CS-150-500 36498 12/12/97 CONC (mg/kg)	Inferred Max. TCLP Conc. (mg/l)	CS-150-550 36499 12/12/97 CONC (mg/kg)	Inferred Max. TCLP Conc. (mg/l)	CS-150-600 36500 12/12/97 CONC (mg/kg)	Inferred Max. TCLP Conc. (mg/l)	CS-200-500 36508 12/12/97 CONC (mg/kg)	Inferred Max. TCLP Conc. (mg/l)	10x UTS TCLP Conc. (mg/l)	NYSDEC TAGM 4046 Soil Cleanup Guidance (mg/kg)
INORGANIC COMPOUND										
Aluminum	10200	510	15700.0	785.0	22500.0	1125.0	16600.0	830.0	NA	SB (18875)
Antimony	1.9	0.10	ND	0.0	24.0	1.2	4.6	0.2	11.5	SB (ND)
Arsenic	217	11	5.7	0.3	14.5	0.7	14.1	0.7	50	7.5 OR SB (NE)
Barium	432	21.6	1350.0	67.5	14300.0	715.0	1030.0	51.5	210	300 OR SB (98)
Beryllium	0.87	0.04	0.6	0.0	0.4	0.0	0.7	0.0	NA	0.16 OR SB (0.8)
Cadmium	9.5	0.48	3590.0	179.5	274.0	13.7	59.1	3.0	1.1	1 OR SB (1)
Calcium	10700	535	11800.0	590.0	37200.0	1860.0	23400.0	1170.0	NA	SB (27728)
Chromium	72.6	3.63	440.0	22.0	2210.0	110.5	193.0	9.7	6	10 OR SB (26)
Cobalt	6.1	0.31	18.3	0.9	23.8	1.2	10.1	0.5	NA	30 OR SB (9)
Copper	123	6.15	1220.0	61.0	3040.0	152.0	1350.0	67.5	NA	25 OR SB (18)
Iron	41100	2055	25100.0	1255.0	87700.0	4385.0	34300.0	1715.0	NA	2000 OR SB (20525)
Lead	212	10.6	405.0	20.3	1510.0	75.5	463.0	23.2	7.5	SB (32)
Magnesium	1700	85	5530.0	276.5	13300.0	665.0	6100.0	305.0	NA	SB (12570)
Manganese	140	7.0	339.0	17.0	1020.0	51.0	410.0	20.5	NA	SB (325)
Mercury	0.22	0.01	0.6	0.0	ND	0.0	ND	0.0	0.25	0.1
Nickel	20.7	1.04	354.0	17.7	214.0	10.7	77.7	3.9	110	13 OR SB (22)
Potassium	922	46.1	1320.0	66.0	1390.0	69.5	1720.0	86.0	NA	SB (3560)
Selenium	ND	0.0	ND	0.0	ND	0.0	ND	0.0	57	2 OR SB (NE)
Silver	1.2	0.06	3.7	0.2	49.7	2.5	4.1	0.2	1.4	SB (ND)
Sodium	853	42.7	627.0	31.4	670.0	33.5	521.0	26.1	NA	SB (<400)
Thallium	1.8	0.09	ND	0.0	ND	0.0	ND	0.0	NA	SB ND)
Vanadium	29	1.45	31.2	1.6	27.2	1.4	29.9	1.5	NA	150 OR SB (37)
Zinc	370	18.5	1890.0	94.5	2570.0	128.5	2690.0	134.5	NA	20 OR SB (128)
Cyanide	ND	0.0	ND	0.0	ND	0.0	ND	0.0	5900	NA

NOTES: Only those samples with inorganic contaminants significantly above TAGM 4046 cleanup guidance have been listed in this table.
Light shading = Compounds exceeding TAGM 4046 Guidance levels
Dark shading = Compounds likely exceeding LDRs.
UTS = Treatment Standard for hazardous wastes [Fed. Register Vol. 63, No. 100 /May 26, 1998]
Inferred Max. TCLP Conc. (mg/l) is estimated as the product of gross conc. and 1/20 dilution factor.
Current Land Disposal Restriction (LDRs) require 90% reduction in TCLP conc.; however maximum reduction concentration required = 10x UTS.
SB = Soil background. Numbers in ( ) indicate average of 4 background sample concentrations.
NA = Not available.
ND = Compound was analyzed for, but not detected.

