Department of Environmental Conservation

Division of Environmental Remediation

Record of Decision

General Circuits, Inc. Site
City of Rochester, Monroe County, New York
Site Number 8-28-085

March 2005

New York State Department of Environmental Conservation
GEORGE E. PATAKI, *Governor* DENISE M. SHEEHAN, *Acting Commissioner*

DECLARATION STATEMENT - RECORD OF DECISION

General Circuits, Inc. Inactive Hazardous Waste Disposal Site
City of Rochester, Monroe County, New York
Site No. 8-28-085

Statement of Purpose and Basis

The Record of Decision (ROD) presents the selected remedy for the General Circuits site, a Class 2 inactive hazardous waste disposal site. The selected remedial program was chosen in accordance with the New York State Environmental Conservation Law and is not inconsistent with the National Oil and Hazardous Substances Pollution Contingency Plan of March 8, 1990 (40CFR300), as amended.

This decision is based on the Administrative Record of the New York State Department of Environmental Conservation (NYSDEC) for the General Circuits inactive hazardous waste disposal site, and the public's input to the Proposed Remedial Action Plan (PRAP) presented by the NYSDEC. A listing of the documents included as a part of the Administrative Record is included in Appendix B of the ROD.

Assessment of the Site

Actual or threatened releases of hazardous waste constituents from this site, if not addressed by implementing the response action selected in this ROD, presents a current or potential significant threat to public health and/or the environment.

Description of Selected Remedv

Based on the results of the Remedial Investigation and Feasibility Study (RI/FS) for the General Circuits site and the criteria identified for evaluation of alternatives, the NYSDEC has selected soil removal and groundwater extraction and treatment with *in situ* reduction. The components of the remedy are as follows:

- A remedial design program to provide the details necessary to implement the remedial program;
- Maintenance of the site's existing protective cover (asphalt/concrete pavement, flooring, etc.) to prevent exposure to contaminated soils and to minimize storm water infiltration;

- Development of a site management plan to address residual contamination, any use restrictions, and long term monitoring to verify the effectiveness of the remedy;
- Imposition of an institutional control in the form of an environmental easement to require compliance with the site management plan and use restrictions;

- Certification of the institutional and engineering controls;

- Removal and off-site disposal of chromium contaminated soils from the source area;

- Extraction and on-site treatment of groundwater followed by in *situ* chemical reduction;

- Installation of a vapor mitigation system in the basement; and

- Operation and maintenance of remedial systems.

New York State Department of Health Acceptance

The New York State Department of Health (NYSDOH) concurs that the remedy selected for this site is protective of human health.

Declaration

The selected remedy is protective of human health and the environment, complies with State and Federal requirements that are legally applicable or relevant and appropriate to the remedial action to the extent practicable, and is cost effective. This remedy utilizes permanent solutions and alternative treatment or resource recovery technologies, to the maximum extent practicable, and satisfies the preference for remedies that reduce toxicity, mobility, or volume as aprincipal element.

MAR 3 1 2005

Date

Dale A. Desnoyers, Director
Division of Environmental Remediation

TABLE OF CONTENTS

SECTION	PAGE
1: SUMMARY OF THE RECORD OF DECISION	1
2: SITE LOCATION AND DESCRIPTION	2
3: SITE HISTORY	2
3.1: Operational/Disposal History	2
3.2: Remedial History	3
4: ENFORCEMENT STATUS	4
5: SITE CONTAMINATION	4
5.1: Summary of the Remedial Investigation	4
5.2: Interim Remedial Measures	11
5.3: Summary of Human Exposure Pathways:	11
5.4: Summary of Environmental Impacts:	12
6: SUMMARY OF THE REMEDIATION GOALS	12
7: SUMMARY OF THE EVALUATION OF ALTERNATIVES	13
7.1: Description of Remedial Alternatives	13
7.2 Evaluation of Remedial Alternatives	20
8: SUMMARY OF THE SELECTED REMEDY	22
9: HIGHLIGHTS OF COMMUNITY PARTICIPATION	27

Tables
- Table 1: Nature and Extent of Contamination
- Table 2: Chromium Sub-Surface Soil Test Results
- Table 3: Remedial Alternative Costs

Figures
- Figure 1: Site Location Map
- Figure 2: Site Map
- Figure 3: Site Plan with Monitoring Well and Test Boring Locations
- Figure 4: Partial Plan with Supplemental Chromium Delineation Test Boring Locations
- Figure 5: Sub-Slab Soil Gas Sample Locations and Indoor Air Sample Locations Associated with March 2004 Study
- Figure 6: Partial Plan with Deepest Soil Samples Containing Concentrations of Chromium Greater than 500 ppm

- Figure 7: Site Plan with Maximum Chromium Concentrations Measured in Soil
- Figure 8: Partial Plan with Maximum Chromium and Maximum Total VOCs Detected in Groundwater Samples
Figure 9: Soil Alternative S1
Figure 10: Soil Alternative S2
- Figure 11: Soil Alternative S3
- Figure 12: Soil Alternative S4
Figure 13: Groundwater Alternatives GW1, GW2, and GW3
Figure 14: Groundwater Alternative GW4
Figure 15: Groundwater Alternative GW5

Appendices Appendix A: Responsiveness Summary
Appendix B: Administrative Record

RECORD OF DECISION

General Circuits, Inc. Site
City of Rochester, Monroe County, New York
Site No. 8-28-085
March 2005

SECTION 1: SUMMARY OF THE RECORD OF DECISION

The New York State Department of Environmental Conservation (NYSDEC), in consultation with the New York State Department of Health (NYSDOH), has selected this remedy for the General Circuits site. The presence of hazardous waste has created significant threats to human health and/or the environment that are addressed by this remedy. As more fully described in Sections 3 and 5 of this document, printed circuit board manufacturing operations at the site have resulted in the disposal of hazardous wastes, including volatile organic compounds (VOCs) and chromium. These wastes have contaminated the soil, groundwater, soil vapor, and indoor air at the site, and have resulted in:

- a significant threat to human health associated with current and potential exposure to contaminated indoor air, soil, and groundwater;
- a significant environmental threat associated with the impacts of contaminants to groundwater.

To eliminate or mitigate these threats, the NYSDEC has selected the following remedy:

- A remedial design program to provide the details necessary to implement the remedial program;
- Maintenance of the site's existing protective cover (asphalt/concrete pavement, flooring, etc.) to prevent exposure to contaminated soils and to minimize storm water infiltration;
- Development of a site management plan to address residual contamination, any use restrictions, and long term monitoring to verify the effectiveness of the remedy;
- Imposition of an institutional control in the form of an environmental easement to require compliance with the site management plan and use restrictions;
- Certification of the institutional and engineering controls;
- Removal and off-site disposal of chromium contaminated soils from the source area;

- Extraction and on-site treatment of groundwater followed by *in situ* chemical reduction;
- Installation of a vapor mitigation system in the basement; and
- Operation and maintenance of remedial systems.

The selected remedy, discussed in detail in Section 8, is intended to attain the remediation goals identified for this site in Section 6. The remedy must conform with officially promulgated standards and criteria that are directly applicable, or that are relevant and appropriate. The selection of a remedy must also take into consideration guidance, as appropriate. Standards, criteria and guidance are hereafter called SCGs.

SECTION 2: SITE LOCATION AND DESCRIPTION

The General Circuits site is located in an urban area in the City of Rochester, Monroe County at the comer of Buffalo Road and Mt. Read Boulevard (Figure 1). The site is approximately 3.5-acres in size improved by a 108,000-square-foot building. Properties located north, south, east and west of the site are zoned industrial or commercial. Some residential properties also exist east of the site. The Arch Chemicals site (site #8-28-018A) is located approximately 114-mile northwest of General Circuits and the New York State Barge Canal is located approximately 1/2-mile west of General Circuits.

SECTION 3: SITE HISTORY

3.1: Operational/Disposal History

The original portion of the building was constructed in the 1920s and the site was used by Rochester Lithograph Corporation for a printing business until the early 1960s.

General Circuits began manufacturing printed circuit boards at the site in the early 1960s and continued operations until 1990 when it closed as a result of bankruptcy. Several expansions were constructed in the 1960s and 1970s that increased the floor space of the building to the current 108,000 square-feet. In 1991, the property was sold to the current owner who subdivided the building and leases space to small light-industrial and commercial businesses.

The primary contaminants of concern attributable to former operations at the site include chlorinated volatile organic compounds (VOCs) and metals, particularly chromium.

The suspected cause of the VOC contamination was the historical use of chlorinated solvent degreasers. It is suspected that the contents of these degreasers were periodically disposed of on the ground west of the original building in areas identified as "disturbed" in the 1951 and 1961 aerial photographs. Figure 2 shows the extent of the disturbed soil.

The chromium contamination resulted from the use of chromic acid to etch circuit boards. The etching process operated from the early 1960s to the 1970s and was located in an area of the building formerly known as the "Shipping Room" (Figure 2). The chromic acid deteriorated underground cast iron piping that was used to transfer the chromic acid between the etching machines. As a result of the deteriorated pipes, chromic acid was released to the subsurface soil and groundwater at the site.

3.2: Remedial Historv

In 1992, the NYSDEC listed the site as a Class 2 site in the Registry of Inactive Hazardous Waste Disposal Sites in New York. A Class 2 site is a site where hazardous waste presents a significant threat to the public health or the environment and action is required.
In 1990, as part of the General Circuits bankruptcy process, a Phase 1 environmental site assessment was performed. The assessment indicated the potential release of metals and hazardous constituents to soils and groundwater underlying the site. A Phase 2 environmental site assessment was also performed in 1990 to collect and analyze soils and groundwater at the site. The Phase 2 assessment included 16 soil borings and 10 groundwater monitoring wells. The results indicated that VOCs in the groundwater and metals in the soil appeared to be the primary site contaminants. Total VOC concentrations up to 252,000 ppb were detected in groundwater in well MW-9. Site soils and groundwater were not analyzed for chromium during the Phase 2 assessment.

A series of sumps and floor drains that collect water from the foundation drains are located in the basement of the building. In 1992, the current owner installed a groundwater treatment system to treat groundwater that accumulates in the sumps prior to discharging the water to the sanitary sewer.

In 1993, two indoor air samples were collected from the basement. One of the samples detected trichloroethene (TCE) at a concentration of 700 $\mu g/m^3$ and cis-1,2-dichloroethene at a concentration of 1,300 $\mu g/m^3$. Site related compounds were not detected in the other sample.

In 1995, 60,100 ppb of chromium was detected in a groundwater sample from under the building at well MW-8. The SCG for chromium in groundwater is 50 ppb. Six new groundwater monitoring wells and 13 soil borings were also installed in 1995 and the former Shipping Room was identified as the likely source of the chromium due to the historic use of chromic acid in this area. Soil samples collected from the shipping room detected total chromium at concentrations up to 310 ppm. The SCG for chromium in soil is 50 ppm.

In 1996, a removal action was conducted in the chromium source area. The removal action included the excavation and removal of floor drains, soil, and an underground sump in the former shipping room. The specific amount of material removed was not reported, but the excavation was reportedly completed to a depth of approximately 3.7 feet below grade. Six confirmatory soil samples from the bottom and side walls of the excavation detected chromium at concentrations ranging from 2,390 ppm to 21,400 ppm. A boring completed through the bottom of the excavation indicated that chromium contaminated soils were still present at a concentration of 100 ppm at a depth of 7.7 to 9.7 feet below grade. The excavation was backfilled without removing the remaining chromium contaminated soil as additional excavation was not considered feasible at the time.

SECTION 4: ENFORCEMENT STATUS

Potentially Responsible Parties (PRPs) are those who may be legally liable for contamination at a site. This may include past or present owners and operators, waste generators, and haulers.

The NYSDEC and Thomas G. Maguire entered into a Consent Order on March 2, 1998. The Order obligates the responsible parties to implement a RI/FS only remedial program. After the remedy is selected, the NYSDEC will approach the PRPs to implement the selected remedy under an Order on Consent.

SECTION 5: SITE CONTAMINATION

A remedial investigation/feasibility study (RI/FS) has been conducted to evaluate the alternatives for addressing the significant threats to human health and the environment.

5.1: Summary of the Remedial Investigation

The purpose of the RI was to define the nature and extent of any contamination resulting from previous activities at the site. The RI was conducted between April 1998 and May 2004. The field activities and findings of the investigation are described in the RI report, the "Data Summary Report", and the "Sub-Slab Soil Gas and Indoor Air Sampling" report. Soil boring, surface soil, and groundwater sample locations from the RI are shown on Figures 3 and 4. Sub-slab vapor and indoor air sample locations from the RI are shown on Figure 5.

The following activities were conducted during the RI:

- Research of historical information;
- Installation of 73 soil borings and 6 new monitoring wells for analysis of soils and groundwater as well as physical properties of soil and hydrogeologic conditions;
- Sampling of 20 new and existing monitoring wells;
- Collection of 4 surface soil samples;
- Collection of 4 sub-slab vapor samples;
- Collection of 4 indoor air samples; and
- Collection of 1 outdoor air sample.

To determine whether the soil, groundwater, sub-slab vapor, and indoor air contain contamination at levels of concern, data from the investigation were compared to the following SCGs:

- Groundwater, drinking water, and surface water SCGs are based on NYSDEC "Ambient Water Quality Standards and Guidance Values" and Part 5 of the New York State Sanitary Code.

- Soil SCGs are based on the NYSDEC "Technical and Administrative Guidance Memorandum (TAGM) 4046; Determination of Soil Cleanup Objectives and Cleanup Levels".

- Sub-slab vapor and indoor air SCGs for tetrachloroethene (PCE) and TCE are based on the NYSDOH soil vapor/indoor air matrices for PCE and TCE.

Based on the RI results, in comparison to the SCGs and potential public health and environmental exposure routes, certain media and areas of the site require remediation. These are summarized below. More complete information can be found in the RI report.

5.1.1: <u>Site Geology and Hydrogeology</u>

The surface of the site is generally covered with asphalt or concrete. Beneath the surface layer is a layer of fill material between 1 and 5-feet thick. The fill material consists mainly of reworked soil with some concrete, crushed stone, asphalt, cinders, brick, ceramic tile, coal, slag, ash and glass. The indigenous soil located beneath the fill material was mostly sand with lesser amounts of gravel, silts, clays and weathered rock.

The top of the bedrock underlying the site ranged between 7.9 and 17 feet below the existing ground surface. The bedrock is Lockport Dolomite which is a hard and fractured dolomite. Groundwater flow in the bedrock is dominated by fracture networks.

The permanent water table at the site is located in the overburden, approximately 6 to 12 feet below ground surface.

Groundwater in the overburden and shallow bedrock within approximately 50 to 75 feet of the basement sump flows radially toward the sump. Beyond the influence of the sump, groundwater on the eastern portion of the site is generally flat while groundwater on the western side of the site appears to flow toward the southwest.

Groundwater in the deep bedrock (approximately 38 feet below ground surface) on the western half of the site flows radially toward the basement sump. Deep groundwater on the eastern half of the site flows toward the southeast.

5.1.2: <u>Nature of Contamination</u>

As described in the RI report, many soil, groundwater, sub-slab vapor, and indoor air samples were collected to characterize the nature and extent of contamination. As summarized in Table 1, the main categories of contaminants that exceed their SCGs are volatile organic compounds (VOCs) and inorganics (metals).

The VOCs of concern are PCE, TCE, 1,2-dichloroethene (1,2-DCE), 1,1-dichloroethene (1,1-DCE), 1,1-dichloroethane (1,1-DCA), and vinyl chloride (VC).

The inorganic contaminants of concern are chromium (including hexavalent chromium), antimony, barium, cadmium, copper, thallium, and zinc.

5.1.3: Extent of Contamination

This section describes the findings of the investigation for all environmental media that were investigated.

Chemical concentrations are reported in parts per billion (ppb) for water, parts per million (pprn) for waste and soil, and micrograms per cubic meter ($\mu g/m^3$) for air samples. For comparison purposes, where applicable, SCGs are provided for each medium.

Table 1 summarizes the degree of contamination for the contaminants of concern in soil, groundwater, sub-slab vapor, and indoor air and compares the data with the SCGs for the site. The following are the media which were investigated and a summary of the findings of the investigation.

Waste Materials

Chromium: Chromium, in the form of chromic acid, was released to the subsurface soil and groundwater in an area of the building formerly known as the "Shipping Room". Prior to the start of the RI, some soils were excavated from the chromium source area to a depth of about 3.7 feet below grade. Figure 4 shows the footprint of the excavation. Confirmatory soil samples from the bottom and side walls of the excavation detected total chromium at concentrations ranging from 2,390 pprn to 21,400 ppm. The SCG for chromium in soil is 50 ppm.

Between December 2001 and July 2002, 26 soil borings were collected in a radial array out from the former Shipping Room to delineate the extent of the chromium source area. For this site, a value of 500 pprn total chromium was chosen to define "source area" soils. The results are provided in the November 2002 "Data Summary Report".

Soil samples were collected and anaylzed for total chromium at 2-foot intervals. Half of the samples were also analyzed for hexavalent chromium. Total chromium concentrations exceeding 500 pprn were detected to a depth of 12 feet. Chromium concentrations below 12 feet did not exceed 299 ppm. Figure 6 shows the deepest soil samples where total chromium concentrations were detected above 500 ppm. Table 2 shows the total chromium and hexavalent chromium concentrations for sub-surface soil samples collected during the RI.

The highest hexavalent chromium concentration detected during the RI, was 3,800 pprn at a depth of 8 to 10 feet below grade in soil boring TB-47 located approximately 12 feet east of the former Shipping Room. Hexavalent chromium concentrations below 10 feet did not exceed 50 ppm.

Remedial alternatives were evaluated for the chromium source area soils due to the highly elevated levels of chromium and hexavalent chromium.

Chlorinated VOCs: The **RI** soil sample results did not indicate the presence of dense non-aqueous phase liquids (DNAPL) in the soils. According to the U.S. Environmental Protection Agency [(EPA; DNAPL Site Characterization, September 1994)], the presence of DNAPL can be inferred if the concentration of DNAPL chemicals in soils exceeds 10,000 ppm. The highest concentration of DNAPL chemicals detected in the soils at the General Circuits site was 46.7 ppm in boring TB-58 at a depth of 9 feet below grade.

DNAPL does appear to be present with the groundwater based on the RI results. According to the U.S. EPA (DNAPL Site Characterization, September 1994), the presence of DNAPL can be inferred if the concentration of DNAPL chemicals in groundwater exceeds 1% of the pure phase solubility. For PCE, the 1% solubility threshold (1,500 ppb) was exceeded during the RI at the basement sump (2,400 ppb), overburden monitoring wells MW-8 (1,600 ppb), MW-9 (95,000 ppb), and MW-12 (4,500 ppb), and deep bedrock well MW-17 (5,800 ppb). Depth specific groundwater samples collected from MW-17 indicated that the DNAPL was present at depths above 28 feet below grade.

For TCE, the 1% solubility threshold (11,000 ppb) was exceeded during the RI at overburden monitoring MW-9 (59,000 ppb), and MW-10 (18,000 ppb).

