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REMEDIAL ACTION SELECTION REPORT FOR THE CLOSED LANDFILL

Rensselaer Facility
Rensselaer, New York

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Site History

The area that became the Closed Landfill was owned by multiple corporate entities and was also under United States government control during World War I and World War II. Use of the Landfill was terminated when BASF purchased the Rensselaer Plant from GAF in 1978.

BASF conducted the initial investigations of the Landfill in 1979, after the NYSDEC's initial listing of the Landfill as a Class 2 Inactive Hazardous Waste Disposal Site. BASF installed a soil cover on the Landfill in 1982, and the Landfill was reclassified as a Class 4 site in 1983. BASF installed a groundwater extraction and treatment unit in 1989.

Additional soil and groundwater investigations of the Landfill conducted between 2001 and 2004 and summarized in the Conceptual Remedial Design report (Roux Associates, 2004a) provide a detailed understanding of the nature and extent of contamination in the Landfill.

Currently, the Landfill is covered with a soil cap, installed during the Landfill closure conducted in 1982, and a groundwater extraction system, a component of the Main Plant remedial action, is installed around the perimeter of the Landfill. These remedial components prevent exposure to constituents that are present in Landfill soil and ground water.

Nature and Extent of Contamination

Soil sampling results indicate that the Landfill contains metals, primarily chromium, lead, and arsenic throughout the majority of the Landfill. The soil sampling results also indicate that

VOCs are present in two general areas, one just south of the Main Plant and the other located in the central and south-central portion of the Landfill.

Groundwater sampling has found VOCs, primarily chlorobenzene and benzene, at concentrations above NYSDEC Ambient Water Quality Standards and Guidance Values (AWQSGVs) in Landfill groundwater, with the highest concentrations found beneath the northern and eastern portions of the Landfill. Although metals are found extensively in Landfill soil, they are not found, or are found only infrequently, at concentrations above AWQSGVs in filtered groundwater samples, supporting a conclusion that the Landfill soil is not a significant source of dissolved metals to groundwater

Remedial Action Goals

The primary goal of the remedy selection process is to select a remedial alternative that is most protective of human health and the environment under the contemplated future use of the Site. The Site will remain a closed landfill. However, BASF has also identified both continuing improvement and beneficial re-use as remedial goals for the site. These objectives have been considered during the remedial alternative selection process.

Evaluation of Alternatives

Seven remedial alternatives were assembled and evaluated to select a remedy for the Site that would best achieve the RAOs:

- Alternative 1: Excavation of Landfill Wastes Exceeding NYSDEC Recommended Soil Cleanup Objectives (RSCOs), Operation of Hydraulic Containment System.
- Alternative 2: Alternative Landfill Cover and Operation of Hydraulic Containment System
- Alternative 3: Alternative Landfill Cover, Removal of Elevated VOC Areas, and Operation of Hydraulic Containment System.
- Alternative 3A: Alternative Landfill Cover, Removal of VOC Source Areas, and Operation of Hydraulic Containment System.
- Alternative 4: Alternative Landfill Cover, Remediation of Elevated VOC and Metals Areas, and Operation of Hydraulic Containment System.

- Alternative 5: Modified Part 360 Cap and Operation of Hydraulic Containment System.
- Alternative 6: No Action (Existing Soil Cap and Hydraulic Containment System).

With Alternative 6, the existing soil cap and operation of the site-wide hydraulic control system, as a base case, the seven alternatives were evaluated against the technical, regulatory, and cost criteria specified in DER-10:

- **Overall Protectiveness (to human health and the environment)** – considers current and future protection against direct contact with constituents and ability of remedy to protect the environment
- **Compliance With SCGs** – describes how the alternative complies with identified chemical-specific, action-specific, and location-specific ARARs.
- **Short-Term Effectiveness** – considers short-term effects of the alternative on the community, workers, and the environment during the specified construction and implementation period until response objectives have been met.
- **Long-Term Effectiveness and Permanence** – evaluates the magnitude of residual risk and the adequacy and reliability of any controls that are used after the alternative is implemented.
- **Reduction of Toxicity, Mobility, or Volume Through Treatment** – considers treatment process(es) used and materials treated; amount of hazardous materials destroyed or treated; degree of expected reductions in toxicity, mobility, and volume; degree to which treatment is irreversible; and the type and quantity of residuals remaining after treatment.
- **Implementability** – evaluates the feasibility of the alternative in terms of the ability to construct and operate the technology; reliability of the technology; ease of undertaking additional remedial actions, if necessary; ability to monitor effectiveness of remedy; availability of offsite disposal services and availability of prospective technologies.
- **Community Acceptance** – preliminarily assesses the community's apparent preferences for, or concerns about, the alternative.
- **Compatibility** – assesses the ability of the alternative to conform with the intended future use of the Site.
- **Cost** – evaluates the capital, operation and maintenance, and present worth costs of the alternative.
- **Regulatory Agency Acceptance** – reflects the NYSDEC's apparent preferences for, or concerns about, alternatives.

The “technical elements” – all criteria except for cost and regulatory agency acceptance – were initially evaluated to identify the alternative(s) that best achieve the RAOs for the site without consideration of the cost element. Cost and regulatory agency acceptance were then considered independently to obtain an overall ranking of the seven alternatives.

Evaluation of Results

The relative scores of the ten criteria for each alternative were influenced by two important factors unique to this site:

1. Unlike most sites, remedial action components are already present at the site. A soil cap was installed over the entire Landfill as a component of the original closure in 1982, and a hydraulic containment system was installed along the perimeter of the Landfill as a component of the Main Plant remedial action in 2004.

2. The vast majority of constituents present in Landfill soil are already stable and immobile. As stated previously, although metals are found extensively in Landfill soil, few detections above the AWQSGVs have been recorded in ground water in any wells, and no metals have been found in any perimeter well at a concentration above the AWQSGVs. Similarly, although VOCs have been found at elevated levels in two locations in the Landfill, only one of these locations is acting as a source of dissolved-phase VOCs in ground water; there is no evidence of any groundwater impact from the other.

3. The conditions at this site are stable and have been the same for almost 30 years. There is no reason to believe that the geochemistry will change and later the behavior of the compounds of concern.

Because of the presence of containment systems for soil and ground water, and the stability of the constituents in the Landfill, there is little potential for any exposure to any constituent, even without any further remedial action. Therefore, unlike most sites at which remediation is proposed, there is little, if any, current risk to public health or the environment under current conditions.

As a result of this unique situation, several considerations that would not necessarily emerge as important factors at other sites became critical to the alternative evaluation for the Landfill:

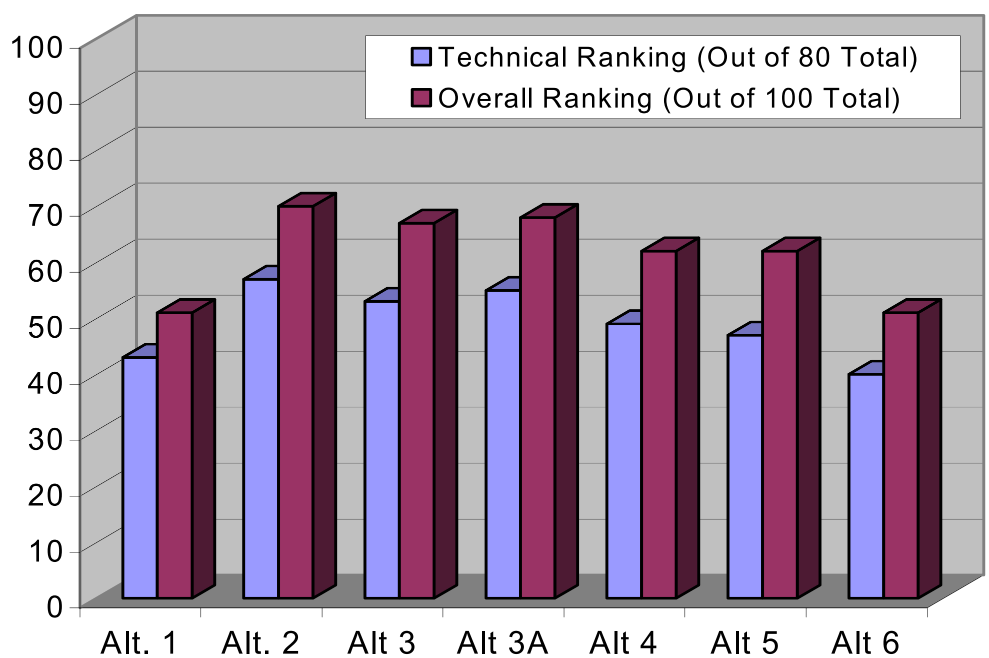
- The short-term risks related to heavy construction activities and truck transportation represent greater relative risks because, under current conditions, there is no risk associated with the constituents in the Landfill. Therefore, both short-term effectiveness and overall protectiveness decline when excavation and off-site disposal are included in an alternative.

- Because the metals have reached a long term stable state, excavation and offsite disposal or onsite in situ treatment will not reduce the toxicity, mobility, or volume (TMV) or these compounds.

- The greatest benefit of any removal action is achieving the SCGs for the VOCs. It is expected that this will reduce the time needed for the ground water and soil SCGs to be achieved. Since metals are not significant constituents of concern in ground water, there will be little benefit with respect to achieving the ground water SCGs, and because of the widespread extent of metals in the Landfill, no alternative, except possibly Alternative 1, will achieve the SCGs for metals in soil.

- BASF proposed the use of an alternative cover in several of the alternatives. In addition to providing an equivalent degree of protection to human health and the environment as the modified Part 360 cap, the alternative cover will provide for ongoing treatment of organic constituents via rhyzodegradation, and additional stabilization of inorganic constituents. The alternatives containing this cap design ranked higher with regard to reduction in TMV through treatment than those without the design.

Table 5 and the following chart summarize the ranking of the individual alternatives. Alternative 2 (Alternative Landfill Cover and Operation of Existing Hydraulic Containment System) was the highest-ranking alternative, scoring highest in *Overall Protection*. Alternative 3A, Alternative Landfill Cover, Removal of VOC Source Area and Operation of Existing Hydraulic Containment System was the second highest ranked alternative, with Alternative 3, Alternative Landfill Cover, Removal of Elevated VOC Areas and Operation of Existing Hydraulic Containment System, the third highest.



These three alternatives were the highest scoring because all provide a high degree of overall protectiveness while minimizing short-term risks by eliminating the removal component (Alternative 2) or focusing the removal component on soils containing VOCs (Alternatives 3 and 3A), where benefits with regard to achieving the SGCs would be obtained. Additionally, all three alternatives contain the alternative cap design, which will provide an equivalent degree of protection as the modified Part 360 cap (Alternative 5), while also providing for ongoing treatment of constituents in the Landfill.

Remedy Selection and Description

Alternative 2 was the highest ranking alternative followed closely by Alternatives 3 and 3A. However, NYSDEC regulations indicate that source areas should be excavated prior to capping, and the NYSDOH has indicated that areas of elevated VOCs should be removed. Therefore, BASF has selected Alternative 3 as the remedy for the Landfill, because this alternative includes excavation of VOC source areas to groundwater, and areas of elevated VOC concentrations. Alternative 3 achieves one SCG that is not achieved by Alternative 2: removal of the VOC source areas to groundwater. It will also reduce the time that will be required for the SCGs for VOCs in soil and groundwater to be achieved.

The selected Remedial Alternative 3 contains the following components:

- Excavation of the VOC source areas located beneath the northern portion of the Landfill;
- Excavation of the areas of elevated VOC concentrations in the central and south-central portions of the Landfill;
- An Alternative Landfill Cover consisting of 6 to 12-inch common fill grading layer, a biota barrier, a 12-inch low permeability soil layer, a 12-inch planting substrate layer, and a 6-inch topsoil layer. The 18-inch substrate and planting layer is to contain plant species to promote creation of a wildlife habitat, with integrated phyto-technology plantings designed to reduce the infiltration of precipitation into the Landfill material;
- A horizontal barrier layer between the alternative landfill cover and underlying impacted fill to prevent burrowing animals from contacting landfill material;
- Drainage layers to direct surface water runoff to drainage swales and minimize infiltration of precipitation into landfill material;
- A perimeter groundwater and leachate collection system, augmented with phyto-technology plantings designed to mitigate leachate generation and groundwater migration;

- A monitoring and maintenance program to maintain the effectiveness of the engineering controls;

- A deed notice in the form of an environmental easement will be prepared and submitted under separate cover following the implementation of Alternative 3 for soil and groundwater. The environmental easement will state that all post-remediation construction will be prohibited within the limits of the Alternative Landfill Cover footprint and that the Site will be restricted to industrial/commercial use (in accordance with current zoning). The environmental easement will also state that the groundwater underlying the Site shall not be used for drinking water or industrial use; and

- A Site Management Plan (SMP) will be prepared and submitted under separate cover following the implementation of Alternative 3 for soil and groundwater. The SMP will address soil management, institutional controls, engineering controls and operation, maintenance and monitoring requirements for Alternative 3.

The present worth cost for Alternative 3 was estimated to be $5,010,000 and is the third highest cost alternative.

The selected remedy provides a high level of public health and environmental protection, is consistent with NYSDEC and NYSDOH guidance, and will result in the beneficial reuse of the Closed Landfill. The selected alternative is also consistent with prior NYSDEC approvals in which containment remedies have been approved, including:

- Browning Ferris Landfill (Site Code 429001) - Electroplating sludge, cyanide, and chromium waste;

- Pedone Landfill (Site Code 447021) - 30,000 cubic yards of lead waste;

- North Sea Landfill (Site Code 152052) - Pesticides, solvents, and chromium impacting surface water body and residential wells; and

- Batavia Landfill (Site Code 819001) - Chromium hydroxide sludge.

1.0 INTRODUCTION

Remedial Engineering, P.C. (Remedial Engineering) and Roux Associates, Inc. (Roux Associates) have prepared this document entitled, "Remedial Action Selection Report (RASR) for the Closed Landfill" on behalf of BASF Corporation (BASF). This RASR presents a detailed evaluation of potential alternatives to address environmental concerns at the Closed Landfill located at the BASF Rensselaer Facility, Rensselaer, New York (Site Code 442004) shown in Figure 1. This RASR has been prepared in accordance with the New York State Department of Environmental Conservation (NYSDEC) Draft DER-10 Technical Guidance for Site Investigation and Remediation (NYSDEC, 2002a) and the May 2002 Draft Voluntary Cleanup Program Guide.

The primary goal of the remedy selection process is to select a remedial alternative that is most protective of human health and the environment under the contemplated future use of the Site. The contemplated future use of the Site is as a landfill with an integrated wildlife habitat as part of BASF's efforts to maximize the beneficial re-use of the Site. Specifically, the following goals have been established for the remedy:

- Protect Human Health and the Environment
  - Prevent direct contact (dermal absorption, inhalation, and ingestion)
  - Control surface water
  - Minimize erosion
  - Reduce infiltration
  - Control and treat leachate
- Continuing improvement
  - Ongoing treatment of subsurface soils and groundwater
- Beneficial re-use
  - Establish wildlife habitat.

To achieve the above goals, the following remedial alternatives were considered:

1. Excavation of Landfill material above the water table exceeding NYSDEC Recommended Soil Cleanup Objectives (RSCOs) and hydraulic containment of impacted groundwater.

2. Alternative Landfill Cover (i.e., Phyto-technology cap) and hydraulic containment.

3. Alternative Landfill Cover, hydraulic containment, and remediation of the volatile organic compound (VOC) source areas to groundwater in the northern portion of the Landfill and areas of high VOCs in the central and south-central portion of the Landfill (collectively referred to as elevated VOC areas).

3A. Alternative Landfill Cover, hydraulic containment, and remediation of VOC source areas to groundwater.

4. Alternative Landfill Cover, hydraulic containment, remediation of elevated VOC areas (as in Alternative 3), and excavation of areas where metals exceed a threshold of approximately 100 times the NYSDEC RSCOs.

5. Modified Resource Conservation and Recovery Act (RCRA) cap and hydraulic containment.

6. Existing soil cap and existing hydraulic containment trenches (equivalent to No-Action Alternative).

Each proposed remedial alternative has been evaluated based on the alternative's ability to meet the Remedial Action Objectives (RAOs) for the Landfill. The RAOs, which are discussed in greater detail in Section 7.0, are medium-specific goals for protecting human health and the environment.

The remainder of this report is organized into the following sections:

- Section 2.0: Site Location and Description
- Section 3.0: Site History
- Section 4.0: Site Contamination
- Section 5.0: Enforcement Status
- Section 6.0: Identification of Standards, Criteria, and Guidelines
- Section 7.0: Summary of Remedial Action Objectives
- Section 8.0: Screening of Remedial Technologies
- Section 9.0: Evaluation of Remedial Alternatives

- Section 10.0: Engineering Evaluation of the Selected Remedy
- Section 11.0: Summary of the Selected Remedy
- Section 12.0: References

2.0 SITE LOCATION AND PHYSICAL CHARACTERISTICS

This section describes the Site's location and its physical characteristics.

2.1 Site Location

The location of the Site is shown in Figure 1. The Site is a former industrial landfill (Closed Landfill) approximately nine acres in size located to the south of the BASF Rensselaer Main Plant as shown in Figure 2.

A chain link fence encloses the entire Site boundary. Main Plant features that immediately border the Site to the north include a paved former drum storage area, a decommissioned above ground storage tank farm (87-TF), and the former location of the facility's warehouse (Building 89). Further to the north is the remainder of the BASF Main Plant with a chemical manufacturing facility (Sterling Site [Inactive Hazardous Waste Disposal Site Code 442009]) and residential areas beyond. A steep slope immediately to the east of the Site rises to the Port of Rensselaer Access Highway. This roadway was constructed in the 1990s and crosses over three sets of railroad tracks immediately to the north east of the Site. A portion of the Port of Rensselaer Access Highway was constructed over approximately 2.5 acres of the historic Landfill footprint. To the south of the Site is one set of railroad tracks accessing a nearby cogeneration plant with the BASF South 40 Area beyond. The BASF Main Plant's parking lot is located to the west with Riverside Avenue, the Lagoon area, and the Hudson River beyond.

2.2 Site Description

The physical characteristics of the site, including surface features, regional and Site-specific geology, regional, and Site-specific hydrogeology and Site hydrology, are included in this section.

2.3 Surface Features

The Site has been graded and slopes gently from the east and west to the center of the Site where there are several storm sewer grates. Surface elevations range from approximately 12 feet above mean sea level (amsl) to approximately 18 feet amsl. The surrounding areas are generally flat with the exception of a steep slope immediately to the east of the Site that rises to the Port of Rensselaer Access Highway.

2.4 Geology

The evaluation of geologic conditions was based upon the Site-specific information developed during the drilling of the borings and piezometer pilot boreholes, and published information (Fisher, 1995; Cadwell, 1987) on the regional or local geology.

2.4.1 Regional Geology

The Site is located in the Hudson Valley of New York. Bedrock underlying the Site belongs to the Lorraine, Trenton, and Black River Groups and consists of shale, mudstone, and sandstone of the Normanskill Shale Formation (Fisher, 1995). Surficial geology in the vicinity of the Site consists of recent glacio-lacustrine deposits (Cadwell, 1987).

2.4.2 Site Geology

The Site is a Landfill consisting of waste material fill. This fill has been reported in historic documentation to include industrial wastes such as spent iron reduction cakes, diatomaceous earth, activated carbon, broken glassware, used empty containers, demolition and construction debris, waste metal drums, waste fiber drums, polyethylene liners, waste laboratory solvents, reagents, and process samples. Also reported as having been disposed of in the landfill is sandy or silty soil that was dredged from the Hudson River. This fill material ranges from two to 12-feet thick. Above the fill material is a soil cap that is approximately one-foot thick. The fill material overlies clay to silty-clay unit. The depth to the clay unit ranges from eight feet at LF-PZ-118 and LF-PZ-127 to 12 feet at LF-PZ-116, LF-PZ-117 and LF-PZ-124 through 126. The average depth to clay is 11 feet. The clay unit thickness ranges from over 60 feet to the west of the Site to less than five-feet thick along the eastern boundary of the site. A gravelly-sand unit with minor amounts of silt and clay underlies the clay unit. This unit ranges from 2 to 16 feet thick, but averages less than 10-feet thick and rests on bedrock (Dames and Moore 1979). The presence of the underlying clay was observed in every soil boring and monitoring well completed at the landfill. The lower gravelly-sand unit was investigated with the installation of two deep monitoring wells during the RI of the Main Plant. The lower gravelly-sand unit was investigated with the installation of two deep double-cased monitoring wells during the RI of the Main Plant. MP-MW-113 was installed along the western border of the Main Plant just east of Riverside Avenue. MP-MW-14 was installed in the parking lot 350-feet west (i.e., downgradient) of the Landfill. No VOCs were detected above AWQSGVs in

MP-MW-113. Only 2 ug/L of benzene was detected in MP-MW-114 compared to an AWQS of 1 ug/L. These results indicate that there is no evidence that the lower sand and gravel unit has been significantly impacted by source areas in the fill. Moreover, the lower saturated sand below the clay unit is not a source of potable water and has extremely limited transmissivity due to a low saturated thickness.

2.5 Hydrogeology

The evaluation of hydrogeologic conditions was based upon a review of synoptic rounds of water level measurements collected during January and March 2002 and April 2004.

2.5.1 Regional Hydrogeology

The Site is located in the lower Hudson sub-basin of the Hudson River basin (Phillips, 1996). Regional groundwater flow is to the west and discharges into the Hudson River.

2.5.2 Site Hydrogeology

There are two saturated zones located beneath the Site. The first is the saturated fill and waste material. The saturated portion of the fill and waste lies an average of 4.5 feet below land surface (ft bls) and extends to the underlying silt and clay unit, which lies between 10 and 12 ft bls. The second saturated zone is the gravelly-sand unit underlying the clay unit at the Site.

The ranges in observed depths to groundwater are summarized below:

- from 4.11 feet at LF-MW-44R to 10.42 feet at LF-MW-43R in January 2002;
- from 2.37 feet at LF-WP-9 to 9.82 feet at LF-PZ-126 in March 2002; and
- from 3.65 feet at LF-MW-44R to 10.01 feet at LF-MW-43R in November 2004.

The average saturated thickness of the Landfill is just under six feet.

Groundwater flow beneath the Landfill is radially outward from the north-central portion (Plate 1). Groundwater elevations beneath the east-central portion of the landfill reflect the hydraulic influence of several sewers that run both north-south through the landfill and east-west along the southern border of the landfill. The influence of the sewer bedding on groundwater flow has been noted during previous investigations. The hydraulic influence is caused to a minor degree by infiltration and to a greater degree by the presence of conductive bedding material. These sewers include the City of Rensselaer Storm Sewer, which transects the landfill in a north-south direction, and the Town of East Greenbush Storm Sewer, and the City of Rensselaer Sanitary Sewer, which lie along the southern border of the landfill and trend east-west. There is a steep hydraulic gradient along the southern border of the Landfill caused by the hydraulic influence of the east-west trending sewers located there. Groundwater flows west from beneath the Port of Rensselaer Access Highway toward the Site and the City of Rensselaer storm sewer.

2.6 Site Hydrology

The Site is graded and slopes gently from both the east and west toward the City of Rensselaer storm sewer and sewer grates. These grates are open to the City of Rensselaer storm sewer that runs north to south across the site.

3.0 SITE HISTORY

This section includes a general description of the Site's operational/disposal and remedial history.

3.1 Operational/Disposal History

The area that became the Closed Landfill was owned by multiple corporate entities and was also under United States government control during World War I and World War II. Process wastes from the adjoining manufacturing plant were placed into the landfill up until BASF assumed ownership of the Site in 1978. Historic aerial photos of the northern portion of the landfill adjoining the former drum storage area of the Main Plant indicated surface depressions in the area.

Applications to construct and operate a solid waste facility were submitted by GAF Corporation to the NYSDEC in February 1978. The waste stream indicated for this facility included non-toxic industrial wastes such as spent iron reduction cakes, diatomaceous earth, activated carbon, tonsil clay (that included trace amounts of chlorobenzene and Azo Phloxine [CAS# 3734-67-6]), "Nuchar" (wood-based activated carbon), broken laboratory glassware, used empty containers, demolition and construction debris, waste metal drums, waste fiber drums, polyethylene liners, lead sulfate, chromium hydroxide, zinc, zinc oxide, slurry with intermediate samples, waste laboratory solvents, dye samples, in-process samples, product samples, and discarded reagents in small quantities.

In April 1978, BASF acquired the area that became the Closed Landfill from GAF Corporation. BASF immediately stopped use of the landfill for disposal purposes. In addition, following acquisition of the facility, a large number of steel drums in the landfill were removed by BASF for reclamation or scrap.

In January 2001, BASF closed its manufacturing facility.

3.2 Remedial History

In 1978, the landfill was listed in the NYSDEC Registry of Inactive Hazardous Waste Disposal Sites as Class 2. In response to this classification, BASF initiated several investigations and subsequently contracted to have a soil cap placed over the entire landfill area. This soil cap was installed in 1982. The landfill was reclassified in the NYSDEC Registry of Inactive Hazardous Waste Disposal Sites as Class 4 in 1983.

In January 1987, the NYSDEC and BASF met to discuss groundwater sampling conducted at the landfill in 1985 and 1986. In April 1987, BASF submitted a proposal to address NYSDEC concerns regarding high concentrations of benzene and 1,2-dichloroethane observed in monitoring wells MW-43 and MW-44, respectively. In May 1987, the NYSDEC accepted BASF's proposal for a groundwater treatment system consisting of a two gallon per minute pump and treat system and two 350-gallon carbon adsorbers installed in series.

A groundwater pump and treat system was installed onsite in 1989. The system consisted of two pumping wells and two carbon filters. Tubing connecting a pumping well (LF-MW-43R) at the far north end of the Site crosses the Site to the carbon filters located at the far south end of the Site. The other pumping well was LF-MW-44R. The pump and treat system pumped at a rate of approximately two gallons per minute for six months of the year from 1989 through 2004. The landfill pump and treat system is currently not in operation because the recently constructed Site groundwater collection and treatment system, described in the NYSDEC approved Remedial Design/Remedial Action (RD/RA) Work Plan for OU-1 (Roux Associates 2004b), is scheduled to begin full-scale operation in the summer of 2005. As a result, the operation of the existing landfill pump and treat and system will no longer be warranted.

The groundwater collection and treatment system was installed from 2002 through 2005 (Figure 3). The groundwater collection system (GCS) consists of seven collection trench areas within and along the perimeter of the Site:

- GCS Area 1 – north of Building 65;
- GCS Area 2 – north of the Lagoon Area;
- GCS Area 3 – west of Building 81;
- GCS Area 4 – north of the Closed Landfill;
- GCS Area 5 – southwest corner of the parking lot;

- GCS Area 6 – south of the Closed Landfill; and
- GCS Area 7 – north and west of the Closed Landfill.

In addition to the GCS collection trenches that border the north, west and southern portion of the Landfill, a groundwater extraction sump will be installed along the eastern border of the Landfill abutting the Port of Rensselaer Access Highway, as described below.

Proposed Location of the Groundwater Extraction Sump

Figure 4 shows the locations of two sewers that run from beneath the Irwin Stewart Port Expressway (herein referred to as the Port Access Highway) to the southeastern portion of the BASF Landfill. The groundwater quality data in the vicinity of these sewers, as summarized in the Conceptual Remedial Design Report (Roux Associates 2004a), indicated that groundwater beneath the southeast portion of the Landfill contains relatively high concentrations of benzene and chlorobenzene. As observed in other areas of the Site, the transmissivity of the soil in the Landfill is very low. BASF believes that the sewer bedding is acting as high conductivity conduits for migration of impacted groundwater from beneath the Port Access Highway portion of the Landfill. The groundwater extraction strategy adopted in GCS Area 1 (sewers along northern border of the Main Plant) is proposed to address this area of the Landfill also. A groundwater extraction sump will be completed adjacent to, and hydraulically connected to, the northern sewer bedding at the approximate location shown in Figure 4. The groundwater migrating along the southern sewer line will be collected by the existing interceptor trench that runs along the southern border of the Landfill.

The inverts of the sewers have been surveyed and found to be 7.8 feet (southern) and 9 feet (northern) relative to mean sea level (rmsl), where they transect the fence demarcating BASF's portion of the Landfill. The groundwater elevation in the same vicinity ranges from 11.5 to 13 feet rmsl. Therefore, the sewer bedding is below the water table. The underlying clay elevation is approximately 8 feet rmsl, indicating that the sewers are at the clay interface. These relationships create an ideal situation to use the hydraulic influence of the conductive sewer bedding as part of a groundwater containment and extraction system.

Prior to installation of the sump, a Geoprobe will be used to delineate the sewer bedding material in the vicinity of the proposed extraction sump. The sump will then be installed as an 18-inch diameter borehole, with the perimeter of the borehole intersecting the sewer bedding material. An extraction well will be completed in the borehole. The extraction well will be connected to an extension of the GCS force main that transects the southern border of the Landfill.

The GCS will be used to convey impacted Site groundwater to the groundwater treatment system located at the southwest portion of the Main Plant, within the existing gravel parking lot. The GCS will collect all leachate and groundwater moving through the Landfill that is not addressed by the proposed cover for the Landfill. No untreated groundwater is expected to migrate past the GCS collection trenches. Key components of the groundwater treatment system include the following:

- Influent equalization
- Metals Removal System:
  - Aeration
  - Vapor Phase granular activated carbon (GAC) off-gas treatment
  - Filtration (two sets of two parallel filters arranged in series)
  - Metals adsorption
- Volatile organic compound/semi-volatile organic compound (VOC/SVOC) Removal System:
  - Air stripping
  - Vapor phase GAC off-gas treatment
  - Liquid phase GAC
- Dissolved Oxygen Injection System

4.0 SITE CONTAMINATION

The following sections of the RASR describe the previous Site remedial investigations and activities and define the nature and extent of contamination at the Closed Landfill.

4.1 Summary of the Previous Remedial Investigations and Activities

A summary of the major investigations and activities performed at the Closed Landfill is provided in the following reports:

- "Hydrogeological Investigation of Industrial Waste Disposal Area, BASF Wyandotte Corporation, Rensselaer, New York," February 20, 1979, Dames & Moore (Dames and Moore 1979).
- "Industrial Landfill Post-Closure Groundwater Assessment," October 1984, Calocerinos & Spina Consulting Engineers (Calocerinos & Spina Consulting Engineers [C&S Engineers] 1984).
- "Landfill Closure Evaluation Phase 2 Piezometer Analysis," May 30, 1985, C&S Engineers (C&S Engineers [C&S Engineers] 1985a).
- "Monitoring Well Results," November 22, 1985, C&S (C&S Engineers [C&S Engineers] 1985b).
- "Final Report Geophysical Survey Landfill Detection, Delineation and Thickness Determination," February 2001, Enviroscan, Inc. (Enviroscan, Inc. [Enviroscan] 2001).
- "Additional Remedial Investigation Activities," August 3, 2001, Roux Associates (Roux Associates 2001a).
- "Site Investigation Report, South 40 Parcel," May 3, 2001, Roux Associates (Roux Associates 2001b).
- "Site Investigation Work Plan, Closed Landfill," May 29, 2002, Roux Associates (Roux Associates 2002a).
- "Site Investigation Report, Closed Landfill," September 4, 2002, Roux Associates (Roux Associates 2002b).
- "Closed Landfill Trench Investigation," February 4, 2003, Roux Associates (Roux Associates 2003).
- "Conceptual Remedial Design for the Closed Landfill," August 23, 2004, Roux Associates (Roux Associates 2004a).

As part of these investigations and activities, the following tasks were performed at the Site between 1978 and April 2004:

- Subsurface investigation of the landfill by Dames & Moore in 1978, which included sixteen borings, eight rock cores, fill sampling, installation of nine monitoring wells, hydraulic tests, and groundwater sampling from eight of the nine monitoring wells.

- Groundwater sampling from four wells by Dames & Moore in October 1979 and analysis for 18 priority pollutants. The wells were re-sampled on November 14, 1983 and June 6, 1984.

- Installation of a soil cap by Dames & Moore in 1982.

- Installation of three monitoring wells by Dames & Moore between 1979 and 1984 along the storm sewer that runs through the Site.

- Post-capping investigation of groundwater flow within the landfill's shallow aquifer by C&S Engineers in 1984, which included geophysical surveys to determine the nature and extent of waste materials, and the installation of 12 shallow piezometers and four driven well points.

- Installation of an additional nine piezometers by C&S Engineers in 1984 to measure the direction and quantity of groundwater flow in the vicinity of sewers that traverse the landfill, and permeability testing and water-level measurements during periods of high and low groundwater conditions.

- Installation of eight monitoring wells by C&S Engineers from December 1984 to November 1985.

- Groundwater sampling performed at the landfill in 1985 and 1986 lead to correspondence between the NYSDEC and BASF in 1987 to discuss groundwater sampling results and treatment options. In 1987, NYSDEC accepted BASF's proposal for a groundwater treatment system consisting of a two gallon per minute pump and treat system and two 350-gallon carbon adsorbers installed in series.

- The NYSDEC requests re-investigation of Closed Landfill based on observations made during the Remedial Investigation (RI) at the adjacent BASF Main Plant performed from 1999 through 2001. The requested investigation of the Landfill was to determine potential sources of groundwater contamination observed emanating from beneath the northern portion of the Landfill and migrating toward the Main Plant.

- Geophysical survey of the Landfill in 2001 by Enviroscan under the supervision of Roux Associates.

- Installation and sampling of ten piezometers by Roux Associates along the perimeter of the Closed Landfill as part of the RI of the Main Plant (2001). Samples were analyzed for VOCs, SVOCs, and filtered and unfiltered metals, including cyanide and hexavalent chromium.

- Groundwater sampling by Roux Associates from 13 monitoring wells and piezometers located in and adjacent to the Site (2002). Samples were analyzed for VOCs, SVOCs, filtered and unfiltered metals, cyanide, hexavalent chromium and polychlorinated biphenyls (PCBs).

- Site investigation of the Closed Landfill by Roux Associates in 2002, which included two rounds of groundwater sampling and water-level measurements, installation of five piezometers and sampling of fill and buried waste.

- Test trench investigation by Roux Associates in 2002, which included the excavation of eight test trenches at the Site through the fill and waste material to the top of the underlying clay unit.

- Excavation of Main Plant Area of Concern (AOC) 1 abutting the northern border of the Landfill in 2002. Post-excavation sidewall sampling along the southern border of the excavation (i.e., corresponding to the northern border of the Landfill) indicated very high concentrations of VOCs. Based on the sidewall data, the NYSDEC requested that BASF continue the excavation of AOC 1 from the Main Plant into the Landfill. BASF did not, at that time, perform the additional removal. Rather, BASF indicated that remedial options for the Landfill would be evaluated independent of the remediation of the Main Plant. This report provides the results of this evaluation.

- Boring and sampling program by Roux Associates in 2004 to delineate areas of high concentrations of VOCs in the Landfill soil.

- Preparation of a Conceptual Remedial Design for the Landfill by Roux Associates in 2004.

A map summarizing previous sampling and investigation locations is provided in Plate 2.

4.2 Nature and Extent

The nature and extent of contamination in the Closed Landfill was determined from the results of the soil and groundwater sampling summarized in the Conceptual Remedial Design Report for the Closed Landfill (Roux Associates, 2004a). The soil sampling results indicated that the primary constituents of concern in the Landfill soil are VOCs and metals (Plates 3 and 4, respectively). However, as will be summarized below, only VOCs were frequently detected in Landfill groundwater at concentrations above NYSDEC Ambient Water Quality Standards and Guidance Values (AWQSGVs) as shown on Plate 5. Metals of concern (arsenic, chromium and lead), though present at high concentrations in Landfill soil, were either not detected or detected infrequently in filtered groundwater samples at concentrations above AWQSGVs as shown on Plate 6. This observation led to the conclusion that geochemical conditions in the Landfill and the nature of the metals-containing material results in metals being relatively immobile in groundwater.

4.2.1 VOCs in Landfill Soil

Plate 3 presents a summary of the 10 VOCs in the Landfill soil that were detected in groundwater during previous investigation (discussed in Section 4.2.3 below) above AWQSGVs. The data summarized on Plate 3 includes soil boring data from previous investigations. A review of Plate 3 indicates that the most frequently detected VOCs present at the highest concentrations include:

- Benzene
- Chlorobenzene
- 1,2-Dichlorobenzene
- Ethylbenzene
- Xylenes

These five compounds occur commingled in two areas of the Landfill:

- along the northern border of the Landfill and the northern portion of the Landfill south of Main Plant AOC-1 in the immediate vicinity of locations PE-A1-S-23 (sampled during post excavation sampling for Main Plant AOC–1) and PE-A1-S-23-4 (sampled in April 2004 [Roux Associates 2004a]); and

- in the central to southern portion of the Landfill in the vicinity of previous soil borings LF-TP-5 and LF-TP-6 (sampled during the test trench investigation in February 2003 [Roux Associates 2003]).

At these locations, concentrations of VOCs greater that 1,000,000 micrograms per kilogram (ug/kg) were observed.

The following summarizes the range in concentrations and number of detections throughout the Landfill in each range for the above five VOCs:

Analyte	1 – 100 (ug/kg)	>100 – 1,000 (ug/kg)	>1,000 – 10,000 (ug/kg)	>10,000 – 100,000 (ug/kg)	>100,000 – 1,000,000 (ug/kg)	>1,000,000 (ug/kg)	Maximum Detection (ug/kg)
Benzene	98	25	19	14	4	1	1,500,000
Chlorobenzene	113	43	25	26	13	7	42,000,000
1,2-Dichlorobenzene	61	23	12	8	3	1	1,700,000

Analyte	1 – 100 (ug/kg)	>100 – 1,000 (ug/kg)	>1,000 – 10,000 (ug/kg)	>10,000 – 100,000 (ug/kg)	>100,000 – 1,000,000 (ug/kg)	>1,000,000 (ug/kg)	Maximum Detection (ug/kg)
Ethylbenzene	42	21	13	7	1	2	1,500,000
Xylenes	104	28	36	19	3	5	6,200,000

A review of the above table and Plate 3 indicates the following:

- Almost 97 percent of the benzene detections lie in the range below 100,000 ug/kg and 97 percent of the chlorobenzene detections lie in the range below 1,000,000 ug/kg. These detections occur relatively uniformly over most of the Landfill area. Concentrations of benzene greater than 100,000 ug/kg and chlorobenzene greater than 1,000,000 ug/kg occur in a relatively small, focused area in the northern portion of the Landfill — coinciding with high detections of 1,2-dichlorobenzene, ethylbenzene, and xylenes.

- Chlorobenzene occurs at concentrations greater than 1,000,000 ug/kg in the central to southern portion in the area that had a high geophysical anomaly as observed during the Landfill Site Investigation in 2002. This area of high chlorobenzene concentrations does not appear to be impacting groundwater significantly.

- With the exception of a detection of xylenes at 200,000 ug/kg in boring LF-SB-107 (2002 data [Roux Associates 2002b]), all detections of 1,2-dichlorobenzene, ethylbenzene and xylenes at concentrations over 100,000 ug/kg occur commingled at locations where benzene and chlorobenzene were also detected at high concentrations.

4.2.2 Metals in Landfill Soil

Plate 4 presents a summary of arsenic, chromium, and lead in Landfill soil and Landfill material samples. Chromium and lead were identified by the NYSDEC as metals of concern in landfill soil due to their presence at relatively high concentrations based on previous data. Arsenic has been identified as a metal of concern during previous RI activities at the Main Plant. A review of the data (Roux Associates 2004a) and Plate 4 indicates that most of the Landfill is impacted by arsenic, chromium, and lead, although, as will be discussed in Section 4.2.3, metals were infrequently and inconsistently detected in Landfill groundwater.

The following summarizes the frequency of detections in concentration ranges by order of magnitude for the three metals of concern:

Analyte	1 – 100 (mg/kg)	>100 – 1,000 (mg/kg)	>1,000 – 10,000 (mg/kg)	>10,000 – 100,000 (mg/kg)	>100,000 (mg/kg)	Maximum Detection (mg/kg)
Arsenic	191	28	2	0	0	2,500
Chromium	62	89	58	24	10	242,000
Lead	57	106	60	17	6	200,000

mg/kg – milligrams per kilogram

These data distributions confirm previous observations that metals occur in most of the Landfill soil at high concentrations, yet do not impact groundwater quality significantly.

4.2.3 Landfill Groundwater Quality

Recent groundwater quality data for the Landfill were obtained during performance of a groundwater sampling round in May 2004 (Roux Associates 2004a) to facilitate design of the Main Plant groundwater treatment system. The respective VOC and metal data are summarized on Plates 5 and 6, respectively.

4.2.3.1 VOCs in Groundwater

A review of the groundwater VOC data indicated that the following 10 VOCs were detected in Landfill groundwater at concentrations above AWQSGVs:

- Benzene
- Chlorobenzene
- 1,2-Dichlorobenzene
- 1,3-Dichlorobenzene
- 1,4-Dichlorobenzene
- 1,2-Dichloroethane
- Ethylbenzene
- Toluene
- 1,2,4-Trichlorobenzene
- Xylenes

Chlorobenzene and benzene were detected most frequently in Landfill groundwater, and at the highest concentrations relative to AWQSGVs. The distribution of these compounds in groundwater relative to observations in soil is discussed below and shown conceptually on Figure 5.

Chlorobenzene

Chlorobenzene was not detected in groundwater beneath the entire western portion of the Landfill. Four of the five locations with the highest chlorobenzene concentrations in groundwater are located in the southeast portion of the Landfill (Plate 5), where groundwater flow is from beneath the Port of Rensselaer Access Highway onto the Landfill (i.e., east to west), as documented during previous investigations. Of these, three locations (LF-PZ-118, LF-PZ-126, and LF-PZ-127) are along the fence separating the Port of Rensselaer Access Highway from the rest of the Landfill. Chlorobenzene was detected in groundwater at these three locations ranging from 680 to 1,300 micrograms/liter (µg/L).

The highest detection of chlorobenzene in groundwater was 87,000 µg/L at location MP-PZ-113R, which is along the northern border of the Landfill adjacent to the Main Plant. This location is in the immediate vicinity of a 42,000,000 µg/kg detection of chlorobenzene in soil (sample location PE-AREA-1-S-23) observed during post-excavation sidewall sampling of Main Plant Area of Concern (AOC) 1.

Benzene

Benzene in groundwater beneath the Landfill follows a similar distribution as chlorobenzene, with one notable exception; Well LF-MW-43R had a high concentration of benzene (5,900 µg/L), but not chlorobenzene (43 µg/L). As with chlorobenzene, benzene was not detected in groundwater beneath the entire western portion of the Landfill, and two of the four highest detections of benzene in groundwater were in wells LF-PZ-126 (2,600 µg/L) and LF-PZ-127 (2,000 µg/L) along the fence abutting NYSDOT property and the Port of Rensselaer Access Highway to the east.

The highest detection of benzene in groundwater was from MP-PZ-113R (120,000 µg/L), which also had the highest chlorobenzene detection.

4.2.3.2 Metals in Groundwater

As will be discussed below, a review of metals groundwater data from filtered samples indicated that the primary metals of concern (arsenic, chromium, and lead) were either consistently not detected (lead), or infrequently and inconsistently detected (arsenic and chromium) in Landfill groundwater (Plate 6).

Zinc was detected at concentrations exceeding the AWQS in filtered groundwater samples at three locations: LF-PZ-123 (3,800 µg/L), LF-MW-30 (16,000 µg/L), and LF-PZ-8 (44,000 µg/L). With the exception of these three locations, which are all in the interior portion of the landfill, zinc has shown no mobility in groundwater at the Site and was never a COC during the remedial investigation. The wells along the perimeter of the landfill all had either non-detected or very low zinc concentrations, supporting the fact that zinc exhibits no tendency for offsite migration in groundwater, and indicating that the landfill is not a source of zinc in groundwater to downgradient locations. Moreover, zinc is considered a secondary drinking water standard, with a standard of 5,000 ug/L based on an aesthetic criterion. The groundwater in the landfill is not, nor will it ever be, a source of potable water.

<u>Arsenic</u>

The following summarizes the detection of arsenic in filtered groundwater samples above NYSDEC AWQSGVs during the three sampling events performed at the Landfill:

Well	January 2002	March 2002	April 2004
LF-PZ-122	NS	872	260*
LF-MW-43R	40 B	NS	ND
LF-MW-30	91	NS	29
LF-PZ-124	37.7 B	NS	ND
LF-MW-32	149	NS	28**

NS – Not sampled
ND – Not detected
B – estimated concentration
*This value had been reported in error as 872 µg/L in the Conceptual Design Report.
**This value had been reported in error as 2,000 µg/L in the Conceptual Design Report.

Note that two of the most recent detections of arsenic in filtered groundwater were only slightly above the NYSDEC AWQSGVs of 25 µg/L. The well where arsenic was detected significantly above the AWQSGVs (LF-PZ-122) is located in the interior portion of the Landfill. Arsenic was not detected above AWQSGVs in any well located along the Landfill perimeter, nor hydraulically downgradient of the Landfill.

Chromium

Chromium was only detected in a filtered groundwater sample from one well at a concentration of 87 µg/L (LF-PZ-8) compared to an AWQSGVs of 50 µg/L. This well is located in the center of the Landfill, and is surrounded by wells in which chromium was not detected above AWQSGVs.

Lead

Lead was not detected in filtered groundwater samples in any Landfill well at concentrations above AWQSGVs.

4.3 Partitioning Evaluation of VOCs and Metals to Groundwater

The following sections discuss the potential for VOCs and metals to partition from soil to groundwater based on a review of soil and groundwater quality data.

4.3.1 Partitioning Evaluation of Sources Areas Contributing to VOCs in Groundwater

A review of data summarized in the Conceptual Design Report for the Closed Landfill (Roux Associates 2004a) indicates that the only area of the BASF portion of the Landfill where significant concentrations of VOCs in soil and groundwater co-occur is beneath the northern portion of the Landfill.

Soil data indicate that the range in chlorobenzene concentrations in soil beneath the northern portion of the Landfill and south-central portion are similar with one exception; a detection of 42,000,000 micrograms per kilogram (µg/kg) (PE-A1-S23) along the northern border of the Landfill adjacent to the Main Plant, where 180,000 µg/L was also detected in groundwater (MP-PZ-113 [January 2002 data]). Elsewhere, chlorobenzene concentrations beneath the northern portion of the Landfill (ranges up to 3,200,000 µg/kg) are similar in magnitude to beneath the south-central portion (ranges up to 2,800,000 µg/kg), but co-occurrence in groundwater at high concentrations was not observed. This indicates that the nature of the material is not conducive to partitioning of chlorobenzene into groundwater, despite ranges in concentrations of 1E6 µg/kg. It is not until a concentration another order of magnitude higher (1E7 µg/kg) is encountered beneath the northern portion of the Landfill that significant chlorobenzene is introduced into groundwater. It is probably that the high organic carbon content (up to 30 percent total organic carbon) and clay in the Landfill material result in the extreme tendency for VOCs to partition preferentially in the solid phase.