Table 3
Wurlitzer Area B Site - Feasibility Study
Inferred TCLP Concentrations and LDR Action Levels for Inorganic Contaminants in Soil Composite Samples

Sample Lab. ID No. Date	CS-200-550 36509 12/12/97 CONC (mg/kg)	Inferred Max. TCLP Conc. (mg/l)	CS-200-600 36510 12/12/97 CONC (mg/kg)	Inferred Max. TCLP Conc. (mg/l)	CS-250-600 36522 12/12/97 CONC (mg/kg)	Inferred Max. TCLP Conc. (mg/l)	CS-300-250 36529 12/12/97 CONC (mg/kg)	Inferred Max. TCLP Conc. (mg/l)	10x UTS TCLP Conc. (mg/l)	NYSDEC TAGM 4046 Soil Cleanup Guidance (mg/kg)
INORGANIC										
Aluminum	27300.0	1365.0	17300.0	865.0	15800.0	790.0	12100.0	605.0	NA	SB (18875)
Antimony	12.2	0.6	4.7	0.2	3.3	0.2	2.7	0.1	11.5	SB (ND)
Arsenic	10.3	0.5	9.5	0.5	23.2	1.2	7.1	0.4	50	7.5 OR SB (NE)
Barium	3680.0	184.0	488.0	24.4	1380.0	69.0	2220.0	111.0	210	300 OR SB (98)
Beryllium	0.5	0.0	0.8	0.0	0.6	0.0	1.0	0.1	NA	0.16 OR SB (0.8)
Cadmium	652.0	32.6	19.5	1.0	233.0	11.7	7.9	0.4	1.1	1 OR SB (1)
Calcium	17700.0	885.0	11400.0	570.0	12000.0	600.0	30300.0	1515.0	NA	SB (27728)
Chromium	1320.0	66.0	269.0	13.5	1120.0	56.0	57.4	2.9	6	10 OR SB (26)
Cobalt	18.2	0.9	12.5	0.6	11.1	0.6	7.3	0.4	NA	30 OR SB (9)
Copper	4030.0	201.5	554.0	27.7	3630.0	181.5	92.9	4.6	NA	25 OR SB (18)
Iron	55700.0	2785.0	30500.0	1525.0	64600.0	3230.0	22700.0	1135.0	NA	2000 OR SB (20525)
Lead	1580.0	79.0	237.0	11.9	505.0	25.3	1360.0	68.0	7.5	SB (32)
Magnesium	5510.0	275.5	4010.0	200.5	3180.0	159.0	3560.0	178.0	NA	SB (12570)
Manganese	572.0	28.6	255.0	12.8	800.0	40.0	347.0	17.4	NA	SB (325)
Mercury	1.0	0.0	ND	0.0	ND	0.0	0.4	0.0	0.25	0.1
Nickel	236.0	11.8	115.0	5.8	133.0	6.7	26.2	1.3	110	13 OR SB (22)
Potassium	2220.0	111.0	2080.0	104.0	1780.0	89.0	933.0	46.7	NA	SB (3560)
Selenium	ND	0.0	ND	0.0	1.2	0.1	ND	0.0	57	2 OR SB (NE)
Silver	24.9	1.2	2.7	0.1	74.8	3.7	1.2	0.1	1.4	SB (ND)
Sodium	946.0	47.3	418.0	20.9	591.0	29.6	801.0	40.1	NA	SB (<400)
Thallium	ND	0.0	ND	0.0	ND	0.0	ND	0.0	NA	SB ND)
Vanadium	29.2	1.5	42.9	2.1	25.5	1.3	48.7	2.4	NA	150 OR SB (37)
Zinc	5340.0	267.0	1530.0	76.5	2830.0	141.5	2310.0	115.5	NA	20 OR SB (128)
Cyanide	ND	0.0	ND	0.0	38.2	1.9	ND	0.0	5900	NA

NOTES: Only those samples with inorganic contaminants significantly above TAGM 4046 cleanup guidance have been listed in this table.
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Dark shading = Compounds likely exceeding LDRs.
UTS = Treatment Standard for hazardous wastes [Fed. Register Vol. 63, No. 100 /May 26, 1998]
Inferred Max. TCLP Conc. (mg/l) is estimated as the product of gross conc. and 1/20 dilution factor.
Current Land Disposal Restriction (LDRs) require 90% reduction in TCLP conc.; however maximum reduction concentration required = 10x UTS.
SB = Soil background. Numbers in ( ) indicate average of 4 background sample concentrations.
NA = Not available.
ND = Compound was analyzed for, but not detected.