Wells MW-8, MW-9, MW-12, and MW-17 are all located underneath the current building. However, these wells are also located west of the original building in an area that was identified as "disturbed" in the 1951 and 1961 aerial photographs (Figure 2). Well MW-10 is located just south of this disturbed area.

Remedial alternatives were evaluated for the VOC source area groundwater due to VOC concentrations that were indicative of DNAPL.

Surface Soil

No surface soils were sampled at the site as there is a minimal amount of surface soil present. Four surface soil samples were collected at the adjacent property to the north near the property line (Figure **3).** The samples were analyzed for chromium and the results were all below the SCG. Surface soils were not considered in the remedial alternatives analysis.

Subsurface Soil

Chromium: Outside of the source area, total chromium concentrations exceeding the SCG were detected beneath the building adjacent to the source area and extending to just outside the building to the north. Chromium was not detected above the SCG on the adjacent property to the north. Total chromium was detected above the SCG at depths ranging from 0 to 2 feet below the slab at TB-56 to 12 to 15.5 feet below the slab at TB-14. Figures 7 shows the highest total chromium concentration detected for each soil boring advanced during the initial phase of RI.

Table 2 shows the total chromium and hexavalent chromium concentrations for all sub-surface soil samples collected during the RI.

Outside of the source area, hexavalent chromium was detected above 50 pprn in the following soil samples.

Boring	Depth (ft)	Hex. Chromium	Total Chromium
TB-56	0-2	230 ppm	468 ppm
TB-30	8-10	**54** ppm	222 **ppm**
TB-59	4-6	56 ppm	63 ppm

TB-30 was the only soil sample location outside of the building footprint where the hexavalent chromium concentration exceeded 50 ppm.

Remedial alternatives were evaluated for chromium impacted soils located outside of the source area.

Other Metals: Metals of concern other than chromium were detected in subsurface soils at levels above SCGs in two borings completed during the RI: test boring TB-27A (1.5 to 3 feet below grade) and test boring TB-30 (0 to 4 feet below grade). At TB-27A, barium, copper, and zinc exceeded their respective SCGs. At TB-30, copper was the only metal detected above the SCG of 25 ppm. The 1990 Phase II investigation also reported copper above the SCG in soil samples collected throughout the site. The highest copper concentration was 1,310 pprn at TB-27A.

These presence of these additional metals in soil were considered during the analysis of remedial alternatives; however, removal of these soils was not identified as a remedial goal.

Chlorinated VOCs: Chlorinated VOCs were detected above SCGs in two samples: TB-11(12 to 14.5 feet below grade) and TB-58 (9 feet below grade). During normal conditions, these sample depths are below the water table. TB-58 and TB-11 are located approximately 40-feet apart and south southwest of the former Shipping Room. TB-11 and TB-58 are also located just outside the estimated extent of the 500 pprn chromium source area. TB-11 and TB-58 were located underneath the current building, but outside and west of the original building. Disposal of chlorinated solvents in an area west of the original building is the suspected cause of the chlorinated volatile organic compound contamination at the site.

The highest concentrations were all detected at TB-58. Maximum concentrations detected for specific compounds were:

- PCE - 32 ppm (SCG 1.4 ppm);
- TCE - 14 ppm (SCG 0.7 ppm); and
- cis-1,2-DCE - 0.7 ppm (SCG 0.3 ppm).

Since the highest VOC concentrations in soil were identified below the water table, remedial alternatives for these areas were evaluated during the groundwater alternatives analysis.

Groundwater

Chromium: Total chromium and hexavalent chromium groundwater sample results from the RI are presented on Figure 8. The highest total chromium concentration detected in the groundwater during the RI was 52,300 ppb in overburden well MW-8 located approximately 30 feet southeast of the former Shipping Room. The groundwater collected from well MW-8 was bright yellow in color which is indicative of high hexavalent chromium concentrations. The second highest total chromium concentration detected during the RI was 1,110 ppb in overburden well MW-9 located approximately 50 feet southeast of the former Shipping Room. The SCG for chromium in groundwater is 50 ppb.

The highest hexavalent chromium concentration detected in the groundwater during the RI was 42,000 ppb in overburden well MW-8. The second highest total chromium concentration detected during the RI was 587 ppb in overburden well MW-12 located within the former Shipping Room. The SCG for hexavalent chromium in groundwater is 50 ppb.

Chromium contaminated groundwater was primarily located under the building. Chromium concentrations declined substantially outside of the building and near the property line. The highest concentration of total chromium detected outside the building was 53.5 ppb detected at deep bedrock monitoring well MW-21 which only slightly exceeds the SGC. Hexavalent chromium was not detected in the groundwater sample from well MW-21.

Vertically, chromium contaminated groundwater was located in the overburden and shallow bedrock to a depth of about 15 feet below ground surface.

Remedial alternatives were evaluated for the chromium impacted groundwater due to the highly elevated concentrations of chromium and hexavalent chromium in the vicinity of MW-8 and the potential for off-site migration.

Other Inorganic Compounds: Metals of concern other than chromium were detected in groundwater at levels above SCGs in four wells: MW-8 (antimony and thallium), MW-9 (antimony, copper, and thallium), and MW-16 (antimony and copper), and MW-20 (thallium). Maximum concentrations for specific compounds provided below:

- antimony - 780 ppb at MW-8 (SCG 3 ppb);
- copper - 273 ppb at MW-9 (SCG 200 ppb); and
- thallium - 111 ppb at MW-8 (SCG 0.5 ppb).

The source of the metals detected in the groundwater does not appear to be associated with the elevated levels of metals detected in soil borings TB-27A and TB-30 because wells MW-8, MW-9, MW-20 and MW-16 are not in the vicinity of soil borings TB-27A and TB-30.

Elevated levels of antimony, copper and thallium in the groundwater were generally associated with elevated levels of chromium and VOCs. The presence of these metals was considered during the analysis of remedial alternatives for the VOCs and the chromium. The MW-16 area appears to be isolated from known source areas at the site and the elevated levels of metals detected in the groundwater at MW-16 may not be related to activities at the site. The area around MW-16 was not considered in the analysis of remedial alternatives.

Chlorinated VOCs: Total VOC groundwater sample results from the RI are presented on Figure 8. The chlorinated VOCs PCE, TCE, 1,2-DCE, 1,1-DCE, 1,1-DCA, and VC, were detected above SCGs in groundwater across the site.

The highest concentrations (up to approximately 156,000 ppb total VOCs) were detected underneath the building at overburden monitoring well MW-9. Chlorinated VOC concentrations declined substantially outside of the building and near the property line. The highest concentration of chlorinated VOCs outside the building was 144 ppb detected at deep bedrock monitoring well MW-21.

The depth of chlorinated VOC groundwater contamination extends to approximately 50 feet below ground.

Remedial alternatives were evaluated for the VOC impacted groundwater due to the highly elevated concentrations of VOCs and the potential for off-site migration.

Soil **Gas/Sub-Slab Vapor/Indoor** Air

In March 2004, 4 sub-slab vapor samples, 4 indoor air samples and 1 ambient air sample were collected at the site. Sample locations are shown on Figure 5.

Chlorinated VOCs, especially TCE and PCE, were detected in the sub-slab vapor. PCE sub-slab vapor concentrations ranged from 8 $\mu g/m^3$ to 190,000 $\mu g/m^3$. TCE sub-slab vapor concentrations ranged from non-detect to 360,000 $\mu g/m^3$.

PCE indoor air concentrations ranged from non-detect to 9.8 $\mu g/m^3$. TCE indoor air concentrations ranged from non-detect to 5.9 $\mu g/m^3$.

Sub-slab soil vapor and indoor air SCGs for PCE and TCE are based on the NYSDOH soil vapor/indoor air matrices for PCE and TCE. Concentrations of other VOCs in indoor air were compared to outdoor air and sub-slab vapor concentrations to determine if vapors were migrating into the indoor air from below the slab. The results indicated that VOCs other than TCE and PCE were not a concern at this site.

The highest soil vapor concentrations were located in the middle of the building in the area of highest VOC groundwater concentrations. Complete results are provided in the May 6,2004 "Sub-slab Soil Gas and Indoor Air Sampling" report.

.2: Interim Remedial Measures

An interim remedial measure (IRM) is conducted at a site when a source of contamination or exposure pathway can be effectively addressed before completion of the RI/FS.

Mitigation measures were taken at the on-site building to address current human exposures (via inhalation) to volatile organic compounds associated with soil vapor intrusion.

Specifically, installation of a sub-slab depressurization system (venting system) underneath the impacted portions of the building was completed in January 2005 to prevent contaminated vapors from entering the building. The system pulls contaminated air from underneath the building and vents it to the outside air through pipes at the top of the building. Air purifiers were also installed in the basement because a sub-slab depressurization system is not practical in the basement due to the presence of groundwater immediately below the floor.

5.3: Summary of Human Exposure Pathwavs:

This section describes the types of human exposures that may present added health risks to persons at or around the site. A more detailed discussion of the human exposure pathways can be found in Section Appendix B of the FS report which can be found at the document repository.

An exposure pathway describes the means by which an individual may be exposed to contaminants originating from a site. An exposure pathway has five elements: [1] a contaminant source, [2] contaminant release and transport mechanisms, [3] a point of exposure, [4] a route of exposure, and [5] a receptor population.

The source of contamination is the location where contaminants were released to the environment (any waste disposal area or point of discharge). Contaminant release and transport mechanisms carry contaminants from the source to a point where people may be exposed. The exposure point is a location where actual or potential human contact with a contaminated medium may occur. The route of exposure is the manner in which a contaminant actually enters or contacts the body (e.g., ingestion, inhalation, or direct contact). The receptor population is the people who are, or may be, exposed to contaminants at a point of exposure.

An exposure pathway is complete when all five elements of an exposure pathway exist. An exposure pathway is considered a potential pathway when one or more of the elements currently does not exist, but could in the future.

Potential Exposure Pathwavs

Subsurface Soil

Direct contact with subsurface soils contaminated with VOCs and metals is a potential exposure pathway for site workers. The impacted portions of the site are paved or covered by the floor slab. Therefore, with the exception of future excavation activities, exposure to site workers from contaminated soil is not expected. The proposed remedy would further minimize potential exposures through the development of a site management plan, an environmental easement, and maintenance of the existing cap.

Groundwater

Ingestion of contaminated groundwater is a potential pathway for site workers or the community. However, the area is supplied with public water. Therefore, ingestion of contaminated groundwater is not expected.

Indoor Air

Inhalation of volatile organic compounds in indoor air as a result of vapor intrusion was a completed exposure pathway at this site. However, a sub-slab depressurization system began operating as an IRM in January 2005. Therefore, inhalation exposure to VOCs from on-site soils and groundwater will not be expected as long as the system is properly maintained.

5.4: Summarv of Environmental Impacts

This section summarizes the existing and potential future environmental impacts presented by the site. Environmental impacts include existing and potential future exposure pathways to fish and wildlife receptors, as well as damage to natural resources such as aquifers and wetlands.

Site contamination has impacted the groundwater resource in the overburden and bedrock. The aquifer is not a source of drinking water in the area.

SECTION 6: SUMMARY OF THE REMEDIATION GOALS

Goals for the remedial program have been established through the remedy selection process stated in 6 NYCRR Part 375-1.10. At a minimum, the remedy selected must eliminate or mitigate all significant threats to public health and/or the environment presented by the hazardous waste disposed at the site through the proper application of scientific and engineering principles.

The remediation goals for this site are to eliminate or reduce to the extent practicable:

- exposures of persons at or around the site to VOCs and inorganics in subsurface soil and groundwater;
- the migration of contaminants in the groundwater to adjacent properties;
- the release of contaminants from soil into groundwater that may create exceedances of groundwater quality standards; and
- the release of contaminants from subsurface soil and groundwater under buildings into indoor air through soil vapor.

Further, the remediation goals for the site include attaining to the extent practicable:

- ambient groundwater quality standards; and

- total chromium concentrations of *500* ppm for subsurface soils and hexavalent chromium concentrations of *50* ppm within the *500* ppm footprint.

SECTION 7: <u>SUMMARY OF THE EVALUATION OF ALTERNATIVES</u>

The selected remedy must be protective of human health and the environment, be cost-effective, comply with other statutory requirements, and utilize permanent solutions, alternative technologies or resource recovery technologies to the maximum extent practicable. Potential remedial alternatives for the General Circuits Site were identified, screened and evaluated in the FS report which is available at the document repositories established for this site.

A summary of the remedial alternatives that were considered for this site are discussed below. The present worth represents the amount of money invested in the current year that would be sufficient to cover all present and future costs associated with the alternative. This enables the costs of remedial alternatives to be compared on a common basis. As a convention, a time frame of *30* years is used to evaluate present worth costs for alternatives with an indefinite duration. This does not imply that operation, maintenance, or monitoring would cease after *30* years if remediation goals are not achieved.

7.1: <u>Description of Remedial Alternatives</u>

The following potential remedies were considered to address the contaminated soils and groundwater at the site. The remedial alternatives are organized according to media.

SITE WIDE ALTERNATIVES

Site Wide Alternative SW1: No Further Action

Present Worth: $160,000
Capital Cost: $0
Annual OM&M: $10,400
Time to Implement . . . . 0 year

The No Further Action alternative recognizes remediation of the site conducted under a previously completed IRM. To evaluate the effectiveness of the remediation completed under the IRM, only continued monitoring is necessary.

This alternative would leave the site in its present condition and would not provide any additional protection to human health or the environment.

Site Wide Alternative SW2: Institutional and Engineering Controls

Present Worth: *$240,000*
Capital Cost: *$24,000*
Annual OM&M: *$14,000*
Time to Implement . . . . *Iyear*

This alternative would rely upon institutional controls (ICs) and engineering controls (ECs) to protect humans from exposure to contaminants. This alternative would also include the continued operation of the sump discharge treatment system.
Specific controls for the General Circuits site would include an environmental easement with the following restrictions and requirements:

- The property could only be used for commercial and industrial purposes. Health care and day care uses would also be prohibited.

- Require proper maintenance of the site's protective cover (asphalt, flooring, etc.). Additionally, any excavations below the protective cover would have to be completed in accordance with a NYSDEC approved site management plan (SMP).

- Require a vapor intrusion evaluation for any new buildings or building additions developed on the site, including provision for mitigation of any impacts identified

- Restrict the use of groundwater as a source of potable or process water, without necessary water quality treatment as determined by the Monroe County Health Department.

- Require the property owner to provide an IC/EC certification, prepared and submitted by a professional engineer or environmental professional acceptable to the NYSDEC annually or for a period to be approved by the NYSDEC, which would certify that the institutional controls and engineering controls put in place, are unchanged from the previous certification and nothing has occurred that would impair the ability of the control to protect public health or the environment or constitute a violation or failure to comply with any operation and maintenance or soil management plan.

This alternative could be implemented in approximately 1 year. The environmental easement would need to be filed with the Monroe County Clerk's office and an SMP would need to be developed.

SOIL ALTERNATIVES

Soil Alternative S1: In *Situ* Soil Stabilization

Present Worth: *$1,620,000*
Capital Cost: *$1,210,000*
Annual OM&M:
(Years 1-2): *$124,000*
(Years 3-30): *$3,600*
Closeout Costs: *$142,000*
Time to Implement: . . . . *2 years*

This alternative would involve the injection of a reducing agent, such as ferrous sulfate, into the soil to chemically reduce hexavalent chromium to trivalent chromium. The treatment would target those areas where the hexavalent chromium concentration exceeds 50 ppm, approximately 7,000 square feet (Figure 9). The treatment area would include areas underneath the building and outside the building. Physical constraints, such as accessability to the Boiler Room, may limit the actual size of the treatment area. Final determinations regarding the extent of the treatment area would be made as part of the remedial design.

A treatability study would be needed prior to full scale implementation. It is estimated that full scale implementation could be completed in about 2 years.

The remaining contaminated soils would be managed through the institutional and engineering controls discussed in Site Wide Alternative SW2.

Soil Alternative S2: Chromium Source Area Soil Excavation with Off-Site Disposal

Present Worth: *$1,220,000*
Capital Cost: *$925,000*
Annual OM&M:
(Yearsl-5): *$124,000*
(Years 6-30): *$3,600*
Closeout Costs: *$437,000*
Time to Implement: . . . . *5 years*

This alternative would involve excavation and off-site disposal of soil with total chromium concentrations exceeding 500 ppm to the extent practicable. Within the 500 ppm footprint, soils with hexavalent chromium concentrations exceeding 50 ppm would also be excavated. The areal extent of soils exceeding 500 ppm is shown on Figure 10. The area covers approximately 2,800 square feet to depths of 6 to 10 feet. Physical constraints, such as accessability to the Boiler Room, may limit the actual size of the excavation area. Figure 10 also shows the extent of the area where excavation is considered practicable at this time. Final determinations regarding the extent of the excavation area would be made as part of the remedial design.

The remaining contaminated soils would be managed through the institutional and engineering controls discussed in Site Wide Alternative SW2.

This excavation would be performed entirely underneath the building and would include several rental units. To minimize the impact on existing businesses, soil removal would occur in a phased manner. Specifically, soils from below a rental unit would be excavated when the space is vacated. With this approach, the source area excavations would be completed in about 5 years. Tenant relocation would be necessary in areas where the soil removal has not been completed within the 5-year period.

Soil Alternative S3: Chromium Source Area Soil Excavation and Exterior Soil Excavation with Off-Site Disposal

Present Worth: *$2,040,000*
Capital Cost: *$1,970,000*
Annual OM&M:
(Years 1-5): *$124,000*
(Years 6-30): *$3,600*
Closeout Costs: *$439,000*
Time to Implement: . . . . *5 years*

This alternative would involve excavation and off-site disposal of soil with total chromium concentrations exceeding 500 ppm underneath the building and 50 ppm outside of the building to the extent practicable. Within the 500 ppm footprint underneath the building, soils with hexavalent chromium concentrations exceeding 50 ppm would also be excavated. The area covers about 2,800 square feet inside the building and 2,500 square feet outside the building (Figure 11). The interior excavation would range from 6 to 10 feet in depth. The exterior excavation would be about 12 feet deep. The difference between Alternatives S2 and S3 is that Alternative S3 would remove soils outside the building with total chromium concentrations above 50 ppm. Alternative S2 would not remove soils outside the building.

Physical constraints, such as accessability to the Boiler Room, may limit the actual size of the excavation area under the building. Figure 11 also shows the extent of the area where excavation under the building is considered practicable at this time. Final determinations regarding the extent of the excavation area would be made as part of the remedial design.

The remaining contaminated soils would be managed through the institutional and engineering controls discussed in Site Wide Alternative SW2.

Excavation activities performed inside the building would include several rental units. To minimize the impact on existing businesses, soil removal would occur in a phased manner. Specifically, soils from below a rental unit would be excavated when the space is vacated. The exterior excavation would require shoring of the exterior wall of the building and working around underground gas and electric utilities located in the area to be excavated. With this approach, the source area and exterior excavations would be completed in about 5 years. Tenant relocation would be necessary in areas where the soil removal has not been completed within the 5-year period.