Benzene was detected at high concentrations only in soil beneath the northern portion of the Landfill. Here, detections of benzene in soil from 100,000 µg/kg to 1,500,000 µg/kg co-occur with detections in groundwater of 2,100 to 14,000 µg/L. The greater tendency for benzene to be partitioned into groundwater relative to chlorobenzene is consistent with the relative solubilities of the two compounds, as expressed by the log octanol-water partition coefficients (log K_{ow}). The log K_{ow} for benzene ranges from 1.95 to 2.13 (Spitz and Moreno 1996), which is lower than the log K_{ow} range of 2.18 to 3.79 for chlorobenzene. These observations regarding the relationship between VOCs in soil and groundwater were used to define the conceptual source area for VOCs in groundwater shown in Figure 5.

4.3.2 Partitioning Evaluation of Areas With High Concentrations of Metals

High concentrations of chromium and lead were detected throughout Landfill soil, with the highest concentrations beneath a large area of the northern portion. Despite concentrations of lead up to 200,000 mg/kg and chromium up to 242,000 mg/kg, there is no tendency for these metals to partition into groundwater (i.e., partition coefficients are infinite).

A review of metals data in soil indicates that, outside of the northern portion of the Landfill, most of the Landfill material is impacted by arsenic up to 100 parts per million (ppm), by chromium up to 10,000 ppm and by lead up to 100,000 ppm. Permit applications prepared by GAF in 1978 indicated that chromium hydroxide and lead sulfate were placed in the Landfill. These constituents resulted in the high detections of metals in soil, yet they are relatively inert from the perspective of dissolution of metals in groundwater. Therefore, despite the relatively high concentrations of chromium and lead detected in Landfill soil, there were no detections of lead and only one detection of chromium above AWQSGVs in filtered groundwater samples. The relationship between metals in Landfill soil and groundwater is shown conceptually on Figure 6.

5.0 ENFORCEMENT STATUS

In February 1978, GAF Corporation filed applications and received approval to operate a landfill on the Site prior to BASF acquisition of the Site.

In April 1978, BASF acquired the Rensselaer facility from GAF Corporation. BASF immediately discontinued use of the Landfill and removed a large number of steel drums stored in the area for reclamation or scrap. Following BASF's acquisition of the facility, the NYSDEC listed the Landfill in the NYSDEC Registry of Inactive Hazardous Waste Disposal Sites as a Class 2 site. This prompted BASF to initiate several investigations of the Site that resulted in the placement of a soil cap in 1982 and installation of a groundwater pump and treat system. The NYSDEC reclassified the Landfill as a Class 4 site in 1983.

In 2001, following initial remedial investigation activities beneath the Main Plant portion of the Rensselaer facility, the NYSDEC requested that the Landfill be re-investigated for potential source areas of groundwater contamination observed beneath the Main Plant.

In 2002, BASF entered into the Voluntary Cleanup Program (VCP) for the investigation and remediation of the Closed Landfill. Since then, BASF has performed four phases of investigation of fill and groundwater quality in the Landfill.

6.0 IDENTIFICATION OF STANDARDS, CRITERIA AND GUIDELINES

The NYSDEC Division of Hazardous Waste Remediation uses New York State standards, criteria and guidelines (SCGs) as applicable rules and regulations (ARARs) in its evaluation and selection of remedial actions (NYSDEC 1990). Site-specific SCGs are discussed below.

6.1 Standards, Criteria and Guidelines

Applicable requirements are defined as:

> *"those cleanup standards, standards of control, and other substantive requirements, criteria, or limitations, promulgated under federal or state environmental facility listing laws that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstances found at a CERCLA Site." (40 CFR Section 300.5 at 55 Fed. Reg. 8814, USEPA, 1990.)*

Relevant and appropriate requirements are defined as:

> *"those cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under federal, or state environmental or facility listing laws that, while not "applicable" to a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA Site, address problems or situations sufficiently similar to those encountered at the CERCLA Site that their use is well suited to the particular Site. Only those state standards that are identified in a timely manner and are more stringent than federal requirements may be relevant and appropriate." (40 CFR Section 300.5 at 55 Fed. Reg. 8817, USEPA, 1990.)*

Under the Federal Superfund Amendments and Reauthorization Act (SARA), remedial actions must comply with SCGs unless one or more of five conditions are met (Federal Comprehensive Environmental Response, Compensation and Liability Act) (CERCLA section 121 [d] [4] [A] through [F]).

1. Interim Measures – The remedial action selected is only part of a total remedial action that will attain such level of standard or control when completed.

2. Greater Risk to Health and the Environment – Compliance with such requirement at the facility will result in greater risk to human health and the environment than alternative options.

3. Technical Impracticability – Compliance with such requirement is technically impractical.

4. Equivalent Standard of Performance – The remedial action selected will attain a standard of performance that is equivalent to that required under the otherwise applicable standard, requirement, criteria, or limitation, through use of another method of approach.

5. Inconsistent Application of State Requirements – With respect to a state standard, requirement, criteria, or limitation, the State has not consistently applied the standard, requirement, criteria, or limitation in similar circumstances at other remedial actions.

In addition to the SCGs, to-be-considered materials (TBCs) are typically considered when selecting a remedial action. TBCs are non-promulgated advisories or guidance issued by federal or state government that are not legally binding and do not have the status of SCGs. TBCs will be used during the development of the remedial design for the Landfill, if SCGs are not available.

The three different types of SCGs are defined below.

1. Ambient or chemical-specific SCGs are health or risk based numerical values or methodologies. Chemical-specific SCGs establish the amount or concentration of a chemical that may be found in, or discharged to, the environment.

2. Action-specific SCGs are usually technology or activity based requirements or limitations on actions taken with respect to hazardous wastes.

3. Location-specific SCGs set restrictions on activities based on the characteristics of special locations.

Each of these three types of SCGs and any associated TBCs relevant to this Site are discussed in the following sections.

6.1.1 Chemical-Specific SCGs and TBCs

As stated in Section 4.0, the soil and groundwater quality results for the Site indicated that elevated levels of primarily VOCs and metals were detected in fill material and VOCs were detected in groundwater above NYSDEC RSCOs and AWQSGVs, respectively. Based on these findings, potential chemical-specific SCGs and TBCs have been identified for the Site and are presented in Table 1.

6.1.2 Action-Specific SCGs and TBCs

Action specific SCGs and TBCs are presented in Table 2.

6.1.3 Location-Specific SCGs and TBCs

Location-specific requirements pertain to existing natural or cultural features in the vicinity of the Site that are specifically protected. Location-specific SCGs and TBCs are discussed below.

NYSDEC Regulation 6 NYCRR 858 – Classifies the nearest surface water (Hudson River) as Class C Waters. Because treated effluent from a potential treatment system could be discharged directly, or indirectly, to the Hudson River, this is an applicable location-specific SCG.

Fish and Wildlife Coordination Act (16 U.S.C. 661) – States that whenever waters of any stream are controlled or modified for any purpose, the department or agency of the United States responsible for the stream or the public or private agency managing the stream under Federal permit or license, must consult with the Department of the Interior and the United States Fish and Wildlife Service. Because treated effluent from a potential treatment system could be discharged directly, or indirectly, to the Hudson River, this is an applicable location-specific SCG.

7.0 SITE REMEDIAL ACTION OBJECTIVES

According to the May 2002 Draft of the NYSDEC VCP Guide (NYSDEC 2002b), the goal of the remedy selection process is to remediate the Site to a level that is protective of human health and the environment under the contemplated future use of the Site. The contemplated future use of the Site is as a landfill. BASF has, however, also identified continuing improvement and beneficial re-use of the Site as RAOs. These were incorporated into the remedy selection process.

1. RAOs are medium-specific goals for protecting human health and the environment, which were developed based on the results from the previous investigations considered in combination with the SCGs discussed in Section 6.0. The RAOs developed for the Landfill are as follows:
   - Protect public health and the environment
     - Prevent direct contact
       - Dermal absorption, inhalation, and ingestion
     - Control surface water
     - Minimize erosion
     - Reduce infiltration
     - Control and treat leachate
   - Continuing improvement
     - Ongoing treatment
   - Beneficial re-use
     - Public or private use of the Site consistent with conditions following remediation.

8.0 SCREENING OF REMEDIAL TECHNOLOGIES

As discussed in Section 4.0, Landfill materials, VOCs and metals (chromium and lead) in soil and VOCs in groundwater require some measure of remediation or containment. This section identifies applicable remedial technologies to address these soil and groundwater impacts at the Landfill. These technologies have been identified through a review of relevant literature, experience with similar types of environmental problems, engineering judgment, and discussions with vendors and contractors. All of the technologies were evaluated on the basis of:

- effectiveness;
- implementability; and
- cost.

The objective of screening the technology types is to narrow the field of available technologies, eliminating those that are not effective in meeting the desired goals or cannot be implemented. Cost was a secondary consideration, in that technologies with a high cost but not a substantial increase in performance in relation to other options could potentially be rejected. After screening, the remaining remedial and/or containment technologies will be combined into remedial alternatives, which will undergo a more detailed evaluation as presented in Section 9.0.

The criteria for effectiveness consider whether the technology can meet the RAOs. Also considered are potential impacts to human health and the environment, and whether the technology has proven reliable for the conditions at the Site.

The criteria for implementability focuses on institutional aspects of remedial technologies with factors such as institutional constraints, time schedules, and the availability of services, equipment and trained personnel being considered as part of the evaluation.

The detailed evaluation of technologies with potential applicability to the Site is presented in Table 3. A list of the evaluated technologies that had the potential to be effective in meeting the remedial goals is provided below with a summary of the results of the evaluation.

Soil Remediation

- Existing Soil Cap [Retained] – use of the existing soil cap is part of the no-action alternative, which is required to be retained by the NYSDEC.

- Geomembrane Cap (Modified NYCRR Part 360 Cap) [Retained] – This is a widely-used, proven and commercially available technology that provides a high level of protection against infiltration, direct contact and leachate generation.

- Wildlife Enhancement Alternative Landfill Cover [Retained] – This is an accepted, proven, and commercially available technology that has additional advantages over more traditional caps, including reduced stormwater management, continuing restoration of landfill soil through rhizodegradation processes and increased benefit to the community.

- Waste Excavation and Offsite Disposal [Retained] – Waste excavation is effective because it removes sources of contamination from the site. The effectiveness of this technology is balanced by high costs, increased short-term risk, and the concept that the technology only moves impacted material from one landfill to another.

- Soil Vapor Extraction with Air Sparging [Not Retained] – Landfill soil is extremely heterogeneous, with small pockets of highly impacted waste material present in the matrix. It is not likely that the influence of SVE or air sparging could be applied in a technically-practicable way that would significantly affect contaminant concentrations.

- Chemical Stabilization [Not Retained] – Does not address VOCs, which are impacting groundwater. Highly heterogeneous nature of waste, and demonstrated immobility of metals in the matrix make chemical stabilization technically impracticable.

- Thermal Desorption [Not Retained] – Highly heterogeneous nature of waste, with small pockets of highly impacted waste material present in the matrix indicate that it is not likely that thermal desorption could be applied in a technically-practicable way that would significantly affect contaminant concentrations. Note that *ex-situ* thermal desorption failed during a field-scale pilot study on less heterogeneous waste from Area 1 beneath the Main Plant.

- Chemical Oxidation [Not Retained] – May potentially mobilized metals that are not mobile in the reduced state (e.g., chromium). Also, it is not likely that this technology could be applied in a technically-practicable way that would significantly affect contaminant concentrations due to high organic levels observed in the VOC source area.

Groundwater Remediation

- Existing Perimeter Groundwater Collection Trench with extraction and *ex-situ* treatment [Retained] – Groundwater collection trenches have already been installed as part of the groundwater remedy for OU-1. Trenches penetrate the entire saturated thickness surrounding the Landfill, and are therefore expected to be highly effective at preventing offsite migrate of impacted groundwater.

- Geomembrane Cap [Retained] – This is a widely-used, proven, and commercially available technology that provides a high level of protection against infiltration and leachate generation, which will reduce the potential for migration of contaminants in groundwater.

- Wildlife Enhancement Alternative Landfill Cover [Retained] – Leachate generation and volume of impacted groundwater are reduced via use of increased soil moisture storage capacity and enhanced evapotranspiration capabilities of Alternative Landfill Cover. Rhizodegradation processes promote continuing restoration of Landfill soil.

Based on the evaluation presented in Table 3, a list of the retained technologies, along with a brief description of their applicability to the Site, is provided below.

Soil Remediation

- Existing Soil Cap – can be used to prevent contact with the Landfill waste.

- Geomembrane Cap – can be used to prevent contact with the Landfill waste.

- Wildlife Enhancement Alternative Landfill Cover – can be used to prevent direct contact with the Landfill waste, minimize infiltration, and promote continued degradation of residual VOCs in the Landfill soil, with the added benefit of maximizing the beneficial re-use of the Landfill.

- Waste Excavation and Offsite Disposal – can be used to address VOC and metals areas.

Groundwater Remediation

- Existing Perimeter Groundwater Collection Trenches – can be used to contain and extract impacted groundwater migrating from the Landfill.

- Geomembrane Cap – can be used to minimize groundwater infiltration.

- Alternative Landfill Cover – can be used to minimize infiltration, stabilize inorganic compounds, and degrade organic compounds.

9.0 EVALUATION OF REMEDIAL ALTERNATIVES

Remedies were evaluated and selected based on whether they were the most protective of human health and the environment under the contemplated future use of the Site in a way that minimized short-term risks. In order to determine the best remedy for the Site, seven potential remedial alternatives for the Closed Landfill were identified, screened, and evaluated, as summarized in Table 4. A description of each of these alternatives is provided below.

9.1 Description of Alternatives

Based on the evaluation of applicable soil and groundwater remedial technologies discussed in Section 8.0, seven remedial alternatives were assembled and evaluated to determine a remedy for the Site that would best achieve the RAOs identified in Section 7.0. Descriptions of the proposed seven alternatives, listed below, are provided in the following subsections of this report with a detailed evaluation of each prospective alternative provided in Table 4.

- Alternative 1: Excavation of Landfill Wastes Exceeding NYSDEC RSCOs and Hydraulic Containment
- Alternative 2: Alternative Landfill Cover and Hydraulic Containment
- Alternative 3: Alternative Landfill Cover and Hydraulic Containment and Remediation of Elevated VOC Areas
- Alternative 3A: Alternative Landfill Cover and Hydraulic Containment and Remediation of VOC Source Areas to Groundwater
- Alternative 4: Alternative Landfill Cover and Hydraulic Containment and Remediation of Elevated VOC and Metals Areas
- Alternative 5: Modified Part 360 Cap and Hydraulic Containment
- Alternative 6: Existing Soil Cap and Hydraulic Containment (equivalent to No-Action Alternative[1])

[1] Hydraulic Containment is going to be provided along the northern, western and southern borders of the Landfill as part of the remedy for Main Plant OU-1.

9.1.1 Alternative 1 – Excavation of Landfill Wastes Exceeding NYSDEC RSCOs and Hydraulic Containment

This alternative would consist of the mechanical excavation of approximately 116,000 cubic yards of fill material from the unsaturated zone. An approximately equal amount of saturated material would remain below the water table. Excavated material would be loaded into trucks and transported to properly permitted offsite disposal facilities. Approximately 100 percent of the excavated material was assumed to be classified as hazardous waste. Hazardous waste would be disposed of at a RCRA Subtitle C-permitted (hazardous) waste facility. The excavated material would be replaced with clean fill. In addition, the existing 1,500 linear feet of perimeter containment system trenches would serve to mitigate the migration of impacted groundwater along the northern, western, and southern landfill boundaries. As will be discussed in further detail in the Remedial Design report to be submitted following approval of the RASR, additional components to the perimeter containment system will be installed along the eastern border of the Landfill to address the migration of impacted groundwater from beneath the Port of Rensselaer Access Highway. These additional components may include—but will not necessarily be limited to—phyto-technology plantings or a groundwater extraction sump. The estimated costs and implementation duration for this alternative are provided below:

- Present Worth: $32,850,000 (based on 30 years of Operation, Maintenance and Monitoring [OM&M])
- Capital Cost: $32,600,000
- Present Worth of OM&M Costs: $250,000
- Time to Implement: 12 to 18 months (OM&M to be performed for an additional 20 to 30 years)

9.1.2 Alternative 2 – Alternative Landfill Cover and Hydraulic Containment

This alternative would involve the construction of an Alternative Landfill Cover consisting of a 6 to 12-inch common fill grading layer, a biota barrier, a 12-inch low permeability soil layer, a 12-inch planting substrate layer, and a 6-inch topsoil layer (Figure 8). The Alternative Landfill Cover component of the remedy would include plant species to promote creation of a wildlife habitat, with integrated phyto-technology plantings designed to meet functional objectives (reduce the infiltration of precipitation into the landfill material via enhanced evapotranspiration, reduce leachate generation and provide for adequate erosion control). In addition, a horizontal barrier layer between the Alternative Landfill Cover and underlying impacted fill would be constructed to prevent burrowing animals from contacting landfill material. Surface water runoff will be managed via the use of vegetative drainage swales and minimizing infiltration of precipitation into the landfill material. The specific details and supporting equivalency calculations for the Alternative Landfill Cover are provided in the previously submitted Conceptual Design Report (Roux Associates 2004a) and in the Preliminary (30 percent) Design Report (Roux Associates 2005). The existing 1,500 linear feet of perimeter containment system trenches would serve to mitigate the migration of impacted groundwater along the northern, western, and southern landfill boundaries. As will be discussed in further detail in the Remedial Design report, additional components to the perimeter containment system will be installed along the eastern border of the Landfill to address the migration of impacted groundwater from beneath the Port of Rensselaer Access Highway. These additional components may include—but will not necessarily be limited to—phyto-technology plantings or a groundwater extraction sump. The estimated costs and implementation duration for this alternative is provided below:

- Present Worth: $2,860,000 (based on 30 years of OM&M)
- Capital Cost: $2,300,000
- Present Worth of Annual OM&M Costs: $560,000
- Time to Implement: Three to six months (OM&M to be performed for an additional 20 to 30 years)

9.1.3 Alternative 3 – Alternative Landfill Cover and Hydraulic Containment and Remediation of Elevated VOC Areas

This alternative would consist of all the remedial components described in Alternative 2 plus the removal of elevated VOC areas discussed in Section 4.2 and shown in Plate 7. For this alternative, approximately 3,500 cubic yards of fill material from the unsaturated zone would be excavated from the elevated VOC areas located in the northern, central and south-central portions of the Landfill. These areas were defined based on extensive pre-delineation sampling performed in both areas as summarized in the Conceptual Remedial Design Report (Roux Associates, 2004a). The excavation volume estimate was based on excavation to a depth of approximately eight feet. Excavated material would be loaded into trucks and transported to properly permitted offsite disposal facilities. All of the excavated material would be classified as hazardous waste. Hazardous waste would be disposed of at a RCRA Subtitle C-permitted waste facility. The excavated material would be replaced with clean fill prior to the construction of the Alternative Landfill Cover. The existing perimeter containment system trenches would be used to address the migration of impacted groundwater along the northern, western, and southern landfill boundaries, with additional components to be added to address migration along the eastern border with the NYSDOT parcel, as in Alternative 2. The estimated costs and implementation duration for this alternative are provided below:

- Present Worth: $5,010,000 (based on 30 years of OM&M)
- Capital Cost: $4,450,000
- Present Worth of Annual OM&M Costs: $560,000
- Time to Implement: Four to eight months (OM&M to be performed for an additional 20 to 30 years)

9.1.4 Alternative 3A – Alternative Landfill Cover and Hydraulic Containment and Remediation of VOC Source Areas to Groundwater

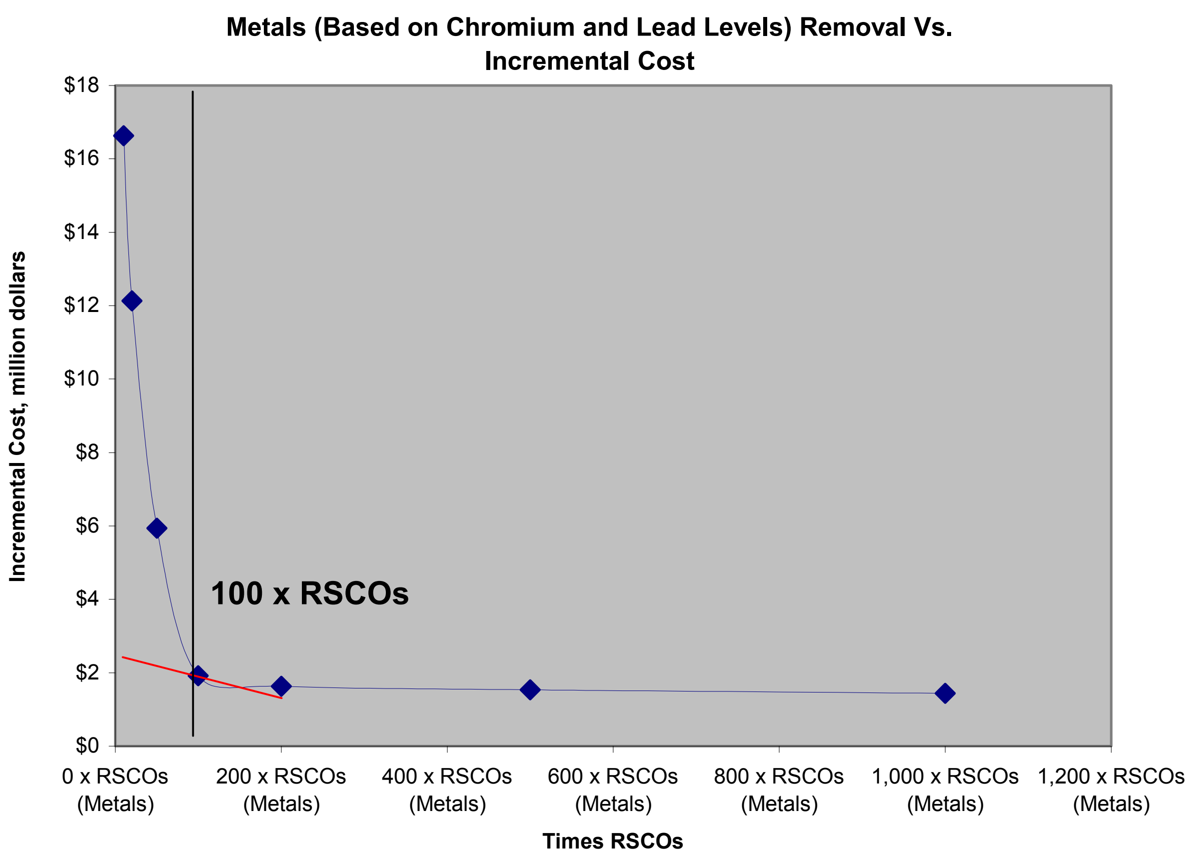
This alternative would consist of all the remedial components described in Alternative 2 plus the removal of the VOC source area to groundwater, as discussed in Section 4.2 and shown in Plate 7. For this alternative, approximately 1,900 cubic yards of fill material from the unsaturated zone (as defined under Alternative 3 above) would be excavated from the VOC source area to groundwater located in the northern portion of the Site. This area was defined based on extensive pre-delineation sampling performed in this area of the Site as summarized in the Conceptual Remedial Design Report (Roux Associates, 2004a). Excavated material would be loaded into trucks and transported to properly permitted offsite disposal facilities. All of the excavated material would be classified as hazardous waste. Hazardous waste would be disposed of at a RCRA Subtitle C-permitted waste facility. The excavated material would be replaced with clean fill prior to the construction of the Alternative Landfill Cover. The existing perimeter containment system trenches would be used to address the migration of impacted groundwater along the northern, western and southern landfill boundaries, with additional components to be added to address migration along the eastern border with the NYSDOT parcel, as in Alternative 2. The estimated costs and implementation duration for this alternative are provided below:

- Present Worth: $4,110,000 (based on 30 years of OM&M)

- Capital Cost: $3,550,000
- Present Worth of Annual OM&M Costs: $560,000
- Time to Implement: Four to eight months (OM&M to be performed for an additional 20 to 30 years)

9.1.5 Alternative 4 – Alternative Landfill Cover and Hydraulic Containment and Remediation of Elevated VOC and Metals Areas

This alternative would consist of all the remedial components described in Alternative 3 plus the removal of areas containing metals of concern above 100 times RSCOs discussed in Section 4.2. Since the entire landfill is impacted by metals at concentrations above RSCOs, - and metals in landfill material are not serving as sources to groundwater (therefore, a source area analysis similar to that conducted for the VOCs could not be performed), –a graphical analysis comparing relative soil volumes to multiples of the RSCOs was used to define the concentrations above which metals in soil would be removed. Using these concentrations, the corresponding area and volume of soil that would be excavated was developed. At the request of the NYSDEC, a "knee-of-the-curve" graph of the volume of metals-impacted material versus excavation and disposal costs was generated. Based on the inflection point for the curve shown below, the elevated metals areas were defined where metals exceed a threshold of approximately 100 times the NYSDEC RSCOs.



Under this alternative, approximately 7,500 cubic yards of additional material from the unsaturated zone (as defined under Alternative 3 above) outside of the VOC source area that would be removed would be excavated from the elevated metals areas. Together with the excavation of 3,500 yards of material with elevated VOCs as defined under Alternative 3 above, the total volume of material to be excavated under Alternative 4 is 11,000 cubic yards. Excavated material would be loaded into trucks and transported to properly permitted offsite disposal facilities. All of the excavated material would be classified as hazardous waste. Hazardous waste would be disposed of at a RCRA Subtitle C-permitted waste facility. The excavated material would be replaced with clean fill prior to the construction of the Alternative Landfill Cover. The existing perimeter containment system trenches would be used to address the migration of impacted groundwater along the northern, western, and southern landfill boundaries, with additional components to be added to address migration along the eastern border with the NYSDOT parcel, as in Alternative 2. The estimated costs and implementation duration for this alternative are provided below:

- Present Worth: $7,260,000 (based on 30 years of OM&M)
- Capital Cost: $6,700,000
- Present Worth of Annual OM&M Costs: $560,000
- Time to Implement: Six to twelve months (OM&M to be performed for an additional 20 to 30 years)

9.1.6 Alternative 5 – Modified Part 360 Cap and Hydraulic Containment

This alternative would entail using a modified Part 360 cap, which is a containment technology that involves using multiple layers of earthen and synthetic materials to reduce contaminant mobility and protect groundwater. Modified Part 360 capping works by maintaining a multi-layer, low-permeability cover over the waste to stabilize surface soil and reduce surface water infiltration. A modified Part 360 cap would be installed in conjunction with use of existing perimeter containment trenches to mitigate offsite migration of leachate and impacted groundwater. All proposed modifications to the Part 360 requirements or other applicable New York State landfill regulations would be demonstrated as equivalent to an un-modified design through calculations provided in remedial design work plans. The existing perimeter containment system trenches would be used to address the migration of impacted groundwater along the northern, western, and southern landfill boundaries, with additional components to be added to address migration along the eastern border with the NYSDOT parcel, as in Alternative 2. The estimated costs and implementation duration for this alternative is provided below:

- Present Worth: $3,850,000 (based on 30 years of OM&M)
- Capital Cost: $3,250,000
- Present Worth of Annual OM&M Costs: $600,000
- Time to Implement: Six to nine months (OM&M to be performed for an additional 20 to 30 years)

9.1.7 Alternative 6 – Existing Soil Cap and Hydraulic Containment (No Action)

This alternative is equivalent to "no action" alternative. This alternative relies on the existing soil cap and collection trenches to prevent direct contact with impacted media, and hydraulic containment of leachate and impacted groundwater via the existing perimeter containment trenches. The estimated costs and implementation duration for this alternative are provided below:

- Present Worth: $575,000 (based on 30 years of OM&M)
- Capital Cost: $325,000
- Present Worth of Annual OM&M Costs: $250,000
- Time to Implement: Immediate (OM&M to be performed for an additional 20 to 30 years)

9.2 Evaluation of Remedial Alternatives

The remedial alternatives described in Section 9.1 were evaluated based on the criteria described below and ranked based on a scale of 1 to 10, where 1 is the lowest ranking and 10 is the highest (Tables 4 and 5). Each alternative was evaluated against the base case of Alternative 6, which consists of the existing soil cap and operation of the site-wide hydraulic containment system.

The evaluation was conducted in two steps. In the first step, scores were compiled for all criteria except for cost and regulatory agency acceptance, to obtain a technical ranking of the alternatives.

In the second step, cost and regulatory acceptance were also considered to obtain an overall evaluation.

Technical Elements

- **Overall protectiveness (to human health and the environment)** – describes how the alternative, as a whole, protects and maintains protection of human health and the environment.

- **Compliance with SCGs** – describes how the alternative complies with identified chemical-specific, action-specific, and location-specific ARARs. The assessment includes information from advisories, criteria, and guidance that agencies have agreed is necessary and appropriate.

- **Short-term effectiveness** – examines the effectiveness of the alternative in protecting the community, workers, and the environment during the specified construction and implementation period until response objectives have been met.

- **Long-term effectiveness and permanence** – evaluates the effectiveness of the alternative in protecting human health and the environment after response objectives have been met and are measured in terms of the magnitude of residual risk and the adequacy and reliability of any controls that are used.

- **Reduction of toxicity, mobility, or volume through treatment** – evaluates the anticipated performance of the specific alternative in terms of treatment process(es) used and materials treated; amount of hazardous materials destroyed or treated; degree of expected reductions in toxicity, mobility and volume; degree to which treatment is irreversible; and the type and quantity of residuals remaining after treatment.

- **Implementability** – evaluates the feasibility of the alternative in terms of the ability to construct and operate the technology; reliability of the technology; ease of undertaking additional remedial actions, if necessary; ability to monitor effectiveness of remedy; availability of offsite disposal services and availability of prospective technologies.

- **Community Acceptance** – preliminarily assesses the community's apparent preferences for, or concerns about the alternative.

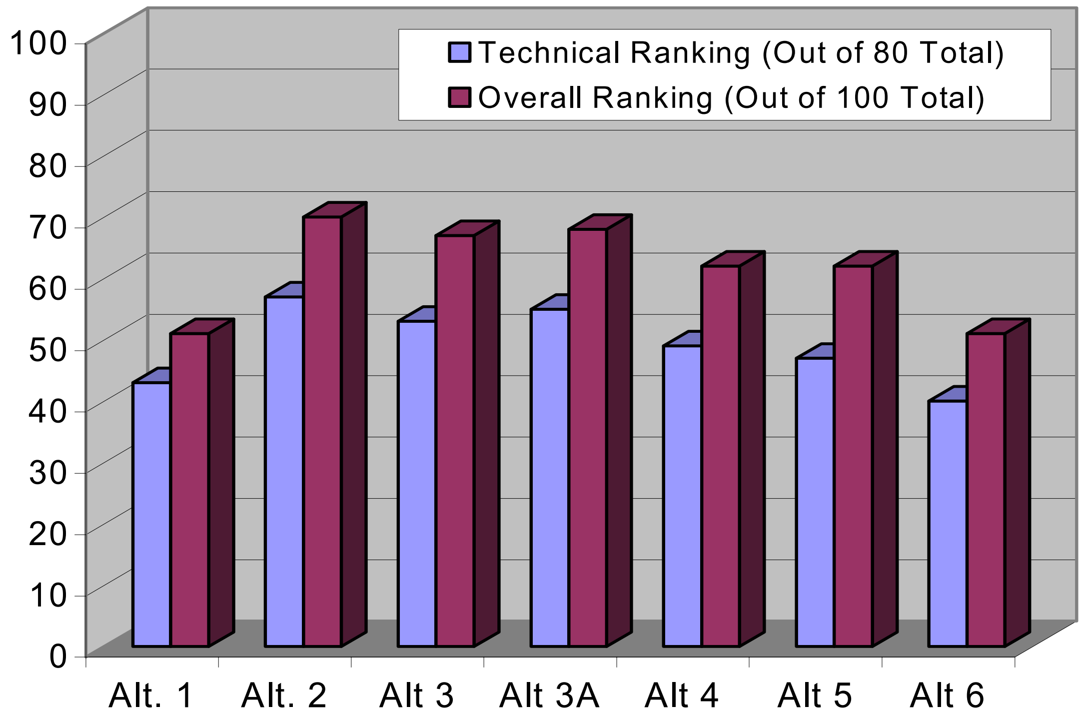
- **Compatibility** – assesses the ability of the alternative to conform with the intended future use of the Site.

Non-Technical Elements

- **Cost** – evaluates the capital, operation and maintenance, and present worth costs of the alternative.

- **Regulatory agency acceptance** – reflects the NYSDEC's apparent preferences for, or concerns about alternatives.

The technical and overall rankings are summarized in Table 5 and discussed below.



By a small margin, Alternative 2 (Alternative Landfill Cover and Hydraulic Containment) was the highest-ranking alternative from both a technical and overall basis, scoring 57 out of 80 and 70 out of 100, respectively. The Overall Ranking of 70 for Alternative 2 was followed closely by an Overall Ranking of 68 for Alternative 3A and 67 for Alternative 3.

The closed Landfill is unique in the respect that remedial actions have already been implemented that reduce or eliminate risks of exposure to constiuents in Landfill soil and groundwater, and the majority of the constituents present in Landfill soil at concentrations above RSCOs are stable and immobile. Therefore, the scores for the various alternatives reflect several concepts that would not necessarily be applicable to sites where no remedial actions have been implemented or where migration of constituents remains uncontrolled.

- All alternatives, including the "No Action" alternative, provide a generally equivalent degree of Long-Term Effectiveness, with rankings ranging from 5 (Alternative 6) to 8 (Alternatives 2, 3, 3A and 4) because all include a cap or cover and continued operation of the hydraulic containment system. These components will provide protection against direct contact to constituents in soil and prevent offsite migration of impacted groundwater.

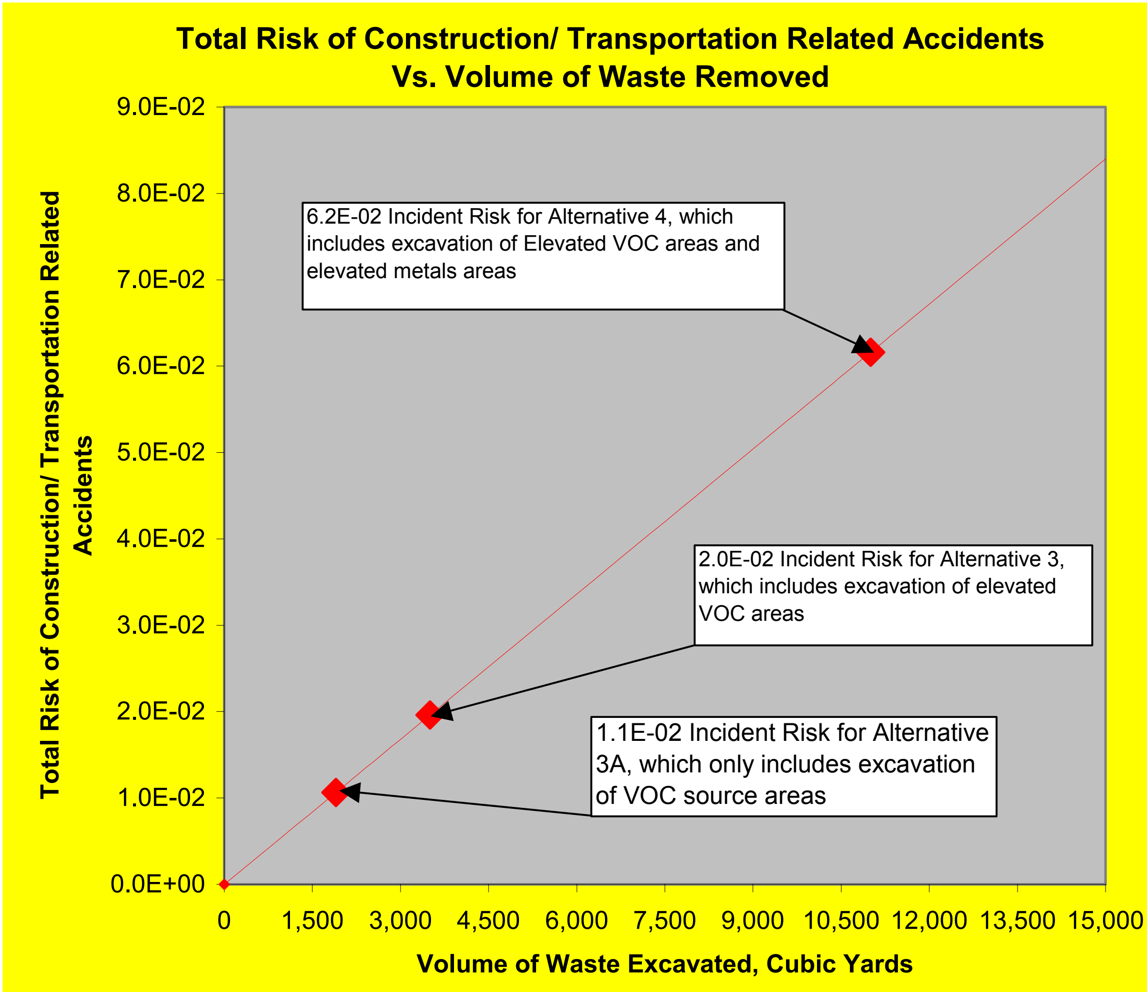
- Since, under current conditions, the majority of the constituents in landfill soil are stable and immobile and operation of the groundwater extraction and treatment system will remove constituents in groundwater, alternatives containing a removal component (Alternatives 1, 3, 3A and 4) scored lower in the category of Reduction in Toxicity, Mobility or Volume (TMV) Through Treatment. Removal actions, where there is no pretreatment prior to re-disposal at another landfill (which is expected to be the case for the majority of the constituents in soil), will not, *through treatment*, reduce the TMV. Further, extensive removal actions pose a potential risk of changing the geochemistry within the landfill, which could increase the mobility of the now stable metals. ,

- The lower scoring in the criterion of Reduction in Toxicity, Mobility or Volume Through Treatment for Alternative 5 is a function of the fact that use of a Modified Part 360 Cap will inhibit the natural biodegradation of VOCs in soil that is expected to occur via rhyzodegradation with an Alternative Landfill Cover. The Alternative Landfill Cover, which is a component of Alternatives 2, 3, 3A and 4, will provide both a degree of biodegradation for the VOCs in soil and groundwater and stabilization of the inorganic compounds.

- The scoring for implementability reflects the difficulty in removing material from the Landfill and replacing it with clean fill and, therefore, decreases as the volume of excavated material increases.

- Short-Term Effectiveness considers the impacts on the general public, workers, and the environment during implementation of the remedy. Based on published accident and injury statistics, the removal actions will create significant risks, relative to typical environmental risk levels. Therefore, the Short-Term Effectiveness ranking decreased as the volume of excavated material increased.

The figure below shows the incident risk of injury or death from construction and transportation-related for Alternatives 3, 3A and 4, all of which contain a removal component. Incident risk for Alternative 3A, in which approximately 1,900 cubic yards of VOC-containing soil would be removed, is 1.1E-02. The incident risk for Alternative 3, in which a total of 3,500 cubic yards of material would be removed, is 2.0E-02. The Incident risk for Alternative 4, in which a total of 11,000 cubic yards of soil would be removed, is 6.2E-02 or greater than a factor of 3 higher than Alternative 3A. The largest component of the incident risk is due to the transportation component.



The key short-term risk factors were calculated by assuming the following:

Risk = (construction worker incident rate x ***hours of construction work) +***

(vehicular accident rate x ***miles traveled) + short-term exposure to chemicals.***

- The construction worker incident rate assumed was 5E-7 accidents per hour.
- An excavation rate of approximately 200 cubic yards per day was assumed using five people working for eight hours per day. Therefore, implementation of Alternative 4, in which a total of 11,000 cubic yards of soil would be removed, would require 2,200 hours (five people, eight hours per day for 55 days).
- The vehicular (heavy truck) accident rate was 44 incidents per 100,000,000 miles (2002 Traffic Safety Facts from the National Center for Statistics and Analysis)
- Vehicular miles were based on 250 miles per trip and 20 cubic yards per truckload. Therefore, implementation of Alternative 4 would result in 137,500 miles being driven (11,000 yd^3/20 yd^3 * 250 miles/trip).

- Short-term risk from exposure to chemicals by direct contact to workers was assumed to be zero.

- No alternative will comply with all SCGs. Although, as presented above, all alternatives provide public health and environmental protection, no alternative will comply with all SCGs, specifically the chemical-specific SCGs. For example, while all soil located above the water table containing constituents at concentrations above RSCOs would be removed in Alternative 1, constituents would still remain in soil below the water table at concentrations above RSCOs and it is probable that VOCs would remain in groundwater at concentrations above the AWQSGVs. Therefore, under every alternative, the groundwater hydraulic control system would still be required and, under every alternative except Alternative 1 where the clean fill will serve as a cap, a cap will still be required to be constructed and maintained (a soil cap is in place under Alternative 6).

The scoring of each alternative is discussed below.

Alternative 1

Alternative 1 (excavation of all impacted material) was the lowest scoring alternative (together with Alternative 6), on both technical and overall bases. Alternative 1 scored low in Short-Term Effectiveness because of the additional risks to workers, the general public and the environment that would result from the excavation, heavy construction, and transportation actions that would be needed to perform the remedy. Alternative 1 was the lowest scoring alternative for Implementability due to the difficult conditions that would be encountered during the excavation and restoration process. Alternative 1 was given a moderate ranking with regard to Public Acceptance, because the acceptability of removal of a large volume of impacted material would be offset by the nuisance and risk caused by the thousands of trucks that would be required to remove the soil and import replacement soil.

Alternative 1 was the highest scoring for the criteria of Compliance with SCGs and Compatibility. Removal of all soil above the water table would achieve the chemical-specific SCGs for soil above the water table, although soil below the water table would still contain constituents at concentrations above RSCOs and VOCs would still be present in groundwater. No additional benefit with regard to compliance with AWQSGVs for metals would be achieved because metals are not generally present in Landfill groundwater at concentrations exceeding the AWQSGVs.

Alternative 1 is the most costly of the seven alternatives and, therefore, received the lowest cost ranking.

Alternative 2

As discussed above, Alternative 2 (Alternative Landfill Cover and Hydraulic Containment) was the highest scoring alternative by a small margin. Protection against direct contact with constituents in Landfill soil and groundwater is provided and no increase in short-term risk to workers, the general public, or the environment would result from excavation. The rhyzodegradation component of the alternative cover will provide continued treatment of constituents in soil and groundwater and the alternative cover scores high with regard to Compatibility because of the habitat and green space that will be provided to the community.

Alternatives 3 and 3A

Alternative 3 includes removal of approximately 3,500 cubic yards of Landfill soil: 1,900 yards from the northern area adjacent to the Main Plant and an additional 1,600 cubic yards from the areas located in the central and southern portions of the Landfill. The northern location has been identified as a source of dissolved-phase VOCs in groundwater, while the southern area does not appear to represent a source of dissolved-phase VOCs. The excavation of the VOC source area will reduce the toxicity of impacted groundwater. The excavation of approximately 1,900 cubic yards of VOC source area soils from the northern portion of the Landfill will reduce the volume and mobility of VOCs from soil into groundwater. Alternative 3A includes removal of only the northern VOC source area (Plate 7). These two related alternatives scored closely behind Alternative 2 in both the technical and overall evaluations. Alternative 3 scored just one point lower than Alternative 3A.

Alternative 3 was not judged to provide any additional benefit over Alternative 3A in Compliance with SCGs because the additional soil removal would not reduce the extent or concentration of dissolved-phase VOCs in groundwater or provide any meaningful reduction in the extent to which constituents are present in soil above RSCOs. Alternative 3 is estimated to be approximately $900,000 greater in cost than Alternative 3A.

Alternative 4

Alternative 4 (Alternative Landfill Cover, hydraulic containment, excavation of elevated VOC and metals areas) was the fourth highest scoring alternative (behind Alternatives 2, 3 and 3A) in the technical evaluation and tied for fourth with Alternative 5 in the overall evaluation. Alternative 4 was judged to provide an equivalent degree of Long-Term Effectiveness as the other alternatives containing the alternative cover (Alternatives 2, 3 and 3A), but scored lower than these alternatives in Short-Term Effectiveness, Reduction in Mobility, Toxicity or Volume Through Treatment, and Implementability. The lower scores in these categories result from the additional volume of soil (approximately 7,500 cubic yards) that would be removed. As discussed previously, the additional excavation would increase risks to workers, the general public, and the environment. Worker risk would increase by a factor of five over the risks posed by Alternative 3A. Additionally, any soil removed from the Landfill would not, by definition, undergo treatment since it would be taken to another landfill for re-disposal. The additional soil removal would increase the difficulty of implementing the remedy.

Alternative 4 was not found to provide any benefit with regard to Compliance with SCGs over either Alternative 3 or 3A, in which metals would not specifically be targeted for removal. Removal of the additional 7,500 cubic yards of soil containing the elevated concentrations of metals would not assist in achieving chemical specific SCGs for groundwater because the metals are not a source of dissolved-phase constituents in groundwater. As discussed in Section 4, there have been minimal detections of inorganic constituents at concentrations greater than the AWQSGVs. Removing the soil would not provide any meaningful benefit with regard to achieving the chemical-specific SCGs for soil because the remainder of the Landfill soil will continue to contain metals at concentrations greater than RSCOs and the cap would still be required.

Alternative 5

Alternative 5 consists of installation of a modified Part 360 Cap and continued operation of the hydraulic containment system. Under this alternative, all Landfill constituents would be essentially entombed and separated from the environment.

Alternative 5 provides a generally equivalent degree of Overall Protection as the other alternatives. It also scored relatively high in the categories of Compliance with SCGs, Short-Term Effectiveness, Long-Term Effectiveness, and Implementability. The alternative will prevent exposure to constituents in Landfill soil and groundwater and, because there is no removal component included, will not increase short-term risk to workers, the general public, or the environment. The alternative is readily implemented.

However, Alternative 5 scores low in two categories: Reduction of Toxicity, Mobility or Volume Through Treatment, and Compatibility. The cap is designed to isolate the Landfill contents from the environment. Under these conditions, no treatment of any Landfill constituents can be expected. No moisture will be present to promote biodegradation of the organic constituents and the benefits of the phyto-stabilization to stabilize the inorganic constituents will not be realized. Therefore, no continuing improvement of conditions will occur.

Additionally, the cap design for Alternative 5 will not support any site reuse. Access to the Site will be restricted to assure that the integrity of the cap is not damaged. The monoculture vegetation of the cap – typically a shallow rooting grass – will not provide a quality habitat for wildlife. There will be no net benefit to the community with the installation of this cap design over the 9-acre Landfill site.

Alternative 6

Alternative 6, the base case or "No Action" alternative, does provide public health and environmental protection against direct contact with constituents in Landfill soil and groundwater. However, this alternative scores low in several categories, including Compliance with SCGs, Long-Term Effectiveness, Compatibility, and Community Acceptance.

Alternative 6 is the lowest scoring alternative with regard to compliance with SCGs. Like other alternatives, it will not achieve the chemical-specific SCGs and, in addition, it is not consistent with NYSDEC guidance and regulation on landfill closure.

Alternative 6 provides a lower degree of Long-Term Effectiveness because the current soil cap is not engineered to current standards and a high degree of operation and maintenance would be needed to ensure that the protection against direct contact is maintained.

The alternative is not compatible with any future use of the site and it will not be accepted by the community.