Table 3
Wurlitzer Area B Site - Feasibility Study
Inferred TCLP Concentrations and LDR Action Levels for Inorganic Contaminants in Soil Composite Samples

Sample Lab. ID No. Date	CS-350-550 36541 12/12/97 CONC (mg/kg)	Inferred Max. TCLP Conc. (mg/l)	CS-350-650 36553 12/13/97 CONC (mg/kg)	Inferred Max. TCLP Conc. (mg/l)	CS-400-550 36543 12/12/97 CONC (mg/kg)	Inferred Max. TCLP Conc. (mg/l)	CS-400-650 36487 12/12/97 CONC (mg/kg)	Inferred Max. TCLP Conc. (mg/l)	10x UTS TCLP Conc. (mg/l)	NYSDEC TAGM 4046 Soil Cleanup Guidance (mg/kg)
INORGANIC										
Aluminum	12700.0	635.0	11100.0	555.0	23800.0	1190.0	11800.0	590.0	NA	SB (18875)
Antimony	1.3	0.1	2.3	0.1	29.5	1.5	3.2	0.2	11.5	SB (ND)
Arsenic	8.2	0.4	13.4	0.7	15.6	0.8	29.2	1.5	50	7.5 OR SB (NE)
Barium	801.0	40.1	1210.0	60.5	5610.0	280.5	418.0	20.9	210	300 OR SB (98)
Beryllium	0.6	0.0	0.7	0.0	0.5	0.0	0.8	0.0	NA	0.16 OR SB (0.8)
Cadmium	28.2	1.4	19.1	1.0	6560.0	328.0	8.6	0.4	1.1	1 OR SB (1)
Calcium	13100.0	655.0	11700.0	585.0	16700.0	835.0	16600.0	830.0	NA	SB (27728)
Chromium	188.0	9.4	398.0	19.9	4680.0	234.0	224.0	11.2	6	10 OR SB (26)
Cobalt	6.9	0.3	7.2	0.4	16.8	0.8	5.5	0.3	NA	30 OR SB (9)
Copper	2190.0	109.5	1480.0	74.0	3060.0	153.0	278.0	13.9	NA	25 OR SB (18)
Iron	24100.0	1205.0	41500.0	2075.0	166000.0	8300.0	29100.0	1455.0	NA	2000 OR SB (20525)
Lead	339.0	17.0	565.0	28.3	2430.0	121.5	139.0	7.0	7.5	SB (32)
Magnesium	2760.0	138.0	4780.0	239.0	4110.0	205.5	3130.0	156.5	NA	SB (12570)
Manganese	239.0	12.0	289.0	14.5	828.0	41.4	172.0	8.6	NA	SB (325)
Mercury	ND	0.0	ND	0.0	0.4	0.0	0.4	0.0	0.25	0.1
Nickel	98.6	4.9	69.3	3.5	578.0	28.9	47.9	2.4	110	13 OR SB (22)
Potassium	1370.0	68.5	2070.0	103.5	1870.0	93.5	997.0	49.9	NA	SB (3560)
Selenium	0.9	0.0	0.9	0.0	ND	0.0	ND	0.0	57	2 OR SB (NE)
Silver	6.7	0.3	5.5	0.3	35.8	1.8	3.6	0.2	1.4	SB (ND)
Sodium	717.0	35.9	443.0	22.2	971.0	48.6	718.0	35.9	NA	SB (<400)
Thallium	ND	0.0	ND	0.0	1.9	0.1	ND	0.0	NA	SB ND)
Vanadium	23.8	1.2	21.1	1.1	25.8	1.3	24.5	1.2	NA	150 OR SB (37)
Zinc	1310.0	65.5	1480.0	74.0	9410.0	470.5	296.0	14.8	NA	20 OR SB (128)
Cyanide	ND	0.0	ND	0.0	ND	0.0	ND	0.0	5900	NA