Soil Alternative S4: Extensive Soil Excavation with Off-Site Disposal

Present Worth: *$15,800,000*
Capital Cost: *$12,100,000*
Annual OM&M: *$600,000*
Closeout Costs: *$1,890,000*
Time to Implement: . . . . *4 years*

This alternative would involve excavation and off-site disposal of contaminated soil until SCGs are obtained. The area to be excavated is shown on Figure 12 and would cover about 20,000 square feet to a depth of about 12 feet.

Most of the excavation would take place under an existing and occupied building. It is estimated that it would take at least 4 years to design and implement this remedy, longer if the work is done in phases as tenant space is vacated.

GROUNDWATER ALTERNATIVES

Groundwater Alternative GW1: *In Situ* Chemical Oxidation

Present Worth: *$1,570,000*
Capital Cost: *$1,250,000*
Annual OM&M:
(Year 1): *$43,000*
(Years 2-9): *$26,700*
(Year 10): *$41,800*
Closeout Costs: *$11,000*
Time to Implement: . . . . *2 years*

This option would involve the periodic injection of an oxidizing agent, such as potassium permanganate or Fentons Reagent, into the groundwater. Figure 13 shows the area that would be treated. The oxidation process would result in the chemical breakdown of chlorinated VOCs; however trivalent chromium could be oxidized to hexavalent chromium. A treatability study would also be needed to select the appropriate oxidizing agent and design the treatment program.

Additional aspects of this remedy would include the institutional and engineering controls discussed in Site Wide Alternative SW2, and installation of a permanent vapor mitigation system for the basement to reduce VOC vapors migrating into the basement air, and a long-term monitoring program.

Groundwater Alternative GW2: In *Situ* Chemical Reduction

Present Worth: *$1,420,000*
Capital Cost: *$492,000*
Annual OM&M:
(Year 1): *$184,000*
(Years 2-5): *$156,000*
(Years 6-9): *$26,700*
(Year 10): *$41,800*
Closeout Costs: *$11,000*
Time to Implement: . . . . *5 years*

This option would involve the periodic injection of a reducing agent, such as zero-valent iron or substrate release compound, into the groundwater over an estimated period of about 5 years. Figure 13 shows the area that would be treated. The reduction process would enhance biological processes which accelerate the natural breakdown of chlorinated VOCs and result in the chemical reduction of hexavalent chromium to trivalent chromium. A treatability study would also be needed to select the appropriate reducing agent and design the treatment program.

Additional aspects of this remedy would include the institutional and engineering controls discussed in Site Wide Alternative SW2, and installation of a permanent vapor mitigation system for the basement to reduce VOC vapors migrating into the basement air, and a long-term monitoring program.

Groundwater Alternative GW3: Source Area Extraction and Treatment

Present Worth: *$5,200,000*
Capital Cost: *$213,000*
Annual OM&M:
(Year 1): *$321,000*
(Years 2-10): *$304,000*
(Years 11-29): *$303,300*
(Year 30): *$318,000*
Closeout Costs: *$11,000*
Time to Implement: . . . . *2 years*

This alternative involves the installation of an estimated 10 groundwater extraction wells. The wells would be located in the VOC and chromium source areas with one extraction well placed at the perimeter of the plume to prevent contaminants from migrating off-site (Figure 14). Groundwater would also continue to be extracted from the basement sumps. The extracted water would be treated on-site. The treatment system would include precipitation of the metals, followed by an air stripper to remove most of the VOCs, and then carbon canisters to remove the remaining VOCs. The treated water would be discharged to the sanitary sewer system. The treated water would also be tested to make sure that the it meets discharge requirements. The precipitated metals would be properly disposed ofoff-site. Vapors from the air stripper would also be treated with carbon to remove VOCs if necessary.

A treatability study would be necessary to design the system. Once installed, the extraction and treatment system would be expected to operate for at least 30 years.

Additional aspects of this remedy would include the institutional and engineering controls discussed in Site Wide Altemative 2, and installation of apermanent vapor mitigation system for the basement to reduce VOC vapors migrating into the basement air, and a long-term monitoring program.

Groundwater Alternative GW4: Site Wide Extraction and Treatment

Present Worth: $7,650,000
Capital Cost: $1,010,000
Annual OM&M:
(Yearl): $448,000
(Years 2-10): $431,000
(Yearsll-29): $430,000
(Year 30): $445,000
Closeout Costs: $11,000
Time to Implement: . . . . 2 years

This alternative involves the installation of an estimated 30 groundwater extraction wells at various depths throughout the groundwater contaminant plume shown on Figure 13. Groundwater would also continue to be extracted from the basement sumps. The extracted water would be treated on-site. The treatment system would include precipitation of the metals, followed by an air stripper to remove most of the VOCs, and then carbon canisters to remove the remaining VOCs. The treated water would be discharged to the sanitary sewer system. The treated water would also be tested to make sure that the it meets discharge requirements. The precipitated metals would be properly disposed ofoff-site. Vapors from the air stripper would also be treated with carbon to remove VOCs if necessary.

A treatability study would be necessary to design the system. Once installed, the system would be expected to operate for at least 30 years.

Additional aspects of this remedy would include the institutional and engineering controls discussed in Site Wide Altemative SW2, and installation of a permanent vapor mitigation system for the basement to reduce VOC vapors migrating into the basement air, and a long-term monitoring program.

Groundwater Alternative GW5: Source Area Extraction and Treatment with In *Situ* Chemical Reduction

Present Worth: *$2,690,000*
Capital Cost: *$987,000*
Annual OM&M:
(Year 1): *$321,000*
(Years 2-5): *$304,000*
(Years 6-9): *$168,000*
(Year 10): *$183,000*
Closeout Costs: *$11,000*
Time to Implement: . . . . *10 years*

This alternative involves the installation of an estimated 8 groundwater extraction wells. The wells would be focused on the chromium source area, but would also include a portion of the VOC source area. One extraction well would also be placed at the perimeter of the plume to prevent contaminants from migrating off-site. Figure 15 shows the approximate extent of the area that would be treated during the extraction and treatment phase. Groundwater would also continue to be extracted from the basement sumps. The extracted water would be treated on-site. The treatment system would include precipitation of the metals, followed by an air stripper to remove most of the VOCs, and then carbon canisters to remove the remaining VOCs. The treated water would be discharged to the sanitary sewer system. The treated water would also be tested to make sure that the it meets discharge requirements. The precipitated metals would be properly disposed of off-site. Vapors from the air stripper would also be treated with carbon to remove VOCs if necessary.

A treatability study would be necessary to design the system. Once installed, the extraction and treatment system would operate until the groundwater concentrations of chromium decrease to adequate levels for using *in situ* chemical reduction (estimated as 5 years).

After that time, the treatment technology would switch to *in situ* chemical reduction (discussed in Groundwater Alternative GW2) as a "polishing" operation. A separate treatability study would need to be completed prior to initiating the reduction phase of the remedy. It is estimated that the reducing agent would be periodically injected into the groundwater over an additional 5-year period. Figure 15 shows the area that would be treated by the reducing agent.

Additional aspects of this remedy would include the institutional and engineering controls discussed in Site Wide Alternative SW2, and installation of a permanent vapor mitigation system for the basement to reduce VOC vapors migrating into the basement air, and a long-term monitoring program.

7 Ev of Remedial Alternatives

The criteria to which potential remedial alternatives are compared are defined in 6 NYCRR Part 375, which governs the remediation of inactive hazardous waste disposal sites in New York State. A detailed discussion of the evaluation criteria and comparative analysis is included in the FS report.

The first two evaluation criteria are termed "threshold criteria" and must be satisfied in order for an alternative to be considered for selection.

1. Protection of Human Health and the Environment. This criterion is an overall evaluation of each alternative's ability to protect public health and the environment.

2. Compliance with New York State Standards, Criteria, and Guidance (SCGs). Compliance with SCGs addresses whether a remedy will meet environmental laws, regulations, and other standards and criteria. In addition, this criterion includes the consideration of guidance which the NYSDEC has determined to be applicable on a case-specific basis.

The next five "primary balancing criteria" are used to compare the positive and negative aspects of each of the remedial strategies.

3. Short-term Effectiveness. The potential short-term adverse impacts of the remedial action upon the community, the workers, and the environment during the construction and/or implementation are evaluated. The length of time needed to achieve the remedial objectives is also estimated and compared against the other alternatives.

4. Long-term Effectiveness and Permanence. This criterion evaluates the long-term effectiveness of the remedial alternatives after implementation. If wastes or treated residuals remain on-site after the selected remedy has been implemented, the following items are evaluated: 1) the magnitude of the remaining risks, 2) the adequacy of the engineering and/or institutional controls intended to limit the risk, and 3) the reliability of these controls.

5. Reduction of Toxicity. Mobility or Volume. Preference is given to alternatives that permanently and significantly reduce the toxicity, mobility or volume of the wastes at the site.

6. Implementability. The technical and administrative feasibility of implementing each alternative are evaluated. Technical feasibility includes the difficulties associated with the construction of the remedy and the ability to monitor its effectiveness. For administrative feasibility, the availability of the necessary personnel and materials is evaluated along with potential difficulties in obtaining specific operating approvals, access for construction, institutional controls, and so forth.

7. Cost-Effectivness. Capital costs and operation, maintenance, and monitoring costs are estimated for each alternative and compared on a present worth basis. Although cost-effectiveness is the last balancing criterion evaluated, where two or more alternatives have met the requirements of the other criteria, it can be used as the basis for the final decision. The costs for each alternative are presented in Table 3.

This final criterion is considered a "modifying criterion" and is taken into account after evaluating those above. It is evaluated after public comments on the Proposed Remedial Action Plan have been received.

8. Community Acceptance - Concerns of the community regarding the RI/FS reports and the PRAP have been evaluated. The responsiveness summary (Appendix A) presents the public comments received and the manner in which the NYSDEC addressed the concerns raised. No significant public comments were received.

SECTION 8: SUMMARY OF THE SELECTED REMEDY

Based on the Administrative Record (Appendix B) and the discussion presented below, the NYSDEC has selected Soil Alternative S2 (Chromium Source Area Soil Excavation with Off-Site Disposal) and Groundwater Alternative GW5 (Source Area Extraction and Treatment with *In* Situ Chemical Reduction) as the remedy for this site. The elements of this remedy are described at the end of this section.

The selected remedy is based on the results of the RI and the evaluation of alternatives presented in the FS.

Soils Component

Soil Alternative S2 is being proposed because, as described below, it satisfies the threshold criteria and provides the best balance of the primary balancing criteria described in Section 7.2. It would achieve the remediation goals for the site by removing the soils that create the most significant threat to public health and the environment, it would greatly reduce the source of contamination to groundwater, and it would create the conditions needed to restore groundwater quality to the extent practicable. Soil Alternatives S1, S3 and S4 would also comply with the threshold selection criteria.

Because each of the soil alternatives satisfy the threshold criteria, the five balancing criteria are particularly important in selecting a final remedy for the site.

Alternatives S2, S3, and S4 are all excavation and removal alternatives and have similar short-term impacts such as:

- the potential creation of airborne chromium particulate matter and VOC vapors during excavation activities;
- tenant inconveniences;
- structural impacts to the building; and
- the need to work around underground utilities.

These concerns can be controlled through the proper use of engineering controls and monitoring during excavation activities. Alternative S1 would also need to address tenant inconveniences and utility concerns. Indoor air and structural concerns would not be significant issues with Alternative S1.

The time needed to achieve the remediation goals would be shortest for Alternative S1 and similar for Alternatives S2, S3, and S4. The need to conduct a treatability study and relocate tenants could significantly delay implementation of Alternative S1.

Achieving long-term effectiveness is best accomplished by excavation and removal of the contaminated overburden soils (Soil Alternatives S2, S3 and S4). Alternative S4 is favorable because it would result in the removal of all of the known contaminated soil (VOCs and metals) at the site (about 18,000 tons). Since all of the contaminated soil would be removed, Alternative S4 would remove the need for engineering controls and the environmental easement related to contaminated soils. Alternative S3 would remove approximately 20 percent (3,550 tons) of the contaminated soils at the site, including all of the contaminated soils outside of the building footprint. Alternative S2 would focus on removing only the most contaminated soils at the site (soils with a total chromium concentration greater than 500 ppm). As such, Alternative S2 would remove about 7.5 percent (1,350 tons) of contaminated soil at the site. Alternatives S2 and S3 are also expected to remove some VOC impacted soils. Engineering controls and an environmental easement would be required for Alternatives S2 and S3 to address contaminated soils that would remain at the site.

Alternative S2 is favorable in that it is the most readily implementable. Alternatives S2 and S3 would be completed as a series of small excavations when tenant spaces in the target area are vacated. Structural considerations, safety requirements for tenants remaining in the building, and the potential presence of utilities underneath the building are challenges that would need to be addressed. Alternatives S3 would also require shoring of the exterior wall of the building and working around known underground electric and natural gas lines. Alternative S4 would also require the relocation of tenants, removal and relocation the boiler room, and significant building reconstruction. Alternative S1 would require a treatability study, relocation of tenants and working around known underground electric and natural gas lines outside of the building as well as potential utilities under the building The physical constraints of the Boiler Room would restrict the implementation of each soil alternative in this area.

Since hexavalent chromium is much more mobile, soluble, and toxic than trivalent chromium, removing hexavalent chromium from site soils must be part of the site remedy. Alternative S1 would accomplish this by converting the hexavalent chromium in the soils to the less toxic and less mobile trivalent chromium. Alternative S1 would also solidify subsurface soils in the treatment area, including soils below the water table. This would result in reduced mobility for metals and VOCs in the treatment area, but could also alter groundwater flow patterns and create challenges in the design and implementation of the groundwater component of the remedy. Alternative S1 would not reduce the volume of contaminated soil at the site.

Alternatives S2, S3, and S4 would reduce the toxicity, mobility, and volume of contaminated soils through excavation and removal. Alternative S4 would remove all contaminated soils at the site. Alternatives S2 and S3 would remove smaller volumes of soil and use engineering controls and an environmental easement to further control toxicity and mobility.

Soils containing total chromium concentrations between 50 ppm and 500 ppm would remain at the site with both Alternatives S2 and S3. The difference between Alternatives S2 and S3 is that Alternative S3 would remove soils outside the building with total chromium concentrations above

50 ppm. Alternative S2 would not remove soils outside the building. However, Alternative S3 would not provide significant additional groundwater protection because the maximum hexavalent chromium concentration outside the building was only 54 ppm.

Alternatives S2 and S3 would be protective of groundwater since both remove the majority of the hexavalent chromium from site soils. The quantity of hexavalent chromium that would remain after the completion of Alternative S2 or S3, would not be expected to act as a significant continuing source of groundwater contamination. Any residual groundwater impacts would be managed by the groundwater component of the remedy.

The cost of the soil alternatives varies significantly. Alternative S2, S3 and S4 are all permanent remedies that would eliminate most of a continuing source of groundwater contamination at the site. The Extensive Soil Excavation (Alternative S4) is the most costly remedy and its implementability is uncertain. Alternative S3 would be much less costly than Alternative S4, but there are also challenges associated with its implementation. Alternative S1 is of similar cost to Alternative S3, but would not remove any chromium contaminated soils from the site, may not be as permanent as the soil removal alternatives, and may create sub-surface conditions that hinder the implementation of the groundwater component of the remedy. Alternative S2 is the least costly and most easily implemented alternative. Additionally, Alternative S2 would provide a similar level of groundwater protection as Alternative S3.

Groundwater Component

Groundwater Alternative GW5 is being proposed because, as described below, it satisfies the threshold criteria and provides the best balance of the primary balancing criteria described in Section 7.2. It would achieve the remediation goals for the site by removing the groundwater that creates the most significant threat to public health and the environment, it would greatly reduce the sources of contamination in groundwater, it would prevent contaminants from migrating off-site, and it would create the conditions needed to restore groundwater quality to the extent practicable. Alternative GW4 would similarly comply with the threshold selection criteria. Alternatives GW2 and GW3 would comply with the threshold selection criteria but to a lesser degree or with lower certainty. Alternative GW1 would not treat any of the chromium in the groundwater and does not meet the threshold selection criteria.

Because Alternatives GW2, GW3, GW4, and GW5 satisfy the threshold criteria, the five balancing criteria are particularly important in selecting a final remedy for the site.

Alternatives GW2 (in situ chemical reduction), GW3 (source area extraction and treatment), GW4 (site wide extraction and treatment) and GW5 (source area extraction and treatment with in situ chemical reduction) all have short-term impacts which can easily be controlled. The time needed to achieve the remediation goals would be longest for Alternatives GW3 and GW4, and similar for Alternatives GW2 and GW5.

Achieving long-term effectiveness at this site is best accomplished by removing contaminant mass from source areas and creating sub-surface conditions which promote the in situ destruction of VOCs and conversion of hexavalent chromium to trivalent chromium. Alternative GW2 would promote the *in situ* destruction of VOCs and conversion of hexavalent chromium to trivalent chromium, but none of the chromium would be removed from the site. Alternative GW2 is also considered less permanent than Alternatives GW4 and GW5 because trivalent chromium could be converted back to hexavalent chromium under certain circumstances. Alternatives GW3 and GW4 would physically remove contaminant mass from the groundwater, but the effectiveness of extraction and treatment systems typically decreases over time.

Alternative GW5 is favorable because it combines the chemical and physical aspects of Alternatives GW2 and GW3. Alternative GW5 would initially extract VOCs, chromium, and other metals from the groundwater in the most contaminated areas. Groundwater would also be extracted at the edge of the plume, as necessary, to prevent contaminants from migrating off-site. Extraction and treatment would continue for a number of years until groundwater concentrations of chromium decrease to adequate levels for using *in situ* chemical reduction and the soil removal component of the remedy has been completed. The *in situ* chemical reduction stage of the remedy would treat the contaminant plume and, over time, result in the destruction of the remaining chlorinated VOCs and the conversion of residual hexavalent chromium in the groundwater to trivalent chromium.

Alternatives GW3 and GW4 are favorable in that they are readily implementable. The extraction and treatment phase of Alternative GW5 is also readily implementable. Alternative GW2 and the *in situ* chemical reduction phase of Alternative GW5 are also implementable, but would require the relocation of several tenants.

Alternatives GW2, GW3, GW4, and GW5 would reduce the volume of VOCs on-site, but Alternative GW2 would not reduce the total amount of chromium on-site. Alternative GW2 would reduce the toxicity of the chromium by converting hexavalent chromium to the less toxic trivalent chromium. Alternative GW2 would also reduce the mobility of the chromium because trivalent chromium is less soluble than hexavalent chromium.

As part of the breakdown of the chlorinated VOCs, Alternative GW2 and the *in situ* chemical reduction phase of Alternative GW5 would produce compounds, such as vinyl chloride, that are more toxic than the original compounds. Public exposure to VOCs would be minimized through the continued operation of the sub-slab depressurization IRM discussed in Section 5.2, engineering controls, and an environmental easement.