9.3 Alternative Selection

BASF has selected Alternative 3, Alternative Landfill Cover, Hydraulic Containment, and Removal of areas of elevated VOCs as the remedy for the site. By a small margin, Alternative 3 is the third highest scoring alternative behind Alternative 2 in both the technical and overall evaluations. It provides an equivalent degree of Overall Protection and Long-Term Effectiveness, as does the higher ranking alternative, but scores lower in Short-Term Effectiveness and Reduction in Toxicity, Mobility or Volume Through Treatment as a result of the removal component.

However, Alternative 3 accomplishes one objective that Alternative 2 does not, removal of areas of elevated VOCs, including source areas to groundwater. NYSDEC regulations require that sources of dissolved-phase constituents in groundwater be removed where feasible, treated, or otherwise addressed. Moreover, the NYSDOH requires that material with high concentrations of VOCs--whether sources to groundwater or not--be removed where feasible.

10.0 ENGINEERING EVALUATION OF THE SELECTED REMEDY

Remedial Alternative 3 (Alternative Landfill Cover and Hydraulic Containment and Remediation of elevated VOC Areas) was selected as the proposed remedial option for the Landfill because this alternative best meets the RAOs identified in Section 7.0. Alternative 3 addresses VOC source areas to groundwater, additional elevated VOC areas, areas of high concentrations of VOCs in Landfill material, and minimizes short-term risk by avoiding unnecessary translocation of metals-impacted material from one landfill to another. A detailed evaluation of the selected remedy, followed by a discussion of the overall key advantages of the remedy is provided below.

10.1 Evaluation of Selected Remedy

A detailed evaluation of Alternative 3 utilizing the screening criteria identified in Section 9.2 is provided below.

10.1.1 Overall Protection of Human Health and the Environment

Alternative 3 will be protective of human health and the environment and achieves risk-reduction by accomplishing the following:

- <u>Short-Term Risk Reduction</u> - Short-term risks associated with the excavation and transport of contaminated soils include construction-related risks due to excavation, inhalation, and dermal contact risk to construction workers and transportation-related risks to drivers and the surrounding community. Alternative 3 minimizes these risks by only excavating material with elevated VOC concentrations, including material that is known to be a significant source of VOCs to groundwater.

- <u>Long-Term Risk Reductions:</u>
  - By covering residual impacted material, Alternative 3 eliminates long-term risks to human health and the environment associated with the potential for direct contact, ingestion, and mobilization of impacted material exceeding NYSDEC RSCOs.
  - Alternative 3 reduces long-term risks to human health and the environment by addressing areas of elevated VOCs in Landfill material via excavation. Residual impacted groundwater is contained and withdrawn by the hydraulic containment system and treated prior to discharge.
  - The Alternative Landfill Cover for Alternative 3 provides functional equivalence to a modified Part 360 cap (i.e., eliminating direct-contact, mobility of impacted material and leachate generation), while providing the additional benefits of continuing restoration of residual VOC-impacted material via rhizodegradation processes, enhanced containment of metals-impacted material via phytostabilization

(immobilization of metals in the root zone), limiting stormwater management via enhanced evapotranspiration, and creation of a Wildlife habitat.

Alternative 3 has an ancillary advantage in that 30 percent of metals-impacted material—including material with the highest concentrations of chromium observed--will be removed during excavation of VOC-impacted material even though metals excavation was not identified as an RAO.

10.1.2 Compliance with Applicable Regulatory Standards, Criteria and Guidelines (SCGs)

Compliance of the selected alternative with the chemical-specific, location-specific, and action-specific SCGs summarized in Section 6.0 is discussed below.

10.1.2.1 Compliance with Chemical-Specific SCGs

VOC source areas, as defined in Section 4.2, will be addressed in accordance with the applicable action-specific SCGs (excavation) discussed below in Section 10.1.2.3.

Remaining onsite soils exceeding the soil cleanup objectives and cleanup levels defined in the NYSDEC Technical and Administrative Guidance Memorandum (TAGM) 4046 would be covered and contained in place as part of the proposed remedy (NYSDEC 1994). Capping and containment in-place is an acceptable remedy according to TAGM 4044 for Accelerated Remedial Actions at Class 2, Non-RCRA Regulated Landfills (NYSDEC 1992). Continued restoration of groundwater toward the applicable SCG for groundwater (NYSDEC Technical Operational Guidance Series [TOGS] 1.1.1 [NYSEC 1998a and 2000]) will be achieved over the long-term via remediation of VOC source areas, rhizodegradation, and hydraulic containment, extraction and treatment. Note that no technology - including excavation of all landfill wastes down to the underlying silt/clay interface - will result in restoration of groundwater quality below AWQSGVs.

10.1.2.2 Compliance with Location-Specific SCGs

Although location-specific SCGs for the Landfill were considered, they do not have any specific applicability to the Site.

10.1.2.3 Compliance with Action-Specific SCGs

The design and implementation of the proposed remedy will be performed in accordance with the NYSDEC Draft DER-10 guidance document (NYSDEC 2002b) and the 6 NYCRR Part 375 Regulations for remediation of Class 2 Inactive Hazardous Waste Disposal Sites. All substantive requirements for construction of an Alternative Landfill Cover will be performed in accordance with applicable New York State landfill regulations (6 NYCRR Part 360) for a low permeability cap, with modifications addressed via an equivalency demonstration and supporting calculations (Roux Associates, 2005). In addition, the substantive requirements of the NYSDEC DER-1 air emission control standards and the 6 NYCRR Parts 750 to 758 groundwater discharge standards will be complied with via operation of the proposed groundwater treatment system.

Action-specific SCGs for the VOC source areas and elevated metal areas are discussed in further detail below:

VOC Source Areas

In accordance with Section 4.1 of the Draft DER-10 Guidance Document, source areas to groundwater are being remediated. In addition, to address NYSDOH concerns, areas of elevated VOCs in Landfill material located in the central to south-central portion of the Landfill will also be excavated. The areas of elevated VOCs will be excavated to a depth of approximately eight feet. The perimeter containment system will mitigate the offsite migration of impacted groundwater.

Areas with Elevated Metals

In accordance with the action-specific SCGs discussed below, excavation and/or treatment of the chromium and lead-containing material in the Landfill is not warranted, although some areas of elevated metals will be excavated because they occur within the areas of elevated VOCs that are to be removed. The excavation of areas of elevated VOCs will remove approximately 30 percent of the mass of soil with chromium exceeding 100 times RSCOS, including soil with the highest chromium concentrations. The excavation of areas of elevated VOCs will remove approximately 35 percent of the mass of soil with lead exceeding 100 times RSCOS.

Metals have been demonstrated to be immobile in groundwater beneath the Landfill and have not been detected in groundwater downgradient of the Landfill. Therefore, the only remaining potential exposure pathway is via direct contact with metals-impacted material. This potential exposure pathway will be addressed by the Alternative Landfill Cover component of the proposed remedy. The following summarizes justification for containment of metals-impacted material in the Landfill:

- Areas of elevated metals do not meet the VCP Guidance definition of "source areas" because significant amounts have not been released to the environment, nor are they expected to in the foreseeable future (NYSDEC 2002b).

- The Draft DER-10 Guidance Document indicates that "sources of contamination" should be removed (NYSDEC 2002a). Based on the definition of "source areas" in the VCP guidance, areas with elevated metal levels in soils are not "source areas" and do not require removal.

- Areas of elevated metals are not necessarily associated with "grossly contaminated soil" as defined in the Draft DER-10 Guidance Document. In the event that "grossly contaminated soil" (i.e., visibly identifiable free or residual product) is encountered during the excavation of elevated VOC areas, it will be removed.

- Areas of elevated metals do not meet the United States Environmental Protection Agency's (USEPA) definition of "hot spots" because these areas are immobile, are present in material that has proven to be inert over the long-term, are contained in-place, and, therefore, do not present a "principal threat to human health and the environment."

- Per the NYSDEC TAGM 4044 (NYSDEC 1992), areas of elevated metals are not "amenable to treatment" based on technical impracticability (i.e., the metals are already stable, they are present throughout the landfill in a highly heterogeneous matrix, and metals are not readily treated by available technologies - including stabilization - as the metals in the Landfill are not mobile).

- Per TAGM 4044, "control and isolation" technologies rank higher than "offsite land disposal" in the hierarchy of preferred remedial technologies (NYSDEC 1992). Other sites in New York State where control and isolation was the remedy for metals-impacted material include:
  - Browning Ferris Landfill (Site Code 429001) - Electroplating sludge, cyanide, and chromium waste;
  - Pedone Landfill (Site Code 447021) - 30,000 cubic yards of lead waste;
  - North Sea Landfill (Site Code 152052) - Pesticides, solvents and chromium impacting a surface water body and residential wells; and
  - Batavia Landfill (Site Code 819001) – Chromium hydroxide sludge.

10.1.3 Short-Term Impacts and Effectiveness

The short-term impacts to human health associated with implementation of Alternative 3 will occur during the 4- to 8-month construction period (dermal contact, inhalation, and ingestion exposure pathways) and will be managed via engineering controls (e.g., dust suppression, use of proper personal protection equipment, etc.). During transportation and offsite disposal activities, vehicles may need to travel through residential, retail, or commercial areas, thereby increasing the risk of exposure to contaminated material. Contingency measures such as route-selection, covering of transport vehicles, and use of leak-proof vehicles would minimize this exposure. These risks are further minimized using Alternative 3 by limiting the volume of excavated soil to areas of elevated VOCs and avoiding unnecessary translocation of metals-impacted material from one landfill to another.

Short-term environmental impacts (contaminated surface-water runoff and vapor emissions during excavation and Alternative Landfill Cover construction activities) will be mitigated with proper engineering controls (e.g., dust control measures, use of hay bales or other runoff control measures).

10.1.4 Long-Term Effectiveness and Permanence

The Site-wide remedial alternative will provide long-term effectiveness and permanence in protecting human health and the environment by areas with elevated VOCs, and covering and containing remaining impacted material. This removes the direct-contact risk associated with the Landfill material and removes sources of dissolved VOCs to groundwater.

Long-term monitoring of the Site-wide remedy would be required, including groundwater quality and condition of the Alternative Landfill Cover and phyto-technology plantings. Long-term maintenance would include repair of the Alternative Landfill Cover and maintenance of the perimeter hydraulic containment system. Provided that adequate monitoring and operation and maintenance programs are implemented, the remedial alternative is considered an effective long-term and permanent remedial action.

10.1.5 Reduction of Toxicity, Mobility or Volume

The reduction of toxicity, mobility or volume of impacted media is discussed below for the proposed remedy.

10.1.5.1 VOCs in Landfill Soils

The excavation of approximately 1,900 cubic yards of VOC source area soils from the northern portion of the Landfill will reduce the volume and mobility of VOCs from soil into groundwater. Residual VOCs in soils will be continuously biodegraded over time via rhizodegradation processes, which will reduce toxicity in the Landfill soils. Excavation of the VOC source area will reduce the toxicity of impacted groundwater.

10.1.5.2 Metals in Landfill Soils

Metals do not represent a risk in the Landfill because they are covered by the current soil cap and are not mobile in groundwater. Excavation of metals would greatly increase short-term risk of exposure by construction workers, increase mobility through transportation, and would not reduce volume through treatment because the metals are no amenable to treatment and would simply be translocated to a different landfill. Under the proposed Alternative 3, metals-impacted material will be covered in-place and maintained in immobile forms via reduction of infiltrating precipitation and phytostabilization mechanisms.

10.1.5.3 VOCs in Landfill Groundwater

Groundwater beneath the Landfill will be captured by the perimeter hydraulic containment system collection trenches, extracted and treated *ex situ* prior to discharge. Aeration, filtration, air stripping, oxidation, and adsorption processes will be utilized for the removal of organics in groundwater. Measures to reduce infiltration of precipitation (drainage control, phyto-technology plantings) will also reduce the mobility and volume of impacted groundwater by significantly reducing leachate generation. Excavation of VOC source areas will reduce the toxicity of impacted groundwater.

As part of the operation and maintenance of the proposed groundwater treatment system, spent carbon from the liquid/vapor phase carbon units, spent media from the metals adsorption unit, and clogged filter bags will have to be removed and replaced on a routine basis.

10.1.6 Implementability

The materials, equipment, and personnel associated with the implementation of Alternative 3 are commercially available and have been proven effective and reliable for remediation of the media of concern at the Landfill under similar circumstances at other sites. In general, the components comprising the alternative can be easily constructed, maintained, and operated. The remedial design of Alternative 3 is flexible enough to remain protective and eliminate exposure pathways under changing groundwater flow conditions. Groundwater is controlled both by the storage and enhanced evapotranspiration properties of the cover and by the GCS trenches, both of which can be adapted to changing flow conditions. As necessary, modifications to the proposed alternative (e.g., expansion of the proposed groundwater treatment system and modification to the planting scheme of the proposed Alternative Landfill Cover) can be easily performed.

The ability to monitor the effectiveness of the remedy is high given that proposed groundwater monitoring and Alternative Landfill Cover inspections will give evidence of impending failure before significant exposure occurs. Monitoring of the potential for translocation of COCs into the planting associated with the Alternative Landfill Cover can easily be performed via the periodic collection of root, leaf, and stem samples.

Once approval is granted from the NYSDEC, this alternative is expected to be completed within 4 to 8 months, followed by 20 to 30 years of O&M.

10.1.7 Cost

The present worth cost for this alternative was estimated to be $5,010,000, which was the third highest cost behind the Alternative 1 cost of $32,850,000 and the Alternative 4 costs of $7,260,000. The detailed cost estimate for Alternative 3 is provided in Table 6.

10.1.8 Compatibility

The compatibility of Alternative 3 with future Site use is consistent with federal and New York State programs designed to redevelop contaminated sites, and the VCA between NYSDEC and BASF for remediation of the Site. Alternative 3 is consistent with the contemplated future use of the Site as a landfill with an integrated wildlife habitat and Alternative Landfill Cover, which will enhance the beneficial re-use of the Site.

10.1.9 Regulatory Agency Acceptance

It is expected that Alternative 3 will be acceptable to federal, state and local regulatory agencies. Overall, it offers adequate protection of human health and the environment, meets the RAOs developed for the Site, and is consistent with the planned future use of the Site. In addition, this remedy will address key NYSDEC and NYSDOH concerns regarding elevated VOCs in soil and groundwater and metals in soil as follows:

- Excavation of the VOC source area located beneath the northern portion of the Landfill;
- Excavation of the areas of elevated VOCs in the central and southern portion of the Landfill;
- Coincident removal of approximately 30 percent of the mass of material impacted by chromium above 100 times RSCOs, and 35 percent of the mass of material impacted by lead above 100 times RSCOs.
- Containment of residual metals-impacted material in inert and immobile form with significant reduction in the potential for direct contact with the chromium and lead-impacted material through containment and phytostabilization;
- Reduction in leachate generation; and
- Hydraulic containment and *ex situ* treatment of impacted groundwater.

10.1.10 Community Acceptance

Alternative 3 was given a ranking of 8 with regard to Community Acceptance because of the anticipated acceptability of removal of significantly impacted material while focusing the excavation on areas of elevated VOCs. This would minimize the nuisance and risk caused by the trucks that will be required to remove the soil and import replacement soil. It is anticipated that the wildlife habitat component of the remedy will be highly acceptable to the community because it will increase the amount of "green space" and provide for educational opportunities as a showcase for the beneficial re-use of an environmentally impacted parcel.

10.2 Key Advantages of Selected Remedy

Provided below is a summary of the key advantage of the selected remedy:

- It is the only alternative that protects public health and the environment by reducing both short-term and long-term risks.
  - Short-term risks attributed to construction or vehicle related accidents are minimized because excavation work is limited to source area soils, and unnecessary translocation of impacted material from one landfill to another is avoided.
  - Long-term exposure will be eliminated by the Alternative Landfill Cover, which will eliminate the direct contact exposure route; hydraulic containment, which will eliminate offsite migration of impacted groundwater; and by the excavation of VOC source areas, which will mitigate dissolved VOC generation.
- Surface water runoff and infiltration of precipitation is minimized by using the soil moisture storage and enhanced evapotranspiration capabilities of the Alternative Landfill Cover.
- Erosion is prevented by the vegetated component of the Alternative Landfill Cover.
- The GCS trenches provide an additional level of control of leachate and impacted groundwater.
- VOC source areas to groundwater are addressed via excavation.
- The Alternative Landfill Cover component of the remedy will be functionally equivalent to a modified Part 360 cap and has the following additional benefits:
  - significant reduction in surface water runoff through evapotranspiration;
  - enhancement of metals immobility via phytostabilization;
  - provides for continuation of groundwater restoration via rhizodegradation; and
  - benefits the community and the environment by creation of wildlife habitat.
- The implementation of Alternative 3 could potentially occur by the fourth quarter of 2005, if the proposed remedy is approved in September 2005.

11.0 SUMMARY OF THE SELECTED REMEDY

According to the NYSDEC VCP Guide (NYSDEC 2002b), the goal of the remedy selection process is to remediate the Site to a level that is protective of human health and the environment under the contemplated future use of the Site. The contemplated future use of the Site is as a landfill with an integrated wildlife habitat and Alternative Landfill Cover. BASF has proposed to create a wildlife habitat on top of the proposed Alternative Landfill Cover to enhance the beneficial re-use of the Site. In summary, the selected Remedial Alternative 3 contains the following components:

- Excavation of the VOC source areas located beneath the northern portion of the Landfill (Plate 7). The limits of excavation were based on extensive pre-delineation sampling and a variogram statistical analysis, as documented in Appendix A. Accordingly, the collection and analysis of post-excavation sidewall samples is not warranted.

- Excavation of the areas of elevated VOCs in the central and south-central portions of the Landfill (Plate 7).

- An Alternative Landfill Cover consisting of a 6- to 12-inch common fill grading layer, a biota barrier, a 12-inch low permeability soil layer, a 12-inch planting substrate layer, and a 6-inch topsoil layer. The 18-inch substrate and planting layer is to contain plant species to promote creation of a wildlife habitat, with integrated phyto-technology plantings designed to reduce the infiltration of precipitation into the landfill material.

- A horizontal barrier layer between the Alternative Landfill Cover and underlying impacted fill to prevent burrowing animals from contacting landfill material.

- Vegetated drainage swales will be used to manage and direct surface water runoff to catch basins.

- A perimeter groundwater and leachate collection system, augmented with phyto-technology plantings designed to mitigate leachate generation and control groundwater migration.

- A monitoring and maintenance program to maintain the effectiveness of the engineering controls.

- An annual certification will be provided to the NYSDEC, which will state that the remedy continues to remain in place and effective for the protection of pubic health and the environment. The certification will be stamped and signed by a professional engineer licensed, or otherwise authorized, to practice in New York State.

- A deed notice in the form of an environmental easement will be prepared and submitted under separate cover following the implementation of Alternative 3 for soil and groundwater. The environmental easement will state that all post-remediation construction will be prohibited within the limits of the Alternative Landfill Cover footprint and that the Site will be restricted to industrial/commercial use (in accordance with current zoning). The environmental easement will also state that the groundwater underlying the Site shall not be used for drinking water or industrial use.

- A Site Management Plan (SMP) will be prepared and submitted under separate cover following the implementation of Alternative 3 for soil and groundwater. The SMP will address soil management, institutional controls, engineering controls and operation, maintenance and monitoring requirements for Alternative 3.

Respectfully submitted,

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Table 1. Listing of Potential Chemical-Specific SCGs
Remedial Alternatives Selection Report, BASF Corporation, Closed Landfill, Rensselaer, New York

Citation	Title	Regulatory Agency
Soil		
TAGM HWR-4046	Determination of Soil Cleanup Objectives and Cleanup Levels	NYSDEC
Ground Water/ Surface Water		
40 CFR Part 131	Water Quality Criteria	USEPA
40 CFR Part 141.11-16	Maximum Contaminant Levels	USEPA
40 CFR Part 141.50-52	Maximum Contaminant Level Goals	USEPA
40 CFR Part 122-125	National Pollutant Discharge Elimination System	USEPA
40 CFR Part 144-147	Underground Injection Control Regulations	USEPA
6 NYCRR Part 700-705	Surface Water and Ground Water Classification Standards	NYSDEC
6 NYCRR Part 858	Lower Hudson River (Main Stream) Assigned Classifications and Standards of Quality and Purity	NYSDEC
6 NYCRR Part 750-758	Implementation of NPDES Program in New York State	NYSDEC
TOGS 1.1.1	Ambient Water Quality Standards and Guidance Values	NYSDEC
TOGS 1.3.1	Waste Assimilative Capacity Analysis & Allocation for Setting Water Quality Based Effluent Limits	NYSDEC
TOGS 1.3.1C	Development of Water Quality Based Effluent Limits for Metals Amendment	NYSDEC
TOGS 2.1.2	Underground Injection/ Recirculation (UIR) at Ground Water Remediation Sites	NYSDEC

Table 1. Listing of Potential Chemical-Specific SCGs
Remedial Alternatives Selection Report, BASF Corporation, Closed Landfill, Rensselaer, New York

Citation	Title	Regulatory Agency
Air		
40 CFR Part 50	National Ambient Air Quality Standards	USEPA
40 CFR Part 60	Standards for Performance of New Stationary Sources	USEPA
40 CFR Part 61	National Emissions Standards for Hazardous Air Pollutants	USEPA
Air Guide No. 1	Guideline for the Control of Toxic Ambient Air Contaminants	NYSDEC
6 NYCRR Part 212	General Process Emission Sources	NYSDEC
6 NYCRR Part 257	Air Quality Standards	NYSDEC
6 NYCRR 360 Part 2.17	Landfill Operation Requirements (Monitoring for Explosive Conditions)	NYSDEC
Hazardous Waste		
40 CFR 264	Identification and Listing of RCRA Hazardous Wastes	USEPA
49 CFR 107, 171, 172	Hazardous Materials Transport	USEPA
6 NYCRR 371	Identification and Listing of Hazardous Waste	NYSDEC
6 NYCRR 374-1	Standards for the Management of Specific Hazardous Wastes and Specific Types of Hazardous Waste Management Facilities	NYSDEC
Hazardous Waste		
6 NYCRR 374-3	Standards for Universal Waste	NYSDEC
6 NYCRR 376	Land Disposal Restrictions	NYSDEC
Solid Waste		
6 NYCRR 360	Solid Waste Management Facilities	NYSDEC

Legend:

SCG: Standards, Criteria and Guidelines
USEPA: United States Environmental Protection Agency
NYCRR: New York Code of Rules and Regulations
NYSDEC: New York State Department of Environmental Conservation
SPDES: State Pollutant Discharge Elimination System
TOGS: Technical Operational Guidance Series
TAGM HWR: Technical and Administrative Guidance Memorandum - Hazardous Waste Remediation

Table 2. Listing of Potential Action-Specific SCGs
Remedial Alternatives Selection Report, BASF Corporation, Closed Landfill, Rensselaer, New York

Citation	Title	Regulatory Agency	Applicable General Response Action
Soil			
TAGM HWR-4046	Determination of Soil Cleanup Objectives and Cleanup Levels	NYSDEC	Source Removal and Disposal
Ground Water			
40 CFR Part 122	National Pollutant Discharge Elimination System	USEPA	Extraction with Ex Situ Treatment and Disposal, Containment/ Hydraulic Control
40 CFR Part 403	Pretreatment Standards	USEPA	Extraction with Ex Situ Treatment and Disposal, Containment/ Hydraulic Control
6 NYCRR Part 608	Use and Protection of Waters	NYSDEC	Extraction with Ex Situ Treatment and Disposal, Containment/ Hydraulic Control
6 NYCRR Part 700-705	Surface Water and Ground Water Classification Standards	NYSDEC	Extraction with Ex Situ Treatment and Disposal, Containment/ Hydraulic Control
6 NYCRR Part 858	Lower Hudson River (Main Stream) Assigned Classifications and Standards of Quality and Purity	NYSDEC	Extraction with Ex Situ Treatment and Disposal, Containment/ Hydraulic Control
6 NYCRR Part 750-758	Implementation of NPDES Program in New York State	NYSDEC	Extraction with Ex Situ Treatment and Disposal, Containment/ Hydraulic Control
TOGS 1.1.1	Ambient Water Quality Standards and Guidance Values	NYSDEC	Extraction with Ex Situ Treatment and Disposal, Containment/ Hydraulic Control
TOGS 1.3.1	Waste Assimilative Capacity Analysis & Allocation for Setting Water Quality Based Effluent Limits	NYSDEC	Extraction with Ex Situ Treatment and Disposal, Containment/ Hydraulic Control
TOGS 1.3.1C	Development of Water Quality Based Effluent Limits for Metals Amendment	NYSDEC	Extraction with Ex Situ Treatment and Disposal, Containment/ Hydraulic Control
TOGS 1.3.4	Best Professional Judgment Methodologies	NYSDEC	Extraction with Ex Situ Treatment and Disposal, Containment/ Hydraulic Control
TOGS 2.1.2	Underground Injection/ Recirculation (UIR) at Ground Water Remediation Sites	NYSDEC	Extraction with Ex Situ Treatment and Disposal, Containment/ Hydraulic Control
TOGS 2.1.3	Primary and Principal Aquifer	NYSDEC	Extraction with Ex Situ Treatment and Disposal, Containment/ Hydraulic Control
Rules and Regulations Governing Discharges to the Rensselaer County Sewer System	Rules and Regulations Governing Discharges to the Rensselaer County Sewer System	Rensselaer County Sewer District	Extraction with Ex Situ Treatment and Disposal, Containment/ Hydraulic Control

Table 2. Listing of Potential Action-Specific SCGs
Remedial Alternatives Selection Report, BASF Corporation, Closed Landfill, Rensselaer, New York

Citation	Title	Regulatory Agency	Applicable General Response Action
Air			
40 CFR Part 50	National Ambient Air Quality Standards	USEPA	Extraction with Ex Situ Treatment and Disposal, In Situ Treatmen and Monitoring, Containment/ Hydraulic Control
40 CFR Part 60	Standards for Performance of New Stationary Sources	USEPA	Extraction with Ex Situ Treatment and Disposal, In Situ Treatmen and Monitoring, Containment/ Hydraulic Control
40 CFR Part 61	National Emissions Standards for Hazardous Air Pollutants	USEPA	Extraction with Ex Situ Treatment and Disposal, In Situ Treatmen and Monitoring, Containment/ Hydraulic Control
Air Guide No. 1	Guideline for the Control of Toxic Ambient Air Contaminants	NYSDEC	Extraction with Ex Situ Treatment and Disposal, In Situ Treatmen and Monitoring, Containment/ Hydraulic Control
Air Guide No. 29	Technical Guidance for Regulating and Permitting Air Emissions from Air Strippers, Soil Vapor Extraction Systems and Cold-Mix Asphalt Units	NYSDEC	Extraction with Ex Situ Treatment and Disposal, In Situ Treatmen and Monitoring, Containment/ Hydraulic Control
Air Guide No. 41	Permitting for Landfill Gas Energy Recovery	NYSDEC	Containment/ Hydraulic Control
TAGM HWR-4031	Fugitive Dust Suppression and Particulate Monitoring Programs at Inactive Hazardous Waste Sites	NYSDEC	Extraction with Ex Situ Treatment and Disposal, Containment/ Hydraulic Control, Source Removal and Disposal
6 NYCRR Part 212	General Process Emission Sources	NYSDEC	Extraction with Ex Situ Treatment and Disposal, In Situ Treatmen and Monitoring, Containment/ Hydraulic Control
6 NYCRR Part 257	Air Quality Standards	NYSDEC	Extraction with Ex Situ Treatment and Disposal, In Situ Treatmen and Monitoring, Containment/ Hydraulic Control
Hazardous Waste			
40 CFR 262	Standards Applicable to Generators of Hazardous Wastes	USEPA	Extraction with Ex Situ Treatment and Disposal, Source Removal and Disposal
40 CFR 263	Standards Applicable to Transporters of Hazardous Wastes	USEPA	Extraction with Ex Situ Treatment and Disposal, Source Removal and Disposal
40 CFR 264	Identification and Listing of RCRA Hazardous Wastes	USEPA	Extraction with Ex Situ Treatment and Disposal, Source Removal and Disposal
40 CFR 264.18	Location Standards and Prohibitions for TSD Facilities	USEPA	Extraction with Ex Situ Treatment and Disposal, Source Removal and Disposal

Table 2. Listing of Potential Action-Specific SCGs
Remedial Alternatives Selection Report, BASF Corporation, Closed Landfill, Rensselaer, New York

Citation	Title	Regulatory Agency	Applicable General Response Action
Hazardous Waste			
40 CFR Part 264.90 - 109	Ground Water Protection and Monitoring	USEPA	Extraction with Ex Situ Treatment and Disposal, Source Removal and Disposal
40 CFR Part 264.110-120	Closure and Post-closure	USEPA	Extraction with Ex Situ Treatment and Disposal, In Situ Treatmen and Monitoring, Containment/ Hydraulic Control, Source Removal and Disposal
49 CFR 107, 171, 172	Hazardous Materials Transport	USEPA	Extraction with Ex Situ Treatment and Disposal, Source Removal and Disposal
Draft DER-10	Technical Guidance for Site Investigation and Remediation	NYSDEC	No Action, Extraction with Ex Situ Treatment and Disposal, Containment/ Hydraulic Control, Source Removal and Disposal
TAGM HWR-4030	Selection of Remedial Actions at Inactive Hazardous Waste Disposal Sites	NYSDEC	Extraction with Ex Situ Treatment and Disposal, In Situ Treatmen and Monitoring, Containment/ Hydraulic Control, Source Removal and Disposal
6 NYCRR 364	Waste Transporter Permits	NYSDEC	Extraction with Ex Situ Treatment and Disposal, Source Removal and Disposal
6 NYCRR 370	Hazardous Waste Management System - General	NYSDEC	Extraction with Ex Situ Treatment and Disposal, Source Removal and Disposal
6 NYCRR 371	Identification and Listing of Hazardous Waste	NYSDEC	Extraction with Ex Situ Treatment and Disposal, Source Removal and Disposal
6 NYCRR 372	Hazardous Waste Manifest System and Related Standards	NYSDEC	Extraction with Ex Situ Treatment and Disposal, Source Removal and Disposal
6 NYCRR 373	Location and Design Standards for TSD facilities	NYSDEC	Extraction with Ex Situ Treatment and Disposal, Source Removal and Disposal
6 NYCRR 373-2	Final Status Standards for Owners and Operators of Hazardous Waste Treatment/ Storage/ Disposal Facilities	NYSDEC	Extraction with Ex Situ Treatment and Disposal, Containment/ Hydraulic Control, Source Removal and Disposal
6 NYCRR 374	Standards for the Management of Specific Hazardous Wastes and Specific Types of Hazardous Waste Management Facilities	NYSDEC	Extraction with Ex Situ Treatment and Disposal, Source Removal and Disposal
6 NYCRR 375	Inactive Hazardous Waste Disposal Site Remedial Program	NYSDEC	Extraction with Ex Situ Treatment and Disposal, In Situ Treatmen and Monitoring, Containment/ Hydraulic Control, Source Removal and Disposal
6 NYCRR 376	Land Disposal Restrictions	NYSDEC	Extraction with Ex Situ Treatment and Disposal, Source Removal and Disposal

Table 2. Listing of Potential Action-Specific SCGs
Remedial Alternatives Selection Report, BASF Corporation, Closed Landfill, Rensselaer, New York

Citation	Title	Regulatory Agency	Applicable General Response Action
Solid Waste			
6 NYCRR 360	Solid Waste Management Facilities	NYSDEC	Extraction with Ex Situ Treatment and Disposal, Containment/ Hydraulic Control, Source Removal and Disposal
TAGM HWR-4044	Accelerated Remedial Actions at Class 2, Non-RCRA Regulated Landfills	NYSDEC	Extraction with Ex Situ Treatment and Disposal, Containment/ Hydraulic Control, Source Removal and Disposal
General			
29 CFR 1910.120	Hazardous Waste Operations and Emergency Response	USEPA	Extraction with Ex Situ Treatment and Disposal, In Situ Treatmen and Monitoring, Containment/ Hydraulic Control, Source Removal and Disposal
Not Applicable	Voluntary Cleanup Program (VCP) Guidance	NYSDEC	No Action, Extraction with Ex Situ Treatment and Disposal, Containment/ Hydraulic Control, Source Removal and Disposal
TAGM HWR-4031	Fugitive Dust Suppression and Particulate Monitoring Program at Inactive Hazardous Waste Sites	NYSDEC	Source Removal and Disposal
Not Applicable	Analytical Services Protocol	NYSDEC	Extraction with Ex Situ Treatment and Disposal, In Situ Treatmen and Monitoring, Containment/ Hydraulic Control, Source Removal and Disposal
6 NYCRR 617-618	State Environmental Quality Review	NYSDEC	Extraction with Ex Situ Treatment and Disposal, In Situ Treatmen and Monitoring, Containment/ Hydraulic Control, Source Removal and Disposal
6 NYCRR 621	Uniform Procedures	NYSDEC	Extraction with Ex Situ Treatment and Disposal, In Situ Treatmen and Monitoring, Containment/ Hydraulic Control, Source Removal and Disposal
6 NYCRR 624	Permit Hearing Procedures	NYSDEC	Extraction with Ex Situ Treatment and Disposal, In Situ Treatmen and Monitoring, Containment/ Hydraulic Control, Source Removal and Disposal
6 NYCRR 650	Qualifications of Operators of Wastewater Treatment Plants	NYSDEC	Containment/ Hydraulic Control

Table 2. Listing of Potential Action-Specific SCGs
Remedial Alternatives Selection Report, BASF Corporation, Closed Landfill, Rensselaer, New York

Citation	Title	Regulatory Agency	Applicable General Response Action
To Be Considered Materials			
USEPA/625/6-91/026	Stabilization Technologies for RCRA Corrective Action Handbook	USEPA	In Situ Treatment and Monitoring
USEPA/230/02-89/042	Methods for Evaluating the Attainment of Cleanup Standards. Volume 1. Soils and Solid Media	USEPA	Extraction with Ex Situ Treatment and Disposal, In Situ Treatmen and Monitoring, Containment/ Hydraulic Control, Source Removal and Disposal
USEPA/540/02-86/001	Handbook for Stabilization/ Solidification of Hazardous Waste	USEPA	In Situ Treatment and Monitoring
OSWER Directive 9355.704	Guidance on Land Use in the CERCLA Remedy Selection Process	USEPA	Extraction with Ex Situ Treatment and Disposal, In Situ Treatmen and Monitoring, Containment/ Hydraulic Control, Source Removal and Disposal
USEPA/530/SW-89-047	Technical Guidance Document: Final Covers On Hazardous Waste Landfills and Surface Impoundment	USEPA	Containment/ Hydraulic Control
USEPA/540/2-880994	Technology Screening Guide for Treatment of CERCLA Soils and Sludges	USEPA	Extraction with Ex Situ Treatment and Disposal, In Situ Treatmen and Monitoring, Containment/ Hydraulic Control, Source Removal and Disposal

Legend:
SCG: Standards, Criteria and Guidelines
USEPA: United States Environmental Protection Agency
NYCRR: New York Code of Rules and Regulations
NYSDEC: New York State Department of Environmental Conservation
SPDES: State Pollutant Discharge Elimination System
TOGS: Technical Operational Guidance Series
TAGM HWR: Technical and Administrative Guidance Memorandum - Hazardous Waste Remediation

Table 3. Individual Evaluation of Remedial Technologies
Remedial Alternatives Selection Report, BASF Corporation, Closed Landfill, Rensselaer, New York

General Response Action	Remedial Technology	Description	Effectiveness		Implementability	Cost	Retained
			Advantages	Disadvantages			
SOIL REMEDIATION							
Containment	Existing Soil Cap	Provides soil barrier to prevent contact with the landfill wastes.	1. Minimizes potential for human and animal contact with the landfill waste. 2. Provides some controls of vapors from volatile contaminants present in the soil and groundwater.	1. Does not remove or degrade contamination within the soil, which will be a continuing source of groundwater contamination. 2. Susceptible to erosion, cracking and can be easily removed. 3. Restrictions on future land use. 4. Least effective of 3 cap construction process options. 5. Not effective in decreasing infiltration and the control of gases, since permeability of the soil layer would not be low enough to significantly reduce these processes.	1. Widely used, proven and commercially available technology. 2. Existing soil cap is already in place. 3. A soil cap cannot be readily incorporated into plans for the beneficial reuse of the Closed Landfill as a Wildlife Habitat.	1. No capital cost. 2. Low maintenance cost expected. 3. Overall lower capital and maintenance costs than other cap construction process options.	Retained
Containment	Geomembrane Cap (Modified Part 360 Cap)	Provides low permeability barrier to prevent contact with the landfill waste.	1. Provides highest level of protection against groundwater infiltration and further leaching of contaminants from soil into groundwater. 2. Minimizes potential for direct exposure to contamination. 3. Controls vapors from volatile contaminants present in the soil and groundwater. 4. Minimizes potential for human and animal contact with the landfill waste. 5. Most effective of 3 cap construction process options.	1. Does not remove or degrade contamination within the soil, which will be a continuing source of groundwater contamination. 2. Susceptible to erosion and cracking. 3. Restrictions on future land use.	1. Widely used, proven and commercially available technology. 2. Highest level of difficulty to implement in comparison to other cap construction process options. 3. Some conventional and specialty construction. 4. A geomembrane cap cannot be readily incorporated into plans for the beneficial reuse of the Closed Landfill as a Wildlife Habitat.	1. High capital cost expected. 2. Moderate maintenance cost expected. 3. Overall higher capital and maintenance costs than other cap construction process options.	Retained
Containment	Alternative Landfill Cover	Provides low permeable barrier to prevent contact with the landfill waste and has the added benefits of maximizing the beneficial reuse of the Landfill, and promoting continued degradation of residual VOCs in the Landfill Soil.	1. Creates ecological enhancements that would support and sustain indigenous and migratory wildlife species (targeted end-use). 2. Reduces the rate of groundwater infiltration and further leaching of contaminants from soil into groundwater. 3. Evapotranspires large quantities of water, thus minimizing leachate generation. 4. Facilitate in-situ VOC biodegradation and metals sequestration in selected landfill areas. 5. Vegetation stabilizes the Landfill Cap and prevents erosion. 6. Vegetation plays a key role in controlling erosion by wind and water. 7. Minimizes potential for human and animal contact with the landfill waste. 8. More effective than soil cap design. 9. Negative effects of differential settling, freeze-thaw cracking, desiccation cracking and plasticizer leaching are not as great as they are for a soil or geomembrane cap.	0. Less effective than geomembrane cap design on reducing infiltration. 1. Not effective in decreasing infiltration and the control of gases, since permeability of the soil layer would not be low enough to significantly reduce these processes. 2. Potential translocation of chemicals of concern to aboveground plant biomass. 3. Hydrologic control of wildlife plant species not quantified. 4. Does not remove contamination within the soil, which will be a continuing source of groundwater contamination.	1. Widely used, proven and commercially available technology. 2. Easily implemented, but more difficult in comparison to other cap construction process options. 3. Conventional construction. 4. A phytoremediation cap can be readily incorporated into plans for the beneficial reuse of the Closed Landfill as a Wildlife Habitat.	1. Moderate capital cost expected. 2. Moderate maintenance cost expected. 3. Similar capital and maintenance costs than geomembrane cap and higher than soil cap.	Retained
Source Removal and Disposal	Waste Excavation and Off-site Disposal	Physical removal of contaminated media.	1. Effective for chlorinated and non-chlorinated VOCs in unsaturated soils. 2. Completely removes contamination. 3. Relatively short remedial construction period expected. 4. Will improve groundwater quality by reducing the ongoing source of VOCs.	1. Material removed could be considered hazardous waste; therefore, disposal costs are relatively high. 2. Material removed may require dewatering/solidification prior to off-site disposal and treatment. 3. Large quantity of material to be removed. 4. High volume of truck traffic required. 5. Potential exposure during excavation activities.	1. Widely used, proven and commercially available option. 2. Easily implemented. 3. Conventional Construction.	1. High capital cost expected. 2. No maintenance cost expected.	Retained

Table 3. Individual Evaluation of Remedial Technologies
Remedial Alternatives Selection Report, BASF Corporation, Closed Landfill, Rensselaer, New York

General Response Action	Remedial Technology	Description	Effectiveness: Advantages	Effectiveness: Disadvantages	Effectiveness	Cost	Retained
SOIL REMEDIATION							
In-situ or Ex-Situ Treatment	Soil Vapor Extraction with Air Sparging	Soil gas extraction coupled with injection of air enhances volatilization of contaminants sorbed to soil particles. Contaminants in the extracted soil vapor are destroyed by off-gas treatment.	In-Situ/ Ex-Situ 1. Effective for Chlorinated and non-chlorinated VOCs in Unsaturated soils only. 2. Contaminants destroyed. Ex-Situ 1. Can address chlorinated and non-chlorinated VOCs in a controlled manner (create homogeneous soil conditions which would limit potential for short circuiting.)	In-Situ/ Ex-Situ 1. Pilot testing would be required. 2. Does not address metals or SVOCs. 3. The presence of mixed wastes (bottles, debris, drums, etc…) will make it extremely difficult to effectively address contamination in-situ or ex-situ. In-Situ 1. Surface cover, where none is currently present, would be required. 2. High potential for short circuiting due to shallow depth to the water table and need to screen wells close to the ground surface. 3. Heterogeneous soil conditions in the unsaturated zone may cause short circuiting, uneven flow distribution and limited radius of influence. Ex-Situ 1. Requires significant handling of soil and landfill wastes (excavation, staging, mixing, etc…) 2. Potential for short circuiting	In-Situ/ Ex-Situ 1. Widely used, proven and commercially available technology. 2. Easily implemented, only after completion of Pilot Study. 3. Conventional Construction.	In-Situ/ Ex-Situ 1. Moderate capital cost expected. 2. Moderate maintenance cost expected. Ex-Situ 1. High capital cost expected.	Ex-Situ Option Not Retained/ In-Situ Option Not Retained
In-situ or Ex-Situ Treatment	Chemical Stabilization	Chemical reactions are induced between a stabilizing agent and contaminants to reduce their mobility.	In-Situ/ Ex-Situ 1. Will immobilize contaminants and prevent on-going dissolution of metals into groundwater. 2. Effective for Metals and some SVOCs in unsaturated and saturated soils. Ex-Situ 1. Can address chlorinated and non-chlorinated VOCs in a controlled manner (create homogeneous soil conditions which would limit potential for short circuiting).	In-Situ/ Ex-Situ 1. Pilot testing would be required. 2. Does not address VOCs. 3. Does not address dissolved phase metals. 4. Multi-year time frame will be required. 5. The presence of mixed wastes (bottles, debris, drums, etc…) will make it extremely difficult to effectively address contamination in-situ or ex-situ. In-Situ 1. Uncontrolled emissions of VOCs to the air will occur during implementation. 2. Heterogeneous soil may produce uneven treatment. Ex-Situ 1. Requires significant handling of soil and landfill wastes (excavation, staging, mixing, etc…) 2. Extended duration of treatment may be required due to high levels of VOCs.	In-Situ/ Ex-Situ 1. Widely used, proven and commercially available technology. 2. Easily implemented, only after completion of Pilot Study. 3. Construction of a shroud to control emissions would likely be required. 4. Conventional Construction.	In-Situ/ Ex-Situ 1. Moderate capital cost expected. 2. Moderate maintenance cost expected. Ex-Situ 1. High capital cost expected	Ex-Situ Option Not Retained/ In-Situ Option Not Retained
In-situ or Ex-Situ Treatment	Thermal Desorption	Heating elements transfer heat to the soil by thermal conduction. Contaminants are removed by processes including boiling, evaporation, oxidation and steam distillation.	In-Situ/ Ex-Situ 1. Effective for Chlorinated and non-chlorinated VOCs in unsaturated soils only. 2. Will provide enhanced removal rates over SVE alone.	In-Situ/ Ex-Situ 1. Surface cover, where none is currently present, would be required. 2. Does not address metals. 3. Off-gas and condensate treatment would be required. 4. Pilot testing would be required. 5. Cannot be done in saturated soils. 6. The presence of mixed wastes (bottles, debris, drums, etc…) will make it extremely difficult to effectively address contamination in-situ or ex-situ. Ex-Situ 1. Requires significant handling of soil and landfill wastes (excavation, staging, mixing, etc…) 2. Extended duration of treatment may be required due to high levels of VOCs.	In-Situ/ Ex-Situ 1. Not widely used technology. Commercial availability is limited. 2. Not easily implemented. 3. Special Construction required. 4. Remedial construction activities would take longer than other technologies.	In-Situ/ Ex-Situ 1. Moderate capital cost expected. 2. Moderate maintenance cost expected. Ex-Situ 1. High capital cost expected	In-Situ Option Not Retained/ Ex-Situ Option Not Retained

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Remedial Alternatives Selection Report, BASF Corporation, Closed Landfill, Rensselaer, New York

General Response Action	Remedial Technology	Description	Effectiveness: Advantages	Effectiveness: Disadvantages	Effectiveness	Cost	Retained
SOIL REMEDIATION							
In-situ Treatment	Chemical Oxidation	Chemically converts hazardous contaminants to non-hazardous or less toxic compounds that are more stable, less mobile, and/or inert.	1. Effective for chlorinated and non-chlorinated VOCs.	1. Does not address certain SVOCs or metals contamination. 2. Effectiveness is dependent on contact time and even distribution of chemical application. 3. Potential for mobilization of metals (i.e., arsenic).	1. Not widely used technology. Commercial availability is limited. 2. Specialty vendor/ contractor and proprietary chemicals are typically required. 3. Low permeability, heterogeneous soils will inhibit equal distribution capability. 4. Initial pilot testing indicates in-situ treatment would not be effective in source areas with high levels of TPH (i.e., northern limits of landfill south of AOC 1).	1. Moderate Capital Cost expected. 2. No Maintenance Cost expected.	Retained
GROUNDWATER REMEDIATION							
In-situ Treatment	Chemical Oxidation	Chemically converts hazardous contaminants to non-hazardous or less toxic compounds that are more stable, less mobile, and/or inert.	1. Effective for chlorinated and non-chlorinated VOCs.	1. Does not address certain SVOCs or metals contamination. 2. Effectiveness is dependent on contact time and even distribution of chemical application. 3. Potential for mobilization of metals (i.e., arsenic).	1. Not widely used technology. Commercial availability is limited. 2. Specialty vendor/ contractor and proprietary chemicals are typically required. 3. Low permeability, heterogeneous soils will inhibit equal distribution capability. 4. Initial pilot testing indicates in-situ treatment would not be effective in source areas with high levels of TPH (i.e., northern limits of landfill south of AOC 1).	1. Moderate Capital Cost expected. 2. No Maintenance Cost expected.	Retained
Hydraulic Control	Existing Perimeter Groundwater Collection Trenches	Existing Perimeter trenches utilized to actively pump water flowing through the Closed Landfill	1. Can effectively remove all groundwater impacted with VOCs, SVOCs and metals.	1. Long treatment duration expected.	1. Widely used, proven and commercially available technology. 2. Perimeter groundwater collection trenches have already been installed.	1. The cost for installing the existing perimeter groundwater collection trenches was moderate. 2. High maintenance cost expected.	Retained
Containment	Geomembrane Cap (Modified Part 360 Cap)	Provides low permeability barrier to minimize groundwater infiltration.	1. Provides highest level of protection against groundwater infiltration and further dissolution of contaminants from soil into groundwater. 2. Minimizes potential for direct exposure to contamination. 3. Controls vapors from volatile contaminants present in the soil and groundwater.	1. Does not remove or degrade contamination within the soil, which will be a continuing source of groundwater contamination. 2. Susceptible to erosion and cracking. 3. Restrictions on future land use.	1. Widely used, proven and commercially available technology. 2. Easily implemented. In comparison to other cap construction process options provides highest level of difficulty to implement. 3. Some conventional and specialty construction. 4. A geomembrane cap cannot be readily incorporated into plans for the beneficial reuse of the Closed Landfill as a Wildlife Habitat.	1. High capital cost expected. 2. Moderate Maintenance cost expected. 3. Overall higher capital and maintenance costs than other cap construction process options.	Retained
Containment	Alternative Landfill Cover	Provides low permeable barrier to prevent contact with the landfill waste and has the added benefits of maximizing the beneficial reuse of the Landfill, and promoting continued degradation of residual VOCs in the Landfill Soil.	1. Creates ecological enhancements that would support and sustain indigenous and migratory wildlife species (targeted end-use). 2. Reduces the rate of groundwater infiltration and further leaching of contaminants from soil into groundwater. 3. Evapotranspires large quantities of water, thus minimizing leachate generation. 4. Facilitate in-situ VOC biodegradation and metals sequestration in selected landfill areas. 5. Vegetation stabilizes the Landfill Cap and prevents erosion. 6. Vegetation plays a key role in controlling erosion by wind and water. 7. Minimizes potential for human and animal contact with the landfill waste. 8. More effective than soil cap design. 9. Negative effects of differential settling, freeze-thaw cracking, desiccation cracking and plasticizer leaching are not as great as they are for a soil or geomembrane cap.	1. Less effective than geomembrane cap design on reducing infiltration. 2. Not effective in decreasing infiltration and the control of gases, since permeability of the soil layer would not be low enough to significantly reduce these processes. 3. Potential translocation of chemicals of concern to aboveground plant biomass. 4. Hydrologic control of wildlife plant species not quantified. 5. Does not remove contamination within the soil, which will be a continuing source of groundwater contamination.	1. Widely used, proven and commercially available technology. 2. Easily implemented, but more difficult in comparison to other cap construction process options. 3. Conventional construction. 4. A phytoremediation cap can be readily incorporated into plans for the beneficial reuse of the Closed Landfill as a Wildlife Habitat.	1. Moderate capital cost expected. 2. Moderate maintenance cost expected. 3. Similar capital and maintenance costs than geomembrane cap and higher than soil cap.	Retained

Table 4. Individual Evaluation of Remedial Alternatives
Remedial Alternatives Selection Report, BASF Corporation, Closed Landfill, Rensselaer, New York

Criteria	Alternative 1 Excavation of Landfill Wastes Exceeding NYSDEC RSCOs and Hydraulic Containment	Alternative 2 Alternative Landfill Cover and Hydraulic Containment	Alternative 3 Alternative Landfill Cover and Hydraulic Containment and Remediation of Elevated VOC Areas	Alternative 4 Alternative Landfill Cover and Hydraulic Containment and Remediation of Elevated VOC and Metal Areas	Alternative 5 Modified Part 360 Cap and Hydraulic Containment	Alternative 6 Existing Soil Cap and Hydraulic Containment (Equivalent to No Action Alternative)
OVERALL PROTECTIVENESS						
Human Health Protectiveness - Direct Contact/ Soil Ingestion	• Significantly reduces direct contact risk and soil ingestion risk because the on-site fill materials exhibiting any significant levels of contamination will be excavated. • In the short-term, cap creates a significant inhalation and dermal contact risk through disturbance of contaminated soils.	• In the long-term, Alternative Landfill Cover reduces direct contact risk and soil ingestion risk significantly.	• In the long-term, Alternative Landfill Cover reduces direct contact risk and soil ingestion risk significantly. • In the short-term, excavation creates an inhalation and dermal contact risk through disturbance of contaminated soils.	See Alternative 3.	• In the long-term, cap reduces direct contact risk and soil ingestions risk significantly.	• Existing risk remains. Soil cap is missing or eroded in some places. • No short-term risk from excavation.
Human Health Protectiveness - Ground Water Ingestion for Existing Users	Not applicable.	Not applicable.	Not applicable.	Not applicable.	Not applicable.	Not applicable.
Human Health Protectiveness - Ground Water Ingestion for Future Users	Not applicable.	Not applicable.	Not applicable.	Not applicable.	Not applicable.	Not applicable.
Environmental Protection	• The potential for direct contact with the impacted waste material is eliminated for animals. • Source of Groundwater contamination is removed. Also, GWT System captures and treats impacted groundwater flowing through residual impacted soil. • Air Emissions during excavation and hauling to be controlled.	• The potential for direct contact with the impacted waste material is significantly reduced for animals. • Source of Groundwater contamination is not eliminated. However, GWT System captures and treats impacted groundwater flowing through the VOC source areas. • Minimizes future leachate formation and groundwater contamination by virtually eliminating infiltration. • Potential translocation of COCs to aboveground plant biomass.	• The potential for direct contact with the impacted waste material is significantly reduced for animals. • Source of Groundwater, and potentially soil gas contamination is removed. Also, GWT System captures and treats impacted groundwater flowing through residual impacted soil. • Minimizes future leachate formation and groundwater contamination by virtually eliminating infiltration.	• The potential for direct contact with the impacted waste material is significantly reduced for animals. • Source of Groundwater contamination is removed. Also, GWT System captures and treats impacted groundwater flowing through residual impacted soil. • Minimizes future leachate formation and groundwater contamination by virtually eliminating infiltration.	See Alternative 2.	GWT System captures and treats impacted groundwater flowing through residual impacted soil.
Overall Protectiveness Ranking[1]	1 2 3 **4** 5 6 7 8 9 10	1 2 3 4 5 6 **7** 8 9 10	1 2 3 4 5 **6** 7 8 9 10	1 2 3 4 5 **6** 7 8 9 10	1 2 3 4 5 **6** 7 8 9 10	1 2 3 4 **5** 6 7 8 9 10
COMPLIANCE WITH SCGs						
Chemical Specific ARARs	• Will meet NYSDEC TAGM 4046 for soil since impacted soil is removed. • Will not initially meet NYSDEC TOGS 1.1.1 for ground water. However, ground water quality is expected to improve with time.	• Impacted soil exceeding NYSDEC TAGM 4046 would be covered and contained in-place. • Will not meet NYSDEC TOGS 1.1.1 for ground water. However, ground water quality is expected to improve with time.	See Alternative 2.	See Alternative 2.	See Alternative 2.	• Impacted soil exceeding NYSDEC TAGM 4046 would continue to be covered and contained in-place below existing soil cap. • Will not meet NYSDEC TOGS 1.1.1 for ground water. Ground water quality is expected to improve with time.
Location-Specific SCGs	Not applicable.	Not applicable.	Not applicable.	Not applicable.	Not applicable.	Not applicable.