NOTES: Only those samples with inorganic contaminants significantly above TAGM 4046 cleanup guidance have been listed in this table.
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Dark shading = Compounds likely exceeding LDRs.
UTS = Treatment Standard for hazardous wastes [Fed. Register Vol. 63, No. 100 /May 26, 1998]
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Current Land Disposal Restriction (LDRs) require 90% reduction in TCLP conc.; however maximum reduction concentration required = 10x UTS.
SB = Soil background. Numbers in ( ) indicate average of 4 background sample concentrations.
NA = Not available.
ND = Compound was analyzed for, but not detected.

Appendix A

Wurlitzer Area B FS
~~Untitled~~
Appendix A

VOLUME COMPUTATIONS Area I - north end of site

UPPER SURFACE
Grid File: C:/1_PROJECTS/9-32-041 (WURLITZER)/AREA1.GRD
Grid size as read: 50 cols by 45 rows
Delta X: 15.4414
Delta Y: 18.9434
X-Range: 4786.16 to 5542.79
Y-Range: 4720.72 to 5554.23
Z-Range: 572.789 to 577.284

LOWER SURFACE
Level Surface defined by Z = 573

VOLUMES
Approximated Volume by
Trapezoidal Rule: 52590.8
Simpson's Rule: 52503.6
Simpson's 3/8 Rule: 51735.9 ft^3

CUT & FILL VOLUMES
Positive Volume [Cut]: 52900.8
Negative Volume [Fill]: 309.964
Cut minus Fill: 52590.8

AREAS
Positive Planar Area
(Upper above Lower): 28705.2
Negative Planar Area
(Lower above Upper): 2593.72
Blanked Planar Area: 599360
Total Planar Area: 630659

Positive Surface Area
(Upper above Lower): 28798.1
Negative Surface Area
(Lower above Upper): 2594.08

Wurlitzer Area B FS
Appendix A

VOLUME COMPUTATIONS: Area 2 - south end of site

UPPER SURFACE

Grid File: C:/1_PROJECTS/9-32-041 (WURLITZER)/OUT.GRD

Grid size as read: 50 cols by 45 rows
Delta X: 15.4414
Delta Y: 18.9434
X-Range: 4786.16 to 5542.79
Y-Range: 4720.72 to 5554.23
Z-Range: 572.601 to 576.046

LOWER SURFACE

Level Surface defined by Z = 573

VOLUMES

Approximated Volume by
Trapezoidal Rule: 35303.1
Simpson's Rule: 34734.1
Simpson's 3/8 Rule: 35694.3 ft^3

CUT & FILL VOLUMES

Positive Volume [Cut]: 38497.7
Negative Volume [Fill]: 3194.6
Cut minus Fill: 35303.1

AREAS

Positive Planar Area
(Upper above Lower): 24975.5
Negative Planar Area
(Lower above Upper): 12758.8
Blanked Planar Area: 592924
Total Planar Area: 630659

Positive Surface Area
(Upper above Lower): 25019.9
Negative Surface Area
(Lower above Upper): 12759.8

Wurlitzer Area B FS
Appendix A

VOLUME COMPUTATIONS: Area 2n - north hot spot

UPPER SURFACE

Grid File: C:/1_PROJECTS/9-32-041 (WURLITZER)/O
UT.GRD

Grid size as read: 50 cols by 45 rows
Delta X: 15.4414
Delta Y: 18.9434
X-Range: 4786.16 to 5542.79
Y-Range: 4720.72 to 5554.23
Z-Range: 572.76 to 572.862

LOWER SURFACE

Level Surface defined by Z = 573

VOLUMES

Approximated Volume by
Trapezoidal Rule: -203.549
Simpson's Rule: -223.725
Simpson's 3/8 Rule: -238.884

CUT & FILL VOLUMES

Positive Volume [Cut]: 0
Negative Volume [Fill]: 203.549 ft^3
Cut minus Fill: -203.549