The cost of the alternatives varies significantly. Although *in situ* chemical reduction (Alternative GW2) is less expensive than extraction and treatment (Alternatives GW3 and GW4), it does not remove chromium from the site and is not certain to be a permanent remedy. Alternative GW4 is the most expensive remedy, primarily due to the long-term cost of operating and maintaining the system. Alternative GW5 is very favorable because it is a permanent remedy that will eliminate most of a continuing source of groundwater contamination at the site at a cost that is less than long-term site-wide extraction and treatment.

Summary **of** the Selected Remedy

The estimated present worth cost to implement the remedy is $3,900,000. The cost to construct the remedy is estimated to be $1,910,000, the estimated average annual operation, maintenance, and monitoring costs for 30 years is $103,000, and the estimated total closeout costs are $450,000. The elements of the selected remedy are as follows:

1. A remedial design program will be implemented to provide the details necessary for the construction, operation, maintenance, and monitoring of the remedial program.

2. The site's existing protective cover (asphalt/concrete pavement, flooring, etc.) will be maintained to prevent exposure to contaminated soils and to minimize storm water infiltration.

3. Since the remedy results in contamination above unrestricted levels remaining at the site, an SMP will be developed and implemented. The SMP will include the ICs and ECs to: (a) address residual contaminated soils that may be excavated from the site during future redevelopment and site maintenance activities. The plan will require soil characterization and, where applicable, disposal/reuse in accordance with NYSDEC regulations; (b) evaluate the potential for vapor intrusion for any new buildings or building additions developed on the site, including provision for mitigation of any impacts identified; (c) provide for the operation and maintenance of the components of the remedy including the protective cover and the sub-slab depressurization IRM; (d) monitor the groundwater, treated groundwater, soil vapor, and indoor air; and (e) identify any use restrictions on site development or groundwater use.

4. The SMP will require the property owner to provide an IC/EC certification, prepared and submitted by a professional engineer or environmental professional acceptable to the NYSDEC, annually or for a period to be approved by the NYSDEC, which will certify that the institutional controls and engineering controls put in place, are unchanged from the previous certification and nothing has occurred that will impair the ability of the control to protect public health or the environment or constitute a violation or failure to comply with any operation and maintenance or soil management plan.

5. Imposition of an institutional control in the form of an environmental easement that will (a) require compliance with the approved site management plan; (b) limit the use and development of the property to restricted commercial and restricted industrial uses only (health care and day care uses will also be prohibited without a waiver from NYSDEC); (c) restrict the use of groundwater as a source of potable or process water, without necessary water quality treatment as determined by the Monroe County Health Department ; and (d) require the property owner to complete and submit to the NYSDEC IC/EC certification.

6. Removal and off-site disposal of soil containing total chromium with concentrations greater than *500* ppm and, within this removal area, removal and off-site disposal of soil containing hexavalent chromium with concentrations greater than *50* ppm, to the extent practicable.

7. Extraction and on-site treatment of groundwater followed by ***in situ*** chemical reduction.

8. Installation of a permanent vapor mitigation system in the basement. Specific components of the system (e.g. sealing the sumps, additional ventilation, etc.) will be determined as part of the remedial design.

9. The operation of the components of the remedy will continue until the remedial objectives have been achieved, or until the NYSDEC determines that continued operation is technically impracticable or not feasible.

SECTION 9: HIGHLIGHTS OF COMMUNITY PARTICIPATION

As part of the remedial investigation process, a number of Citizen Participation activities were undertaken to inform and educate the public about conditions at the site and the potential remedial alternatives. The following public participation activities were conducted for the site:

- Repositories for documents pertaining to the site were established.

- A public contact list, which included nearby property owners, elected officials, local media and other interested parties, was established.

- Three fact sheets were sent to the names on the public contact list.

- A public meeting was held on March 1, *2005* to present and receive comment on the PRAP.

- A responsiveness summary (Appendix A) was prepared to address the comments received during the public comment period for the PRAP.

TABLE 1
Nature and Extent of Contamination
August 1990- March 2004

WASTE	Contaminants of Concern	Concentration Range Detected (ppm)"	SCG[b] (ppm)"	Frequency of Exceeding SCG
Inorganic	total chromium	12.1 - 21,400	50	80 of 85
Compounds	hexavalent chromium	**ND** - 3,880	50	15 of 41

SURFACE SOIL	Contaminants of Concern	Concentration Range Detected **(ppm)**[a]	SCG[b] (ppm)"	Frequency of Exceeding SCG
Inorganic Compounds	total chromium	8.9 - 40.8	50	0 of 4

SUBSURFACE SOIL	Contaminants of Concern	Concentration Range Detected (ppm)"	SCG[b] (ppm)"	Frequency of Exceeding SCG
Volatile Organic	tetrachloroethene	ND - 32	1.4	2 of 25
Compounds **(VOCs)**	trichloroethene	ND - 14	0.7	1 of 25
	1,2-dichloroethene	ND - 0.69	0.3	1 of 25
Inorganic	total chromium	2.9 - 468	50	30 of 94
Compounds	hexavalent chromium	ND - 230	50	3 of 49
	barium	28.1 - 2,650	300	1 of 5
	copper	8.0 - 1,310	25	6 of 19
	zinc	16.5 - 2,770	20	3 of 5

GROUNDWATER	Contaminants of Concern	Concentration Range Detected (ppb)"	SCG[b] (ppb)"	Frequency of Exceeding SCG
Volatile Organic	tetrachloroethene	ND - 110,000	5	26 of 67
Compounds (VOCs)	trichloroethene	ND - 130,000	5	30 of 67
	1,2-dichloroethene	ND - 8,900	5	35 of 67
	1,1-dichloroethene	ND - 680	5	14 of 67
	1,1-dichloroethane	ND - 340	5	8 of 67

GROUNDWATER	Contaminants of Concern	Concentration Range Detected (ppb)[a]	SCG[b] (ppb)[a]	Frequency of Exceeding SCG
	1,2-dichloroethane	ND - 6	0.6	4 of 67
	vinyl chloride	ND -720	2	12 of 67
Inorganic Compounds	total chromium	ND - 60,100	50	13 of 46
	hexavalent chromium	ND - 57,700	50	9 of 44
	antimony	ND - 780	3	3 of 5
	copper	ND - 273	200	2 of 5
	thallium	ND - 111	0.5	4 of 5

SOIL GAS	Contaminants of Concern	Concentration Range Detected ($\mu g/m^3$)[a]	SCG[b] ($\mu g/m^3$)[a]	Frequency of Exceeding SCG
Volatile Organic Compounds (VOCs)	tetrachloroethene	8.0 - 190,000	see note b	2 of 4
	trichloroethene	ND - 360,000	see note b	**NA**
	cis-1,2-dichloroethene	ND - 18,000	**NA**	**NA**
	trans-1,2-dichloroethene	**ND** - 7,200	**NA**	**NA**

INDOOR AIR	Contaminants of Concern	Concentration Range Detected ($\mu g/m^3$)[a]	SCG[b] ($\mu g/m^3$)[a]	Frequency of Exceeding SCG
Volatile Organic Compounds (VOCs)	tetrachloroethene	ND - 9.8	see note b	NA
	trichloroethene	ND - 700	5	2 of 6
	cis-1,2-dichloroethene	ND - 1300	**NA**	NA

[a] ppb = parts per billion, which is equivalent to micrograms per liter, ug/L, in water;
ppm = parts per million, which is equivalent to milligrams per kilogram, mglkg, in soil;
ug/m[3] = micrograms per cubic meter

[b] SCG = standards, criteria, and guidance values;
Soil: NYSDEC TAGM 4046 Recommended Soil Cleanup Objectives
Groundwater: Class GA Groundwater Standards and Guidance Values
Soil Gas and Indoor Air: Sub-slab soil vapor and indoor air SCGs for PCE and TCE are based on the NYSDOH soil vaporlindoor air matrices for PCE and TCE. Determinations are based on site-specific qualitative assessments.

ND = Non-detect
NA = Not applicable

Table 2
General Circuits Site #8-28-085

Remedial Investigation
Chromium Sub-Surface Soil Test Results
In Parts per Million (ppm)

B-31 8-11.850869.0TB-31 4-8408NATB-31 11.8-14371NA

Location	Depth (Ft.)	Total Chromium (ppm)	Hexavalent Chromium (ppm)
CHROMIUM SOURCE AREA			
TB-43	0-2	18.3	**NA**
TB-43	2-4	3,050	ND
TB-43	4-6	3,200	NA
TB-43	6-7	10,500	1,120
TB-44	0-2	41.1	ND
TB-44	2-4	632	NA
TB-44	4-5	21,000	1,310
TB-45	0-2	227	4.1
TB-45	2-4	576	NA
TB-45	4-6	98.2	4.9
TB-45	6-8	145	NA
TB-45	8-10	151	ND
TB-45	10-12	544	NA
TB-45	12-14	299	5.0
TB-46	0-2	171	9.3
TB-46	2-4	161	NA
TB-46	4-6	181	ND
TB-46	6-8	887	NA
TB-46	8-10	231	11.5
TB-46	10-12	311	NA
TB-46	12-14	243	4.2
TB-47	0-2	12.4	ND
TB-47	2-4	103	NA
TB-47	4-6	11,500	2,276
TB-47	6-8	108	NA
TB-47	8-10	11,100	3,880
TB-47	10-12	57.4	NA
TB-47	12-13.5	219	4.5
TB-48	0-2	56.3	1.8
TB-48	2-4	2,460	NA

Location	Depth (Ft.)	Total Chromium (ppm)	Hexavalent Chromium (ppm)
TB-48	4-6	5,520	1,730
TB-48	6-8	195	NA
TB-48	8-10	138	19.3
TB-48	10-12	127	NA
TB-48	12-14	141	1.8
TB-49	0-2	12,000	2.9
TB-49	2-4	2,110	NA
TB-49	4-6	99.7	282
TB-49	6-8	110	NA
TB-49	8-10	102	11.4
TB-49	10-12	133	NA
TB-49	12-14	121	ND
TB-50	0-2	953	NA
TB-50	2-4	3,370	650
TB-50	4-6	251	219
TB-50	6-8	106	NA
TB-50	8-10	145	ND
TB-50	10-12	165	NA
TB-50	12-14	238	ND
TB-51	0-2	4,810	NA
TB-51	2-4	1,230	164
TB-52	0-2	3,720	NA
TB-52	2-4	4,240	743
TB-53	0-2	8,000	ND
TB-53	2-4	1,790	NA
TB-53	4-6	3,110	992
TB-53	6-8	98.1	NA
TB-53	8-10	61.9	5.1
TB-53	10-12	127	NA
TB-53	12-13	156	17.1
TB-55	0-2	840	195
TB-57	0-2	65.4	ND
TB-57	2-4	25.7	NA
TB-57	4-6	184	10.8
TB-57	6-8	566	NA
TB-57	8-10	301	2.3
TB-60	0-2	12.1	ND
TB-60	2-4	230	NA
TB-60	4-6	3,200	1,010
TB-60	6-8	96.5	NA

Location	Depth (Ft.)	Total Chromium (ppm)	Hexavalent Chromium (ppm)
TB-60	8-10	106	17.3
TB-31	8-11.8	508	69.0
TB-31	4-8	408	NA
TB-31	11.8-14	371	NA
OUTSIDE CHROMIUM SOURCE AREA			
TB-12	12-15.8	6.2	2.6
TB-15	12-15.9	5.5	0.54
TB-19	8-12	6.4	1.5
TB-14	12-15.5	157	1.7
TB-13	8-12	337	16.7
TB-18	12-14.2	8.0	10.2
TB-9	4-8	6.6	1.3
TB-11	0-4	14.5	ND
TB-10A	8-11.3	5.4	1.2
TB-11	8-12	330	6.5
TB-11	8-12	300	2.5
TB-1OA	8-11.3	6.6	NA
TB-17	2-4	12.0	NA
TB-4	10-11.8	6.7	ND
TB-4	10-11.8	5.4	ND
TB-17	8-10	5.0	NA
TB-3	8-10	8.4	NA
TB-7	8-10	9.0	NA
TB-28	8-10	8.4	0.48
TB-34	10-11.4	11.0	0.97
TB-27A	1.5-3.0	55.0	1.9
TB-26	8-10.1	2.9	0.88
TB-42	12-14.5	4.4	NA
TB-33	12-14.5	41.4	8.4
TB-30	0-4	23.6	NA
TB-30	8-10	222	54.0
TB-32	11.5-12.5	5.2	ND
TB-35	11-12	6.1	4.4
TB-37	10-12	6.5	NA
TB-39	8-10	7.4	NA
TB-36	8-10	11.6	NA
TB-29	6-7.9	9.3	1.2
TB-25	10-11.9	6.4	1.2
TB-23	8-10	6.0	0.7
MW-20	11-13	4.7	NA
MW-21	10-12	4.0	NA

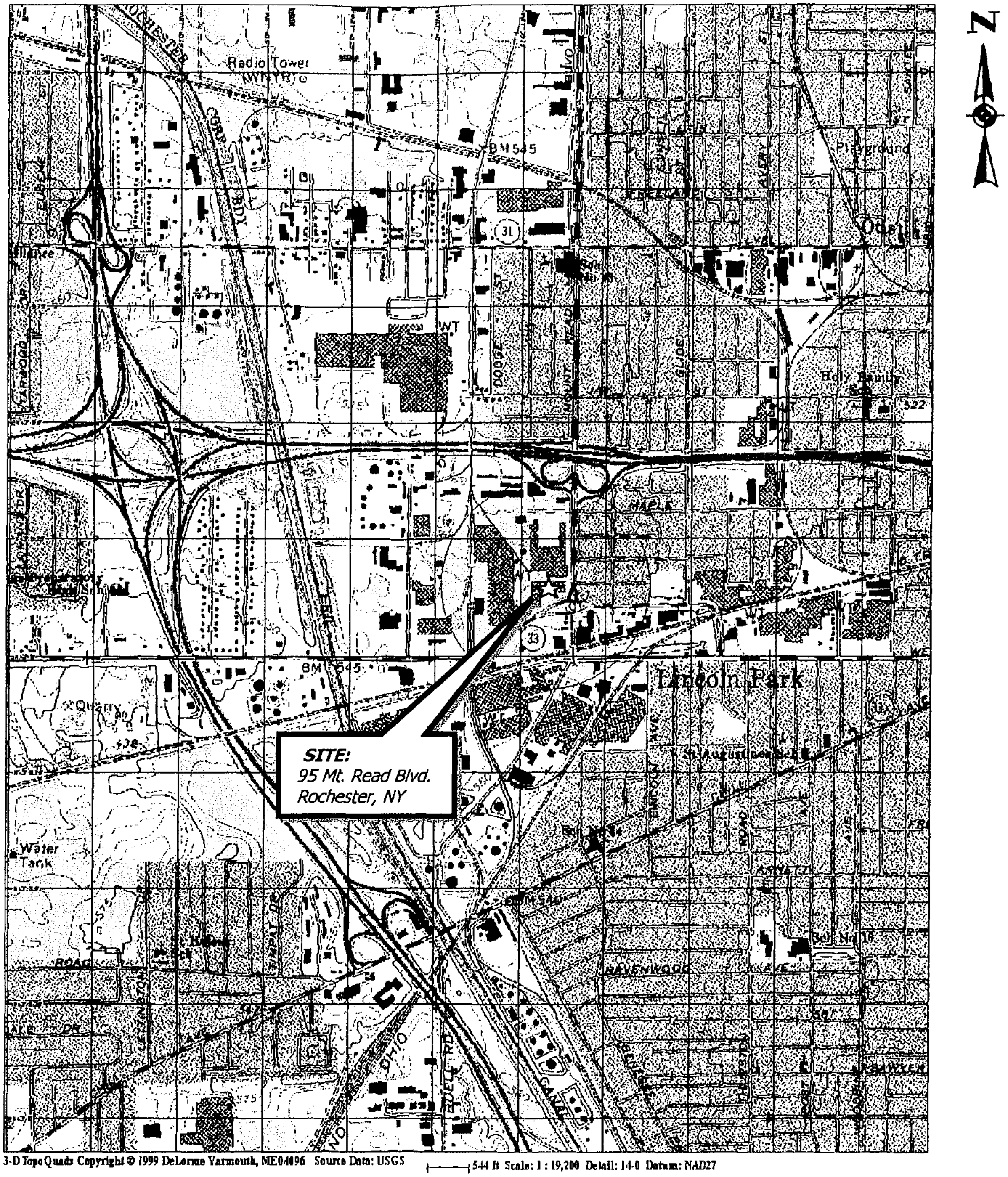
Location	Depth (Ft.)	Total Chromium (ppm)	Hexavalent Chromium (ppm)
MW-22	7-9	16.6	NA
MW-19	10-12	4.2	NA
MW-17	5-7	7.6	NA
TB-54	0-2	220	NA
TB-54	2-4	164	ND
TB-54	4-6	56.1	NA
TB-54	6-8	100	4.3
TB-54	8-10	120	NA
TB-54	10-11	107	3.7
TB-56	0-2	468	230
TB-58	0-2	71.7	NA
TB-58	2-4	17.8	5.4
TB-58	6-8	102	NA
TB-58	8-10	121	36.9
TB-59	0-2	90.9	NA
TB-59	2-4	83.1	NA
TB-59	4-6	63	56.5
TB-59	6-8	170	NA
TB-59	8-10	429	17.4
TB-61	0-2	12.2	ND
TB-61	2-4	14.9	NA
TB-61	4-6	12.7	ND
TB-62	0-2	8.5	NA
TB-62	2-4	10.4	ND
TB-62	4-6	102	NA
TB-62	6-8	85.9	6.9
TB-62	8-10	80	NA
TB-62	10-11.4	53.2	ND
TB-63	0-2	9.2	NA
TB-63	2-4	76.2	ND
TB-63	4-6	60.9	NA
TB-63	6-8	50.1	1.9
TB-64	0-2	11.5	NA
TB-64	2-4	12.6	5.1
TB-64	4-6	16.9	NA
TB-64	6-7.7	16	11.2
TB-65	0-2	13.1	ND
TB-65	2-4	7.9	NA
TB-65	4-6	10.2	ND
TB-65	6-8	14.2	NA

Location	Depth (Ft.)	Total Chromium (ppm)	Hexavalent Chromium (ppm)
TB-65	8-10	10.5	ND
TB-66	0-2	17.9	NA
TB-66	2-4	22.7	2.6
TB-66	4-6	40.5	NA
TB-66	6-6.5	69.1	4.7
TB-67	0-2	11.1	NA
TB-67	2-4	11.9	1.3
TB-67	4-6	40.1	NA
TB-67	6-7	35.9	1.7
TB-68	0-2	12.6	NA
TB-68	2-4	21.2	ND
TB-OS1	0-4	21.4	NA
TB-OSI	4-8	6.0	NA
TB-OS1	8-12	4.6	NA
TB-OS1	12-13	6.9	NA
TB-0S2	0-4	16.2	NA
TB-OS2	4-7	8.4	NA

NA - Not Analyzed
ND - Non-detect

Table 3
Remedial Alternative Costs

Remedial Alternative	Present Value Capital Cost	Present Value Annual OM&M	Present Value Closeout	Total Present Worth
SW1 - No Further Action	$0	$160,000	$0	$160,000
SW2 - Institutional and Engineering Controls	$24,000	$216,000	$0	$234,000
S1 - *In Situ* Soil Stabilization	$1,210,000	$278,000	$128,000	$1,620,000
S2 - Chromium Source Area Soil Excavation and Off-Site Disposal	$725,000	$149,000	$342,000	$1,220,000
S3 - Chromium Source Area Soil Excavation and Exterior Soil Excavation with Off-Site Disposal	$1,540,000	$149,000	$344,000	$2,040,000
S4 - Extensive Soil Excavation with Off-Site Disposal	$12,100,000	$2,130,000	$1,560,000	$15,800,000
GW1 - *In Situ* Chemical Oxidation	$1,250,000	$311,000	$8,620	$1,570,000
GW2 - *In Situ* Chemical Reduction	$492,000	$921,000	$8,620	$1,420,000
GW3 - Source Area Extraction and Treatment	$513,000	$4,690,000	$2,550	$5,200,000
GW4 - Site Wide Extraction and Treatment	$1,010,000	$6,640,000	$2,550	$7,650,000
GW5 - Source Area Extraction and Treatment with In *Situ* Chemical Reduction	$882,000	$1,800,000	$6,750	$2,690,000
Total of **Alternatives** S2 and **GW5**	$1,610,000	$1,950,000	$349,000	$3,900,000



Drawing Produced From: 3-D TopoQuads, DeLorme Map Co., referencing USGS quad map Rochester West (NY) 1995. Site Lat/Long: N43d-09.15' – W77d-39.67'

SCALE 1" = 2000'	**Figure I**	PROJECT TITLE **95 MT. READ BOULEVARD ROCHESTER, NEW YORK General Circuits Site #8-28-085** DRAWING TITLE **PROJECT LOCUS MAP**	PROJECT NO.