Table 4. Individual Evaluation of Remedial Alternatives
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Criteria	Alternative 1 Excavation of Landfill Wastes Exceeding NYSDEC RSCOs and Hydraulic Containment	Alternative 2 Alternative Landfill Cover and Hydraulic Containment	Alternative 3 Alternative Landfill Cover and Hydraulic Containment and Remediation of Elevated VOC Areas	Alternative 4 Alternative Landfill Cover and Hydraulic Containment and Remediation of Elevated VOC and Metal Areas	Alternative 5 Modified Part 360 Cap and Hydraulic Containment	Alternative 6 Existing Soil Cap and Hydraulic Containment (Equivalent to No Action Alternative)
COMPLIANCE WITH SCGs						
Action-Specific SCGs	• Will meet 6 NYCRR Part 375 Regulations for the remediation of Class 2 Inactive Hazardous Waste Disposal Sites. • Will meet NYSDEC Draft DER-10 requirements for designing and implementing remedial actions. • Will meet 6 NYCRR Parts 360, 364, 370 - 376 for management of solid and hazardous waste. • Will meet NYSDEC VCP Guidance Document, NYSDEC TAGM 4030 and CFR 300, Part 430(a)(iii) B for addressing source areas. • Will meet NYSDEC TAGM 4031 for particulate and VOC monitoring.	• Will meet 6 NYCRR Part 375 Regulations for the remediation of Class 2 Inactive Hazardous Waste Disposal Sites. • Will meet NYSDEC Draft DER-10 requirements for designing and implementing remedial actions. • Will meet all **"substantive"** requirements for New York State Part 360 Regulations for construction of a remedial cap. • Will meet NYSDEC VCP Guidance Document, NYSDEC TAGMs 4030 and 4044 and CFR 300, Part 430(a)(iii) B for addressing source areas. • Will meet NYSDEC DAR-1 applicable emission control standards. • Will meet 6 NYCRR Parts 750-758 **"substantive"** requirements for discharge of treated groundwater.	• Will meet 6 NYCRR Part 375 Regulations for the remediation of Class 2 Inactive Hazardous Waste Disposal Sites. • Will meet NYSDEC Draft DER-10 requirements for designing and implementing remedial actions. • Will meet all **"substantive"** requirements for New York State Part 360 Regulations for construction of a remedial cap. • Will meet NYSDEC VCP Guidance Document, NYSDEC TAGMs 4030 and 4044 and CFR 300, Part 430(a)(iii) B for addressing source areas. • Will meet NYSDEC DAR-1 applicable emission control standards. • Will meet 6 NYCRR Parts 750-758 **"substantive"** requirements for discharge of treated groundwater. • Will meet NYSDEC TAGM 4031 for particulate and VOC monitoring.	• Will meet 6 NYCRR Part 375 Regulations for the remediation of Class 2 Inactive Hazardous Waste Disposal Sites. • Will meet NYSDEC Draft DER-10 requirements for designing and implementing remedial actions. • Will meet all **"substantive"** requirements for New York State Part 360 Regulations for construction of a remedial cap. • Will meet NYSDEC VCP Guidance Document, NYSDEC TAGM 4030 and CFR 300, Part 430(a)(iii) B) for addressing source areas. • Will meet NYSDEC DAR-1 applicable emission control standards. • Will meet 6 NYCRR Parts 750-758 **"substantive"** requirements for discharge of treated groundwater. • Will meet NYSDEC TAGM 4031 for particulate and VOC monitoring.	• Will meet 6 NYCRR Part 375 Regulations for the remediation of Class 2 Inactive Hazardous Waste Disposal Sites. • Will meet NYSDEC Draft DER-10 requirements for designing and implementing remedial actions. • Will meet all **"substantive"** requirements for New York State Part 360 Regulations for construction of a Modified RCRA cap. • Will meet NYSDEC VCP Guidance Document, NYSDEC TAGMs 4030 and 4044 and CFR 300, Part 430(a)(iii) B for addressing source areas. • Will meet NYSDEC DAR-1 applicable emission control standards. • Will meet 6 NYCRR Parts 750-758 **"substantive"** requirements for discharge of treated groundwater.	• Will not meet 6 NYCRR Part 375 Regulations for the remediation of Class 2 Inactive Hazardous Waste Disposal Sites. • Will not meet NYSDEC Draft DER-10 requirements for designing and implementing remedial actions. • Will not meet NYSDEC VCP Guidance Document, TAGM 4044 and CFR 300, Part 430(a)(iii) B for addressing source areas. • Will meet NYSDEC DAR-1 applicable emission control standards. • Will meet 6 NYCRR Parts 750-758 **"substantive"** requirements for discharge of treated groundwater.
Other Criteria and Guidance	Meets all other criteria and guidance except remaining waste will remain in contact with ground water.	See Alternative 1	See Alternative 1	See Alternative 1	See Alternative 1	Not applicable.
Compliance with SCGs Ranking[1]	1 2 3 4 5 6 7 8 9 **10**	1 2 3 4 5 6 7 **8** 9 10	1 2 3 4 5 6 7 8 **9** 10	1 2 3 4 5 6 7 8 **9** 10	1 2 3 4 5 6 7 **8** 9 10	1 2 3 **4** 5 6 7 8 9 10
SHORT-TERM EFFECTIVENESS						
Community Protection	• Significant short-term increase in dust and vapor emission production during the soil excavation phase of construction. • Significant increase in truck traffic during off-site disposal and backfilling phases of construction. • All soils exceeding NYSDEC RSCOs are removed from the Closed Landfill.	• Short-term increase in dust and vapor emission production during the Alternative Landfill Cover installation phase of construction. • Increase in truck traffic during Alternative Landfill Cover installation phase of construction. • Impacted soils remain undisturbed.	• Short-term increase in dust and vapor emission production during the soil excavation and Alternative Landfill Cover installation phases of construction. • Increase in truck traffic during soil excavation, off-site disposal, backfilling and Alternative Landfill Cover installation phases of construction. • Source area soils are removed from the Closed Landfill.	• Moderate short-term increase in dust and vapor emission production during the soil excavation and Alternative Landfill Cover installation phases of construction. • Significant increase in truck traffic during soil excavation, off-site disposal, backfilling and Alternative Landfill Cover installation phases of construction. • Elevated Metal Areas along with source area soils, are removed from the Closed Landfill.	See Alternative 2.	Risk to community not increased by remedy implementation.
Worker Protection	• Protection required against dermal contact and inhalation of impacted dust during soil excavation. • Substantial worker and transportation risk. • Length of project increases with weather related risks.	Protection required against dermal contact and inhalation of impacted dust during Alternative Landfill Cover installation.	• Protection required against dermal contact and inhalation of impacted dust during Alternative Landfill Cover installation and soil excavation. • Moderate construction and transportation risk.	• Protection required against dermal contact and inhalation of impacted dust during Alternative Landfill Cover installation and soil excavation. • Moderate construction and transportation risk.	Protection required against dermal contact and inhalation of impacted dust during cap installation.	No significant risk to workers.
Environmental Impacts	Potential impact to off-site human and wildlife receptors during transportation of waste.	No significant short-term impacts expected.	See Alternative 1.	See Alternative 1.	See Alternative 2.	See Alternative 2.
Time Until Action is Complete	• 12 to 18 months (excavation element); and • 20 to 30 years of groundwater remediation and monitoring.	• 3 to 6 months (Alternative Landfill Cover element); and • 20 to 30 years of groundwater remediation and monitoring.	• 1 to 2 months (excavation element); • 3 to 6 months (Alternative Landfill Cover element); and • 20 to 30 years of groundwater remediation and monitoring.	• 3 to 6 months (excavation element); • 3 to 6 months (Alternative Landfill Cover element); and • 20 to 30 years of groundwater remediation and monitoring.	• 6 to 9 months (RCRA Cap element); and • 20 to 30 years of groundwater remediation and monitoring.	20 to 30 years of groundwater remediation and monitoring.
Short-term Effectiveness Ranking[1]	1 **2** 3 4 5 6 7 8 9 10	1 2 3 4 5 6 **7** 8 9 10	1 2 3 4 **5** 6 7 8 9 10	1 2 3 **4** 5 6 7 8 9 10	1 2 3 4 5 6 **7** 8 9 10	1 2 3 4 5 6 7 8 **9** 10

Table 4. Individual Evaluation of Remedial Alternatives
Remedial Alternatives Selection Report, BASF Corporation, Closed Landfill, Rensselaer, New York

Criteria	Alternative 1 Excavation of Landfill Wastes Exceeding NYSDEC RSCOs and Hydraulic Containment	Alternative 2 Alternative Landfill Cover and Hydraulic Containment	Alternative 3 Alternative Landfill Cover and Hydraulic Containment and Remediation of Elevated VOC Areas	Alternative 4 Alternative Landfill Cover and Hydraulic Containment and Remediation of Elevated VOC and Metal Areas	Alternative 5 Modified Part 360 Cap and Hydraulic Containment	Alternative 6 Existing Soil Cap and Hydraulic Containment (Equivalent to No Action Alternative)
LONG-TERM EFFECTIVENESS AND PERMANENCE						
Magnitude of Residual Risk	Risk eliminated as long as soil above NYSDEC RSCOS removed from the site and as long as GWT System is maintained.	Risk eliminated as long as Alternative Landfill Cover and GWT System is maintained.	Risk eliminated as long as Alternative Landfill Cover and GWT System is maintained. Also, reduces the potential that soil vapor imported by VOCs could be generated.	See Alternative 3.	See Alternative 2.	Source has not been removed; therefore, existing risk will remain.
Human Health Protectiveness - Ground Water Ingestion for Existing Users	Not applicable.	Not applicable.	Not applicable.	Not applicable.	Not applicable.	Not applicable.
Human Health Protectiveness - Ground Water Ingestion for Future Users	Not applicable.	Not applicable.	Not applicable.	Not applicable.	Not applicable.	Not applicable.
Adequacy and Reliability of Controls	• No controls required for soil remediation program since there will be no residual contamination. • Reliability of GWT System is high if maintained and operated properly.	• Reliability of Alternative Landfill Cover is high if maintained. • Reliability of GWT System is high if maintained and operated properly.	See Alternative 2.	See Alternative 2.	See Alternative 2.	• Reliability of existing soil cap is low. • Reliability of GWT System is high if maintained and operated properly.
Need for 5-Year Review	Review would be required to ensure adequate protection of human health and the environment is maintained.	See Alternative 1.	See Alternative 1.	See Alternative 1.	See Alternative 1.	See Alternative 1.
Long-Term Effectiveness and Permanence Ranking[1]	1 2 3 4 **5** 6 7 8 9 10	1 2 3 4 5 6 7 **8** 9 10	1 2 3 4 5 **6** 7 8 9 10	1 2 3 4 5 **6** 7 8 9 10	1 2 3 4 5 6 **7** 8 9 10	1 2 3 **4** 5 6 7 8 9 10
REDUCTION OF TOXICITY, MOBILITY, OR VOLUME THROUGH TREATMENT						
Treatment Process Used	• Thermal treatment or stabilization by Disposal Facility, if required, for soil disposal element. • Aeration, Filtration, Air stripping, oxidation and adsorption for removal of organics and metals in groundwater.	• Aeration, Filtration, Air stripping, oxidation and adsorption for removal of organics and metals in groundwater. • Residual VOCs in soil will continuously biodegrade over time via rhizodegradation mechanisms. • Metals will be sequestered through phytostabilization mechanisms. • Groundwater control through evapotranspiration mechanisms	• Thermal treatment or stabilization by Disposal Facility, if required, for soil disposal element. • Aeration, Filtration, Air stripping, oxidation and adsorption for removal of organics and metals in groundwater. • Residual VOCs in soil will continuously biodegrade over time via rhizodegradation mechanisms. • Metals will be sequestered through phytostabilization mechanisms.	• Thermal treatment or stabilization by Disposal Facility, if required, for soil disposal element. • Aeration, Filtration, Air stripping, oxidation and adsorption for removal of organics and metals in groundwater. • Residual VOCs in soil will continuously biodegrade over time via rhizodegradation mechanisms. • Metals will be sequestered through phytostabilization mechanisms.	Aeration, Filtration, Air stripping, oxidation and adsorption for removal of organics and metals in groundwater.	See Alternative 5.
Amount Destroyed or Treated	• 20% VOC removal rate from treated groundwater expected from Aeration Unit. • 99% VOC removal rate from treated groundwater expected from Air Stripper Unit. • The metal removal rate from treated groundwater is unknown; however, it is estimated that metals will meet required SCGs except for aluminum, cobalt, iron and zinc. • Approximately 115,000 cubic yards of soil excavated and shipped off-site as non-hazardous and/ or hazardous waste.	• 20% VOC removal rate from treated groundwater expected from Aeration Unit. • 99% VOC removal rate from treated groundwater expected from Air Stripper Unit. • The metal removal rate from treated groundwater is unknown; however, it is estimated that metals will meet required SCGs except for aluminum, cobalt, iron and zinc. • VOC removal rate from soil biodegraded over time via rhizodegradation mechanisms rate is unknown. • Metals in soil are stabilized via phytostabilization mechanisms is unknown. • Hydraulic control can be quantified by performing a water balance analysis utilizing documented transpiration rates for specific species (not quantified for all species.)	• 20% VOC removal rate from treated groundwater expected from Aeration Unit. • 99% VOC removal rate from treated groundwater expected from Air Stripper Unit. • The metal removal rate from treated groundwater is unknown; however, it is estimated that metals will meet required SCGs except for aluminum, cobalt, iron and zinc. • Approximately 4,300 cubic yards of soil excavated and shipped off-site as non-hazardous and/ or hazardous waste. • The VOC removal rate from soil biodegraded over time via rhizodegradation mechanisms is unknown. • The rate that metals in soil are stabilized over time via phytostabilization mechanisms is unknown. • Excavated soils will not undergo treatment.	• 20% VOC removal rate from treated groundwater expected from Aeration Unit. • 99% VOC removal rate from treated groundwater expected from Air Stripper Unit. • The metal removal rate from treated groundwater is unknown; however, it is estimated that metals will meet required SCGs except for aluminum, cobalt, iron and zinc. • Approximately 13,000 cubic yards of soil excavated and shipped off-site as non-hazardous and/ or hazardous waste. • The VOC removal rate from soil biodegraded over time via rhizodegradation mechanism. • The rate that metals in soil are stabilized over time via phytostabilization mechanisms is unknown. • Excavated soils will not undergo treatment.	• 20% VOC removal rate from treated groundwater expected from Aeration Unit. • 99% VOC removal rate from treated groundwater expected from Air Stripper Unit. • The metal removal rate from treated groundwater is unknown; however, it is estimated that metals will meet required SCGs except for aluminum, cobalt, iron and zinc. • Reduced biological mechanisms resulting from reduced water infiltration.	• 20% VOC removal rate from treated groundwater expected from Aeration Unit. • 99% VOC removal rate from treated groundwater expected from Air Stripper Unit. • The metal removal rate from treated groundwater is unknown; however, it is estimated that metals will meet required SCGs except for aluminum, cobalt, iron and zinc. • Most active biological reduction of organic compounds.

Criteria	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6
	Excavation of Landfill Wastes Exceeding NYSDEC RSCOs and Hydraulic Containment	**Alternative Landfill Cover and Hydraulic Containment**	**Alternative Landfill Cover and Hydraulic Containment and Remediation of Elevated VOC Areas**	**Alternative Landfill Cover and Hydraulic Containment and Remediation of Elevated VOC and Metal Areas**	**Modified Part 360 Cap and Hydraulic Containment**	**Existing Soil Cap and Hydraulic Containment (Equivalent to No Action Alternative)**
REDUCTION OF TOXICITY, MOBILITY, OR VOLUME THROUGH TREATMENT						
Reduction of Toxicity, Mobility, or Volume	• Elimination of toxicity for soil. Reduction in toxicity for ground water is expected to follow. • Elimination in mobility for soil. Reduction in sources for ground water impact. • Significant Reduction in volume for impacted soil.	• Plant roots enhance microbial degradation of VOCs in soil. Reduction in toxicity for ground water. • Significant reduction in mobility for both soil and ground water. • No reduction in volume for soil. Reduction in volume for ground water with time.	• Initial reduction in toxicity for soil. Reduction in toxicity for ground water. • Significant reduction in mobility for both soil and ground water. • Reduction in volume for source area soils. Reduction in volume for ground water with time.	• Significant elimination of toxicity for soil. Reduction in toxicity for ground water is expected to follow. • Significant decrease in mobility for soil. Reduction in sources for ground water impact. • Significant Reduction in volume for impacted soil.	See Alternative 2.	• No reduction in toxicity for soil. Reduction in toxicity for ground water. • No reduction in mobility for soil. Reduction in mobility for ground water. • No reduction in volume for soil. Reduction in volume for ground water with time.
Irreversible Treatment	• Irreversible alternative for soil. • Alternative for ground water can be modified. Several processes (i.e., air stripping, aeration, etc…) utilized by the GWT System are irreversible.	• Alternative for soil can be modified. • Alternative for ground water can be modified. Several processes (i.e., air stripping, aeration, etc…) utilized by the GWT System are irreversible.	See Alternative 2.	See Alternative 2.	See Alternative 2.	Not applicable.
Type and Quantity of Residuals Remaining After Treatment	• Carbon from liquid phase and vapor phase units require replacement or regeneration. Quantity to be determined during OM&M phase. • Media from metals adsorption unit requires replacement or regeneration. Quantity to be determined during OM&M phase. • Filter bags must be disposed of properly. Quantity to be determined during OM&M phase.	• Carbon from liquid phase and vapor phase units require replacement or regeneration. Quantity to be determined during OM&M phase. • Media from metals adsorption unit requires replacement or regeneration. Quantity to be determined during OM&M phase. • Filter bags must be disposed of properly. Quantity to be determined during OM&M phase. • VOC source areas not removed, but are contained within Alternative Landfill Cover. Exact quantity unknown, but estimate to be approximately 4,300 cubic yards. • Approximately 110,000 cubic yards of additional residual soils exceeding NYSDEC RSCOs will remain below the Alternative Landfill Cover.	• Carbon from liquid phase and vapor phase units require replacement or regeneration. Quantity to be determined during OM&M phase. • Media from metals adsorption unit requires replacement or regeneration. Quantity to be determined during OM&M phase. • Filter bags must be disposed of properly. Quantity to be determined during OM&M phase. • VOC source areas (approximately 4,300 cubic yards) are removed, but residual soils exceeding NYSDEC RSCOs are not. Approximately 110,000 cubic yards of residual soils exceeding NYSDEC RSCOs will remain below the Alternative Landfill Cover.	• Carbon from liquid phase and vapor phase units require replacement or regeneration. Quantity to be determined during OM&M phase. • Media from metals adsorption unit requires replacement or regeneration. Quantity to be determined during OM&M phase. • Filter bags must be disposed of properly. Quantity to be determined during OM&M phase. • Soil exceeding approximately 200 times NYSDEC RSCOs (approximately 13,000 cubic yards) is removed, but residual soils exceeding NYSDEC RSCOs are not. Approximately 100,000 cubic yards of residual soils exceeding NYSDEC RSCOs will remain below the Alternative Landfill Cover.	See Alternative 2.	See Alternative 1.
Reduction Of Toxicity, Mobility, Or Volume Through Treatment Ranking[1]	**1** 2 3 4 5 6 7 8 9 10	1 2 3 4 5 6 7 **8** 9 10	1 2 3 4 5 6 **7** 8 9 10	1 2 3 4 5 **6** 7 8 9 10	1 2 **3** 4 5 6 7 8 9 10	1 2 3 4 **5** 6 7 8 9 10
IMPLEMENTABILITY						
Ability to Construct and Operate	Components comprising this alternative can be easily constructed, maintained and operated and there should be no impediments associated with implementation of this alternative.	Plantings must occur while the vegetation is dormant (i.e., early spring or late fall).	See Alternative 2.	See Alternative 2.	See Alternative 1.	No construction or operation.
Ease of Doing More Action if Needed	• No further action would be required for soil. • Can handle varying volumes or concentrations in soil. • Groundwater extraction system and GWT System can be expanded.	• Expansion of Alternative Landfill Cover would require modified design. • Groundwater extraction system and GWT System can be expanded. • Additional plantings can easily be added.	• Can handle varying volumes or concentrations in soil. • Expansion of Alternative Landfill Cover would require modified design. • Groundwater extraction system and GWT System can be expanded.	• Can handle varying volumes or concentrations. • Expansion of Alternative Landfill Cover would require modified design. • Groundwater extraction system and GWT System can be expanded.	• Expansion of cap would require modified design. • Groundwater extraction system and GWT System can be expanded.	Groundwater extraction system and GWT System can be expanded.
Ability to Monitor Effectiveness	Proposed groundwater monitoring will give notice of failure before significant exposure occurs.	• Proposed groundwater monitoring and Alternative Landfill Cover inspections will give notice of failure before significant exposure occurs. • Lysimeters can easily be installed. • Monitoring potential translocation rates cannot easily be performed. Accordingly, vegetation samples must be collected, analyzed and evaluated.	See Alternative 2.	See Alternative 2.	See Alternative 2.	See Alternative 1.

Table 4. Individual Evaluation of Remedial Alternatives
Remedial Alternatives Selection Report, BASF Corporation, Closed Landfill, Rensselaer, New York

Criteria	Alternative 1 Excavation of Landfill Wastes Exceeding NYSDEC RSCOs and Hydraulic Containment	Alternative 2 Alternative Landfill Cover and Hydraulic Containment	Alternative 3 Alternative Landfill Cover and Hydraulic Containment and Remediation of Elevated VOC Areas	Alternative 4 Alternative Landfill Cover and Hydraulic Containment and Remediation of Elevated VOC and Metal Areas	Alternative 5 Modified Part 360 Cap and Hydraulic Containment	Alternative 6 Existing Soil Cap and Hydraulic Containment (Equivalent to No Action Alternative)
IMPLEMENTABILITY						
Ability to Obtain Approvals and Coordinate with Other Agencies	Approval of this alternative by the NYSDEC should not be a problem. Once approval is granted, subsequent coordination with the appropriate regulatory agencies should not impact implementation of this alternative.	Approval of this alternative by the NYSDEC will not be easily obtained since groundwater source areas would not be removed from the Site. If approval is granted, subsequent coordination with the appropriate regulatory agencies and the Wildlife Habitat Council should not impact implementation of this alternative.	See Alternative 1.	See Alternative 1.	Approval of this alternative by the NYSDEC will not be easily obtained since groundwater source areas would not be removed from the Site. If approval is granted, subsequent coordination with the appropriate regulatory agencies should not impact implementation of this alternative.	Approval from applicable agencies will not be easily obtained.
Availability of services and Capacities	• T&D facility must have enough storage/ treatment capacity to handle volume of landfill waste generated during construction operations. • Receiving water body must be able to handle treated water from proposed GWT System.	• Receiving water body must be able to handle treated water from proposed GWT System.	See Alternative 1.	See Alternative 1.	See Alternative 2.	Receiving water body must be able to handle treated water from proposed GWT System.
Availability of Equipment, Specialists, and Materials	Generally, materials and personnel are commercially available.	• Generally, materials and personnel are commercially available. • The availability of proposed vegetative species for the Alternative Landfill Cover is expected to decrease during the cold weather months. • Local nurseries must have plant species & quantities specified in plan.	• Generally, materials and personnel are commercially available. • The availability of proposed vegetative species for the Alternative Landfill Cover is expected to decrease during the cold weather months.	• Generally, materials and personnel are commercially available. • The availability of proposed vegetative species for the Alternative Landfill Cover is expected to decrease during the cold weather months.	Generally, materials and personnel are commercially available.	Generally, materials and personnel are commercially available.
Availability of Technologies	Readily available.	See Alternative 1.	See Alternative 1.	See Alternative 1.	See Alternative 1.	See Alternative 1.
Implementability Ranking[1]	**1** 2 3 4 5 6 7 8 9 10	1 2 3 4 **5** 6 7 8 9 10	1 2 3 **4** 5 6 7 8 9 10	1 2 **3** 4 5 6 7 8 9 10	1 2 3 4 **5** 6 7 8 9 10	1 2 3 4 5 6 7 8 9 **10**
COST						
Capital Cost	GWT System = $1,400,000 Excavation = $26,000,000 **Total = $27,400,000**	GWT System = $1,400,000 Alternative Landfill Cover = $1,850,000 **Total = $3,250,000**	GWT System = $1,400,000 Excavation = $1,800,000 Alternative Landfill Cover = $1,850,000 **Total = $5,050,000**	GWT System = $1,400,000 Excavation = $3,900,000 Alternative Landfill Cover = $1,850,000 **Total = $7,150,000**	GWT System = $1,400,000 RCRA Cap = $2,400,000 **Total = $3,800,000**	GWT System = $1,400,000 **Total = $1,400,000**
Annual Cost	O&M =$85,000 Monitoring = $60,000 Reporting = $30,000 **Total = $175,000**	O&M =$85,000 Monitoring = $60,000 Reporting = $30,000 **Total = $175,000**	O&M =$85,000 Monitoring = $60,000 Reporting = $30,000 **Total = $175,000**	O&M =$85,000 Monitoring = $60,000 Reporting = $30,000 **Total = $175,000**	O&M =$85,000 Monitoring = $60,000 Reporting = $30,000 **Total = $175,000**	O&M =$85,000 Monitoring = $60,000 Reporting = $30,000 **Total = $175,000**
Cost Ranking[1]	**1** 2 3 4 5 6 7 8 9 10	1 2 3 4 5 6 7 8 **9** 10	1 2 3 4 5 6 **7** 8 9 10	1 2 3 4 **5** 6 7 8 9 10	1 2 3 4 5 6 7 **8** 9 10	1 2 3 4 5 6 7 8 9 **10**
COMPATIBILITY						
COMPATIBILITY	Will allow for restricted (industrial) use of the entire Closed Landfill.	A Wildlife Habitat will be created through the beneficial reuse of the Closed Landfill.	A Wildlife Habitat will be created through the beneficial reuse of the Closed Landfill.	A Wildlife Habitat will be created through the beneficial reuse of the Closed Landfill.	There are no plans to beneficially reuse the Closed Landfill with the installation of a RCRA cap.	Will allow for restricted (industrial) use of the entire Closed Landfill.
Compatibility Ranking[1]	1 2 3 4 5 6 7 8 9 **10**	1 2 3 4 5 6 **7** 8 9 10	1 2 3 4 5 6 **7** 8 9 10	1 2 3 4 5 6 **7** 8 9 10	1 2 **3** 4 5 6 7 8 9 10	**1** 2 3 4 5 6 7 8 9 10
REGULATORY AGENCY ACCEPTANCE						
REGULATORY AGENCY ACCEPTANCE	This alternative should be acceptable to all federal, state and local regulatory agencies; however, it utilizes the least preferred approach (excavation over containment) in the hierarchy of remedial technologies, to address a significant volume of contaminated soil above NYSDEC RSCOs.	This alternative may not be acceptable to all federal and state regulatory agencies because the sources to groundwater will remain.	This alternative may not be acceptable to all federal and state regulatory agencies because only the VOC sources to groundwater will be removed, while metal "hot spots" will remain.	This alternative should be acceptable to all federal and state regulatory agencies because the sources to groundwater will be removed along with significant volumes of soil above NYSDEC RSCOs, residual contamination in soil above RSCOs will be contained and contaminated groundwater will be recovered and treated. Similar to Alternative 1, this alternative will utilize the least preferred approach (excavation over containment) in the hierarchy of remedial technologies, to address a significant volume of contaminated soil above NYSDEC RSCOs.	See Alternative 2.	This alternative will not be acceptable to federal or state regulatory agencies because this approach will not provide effective and permanent remediation, provide total protection of human health and the environment, or meet applicable SCGs for soil.

Table 4. Individual Evaluation of Remedial Alternatives
Remedial Alternatives Selection Report, BASF Corporation, Closed Landfill, Rensselaer, New York

Criteria	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6
	Excavation of Landfill Wastes Exceeding NYSDEC RSCOs and Hydraulic Containment	Alternative Landfill Cover and Hydraulic Containment	Alternative Landfill Cover and Hydraulic Containment and Remediation of Elevated VOC Areas	Alternative Landfill Cover and Hydraulic Containment and Remediation of Elevated VOC and Metal Areas	Modified Part 360 Cap and Hydraulic Containment	Existing Soil Cap and Hydraulic Containment (Equivalent to No Action Alternative)
Regulatory Agency Acceptance Ranking[1]	1 2 3 4 **5** 6 7 8 9 10	1 2 3 4 **5** 6 7 8 9 10	1 2 3 4 5 **6** 7 8 9 10	1 2 3 4 5 6 **7** 8 9 10	1 2 3 4 5 6 7 **8** 9 10	**1** 2 3 4 5 6 7 8 9 10
COMMUNITY ACCEPTANCE						
COMMUNITY ACCEPTANCE	• The community should find this alternative acceptable because all fill materials exceeding NYSDEC RSCOs would be removed and disposed off-site. • The community may have some reservations related to truck traffic for a 12 to 18 month period. Also, if this alternative is selected, BASF will not beneficially reuse the Site to create a wildlife habitat.	• The community may not find this alternative acceptable because groundwater sources will remain. The community will benefit from the beneficial reuse of the Closed Landfill through the creation of a wildlife habitat. • This alternative may require multiple public meetings to properly educate the public on phytotechnology. • The community may have some minor reservations related to truck traffic for a 3 to 6 month period.	• The community may not find this alternative acceptable because only groundwater source areas are removed while metal "hot spots" remain. The community will benefit from the beneficial reuse of the Closed Landfill through the creation of a wildlife habitat. • This alternative may require multiple public meetings to properly educate the public on phytotechnology. • The community may have some minor reservations related to truck traffic for a 4 to 8 month period.	• The community should find this alternative highly acceptable because significant volumes of soil exceeding NYSDEC RSCOs are removed and all residual risk concerns are eliminated if the cap and GWT System are properly maintained. Also, the community will benefit from the beneficial reuse of the Closed Landfill through the creation of a wildlife habitat. However, this alternative may require multiple public meetings to properly educate the public. • The community may have some reservations related to truck traffic for a 15 to 24 month period.	• The community may not find this alternative acceptable because groundwater sources will remain. • The community may have some reservations related to truck traffic for a 6 to 9 month period. Also, if this alternative is selected, BASF will not beneficially reuse the Site to create a wildlife habitat.	Since it will not provide effective and permanent remediation, provide protection of human health and the environment, or meet SCGs for soil, it will not be acceptable to the community.
Community Acceptance Ranking[1]	1 2 3 4 **5** 6 7 8 9 10	1 2 3 4 5 6 7 **8** 9 10	1 2 3 4 5 6 7 8 **9** 10	1 2 3 4 5 6 7 8 **9** 10	1 2 3 4 5 6 7 8 9 **10**	**1** 2 3 4 5 6 7 8 9 10

OVERALL RANKING[2]	44	72	66	62	65	50

Note(s):
1. Ranking system is based on a scale of 1 to 10, whereby 1 is the lowest preferred alternative and 10 is the highest.
2. Overall ranking is based on a summation of individual rankings (see note 1) for each criteria utilized to evaluate each alternative.

Legend:
ARARs – Applicable or Relevant and Appropriate Requirements
CFR – Code of Federal Regulations
DAR – Division of Air Resources
DER – Division of Environmental Remediation
GWT – Groundwater Treatment
NYCRR – New York Code, Rules and Regulations
NYSDEC RSCOs – New York State Department of Environmental Conservation Recommended Soil Cleanup Objectives
O&M – Operation and Maintenance
OM&M – Operation, Maintenance and Monitoring
RCRA – Resource Conservation Recovery Act
SCG – Standards, Criteria and Guidelines
TAGM – Technical Administrative Guidance Memorandum
TOGS – Technical and Operational Guidance Series
T&D – Transportation and Disposal
VCP – Voluntary Cleanup Program
VOCs – Volatile Organic Compounds

Table 5. Ranking of Individual Alternatives
Remedial Alternatives Selection Report, BASF Corporation, Closed Landfill, Rensselaer, New York

	Alternative 1	Alternative 2	Alternative 3	Alternative 3A	Alternative 4	Alternative 5	Alternative 6
Remedial Action Objective	**Excavation of Landfill Wastes Exceeding NYSDEC RSCOs and Hydraulic Containment**	**Alternative Landfill Cover and Hydraulic Containment**	**Alternative Landfill Cover and Hydraulic Containment and Removal of Elevated VOC Area[3]**	**Alternative Landfill Cover and Hydraulic Containment and Removal of VOC Source Area[3]**	**Alternative Landfill Cover and Hydraulic Containment and Remediation of Elevated VOC and Metal Areas[4]**	**Modified Part 360 Cap and Hydraulic Containment**	**Existing Soil Cap and Hydraulic Containment[5]**
RANKING[1,2]							
Overall Protection	4	7	6	6	6	6	5
Compliance with SCGs	8	5	7	7	7	7	4
Short-Term Risk	2	7	4	6	3	7	9
Long-Term Effectiveness	6	8	8	8	8	7	5
Reduction of Toxicity, Mobility, or Volume Through Treatment	6	8	7	7	5	2	5
Implementability	1	7	5	6	3	7	10
Compatibility	10	8	8	8	8	3	1
Community Acceptance	6	7	8	7	9	8	1
Technical Ranking	**43**	**57**	**53**	**55**	**49**	**47**	**40**
Cost	1	8	6	7	5	7	10
Regulatory Agency Acceptance	7	5	8	6	8	8	1
Overall Ranking	**51**	**70**	**67**	**68**	**62**	**62**	**51**

NOTES:

1. Ranking system is based on a scale of 1 to 10, whereby 1 is the lowest preferred alternative and 10 is the highest.
2. Overall ranking is based on a summation of individual rankings (see note 1) for each criteria utilized to evaluate each alternative.
3. Based on VOC pre-delineation sampling.
4. Based on metal concentrations exceeding 100 Times NYSDEC RSCOs in landfill material samples.
5. Equivalent to No Action Alternative.

Table 6. Detailed Costs for Alternative 3 (Alternative Landfill Cover and Hydraulic Containment and Remediation of Elevated VOC Areas)
Remedial Alternatives Selection Report
BASF Corporation, Closed Landfill, Rensselaer, New York

COST ITEM	QUANTITY	UNITS	UNIT COST	TOTAL
CAPITAL COSTS				
Alternative Landfill Cover Materials				
6" Topsoil Layer	7,300	Cubic Yard	$30	$219,000
12" Planting Substrate Layer	14,500	Cubic Yard	$20	$290,000
Biota Barrier	46,000	Square Yard	$2	$92,000
Common Fill Grading Layer	16,000	Cubic Yard	$15	$240,000
40 mil HDPE liner for Swale	6,000	Square Yard	$5.50	$33,000
Gravel for Swale[1]	3,500	Cubic Yard	$25	$87,500
Plantings[2]	9.4	Acre	$16,750	$157,500
			Subtotal	**$1,119,000**
Alternative Landfill Cover Construction Items				
Mobilization/Demobilization	1	Lump Sum	$30,000	$30,000
Control Surveys/ As-Builts	1	Lump Sum	$20,000	$20,000
Preparation of Contractor Plans	1	Lump Sum	$5,000	$5,000
Grading of Landfill	1	Lump Sum	$45,000	$45,000
Irrigation System	9.4	Acre	$9,000	$84,600
Seeding	9.4	Acre	$2,000	$18,800
Slip Lining of 36" Pipe	150	Linear Foot	$125	$18,800
Slip Lining of 42" Pipe	550	Linear Foot	$150	$82,500
Grout Pipe Annular Space	700	Linear Foot	$4	$2,800
Catch Basin/Laterals Modifications	3	Each	$15,000	$45,000
			Subtotal	**$352,500**
Hydraulic Containment Improvements				
Additional components along the eastern border of the Landfill	1	Lump Sum	$250,000	$250,000
			Subtotal	**$250,000**
Remedial Construction Items for Elevated VOC Areas				
Site Preparation and Site Restoration	1	Lump Sum	$20,000	$20,000
Survey/As-Builts	1	Lump Sum	$10,000	$10,000
Preparation of Contractor Plans	1	Lump Sum	$5,000	$5,000
Community Air Monitoring	20	Days	$1,000	$20,000
Elevated VOC Area Excavation (0 to 8' bls)[3]	3,500	Cubic Yard	$15	$52,500
Staging of Excavated Materials[3]	3,500	Cubic Yard	$5	$17,500
Loading of Excavated Materials[3]	3,500	Cubic Yard	$5	$17,500
Provision, Placement and Compaction of Off-Site General Fill[4]	5,300	Ton	$10.00	$53,000
			Subtotal	**$195,500**
Transportation & Disposal Items for Elevated VOC Areas				
NYSDEC Fees	1	Lump Sum	$150,000	$150,000
T&D of Construction Wastewaters	250,000	Gallon	$0.40	$100,000
Hazardous Waste Material (Stablex's Canadian Facility)[5]	4,400	Ton	$285	$1,254,000
			Subtotal	**$1,504,000**
			Total Capital Cost	**$3,421,000**
CONTINGENCY AND ENGINEERING FEES				
Contingency allowance	20%	% of Capital Cost	$3,421,000	$684,000
Engineering fees [6]	10%	% of Capital Cost	$3,421,000	$342,000
			Total Contingency and Engineering Fees	$1,026,000
REMEDIAL ALTERNATIVE 3 TOTAL CAPITAL COSTS AND CONTINGENCY AND ENGINEERING FEES				**$4,447,000**

Table 6. Detailed Costs for Alternative 3 (Alternative Landfill Cover and Hydraulic Containment and Remediation of Elevated VOC Areas)
Remedial Alternatives Selection Report
BASF Corporation, Closed Landfill, Rensselaer, New York

COST ITEM	QUANTITY	UNITS	UNIT COST	TOTAL
ANNUAL OPERATION, MAINTENANCE AND MONITORING (OM&M) COSTS				
Alternative Landfill Cover Operation and Maintenance (O&M) Costs				
Site inspection	-	Lump Sum	$15,000	$15,000
Miscellaneous site work (including swale maintenance)	-	Lump Sum	$5,000	$5,000
Annual O&M Costs for the Alternative Landfill Cover				**$20,000**
Present Worth of Annual O&M Costs for the Alternative Landfill Cover (30 Years, i=5%)				**$308,000**
Hydraulic Containment O&M Costs Attributed to Landfill Component (Estimated to be 10% of the Site-Wide Cost)				
Power requirements and residual disposal	-	Lump Sum	$25,000	$25,000
Labor for maintenance	104	Mandays	$600	$62,400
Equipment, materials and supplies	12	Month	$1,000	$12,000
Carbon replacement	-	Lump Sum	$18,000	$18,000
Chemical addition (lime)	-	Lump Sum	$3,000	$3,000
Groundwater Discharge sample analysis	12	Samples	$550	$6,600
Air Discharge sample analysis	12	Samples	$1,000	$12,000
Annual O&M Costs for Site-Wide Hydraulic Containment System				$139,000
Present Worth of Annual O&M Costs for Site-Wide Hydraulic Containment System (30 Years, i=5%)				$2,137,000
Annual O&M Costs for Landfill Component of Site-Wide Hydraulic Containment System (Estimated to be 10% of the Site-Wide Cost)				**$13,900**
Present Worth of Annual O&M Costs for Landfill Component of Site-Wide Hydraulic Containment System (30 Years, i=5%)				**$213,700**
Groundwater Monitoring Costs Attributed to Landfill Component (Estimated to be 10% of the Site-Wide Cost)				
Groundwater sampling	3	Mandays	$600	$1,800
Purge water disposal	1	Drums	$200	$200
Equipment, materials and supplies	-	Lump Sum	$500	$500
Sample analysis	10	Samples	$1,000	$10,000
Costs per Each Event for Site-Wide Hydraulic Containment System [7]				$12,500
Present Worth of Annual Groundwater Monitoring Costs for Site-Wide Hydraulic Containment System (30 Years, i=5%)				$361,000
Costs per Event for Landfill Component of Site-Wide Hydraulic Containment System (Estimated to be 10% of the Site-Wide Cost)[7]				**$1,250**
Present Worth of Annual Groundwater Monitoring Costs for Landfill Component of Site-Wide Hydraulic Containment System (30 Years, i=5%)				**$36,100**
REMEDIAL ALTERNATIVE 3 PRESENT WORTH OF ANNUAL OM&M COSTS				**$557,800**
REMEDIAL ALTERNATIVE 3 TOTAL PRESENT WORTH OF CAPITAL AND ANNUAL OM&M COSTS				**$5,004,800**

Notes:

(1) The swale length includes proposed swale around the perimeter of the landfill (not including the highway embankment side) and the two swales within the landfill area.