AREAS

Positive Planar Area
(Upper above Lower): 0
Negative Planar Area
(Lower above Upper): 0
Blanked Planar Area: 630659
Total Planar Area: 630659

Positive Surface Area
(Upper above Lower): 0
Negative Surface Area
(Lower above Upper): 0

Wurlitzer Area B FS
Appendix A

VOLUME COMPUTATIONS: Area 2s - south hot spot

UPPER SURFACE
Grid File: C:/1_PROJECTS/9-32-041 (WURLITZER)/O
UT.GRD
Grid size as read: 50 cols by 45 rows
Delta X: 15.4414
Delta Y: 18.9434
X-Range: 4786.16 to 5542.79
Y-Range: 4720.72 to 5554.23
Z-Range: 573.413 to 575.652

LOWER SURFACE
Level Surface defined by Z = 573

VOLUMES
Approximated Volume by
Trapezoidal Rule: 17371.1
Simpson's Rule: 16458.3
Simpson's 3/8 Rule: 17610.9 ft^3

CUT & FILL VOLUMES
Positive Volume [Cut]: 17371.1
Negative Volume [Fill]: 0
Cut minus Fill: 17371.1

AREAS
Positive Planar Area
(Upper above Lower): 6727.81
Negative Planar Area
(Lower above Upper): 0
Blanked Planar Area: 623931
Total Planar Area: 630659

Positive Surface Area
(Upper above Lower): 6735.56
Negative Surface Area
(Lower above Upper): 0

Appendix B

Wurlitzer Area B Site
Feasability Study - Remedial Alternatives

Assumptions for Cost Estimates

Site Preparation (Alt. 2 & 3):

Clearing:
Removal of remaining trees and stumps on 2 acres which was previously cleared and grubbed

Consolidate Material/Relocate Scrap and Rubble:
Transport of approx. 1900 yds^3 of waste/fill material present along old roadway (above soil cleanup guidance) and consolidation within the confines of cover area. Also includes segregation and relocation (to an area outside the cover) of approximately 1000 yds^3 of scrap and rubble.

Cover Area Construction (Alt. 2 & 3):

Site Grading/Contouring/Compaction:
Spread and compact 3200 yds^3 of fill/waste material above soil cleanup guidance in in Alternative 2 or 2550 yds^3 of fill/waste material in Alternative 3.

Geotextile:
Layer between waste/fill subbase and clean cover soil

Waste/Fill Disposal (Alt. 3 & 4):

Material above NYSDEC Soil Cleanup Guidance but below LDRs:
Transport and disposal cost: $30 per ton. Estimated Weight of fill/waste 1.5 $tons/yd^3$

Material requiring treatment prior to disposal (subject to LDRs):
Approximate volume 650 yds^3. Disposal cost: $100 per ton.
Transport cost: $490 cost per truck (13 yds^3)- includes standby time.

Wurlitzer Area B Site
Remedial Alternative Detailed Analysis
Capital Cost Estimate
Alternative 2: On-Site Containment of All Material above SCGs

ITEM/MATERIAL	UNITS	QUAN.	UNIT COST	ESTIMATED COST
Site Preparation				
Clearing	Lump	1	$2,000	$2,000
Consolidate Material/ relocate scrap and rubble	Hours	72	$81	$5,900
Cover Area Construction				
Site Grading/Contouring and Compaction	yd^3	3200	$0.37	$1,200
Geotextile	ft^2	87120	$0.30	$26,200
12" Clean Soil	yd^3	3227	$10	$32,300
6" Topsoil	yd^3	1613	$23	$37,100
Seed	Acre	3	$450	$1,400
Stormwater Drainage	Lump	1	$20,000	$20,000
SUBTOTAL				**$126,100**
MOBILIZATION/DEMOB. @ 10%				**$12,700**
ENGINEERING @ 30%				**$37,900**
CONTINGENCY @ 20%				**$25,300**
TOTAL				**$202,000**

Wurlitzer Area B Site
Remedial Alternative Detailed Analysis
Capital Cost Estimate
Alternative 3: Off-Site Treatment/Disposal of the More Highly Contaminated Material + On-Site Containment of Material above SCGs