Time Plotted: Fri Jan 28 10:30 2005
File Name: 2712-1.dwg
Layout Name: Layout1

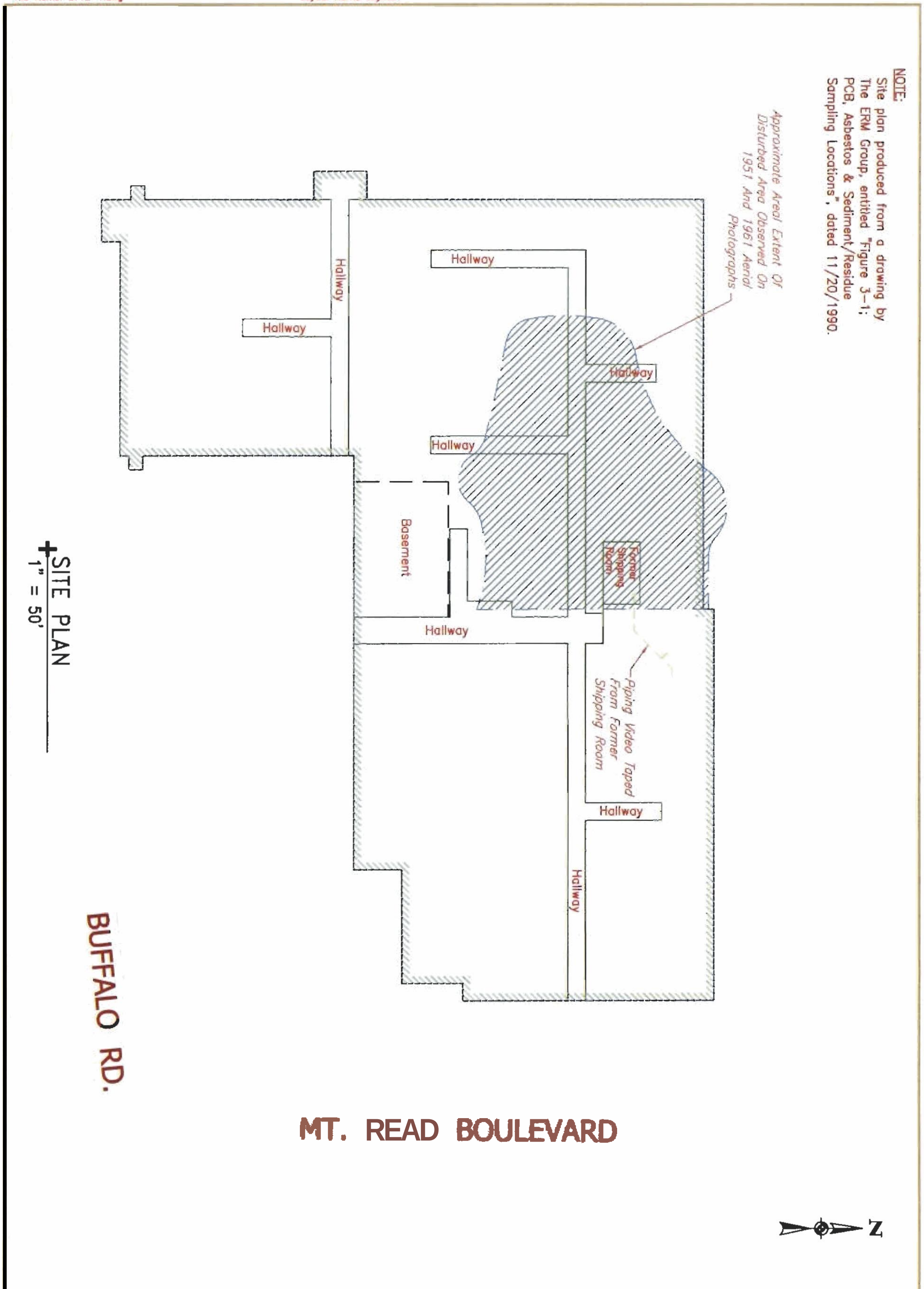


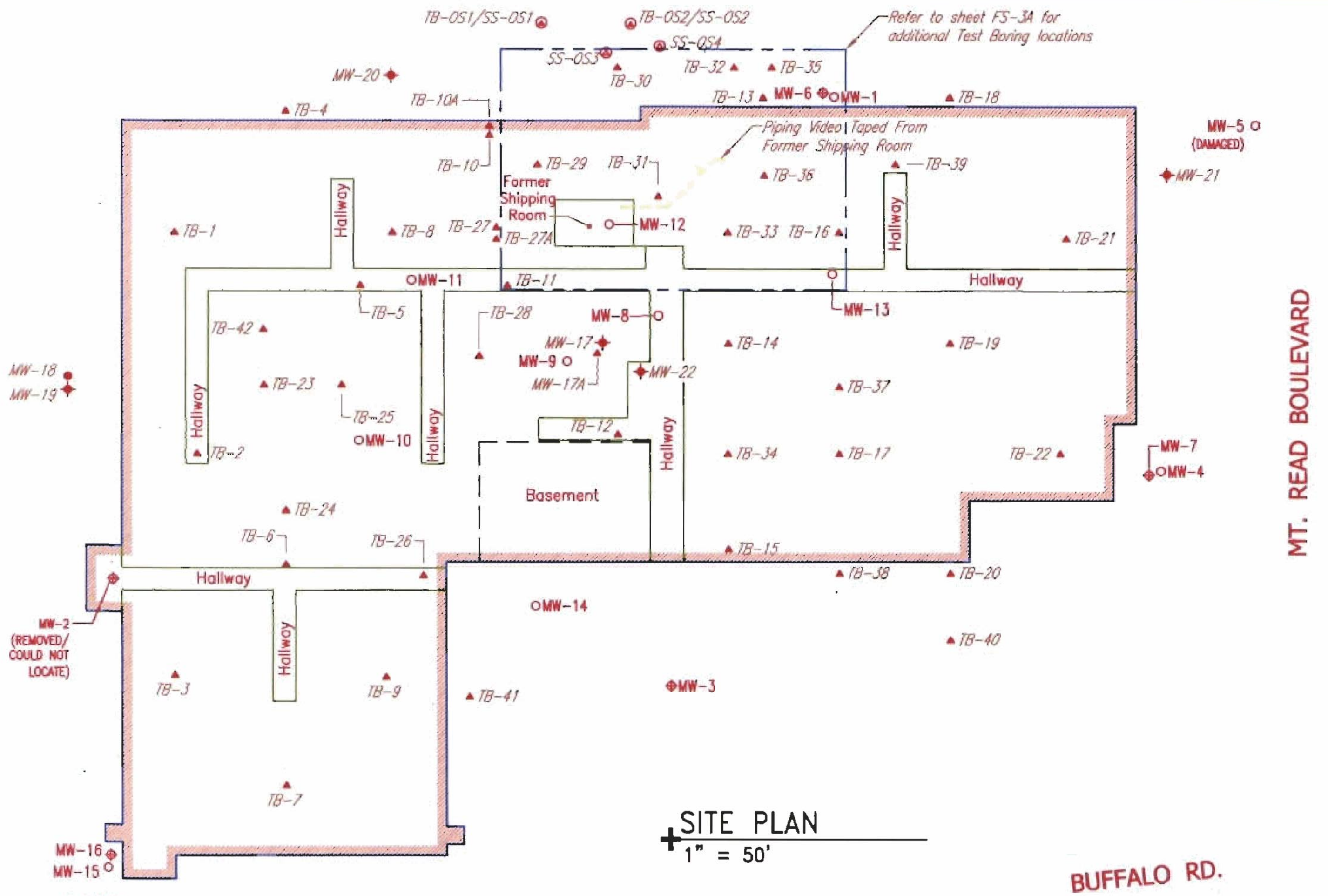
Figure 2

PROJECT TITLE
95 MT. READ BOULEVARD
ROCHESTER, NY
Site #8-28-085

DRAWING TITLE
General Circuits
Site Plan

SCALE
1" = 50'

Time Plotted: Fri Jan 28 10:35 2005
File Name: 2712-12.dwg
Layout Name: Layout1



SITE PLAN
1" = 50'

LEGEND

● MW-18	Shallow Bedrock Monitoring Well Installed During The Remedial Investigation
✦ MW-17	Deep Bedrock Monitoring Well Installed During The Remedial Investigation
▲ TB-1	Test Boring Advanced During The Remedial Investigation
TB-OS1/SS-OS1	Off-Site Test Boring/Surface Sample Advanced During The Remedial Investigation
○ MW-1	Overburden And/Or Shallow Bedrock Monitoring Well Installed Prior To The Remedial Investigation
MW-3	Existing Deep Bedrock Monitoring Well Installed Prior To The Remedial Investigation
SS-OS4	Offsite Surface Sample Collected During The Remedial Investigation

NOTES:

1. Site plan produced from a drawing by The ERM Group, entitled "Figure 3-1; PCB, Asbestos & Sediment/Residue Sampling Locations", dated 11/20/1990.
2. Bedrock well MW-2 has been abandoned due to new construction. Overburden well MW-5 is damaged.
3. Test boring elevations on cross sections not surveyed, but are inferred based on surveyed elevations of monitoring wells.

PROJECT TITLE
95 MT. READ BOULEVARD
ROCHESTER, NY
General Circuits Site
Site #8-28-085

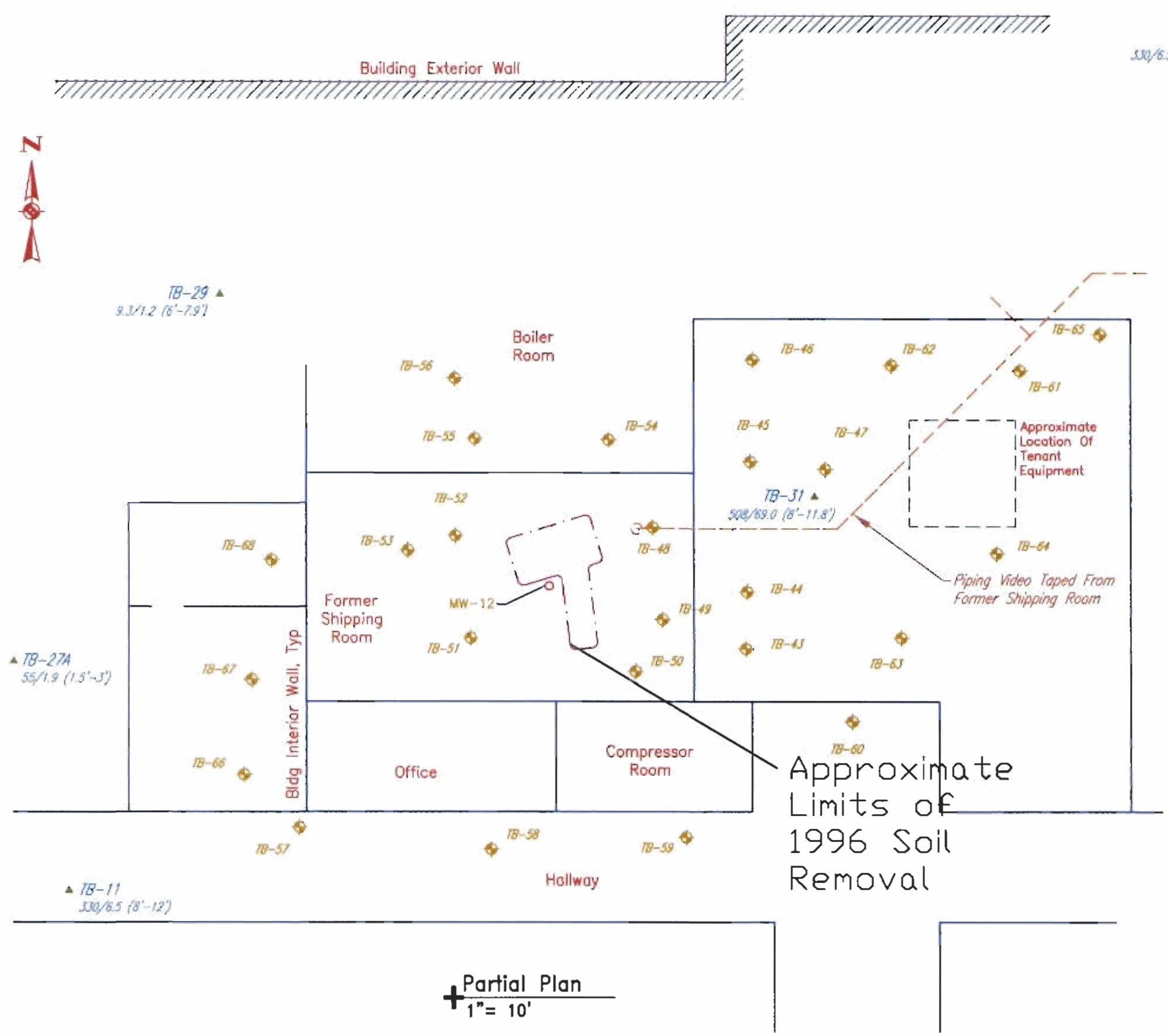
DRAWING TITLE
Site Plan With Monitoring Well And Test Boring Locations

SCALE
1" = 50'

Figure 3

Time Plotted: Fri Jan 28 10:40
File Name: 2712-24.dwg

Layout Name: Layout3



LEGEND:

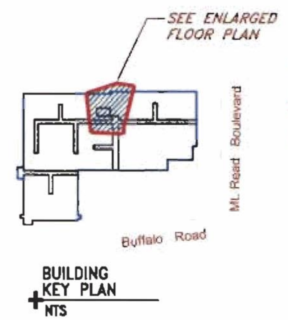
TB-11 ▲ 330/6.5 (8'-12') — Test Boring Advanced During The Remedial Investigation With Total Chromium/Hexavalent Chromium Concentration In Parts Per Million (ppm) Detected In A Soil Sample, Depth Interval (Feet) In Parenthesis, Test Borings Were Advanced Between April And September 1998

MW-12 ○ — Overburden and/or Shallow Bedrock Monitoring Well Installed Prior To The Remedial Investigation

TB-51 — Test Borings advanced During The Supplemental Chromium Delineation

NOTE:

1. Partial plan produced from a drawing by The ERM Group, entitled "Figure 3-1; PCB, Asbestos & Sediment/Residue Sampling Locations", dated 11/20/1990.

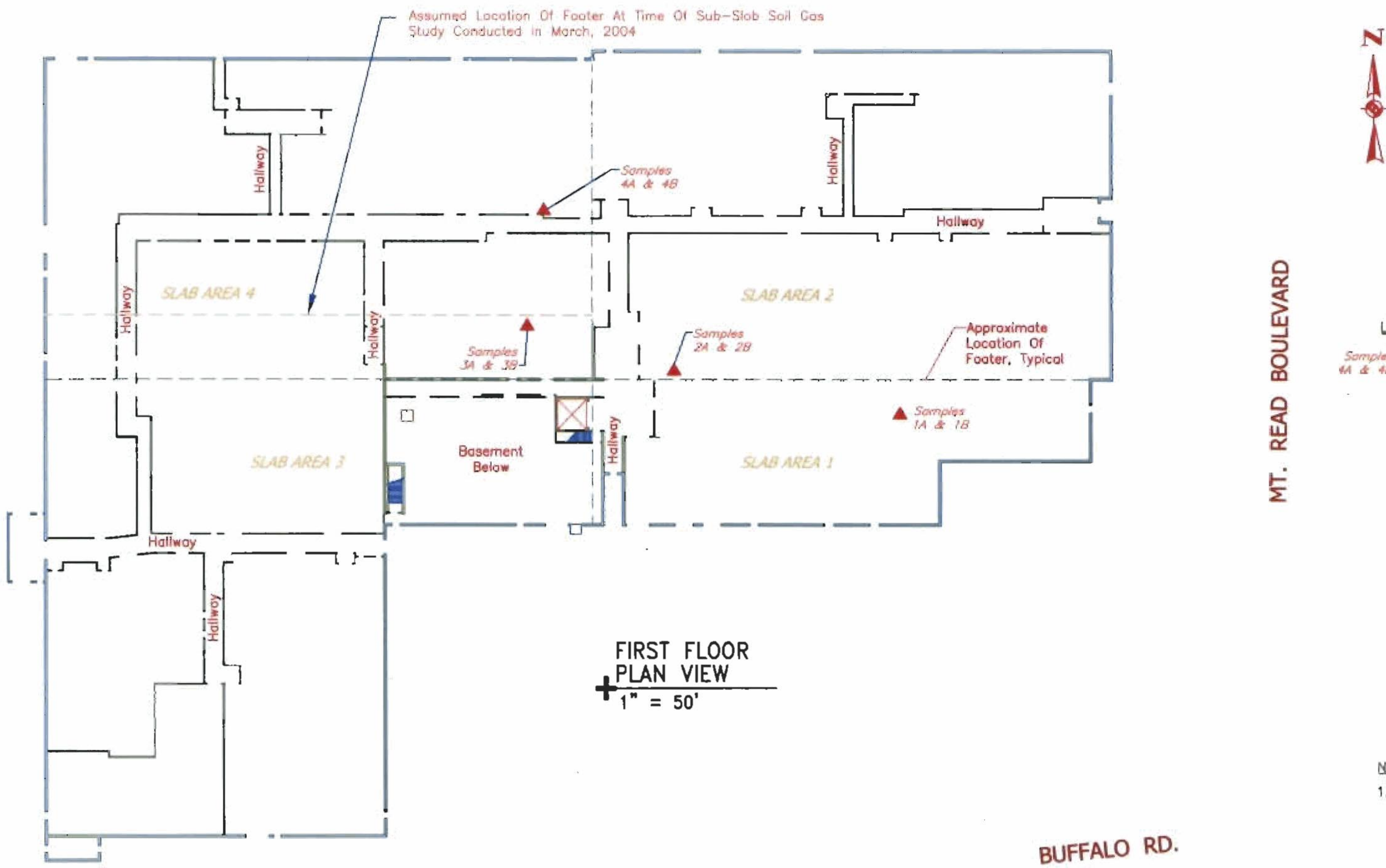


PROJECT TITLE
95 MT. READ BOULEVARD
ROCHESTER, NY
General Circuits
Site #8-28-085