(2) Planting cost based upon the installation of 8530 (4 ft to 5 ft tall) trees over 9.4 acres, including labor and materials. Estimated tree spacing between 6 ft on center (phytoremediation species) to 10 ft on center (wildlife enhancement species).

(3) All excavation, staging and loading volumes based on in-situ volumes.

(4) Off-site fill material weights based on 1.5 tons/ in-situ cubic yard excavated.

(5) All disposal weights based on 1.25 tons/ in-situ cubic yard excavated.

(6) Includes construction inspection and engineering design.

(7) Sampling frequency includes 4 times per year for the first 5 years, 2 times per year for the next 5 years and 1 time per year for the next 20 years.

APPENDIX A

Proposed Excavation Extents for Alternatives 3 and 3A

Proposed Excavation Extents for RASR Remedial Alternatives 3 and 3A

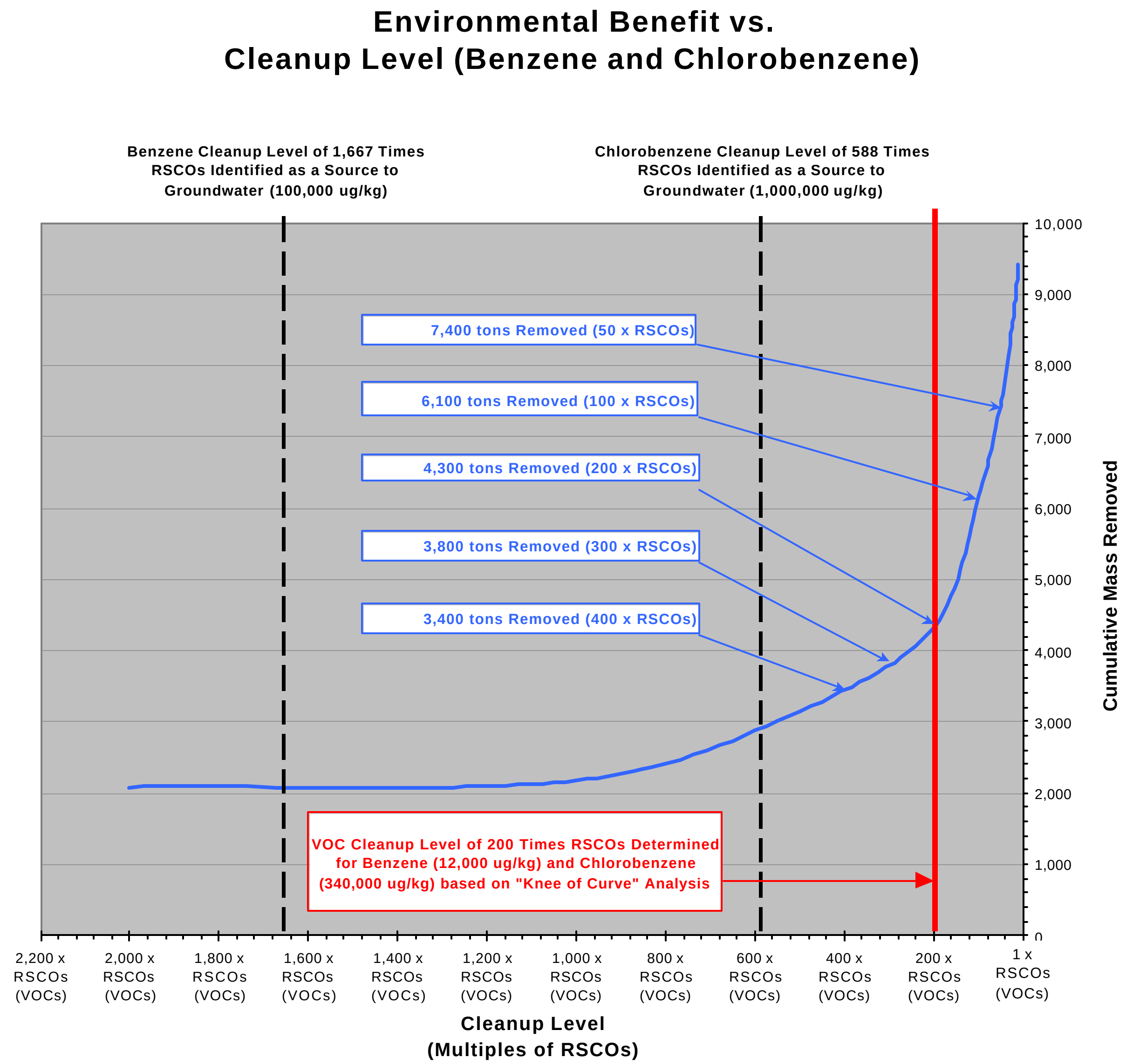
Remedial Alternatives 3 and 3A were summarized in the RASR and contained components that included excavation of areas with elevated VOCs in Landfill material. These areas include material located in the northern portion of the Landfill where high concentrations of benzene and chlorobenzene are serving as sources to groundwater, and areas of high chlorobenzene in the central and south-central portions of the Landfill. The south-central portion is not serving as a groundwater source area.

The proposed limits of excavation were based on the following:

- a mass removal (i.e., "knee-of-the-curve") analysis requested by the NYSDEC, which evaluated the volume of Landfill material to be excavated depending on cleanup level, as represented by multiples of the NYSDEC Recommended Soil Cleanup Objectives (RSCOs) for benzene and chlorobenzene;
- soil boring data obtained during the Site Investigation, test pit investigation, and pre-design investigation; and
- a variogram analysis of the soil boring data.

Based on the "knee of the curve" analysis shown in the figure below, the elevated VOC areas are defined by a cleanup level of 200 times RSCOs for benzene (equivalent to 12,000 µg/kg) and chlorobenzene (equivalent to 340,000 µg/kg), which BASF proposes as the cleanup levels for the Closed Landfill.

As shown in the figure, the proposed cleanup level of 12,000 µg/kg for benzene is more than eight times lower than the approximate concentration identified in the RASR as a source to groundwater (100,000 µg/kg). Similarly, the proposed cleanup level of 340,000 µg/kg for chlorobenzene is approximately three times lower than the concentration identified in the RASR as a source to groundwater (1,000,000 µg/kg). As shown below, selection of the 200 times RSCO cleanup level will result in the excavation of approximately 4,300 tons of material from the Landfill.



As shown above, the cumulative volume of excavated material increases very rapidly below a cleanup level of 200 times RSCOs. Merely decreasing the cleanup level to 100 times RSCOs would result in a 40 percent increase in the volume of material that would have to be excavated and transported offsite, which would also result in a corresponding increase in construction and transportation-related risks. All exposure pathways would be effectively eliminated by removing Landfill waste with VOCs exceeding 200 times RSCOs and by installing and properly maintaining the proposed alternative landfill cover and hydraulic containment system. Therefore, a lower cleanup level would not provide a commensurate increase in overall protection, long-term effectiveness, or compliance with applicable Standards, Criteria or Guidelines (SCGs).

In fact, cleanup levels below 200 times RSCOs and the associated increases in excavation would result in a substantial increase in short-term risks to workers, the public, and the environment, without corresponding decreases in long-term risks.

The elevated VOC areas above the 200 times RSCOs cleanup level are highlighted in orange on Plate 7, and were defined by the borings shown in red. The boring analytical data are provided in attached Tables A-1 and A-2. In lieu of post-excavation sampling, BASF proposes to extend the excavation limits to borings that were below 200 times RSCOs, as shown by the green dots on Plate 7. The proposed limits of excavation were also confirmed based on a variogram statistical analysis of the distribution of soil boring analytical data. The variogram analysis identified the average distance outward from a data point above 200 times RSCOs to place the excavation limit to reach the proposed cleanup level. This analysis is summarized in the attachment to this letter.

Excavation beyond the areas highlighted in orange will result in an additional 2,750 tons of material being excavated under Alternative 3 (corresponding to the excavation of the green and blue-hatched areas on Plate 7) and an additional 1,500 tons of material excavated for Alternative 3A (corresponding to the excavation of the blue-hatched area on Plate 7). BASF is advocating the additional excavation for the following reasons:

- By utilizing pre-defined limits for the excavation areas, the work can be completed in a more expeditious and efficient manner;
- The delineation data and supplemental statistical analysis provided in this appendix indicated that all elevated VOC areas would be removed based on the proposed limits of excavation;
- There are practical limitations related to collecting representative post-excavation samples from a sidewall in extremely heterogeneous waste material, including the likely presence of debris and sidewall stability concerns;
- All detections of VOCs at concentrations above 200 times RSCOs occur within the proposed excavation limits.

The vertical limits of the proposed excavations were based on the thickness of the unsaturated zone as measured during the Landfill investigations in January and March 2002 and in November 2004, and the results of the Geoprobe investigation. The depth to water in the northern portion of the Landfill was approximately 8 feet. The depth to water in the central and southern portion of the Landfill ranged from 6 to 7 feet. The Geoprobe investigation indicated that significant VOC impacts occur in the range from 4 to 8 feet below land surface in each area. Therefore, the approximate depth of the proposed excavations will be from 8 to 9 feet.

Statistical Analysis

Limits of proposed excavations were estimated by two-dimensional kriging of the maximum benzene and chlorobenzene concentrations (separately) observed at each horizontal sampling location, regardless of sample depth or sampled media (i.e., soil or waste). Kriging is a geostatistical interpolation technique used to estimate or predict values at locations not physically sampled based upon a statistical evaluation of the actual values collected at sampled locations. Results of the kriging process can be plotted as an isoconcentration map of the modeled parameter. The first step in the kriging is to produce modeled variograms of the observed data that can then be used to produce kriged isoconcentration maps. A variogram model is an interpretation of the spatial correlation of the observed data and is an attempt to quantify the relationship between observed points based upon the assumption that observations at any point represents nearby locations better than observations located farther away. Variograms are displayed as plots of one-half the squared difference, or variance between pairs of observed values against the distances separating the pairs. Variograms control the way kriging weights are assigned to observations during interpolation, and consequently controls the predicted values at unsampled locations. Please note as the observed benzene and chlorobenezene data spanned over five orders of magnitude, the data was log-normalized prior to developing variogram models and kriged isoconcentration maps.

Variograms and kriged contour maps were developed using Surfer Version 8 (Golden Software, Inc.). The benzene data set included 130 observations and was modeled using an exponential variogram model (Figure A-1) based on a trial and error adjustment of the variables describing the variogram curve (curve model, scale or variogram, length and anisotropy). Based upon the results of the trial and error fitting exercise, the scale of the benzene variogram is 3.25 (1,778.3 $\mu g/kg^2$) and the distance at which the variogram becomes independent of distances (and direction) separating the pairs is approximately 85 feet. Variogram models tested before an exponential model was selected included linear, gaussian, logarithmic and spherical (all with and without nuggets). The chlorobenzene data set included 129 observations and was modeled using an exponential variogram model (Figure A-2) based on a trial and error adjustment of the variables describing the variogram curve (curve model, scale or variogram, length and anisotropy). Based upon the results of the trial and error fitting exercise, the scale of the chlorobenzene variogram is 3.864 (7,311.4 µg/kg^2) and the distance at which the variogram becomes independent of distances (and direction) separating the pairs is approximately 32 feet. Variogram models tested before an exponential model was selected included linear, gaussian, logarithmic and spherical (all with and without nuggets). Isoconcentration contour maps for benzene and chlorobenzene were prepared with the modeled variograms described above based on a grid spacing of approximately 6 feet by 6 feet (100 rows and 91 columns) and are included as Figures A-3 and A-4, respectively.

Figure A-1 Log Transformed Benzene Concentrations - Direction: 0.0 Tolerance:

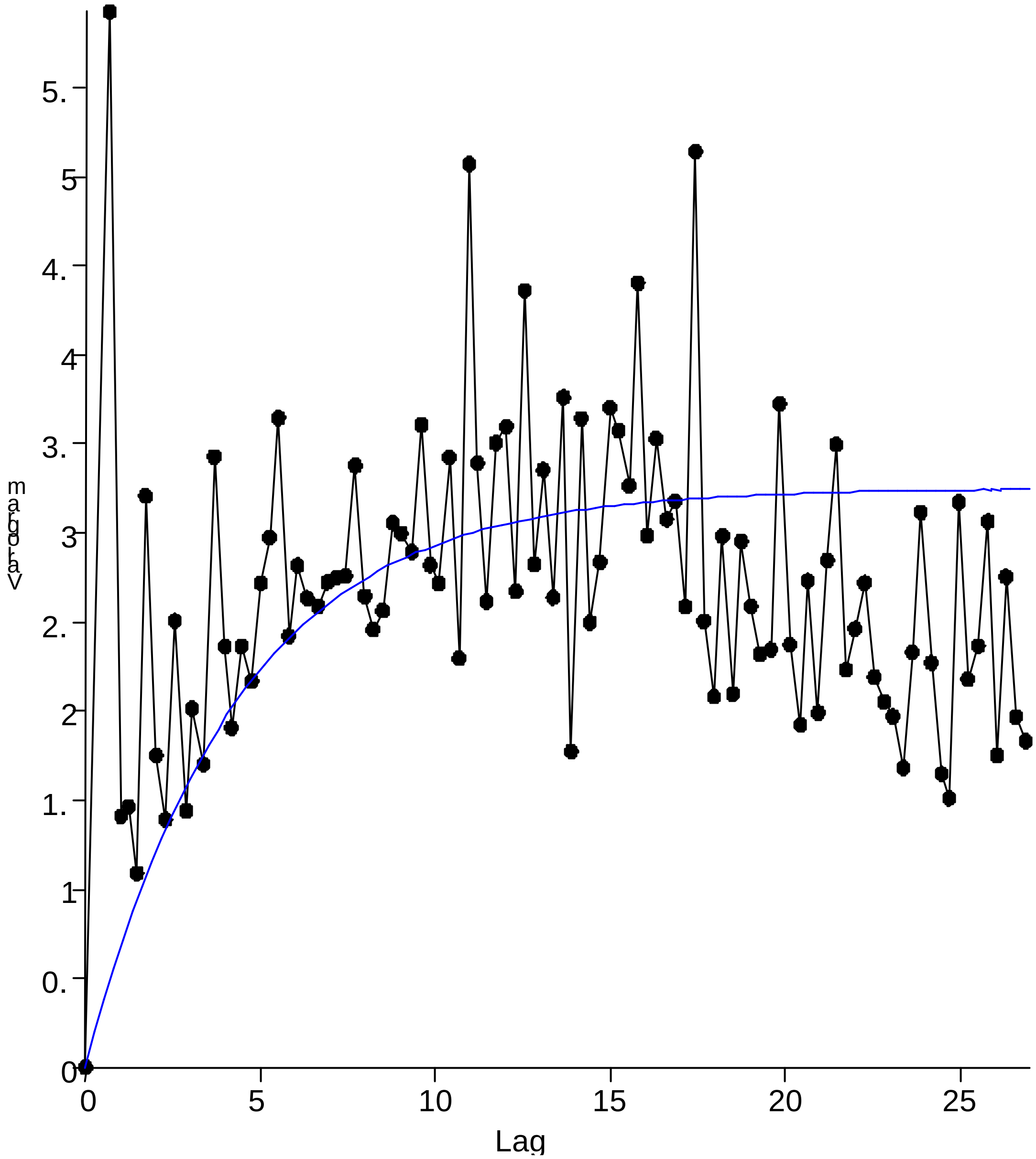
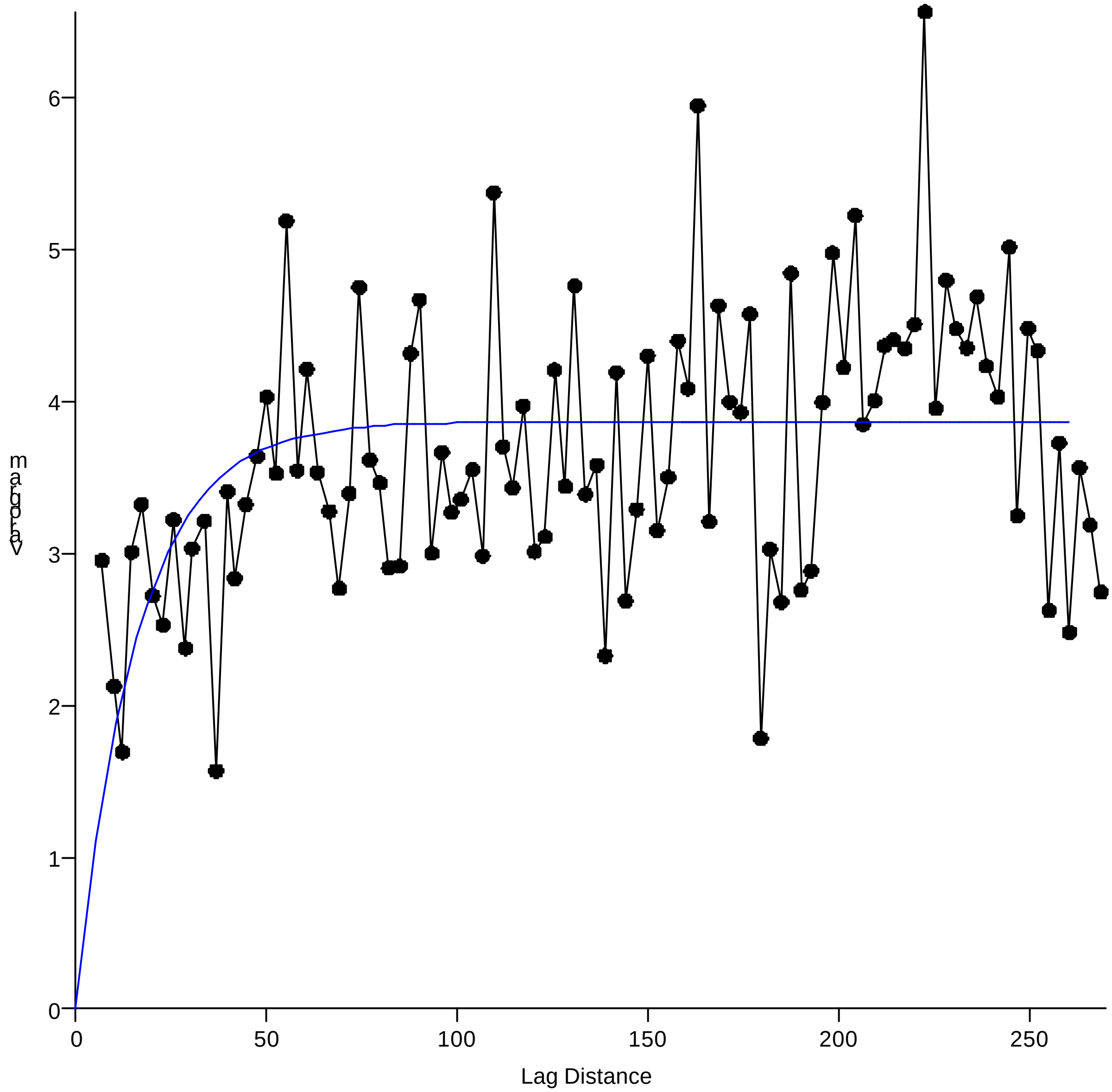
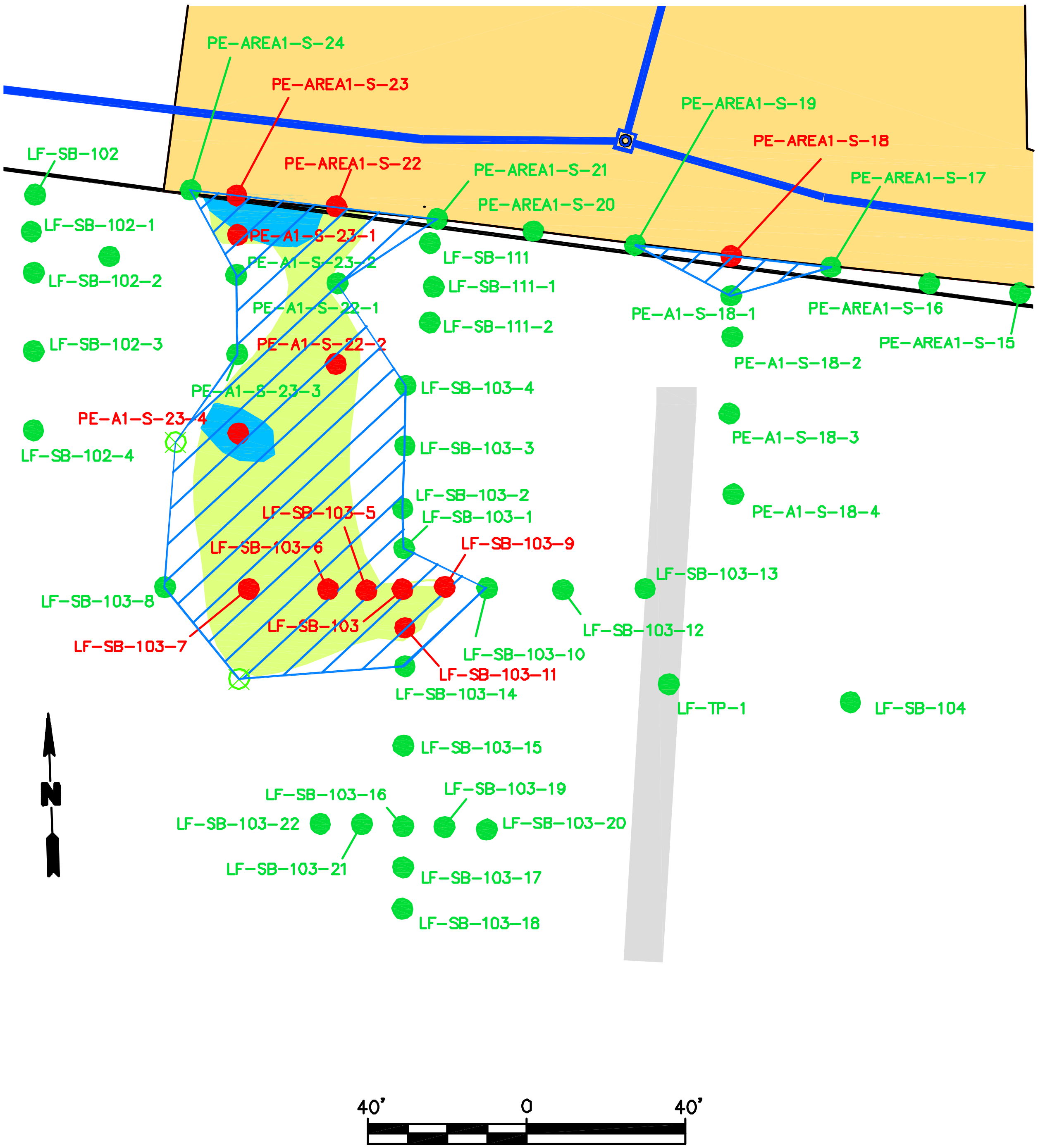


Figure A-2 Log Transformed Chlorobenzene Concentrations - Variogram
Direction: 0.0 Tolerance: 90.0





LEGEND

AREAS WHERE BENZENE IS EXPECTED TO EXCEED 12,000 UG/KG BASED ON VARIOGRAM ANALYSIS PROVIDED IN ATTACHMENT 1

AREAS WHERE CHLOROBENZENE IS EXPECTED TO EXCEED 340,000 UG/KG BASED ON VARIOGRAM ANALYSIS PROVIDED IN ATTACHMENT 1

PROPOSED PRE-DELINEATED AREAS TO BE EXCAVATED UNDER REMEDIAL ALTERNATIVES 3 &3A

LF-SB-103-11 — LOCATION AND DESIGNATION OF SOIL SAMPLE WITH BENZENE GREATER THAN 12,000 UG/KG OR CHLOROBENZENE GREATER THAN 340,000 UG/KG

LF-TP-1 — LOCATION AND DESIGNATION OF SOIL SAMPLE WITH BENZENE LESS THAN OR EQUAL TO 12,000 UG/KG OR CHLOROBENZENE LESS THAN OR EQUAL TO 340,000 UG/KG

LIMITS OF PROPOSED EXCAVATION BASED ON VARIAGRAM ANALYSIS PROVIDED IN ATTACHMENT 1

AOC-1 (PREVIOUSLY EXCAVATED AND BACKFILLED WITH CLEAN SOIL TO 1 FOOT BELOW THE WATER TABLE DURING THE SOIL IRM)

BOUNDARY OF CLOSED LANDFILL

EXISTING GROUNDWATER COLLECTION TRENCH

LOCATION OF TEST PITS INSTALLED AND SAMPLED IN 2002

UG/KG — MICROGRAMS PER KILOGRAM

Title:

ELEVATED VOC AREAS IN NORTHERN PORTION OF LANDFILL BASED ON VARIOGRAM ANALYSIS

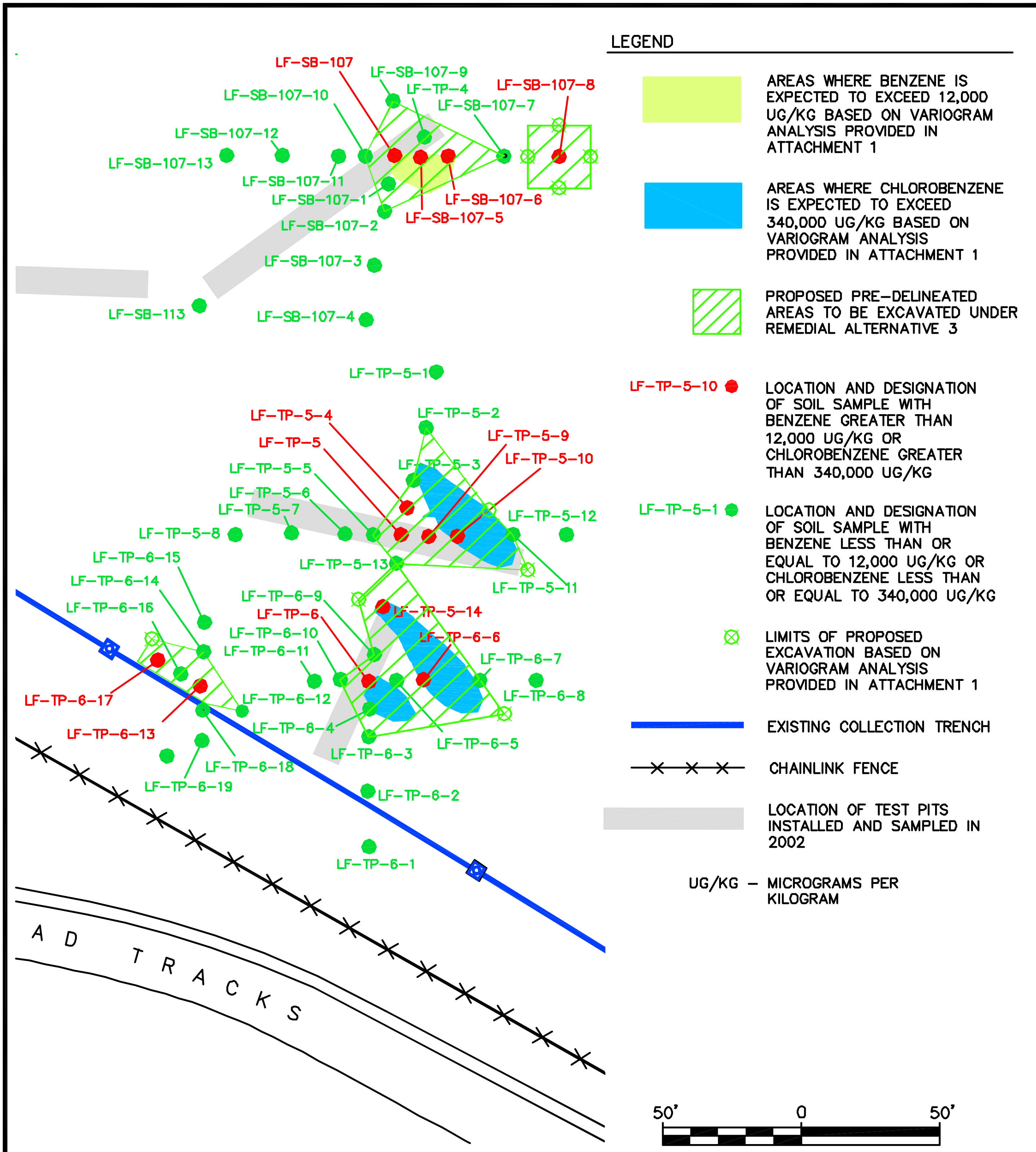
REMEDIAL ACTION SELECTION REPORT
BASF CLOSED LANDFILL, RENSSELAER, NEW YORK

Prepared For:

BASF CORPORATION
FLORHAM PARK, NEW JERSEY

ROUX
ROUX ASSOCIATES, INC.
Environmental Consulting & Management

Compiled by: O.R.	Date: 21SEPT05	FIGURE
Prepared by: G.M.	Scale: AS SHOWN	A-3
Project Mgr: O.R.	Office: NY	
File No: BF1143124	Project: 25111Y27	



Title:

ELEVATED VOC AREAS IN SOUTH CENTRAL PORTION OF LANDFILL BASED ON VARIOGRAM ANALYSIS

REMEDIAL ACTION SELECTION REPORT
BASF LANDFILL, RENSSELAER, NEW YORK

Prepared For:

BASF CORPORATION
FLORHAM PARK, NEW JERSEY

ROUX
ROUX ASSOCIATES, INC.
Environmental Consulting & Management

Compiled by: O.R.	Date: 21SEPT05	FIGURE
Prepared by: G.M.	Scale: AS SHOWN	A-4
Project Mgr: O.R.	Office: NY	
File No: BF1143125	Project: 25111Y27	

Table A-1. Summary of Volatile Organic Compounds Detected in Soil, BASF Corporation, Closed Landfill, Rensselaer, New York

Analyte (Concentrations in µg/kg)	Sample Location:	LF-SB-101	LF-SB-101	LF-SB-102	LF-SB-102 DUP	LF-SB-102	LF-SB-102-1	LF-SB-102-1	LF-SB-102-2	LF-SB-102-2
	Sample Date:	03/13/02	03/13/02	03/13/02	03/13/02	03/13/02	04/06/04	04/06/04	04/06/04	04/06/04
	Sample Depth (ft bls):	1-3	3-5	3-5	3-5	5-7	0-4	4-7	0-4	4-7
	Sample Designation:	B7-46-13	B7-46-16	B7-48-11	B7-48-17	B7-48-14	B9-99-21	B9-100-6	B9-100-17	B9-100-20
Acetone		**19 B**	**26 B**	1500 U	3000 U	16000 U	25 U	**110**	22 U	**62**
Benzene		0.6 U	0.7 U	55 U	110 U	**3600 J**	**3.8**	**16**	**5.6**	**5.2**
Bromodichloromethane		0.6 U	0.7 U	54 U	110 U	580 U	6.3 U	7.8 U	5.6 U	9.1 U
Bromoform		0.7 U	0.9 U	58 U	120 U	630 U	6.3 U	7.8 U	5.6 U	9.1 U
Bromomethane		3 U	4 U	130 U	260 U	1400 U	6.3 U	7.8 U	5.6 U	9.1 U
2-Butanone		4 U	**8 J**	230 UB	460 UB	2500 U	31 U	39 U	28 U	45 U
Carbon disulfide		**0.7 JB**	0.3 U	5 U	10 U	51 U	6.3 U	7.8 U	5.6 U	9.1 U
Carbon tetrachloride		0.5 U	0.6 U	75 U	150 U	810 U	6.3 U	7.8 U	5.6 U	9.1 U
Chlorobenzene		**0.9 J**	**2 J**	97 U	190 U	1000 U	**400**	**140**	**28**	**11**
Chloroethane		0.9 U	1 U	88 U	170 U	940 U	6.3 U	7.8 U	5.6 U	9.1 U
Chloroform		0.7 U	0.9 U	180 U	350 U	1900 U	6.3 U	7.8 U	5.6 U	9.1 U
Chloromethane		1 U	1 U	83 U	160 U	890 U	6.3 U	7.8 U	5.6 U	9.1 U
Dibromochloromethane		0.5 U	0.6 U	54 U	110 U	580 U	6.3 U	7.8 U	5.6 U	9.1 U
1,2-Dichlorobenzene		NA	NA	NA	NA	NA	**2.9 J**	7.8 U	**16**	9.1 U
1,3-Dichlorobenzene		NA	NA	NA	NA	NA	6.3 U	7.8 U	5.6 U	9.1 U
1,4-Dichlorobenzene		NA	NA	NA	NA	NA	**2.3 J**	7.8 U	5.6 U	9.1 U
1,1-Dichloroethane		0.6 U	0.7 U	73 U	140 U	780 U	6.3 U	7.8 U	5.6 U	9.1 U
1,2-Dichloroethane		0.5 U	0.6 U	160 U	320 U	1700 U	6.3 U	7.8 U	5.6 U	9.1 U
1,1-Dichloroethene		0.6 U	0.7 U	41 U	82 U	440 U	6.3 U	7.8 U	5.6 U	9.1 U
Cis-1,2-Dichloroethene		NA	NA	NA	NA	NA	6.3 U	7.8 U	5.6 U	9.1 U
Trans-1,2-Dichloroethene		NA	NA	NA	NA	NA	6.3 U	7.8 U	5.6 U	9.1 U
1,2-Dichloroethene (total)		0.6 U	0.7 U	88 U	170 U	950 U	NA	NA	NA	NA
1,2-Dichloropropane		0.5 U	0.6 U	36 U	73 U	390 U	6.3 U	7.8 U	5.6 U	9.1 U
Cis-1,3-Dichloropropene		0.5 U	0.6 U	50 U	99 U	540 U	6.3 U	7.8 U	5.6 U	9.1 U
Trans-1,3-Dichloropropene		0.5 U	0.6 U	48 U	95 U	510 U	6.3 U	7.8 U	5.6 U	9.1 U
Ethylbenzene		0.5 U	**0.7 J**	92 U	180 U	1000 U	**1.3**	1.6 U	1.1 U	1.8 U
2-Hexanone		4 U	5 U	220 U	430 U	2300 U	25 U	31 U	22 U	36 U
Methylene chloride		**2 JB**	**2 JB**	150 U	310 U	1700 U	**11 B**	**5.2 JB**	**7.7 B**	**6.5 JB**
4-Methyl-2-Pentanone		3 U	4 U	260 U	520 U	2800 U	25 U	31 U	22 U	36 U
Styrene		0.6 U	0.7 U	93 U	190 U	1000 U	1.3 U	1.6 U	1.1 U	1.8 U
1,1,2,2-Tetrachloroethane		1 U	1 U	110 U	210 U	1100 U	6.3 U	7.8 U	5.6 U	9.1 U
Tetrachloroethene		0.5 U	0.6 U	120 U	240 U	1300 U	6.3 U	7.8 U	5.6 U	9.1 U
Toluene		**3 J**	**3 J**	**9600**	**10000**	**150000**	**16**	**71**	**33**	**69**
1,2,4-Trichlorobenzene		NA	NA	NA	NA	NA	1.3 U	1.6 U	1.1 U	1.8 U
1,1,1-Trichloroethane		0.6 U	0.7 U	75 U	150 U	810 U	6.3 U	7.8 U	5.6 U	9.1 U
1,1,2-Trichloroethane		0.6 U	0.7 U	50 U	100 U	540 U	6.3 U	7.8 U	5.6 U	9.1 U
Trichloroethene		0.6 U	0.7 U	38 U	76 U	410 U	6.3 U	7.8 U	5.6 U	9.1 U
Vinyl acetate		4 U	4 U	240 U	470 U	2600 U	NA	NA	NA	NA
Vinyl chloride		0.5 U	0.6 U	130 U	260 U	1400 U	6.3 U	7.8 U	5.6 U	9.1 U
M&p-Xylenes		NA	NA	NA	NA	NA	**8.6**	**6.3**	2.2 U	3.6 U
O-Xylene		NA	NA	NA	NA	NA	**3.2**	**2.4**	1.1 U	1.8 U
Xylenes (total)		1 U	**2 J**	320 U	630 U	3400 U	NA	NA	NA	NA

Notes:
ft bls - Feet below land surface
µg/kg - Micrograms per kilogram
B - Detected in blank
J - Estimated value
U - Not detected, detection limit is shown

Table A-1. Summary of Volatile Organic Compounds Detected in Soil, BASF Corporation, Closed Landfill, Rensselaer, New York

Analyte (Concentrations in µg/kg)	Sample Location:	LF-SB-102-3	LF-SB-102-3	LF-SB-102-4	LF-SB-102-4	LF-SB-102-5	LF-SB-102-5	LF-SB-102-6	LF-SB-102-6	LF-SB-102-7	LF-SB-102-7
	Sample Date:	04/06/04	04/06/04	04/06/04	04/06/04	04/06/04	04/06/04	04/06/04	04/06/04	04/06/04	04/06/04
	Sample Depth (ft bls):	0-4	4-7	0-4	4-7	0-4	4-7	0-4	4-7	0-4	4-7
	Sample Designation:	B9-101-6	B9-101-9	B9-101-21	B9-101-24	B9-102-10	B9-102-13	B9-103-2	B9-103-5	B9-103-16	B9-103-19
Acetone		**29**	**76**	22 U	**80**	**31**	**190**	26 U	**140**	**71**	**180**
Benzene		1.1 U	1.5 U	**4.4**	**2.9**	1.2 U	1.5 U	1.3 U	1.8 U	1.1 U	1.6 U
Bromodichloromethane		5.7 U	7.4 U	5.5 U	6 U	6.2 U	7.4 U	6.4 U	9.1 U	5.3 U	8.2 U
Bromoform		5.7 U	7.4 U	5.5 U	6 U	6.2 U	7.4 U	6.4 U	9.1 U	5.3 U	8.2 U
Bromomethane		5.7 U	7.4 U	5.5 U	6 U	6.2 U	7.4 U	6.4 U	9.1 U	5.3 U	8.2 U
2-Butanone		29 U	37 U	27 U	30 U	31 U	37 U	32 U	45 U	27 U	41 U
Carbon disulfide		5.7 U	7.4 U	5.5 U	6 U	6.2 U	7.4 U	6.4 U	9.1 U	5.3 U	8.2 U
Carbon tetrachloride		5.7 U	7.4 U	5.5 U	6 U	6.2 U	7.4 U	6.4 U	9.1 U	5.3 U	8.2 U
Chlorobenzene		5.7 U	**2.2 J**	**56**	**6.8**	6.2 U	7.4 U	6.4 U	9.1 U	5.3 U	8.2 U
Chloroethane		5.7 U	7.4 U	5.5 U	6 U	6.2 U	7.4 U	6.4 U	9.1 U	5.3 U	8.2 U
Chloroform		5.7 U	7.4 U	5.5 U	6 U	6.2 U	7.4 U	6.4 U	9.1 U	5.3 U	8.2 U
Chloromethane		5.7 U	7.4 U	5.5 U	6 U	6.2 U	7.4 U	6.4 U	9.1 U	5.3 U	8.2 U
Dibromochloromethane		5.7 U	7.4 U	5.5 U	6 U	6.2 U	7.4 U	6.4 U	9.1 U	5.3 U	8.2 U
1,2-Dichlorobenzene		5.7 U	7.4 U	**28**	**3 J**	6.2 U	7.4 U	6.4 U	9.1 U	5.3 U	8.2 U
1,3-Dichlorobenzene		5.7 U	7.4 U	**1.3 J**	6 U	6.2 U	7.4 U	6.4 U	9.1 U	5.3 U	8.2 U
1,4-Dichlorobenzene		5.7 U	7.4 U	**1.8 J**	6 U	6.2 U	7.4 U	6.4 U	9.1 U	5.3 U	8.2 U
1,1-Dichloroethane		5.7 U	7.4 U	5.5 U	6 U	6.2 U	7.4 U	6.4 U	9.1 U	5.3 U	8.2 U
1,2-Dichloroethane		5.7 U	7.4 U	**1.8 J**	6 U	6.2 U	7.4 U	6.4 U	9.1 U	5.3 U	8.2 U
1,1-Dichloroethene		5.7 U	7.4 U	5.5 U	6 U	6.2 U	7.4 U	6.4 U	9.1 U	5.3 U	8.2 U
Cis-1,2-Dichloroethene		5.7 U	7.4 U	5.5 U	6 U	6.2 U	7.4 U	6.4 U	9.1 U	5.3 U	8.2 U
Trans-1,2-Dichloroethene		5.7 U	7.4 U	5.5 U	6 U	6.2 U	7.4 U	6.4 U	9.1 U	5.3 U	8.2 U
1,2-Dichloroethene (total)		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichloropropane		5.7 U	7.4 U	5.5 U	6 U	6.2 U	7.4 U	6.4 U	9.1 U	5.3 U	8.2 U
Cis-1,3-Dichloropropene		5.7 U	7.4 U	5.5 U	6 U	6.2 U	7.4 U	6.4 U	9.1 U	5.3 U	8.2 U
Trans-1,3-Dichloropropene		5.7 U	7.4 U	5.5 U	6 U	6.2 U	7.4 U	6.4 U	9.1 U	5.3 U	8.2 U
Ethylbenzene		1.1 U	1.5 U	1.1 U	1.2 U	1.2 U	1.5 U	1.3 U	1.8 U	1.1 U	1.6 U
2-Hexanone		23 U	29 U	22 U	24 U	25 U	29 U	26 U	36 U	21 U	33 U
Methylene chloride		**11 B**	**5.1 JB**	**12 B**	**7.1 B**	**17 B**	**40 B**	**14 B**	**55 B**	**35 B**	**39 B**
4-Methyl-2-Pentanone		23 U	29 U	22 U	24 U	25 U	29 U	26 U	36 U	21 U	33 U
Styrene		1.1 U	1.5 U	1.1 U	1.2 U	1.2 U	1.5 U	1.3 U	1.8 U	1.1 U	1.6 U
1,1,2,2-Tetrachloroethane		5.7 U	7.4 U	5.5 U	6 U	6.2 U	7.4 U	6.4 U	9.1 U	5.3 U	8.2 U
Tetrachloroethene		5.7 U	7.4 U	5.5 U	6 U	6.2 U	7.4 U	6.4 U	9.1 U	5.3 U	8.2 U
Toluene		**3.7**	**14**	**69**	**49**	**12**	**31**	**5.2**	**18**	**7.8**	**4.7**
1,2,4-Trichlorobenzene		1.1 U	1.5 U	**3.8**	1.2 U	1.2 U	1.5 U	1.3 U	1.8 U	1.1 U	1.6 U
1,1,1-Trichloroethane		5.7 U	7.4 U	5.5 U	6 U	6.2 U	7.4 U	6.4 U	9.1 U	5.3 U	8.2 U
1,1,2-Trichloroethane		5.7 U	7.4 U	5.5 U	6 U	6.2 U	7.4 U	6.4 U	9.1 U	5.3 U	8.2 U
Trichloroethene		5.7 U	7.4 U	5.5 U	6 U	6.2 U	7.4 U	6.4 U	9.1 U	5.3 U	8.2 U
Vinyl acetate		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vinyl chloride		5.7 U	7.4 U	5.5 U	6 U	6.2 U	7.4 U	6.4 U	9.1 U	5.3 U	8.2 U
M&p-Xylenes		2.3 U	2.9 U	2.2 U	2.4 U	2.5 U	2.9 U	2.6 U	3.6 U	2.1 U	3.3 U
O-Xylene		1.1 U	1.5 U	1.1 U	1.2 U	1.2 U	1.5 U	1.3 U	1.8 U	1.1 U	1.6 U
Xylenes (total)		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:
ft bls - Feet below land surface
µg/kg - Micrograms per kilogram
B - Detected in blank
J - Estimated value
U - Not detected, detection limit is shown

Table A-1. Summary of Volatile Organic Compounds Detected in Soil, BASF Corporation, Closed Landfill, Rensselaer, New York

Analyte (Concentrations in µg/kg)	Sample Location:	LF-SB-102-8	LF-SB-102-8	LF-SB-103	LF-SB-103	LF-SB-103-1	LF-SB-103-1	LF-SB-103-2	LF-SB-103-2	LF-SB-103-3
	Sample Date:	04/06/04	04/06/04	03/13/02	03/13/02	04/06/04	04/06/04	04/06/04	04/06/04	04/06/04
	Sample Depth (ft bls):	0-4	4-7	3-5	5-7	0-4	4-7	0-4	4-7	0-4
	Sample Designation:	B9-104-6	B9-104-9	B7-51-25	B7-52-02	B9-104-22	B9-105-2	B9-105-16	B9-105-19	B9-106-7
Acetone		**35**	**180**	2400 U	5500 U	**290**	**470**	**25**	**230**	**30**
Benzene		1.2 U	1.8 U	**1200**	**27000**	1.2 U	**85**	**1.7**	**450**	**1.6**
Bromodichloromethane		6.2 U	8.8 U	86 U	200 U	6 U	35 U	6 U	38 U	6 U
Bromoform		6.2 U	8.8 U	93 U	210 U	6 U	35 U	6 U	38 U	6 U
Bromomethane		6.2 U	8.8 U	210 U	470 U	6 U	35 U	6 U	38 U	6 U
2-Butanone		31 U	44 U	370 U	**1400 J**	30 U	180 U	30 U	190 U	30 U
Carbon disulfide		6.2 U	8.8 U	8 U	17 U	6 U	35 U	6 U	38 U	6 U
Carbon tetrachloride		6.2 U	8.8 U	120 U	270 U	6 U	35 U	6 U	38 U	6 U
Chlorobenzene		6.2 U	8.8 U	**300 J**	**1900 J**	6 U	**45**	6 U	**52**	**1.5 J**
Chloroethane		6.2 U	8.8 U	140 U	320 U	6 U	35 U	6 U	38 U	6 U
Chloroform		6.2 U	8.8 U	290 U	650 U	6 U	35 U	6 U	38 U	6 U
Chloromethane		6.2 U	8.8 U	130 U	300 U	6 U	35 U	6 U	38 U	6 U
Dibromochloromethane		6.2 U	8.8 U	87 U	200 U	6 U	35 U	6 U	38 U	6 U
1,2-Dichlorobenzene		6.2 U	8.8 U	NA	NA	**2.1 J**	**28 J**	**2 J**	**11 J**	**1.9 J**
1,3-Dichlorobenzene		6.2 U	8.8 U	NA	NA	6 U	35 U	6 U	38 U	6 U
1,4-Dichlorobenzene		6.2 U	8.8 U	NA	NA	6 U	35 U	6 U	38 U	6 U
1,1-Dichloroethane		6.2 U	8.8 U	120 U	260 U	6 U	35 U	6 U	38 U	6 U
1,2-Dichloroethane		6.2 U	8.8 U	**3200**	**15000**	**12**	35 U	6 U	38 U	**1.5 J**
1,1-Dichloroethene		6.2 U	8.8 U	**800 J**	**770 J**	**1.3 J**	**15 J**	6 U	38 U	6 U
Cis-1,2-Dichloroethene		6.2 U	8.8 U	NA	NA	**11**	**88**	6 U	**22 J**	6 U
Trans-1,2-Dichloroethene		6.2 U	8.8 U	NA	NA	**2.5 J**	**14 J**	6 U	38 U	6 U
1,2-Dichloroethene (total)		NA	NA	**2900**	**6500**	NA	NA	NA	NA	NA
1,2-Dichloropropane		6.2 U	8.8 U	59 U	130 U	6 U	35 U	6 U	38 U	6 U
Cis-1,3-Dichloropropene		6.2 U	8.8 U	80 U	180 U	6 U	35 U	6 U	38 U	6 U
Trans-1,3-Dichloropropene		6.2 U	8.8 U	76 U	170 U	6 U	35 U	6 U	38 U	6 U
Ethylbenzene		1.2 U	1.8 U	150 U	**430 J**	1.2 U	**80**	1.2 U	**17**	1.2 U
2-Hexanone		25 U	35 U	350 U	790 U	24 U	140 U	24 U	150 U	24 U
Methylene chloride		**18 B**	**35 B**	250 U	560 U	**9.8 B**	**200 B**	**11 B**	**180 B**	**9.7 B**
4-Methyl-2-Pentanone		25 U	35 U	420 U	940 U	24 U	140 U	24 U	150 U	24 U
Styrene		1.2 U	1.8 U	150 U	340 U	1.2 U	7 U	1.2 U	7.6 U	1.2 U
1,1,2,2-Tetrachloroethane		6.2 U	8.8 U	170 U	390 U	6 U	35 U	6 U	38 U	6 U
Tetrachloroethene		6.2 U	8.8 U	200 U	440 U	6 U	35 U	6 U	38 U	6 U
Toluene		**15**	**3.2**	170 U	390 U	**13**	**320**	**5.4**	**410**	**3.8**
1,2,4-Trichlorobenzene		1.2 U	1.8 U	NA	NA	1.2 U	7 U	1.2 U	7.6 U	1.2 U
1,1,1-Trichloroethane		6.2 U	8.8 U	120 U	270 U	6 U	35 U	6 U	38 U	6 U
1,1,2-Trichloroethane		6.2 U	8.8 U	81 U	180 U	6 U	35 U	6 U	38 U	6 U
Trichloroethene		6.2 U	8.8 U	**4500**	**5600**	**18**	**54**	6 U	38 U	6 U
Vinyl acetate		NA	NA	380 U	860 U	NA	NA	NA	NA	NA
Vinyl chloride		6.2 U	8.8 U	210 U	470 U	6 U	35 U	6 U	38 U	6 U
M&p-Xylenes		2.5 U	3.5 U	NA	NA	2.4 U	**38**	2.4 U	15 U	2.4 U
O-Xylene		1.2 U	1.8 U	NA	NA	**1.3**	**92**	1.2 U	**8.4**	1.2 U
Xylenes (total)		NA	NA	510 U	**1600 J**	NA	NA	NA	NA	NA