ITEM/MATERIAL	UNITS	QUAN.	UNIT COST	ESTIMATED COST
Off-Site Treatment/Disposal of Highly Contaminated Material				
Material Handling	yd^3	650	$2.00	$1,300
Transport	truckload	50	$490.00	$24,500
Treatment/Disposal	ton	975	$100.00	$97,500
Site Preparation				
Clearing	Lump	1	$2,000	$2,000
Consolidate Material/ relocate scrap and rubble	Hours	72	$81	$5,900
Cover Area Construction				
Site Grading/Contouring and Compaction	yd^3	2,550	$0.37	$1,000
Geotextile	ft^2	87120	$0.30	$26,200
12" Clean Soil	yd^3	3227	$10	$32,300
6" Topsoil	yd^3	1613	$23	$37,100
Seed	Acre	3	$450	$1,400
Stormwater Drainage	Lump	1	$20,000	$20,000
SUBTOTAL				**$249,200**
MOBILIZATION/DEMOB. @ 10%				**$25,000**
ENGINEERING @ 30% - cover; 10% - disposal				**$49,600**
CONTINGENCY @20%				**$49,900**
TOTAL				**$373,700**

Wurlitzer Area B Site
Remedial Alternative Detailed Analysis
Capital Cost Estimate
Alternative 4: Off-Site Treatment/Disposal of All Material above SCGs

ITEM/MATERIAL	UNITS	QUAN.	UNIT COST	ESTIMATED COST
Off-Site Treatment/Disposal of Highly Contaminated Material				
Material Handling	yd^3	650	$2.00	$1,300
Transport	truckload	50	$490	$24,500
Treatment/Disposal	ton	975	$100	$97,500
Off-Site Disposal of Other Material Above SCGs				
Material Handling	yd^3	2,550	$2.00	$5,100
Transport/Disposal	ton	3,825	$30	$114,800
SUBTOTAL				**$243,200**
MOBILIZATION/DEMOB. @ 10%				**$24,400**
ENGINEERING @ 10%				**$24,400**
CONTINGENCY @ 20%				**$48,700**
TOTAL				**$340,700**

Appendix C

Wurlitzer Area B Site
Remedial Alternative Detailed Analysis
Present Worth Cost Estimate - Alternatives 1 and 2

	ITEM/MATERIAL	UNITS	QUAN.	UNIT COST	ESTIMATED COST
Alternative 1:					
ANNUAL COST					$0
30 Yr. Present Worth					$0
Capital Cost					
Total PW Cost					**$0**

	ITEM/MATERIAL	UNITS	QUAN.	UNIT COST	ESTIMATED COST
Alternative 2:					
Annual GW	Labor	Hours	12	$40	$480
sampling - 3 wells	Analytical Costs	Sample	6	$650	$3,900
	Annual Report	Hours	30	$50	$1,500
Cover System Maint.	mowing	acre	2	$60	$120
	Inspection	Hours	4	$40	$160
	cover/drainage repair	Lump	1	$500	$500
ANNUAL COST					$6,700
30 Yr. Present Worth	(5% discount rate)				$103,200
Capital Cost					$202,000
Total PW Cost					**$305,200**

Wurlitzer Area B Site
Feasability Study
Present Worth Cost Estimate - Alternatives 3 and 4

	ITEM/MATERIAL	UNITS	QUAN.	UNIT COST	ESTIMATED COST
Alternative 3:					
Annual GW	Labor	Hours	12	$40	$480
sampling - 3 wells	Analytical Costs	Sample	6	$650	$3,900
	Annual Report	Hours	30	$50	$1,500
Cover System Maint.	mowing	acre	2	$60	$120
	Inspection	Hours	4	$40	$160
	cover/drainage repair	Lump	1	$500	$500
ANNUAL COST					$6,700
30 Yr. Present Worth	(5% discount rate)				$103,200
Capital Cost					$373,700
Total PW Cost					**$476,900**

Alternative 4:		
ANNUAL COST		$0
30 Yr. Present Worth	(5% discount rate)	$0
Capital Cost		$340,700
Total PW Cost		**$340,700**