DRAWING TITLE
Partial Plan With Supplemental Chromium Delineation Test Boring Locations

SCALE
1" = 10'

Figure 4



FIRST FLOOR PLAN VIEW
1" = 50'

LEGEND:

▲ Samples 4A & 4B — Sub-Slab Soil Gas and Indoor Air Sampling Point Locations

NOTE:

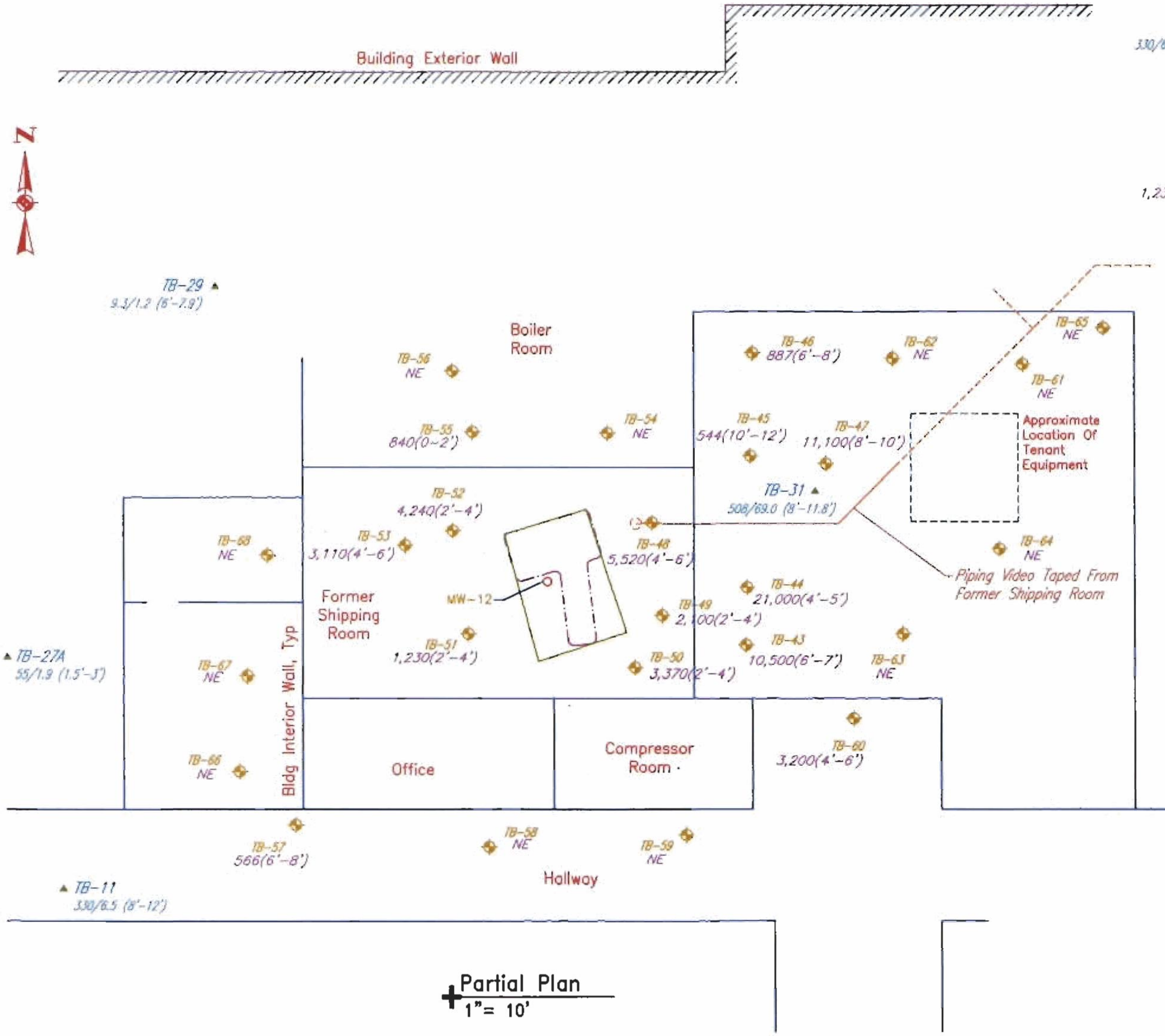
1. Drawing produced from a drawing by The ERM Group, entitled "Figure 3-1; PCB, Asbestos & Sediment/Residue Sampling Locations", dated 11/20/1990; A blueline print by Miller-Anderson Architects, entitled "1st Floor Plan Details", date issued 3-3-2000; and from notes of site visits by representatives of Day Environmental, Inc.

PROJECT TITLE 95 MT. READ BOULEVARD ROCHESTER, NY General Circuits Site Site #8-28-085	SCALE As Noted
DRAWING TITLE Sub-Slab Soil Gas Sample Locations and Indoor Air Sample Locations Associated With March, 2004 Study	

FIGURE 5

Time Plotted: Fri Jan 28 11:15 2005
File Name: 2712-25.dwg

Layout Name: Model



LEGEND:

TB-11 ▲ 330/6.5 (8'-12') — Test Boring Advanced During The Remedial Investigation With Total Chromium/Hexavalent Chromium Concentration In Parts Per Million (ppm) Detected In A Soil Sample, Depth Interval (Feet) In Parenthesis, Test Borings Were Advanced Between April And September 1998.

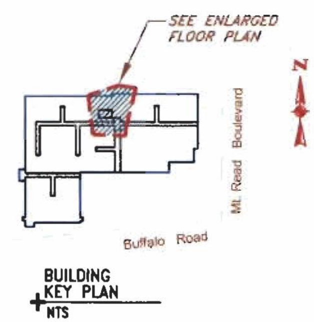
MW-12 ○ — Overburden and/or Shallow Bedrock Monitoring Well Installed Prior To The Remedial Investigation

TB-51 1,230(2'-4') — Test Boring Location And Deepest Soil Sample With Total Chromium Concentration Greater Than 500 ppm. These Test Borings Were Advanced During The Supplemental Chromium Delineation.

NE — Indicates That Soil Samples Collected From This Test Boring Did Not Exceed 500 ppm Total Chromium.

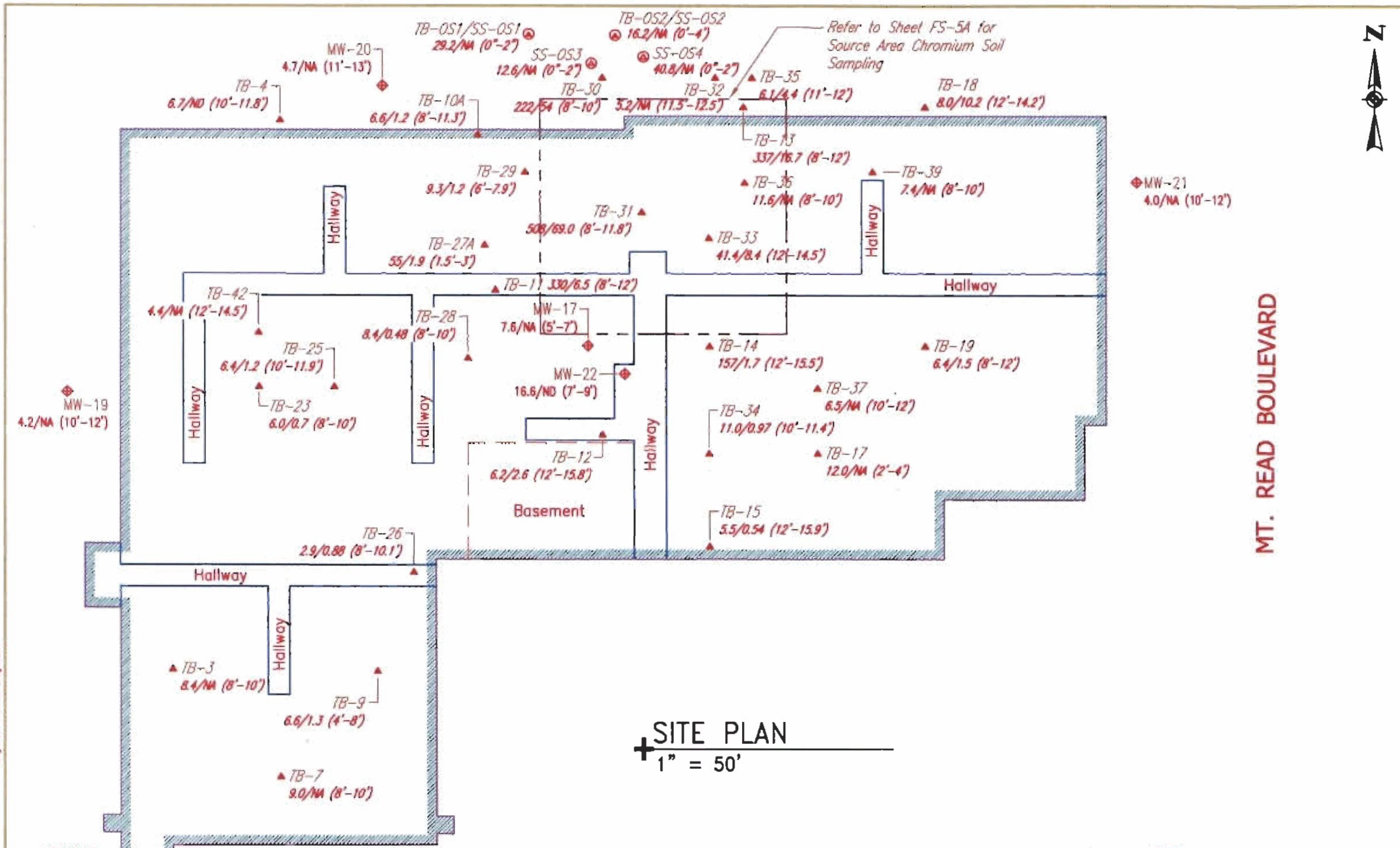
NOTE:

1. Partial plan produced from a drawing by The ERM Group, entitled "Figure 3-1; PCB, Asbestos & Sediment/Residue Sampling Locations", dated 11/20/1990.
2. Soil samples tested for Chromium using ASP Method CLP-M.



PROJECT TITLE	95 MT. READ BOULEVARD ROCHESTER, NY General Circuits Site #8-28-085
DRAWING TITLE	Partial Plan With Deepest Soil Samples Containing Concentrations Of Chromium Greater Than 500 ppm
SCALE	1" = 10'

Figure 6



SITE PLAN
1" = 50'

LEGEND

MW-17 7.6/NA (5'-7') — Monitoring Well Installed During The Remedial Investigation With The Highest Total Chromium/ Hexavalent Chromium Concentration In Parts Per Million (ppm) Measured In A Soil Sample From This Location, Depth Interval (Feet) In Parenthesis

TB-19 6.4/1.5 (8'-12') — Test Boring Advanced During The Remedial Investigation With The Highest Total Chromium/Hexavalent Chromium Concentration In ppm Measured In A Soil Sample From This Location, Depth Interval (Feet) In Parenthesis

TB-OS1/SS-OS1 29.9/NA (0'-2') — Off-Site Test Boring/Surface Sample Advanced/Collected During The Remedial Investigation With The Highest Total Chromium/Hexavalent Chromium Concentration In ppm Measured In A Soil Sample From This Location, Depth Interval (Feet) In Parenthesis

NA Not Analyzed

ND Not Detected Above Laboratory Detection Limits

NOTES:

1. Site plan produced from a drawing by The ERM Group, entitled "Figure 3-1; PCB, Asbestos & Sediment/Residue Sampling Locations", dated 11/20/1990.
2. Soil samples tested for chromium using ASP Method CLP-M.

PROJECT TITLE
95 MT. READ BOULEVARD
ROCHESTER, NY
General Circuits Site
Site #8-28-085

DRAWING TITLE
Site Plan With Maximum Chromium Concentrations Measured In Soil Samples

SCALE
1" = 50'

Figure 7

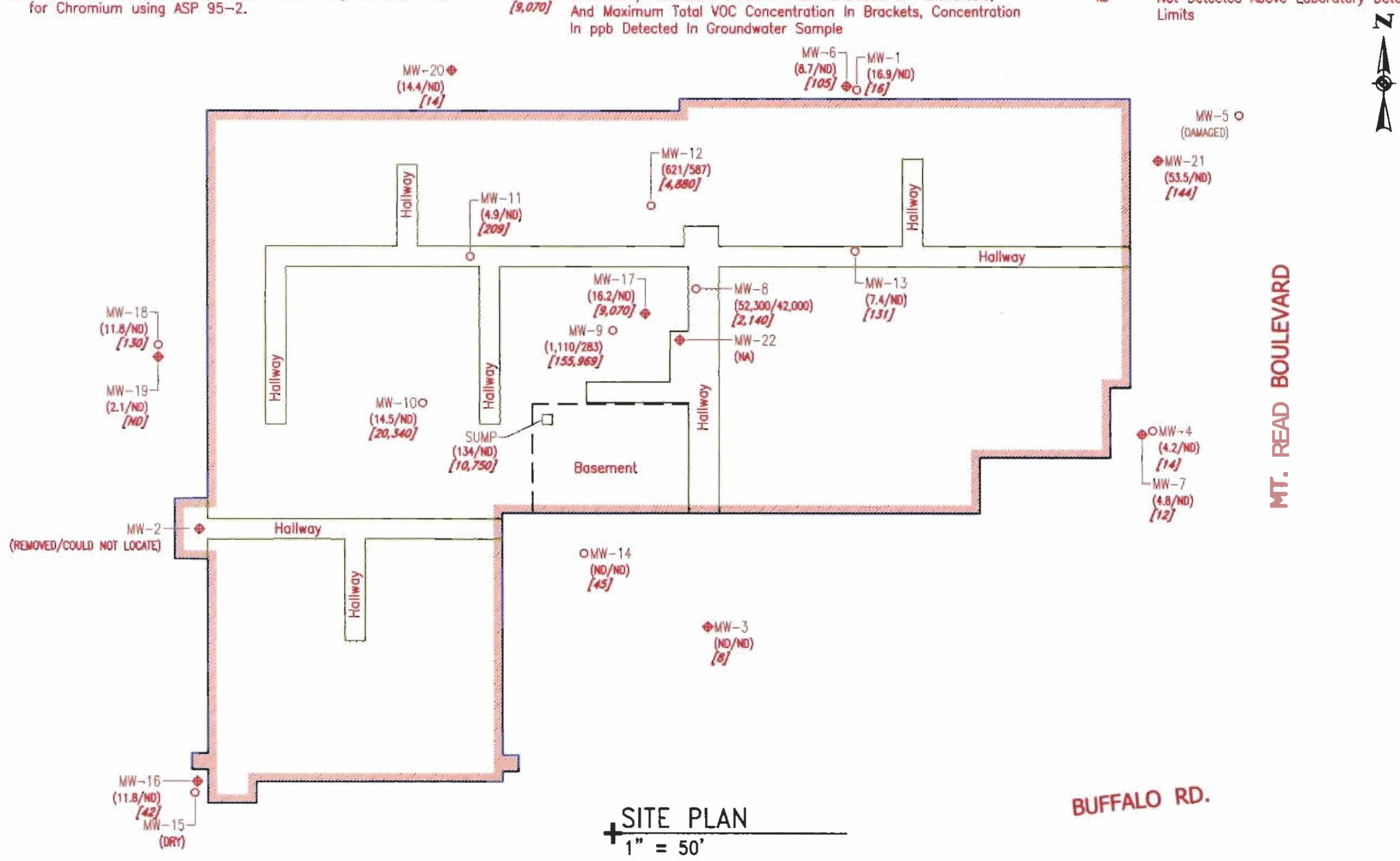
Time Plotted: Fri Jan 28 11:35 2005
File Name: 2712-17.dwg
Layout Name: Layout1

NOTE:

1. Site plan produced from a drawing by The ERM Group, entitled "Figure 3-1; PCB, Asbestos & Sediment/Residue Sampling Locations", dated 11/20/1990.
2. Bedrock well MW-2 has been abandoned due to new construction. Overburden well MW-5 is damaged.
3. Groundwater samples analyzed for VOCs using ASP 95-1 and for Chromium using ASP 95-2.