Notes:
ft bls - Feet below land surface
µg/kg - Micrograms per kilogram
B - Detected in blank
J - Estimated value
U - Not detected, detection limit is shown

Table A-1. Summary of Volatile Organic Compounds Detected in Soil, BASF Corporation, Closed Landfill, Rensselaer, New York

Analyte (Concentrations in µg/kg)	LF-SB-103-3	LF-SB-103-4	LF-SB-103-4	LF-SB-103-5	LF-SB-103-5	LF-SB-103-6	LF-SB-103-6	LF-SB-103-7	LF-SB-103-7	LF-SB-103-8
Sample Date:	04/06/04	04/06/04	04/06/04	04/06/04	04/06/04	04/08/04	04/08/04	04/08/04	04/08/04	04/08/04
Sample Depth (ft bls):	4-7	0-4	4-7	0-4	4-7	0-4	4-8	0-4	4-8	0-4
Sample Designation:	B9-106-14	B9-107-5	B9-107-8	B9-107-23	B9-108-2	B9-136-20	B9-136-23	B9-137-15	B9-137-18	B9-138-12
Acetone	**370**	**43**	**190**	**150**	3500 U	130 U	32000 U	**510**	**160**	**120**
Benzene	**44**	1.2 U	**28**	**13**	**9600**	6.3 U	**28000**	**57**	**2800**	**9.6**
Bromodichloromethane	42 U	5.8 U	40 U	29 U	880 U	32 U	8100 U	32 U	37 U	29 U
Bromoform	42 U	5.8 U	40 U	29 U	880 U	32 U	8100 U	32 U	37 U	29 U
Bromomethane	42 U	5.8 U	40 U	29 U	880 U	32 U	8100 U	32 U	37 U	29 U
2-Butanone	210 U	29 U	200 U	140 U	4400 U	160 U	41000 U	160 U	180 U	150 U
Carbon disulfide	42 U	5.8 U	40 U	29 U	880 U	32 U	8100 U	32 U	37 U	29 U
Carbon tetrachloride	42 U	5.8 U	40 U	29 U	880 U	32 U	8100 U	32 U	37 U	29 U
Chlorobenzene	**460**	5.8 U	40 U	29 U	**640 J**	**7.5 J**	**6200 J**	**61**	**760**	**87**
Chloroethane	42 U	5.8 U	40 U	29 U	880 U	32 U	8100 U	32 U	37 U	29 U
Chloroform	42 U	5.8 U	40 U	29 U	880 U	32 U	8100 U	32 U	37 U	29 U
Chloromethane	42 U	5.8 U	40 U	29 U	880 U	32 U	8100 U	32 U	37 U	29 U
Dibromochloromethane	42 U	5.8 U	40 U	29 U	880 U	32 U	8100 U	32 U	37 U	29 U
1,2-Dichlorobenzene	**16 J**	5.8 U	**12 J**	**13 J**	**1100**	32 U	**4600 J**	32 U	**210**	**120**
1,3-Dichlorobenzene	42 U	5.8 U	40 U	29 U	880 U	32 U	**2500 J**	32 U	37 U	29 U
1,4-Dichlorobenzene	42 U	5.8 U	40 U	29 U	880 U	32 U	**3100 J**	32 U	**32 J**	29 U
1,1-Dichloroethane	42 U	5.8 U	40 U	29 U	880 U	32 U	8100 U	32 U	37 U	29 U
1,2-Dichloroethane	42 U	5.8 U	40 U	**1100**	880 U	**840**	**34000**	32 U	37 U	**9.6 J**
1,1-Dichloroethene	42 U	5.8 U	40 U	29 U	880 U	32 U	8100 U	32 U	37 U	29 U
Cis-1,2-Dichloroethene	42 U	5.8 U	40 U	**15 J**	**210 J**	32 U	**5800 J**	32 U	**68**	29 U
Trans-1,2-Dichloroethene	42 U	5.8 U	40 U	29 U	880 U	32 U	8100 U	32 U	**11 J**	29 U
1,2-Dichloroethene (total)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichloropropane	42 U	5.8 U	40 U	29 U	880 U	32 U	8100 U	32 U	37 U	29 U
Cis-1,3-Dichloropropene	42 U	5.8 U	40 U	29 U	880 U	32 U	8100 U	32 U	37 U	29 U
Trans-1,3-Dichloropropene	42 U	5.8 U	40 U	29 U	880 U	32 U	8100 U	32 U	37 U	29 U
Ethylbenzene	8.5 U	1.2 U	7.9 U	5.7 U	**280**	6.3 U	1600 U	6.3 U	**43**	5.9 U
2-Hexanone	170 U	23 U	160 U	110 U	3500 U	130 U	32000 U	130 U	150 U	120 U
Methylene chloride	**130 B**	**22 B**	**60 B**	**64 B**	**210 J**	**42 B**	8100 U	**57 B**	**29 JB**	**62 B**
4-Methyl-2-Pentanone	170 U	23 U	160 U	110 U	3500 U	130 U	32000 U	130 U	150 U	120 U
Styrene	8.5 U	1.2 U	7.9 U	5.7 U	180 U	6.3 U	1600 U	6.3 U	7.4 U	5.9 U
1,1,2,2-Tetrachloroethane	42 U	5.8 U	40 U	29 U	880 U	32 U	8100 U	32 U	37 U	29 U
Tetrachloroethene	42 U	5.8 U	40 U	29 U	880 U	32 U	8100 U	32 U	37 U	29 U
Toluene	**120**	**9.1**	**270**	**42**	180 U	**25**	**3600**	**93**	**80**	**120**
1,2,4-Trichlorobenzene	8.5 U	1.2 U	7.9 U	5.7 U	180 U	6.3 U	**440000**	6.3 U	**14**	5.9 U
1,1,1-Trichloroethane	42 U	5.8 U	40 U	29 U	880 U	32 U	8100 U	32 U	37 U	29 U
1,1,2-Trichloroethane	42 U	5.8 U	40 U	29 U	880 U	32 U	8100 U	32 U	37 U	29 U
Trichloroethene	42 U	5.8 U	**61**	**10 J**	**710 J**	32 U	**6000 J**	32 U	**56**	29 U
Vinyl acetate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vinyl chloride	42 U	5.8 U	40 U	29 U	880 U	32 U	8100 U	32 U	37 U	29 U
M&p-Xylenes	17 U	2.3 U	**18**	11 U	**1200**	13 U	3200 U	13 U	**170**	12 U
O-Xylene	8.5 U	1.2 U	7.9 U	5.7 U	**1100**	6.3 U	1600 U	6.3 U	**84**	**7.1**
Xylenes (total)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:
ft bls - Feet below land surface
µg/kg - Micrograms per kilogram
B - Detected in blank
J - Estimated value
U - Not detected, detection limit is shown

Table A-1. Summary of Volatile Organic Compounds Detected in Soil, BASF Corporation, Closed Landfill, Rensselaer, New York

Analyte (Concentrations in µg/kg)	Sample Location:	LF-SB-103-8	LF-SB-103-9	LF-SB-103-9	LF-SB-103-10	LF-SB-103-10	LF-SB-103-11	LF-SB-103-11	LF-SB-103-12	LF-SB-103-12	LF-SB-103-13
	Sample Date:	04/08/04	04/09/04	04/09/04	04/09/04	04/09/04	04/09/04	04/09/04	04/09/04	04/09/04	04/09/04
	Sample Depth (ft bls):	4-8	0-4	4-8	0-4	4-8	0-4	4-8	0-4	4-8	0-4
	Sample Designation:	B9-138-15	B9-140-19	B9-140-22	B9-141-16	B9-141-19	B9-142-13	B9-142-16	B9-143-13	B9-143-16	B9-144-12
Acetone		**310**	120 U	4700 U	**260**	3300 U	110 U	**300**	83000 U	3100 U	**210**
Benzene		**320**	**11**	**18000**	6.5 U	**9000**	5.6 U	**110**	4200 U	**2300**	**13**
Bromodichloromethane		33 U	30 U	1200 U	32 U	830 U	28 U	33 U	21000 U	770 U	31 U
Bromoform		33 U	30 U	1200 U	32 U	830 U	28 U	33 U	21000 U	770 U	31 U
Bromomethane		33 U	30 U	1200 U	32 U	830 U	28 U	33 U	21000 U	770 U	31 U
2-Butanone		170 U	150 U	5900 U	160 U	4200 U	140 U	160 U	100000 U	3900 U	150 U
Carbon disulfide		33 U	30 U	1200 U	32 U	830 U	28 U	**9.3 J**	21000 U	770 U	31 U
Carbon tetrachloride		33 U	30 U	1200 U	32 U	830 U	28 U	33 U	21000 U	770 U	31 U
Chlorobenzene		**140**	**7.5 J**	**1700**	32 U	**1500**	**7.5 J**	**36**	**36000**	**430 J**	31 U
Chloroethane		33 U	30 U	1200 U	32 U	830 U	28 U	33 U	21000 U	770 U	31 U
Chloroform		33 U	30 U	1200 U	32 U	830 U	28 U	33 U	21000 U	770 U	31 U
Chloromethane		33 U	30 U	1200 U	32 U	830 U	28 U	33 U	21000 U	770 U	31 U
Dibromochloromethane		33 U	30 U	1200 U	32 U	830 U	28 U	33 U	21000 U	770 U	31 U
1,2-Dichlorobenzene		**10 J**	30 U	1200 U	32 U	**650 J**	28 U	33 U	21000 U	770 U	31 U
1,3-Dichlorobenzene		33 U	30 U	1200 U	32 U	830 U	28 U	33 U	21000 U	770 U	31 U
1,4-Dichlorobenzene		33 U	30 U	1200 U	32 U	**600 J**	28 U	33 U	21000 U	770 U	31 U
1,1-Dichloroethane		33 U	30 U	1200 U	32 U	830 U	28 U	33 U	21000 U	770 U	31 U
1,2-Dichloroethane		33 U	30 U	1200 U	32 U	830 U	28 U	33 U	21000 U	770 U	31 U
1,1-Dichloroethene		33 U	30 U	**1600**	32 U	**190 J**	28 U	33 U	21000 U	770 U	31 U
Cis-1,2-Dichloroethene		33 U	30 U	**8800**	32 U	**2900**	28 U	33 U	21000 U	**230 J**	31 U
Trans-1,2-Dichloroethene		33 U	30 U	**1400**	32 U	**1300**	28 U	33 U	21000 U	770 U	31 U
1,2-Dichloroethene (total)		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichloropropane		33 U	30 U	1200 U	32 U	830 U	28 U	33 U	21000 U	770 U	31 U
Cis-1,3-Dichloropropene		33 U	30 U	1200 U	32 U	830 U	28 U	33 U	21000 U	770 U	31 U
Trans-1,3-Dichloropropene		33 U	30 U	1200 U	32 U	830 U	28 U	33 U	21000 U	770 U	31 U
Ethylbenzene		6.7 U	6 U	**830**	6.5 U	170 U	5.6 U	6.6 U	4200 U	150 U	6.2 U
2-Hexanone		130 U	120 U	4700 U	130 U	3300 U	110 U	130 U	83000 U	3100 U	120 U
Methylene chloride		**51 B**	**74 B**	**600 J**	**150 B**	830 U	**46 B**	**36 B**	21000 U	770 U	**120 B**
4-Methyl-2-Pentanone		130 U	120 U	4700 U	130 U	3300 U	110 U	130 U	83000 U	3100 U	120 U
Styrene		6.7 U	6 U	240 U	6.5 U	170 U	5.6 U	6.6 U	4200 U	150 U	6.2 U
1,1,2,2-Tetrachloroethane		33 U	30 U	1200 U	32 U	830 U	28 U	33 U	**590000**	770 U	31 U
Tetrachloroethene		33 U	**6.4 J**	1200 U	32 U	830 U	28 U	33 U	**4700 J**	**230 J**	31 U
Toluene		**58**	**100**	240 U	6.5 U	**230**	**39**	6.6 U	4200 U	**360**	**8**
1,2,4-Trichlorobenzene		6.7 U	6 U	240 U	6.5 U	**630**	5.6 U	6.6 U	**10000**	**2500**	6.2 U
1,1,1-Trichloroethane		33 U	30 U	1200 U	32 U	830 U	28 U	33 U	21000 U	770 U	31 U
1,1,2-Trichloroethane		33 U	30 U	1200 U	32 U	830 U	28 U	33 U	21000 U	770 U	31 U
Trichloroethene		33 U	30 U	**31000**	32 U	**3100**	28 U	33 U	**340000**	**8300**	31 U
Vinyl acetate		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vinyl chloride		33 U	30 U	1200 U	32 U	**290 J**	28 U	33 U	21000 U	770 U	31 U
M&p-Xylenes		13 U	12 U	**3600**	13 U	330 U	11 U	13 U	8300 U	**650**	12 U
O-Xylene		6.7 U	6 U	**5200**	6.5 U	170 U	5.6 U	6.6 U	**29000**	**290**	6.2 U
Xylenes (total)		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:
ft bls - Feet below land surface
µg/kg - Micrograms per kilogram
B - Detected in blank
J - Estimated value
U - Not detected, detection limit is shown

Table A-1. Summary of Volatile Organic Compounds Detected in Soil, BASF Corporation, Closed Landfill, Rensselaer, New York

Analyte (Concentrations in µg/kg)	Sample Location:	LF-SB-103-13	LF-SB-103-14	LF-SB-103-14	LF-SB-103-15	LF-SB-103-15	LF-SB-103-16	LF-SB-103-16	LF-SB-103-17	LF-SB-103-17	LF-SB-103-18
	Sample Date:	04/09/04	04/09/04	04/09/04	04/09/04	04/09/04	04/09/04	04/09/04	05/18/04	05/18/04	05/18/04
	Sample Depth (ft bls):	4-8	0-4	4-8	0-4	4-8	0-4	4-8	4-8	4-8	4-8
	Sample Designation:	B9-144-15	B9-145-2	B9-145-5	B9-145-16	B9-145-19	B9-146-6	B9-146-9	B11-8-21	B11-8-24	B11-8-2
Acetone		**30**	**62**	**310**	**150**	48 U	130 U	**660**	35 U	220 U	160 U
Benzene		**2**	1.3 U	**140**	6.3 U	2.4 U	6.7 U	**24**	1.4 U	**15**	6.6 U
Bromodichloromethane		6 U	6.7 U	33 U	31 U	12 U	33 U	93 U	7 U	45 U	33 U
Bromoform		6 U	6.7 U	33 U	31 U	12 U	33 U	93 U	7 U	45 U	33 U
Bromomethane		6 U	6.7 U	33 U	31 U	12 U	33 U	93 U	7 U	45 U	33 U
2-Butanone		30 U	33 U	170 U	160 U	60 U	170 U	460 U	35 U	220 U	160 U
Carbon disulfide		6 U	6.7 U	33 U	31 U	12 U	33 U	93 U	7 U	45 U	33 U
Carbon tetrachloride		6 U	6.7 U	33 U	31 U	12 U	33 U	93 U	7 U	45 U	33 U
Chlorobenzene		6 U	6.7 U	**42**	31 U	12 U	33 U	93 U	**20**	**3000**	**280**
Chloroethane		6 U	6.7 U	33 U	31 U	12 U	33 U	93 U	7 U	45 U	33 U
Chloroform		6 U	6.7 U	33 U	31 U	12 U	33 U	93 U	7 U	45 U	33 U
Chloromethane		6 U	6.7 U	33 U	31 U	12 U	33 U	93 U	7 U	45 U	33 U
Dibromochloromethane		6 U	6.7 U	33 U	31 U	12 U	33 U	93 U	7 U	45 U	33 U
1,2-Dichlorobenzene		6 U	6.7 U	33 U	31 U	12 U	33 U	93 U	7 U	**23 J**	**44**
1,3-Dichlorobenzene		6 U	6.7 U	33 U	31 U	12 U	33 U	93 U	7 U	45 U	**13 J**
1,4-Dichlorobenzene		6 U	6.7 U	33 U	31 U	12 U	33 U	93 U	7 U	45 U	**13 J**
1,1-Dichloroethane		6 U	6.7 U	33 U	31 U	12 U	33 U	93 U	7 U	45 U	33 U
1,2-Dichloroethane		6 U	6.7 U	**42**	31 U	**4.9 J**	33 U	93 U	7 U	45 U	33 U
1,1-Dichloroethene		6 U	6.7 U	33 U	31 U	12 U	33 U	93 U	7 U	45 U	33 U
Cis-1,2-Dichloroethene		6 U	6.7 U	**17 J**	31 U	12 U	33 U	93 U	7 U	45 U	33 U
Trans-1,2-Dichloroethene		6 U	6.7 U	33 U	31 U	12 U	33 U	93 U	7 U	45 U	33 U
1,2-Dichloroethene (total)		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichloropropane		6 U	6.7 U	33 U	31 U	12 U	33 U	93 U	7 U	45 U	33 U
Cis-1,3-Dichloropropene		6 U	6.7 U	33 U	31 U	12 U	33 U	93 U	7 U	45 U	33 U
Trans-1,3-Dichloropropene		6 U	6.7 U	33 U	31 U	12 U	33 U	93 U	7 U	45 U	33 U
Ethylbenzene		1.2 U	1.3 U	6.7 U	6.3 U	2.4 U	6.7 U	19 U	1.4 U	8.9 U	**20**
2-Hexanone		24 U	27 U	130 U	120 U	48 U	130 U	370 U	28 U	180 U	130 U
Methylene chloride		**12 B**	**6.1 JB**	**130 B**	**57 B**	**34 B**	**35 B**	**340 B**	**56 B**	**130 B**	**79 B**
4-Methyl-2-Pentanone		24 U	27 U	130 U	120 U	48 U	130 U	370 U	28 U	180 U	130 U
Styrene		1.2 U	1.3 U	6.7 U	6.3 U	2.4 U	6.7 U	19 U	7 U	45 U	33 U
1,1,2,2-Tetrachloroethane		6 U	6.7 U	33 U	31 U	12 U	33 U	93 U	7 U	45 U	33 U
Tetrachloroethene		6 U	6.7 U	33 U	31 U	12 U	33 U	93 U	7 U	45 U	33 U
Toluene		1.2 U	**1.9**	**14**	**30**	2.4 U	**12**	**33**	**59**	**58**	**39**
1,2,4-Trichlorobenzene		1.2 U	1.3 U	6.7 U	6.3 U	2.4 U	6.7 U	19 U	1.4 U	**38**	**21**
1,1,1-Trichloroethane		6 U	6.7 U	33 U	31 U	12 U	33 U	93 U	7 U	45 U	33 U
1,1,2-Trichloroethane		6 U	6.7 U	33 U	31 U	12 U	33 U	93 U	7 U	45 U	33 U
Trichloroethene		**1.7 J**	6.7 U	**8.7 J**	31 U	12 U	33 U	93 U	7 U	45 U	33 U
Vinyl acetate		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vinyl chloride		6 U	6.7 U	33 U	31 U	12 U	33 U	93 U	7 U	45 U	33 U
M&p-Xylenes		2.4 U	2.7 U	13 U	13 U	4.8 U	13 U	37 U	2.8 U	**15 J**	**77**
O-Xylene		1.2 U	1.3 U	6.7 U	6.3 U	2.4 U	6.7 U	19 U	1.4 U	8.9 U	**70**
Xylenes (total)		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:
ft bls - Feet below land surface
µg/kg - Micrograms per kilogram
B - Detected in blank
J - Estimated value
U - Not detected, detection limit is shown

Table A-1. Summary of Volatile Organic Compounds Detected in Soil, BASF Corporation, Closed Landfill, Rensselaer, New York

Analyte (Concentrations in µg/kg)	Sample Location:	LF-SB-103-18	LF-SB-103-19	LF-SB-103-19	LF-SB-103-20	LF-SB-103-20	LF-SB-103-21	LF-SB-103-21	LF-SB-103-22	LF-SB-103-22
	Sample Date:	05/18/04	05/18/04	05/18/04	05/18/04	05/18/04	05/18/04	05/18/04	05/18/04	05/18/04
	Sample Depth (ft bls):	4-8	4-8	4-8	4-8	4-8	4-8	4-8	4-8	4-8
	Sample Designation:	B11-8-5	B11-10-7	B11-10-10	B11-9-15	B11-9-18	B11-7-12	B11-7-15	B11-6-14	B11-6-22
Acetone		7400 U	**410**	44 U	39 U	34 U	**390**	69 U	33 U	30 U
Benzene		1500 U	1.3 U	**2.8**	1.6 U	**2.4**	**2.7**	**130**	1.3 U	**7.5**
Bromodichloromethane		1500 U	6.3 U	8.8 U	7.8 U	6.8 U	8.8 U	14 U	6.7 U	6 U
Bromoform		1500 U	6.3 U	8.8 U	7.8 U	6.8 U	8.8 U	14 U	6.7 U	6 U
Bromomethane		1500 U	6.3 U	8.8 U	7.8 U	6.8 U	8.8 U	14 U	6.7 U	6 U
2-Butanone		7400 U	32 U	44 U	39 U	34 U	44 U	69 U	33 U	30 U
Carbon disulfide		1500 U	**7.2**	**4.2 J**	7.8 U	6.8 U	8.8 U	14 U	6.7 U	6 U
Carbon tetrachloride		1500 U	6.3 U	8.8 U	7.8 U	6.8 U	8.8 U	14 U	6.7 U	6 U
Chlorobenzene		**19000**	**2.6 J**	**3.5 J**	**4.8 J**	**2.4 J**	8.8 U	**5.4 J**	6.7 U	6 U
Chloroethane		1500 U	6.3 U	8.8 U	7.8 U	6.8 U	8.8 U	14 U	6.7 U	6 U
Chloroform		1500 U	6.3 U	8.8 U	7.8 U	6.8 U	8.8 U	14 U	6.7 U	6 U
Chloromethane		1500 U	6.3 U	8.8 U	7.8 U	6.8 U	8.8 U	14 U	6.7 U	6 U
Dibromochloromethane		1500 U	6.3 U	8.8 U	7.8 U	6.8 U	8.8 U	14 U	6.7 U	6 U
1,2-Dichlorobenzene		1500 U	6.3 U	**4.6 J**	7.8 U	6.8 U	8.8 U	**7.8 J**	6.7 U	6 U
1,3-Dichlorobenzene		1500 U	6.3 U	8.8 U	7.8 U	6.8 U	8.8 U	**3.3 J**	6.7 U	6 U
1,4-Dichlorobenzene		1500 U	6.3 U	8.8 U	7.8 U	6.8 U	8.8 U	**5.2 J**	6.7 U	6 U
1,1-Dichloroethane		1500 U	6.3 U	8.8 U	7.8 U	6.8 U	8.8 U	14 U	6.7 U	6 U
1,2-Dichloroethane		1500 U	6.3 U	8.8 U	**28**	6.8 U	8.8 U	14 U	6.7 U	**5 J**
1,1-Dichloroethene		1500 U	6.3 U	8.8 U	7.8 U	6.8 U	8.8 U	14 U	6.7 U	6 U
Cis-1,2-Dichloroethene		1500 U	6.3 U	8.8 U	7.8 U	6.8 U	8.8 U	14 U	6.7 U	6 U
Trans-1,2-Dichloroethene		1500 U	6.3 U	8.8 U	7.8 U	6.8 U	8.8 U	14 U	6.7 U	6 U
1,2-Dichloroethene (total)		NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichloropropane		1500 U	6.3 U	8.8 U	7.8 U	6.8 U	8.8 U	14 U	6.7 U	6 U
Cis-1,3-Dichloropropene		1500 U	6.3 U	8.8 U	7.8 U	6.8 U	8.8 U	14 U	6.7 U	6 U
Trans-1,3-Dichloropropene		1500 U	6.3 U	8.8 U	7.8 U	6.8 U	8.8 U	14 U	6.7 U	6 U
Ethylbenzene		1500 U	1.3 U	1.8 U	1.6 U	1.4 U	1.8 U	2.8 U	1.3 U	1.2 U
2-Hexanone		6000 U	25 U	35 U	31 U	27 U	35 U	56 U	27 U	24 U
Methylene chloride		**540 JB**	**14 B**	**24 B**	**22 B**	**7.8 B**	**17 B**	**73 B**	**12 B**	**12 B**
4-Methyl-2-Pentanone		6000 U	25 U	35 U	31 U	27 U	35 U	56 U	27 U	24 U
Styrene		1500 U	6.3 U	8.8 U	7.8 U	6.8 U	8.8 U	14 U	6.7 U	6 U
1,1,2,2-Tetrachloroethane		1500 U	6.3 U	8.8 U	7.8 U	6.8 U	8.8 U	14 U	6.7 U	6 U
Tetrachloroethene		1500 U	6.3 U	8.8 U	7.8 U	6.8 U	8.8 U	14 U	6.7 U	6 U
Toluene		1500 U	**10**	**22**	**6.4**	**60**	**9.9**	**17**	1.3 U	**17**
1,2,4-Trichlorobenzene		1500 U	1.3 U	1.8 U	1.6 U	**3.6**	1.8 U	**10 J**	1.3 U	1.2 U
1,1,1-Trichloroethane		1500 U	6.3 U	8.8 U	7.8 U	6.8 U	8.8 U	14 U	6.7 U	6 U
1,1,2-Trichloroethane		1500 U	6.3 U	8.8 U	7.8 U	6.8 U	8.8 U	14 U	6.7 U	6 U
Trichloroethene		1500 U	6.3 U	8.8 U	7.8 U	6.8 U	8.8 U	14 U	6.7 U	6 U
Vinyl acetate		NA	NA	NA	NA	NA	NA	NA	NA	NA
Vinyl chloride		1500 U	6.3 U	8.8 U	7.8 U	6.8 U	8.8 U	14 U	6.7 U	6 U
M&p-Xylenes		3000 U	2.5 U	3.5 U	3.1 U	2.7 U	3.5 U	**7.8**	2.7 U	**1.9 J**
O-Xylene		1500 U	1.3 U	1.8 U	1.6 U	1.4 U	1.8 U	2.8 U	1.3 U	1.2 U
Xylenes (total)		NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:
ft bls - Feet below land surface
µg/kg - Micrograms per kilogram
B - Detected in blank
J - Estimated value
U - Not detected, detection limit is shown

Table A-1. Summary of Volatile Organic Compounds Detected in Soil, BASF Corporation, Closed Landfill, Rensselaer, New York

Analyte (Concentrations in µg/kg)								
Sample Location:	LF-SB-104	LF-SB-104 DUP	LF-SB-104	LF-SB-106	LF-SB-106	LF-SB-107	LF-SB-107	LF-SB-107
Sample Date:	03/14/02	03/14/02	03/14/02	03/14/02	03/14/02	03/13/02	03/13/02	03/14/02
Sample Depth (ft bls):	1-3	1-3	5-7	2-4	4-6	1-3	3-5	1-3
Sample Designation:	B7-58-08	B7-58-17	B7-58-14	B7-63-02	B7-63-05	B7-53-07	B7-53-10	B7-61-16
Acetone	7 UB	**25 B**	**15 B**	**13 B**	3000 U	**61 B**	**44 B**	14000 U
Benzene	0.7 U	0.7 U	0.6 U	0.6 U	110 U	0.6 U	3 U	**30000**
Bromodichloromethane	0.7 U	0.7 U	0.6 U	0.6 U	110 U	0.6 U	3 U	510 U
Bromoform	0.9 U	0.9 U	0.7 U	0.7 U	120 U	0.7 U	4 U	550 U
Bromomethane	4 U	4 U	3 U	3 U	260 U	3 U	17 U	1200 U
2-Butanone	4 U	4 U	3 U	3 U	460 U	**19**	**20 J**	2200 U
Carbon disulfide	**0.4 J**	0.3 U	0.2 U	0.2 U	9 U	**0.9 J**	1 U	**270 J**
Carbon tetrachloride	0.6 U	**14**	0.5 U	0.5 U	150 U	0.4 U	3 U	720 U
Chlorobenzene	**3 J**	**8**	**0.9 J**	**23**	**22000**	**19**	**5 J**	**100000**
Chloroethane	1 U	1 U	0.8 U	0.8 U	170 U	0.8 U	5 U	840 U
Chloroform	0.9 U	**5 J**	0.7 U	0.7 U	350 U	0.7 U	4 U	1700 U
Chloromethane	1 U	1 U	1 U	1 U	160 U	0.9 U	5 U	790 U
Dibromochloromethane	0.6 U	0.6 U	0.5 U	0.5 U	110 U	0.4 U	3 U	520 U
1,2-Dichlorobenzene	NA	NA	NA	NA	NA	NA	NA	NA
1,3-Dichlorobenzene	NA	NA	NA	NA	NA	NA	NA	NA
1,4-Dichlorobenzene	NA	NA	NA	NA	NA	NA	NA	NA
1,1-Dichloroethane	0.7 U	0.7 U	0.6 U	0.6 U	140 U	0.6 U	3 U	690 U
1,2-Dichloroethane	0.6 U	0.6 U	0.5 U	0.5 U	320 U	0.4 U	3 U	1500 U
1,1-Dichloroethene	0.7 U	0.7 U	0.6 U	0.6 U	81 U	0.6 U	3 U	390 U
Cis-1,2-Dichloroethene	NA	NA	NA	NA	NA	NA	NA	NA
Trans-1,2-Dichloroethene	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichloroethene (total)	0.7 U	0.7 U	0.6 U	0.6 U	170 U	0.6 U	3 U	840 U
1,2-Dichloropropane	0.6 U	0.6 U	0.5 U	0.5 U	72 U	0.4 U	3 U	350 U
Cis-1,3-Dichloropropene	0.6 U	0.6 U	0.5 U	0.5 U	98 U	0.4 U	3 U	470 U
Trans-1,3-Dichloropropene	0.6 U	0.6 U	0.5 U	0.5 U	94 U	0.4 U	3 U	450 U
Ethylbenzene	0.6 U	**2 J**	0.5 U	0.5 U	180 UH	**0.6 J**	**4 J**	**66000 H**
2-Hexanone	5 U	5 U	4 U	4 U	430 U	4 U	23 U	2100 U
Methylene chloride	**2 JB**	**9 B**	**5 JB**	**2 JB**	300 U	**3 JB**	**14 JB**	1500 U
4-Methyl-2-Pentanone	4 U	4 U	3 U	3 U	510 U	3 U	19 U	2500 U
Styrene	0.7 U	0.7 U	0.6 U	0.6 U	180 U	0.6 U	3 U	890 U
1,1,2,2-Tetrachloroethane	1 U	1 U	1 U	1 U	210 U	1 U	6 U	1000 U
Tetrachloroethene	0.6 U	0.6 U	0.5 U	0.5 U	240 U	0.4 U	3 U	1200 U
Toluene	**1 JB**	**110**	**32**	**23**	210 U	**4 J**	**4 J**	**1400 J**
1,2,4-Trichlorobenzene	NA	NA	NA	NA	NA	NA	NA	NA
1,1,1-Trichloroethane	0.7 U	0.7 U	0.6 U	0.6 U	150 U	0.6 U	3 U	720 U
1,1,2-Trichloroethane	0.7 U	0.7 U	0.6 U	0.6 U	100 U	0.6 U	3 U	480 U
Trichloroethene	**2 J**	**17**	**1 J**	0.6 U	76 U	0.6 U	3 U	370 U
Vinyl acetate	4 U	4 U	4 U	4 U	470 U	3 U	20 U	2300 U
Vinyl chloride	0.6 U	0.6 U	0.5 U	0.5 U	260 U	0.4 U	3 U	1200 U
M&p-Xylenes	NA	NA	NA	NA	NA	NA	NA	NA
O-Xylene	NA	NA	NA	NA	NA	NA	NA	NA
Xylenes (total)	2 U	2 U	1 U	**2 J**	630 U	**2 J**	**17**	**200000**

Notes:
ft bls - Feet below land surface
µg/kg - Micrograms per kilogram
B - Detected in blank
J - Estimated value
U - Not detected, detection limit is shown

Table A-1. Summary of Volatile Organic Compounds Detected in Soil, BASF Corporation, Closed Landfill, Rensselaer, New York

Analyte (Concentrations in µg/kg)		LF-SB-107	LF-SB-107-1	LF-SB-107-1	LF-SB-107-2	LF-SB-107-2	LF-SB-107-3	LF-SB-107-3	LF-SB-107-4	LF-SB-107-4
	Sample Location:	LF-SB-107	LF-SB-107-1	LF-SB-107-1	LF-SB-107-2	LF-SB-107-2	LF-SB-107-3	LF-SB-107-3	LF-SB-107-4	LF-SB-107-4
	Sample Date:	03/14/02	04/08/04	04/08/04	04/08/04	04/08/04	04/08/04	04/08/04	04/08/04	04/08/04
	Sample Depth (ft bls):	3-5	0-4	4-8	0-4	4-8	0-4	4-8	0-4	4-8
	Sample Designation:	B7-61-19	B9-127-12	B9-127-15	B9-128-7	B9-128-10	B9-129-2	B9-129-5	B9-129-21	B9-129-24
Acetone		17000 U	3100 U	3300 U	**53**	3700 U	**190**	**540**	**51**	**170**
Benzene		**41000**	**500**	**10000**	**8.5**	180 U	**71**	**540**	1.1 U	**13**
Bromodichloromethane		610 U	780 U	830 U	6 U	920 U	5.8 U	37 U	5.7 U	7.9 U
Bromoform		660 U	780 U	830 U	6 U	920 U	5.8 U	37 U	5.7 U	7.9 U
Bromomethane		1500 U	780 U	830 U	6 U	920 U	5.8 U	37 U	5.7 U	7.9 U
2-Butanone		2600 UB	3900 U	4200 U	30 U	4600 U	29 U	190 U	29 U	40 U
Carbon disulfide		**230 J**	780 U	830 U	6 U	920 U	**6.3**	37 U	5.7 U	7.9 U
Carbon tetrachloride		850 U	780 U	830 U	6 U	920 U	5.8 U	37 U	5.7 U	7.9 U
Chlorobenzene		**81000**	**4500**	**43000**	**32**	**5000**	**240**	**2000**	**34**	**7.3 J**
Chloroethane		990 U	780 U	830 U	6 U	920 U	5.8 U	37 U	5.7 U	7.9 U
Chloroform		2000 U	780 U	830 U	6 U	920 U	**5.1 J**	37 U	5.7 U	7.9 U
Chloromethane		940 U	780 U	830 U	6 U	920 U	5.8 U	37 U	5.7 U	7.9 U
Dibromochloromethane		610 U	780 U	830 U	6 U	920 U	5.8 U	37 U	5.7 U	7.9 U
1,2-Dichlorobenzene		NA	780 U	**360 J**	**1.3 J**	920 U	**52**	**49**	**3 J**	7.9 U
1,3-Dichlorobenzene		NA	780 U	830 U	6 U	920 U	**25**	37 U	5.7 U	7.9 U
1,4-Dichlorobenzene		NA	780 U	**370 J**	6 U	920 U	**3.6 J**	37 U	5.7 U	7.9 U
1,1-Dichloroethane		820 U	780 U	830 U	6 U	920 U	5.8 U	37 U	5.7 U	7.9 U
1,2-Dichloroethane		1800 U	780 U	830 U	6 U	920 U	5.8 U	37 U	**6.5**	7.9 U
1,1-Dichloroethene		460 U	780 U	830 U	6 U	920 U	5.8 U	37 U	5.7 U	7.9 U
Cis-1,2-Dichloroethene		NA	780 U	**1200**	6 U	920 U	5.8 U	**7.7 J**	5.7 U	7.9 U
Trans-1,2-Dichloroethene		NA	780 U	**610 J**	6 U	920 U	5.8 U	37 U	5.7 U	7.9 U
1,2-Dichloroethene (total)		990 U	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichloropropane		410 U	780 U	830 U	6 U	920 U	5.8 U	37 U	5.7 U	7.9 U
Cis-1,3-Dichloropropene		560 U	780 U	830 U	6 U	920 U	5.8 U	37 U	5.7 U	7.9 U
Trans-1,3-Dichloropropene		540 U	780 U	830 U	6 U	920 U	5.8 U	37 U	5.7 U	7.9 U
Ethylbenzene		**62000**	**390**	**2600**	1.2 U	**300**	**15**	**150**	**1.7**	1.6 U
2-Hexanone		2500 U	3100 U	3300 U	24 U	3700 U	23 U	150 U	23 U	32 U
Methylene chloride		1700 U	780 U	830 U	**6.6**	**220 J**	**4.8 J**	**43 B**	**6.6**	**7.8 J**
4-Methyl-2-Pentanone		2900 U	3100 U	3300 U	24 U	3700 U	23 U	150 U	23 U	32 U
Styrene		**2300 J**	160 U	170 U	1.2 U	180 U	1.2 U	7.5 U	1.1 U	1.6 U
1,1,2,2-Tetrachloroethane		1200 U	780 U	**580 J**	6 U	920 U	5.8 U	37 U	5.7 U	7.9 U
Tetrachloroethene		1400 U	780 U	830 U	**3.9 J**	920 U	5.8 U	37 U	**4.3 J**	7.9 U
Toluene		**17000**	**3600**	**41000**	**19**	180 U	**66**	**220**	**2**	**45**
1,2,4-Trichlorobenzene		NA	160 U	**2500**	1.2 U	180 U	**180**	**14**	1.1 U	1.6 U
1,1,1-Trichloroethane		850 U	780 U	830 U	6 U	920 U	5.8 U	37 U	5.7 U	7.9 U
1,1,2-Trichloroethane		570 U	780 U	**420 J**	6 U	920 U	5.8 U	37 U	5.7 U	7.9 U
Trichloroethene		430 U	780 U	**7900**	6 U	920 U	**2.7 J**	**22 J**	5.7 U	7.9 U
Vinyl acetate		2700 U	NA	NA	NA	NA	NA	NA	NA	NA
Vinyl chloride		1500 U	780 U	830 U	6 U	920 U	5.8 U	37 U	5.7 U	7.9 U
M&p-Xylenes		NA	**1600**	**7300**	**2.5**	**840**	**44**	**660**	**2.7**	**1.7 J**
O-Xylene		NA	**310**	**2200**	**1.7**	**420**	**35**	**480**	**3.6**	1.6 U
Xylenes (total)		**310000**	NA	NA	NA	NA	NA	NA	NA	NA

Notes:
ft bls - Feet below land surface
µg/kg - Micrograms per kilogram
B - Detected in blank
J - Estimated value
U - Not detected, detection limit is shown

Table A-1. Summary of Volatile Organic Compounds Detected in Soil, BASF Corporation, Closed Landfill, Rensselaer, New York

Analyte (Concentrations in µg/kg)	**Sample Location:**	LF-SB-107-5	LF-SB-107-5	LF-SB-107-6	LF-SB-107-6	LF-SB-107-7	LF-SB-107-7	LF-SB-107-8	LF-SB-107-8	LF-SB-107-9	LF-SB-107-9
	Sample Date:	04/08/04	04/08/04	04/08/04	04/08/04	04/08/04	04/08/04	04/08/04	04/08/04	04/08/04	04/08/04
	Sample Depth (ft bls):	0-4	4-8	0-4	4-8	0-4	4-8	0-4	4-8	0-4	4-8
	Sample Designation:	B9-130-13	B9-130-16	B9-131-7	B9-131-10	B9-132-2	B9-132-5	B9-132-18	B9-132-21	B9-133-11	B9-133-14
Acetone		**180**	**340**	**2100**	**1600**	**120**	**230**	**130**	3800 U	130 U	**410**
Benzene		**600**	**240**	**60**	**1600**	**19**	**65**	**26**	**17000**	**8.8**	**14**
Bromodichloromethane		6.3 U	35 U	30 U	33 U	7.5 U	8.1 U	30 U	960 U	32 U	38 U
Bromoform		6.3 U	35 U	30 U	33 U	7.5 U	8.1 U	30 U	960 U	32 U	38 U
Bromomethane		6.3 U	35 U	30 U	33 U	7.5 U	8.1 U	30 U	960 U	32 U	**12 J**
2-Butanone		32 U	180 U	**130 J**	**140 J**	37 U	40 U	150 U	4800 U	160 U	190 U
Carbon disulfide		**12**	35 U	**21 J**	**17 J**	**2.4 J**	**25**	30 U	960 U	32 U	**16 J**
Carbon tetrachloride		6.3 U	35 U	30 U	33 U	7.5 U	8.1 U	30 U	960 U	32 U	38 U
Chlorobenzene		**420**	**540**	**320**	**160**	**26**	**23**	**240**	**32000**	**230**	**30 J**
Chloroethane		6.3 U	35 U	30 U	33 U	7.5 U	8.1 U	30 U	960 U	32 U	**12 J**
Chloroform		6.3 U	35 U	30 U	33 U	7.5 U	8.1 U	30 U	960 U	32 U	38 U
Chloromethane		6.3 U	35 U	30 U	33 U	7.5 U	8.1 U	30 U	960 U	32 U	**14 J**
Dibromochloromethane		6.3 U	35 U	30 U	33 U	7.5 U	8.1 U	30 U	960 U	32 U	38 U
1,2-Dichlorobenzene		**4.8 J**	35 U	**6.4 J**	33 U	7.5 U	8.1 U	30 U	**550 J**	32 U	**10 J**
1,3-Dichlorobenzene		6.3 U	35 U	30 U	33 U	7.5 U	8.1 U	30 U	**280 J**	32 U	38 U
1,4-Dichlorobenzene		6.3 U	35 U	30 U	33 U	7.5 U	8.1 U	30 U	**1300**	32 U	**69**
1,1-Dichloroethane		6.3 U	35 U	30 U	33 U	7.5 U	8.1 U	30 U	960 U	32 U	38 U
1,2-Dichloroethane		6.3 U	35 U	**85**	33 U	**10**	8.1 U	30 U	960 U	**28 J**	38 U
1,1-Dichloroethene		6.3 U	35 U	30 U	33 U	7.5 U	8.1 U	30 U	960 U	32 U	38 U
Cis-1,2-Dichloroethene		6.3 U	35 U	30 U	33 U	7.5 U	8.1 U	30 U	960 U	32 U	38 U
Trans-1,2-Dichloroethene		6.3 U	35 U	30 U	33 U	7.5 U	8.1 U	30 U	960 U	32 U	38 U
1,2-Dichloroethene (total)		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichloropropane		6.3 U	35 U	30 U	33 U	7.5 U	8.1 U	30 U	960 U	32 U	38 U
Cis-1,3-Dichloropropene		6.3 U	35 U	30 U	33 U	7.5 U	8.1 U	30 U	960 U	32 U	38 U
Trans-1,3-Dichloropropene		6.3 U	35 U	30 U	33 U	7.5 U	8.1 U	30 U	960 U	32 U	38 U
Ethylbenzene		**81**	**340**	**78**	**70**	1.5 U	1.6 U	**6.6**	**950**	**200**	**33**
2-Hexanone		25 U	140 U	120 U	130 U	30 U	32 U	120 U	3800 U	130 U	150 U
Methylene chloride		**9.2**	**50 B**	**39 B**	**86 B**	**6.3 JB**	**9.7 B**	**30 JB**	960 U	**43 B**	**130 B**
4-Methyl-2-Pentanone		25 U	140 U	120 U	130 U	30 U	32 U	120 U	3800 U	130 U	150 U
Styrene		1.3 U	7 U	6 U	6.7 U	1.5 U	1.6 U	6.1 U	190 U	6.5 U	7.7 U
1,1,2,2-Tetrachloroethane		6.3 U	35 U	30 U	33 U	7.5 U	8.1 U	30 U	960 U	32 U	38 U
Tetrachloroethene		6.3 U	35 U	30 U	33 U	**1.6 J**	8.1 U	30 U	960 U	**18 J**	38 U
Toluene		**130**	**39**	**190**	**470**	**22**	**16**	**24**	**330**	**99**	**19**
1,2,4-Trichlorobenzene		1.3 U	7 U	6 U	6.7 U	1.5 U	1.6 U	6.1 U	**990**	6.5 U	**10**
1,1,1-Trichloroethane		6.3 U	35 U	30 U	33 U	7.5 U	8.1 U	30 U	960 U	32 U	38 U
1,1,2-Trichloroethane		6.3 U	35 U	30 U	33 U	7.5 U	8.1 U	30 U	960 U	32 U	38 U
Trichloroethene		**2.1 J**	35 U	30 U	33 U	7.5 U	8.1 U	30 U	960 U	32 U	38 U
Vinyl acetate		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vinyl chloride		6.3 U	35 U	30 U	33 U	7.5 U	8.1 U	30 U	960 U	32 U	**13 J**
M&p-Xylenes		**230**	**1300**	**180**	**240**	**2.4 J**	**1.9 J**	**8.7 J**	**1600**	**40**	**73**
O-Xylene		**38**	**380**	**41**	**100**	1.5 U	1.6 U	6.1 U	190 U	**710**	**29**
Xylenes (total)		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:
ft bls - Feet below land surface
µg/kg - Micrograms per kilogram
B - Detected in blank
J - Estimated value
U - Not detected, detection limit is shown