LEGEND

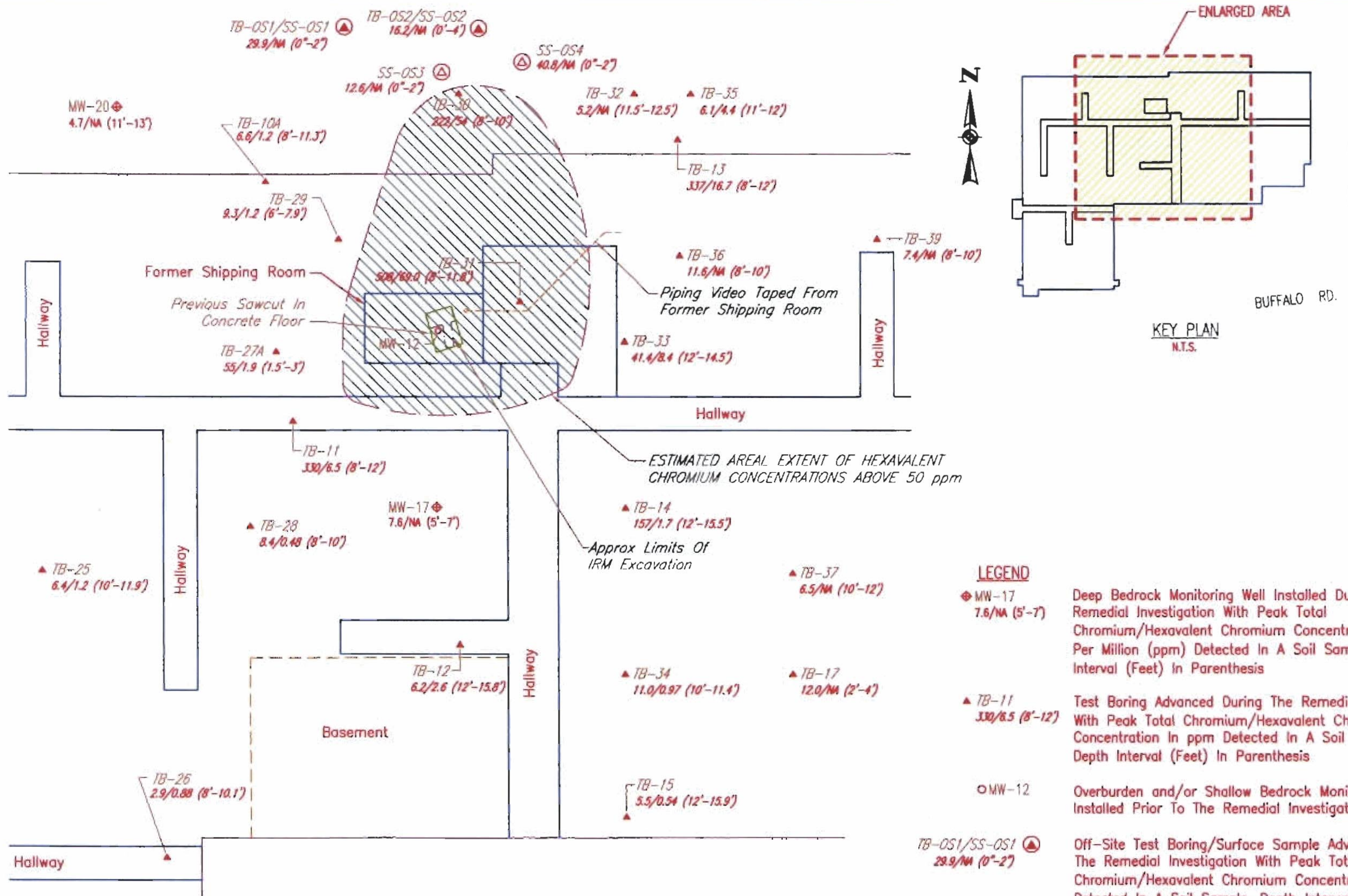
- ○ MW-1 (16.9/ND) [16] — Overburden and/or Shallow Bedrock Monitoring Well Location With maximum Chromium/Hexavalent Chromium Concentration In Parenthesis, And Maximum Total VOC Concentration In Brackets, Concentration In Parts Per Billion (ppb) Detected In Groundwater Sample
- ⊕ MW-17 (16.2/ND) [9,070] — Deep Bedrock Monitoring Well Location With Maximum Chromium/Hexavalent Chromium Concentration In Parenthesis, And Maximum Total VOC Concentration In Brackets, Concentration In ppb Detected In Groundwater Sample
- □ SUMP (134/ND) [10,750] — Basement Sump With Maximum Chromium/ Hexavalent Chromium Concentration In Parenthesis, And Maximum Total VOC Concentration In Brackets, Concentration In ppb Detected In Groundwater Sample
- ND — Not Detected Above Laboratory Detection Limits



SITE PLAN
1" = 50'

PROJECT TITLE 95 MT. READ BOULEVARD ROCHESTER, NY General Circuits Site Site #8-28-085	SCALE 1" = 50'
DRAWING TITLE Partial Plan With Maximum Chromium And Maximum Total VOCs Detected In Groundwater Samples	

Figure 8



PARTIAL PLAN
1" = 30'

LEGEND

MW-17 7.6/NA (5'-7')	Deep Bedrock Monitoring Well Installed During The Remedial Investigation With Peak Total Chromium/Hexavalent Chromium Concentration In Parts Per Million (ppm) Detected In A Soil Sample, Depth Interval (Feet) In Parenthesis
TB-11 330/6.5 (8'-12')	Test Boring Advanced During The Remedial Investigation With Peak Total Chromium/Hexavalent Chromium Concentration In ppm Detected In A Soil Sample, Depth Interval (Feet) In Parenthesis
MW-12	Overburden and/or Shallow Bedrock Monitoring Well Installed Prior To The Remedial Investigation
TB-OS1/SS-OS1 29.9/NA (0"-2")	Off-Site Test Boring/Surface Sample Advanced During The Remedial Investigation With Peak Total Chromium/Hexavalent Chromium Concentration In ppm Detected In A Soil Sample, Depth Interval (Feet) In Parenthesis
NA	Not Analyzed
ND	Not Detected Above Laboratory Detection Limits

NOTE:

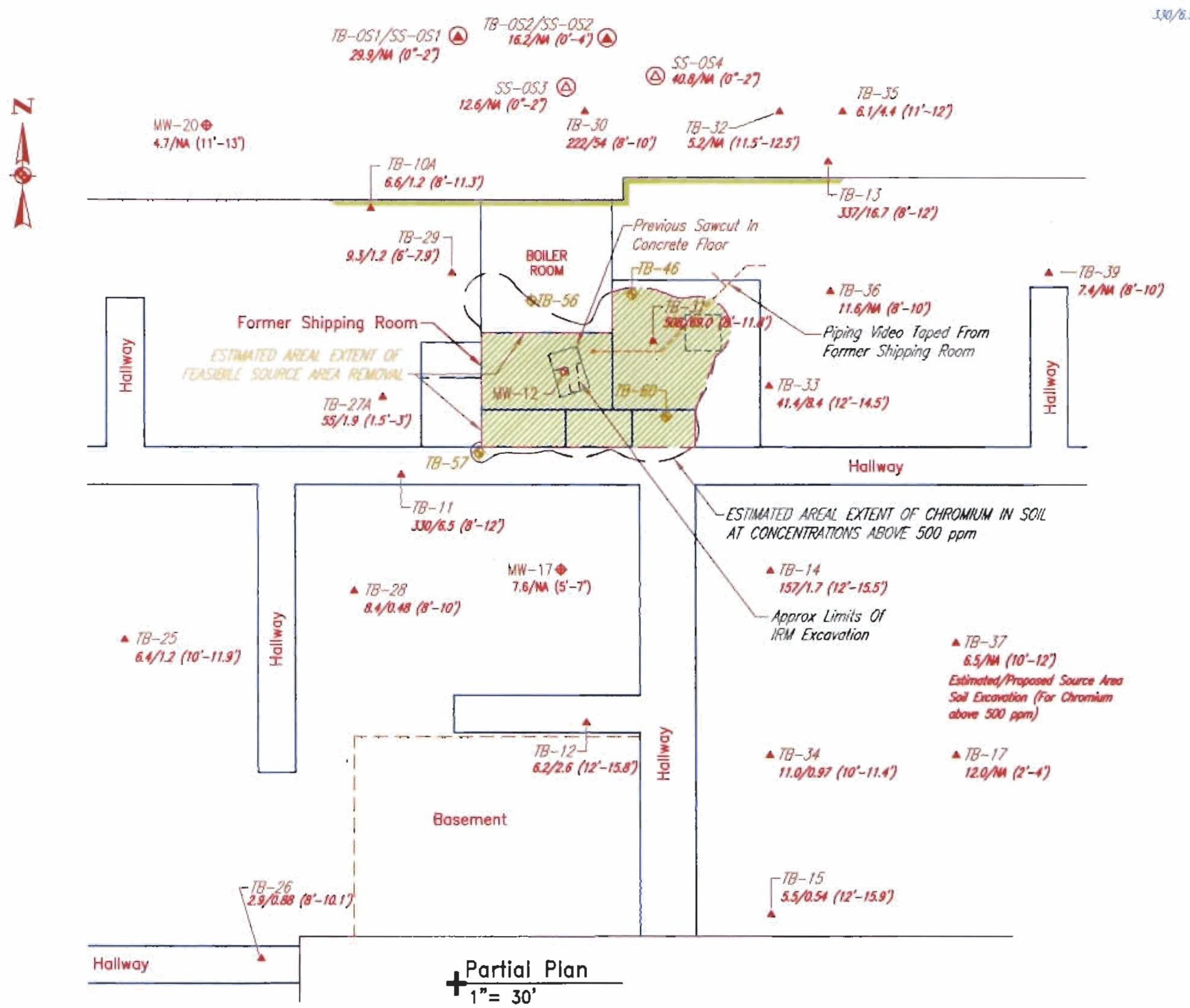
1. Partial plan produced from a drawing by The ERM Group, entitled "Figure 3-1; PCB, Asbestos & Sediment/Residue Sampling Locations", dated 11/20/1990.

PROJECT TITLE
95 MT. READ BOULEVARD
ROCHESTER, NY
General Circuits Site
Site #8-28-085
DRAWING TITLE
Partial Plan With Isopleth For Hexavalent Chromium Within Soil Exceeding 50 ppm

Soil Alternative S1

SCALE
1" = 30'

Figure 9

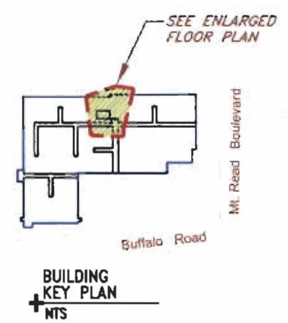


LEGEND:

TB-11 ▲ 330/6.5 (8'-12')	Test Boring Advanced Between During Remedial Investigation With Total Chromium/Hexavalent Chromium Concentration In Parts Per Million (ppm) Detected In A Soil Sample, Depth Interval (Feet) In Parenthesis, Test Borings Were Advanced Between April And September 1998.
MW-12 ○	Overburden and/or Shallow Bedrock Monitoring Well Installed Prior To The Remedial Investigation
MW-17 ◆ 7.6/NA (5'-7')	Deep Bedrock Monitoring Well Installed During The Remedial Investigation With Peak Total Chromium/Hexavalent Chromium Concentration In Parts Per Million (ppm) Detected In A Soil Sample, Depth Interval (Feet) In Parenthesis

NOTE:

1. Partial plan produced from a drawing by The ERM Group, entitled "Figure 3-1; PCB, Asbestos & Sediment/Residue Sampling Locations", dated 11/20/1990.



PROJECT TITLE
95 MT. READ BOULEVARD
ROCHESTER, NY
General Circuits Site
Site #8-28-085

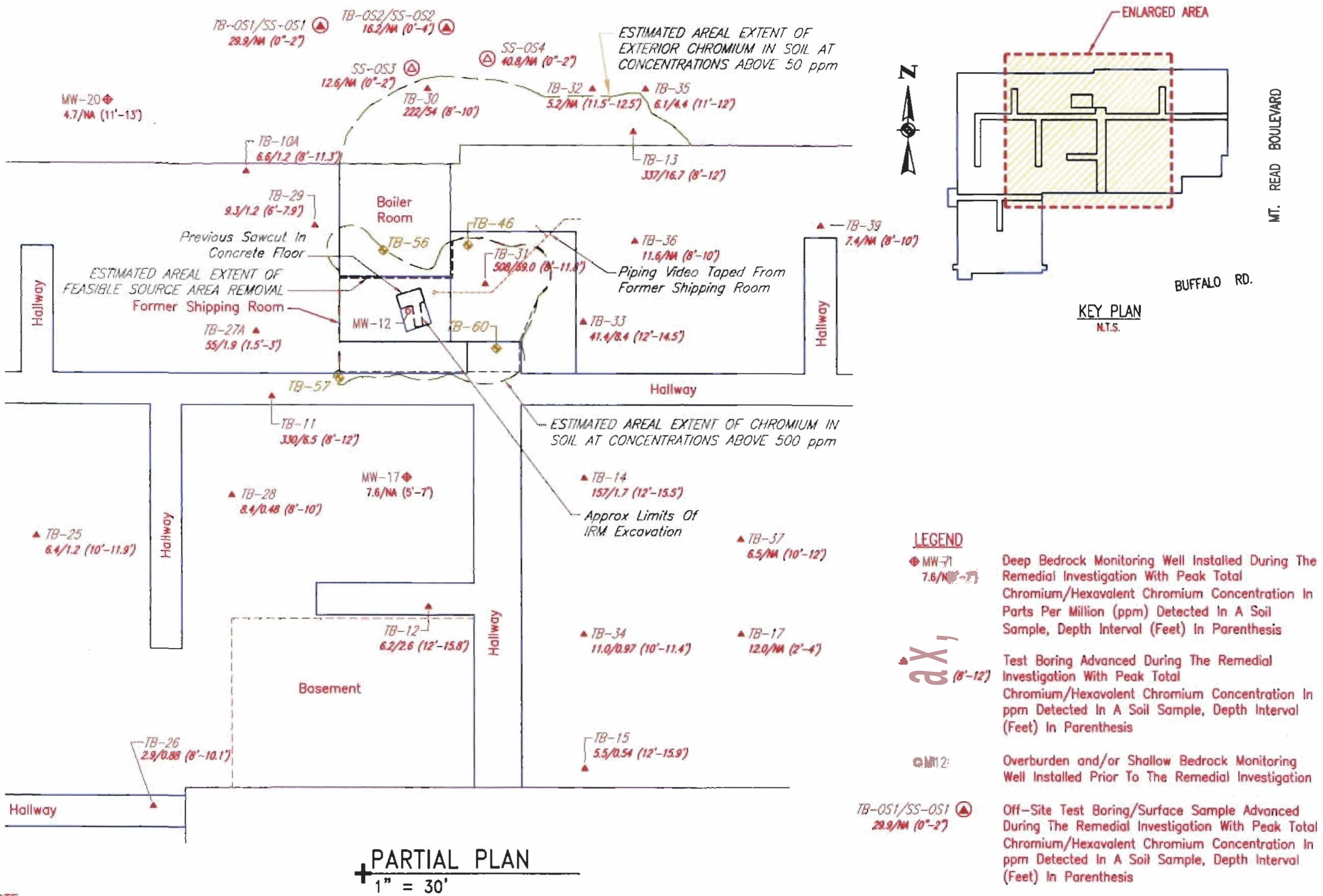
DRAWING TITLE
Partial Plan With Isopleth For Total Chromium Within Soil Exceeding 500 ppm And Estimated Extent Of Feasible Source Area Soil Removal

Soil Alternative S2

SCALE
1" = 30'

Figure 10

Time Plotted: Fri Jan 28 11:30 2005
File Name: 2712-20.dwg
Layout Name: Layout1



PARTIAL PLAN
1" = 30'

NOTE:

1. Partial plan produced from a drawing by The ERM Group, entitled "Figure 3-1; PCB, Asbestos & Sediment/Residue Sampling Locations", dated 11/20/1990.

LEGEND

MW-?1 7.6/N...	Deep Bedrock Monitoring Well Installed During The Remedial Investigation With Peak Total Chromium/Hexavalent Chromium Concentration In Parts Per Million (ppm) Detected In A Soil Sample, Depth Interval (Feet) In Parenthesis
(8'-12')	Test Boring Advanced During The Remedial Investigation With Peak Total Chromium/Hexavalent Chromium Concentration In ppm Detected In A Soil Sample, Depth Interval (Feet) In Parenthesis
MW12	Overburden and/or Shallow Bedrock Monitoring Well Installed Prior To The Remedial Investigation
TB-OS1/SS-OS1 29.9/NA (0'-2')	Off-Site Test Boring/Surface Sample Advanced During The Remedial Investigation With Peak Total Chromium/Hexavalent Chromium Concentration In ppm Detected In A Soil Sample, Depth Interval (Feet) In Parenthesis
NA	Not Analyzed
ND	Not Detected Above Laboratory Detection Limits

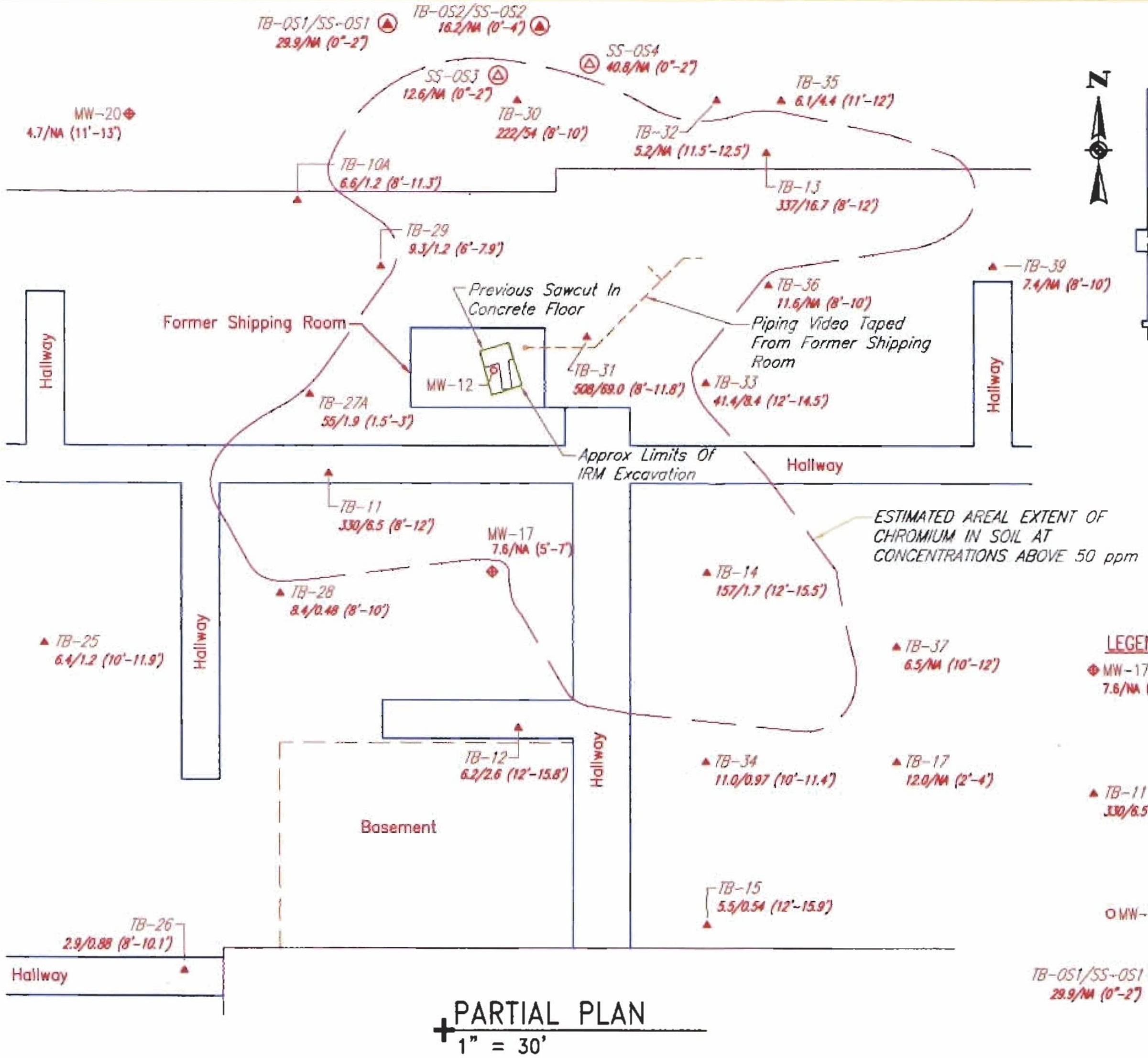
PROJECT TITLE
95 MT. READ BOULEVARD
ROCHESTER, NY
General Circuits Site
Site #8-28-085

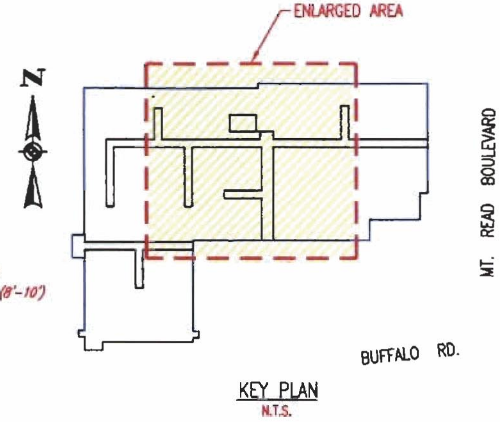
DRAWING TITLE
Partial Plan with Isopleths for Total Chromium within Soil Exceeding 500 ppm and Total Chromium within Exterior Soil Exceeding 50 ppm

Soil Alternative S3

SCALE
1" = 30'

Figure 11





LEGEND

MW-17 7.6/NA (5'-7')	Deep Bedrock Monitoring Well Installed During The Remedial Investigation With Peak Total Chromium/Hexavalent Chromium Concentration In Parts Per Million (ppm) Detected In A Soil Sample, Depth Interval (Feet) In Parenthesis
TB-11 330/6.5 (8'-12')	Test Boring Advanced During The Remedial Investigation With Peak Total Chromium/Hexavalent Chromium Concentration In ppm Detected In A Soil Sample, Depth Interval (Feet) In Parenthesis
MW-12	Overburden and/or Shallow Bedrock Monitoring Well Installed Prior To The Remedial Investigation
TB-0S1/SS-0S1 29.9/NA (0"-2")	Off-Site Test Boring/Surface Sample Advanced During The Remedial Investigation With Peak Total Chromium /Hexavalent Chromium Concentration In ppm Detected In A Soil Sample, Depth Interval (Feet) In Parenthesis
NA	Not Analyzed
ND	Not Detected Above Laboratory Detection Limits

NOTE:

1. Partial plan produced from a drawing by The ERM Group, entitled "Figure 3-1; PCB, Asbestos & Sediment/Residue Sampling Locations", dated 11/20/1990.

Soil Alternative S4

SCALE 1" = 30'

PROJECT TITLE
95 MT. READ BOULEVARD
ROCHESTER, NY
General Circuits Site
Site #8-28-085

DRAWING TITLE
Partial Plan With Isopleth For
Total Chromium Within Soil Exceeding 50 ppm

Figure 12

Layout Name: Layout1

Time Plotted: Fri Jan 28 11:20 2005
File Name: 2712-15.dwg

Time Plotted: Fri Jan 28 11:40 2005
File Name: 2712-21.dwg
Layout Name: Layout1

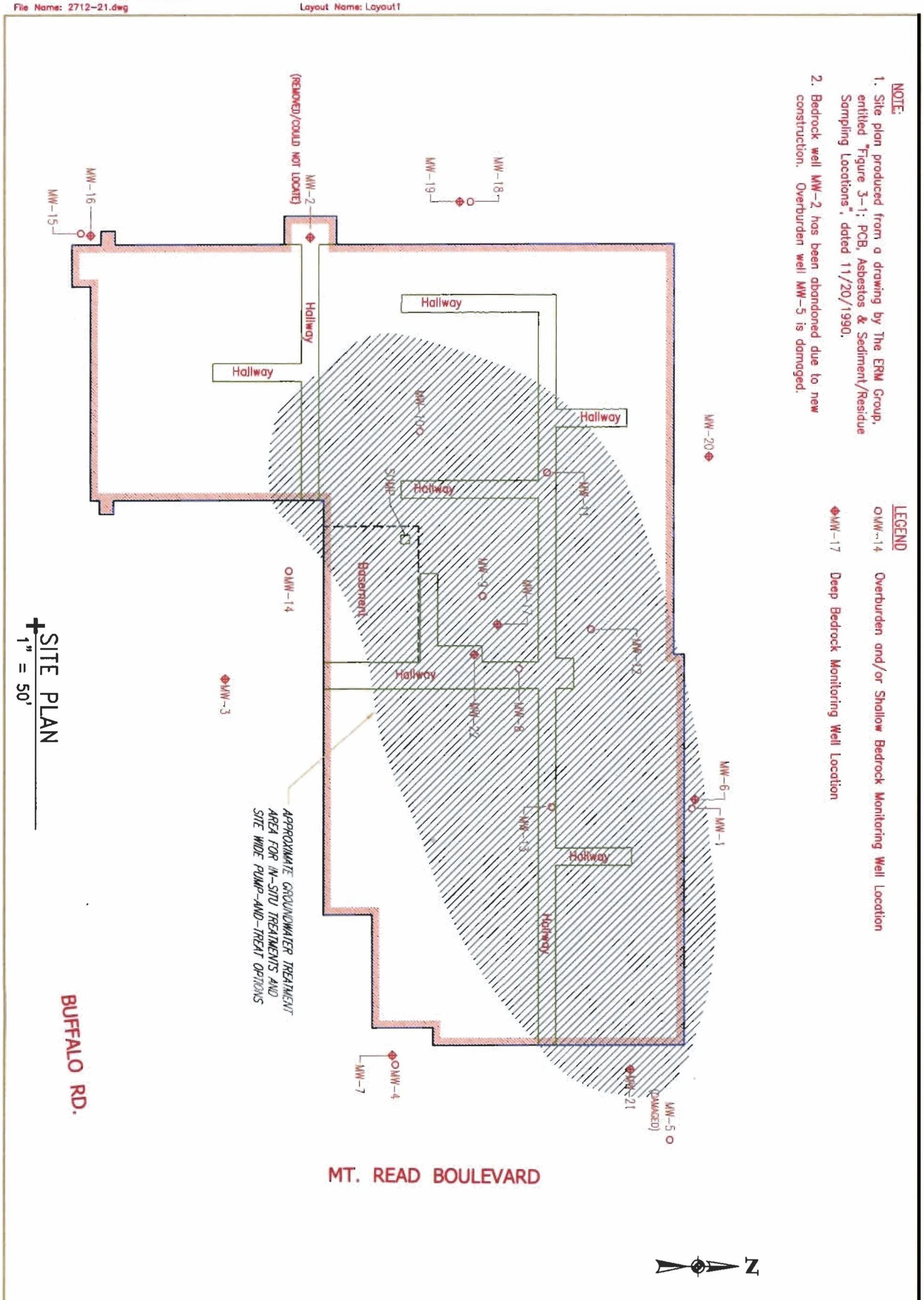


Figure 13	PROJECT TITLE 95 MT. READ BOULEVARD ROCHESTER, NY General Circuits Site Site #8-28-085 DRAWING TITLE Site Plan With Proposed Groundwater Treatment Area For In-Situ Chemical Treatments and Site Wide Pump-and-Treat Options	Groundwater Alternatives GW1, GW2, and GW3	SCALE 1" = 50'

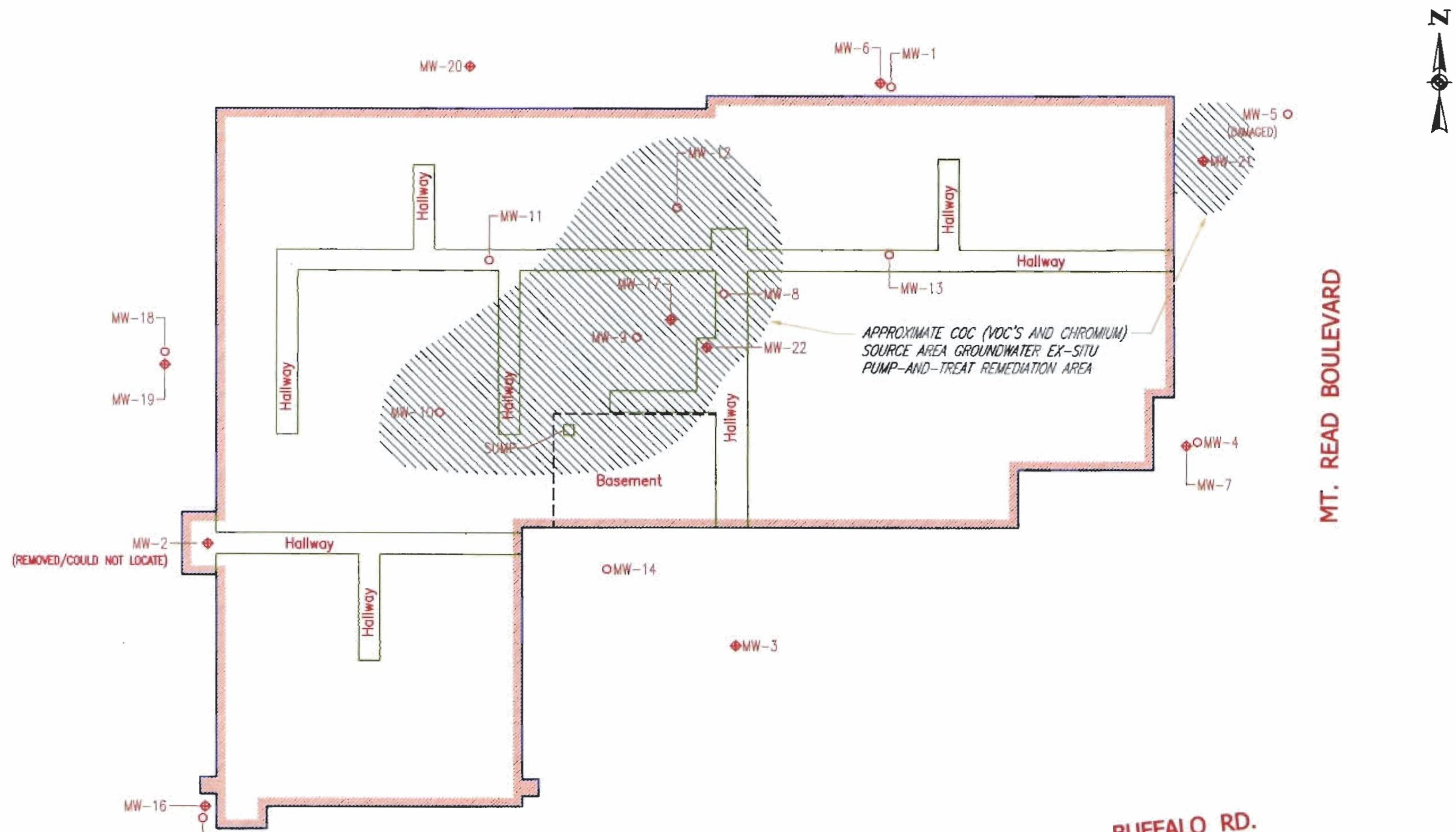
Time Plotted: Fri Jan 28 11:40 2005
File Name: 2712-22.dwg
Layout Name: Layout1

NOTE:

1. Site plan produced from a drawing by The ERM Group, entitled "Figure 3-1; PCB, Asbestos & Sediment/Residue Sampling Locations", dated 11/20/1990.
2. Bedrock well MW-2 has been abandoned due to new construction. Overburden well MW-5 is damaged.

LEGEND

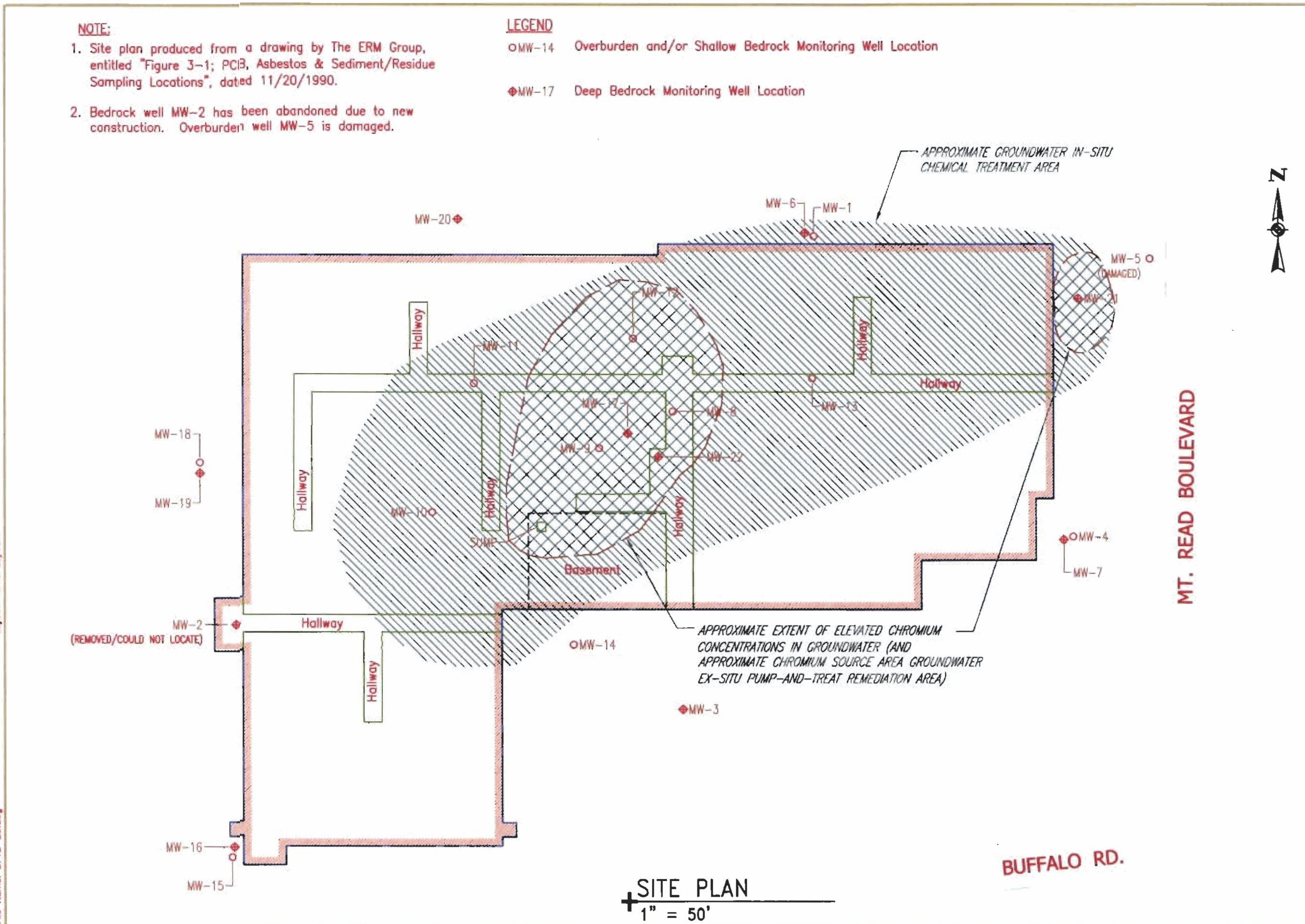
- ○MW-14 Overburden and/or Shallow Bedrock Monitoring Well Location
- ◆MW-17 Deep Bedrock Monitoring Well Location



SITE PLAN
1" = 50'

Figure 14	PROJECT TITLE 95 MT. READ BOULEVARD ROCHESTER, NY General Circuits Site Site #8-28-085 DRAWING TITLE Site Plan With Proposed COC (VOCs And Chromium) Source Area Groundwater Pump-And-Treat Remediation Area	Groundwater Alternative GW4	SCALE 1" = 50'

Time Plotted: Fri Jan 28 11:45 2005
File Name: 2712-23.dwg
Layout Name: Layout1



PROJECT TITLE 95 MT. READ BOULEVARD ROCHESTER, NY General Circuits Site Site #8-28-085 DRAWING TITLE Site Plan With Chromium Source Area Groundwater Ex-Situ Pump-And-Treat With In-Situ Chemical Reduction	Groundwater Alternative GWS	SCALE 1" = 50'

Figure 15

APPENDIX A

Responsiveness Summary

RESPONSIVENESS SUMMARY

General Circuits, Inc.
City of Rochester, Monroe County, New York
Site No. 8-28-085

The Proposed Remedial Action Plan (PRAP) for the General Circuits site, was prepared by the New York State Department of Environmental Conservation (NYSDEC) in consultation with the New York State Department of Health (NYSDOH) and was issued to the document repositories on February 21,2005. The PRAP outlined the remedial measure proposed for the contaminated soil, groundwater, and soil vapor at the General Circuits site.

The release of the PRAP was announced by sending a notice to the public contact list, informing the public of the opportunity to comment on the proposed remedy.

A public meeting was held on March 1, 2005 which included a presentation of the Remedial Investigation (RI) and the Feasibility Study (FS) as well as a discussion of the proposed remedy. The meeting provided an opportunity for citizens to discuss their concerns, ask questions and comment on the proposed remedy. These comments have become part of the Administrative Record for this site. The public comment period for the PRAP ended on March 21, 2005.

This responsiveness summary responds to all questions and comments raised during the public comment period. The following are the comments received, with the NYSDEC's responses:

- No public comments were received.

APPENDIX B

Administrative Record

Administrative Record

General Circuits, Inc.
Site No. 8-28-085

1. Proposed Remedial Action Plan for the General Circuits site, dated February 2005, prepared by the NYSDEC.

2. Order on Consent, Index No. B8-0400-92-03, between NYSDEC and Thomas G. Maguire, executed on February 18, 1998.

3. "Phase 2 Environmental Site Assessment", Volume I- Report, dated December 1990, prepared by Environmental Resources Management, Inc.

4. "Phase 2 Environmental Site Assessment", Volume II- Appendices, dated December 1990, prepared by Environmental Resources Management, Inc.

5. "Subsurface Investigation Report", dated January 1996, prepared by Day Environmental, Inc.

6. "Remedial InvestigatiodFeasibility Study Work Plan", dated May 1997, prepared by Day Environmental, Inc.

7. "Remedial InvestigatiodFeasibility Study Work Plan Addendum", dated October 1999, prepared by Day Environmental, Inc.

8. "Remedial Investigation/Feasibility Study Work Plan Addendum No. 2", dated May 2000, prepared by Day Environmental, Inc.

9. "Remedial Investigation Report", dated February 2001, prepared by Day Environmental, Inc.

10. "Remedial InvestigatiodFeasibility Study Work Plan Addendum No. 3", dated September 2001, prepared by Day Environmental, Inc.

11. "Remedial InvestigatiodFeasibility Study Work Plan Addendum No. 4", dated May 2002, prepared by Day Environmental, Inc.

12. "Data Summary Report", dated November 2002, prepared by Day Environmental, Inc.

13. "Remedial InvestigatiodFeasibility Study Work Plan Addendum No. 5", dated November 2003, prepared by Day Environmental, Inc.

14. Interim Remedial Measures Design Plan, Indoor Vapor Intrusion System, dated September 2004, prepared by Day Environmental, Inc.

15. "Feasibility Study Report", dated January 2005, prepared by Day Environmental, Inc.

16. "Citizen Participation Plan for the General Circuits Inactive Hazardous Waste Disposal Site", prepared by the NYSDEC.

17. Fact Sheet dated April 1998, prepared by the NYSDEC.

18. Fact Sheet dated October 2004, prepared by the NYSDEC.

19. Fact Sheet dated February 2005, prepared by the NYSDEC.