Table A-1. Summary of Volatile Organic Compounds Detected in Soil, BASF Corporation, Closed Landfill, Rensselaer, New York

Analyte (Concentrations in µg/kg)	Sample Location:	LF-SB-107-10	LF-SB-107-10	LF-SB-107-11	LF-SB-107-11	LF-SB-107-12	LF-SB-107-12	LF-SB-107-13	LF-SB-107-13	LF-SB-108
	Sample Date:	04/08/04	04/08/04	04/08/04	04/08/04	04/08/04	04/08/04	04/08/04	04/08/04	03/14/02
	Sample Depth (ft bls):	0-4	4-8	0-4	4-8	0-4	4-8	0-4	4-8	1-3
	Sample Designation:	B9-134-2	B9-134-5	B9-134-18	B9-134-21	B9-135-12	B9-135-15	B9-136-2	B9-136-5	B7-59-17
Acetone		**36**	**1400**	110 U	**540**	**160**	**140 J**	120 U	**230**	**35 B**
Benzene		**3.2**	**140**	5.7 U	**200**	5.8 U	7.7 U	6 U	6.1 U	0.7 U
Bromodichloromethane		5.8 U	39 U	29 U	30 U	29 U	38 U	30 U	30 U	0.7 U
Bromoform		5.8 U	39 U	29 U	30 U	29 U	38 U	30 U	30 U	0.8 U
Bromomethane		5.8 U	39 U	29 U	30 U	29 U	38 U	30 U	30 U	3 U
2-Butanone		29 U	200 U	140 U	150 U	150 U	190 U	150 U	150 U	4 U
Carbon disulfide		**6**	**29 J**	29 U	**10 J**	29 U	38 U	30 U	30 U	0.3 U
Carbon tetrachloride		5.8 U	39 U	29 U	30 U	29 U	38 U	30 U	30 U	0.6 U
Chlorobenzene		**9.9**	**210**	**20 J**	**87**	**72**	**78**	**7.4 J**	30 U	0.7 U
Chloroethane		5.8 U	39 U	29 U	30 U	29 U	38 U	30 U	30 U	1 U
Chloroform		5.8 U	39 U	29 U	30 U	29 U	38 U	30 U	30 U	0.8 U
Chloromethane		5.8 U	39 U	29 U	30 U	29 U	38 U	30 U	30 U	1 U
Dibromochloromethane		5.8 U	39 U	29 U	30 U	29 U	38 U	30 U	30 U	0.6 U
1,2-Dichlorobenzene		5.8 U	39 U	29 U	30 U	29 U	38 U	30 U	30 U	NA
1,3-Dichlorobenzene		5.8 U	39 U	29 U	30 U	29 U	38 U	30 U	30 U	NA
1,4-Dichlorobenzene		5.8 U	39 U	29 U	30 U	29 U	38 U	30 U	30 U	NA
1,1-Dichloroethane		5.8 U	39 U	29 U	30 U	29 U	38 U	30 U	30 U	0.7 U
1,2-Dichloroethane		5.8 U	39 U	29 U	30 U	29 U	**9.6 J**	**8.3 J**	30 U	0.6 U
1,1-Dichloroethene		5.8 U	39 U	29 U	30 U	29 U	38 U	30 U	30 U	0.7 U
Cis-1,2-Dichloroethene		5.8 U	39 U	29 U	30 U	29 U	38 U	30 U	30 U	NA
Trans-1,2-Dichloroethene		5.8 U	39 U	29 U	30 U	29 U	38 U	30 U	30 U	NA
1,2-Dichloroethene (total)		NA	NA	NA	NA	NA	NA	NA	NA	0.7 U
1,2-Dichloropropane		5.8 U	39 U	29 U	30 U	29 U	38 U	30 U	30 U	0.6 U
Cis-1,3-Dichloropropene		5.8 U	39 U	29 U	30 U	29 U	38 U	30 U	30 U	0.6 U
Trans-1,3-Dichloropropene		5.8 U	39 U	29 U	30 U	29 U	38 U	30 U	30 U	0.6 U
Ethylbenzene		1.2 U	**15**	5.7 U	6.1 U	5.8 U	7.7 U	6 U	6.1 U	0.6 U
2-Hexanone		23 U	160 U	110 U	120 U	120 U	150 U	120 U	120 U	5 U
Methylene chloride		**9.7 B**	**120 B**	**53 B**	**35 B**	**35 B**	**65 B**	**53 B**	**35 B**	**6 JB**
4-Methyl-2-Pentanone		23 U	160 U	110 U	120 U	120 U	150 U	120 U	120 U	4 U
Styrene		1.2 U	7.8 U	5.7 U	6.1 U	5.8 U	7.7 U	6 U	6.1 U	0.7 U
1,1,2,2-Tetrachloroethane		5.8 U	39 U	29 U	30 U	29 U	38 U	30 U	30 U	1 U
Tetrachloroethene		**2.6 J**	39 U	**5.9 J**	30 U	29 U	**15 J**	30 U	30 U	0.6 U
Toluene		**3.1**	**54**	**6.9**	**59**	5.8 U	7.7 U	6 U	**17**	**26**
1,2,4-Trichlorobenzene		1.2 U	7.8 U	5.7 U	6.1 U	5.8 U	7.7 U	6 U	6.1 U	NA
1,1,1-Trichloroethane		5.8 U	39 U	29 U	30 U	29 U	38 U	30 U	30 U	0.7 U
1,1,2-Trichloroethane		5.8 U	39 U	29 U	30 U	29 U	38 U	30 U	30 U	0.7 U
Trichloroethene		5.8 U	39 U	29 U	30 U	29 U	38 U	30 U	30 U	0.7 U
Vinyl acetate		NA	NA	NA	NA	NA	NA	NA	NA	4 U
Vinyl chloride		5.8 U	39 U	29 U	30 U	29 U	38 U	30 U	30 U	0.6 U
M&p-Xylenes		**3.1**	**9.1 J**	11 U	**6.8 J**	12 U	15 U	12 U	12 U	NA
O-Xylene		1.2 U	7.8 U	5.7 U	6.1 U	5.8 U	7.7 U	6 U	6.1 U	NA
Xylenes (total)		NA	NA	NA	NA	NA	NA	NA	NA	2 U

Notes:
ft bls - Feet below land surface
µg/kg - Micrograms per kilogram
B - Detected in blank
J - Estimated value
U - Not detected, detection limit is shown

Table A-1. Summary of Volatile Organic Compounds Detected in Soil, BASF Corporation, Closed Landfill, Rensselaer, New York

Analyte (Concentrations in µg/kg)		LF-SB-108	LF-SB-109	LF-SB-109	LF-SB-110	LF-SB-110	LF-SB-111	LF-SB-111	LF-SB-111-1	LF-SB-111-1
	Sample Location:	LF-SB-108	LF-SB-109	LF-SB-109	LF-SB-110	LF-SB-110	LF-SB-111	LF-SB-111	LF-SB-111-1	LF-SB-111-1
Analyte	**Sample Date:**	03/14/02	03/14/02	03/14/02	03/13/02	03/13/02	03/13/02	03/13/02	04/06/04	04/06/04
(Concentrations in µg/kg)	**Sample Depth (ft bls):**	3-5	2-4	4-6	1-3	3-5	1-3	3-5	0-4	4-8
	Sample Designation:	B7-59-20	B7-57-02	B7-57-05	B7-54-16	B7-54-19	B7-50-08	B7-50-11	B9-93-15	B9-93-23
Acetone		**16 B**	**160 B**	**110 B**	**10 JB**	**20 B**	**10 JB**	**2100**	24 U	190 U
Benzene		0.7 U	**4 J**	**44**	0.6 U	**7**	**5 J**	**12000**	1.2 U	**180**
Bromodichloromethane		0.7 U	0.7 U	0.7 U	0.6 U	0.7 U	0.6 U	69 U	5.9 U	48 U
Bromoform		0.8 U	0.8 U	0.8 U	0.7 U	0.8 U	0.7 U	74 U	5.9 U	48 U
Bromomethane		3 U	3 U	3 U	3 U	3 U	3 U	160 U	5.9 U	48 U
2-Butanone		4 U	**32**	**26**	4 U	4 U	3 U	300 UB	29 U	240 U
Carbon disulfide		0.3 U	**1 J**	**38**	**0.5 JB**	**1 JB**	**2 J**	**370 J**	5.9 U	48 U
Carbon tetrachloride		0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	96 U	5.9 U	48 U
Chlorobenzene		**1 J**	**9**	**130**	**1 J**	**5 J**	**4 J**	**5100**	5.9 U	**49**
Chloroethane		0.9 U	1 U	0.9 U	0.9 U	0.9 U	0.8 U	110 U	5.9 U	48 U
Chloroform		0.8 U	0.8 U	0.8 U	0.7 U	0.8 U	0.7 U	230 U	5.9 U	48 U
Chloromethane		1 U	1 U	1 U	1 U	1 U	0.9 U	110 U	5.9 U	48 U
Dibromochloromethane		0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	69 U	5.9 U	48 U
1,2-Dichlorobenzene		NA	NA	NA	NA	NA	NA	NA	5.9 U	48 U
1,3-Dichlorobenzene		NA	NA	NA	NA	NA	NA	NA	5.9 U	48 U
1,4-Dichlorobenzene		NA	NA	NA	NA	NA	NA	NA	5.9 U	48 U
1,1-Dichloroethane		0.7 U	0.7 U	0.7 U	0.6 U	0.7 U	0.6 U	93 U	5.9 U	48 U
1,2-Dichloroethane		0.5 U	**11**	0.5 U	0.5 U	0.5 U	0.5 U	210 U	5.9 U	48 U
1,1-Dichloroethene		0.7 U	0.7 U	0.7 U	0.6 U	0.7 U	0.6 U	52 U	5.9 U	48 U
Cis-1,2-Dichloroethene		NA	NA	NA	NA	NA	NA	NA	5.9 U	48 U
Trans-1,2-Dichloroethene		NA	NA	NA	NA	NA	NA	NA	5.9 U	48 U
1,2-Dichloroethene (total)		0.7 U	0.7 U	**2 J**	0.6 U	0.7 U	0.6 U	**550 J**	NA	NA
1,2-Dichloropropane		0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	47 U	5.9 U	48 U
Cis-1,3-Dichloropropene		0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	64 U	5.9 U	48 U
Trans-1,3-Dichloropropene		0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	61 U	5.9 U	48 U
Ethylbenzene		0.5 U	0.5 U	**5 J**	0.5 U	**0.6 J**	**0.9 J**	**180 J**	1.2 U	9.6 U
2-Hexanone		5 U	5 U	5 U	4 U	5 U	4 U	280 U	24 U	190 U
Methylene chloride		**3 JB**	**4 JB**	**3 JB**	**3 JB**	**3 JB**	**16 B**	200 U	**7.7 B**	**70 B**
4-Methyl-2-Pentanone		4 U	4 U	4 U	3 U	4 U	3 U	330 U	24 U	190 U
Styrene		0.7 U	0.7 U	0.7 U	0.6 U	0.7 U	0.6 U	120 U	1.2 U	9.6 U
1,1,2,2-Tetrachloroethane		1 U	1 U	1 U	1 U	**10**	1 U	140 U	5.9 U	48 U
Tetrachloroethene		0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	160 U	5.9 U	48 U
Toluene		**3 J**	**5 J**	**21**	**6 J**	**10**	**10**	**350 J**	**51**	**560**
1,2,4-Trichlorobenzene		NA	NA	NA	NA	NA	NA	NA	1.2 U	9.6 U
1,1,1-Trichloroethane		0.7 U	0.7 U	0.7 U	0.6 U	0.7 U	0.6 U	96 U	5.9 U	48 U
1,1,2-Trichloroethane		0.7 U	0.7 U	0.7 U	0.6 U	0.7 U	0.6 U	64 U	5.9 U	48 U
Trichloroethene		0.7 U	**0.9 J**	**1 J**	**2 J**	**14**	0.6 U	**290 J**	5.9 U	48 U
Vinyl acetate		4 U	4 U	4 U	4 U	4 U	3 U	300 U	NA	NA
Vinyl chloride		0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	**0.6 J**	**600 J**	5.9 U	48 U
M&p-Xylenes		NA	NA	NA	NA	NA	NA	NA	2.4 U	19 U
O-Xylene		NA	NA	NA	NA	NA	NA	NA	1.2 U	9.6 U
Xylenes (total)		1 U	**2 J**	**17**	1 U	**6 J**	**5 J**	**3100**	NA	NA

Notes:
ft bls - Feet below land surface
µg/kg - Micrograms per kilogram
B - Detected in blank
J - Estimated value
U - Not detected, detection limit is shown

Table A-1. Summary of Volatile Organic Compounds Detected in Soil, BASF Corporation, Closed Landfill, Rensselaer, New York

Sample Location:	LF-SB-111-2	LF-SB-113	LF-SB-116	LF-TP-1	LF-TP-2	LF-TP-3	LF-TP-3A	LF-TP-4	LF-TP-5	LF-TP-5-1
Analyte **Sample Date:**	04/06/04	03/15/02	03/15/02	12/10/02	12/17/02	12/10/02	12/10/02	12/9/02	12/9/02	04/07/04
(Concentrations in µg/kg) **Sample Depth (ft bls):**	0-4	3.5-5.5	2-4	4-8	4-8	4-8	4-8	4-8	4-8	0-4
Sample Designation:	B9-94-9	B7-69-16	B7-71-22	B9-13-07	B9-27-18	B9-09-02	B9-09-19	B9-02-14	B9-04-23	B9-113-12
Acetone	30 U	**72**	**13 J**	2500 U	**33**	**66 B**	1600 U	**1,700**	110000 U	3200 U
Benzene	**2.2**	**8**	**2 J**	88 U	0.6 U	**19**	**1,000**	**1,200**	3900 U	**220**
Bromodichloromethane	7.6 U	0.7 U	0.7 U	87 U	0.6 U	0.7 U	55 U	55 U	3900 U	790 U
Bromoform	7.6 U	0.8 U	0.9 U	94 U	0.8 U	0.9 U	60 U	60 U	4200 U	790 U
Bromomethane	7.6 U	4 U	4 U	210 U	3 U	4 U	130 U	130 U	9300 U	790 U
2-Butanone	38 U	4 U	4 U	380 U	**10 J**	**14 JB**	240 U	240 U	17000 U	4000 U
Carbon disulfide	7.6 U	**9**	**1 J**	8 U	0.3 U	**3 JB**	5 U	56 U	350 U	790 U
Carbon tetrachloride	7.6 U	0.6 U	0.6 U	120 U	0.5 U	0.6 U	77 U	77 U	5500 U	790 U
Chlorobenzene	7.6 U	**43**	**10**	160 U	**2 J**	**6 J**	**2,400**	**1,500**	**940,000**	**5500**
Chloroethane	7.6 U	1 U	1 U	140 U	0.9 U	1 U	90 U	90 U	6300 U	790 U
Chloroform	7.6 U	0.8 U	0.9 U	290 U	0.8 U	0.9 U	180 U	180 U	13000 U	790 U
Chloromethane	7.6 U	1 U	1 U	130 U	1 U	1 U	85 U	85 U	6000 U	790 U
Dibromochloromethane	7.6 U	0.6 U	0.6 U	88 U	0.5 U	0.6 U	56 U	56 U	3900 U	790 U
1,2-Dichlorobenzene	7.6 U	NA	NA	180 U	**3 J**	**6 J**	**6,100**	110 U	**34000 J**	**190 J**
1,3-Dichlorobenzene	7.6 U	NA	NA	170 U	0.6 U	0.7 U	**800**	110 UM	7500 U	790 U
1,4-Dichlorobenzene	7.6 U	NA	NA	**470 J**	0.8 U	**2J**	**2,200**	130 U	9100 U	790 U
1,1-Dichloroethane	7.6 U	0.7 U	0.7 U	120 U	0.6 U	0.7 U	74 U	74 U	5200 U	790 U
1,2-Dichloroethane	7.6 U	0.6 U	0.6 U	260 U	**5 J**	**6 JH**	**540 J**	170 U	12000 U	790 U
1,1-Dichloroethene	7.6 U	0.7 U	0.7 U	66 U	0.6 U	0.7 U	42 U	42 U	3000 U	790 U
Cis-1,2-Dichloroethene	7.6 U	NA	NA	NA	NA	NA	NA	NA	NA	790 U
Trans-1,2-Dichloroethene	7.6 U	NA	NA	NA	NA	NA	NA	NA	NA	790 U
1,2-Dichloroethene (total)	NA	0.7 U	0.7 U	140 U	0.6 U	0.7 U	90 U	90 U	6300 U	NA
1,2-Dichloropropane	7.6 U	0.6 U	0.6 U	59 U	0.5 U	0.6 U	37 U	37 U	2600 U	790 U
Cis-1,3-Dichloropropene	7.6 U	0.6 U	0.6 U	80 U	0.5 U	0.6 U	51 U	51 U	3600 U	790 U
Trans-1,3-Dichloropropene	7.6 U	0.6 U	0.6 U	77 U	0.5 U	0.6 U	49 U	49 U	3400 U	790 U
Ethylbenzene	1.5 U	**2 J**	0.6 U	150 U	0.5 U	**2 J**	95 U	**1,400**	6700 U	**5400**
2-Hexanone	30 U	5 U	5 U	350 U	4 U	5 U	220 U	220 U	16000 U	3200 U
Methylene chloride	**6 JB**	**5 JB**	**3 JB**	250 U	2 U	**3 J**	160 U	160 U	11000 U	790 U
4-Methyl-2-Pentanone	30 U	4 U	4 U	420 U	4 U	4 U	270 U	**630**	19000 U	3200 U
Styrene	1.5 U	0.7 U	0.7 U	150 U	0.6 U	0.7 U	96 U	96 U	6700 U	160 U
1,1,2,2-Tetrachloroethane	7.6 U	1 U	1 U	170 U	1 U	1 U	110 U	110 U	7700 U	790 U
Tetrachloroethene	7.6 U	0.6 U	0.6 U	200 U	0.5 U	0.6 U	120 U	120 U	8800 U	790 U
Toluene	**24**	**4 J**	0.6 U	**1,800**	**0.6 J**	0.6 U	110 U	**7,100**	7700 U	**530**
1,2,4-Trichlorobenzene	1.5 U	NA	NA	**2,000**	**2 JH**	**6 JH**	**2,000**	**770**	44000 U	**660**
1,1,1-Trichloroethane	7.6 U	0.7 U	0.7 U	120 U	0.6 U	0.7 U	77 U	77 U	5400 U	790 U
1,1,2-Trichloroethane	7.6 U	0.7 U	0.7 U	81 U	0.6 U	0.7 U	52 U	52 U	3600 U	790 U
Trichloroethene	7.6 U	0.7 U	0.7 U	62 U	0.6 U	0.7 U	39 U	39 U	2800 U	790 U
Vinyl acetate	NA	4 U	4 U	380 U	4 U	4 U	240 U	240 U	17000 U	NA
Vinyl chloride	7.6 U	0.6 U	0.6 U	210 U	0.5 U	0.6 U	130 U	130 U	9300 U	790 U
M&p-Xylenes	3 U	NA	NA	NA	NA	NA	NA	NA	NA	**20000**
O-Xylene	1.5 U	NA	NA	NA	NA	NA	NA	NA	NA	**7400**
Xylenes (total)	NA	**10**	2 U	510 U	1 U	**3 J**	**350 J**	**6,400**	23000 U	NA

Notes:
ft bls - Feet below land surface
µg/kg - Micrograms per kilogram
B - Detected in blank
J - Estimated value
U - Not detected, detection limit is shown

Table A-1. Summary of Volatile Organic Compounds Detected in Soil, BASF Corporation, Closed Landfill, Rensselaer, New York

Analyte (Concentrations in µg/kg)		LF-TP-5-1	LF-TP-5-2	LF-TP-5-2	LF-TP-5-3	LF-TP-5-3	LF-TP-5-4	LF-TP-5-4	LF-TP-5-5	LF-TP-5-5	LF-TP-5-6
	Sample Date:	04/07/04	04/07/04	04/07/04	04/07/04	04/07/04	04/07/04	04/07/04	04/07/04	04/07/04	04/07/04
	Sample Depth (ft bls):	4-8	0-4	4-8	0-4	4-8	0-4	4-8	0-4	4-8	0-4
	Sample Designation:	B9-113-15	B9-114-2	B9-114-5	B9-114-18	B9-114-21	B9-115-10	B9-115-13	B9-115-25	B9-116-2	B9-116-13
Acetone		3000 U	**72**	4300 U	3400 U	27000 U	260000 U	30000 U	**520**	**56**	**510**
Benzene		150 U	**110**	**220**	170 U	**3700**	13000 U	1500 U	**9.8**	1.2 U	**29**
Bromodichloromethane		760 U	6.8 U	1100 U	840 U	6800 U	66000 U	7600 U	35 U	6.2 U	33 U
Bromoform		760 U	6.8 U	1100 U	840 U	6800 U	66000 U	7600 U	35 U	6.2 U	33 U
Bromomethane		760 U	6.8 U	1100 U	840 U	6800 U	66000 U	7600 U	35 U	6.2 U	33 U
2-Butanone		3800 U	34 U	5400 U	4200 U	34000 U	330000 U	38000 U	170 U	31 U	170 U
Carbon disulfide		760 U	6.8 U	1100 U	840 U	6800 U	66000 U	7600 U	**38**	6.2 U	**13 J**
Carbon tetrachloride		760 U	6.8 U	1100 U	840 U	6800 U	66000 U	7600 U	35 U	6.2 U	33 U
Chlorobenzene		**390 J**	**75**	**66000**	**4100**	**300000**	**650000**	**160000**	**1800**	6.2 U	**41**
Chloroethane		760 U	6.8 U	1100 U	840 U	6800 U	66000 U	7600 U	35 U	**1.3 J**	33 U
Chloroform		760 U	6.8 U	1100 U	840 U	6800 U	66000 U	7600 U	35 U	6.2 U	33 U
Chloromethane		760 U	6.8 U	1100 U	840 U	6800 U	66000 U	7600 U	35 U	**1.8 J**	33 U
Dibromochloromethane		760 U	6.8 U	1100 U	840 U	6800 U	66000 U	7600 U	35 U	6.2 U	33 U
1,2-Dichlorobenzene		760 U	**5.2 J**	1100 U	840 U	6800 U	66000 U	7600 U	**10 J**	6.2 U	**8.4 J**
1,3-Dichlorobenzene		760 U	**1.6 J**	1100 U	840 U	6800 U	66000 U	7600 U	35 U	6.2 U	33 U
1,4-Dichlorobenzene		760 U	**2.6 J**	1100 U	840 U	6800 U	66000 U	7600 U	35 U	6.2 U	33 U
1,1-Dichloroethane		760 U	6.8 U	1100 U	840 U	6800 U	66000 U	7600 U	35 U	6.2 U	33 U
1,2-Dichloroethane		760 U	6.8 U	1100 U	840 U	6800 U	66000 U	7600 U	35 U	6.2 U	33 U
1,1-Dichloroethene		760 U	6.8 U	1100 U	840 U	6800 U	66000 U	7600 U	35 U	6.2 U	33 U
Cis-1,2-Dichloroethene		760 U	6.8 U	1100 U	840 U	6800 U	66000 U	7600 U	35 U	6.2 U	33 U
Trans-1,2-Dichloroethene		760 U	6.8 U	1100 U	840 U	6800 U	66000 U	7600 U	35 U	6.2 U	33 U
1,2-Dichloroethene (total)		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichloropropane		760 U	6.8 U	1100 U	840 U	6800 U	66000 U	7600 U	35 U	6.2 U	33 U
Cis-1,3-Dichloropropene		760 U	6.8 U	1100 U	840 U	6800 U	66000 U	7600 U	35 U	6.2 U	33 U
Trans-1,3-Dichloropropene		760 U	6.8 U	1100 U	840 U	6800 U	66000 U	7600 U	35 U	6.2 U	33 U
Ethylbenzene		150 U	**3.3**	**1200**	**640**	**4100**	**1500000**	**18000**	**140**	1.2 U	6.7 U
2-Hexanone		3000 U	27 U	4300 U	3400 U	27000 U	260000 U	30000 U	140 U	25 U	130 U
Methylene chloride		760 U	**21 B**	**230 J**	840 U	6800 U	**24000 J**	7600 U	**34 JB**	**6.5 B**	**59 B**
4-Methyl-2-Pentanone		3000 U	27 U	4300 U	3400 U	27000 U	260000 U	30000 U	140 U	25 U	130 U
Styrene		150 U	1.4 U	220 U	170 U	1400 U	13000 U	1500 U	6.9 U	1.2 U	6.7 U
1,1,2,2-Tetrachloroethane		760 U	6.8 U	1100 U	840 U	6800 U	66000 U	7600 U	35 U	6.2 U	33 U
Tetrachloroethene		760 U	6.8 U	1100 U	840 U	6800 U	66000 U	7600 U	35 U	6.2 U	33 U
Toluene		150 U	**47**	**370**	**230**	1400 U	**30000**	1500 U	**140**	1.2 U	**360**
1,2,4-Trichlorobenzene		150 U	**4.6**	220 U	170 U	1400 U	13000 U	1500 U	6.9 U	1.2 U	6.7 U
1,1,1-Trichloroethane		760 U	6.8 U	1100 U	840 U	6800 U	66000 U	7600 U	35 U	6.2 U	33 U
1,1,2-Trichloroethane		760 U	6.8 U	1100 U	840 U	6800 U	66000 U	7600 U	35 U	6.2 U	33 U
Trichloroethene		760 U	**1.5 J**	1100 U	840 U	6800 U	66000 U	7600 U	35 U	6.2 U	33 U
Vinyl acetate		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vinyl chloride		760 U	6.8 U	1100 U	840 U	6800 U	66000 U	7600 U	35 U	6.2 U	33 U
M&p-Xylenes		**160 J**	**8.6**	**250 J**	**2300**	**9600**	**5000000**	**72000**	**380**	2.5 U	**12 J**
O-Xylene		150 U	**5.1**	220 U	**1000**	**3600**	**2800000**	**47000**	**200**	1.2 U	6.7 U
Xylenes (total)		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:
ft bls - Feet below land surface
µg/kg - Micrograms per kilogram
B - Detected in blank
J - Estimated value
U - Not detected, detection limit is shown

Table A-1. Summary of Volatile Organic Compounds Detected in Soil, BASF Corporation, Closed Landfill, Rensselaer, New York

Analyte (Concentrations in µg/kg)	**Sample Location:**	LF-TP-5-6	LF-TP-5-7	LF-TP-5-7	LF-TP-5-8	LF-TP-5-8	LF-TP-5-9	LF-TP-5-9	LF-TP-5-10	LF-TP-5-10	LF-TP-5-11
	Sample Date:	04/07/04	04/07/04	04/07/04	04/07/04	04/07/04	04/07/04	04/07/04	04/07/04	04/07/04	04/07/04
	Sample Depth (ft bls):	4-8	0-4	4-8	0-4	4-8	0-4	4-8	0-4	4-8	0-4
	Sample Designation:	B9-116-16	B9-117-3	B9-117-6	B9-117-17	B9-117-20	B9-118-7	B9-118-10	B9-118-21	B9-118-24	B9-119-15
Acetone		130 U	30 U	**71**	**360**	**380**	**290**	26000 U	**430**	140000 U	130 U
Benzene		**25**	1.5 U	1.9 U	6.8 U	6 U	6.1 U	1300 U	**370**	7000 U	**25**
Bromodichloromethane		32 U	7.6 U	9.4 U	34 U	30 U	30 U	6600 U	34 U	35000 U	32 U
Bromoform		32 U	7.6 U	9.4 U	34 U	30 U	30 U	6600 U	34 U	35000 U	32 U
Bromomethane		32 U	7.6 U	9.4 U	34 U	30 U	30 U	6600 U	34 U	35000 U	32 U
2-Butanone		160 U	38 U	47 U	170 U	150 U	150 U	33000 U	170 U	180000 U	160 U
Carbon disulfide		32 U	7.6 U	9.4 U	34 U	30 U	30 U	6600 U	34 U	35000 U	**42**
Carbon tetrachloride		32 U	7.6 U	9.4 U	34 U	30 U	30 U	6600 U	34 U	35000 U	32 U
Chlorobenzene		**19 J**	7.6 U	9.4 U	**9 J**	**140**	**930**	**370000**	**640**	**1600000**	**37**
Chloroethane		32 U	7.6 U	9.4 U	34 U	30 U	30 U	6600 U	34 U	35000 U	32 U
Chloroform		32 U	7.6 U	9.4 U	34 U	30 U	30 U	6600 U	34 U	35000 U	32 U
Chloromethane		32 U	7.6 U	9.4 U	34 U	30 U	30 U	6600 U	34 U	35000 U	32 U
Dibromochloromethane		32 U	7.6 U	9.4 U	34 U	30 U	30 U	6600 U	34 U	35000 U	32 U
1,2-Dichlorobenzene		**8.8 J**	**2.7 J**	9.4 U	34 U	30 U	**22 J**	**10000**	**16 J**	**12000 J**	32 U
1,3-Dichlorobenzene		32 U	7.6 U	9.4 U	34 U	30 U	30 U	6600 U	34 U	35000 U	32 U
1,4-Dichlorobenzene		32 U	7.6 U	9.4 U	34 U	30 U	30 U	**2600 J**	34 U	**11000 J**	32 U
1,1-Dichloroethane		32 U	7.6 U	9.4 U	34 U	30 U	30 U	6600 U	34 U	35000 U	32 U
1,2-Dichloroethane		32 U	7.6 U	9.4 U	**8.3 J**	30 U	30 U	6600 U	34 U	35000 U	**22 J**
1,1-Dichloroethene		32 U	7.6 U	9.4 U	34 U	30 U	30 U	6600 U	34 U	35000 U	32 U
Cis-1,2-Dichloroethene		32 U	7.6 U	9.4 U	34 U	30 U	30 U	6600 U	34 U	35000 U	32 U
Trans-1,2-Dichloroethene		32 U	7.6 U	9.4 U	34 U	30 U	30 U	6600 U	34 U	35000 U	32 U
1,2-Dichloroethene (total)		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichloropropane		32 U	7.6 U	9.4 U	34 U	30 U	30 U	6600 U	34 U	35000 U	32 U
Cis-1,3-Dichloropropene		32 U	7.6 U	9.4 U	34 U	30 U	30 U	6600 U	34 U	35000 U	32 U
Trans-1,3-Dichloropropene		32 U	7.6 U	9.4 U	34 U	30 U	30 U	6600 U	34 U	35000 U	32 U
Ethylbenzene		**7.1**	1.5 U	1.9 U	6.8 U	6 U	**9.3**	**3800**	**44**	**11000**	6.3 U
2-Hexanone		130 U	30 U	38 U	140 U	120 U	120 U	26000 U	140 U	140000 U	130 U
Methylene chloride		**80 B**	**17 B**	**7 JB**	**66 B**	**41 B**	**100 B**	6600 U	**95 B**	35000 U	**84 B**
4-Methyl-2-Pentanone		130 U	30 U	38 U	140 U	120 U	120 U	26000 U	140 U	140000 U	130 U
Styrene		6.5 U	1.5 U	1.9 U	6.8 U	6 U	6.1 U	1300 U	6.8 U	7000 U	6.3 U
1,1,2,2-Tetrachloroethane		32 U	7.6 U	9.4 U	34 U	30 U	30 U	6600 U	34 U	35000 U	32 U
Tetrachloroethene		**23 J**	7.6 U	9.4 U	**10 J**	30 U	**10 J**	6600 U	34 U	35000 U	32 U
Toluene		**270**	**7.9**	**4.2**	**41**	**28**	**11**	1300 U	**170**	7000 U	**220**
1,2,4-Trichlorobenzene		6.5 U	1.5 U	1.9 U	6.8 U	6 U	6.1 U	1300 U	6.8 U	7000 U	6.3 U
1,1,1-Trichloroethane		32 U	7.6 U	9.4 U	34 U	30 U	30 U	6600 U	34 U	35000 U	32 U
1,1,2-Trichloroethane		32 U	7.6 U	9.4 U	34 U	30 U	30 U	6600 U	34 U	35000 U	32 U
Trichloroethene		32 U	7.6 U	9.4 U	34 U	30 U	30 U	6600 U	**9.9 J**	35000 U	32 U
Vinyl acetate		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vinyl chloride		32 U	7.6 U	9.4 U	34 U	30 U	30 U	6600 U	34 U	35000 U	32 U
M&p-Xylenes		**12 J**	3 U	3.8 U	14 U	12 U	**35**	**14000**	**51**	**56000**	**8.4 J**
O-Xylene		6.5 U	1.5 U	1.9 U	6.8 U	6 U	**23**	**7700**	**45**	**64000**	6.3 U
Xylenes (total)		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:
ft bls - Feet below land surface
µg/kg - Micrograms per kilogram
B - Detected in blank
J - Estimated value
U - Not detected, detection limit is shown

Table A-1. Summary of Volatile Organic Compounds Detected in Soil, BASF Corporation, Closed Landfill, Rensselaer, New York

Analyte (Concentrations in µg/kg)										
Sample Location:	LF-TP-5-11	LF-TP-5-12	LF-TP-5-12	LF-TP-5-13	LF-TP-5-13	LF-TP-5-14	LF-TP-5-14	LF-TP-6	LF-TP-6 DUP	LF-TP-6-1
Sample Date:	04/07/04	04/07/04	04/07/04	04/07/04	04/07/04	04/07/04	04/07/04	12/11/02	12/11/02	04/05/04
Sample Depth (ft bls):	4-8	0-4	4-8	0-4	4-8	0-4	4-8	4-8	4-8	0-4
Sample Designation:	B9-119-18	B9-120-12	B9-120-15	B9-121-2	B9-121-5	B9-121-21	B9-121-24	B9-18-14	B9-18-23	B9-90-10
Acetone	12000 U	**93**	**350**	**190**	**74**	3300 U	140000 U	210000 U	110000 U	22 U
Benzene	600 U	1.2 U	**43**	**4**	**7.4**	170 U	6800 U	7500 U	3800 U	**2**
Bromodichloromethane	3000 U	5.9 U	31 U	7 U	6.4 U	830 U	34000 U	7400 U	3800 U	5.4 U
Bromoform	3000 U	5.9 U	31 U	7 U	6.4 U	830 U	34000 U	8000 U	4100 U	5.4 U
Bromomethane	3000 U	5.9 U	31 U	7 U	6.4 U	830 U	34000 U	18000 U	9100 U	5.4 U
2-Butanone	15000 U	29 U	150 U	35 U	32 U	4200 U	170000 U	32000 U	16000 U	27 U
Carbon disulfide	**5600**	5.9 U	31 U	**78**	**7.2**	830 U	34000 U	660 U	340 U	5.4 U
Carbon tetrachloride	3000 U	5.9 U	31 U	7 U	6.4 U	830 U	34000 U	10000 U	5300 U	5.4 U
Chlorobenzene	**190000**	**11**	**49**	**250**	**150**	**14000**	**940000**	**2,800,000**	**1,400,000**	**3 J**
Chloroethane	3000 U	5.9 U	31 U	7 U	6.4 U	830 U	34000 U	12000 U	6200 U	5.4 U
Chloroform	3000 U	**3.9 J**	31 U	7 U	6.4 U	830 U	34000 U	25000 U	13000 U	5.4 U
Chloromethane	3000 U	5.9 U	31 U	7 U	6.4 U	830 U	34000 U	11000 U	5800 U	5.4 U
Dibromochloromethane	3000 U	5.9 U	31 U	7 U	6.4 U	830 U	34000 U	7500 U	3800 U	5.4 U
1,2-Dichlorobenzene	**2400 J**	**10**	**19 J**	7 U	6.4 U	830 U	34000 U	**110,000**	**46,000**	5.4 U
1,3-Dichlorobenzene	3000 U	5.9 U	31 U	7 U	6.4 U	830 U	34000 U	14000 UM	7300 U	5.4 U
1,4-Dichlorobenzene	**960 J**	5.9 U	31 U	7 U	6.4 U	830 U	34000 U	**38000 J**	**11000 J**	5.4 U
1,1-Dichloroethane	3000 U	5.9 U	31 U	7 U	6.4 U	830 U	34000 U	10000 U	5100 U	5.4 U
1,2-Dichloroethane	3000 U	**2.3 J**	31 U	7 U	6.4 U	830 U	34000 U	22000 U	11000 U	5.4 U
1,1-Dichloroethene	3000 U	5.9 U	31 U	7 U	6.4 U	830 U	34000 U	5700 U	2900 U	5.4 U
Cis-1,2-Dichloroethene	3000 U	5.9 U	31 U	7 U	6.4 U	830 U	34000 U	NA	NA	5.4 U
Trans-1,2-Dichloroethene	3000 U	5.9 U	31 U	7 U	6.4 U	830 U	34000 U	NA	NA	5.4 U
1,2-Dichloroethene (total)	NA	NA	NA	NA	NA	NA	NA	12000 U	6200 U	NA
1,2-Dichloropropane	3000 U	5.9 U	31 U	7 U	6.4 U	830 U	34000 U	5000 U	2600 U	5.4 U
Cis-1,3-Dichloropropene	3000 U	5.9 U	31 U	7 U	6.4 U	830 U	34000 U	6900 U	3500 U	5.4 U
Trans-1,3-Dichloropropene	3000 U	5.9 U	31 U	7 U	6.4 U	830 U	34000 U	6600 U	3400 U	5.4 U
Ethylbenzene	**1200**	1.2 U	**9.8**	**4.6**	**1.6**	170 U	6800 U	13000 U	6500 U	1.1 U
2-Hexanone	12000 U	24 U	120 U	28 U	26 U	3300 U	140000 U	30000 U	15000 U	22 U
Methylene chloride	3000 U	**9.6 B**	**100 B**	**6 J**	**3 J**	**170 J**	**9200 J**	21000 UB	11000 U	**8.6 B**
4-Methyl-2-Pentanone	12000 U	24 U	120 U	28 U	26 U	3300 U	140000 U	36000 U	18000 U	22 U
Styrene	600 U	1.2 U	6.2 U	1.4 U	1.3 U	170 U	6800 U	13000 U	6600 U	1.1 U
1,1,2,2-Tetrachloroethane	3000 U	5.9 U	31 U	7 U	6.4 U	830 U	34000 U	15000 U	7500 U	5.4 U
Tetrachloroethene	3000 U	5.9 U	31 U	7 U	6.4 U	830 U	34000 U	17000 U	8600 U	5.4 U
Toluene	**850**	**13**	**200**	**31**	**19**	170 U	6800 U	15000 U	7500 U	**31**
1,2,4-Trichlorobenzene	600 U	**2**	6.2 U	1.4 U	1.3 U	170 U	6800 U	85000 U	43000 U	1.1 U
1,1,1-Trichloroethane	3000 U	5.9 U	31 U	7 U	6.4 U	830 U	34000 U	10000 U	5300 U	5.4 U
1,1,2-Trichloroethane	3000 U	5.9 U	31 U	7 U	6.4 U	830 U	34000 U	7000 U	3500 U	5.4 U
Trichloroethene	3000 U	5.9 U	31 U	7 U	6.4 U	830 U	34000 U	5300 U	2700 U	5.4 U
Vinyl acetate	NA	NA	NA	NA	NA	NA	NA	33000 U	17000 U	NA
Vinyl chloride	3000 U	5.9 U	31 U	7 U	6.4 U	830 U	34000 U	18000 U	9100 U	5.4 U
M&p-Xylenes	**3800**	**1.9 J**	**13**	**3.9**	2.6 U	**280 J**	**22000**	NA	NA	**2.9**
O-Xylene	**2700**	1.2 U	6.2 U	**1.6**	1.3 U	170 U	**8600**	NA	NA	**4.2**
Xylenes (total)	NA	NA	NA	NA	NA	NA	NA	44000 U	22000 U	NA

Notes:
ft bls - Feet below land surface
µg/kg - Micrograms per kilogram
B - Detected in blank
J - Estimated value
U - Not detected, detection limit is shown

Table A-1. Summary of Volatile Organic Compounds Detected in Soil, BASF Corporation, Closed Landfill, Rensselaer, New York

Analyte (Concentrations in µg/kg)	Sample Location:	LF-TP-6-2	LF-TP-6-3	LF-TP-6-4	LF-TP-6-5	LF-TP-6-5	LF-TP-6-6	LF-TP-6-6	LF-TP-6-7	LF-TP-6-7	LF-TP-6-8
	Sample Date:	04/05/04	04/05/04	04/05/04	04/07/04	04/07/04	04/07/04	04/07/04	04/07/04	04/07/04	04/07/04
	Sample Depth (ft bls):	0-4	0-4	0-4	0-4	4-8	0-4	4-8	0-4	4-8	0-4
	Sample Designation:	B9-90-18	B9-91-3	B9-91-15	B9-110-17	B9-110-20	B9-111-7	B9-111-10	B9-111-21	B9-111-24	B9-112-14
Acetone		3000 U	**46**	33000 U	3400 U	3500 U	26 U	33000 U	**61**	7600 U	**76**
Benzene		150 U	1.3 U	1600 U	170 U	**280**	**4**	1600 U	1.2 U	380 U	**4.1**
Bromodichloromethane		750 U	6.3 U	8200 U	840 U	870 U	6.6 U	8200 U	6.1 U	1900 U	6.3 U
Bromoform		750 U	6.3 U	8200 U	840 U	870 U	6.6 U	8200 U	6.1 U	1900 U	6.3 U
Bromomethane		750 U	6.3 U	8200 U	840 U	870 U	6.6 U	8200 U	6.1 U	1900 U	6.3 U
2-Butanone		3800 U	31 U	41000 U	4200 U	4300 U	33 U	41000 U	30 U	9500 U	31 U
Carbon disulfide		750 U	6.3 U	8200 U	840 U	870 U	6.6 U	8200 U	**1.4 J**	1900 U	6.3 U
Carbon tetrachloride		750 U	6.3 U	8200 U	840 U	870 U	6.6 U	8200 U	6.1 U	1900 U	6.3 U
Chlorobenzene		**58000**	**1.7 J**	**200000**	**79000**	**41000**	**28**	**780000**	**1.5 J**	**86000**	**2.1 J**
Chloroethane		750 U	6.3 U	8200 U	840 U	870 U	6.6 U	8200 U	6.1 U	1900 U	6.3 U
Chloroform		750 U	6.3 U	8200 U	840 U	870 U	6.6 U	8200 U	6.1 U	1900 U	6.3 U
Chloromethane		750 U	6.3 U	8200 U	840 U	870 U	6.6 U	8200 U	6.1 U	1900 U	6.3 U
Dibromochloromethane		750 U	6.3 U	8200 U	840 U	870 U	6.6 U	8200 U	6.1 U	1900 U	6.3 U
1,2-Dichlorobenzene		**1300**	6.3 U	8200 U	**1600**	870 U	**1.8 J**	8200 U	**1.3 J**	1900 U	6.3 U
1,3-Dichlorobenzene		750 U	6.3 U	8200 U	840 U	870 U	6.6 U	8200 U	6.1 U	1900 U	6.3 U
1,4-Dichlorobenzene		**490 J**	6.3 U	8200 U	**750 J**	870 U	6.6 U	8200 U	6.1 U	1900 U	6.3 U
1,1-Dichloroethane		750 U	6.3 U	8200 U	840 U	870 U	6.6 U	8200 U	6.1 U	1900 U	6.3 U
1,2-Dichloroethane		750 U	6.3 U	8200 U	**18000**	**780 J**	**21**	8200 U	**2.6 J**	1900 U	**2.4 J**
1,1-Dichloroethene		750 U	6.3 U	8200 U	840 U	870 U	**24**	8200 U	6.1 U	1900 U	6.3 U
Cis-1,2-Dichloroethene		750 U	6.3 U	8200 U	840 U	870 U	**94**	8200 U	6.1 U	1900 U	6.3 U
Trans-1,2-Dichloroethene		750 U	6.3 U	8200 U	840 U	870 U	**28**	8200 U	6.1 U	1900 U	6.3 U
1,2-Dichloroethene (total)		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichloropropane		750 U	6.3 U	8200 U	840 U	870 U	6.6 U	8200 U	6.1 U	1900 U	6.3 U
Cis-1,3-Dichloropropene		750 U	6.3 U	8200 U	840 U	870 U	6.6 U	8200 U	6.1 U	1900 U	6.3 U
Trans-1,3-Dichloropropene		750 U	6.3 U	8200 U	840 U	870 U	6.6 U	8200 U	6.1 U	1900 U	6.3 U
Ethylbenzene		150 U	1.3 U	1600 U	**420**	**350**	1.3 U	**19000**	1.2 U	**1800**	1.3 U
2-Hexanone		3000 U	25 U	33000 U	3400 U	3500 U	26 U	33000 U	24 U	7600 U	25 U
Methylene chloride		750 U	**12 B**	8200 U	**230 J**	870 U	**9.7 B**	8200 U	**24 B**	1900 U	**26 B**
4-Methyl-2-Pentanone		3000 U	25 U	33000 U	3400 U	3500 U	26 U	33000 U	24 U	7600 U	25 U
Styrene		150 U	1.3 U	1600 U	170 U	170 U	1.3 U	1600 U	1.2 U	380 U	1.3 U
1,1,2,2-Tetrachloroethane		750 U	6.3 U	8200 U	840 U	870 U	6.6 U	8200 U	6.1 U	1900 U	6.3 U
Tetrachloroethene		750 U	6.3 U	8200 U	**340 J**	870 U	**3.8 J**	8200 U	6.1 U	1900 U	6.3 U
Toluene		150 U	1.3 U	1600 U	**500**	**190**	**44**	1600 U	**1.4**	**380 U**	**4.9**
1,2,4-Trichlorobenzene		**520**	1.3 U	1600 U	**6800**	170 U	1.3 U	**26000**	1.2 U	380 U	1.3 U
1,1,1-Trichloroethane		750 U	6.3 U	8200 U	840 U	870 U	6.6 U	8200 U	6.1 U	1900 U	6.3 U
1,1,2-Trichloroethane		750 U	6.3 U	8200 U	840 U	870 U	6.6 U	8200 U	6.1 U	1900 U	6.3 U
Trichloroethene		750 U	6.3 U	8200 U	**2600**	870 U	**130**	8200 U	6.1 U	1900 U	6.3 U
Vinyl acetate		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vinyl chloride		750 U	6.3 U	8200 U	840 U	870 U	**15**	8200 U	6.1 U	1900 U	6.3 U
M&p-Xylenes		300 U	2.5 U	3300 U	**1800**	**1100**	**2.5 J**	**62000**	2.4 U	760 U	2.5 U
O-Xylene		150 U	1.3 U	1600 U	**850**	**430**	**1.8**	**39000**	1.2 U	380 U	1.3 U
Xylenes (total)		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:
ft bls - Feet below land surface
µg/kg - Micrograms per kilogram
B - Detected in blank
J - Estimated value
U - Not detected, detection limit is shown

Table A-1. Summary of Volatile Organic Compounds Detected in Soil, BASF Corporation, Closed Landfill, Rensselaer, New York

Analyte (Concentrations in µg/kg)											
	Sample Location:	LF-TP-6-8	LF-TP-6-9	LF-TP-6-9	LF-TP-6-10	LF-TP-6-10	LF-TP-6-11	LF-TP-6-11	LF-TP-6-12	LF-TP-6-12	LF-TP-6-13
	Sample Date:	04/07/04	04/07/04	04/07/04	04/08/04	04/08/04	04/08/04	04/08/04	04/08/04	04/08/04	04/08/04
	Sample Depth (ft bls):	4-8	0-4	4-8	0-4	4-8	0-4	4-8	0-4	4-8	0-4
	Sample Designation:	B9-112-17	B9-122-14	B9-122-17	B9-124-15	B9-124-18	B9-125-7	B9-125-10	B9-125-23	B9-126-2	B9-126-15
Acetone		**750**	**93**	**250**	**93**	**110**	**65**	4400 U	**160**	**120**	260000 U
Benzene		**54**	1.8 U	**10**	1.6 U	**2.9**	1.3 U	220 U	**2.5**	**3.5**	13000 U
Bromodichloromethane		32 U	8.8 U	9.3 U	7.8 U	7.4 U	6.3 U	1100 U	9.1 U	7.4 U	65000 U
Bromoform		32 U	8.8 U	9.3 U	7.8 U	7.4 U	6.3 U	1100 U	9.1 U	7.4 U	65000 U
Bromomethane		32 U	8.8 U	9.3 U	7.8 U	7.4 U	6.3 U	1100 U	9.1 U	7.4 U	65000 U
2-Butanone		160 U	44 U	46 U	39 U	37 U	31 U	5500 U	45 U	37 U	320000 U
Carbon disulfide		32 U	8.8 U	**4.4 J**	7.8 U	**1.5 J**	**1.9 J**	1100 U	9.1 U	7.4 U	65000 U
Carbon tetrachloride		32 U	8.8 U	9.3 U	7.8 U	7.4 U	6.3 U	1100 U	9.1 U	7.4 U	65000 U
Chlorobenzene		**370**	**11**	**720**	**2.9 J**	**8.7**	**33**	**25000**	**3.3 J**	**2 J**	**1900000**
Chloroethane		32 U	8.8 U	9.3 U	7.8 U	7.4 U	6.3 U	1100 U	9.1 U	7.4 U	65000 U
Chloroform		32 U	8.8 U	9.3 U	7.8 U	7.4 U	6.3 U	1100 U	9.1 U	7.4 U	65000 U
Chloromethane		32 U	8.8 U	9.3 U	7.8 U	7.4 U	6.3 U	1100 U	9.1 U	7.4 U	65000 U
Dibromochloromethane		32 U	8.8 U	9.3 U	7.8 U	7.4 U	6.3 U	1100 U	9.1 U	7.4 U	65000 U
1,2-Dichlorobenzene		**9.8 J**	8.8 U	9.3 U	7.8 U	7.4 U	**50**	**7600**	9.1 U	7.4 U	65000 U
1,3-Dichlorobenzene		32 U	8.8 U	9.3 U	7.8 U	7.4 U	6.3 U	1100 U	9.1 U	7.4 U	65000 U
1,4-Dichlorobenzene		32 U	8.8 U	9.3 U	7.8 U	7.4 U	6.3 U	**870 J**	9.1 U	7.4 U	65000 U
1,1-Dichloroethane		32 U	8.8 U	9.3 U	7.8 U	7.4 U	6.3 U	1100 U	9.1 U	7.4 U	65000 U
1,2-Dichloroethane		32 U	8.8 U	9.3 U	7.8 U	7.4 U	6.3 U	1100 U	9.1 U	7.4 U	65000 U
1,1-Dichloroethene		32 U	8.8 U	9.3 U	7.8 U	7.4 U	6.3 U	1100 U	9.1 U	7.4 U	65000 U
Cis-1,2-Dichloroethene		32 U	8.8 U	9.3 U	7.8 U	7.4 U	6.3 U	1100 U	9.1 U	7.4 U	65000 U
Trans-1,2-Dichloroethene		32 U	8.8 U	9.3 U	7.8 U	7.4 U	6.3 U	1100 U	9.1 U	7.4 U	65000 U
1,2-Dichloroethene (total)		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichloropropane		32 U	8.8 U	9.3 U	7.8 U	7.4 U	6.3 U	1100 U	9.1 U	7.4 U	65000 U
Cis-1,3-Dichloropropene		32 U	8.8 U	9.3 U	7.8 U	7.4 U	6.3 U	1100 U	9.1 U	7.4 U	65000 U
Trans-1,3-Dichloropropene		32 U	8.8 U	9.3 U	7.8 U	7.4 U	6.3 U	1100 U	9.1 U	7.4 U	65000 U
Ethylbenzene		**12**	1.8 U	1.9 U	1.6 U	1.5 U	1.3 U	220 U	1.8 U	1.5 U	13000 U
2-Hexanone		130 U	35 U	37 U	31 U	29 U	25 U	4400 U	36 U	29 U	260000 U
Methylene chloride		**140 B**	**57 B**	**5.7 J**	**56 B**	**8.5**	**6.1 J**	**330 J**	**85 B**	**56 B**	65000 U
4-Methyl-2-Pentanone		130 U	35 U	37 U	31 U	29 U	25 U	4400 U	36 U	29 U	260000 U
Styrene		6.4 U	1.8 U	1.9 U	1.6 U	1.5 U	1.3 U	220 U	1.8 U	1.5 U	13000 U
1,1,2,2-Tetrachloroethane		32 U	8.8 U	9.3 U	7.8 U	7.4 U	6.3 U	1100 U	9.1 U	7.4 U	65000 U
Tetrachloroethene		32 U	8.8 U	9.3 U	**1.8 J**	7.4 U	6.3 U	1100 U	**4.9 J**	7.4 U	65000 U
Toluene		**220**	**12**	**110**	**8.1**	**24**	**12**	220 U	**35**	**21**	13000 U
1,2,4-Trichlorobenzene		6.4 U	1.8 U	1.9 U	1.6 U	1.5 U	1.3 U	**960**	1.8 U	1.5 U	13000 U
1,1,1-Trichloroethane		32 U	8.8 U	9.3 U	7.8 U	7.4 U	6.3 U	1100 U	9.1 U	7.4 U	65000 U
1,1,2-Trichloroethane		32 U	8.8 U	9.3 U	7.8 U	7.4 U	6.3 U	1100 U	9.1 U	7.4 U	65000 U
Trichloroethene		32 U	8.8 U	9.3 U	7.8 U	7.4 U	6.3 U	1100 U	9.1 U	7.4 U	65000 U
Vinyl acetate		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vinyl chloride		32 U	8.8 U	9.3 U	7.8 U	7.4 U	6.3 U	1100 U	9.1 U	7.4 U	65000 U
M&p-Xylenes		**17**	3.5 U	3.7 U	3.1 U	2.9 U	2.5 U	**690**	**6.3**	2.9 U	26000 U
O-Xylene		6.4 U	1.8 U	1.9 U	1.6 U	1.5 U	1.3 U	**560**	1.8 U	1.5 U	13000 U
Xylenes (total)		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:
ft bls - Feet below land surface
µg/kg - Micrograms per kilogram
B - Detected in blank
J - Estimated value
U - Not detected, detection limit is shown

Table A-1. Summary of Volatile Organic Compounds Detected in Soil, BASF Corporation, Closed Landfill, Rensselaer, New York

Analyte (Concentrations in µg/kg)	**Sample Location:**	LF-TP-6-13	LF-TP-7	LF-TP-7-1	LF-TP-7-1	LF-TP-7-2	LF-TP-7-2	LF-TP-7-3	LF-TP-7-3	LF-TP-7-4	LF-TP-7-4
	Sample Date:	04/08/04	12/12/02	4/5/2004	4/5/2004	4/5/2004	4/5/2004	4/5/2004	4/5/2004	4/5/2004	4/5/2004
	Sample Depth (ft bls):	4-8	4-8	0-4	4-8	0-4	4-8	0-4	4-8	0-4	4-6
	Sample Designation:	B9-126-18	B9-23-11	B9-83-21	B9-83-23	B9-83-10	B9-83-13	B9-84-11	B9-84-17	B9-85-16	B9-85-13
Acetone		**69**	1700 U	26 U	**170**	24 U	**430**	24 U	**100**	**100**	140 U
Benzene		**2.3**	**6,600**	1.3 U	**140**	**5.7**	**75**	1.2 U	**76**	**29**	**2000**
Bromodichloromethane		6.7 U	61 U	6.4 U	31 U	6 U	30 U	5.9 U	6 U	5.6 U	35 U
Bromoform		6.7 U	66 U	6.4 U	31 U	6 U	30 U	5.9 U	6 U	5.6 U	35 U
Bromomethane		6.7 U	150 U	6.4 U	31 U	6 U	30 U	5.9 U	6 U	5.6 U	35 U
2-Butanone		33 U	**1,000**	32 U	150 U	30 U	150 U	29 U	30 U	28 U	180 U
Carbon disulfide		6.7 U	5 U	6.4 U	31 U	6 U	30 U	5.9 U	6 U	5.6 U	35 U
Carbon tetrachloride		6.7 U	85 U	6.4 U	31 U	6 U	30 U	5.9 U	6 U	5.6 U	35 U
Chlorobenzene		**310**	**16,000**	**1.4 J**	**200**	6 U	**260**	5.9 U	**73**	**10**	**2500**
Chloroethane		6.7 U	99 U	6.4 U	31 U	6 U	30 U	5.9 U	6 U	5.6 U	35 U
Chloroform		6.7 U	200 U	6.4 U	31 U	6 U	30 U	5.9 U	6 U	5.6 U	35 U
Chloromethane		6.7 U	94 U	6.4 U	31 U	6 U	30 U	5.9 U	6 U	5.6 U	35 U
Dibromochloromethane		6.7 U	61 U	6.4 U	31 U	6 U	30 U	5.9 U	6 U	5.6 U	35 U
1,2-Dichlorobenzene		**1.6 J**	**6,400**	6.4 U	**15 J**	6 U	**7.8 J**	5.9 U	6 U	5.6 U	**64**
1,3-Dichlorobenzene		6.7 U	**2,500**	6.4 U	31 U	6 U	30 U	5.9 U	6 U	5.6 U	35 U
1,4-Dichlorobenzene		6.7 U	**8,400**	6.4 U	31 U	6 U	30 U	5.9 U	6 U	5.6 U	35 U
1,1-Dichloroethane		6.7 U	82 U	6.4 U	31 U	6 U	30 U	5.9 U	6 U	5.6 U	35 U
1,2-Dichloroethane		6.7 U	**450 J**	6.4 U	31 U	6 U	30 U	5.9 U	6 U	5.6 U	35 U
1,1-Dichloroethene		6.7 U	46 U	6.4 U	31 U	6 U	30 U	5.9 U	6 U	5.6 U	35 U
Cis-1,2-Dichloroethene		6.7 U	NA	6.4 U	31 U	6 U	30 U	5.9 U	6 U	5.6 U	35 U
Trans-1,2-Dichloroethene		6.7 U	NA	6.4 U	31 U	6 U	30 U	5.9 U	6 U	5.6 U	35 U
1,2-Dichloroethene (total)		NA	99 U	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichloropropane		6.7 U	41 U	6.4 U	31 U	6 U	30 U	5.9 U	6 U	5.6 U	35 U
Cis-1,3-Dichloropropene		6.7 U	56 U	6.4 U	31 U	6 U	30 U	5.9 U	6 U	5.6 U	35 U
Trans-1,3-Dichloropropene		6.7 U	54 U	6.4 U	31 U	6 U	30 U	5.9 U	6 U	5.6 U	35 U
Ethylbenzene		1.3 U	**860**	1.3 U	6.2 U	1.2 U	6 U	1.2 U	1.2 U	1.1 U	**110**
2-Hexanone		27 U	250 U	26 U	120 U	24 U	120 U	24 U	24 U	22 U	140 U
Methylene chloride		**7**	170 UB	**13 B**	**66 B**	**12 B**	**62 B**	**9.1 B**	**9.7 B**	**11 B**	**78 B**
4-Methyl-2-Pentanone		27 U	290 U	26 U	120 U	24 U	120 U	24 U	24 U	22 U	140 U
Styrene		1.3 U	110 U	1.3 U	6.2 U	1.2 U	6 U	1.2 U	1.2 U	1.1 U	7 U
1,1,2,2-Tetrachloroethane		6.7 U	**230 J**	6.4 U	31 U	6 U	30 U	5.9 U	6 U	5.6 U	35 U
Tetrachloroethene		**2.9 J**	140 U	6.4 U	31 U	6 U	30 U	5.9 U	6 U	5.6 U	35 U
Toluene		**22**	**420 J**	**45**	**320**	**44**	**110**	**21**	**47**	**75**	**530**
1,2,4-Trichlorobenzene		1.3 U	**1,300**	1.3 U	6.2 U	1.2 U	6 U	1.2 U	1.2 U	1.1 U	7 U
1,1,1-Trichloroethane		6.7 U	85 U	6.4 U	31 U	6 U	30 U	5.9 U	6 U	5.6 U	35 U
1,1,2-Trichloroethane		6.7 U	57 U	6.4 U	31 U	6 U	30 U	5.9 U	6 U	5.6 U	35 U
Trichloroethene		6.7 U	**130 J**	6.4 U	31 U	6 U	30 U	5.9 U	6 U	5.6 U	35 U
Vinyl acetate		NA	270 U	NA	NA	NA	NA	NA	NA	NA	NA
Vinyl chloride		6.7 U	150 U	6.4 U	31 U	6 U	30 U	5.9 U	6 U	5.6 U	35 U
M&p-Xylenes		2.7 U	NA	2.6 U	12 U	2.4 U	**6.5 J**	2.4 U	**2 J**	**6.7**	**45**
O-Xylene		1.3 U	NA	1.3 U	6.2 U	1.2 U	6 U	1.2 U	**1.3**	**4.3**	**35**
Xylenes (total)		NA	**2,000**	NA	NA	NA	NA	NA	NA	NA	NA

Notes:
ft bls - Feet below land surface
µg/kg - Micrograms per kilogram
B - Detected in blank
J - Estimated value
U - Not detected, detection limit is shown

Table A-1. Summary of Volatile Organic Compounds Detected in Soil, BASF Corporation, Closed Landfill, Rensselaer, New York

Analyte (Concentrations in µg/kg)		LF-TP-7-5	LF-TP-7-5	LF-TP-7-6	LF-TP-7-6	LF-TP-7-7	LF-TP-7-8	LF-TP-7-9	LF-TP-7-9	LF-TP-7-10	LF-TP-7-11
	Sample Date:	04/05/04	04/05/04	04/05/04	04/05/04	04/05/04	04/05/04	04/05/04	04/05/04	4/5/2004	4/5/2004
	Sample Depth (ft bls):	0-4	4-8	0-4	4-8	0-4	0-4	0-4	4-8	0-4	0-4
	Sample Designation:	B9-87-5	B9-87-13	B9-86-18	B9-86-23	B9-86-6	B9-85-23	B9-87-20	B9-88-2	B9-88-9	B9-89-13
Acetone		25 U	**270**	25 U	24 U	25 U	**78**	24 U	**400**	**64**	26 U
Benzene		1.3 U	**36**	1.2 U	**7.4**	1.2 U	**2.4**	**1.5**	**23**	1.2 U	**1.9**
Bromodichloromethane		6.3 U	5.9 U	6.2 U	5.9 U	6.2 U	5.7 U	6.1 U	6.5 U	5.8 U	6.5 U
Bromoform		6.3 U	5.9 U	6.2 U	5.9 U	6.2 U	5.7 U	6.1 U	6.5 U	5.8 U	6.5 U
Bromomethane		6.3 U	5.9 U	6.2 U	5.9 U	6.2 U	5.7 U	6.1 U	6.5 U	5.8 U	6.5 U
2-Butanone		31 U	**21 J**	31 U	29 U	31 U	28 U	30 U	**33**	29 U	32 U
Carbon disulfide		6.3 U	5.9 U	6.2 U	5.9 U	6.2 U	5.7 U	6.1 U	6.5 U	5.8 U	6.5 U
Carbon tetrachloride		6.3 U	5.9 U	6.2 U	5.9 U	6.2 U	5.7 U	6.1 U	6.5 U	5.8 U	6.5 U
Chlorobenzene		6.3 U	**20**	6.2 U	**5.1 J**	6.2 U	**5.2 J**	**5.6 J**	**620**	**18**	6.5 U
Chloroethane		6.3 U	5.9 U	6.2 U	5.9 U	6.2 U	5.7 U	6.1 U	6.5 U	5.8 U	6.5 U
Chloroform		6.3 U	5.9 U	6.2 U	5.9 U	6.2 U	5.7 U	6.1 U	6.5 U	5.8 U	6.5 U
Chloromethane		6.3 U	5.9 U	6.2 U	5.9 U	6.2 U	5.7 U	6.1 U	6.5 U	5.8 U	6.5 U
Dibromochloromethane		6.3 U	5.9 U	6.2 U	5.9 U	6.2 U	5.7 U	6.1 U	6.5 U	5.8 U	6.5 U
1,2-Dichlorobenzene		6.3 U	5.9 U	6.2 U	5.9 U	6.2 U	5.7 U	6.1 U	6.5 U	5.8 U	6.5 U
1,3-Dichlorobenzene		6.3 U	5.9 U	6.2 U	5.9 U	6.2 U	5.7 U	6.1 U	6.5 U	5.8 U	6.5 U
1,4-Dichlorobenzene		6.3 U	5.9 U	6.2 U	5.9 U	6.2 U	5.7 U	6.1 U	6.5 U	5.8 U	6.5 U
1,1-Dichloroethane		6.3 U	5.9 U	6.2 U	5.9 U	6.2 U	5.7 U	6.1 U	6.5 U	5.8 U	6.5 U
1,2-Dichloroethane		6.3 U	5.9 U	6.2 U	5.9 U	6.2 U	5.7 U	6.1 U	6.5 U	5.8 U	6.5 U
1,1-Dichloroethene		6.3 U	5.9 U	6.2 U	5.9 U	6.2 U	5.7 U	6.1 U	6.5 U	5.8 U	6.5 U
Cis-1,2-Dichloroethene		6.3 U	5.9 U	6.2 U	5.9 U	6.2 U	5.7 U	6.1 U	6.5 U	5.8 U	6.5 U
Trans-1,2-Dichloroethene		6.3 U	5.9 U	6.2 U	5.9 U	6.2 U	5.7 U	6.1 U	6.5 U	5.8 U	6.5 U
1,2-Dichloroethene (total)		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichloropropane		6.3 U	5.9 U	6.2 U	5.9 U	6.2 U	5.7 U	6.1 U	6.5 U	5.8 U	6.5 U
Cis-1,3-Dichloropropene		6.3 U	5.9 U	6.2 U	5.9 U	6.2 U	5.7 U	6.1 U	6.5 U	5.8 U	6.5 U
Trans-1,3-Dichloropropene		6.3 U	5.9 U	6.2 U	5.9 U	6.2 U	5.7 U	6.1 U	6.5 U	5.8 U	6.5 U
Ethylbenzene		1.3 U	1.2 U	1.2 U	1.2 U	1.2 U	1.1 U	1.2 U	1.3 U	1.2 U	1.3 U
2-Hexanone		25 U	24 U	25 U	24 U	25 U	23 U	24 U	26 U	23 U	26 U
Methylene chloride		**7.4 B**	**9.5 B**	**9.2 B**	**12 B**	**11 B**	**11 B**	**10 B**	**14 B**	**9.3 B**	**13 B**
4-Methyl-2-Pentanone		25 U	24 U	25 U	24 U	25 U	23 U	24 U	26 U	23 U	26 U
Styrene		1.3 U	1.2 U	1.2 U	1.2 U	1.2 U	1.1 U	1.2 U	1.3 U	1.2 U	1.3 U
1,1,2,2-Tetrachloroethane		6.3 U	5.9 U	6.2 U	5.9 U	6.2 U	5.7 U	6.1 U	6.5 U	5.8 U	6.5 U
Tetrachloroethene		6.3 U	5.9 U	6.2 U	5.9 U	6.2 U	5.7 U	6.1 U	6.5 U	5.8 U	6.5 U
Toluene		**32**	**28**	**12**	**27**	**3.6**	**8.8**	**14**	**32**	**23**	**44**
1,2,4-Trichlorobenzene		1.3 U	1.2 U	1.2 U	1.2 U	1.2 U	1.1 U	1.2 U	1.3 U	1.2 U	1.3 U
1,1,1-Trichloroethane		6.3 U	5.9 U	6.2 U	5.9 U	6.2 U	5.7 U	6.1 U	6.5 U	5.8 U	6.5 U
1,1,2-Trichloroethane		6.3 U	5.9 U	6.2 U	5.9 U	6.2 U	5.7 U	6.1 U	6.5 U	5.8 U	6.5 U
Trichloroethene		6.3 U	5.9 U	6.2 U	5.9 U	6.2 U	5.7 U	6.1 U	6.5 U	5.8 U	6.5 U
Vinyl acetate		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vinyl chloride		6.3 U	5.9 U	6.2 U	5.9 U	6.2 U	5.7 U	6.1 U	6.5 U	5.8 U	6.5 U
M&p-Xylenes		2.5 U	2.4 U	2.5 U	2.4 U	2.5 U	2.3 U	2.4 U	2.6 U	2.3 U	2.6 U
O-Xylene		1.3 U	1.2 U	1.2 U	1.2 U	1.2 U	1.1 U	1.2 U	1.3 U	1.2 U	1.3 U
Xylenes (total)		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:
ft bls - Feet below land surface
µg/kg - Micrograms per kilogram
B - Detected in blank
J - Estimated value
U - Not detected, detection limit is shown

Table A-1. Summary of Volatile Organic Compounds Detected in Soil, BASF Corporation, Closed Landfill, Rensselaer, New York

Analyte (Concentrations in µg/kg)	Sample Location:	LF-TP-7-12	LF-TP-7-12	LF-TP-8	PE-AREA1-S-16	PE-AREA1-S-17	PE-AREA1-S-18	PE-A1-S-18-1	PE-A1-S-18-1	PE-A1-S-18-2
	Sample Date:	4/5/2004	4/5/2004	12/17/02	09/10/02	09/10/02	09/10/02	04/06/04	04/06/04	04/06/04
	Sample Depth (ft bls):	0-4	4-8	4.0				0-4	4-8	0-4
	Sample Designation:	B9-88-19	B9-89-2	B9-29-25				B9-94-23	B9-95-7	B9-95-16
Acetone		**540**	**170**	**64**	**23**	**46**	48000 U	**81**	170 U	29 U
Benzene		6.5 U	**35**	0.6 U	**10**	**3 J**	1700 U	1.1 U	**170**	1.4 U
Bromodichloromethane		32 U	6 U	0.6 U	0.9 U	0.7 U	1700 U	5.5 U	43 U	7.2 U
Bromoform		32 U	6 U	0.7 U	1 U	0.8 U	1800 U	5.5 U	43 U	7.2 U
Bromomethane		32 U	6 U	3 U	4 U	3 U	4100 U	5.5 U	43 U	7.2 U
2-Butanone		160 U	30 U	**12 J**	**10 J**	**12 J**	7400 U	27 U	220 U	36 U
Carbon disulfide		32 U	6 U	0.2 U	**0.7 J**	**3 J**	150 U	5.5 U	43 U	7.2 U
Carbon tetrachloride		32 U	6 U	0.5U	0.7 U	0.6 U	2400 U	5.5 U	43 U	7.2 U
Chlorobenzene		**3200**	6 U	**3 J**	**20**	**24**	**410000**	**13**	**660**	7.2 U
Chloroethane		32 U	6 U	0.9 U	1 U	1 U	2800 U	5.5 U	43 U	7.2 U
Chloroform		32 U	6 U	0.7 U	1 U	0.8 U	5700 U	5.5 U	43 U	7.2 U
Chloromethane		32 U	6 U	1 U	1 U	1 U	2600 U	5.5 U	43 U	7.2 U
Dibromochloromethane		32 U	6 U	0.5 U	0.7 U	0.6 U	1700 U	5.5 U	43 U	7.2 U
1,2-Dichlorobenzene		32 U	6 U	**1 J**	NA	NA	NA	5.5 U	**15 J**	7.2 U
1,3-Dichlorobenzene		32 U	6 U	0.6 U	NA	NA	NA	5.5 U	43 U	7.2 U
1,4-Dichlorobenzene		32 U	6 U	0.7 U	NA	NA	NA	5.5 U	43 U	7.2 U
1,1-Dichloroethane		32 U	6 U	0.6 U	0.9 U	0.7 U	2300 U	5.5 U	43 U	7.2 U
1,2-Dichloroethane		32 U	6 U	**7**	0.7 U	0.6 U	5200 U	5.5 U	43 U	**4.2 J**
1,1-Dichloroethene		32 U	6 U	0.6 U	0.9 U	0.7 U	1300 U	5.5 U	43 U	7.2 U
Cis-1,2-Dichloroethene		32 U	6 U	NA	NA	NA	NA	5.5 U	43 U	7.2 U
Trans-1,2-Dichloroethene		32 U	6 U	NA	NA	NA	NA	5.5 U	43 U	7.2 U
1,2-Dichloroethene (total)		NA	NA	0.6 U	0.9 U	0.7 U	2800 U	NA	NA	NA
1,2-Dichloropropane		32 U	6 U	0.5 U	0.7 U	0.6 U	1200 U	5.5 U	43 U	7.2 U
Cis-1,3-Dichloropropene		32 U	6 U	0.5 U	0.7 U	0.6 U	1600 U	5.5 U	43 U	7.2 U
Trans-1,3-Dichloropropene		32 U	6 U	0.5 U	0.7 U	0.6 U	1500 U	5.5 U	43 U	7.2 U
Ethylbenzene		6.5 U	1.2 U	0.5 U	0.7 U	0.6 U	2900 U	1.1 U	8.6 U	1.4 U
2-Hexanone		130 U	24 U	4 U	6 U	5 U	6900 U	22 U	170 U	29 U
Methylene chloride		**57 B**	**10 B**	1 U	**7 JB**	**4 JB**	4900 U	**7.1 B**	**58 B**	**3.6 JB**
4-Methyl-2-Pentanone		130 U	24 U	3 U	5 U	4 U	8200 U	22 U	170 U	29 U
Styrene		6.5 U	1.2 U	0.6 U	0.9 U	0.7 U	3000 U	1.1 U	8.6 U	1.4 U
1,1,2,2-Tetrachloroethane		32 U	6 U	1 U	2 U	1 U	3400 U	5.5 U	43 U	7.2 U
Tetrachloroethene		32 U	6 U	0.5 U	0.7 U	0.6 U	3900 U	5.5 U	43 U	7.2 U
Toluene		**120**	**13**	**1 J**	0.7 U	**0.9 J**	3400 U	**4.4**	**600**	1.4 U
1,2,4-Trichlorobenzene		6.5 U	1.2 U	0.9 U	NA	NA	NA	1.1 U	8.6 U	1.4 U
1,1,1-Trichloroethane		32 U	6 U	0.6 U	0.9 U	0.7 U	2400 U	5.5 U	43 U	7.2 U
1,1,2-Trichloroethane		32 U	6 U	0.6 U	0.9 U	0.7 U	1600 U	5.5 U	43 U	7.2 U
Trichloroethene		32 U	6 U	0.6 U	0.9 U	0.7 U	1200 U	5.5 U	43 U	7.2 U
Vinyl acetate		NA	NA	4 U	5 U	4 U	7600 U	NA	NA	NA
Vinyl chloride		32 U	6 U	0.5 U	0.7 U	0.6 U	4100 U	5.5 U	43 U	7.2 U
M&p-Xylenes		**7.8 J**	2.4 U	NA	NA	NA	NA	2.2 U	17 U	2.9 U
O-Xylene		6.5 U	1.2 U	NA	NA	NA	NA	1.1 U	**14**	1.4 U
Xylenes (total)		NA	NA	**2 J**	2 U	**2 J**	10000 U	NA	NA	NA

Notes:
ft bls - Feet below land surface
µg/kg - Micrograms per kilogram
B - Detected in blank
J - Estimated value
U - Not detected, detection limit is shown

Table A-1. Summary of Volatile Organic Compounds Detected in Soil, BASF Corporation, Closed Landfill, Rensselaer, New York

Analyte (Concentrations in µg/kg)		PE-A1-S-18-3	PE-A1-S-18-3	PE-A1-S-18-4	PE-A1-S-18-4	PE-AREA1-S-19	PE-AREA1-S-20	PE-AREA1-S-21	PE-AREA1-S-22	PE-A1-S-22-1
	Sample Location:	PE-A1-S-18-3	PE-A1-S-18-3	PE-A1-S-18-4	PE-A1-S-18-4	PE-AREA1-S-19	PE-AREA1-S-20	PE-AREA1-S-21	PE-AREA1-S-22	PE-A1-S-22-1
	Sample Date:	04/06/04	04/06/04	04/06/04	04/06/04	09/10/02	09/10/02	09/10/02	09/10/02	04/09/04
	Sample Depth (ft bls):	0-4	4-8	0-4	4-8					0-4
	Sample Designation:	B9-96-2	B9-96-12	B9-97-7	B9-97-11					B9-146-23
Acetone		**460**	130 U	23 U	180 U	6 U	7 U	5 U	42000 U	120 U
Benzene		**60**	**990**	**1.4**	**57**	**4 J**	**2 J**	0.5 U	**510000**	**83**
Bromodichloromethane		31 U	33 U	5.8 U	44 U	0.6 U	0.6 U	0.5 U	1500 U	30 U
Bromoform		31 U	33 U	5.8 U	44 U	0.7 U	0.8 U	0.6 U	1600 U	30 U
Bromomethane		31 U	33 U	5.8 U	44 U	3 U	3 U	3 U	3500 U	30 U
2-Butanone		160 U	160 U	29 U	220 U	4 U	4 U	3 U	6400 U	150 U
Carbon disulfide		31 U	33 U	**1.2 J**	44 U	**0.4 J**	**0.7 J**	0.2 U	130 U	30 U
Carbon tetrachloride		31 U	33 U	5.8 U	44 U	0.5 U	0.5 U	0.4 U	2100 U	30 U
Chlorobenzene		**19 J**	**960**	**2.3 J**	**110**	**7**	**5 J**	**2 J**	**98000**	**18 J**
Chloroethane		31 U	33 U	5.8 U	44 U	0.9 U	0.9 U	0.7 U	2400 U	30 U
Chloroform		31 U	33 U	5.8 U	44 U	0.7 U	0.8 U	0.6 U	4900 U	30 U
Chloromethane		31 U	33 U	5.8 U	44 U	1 U	1 U	0.8 U	2300 U	30 U
Dibromochloromethane		31 U	33 U	5.8 U	44 U	0.5 U	0.5 U	0.4 U	1500 U	30 U
1,2-Dichlorobenzene		31 U	**36**	5.8 U	**69**	NA	NA	NA	NA	30 U
1,3-Dichlorobenzene		31 U	33 U	5.8 U	**9.4 J**	NA	NA	NA	NA	30 U
1,4-Dichlorobenzene		31 U	**9 J**	5.8 U	**91**	NA	NA	NA	NA	30 U
1,1-Dichloroethane		31 U	33 U	5.8 U	44 U	0.6 U	0.6 U	0.5 U	2000 U	30 U
1,2-Dichloroethane		31 U	33 U	5.8 U	44 U	0.5 U	0.5 U	0.4 U	4400 U	30 U
1,1-Dichloroethene		31 U	33 U	5.8 U	44 U	0.6 U	0.6 U	0.5 U	1100 U	30 U
Cis-1,2-Dichloroethene		31 U	**20 J**	5.8 U	44 U	NA	NA	NA	NA	**9.5 J**
Trans-1,2-Dichloroethene		31 U	33 U	5.8 U	44 U	NA	NA	NA	NA	30 U
1,2-Dichloroethene (total)		NA	NA	NA	NA	0.6 U	0.6 U	0.5 U	**13000 J**	NA
1,2-Dichloropropane		31 U	33 U	5.8 U	44 U	0.5 U	0.5 U	0.4 U	1000 U	30 U
Cis-1,3-Dichloropropene		31 U	33 U	5.8 U	44 U	0.5 U	0.5 U	0.4 U	1400 U	30 U
Trans-1,3-Dichloropropene		31 U	33 U	5.8 U	44 U	0.5 U	0.5 U	0.4 U	1300 U	30 U
Ethylbenzene		6.3 U	**17**	1.2 U	**17**	0.5 U	0.5 U	0.4 U	2500 U	**96**
2-Hexanone		120 U	130 U	23 U	180 U	4 U	4 U	4 U	6000 U	120 U
Methylene chloride		**36 B**	**44 B**	**14 B**	**58 B**	**4 JB**	**4 JB**	**2 JB**	**4500 J**	**56 B**
4-Methyl-2-Pentanone		120 U	130 U	23 U	180 U	3 U	4 U	3 U	7100 U	120 U
Styrene		6.3 U	6.6 U	1.2 U	8.8 U	0.6 U	0.6 U	0.5 U	2600 U	6 U
1,1,2,2-Tetrachloroethane		31 U	33 U	5.8 U	44 U	1 U	1 U	0.9 U	2900 U	30 U
Tetrachloroethene		31 U	33 U	5.8 U	44 U	0.5 U	0.5 U	0.4 U	3300 U	30 U
Toluene		**260**	**180**	**16**	**540**	0.5 U	**0.5 J**	0.4 U	2900 U	**41**
1,2,4-Trichlorobenzene		6.3 U	6.6 U	1.2 U	8.8 U	NA	NA	NA	NA	6 U
1,1,1-Trichloroethane		31 U	33 U	5.8 U	44 U	0.6 U	0.6 U	0.5 U	2100 U	30 U
1,1,2-Trichloroethane		31 U	33 U	5.8 U	44 U	0.6 U	0.6 U	0.5 U	1400 U	30 U
Trichloroethene		31 U	33 U	5.8 U	44 U	0.6 U	0.6 U	0.5 U	**18000**	**7.6 J**
Vinyl acetate		NA	NA	NA	NA	4 U	4 U	3 U	6500 U	NA
Vinyl chloride		31 U	33 U	5.8 U	44 U	0.5 U	0.5 U	0.4 U	3500 U	30 U
M&p-Xylenes		**6.3 J**	**11 J**	**6.7**	**130**	NA	NA	NA	NA	**57**
O-Xylene		**11**	**57**	**4.2**	**94**	NA	NA	NA	NA	**53**
Xylenes (total)		NA	NA	NA	NA	1 U	1 U	1 U	8700 U	NA

Notes:
ft bls - Feet below land surface
µg/kg - Micrograms per kilogram
B - Detected in blank
J - Estimated value
U - Not detected, detection limit is shown

Table A-1. Summary of Volatile Organic Compounds Detected in Soil, BASF Corporation, Closed Landfill, Rensselaer, New York

Analyte (Concentrations in µg/kg)	Sample Location:	PE-A1-S-22-1	PE-A1-S-22-2	PE-A1-S-22-2	PE-AREA1-S-23	PE-A1-S-23-1	PE-A1-S-23-2	PE-A1-S-23-3	PE-A1-S-23-4	PE-A1-S-23-4
	Sample Date:	04/09/04	04/09/04	04/09/04	09/10/02	04/06/04	04/06/04	04/06/04	04/06/04	04/06/04
	Sample Depth (ft bls):	4-8	0-4	4-8		0-4	0-4	0-4	0-4	4-8
	Sample Designation:	B9-147-2	B9-147-15	B9-147-18		B9-97-25	B9-98-9	B9-98-16	B9-99-6	B9-99-9
Acetone		250 U	**200**	69000 U	6700000 U	70000 U	22 U	25000 U	22 U	3000 U
Benzene		**4100**	**330**	**150000**	240000 U	**42000**	**5.4**	**3000**	1.1 U	**16000**
Bromodichloromethane		62 U	30 U	17000 U	240000 U	18000 U	5.5 U	6200 U	5.4 U	750 U
Bromoform		62 U	30 U	17000 U	260000 U	18000 U	5.5 U	6200 U	5.4 U	750 U
Bromomethane		62 U	30 U	17000 U	570000 U	18000 U	5.5 U	6200 U	5.4 U	750 U
2-Butanone		310 U	150 U	87000 U	1000000 U	88000 U	27 U	31000 U	27 U	3800 U
Carbon disulfide		62 U	30 U	17000 U	21000 U	18000 U	5.5 U	6200 U	5.4 U	750 U
Carbon tetrachloride		62 U	30 U	17000 U	340000 U	18000 U	5.5 U	6200 U	5.4 U	750 U
Chlorobenzene		**2600**	**13 J**	**300000**	**42000000**	**22000**	**5.2 J**	**51000**	**3.7 J**	**6600**
Chloroethane		62 U	30 U	17000 U	390000 U	18000 U	5.5 U	6200 U	5.4 U	750 U
Chloroform		62 U	30 U	17000 U	790000 U	18000 U	5.5 U	6200 U	5.4 U	750 U
Chloromethane		62 U	30 U	17000 U	370000 U	18000 U	5.5 U	6200 U	5.4 U	750 U
Dibromochloromethane		62 U	30 U	17000 U	240000 U	18000 U	5.5 U	6200 U	5.4 U	750 U
1,2-Dichlorobenzene		**140**	30 U	**13000 J**	NA	**1700000**	**12**	**310000**	**6.2**	**590 J**
1,3-Dichlorobenzene		**22 J**	30 U	17000 U	NA	**6200 J**	5.5 U	6200 U	5.4 U	750 U
1,4-Dichlorobenzene		**120**	30 U	17000 U	NA	**28000**	5.5 U	6200 U	5.4 U	750 U
1,1-Dichloroethane		62 U	30 U	17000 U	320000 U	18000 U	5.5 U	6200 U	5.4 U	750 U
1,2-Dichloroethane		62 U	**130**	17000 U	720000 U	18000 U	5.5 U	6200 U	5.4 U	750 U
1,1-Dichloroethene		62 U	30 U	17000 U	180000 U	18000 U	5.5 U	6200 U	5.4 U	750 U
Cis-1,2-Dichloroethene		**28 J**	**7.6 J**	17000 U	NA	18000 U	5.5 U	6200 U	5.4 U	750 U
Trans-1,2-Dichloroethene		62 U	30 U	17000 U	NA	18000 U	5.5 U	6200 U	5.4 U	750 U
1,2-Dichloroethene (total)		NA	NA	NA	390000 U	NA	NA	NA	NA	NA
1,2-Dichloropropane		62 U	30 U	17000 U	160000 U	18000 U	5.5 U	6200 U	5.4 U	750 U
Cis-1,3-Dichloropropene		62 U	30 U	17000 U	220000 U	18000 U	5.5 U	6200 U	5.4 U	750 U
Trans-1,3-Dichloropropene		62 U	30 U	17000 U	210000 U	18000 U	5.5 U	6200 U	5.4 U	750 U
Ethylbenzene		**210**	6 U	3500 U	**1100000 J**	3500 U	1.1 U	**31000**	1.1 U	**790**
2-Hexanone		250 U	120 U	69000 U	970000 U	70000 U	22 U	25000 U	22 U	3000 U
Methylene chloride		**66 B**	**120 B**	17000 U	680000 U	18000 U	**3.9 JB**	6200 U	**6.5 B**	750 U
4-Methyl-2-Pentanone		250 U	120 U	69000 U	1200000 U	70000 U	22 U	25000 U	22 U	3000 U
Styrene		13 U	6 U	3500 U	410000 U	3500 U	1.1 U	1200 U	1.1 U	150 U
1,1,2,2-Tetrachloroethane		62 U	30 U	17000 U	470000 U	18000 U	5.5 U	6200 U	5.4 U	750 U
Tetrachloroethene		62 U	30 U	17000 U	540000 U	18000 U	5.5 U	6200 U	5.4 U	750 U
Toluene		**54**	6 U	3500 U	480000 U	3500 U	**8.1**	1200 U	**4.3**	150 U
1,2,4-Trichlorobenzene		**400**	6 U	3500 U	NA	**7100**	**4.9**	**16000**	1.1 U	150 U
1,1,1-Trichloroethane		62 U	30 U	17000 U	330000 U	18000 U	5.5 U	6200 U	5.4 U	750 U
1,1,2-Trichloroethane		62 U	30 U	17000 U	220000 U	18000 U	5.5 U	6200 U	5.4 U	750 U
Trichloroethene		**45 J**	30 U	17000 U	170000 U	18000 U	5.5 U	6200 U	5.4 U	750 U
Vinyl acetate		NA	NA	NA	1100000 U	NA	NA	NA	NA	NA
Vinyl chloride		**53 J**	**120**	17000 U	570000 U	18000 U	5.5 U	6200 U	5.4 U	750 U
M&p-Xylenes		**94**	12 U	6900 U	NA	**4100 J**	2.2 U	**150000**	**1.9 J**	**2500**
O-Xylene		**74**	6 U	3500 U	NA	3500 U	1.1 U	**22000**	1.1 U	**870**
Xylenes (total)		NA	NA	NA	**6200000**	NA	NA	NA	NA	NA

Notes:
ft bls - Feet below land surface
µg/kg - Micrograms per kilogram
B - Detected in blank
J - Estimated value
U - Not detected, detection limit is shown

Table A-1. Summary of Volatile Organic Compounds Detected in Soil, BASF Corporation, Closed Landfill, Rensselaer, New York

Analyte (Concentrations in µg/kg)	Sample Location:	PE-AREA1-S-24	TP-6-14	TP-6-14	TP-6-15	TP-6-15	TP-6-16	TP-6-16	TP-6-17
	Sample Date:	09/10/02	05/26/04	05/26/04	05/26/04	05/26/04	05/26/04	05/26/04	05/26/04
	Sample Depth (ft bls):		0-4	4-8	0-4	4-8	0-4	4-8	0-4
	Sample Designation:		B12-4-02	B12-4-05	B12-3-02	B12-3-05	B12-7-13	B12-7-16	B12-6-17
Acetone		7500 U	**260**	38 U	170 U	32 U	180 U	8400 U	98000 U
Benzene		**2000 J**	7.2 U	1.5 U	34 U	**4.4**	**9.1**	340 U	3900 U
Bromodichloromethane		270 U	7.2 U	7.7 U	34 U	6.3 U	36 U	1700 U	20000 U
Bromoform		290 U	7.2 U	7.7 U	34 U	6.3 U	36 U	1700 U	20000 U
Bromomethane		640 U	7.2 U	7.7 U	34 U	6.3 U	36 U	1700 U	20000 U
2-Butanone		1200 U	36 U	38 U	170 U	32 U	180 U	8400 U	98000 U
Carbon disulfide		24 U	7.2 U	7.7 U	34 U	**4 J**	36 U	1700 U	20000 U
Carbon tetrachloride		380 U	7.2 U	7.7 U	34 U	6.3 U	36 U	1700 U	20000 U
Chlorobenzene		**96000**	**3.1 J**	**67**	**80**	**32**	**2400**	**41000**	**620000**
Chloroethane		440 U	7.2 U	7.7 U	34 U	6.3 U	36 U	1700 U	20000 U
Chloroform		890 U	7.2 U	7.7 U	34 U	6.3 U	36 U	1700 U	20000 U
Chloromethane		410 U	7.2 U	7.7 U	34 U	6.3 U	36 U	1700 U	20000 U
Dibromochloromethane		270 U	7.2 U	7.7 U	34 U	6.3 U	36 U	1700 U	20000 U
1,2-Dichlorobenzene		NA	7.2 U	7.7 U	34 U	**2.8 J**	36 U	**920 J**	20000 U
1,3-Dichlorobenzene		NA	7.2 U	7.7 U	34 U	6.3 U	36 U	1700 U	20000 U
1,4-Dichlorobenzene		NA	7.2 U	7.7 U	34 U	6.3 U	36 U	1700 U	20000 U
1,1-Dichloroethane		360 U	7.2 U	7.7 U	34 U	6.3 U	36 U	1700 U	20000 U
1,2-Dichloroethane		810 U	**1.6 J**	7.7 U	34 U	6.3 U	**10 J**	1700 U	20000 U
1,1-Dichloroethene		200 U	7.2 U	7.7 U	34 U	6.3 U	36 U	1700 U	20000 U
Cis-1,2-Dichloroethene		NA	7.2 U	7.7 U	34 U	6.3 U	36 U	1700 U	20000 U
Trans-1,2-Dichloroethene		NA	7.2 U	7.7 U	34 U	6.3 U	36 U	1700 U	20000 U
1,2-Dichloroethene (total)		440 U	NA	NA	NA	NA	NA	NA	NA
1,2-Dichloropropane		180 U	7.2 U	7.7 U	34 U	6.3 U	36 U	1700 U	20000 U
Cis-1,3-Dichloropropene		250 U	7.2 U	7.7 U	34 U	6.3 U	36 U	1700 U	20000 U
Trans-1,3-Dichloropropene		240 U	7.2 U	7.7 U	34 U	6.3 U	36 U	1700 U	20000 U
Ethylbenzene		**2200 J**	7.2 U	1.5 U	34 U	1.3 U	7.1 U	340 U	3900 U
2-Hexanone		1100 U	29 U	31 U	140 U	25 U	140 U	6800 U	78000 U
Methylene chloride		**800 J**	**15 B**	**19 B**	**82 B**	**15 B**	**82 B**	**830 J**	**6800 J**
4-Methyl-2-Pentanone		1300 U	29 U	31 U	140 U	25 U	140 U	6800 U	78000 U
Styrene		460 U	7.2 U	7.7 U	34 U	6.3 U	36 U	1700 U	20000 U
1,1,2,2-Tetrachloroethane		530 U	7.2 U	7.7 U	34 U	6.3 U	36 U	1700 U	20000 U
Tetrachloroethene		610 U	7.2 U	7.7 U	34 U	6.3 U	36 U	1700 U	20000 U
Toluene		**2400 J**	**61**	**65**	**410**	**56**	**140**	**610**	3900 U
1,2,4-Trichlorobenzene		NA	7.2 U	1.5 U	34 U	1.3 U	7.1 U	1700 U	20000 U
1,1,1-Trichloroethane		380 U	7.2 U	7.7 U	34 U	6.3 U	36 U	1700 U	20000 U
1,1,2-Trichloroethane		250 U	7.2 U	7.7 U	34 U	6.3 U	36 U	1700 U	20000 U
Trichloroethene		190 U	7.2 U	7.7 U	34 U	6.3 U	36 U	1700 U	20000 U
Vinyl acetate		1200 U	NA	NA	NA	NA	NA	NA	NA
Vinyl chloride		640 U	7.2 U	7.7 U	34 U	6.3 U	36 U	1700 U	20000 U
M&p-Xylenes		NA	14 U	3.1 U	68 U	2.5 U	14 U	680 U	7800 U
O-Xylene		NA	7.2 U	1.5 U	34 U	1.3 U	7.1 U	340 U	3900 U
Xylenes (total)		**12000**	NA	NA	NA	NA	NA	NA	NA

Notes:
ft bls - Feet below land surface
µg/kg - Micrograms per kilogram
B - Detected in blank
J - Estimated value
U - Not detected, detection limit is shown

Table A-1. Summary of Volatile Organic Compounds Detected in Soil, BASF Corporation, Closed Landfill, Rensselaer, New York

Analyte (Concentrations in µg/kg)	**Sample Location:**	TP-6-17	TP-6-18	TP-6-18	TP-6-19	TP-6-19
	Sample Date:	05/26/04	05/26/04	05/26/04	05/26/04	05/26/04
	Sample Depth (ft bls):	4-8	0-4	4-8	0-4	4-8
	Sample Designation:	B12-6-19	B12-4-21	B12-4-24	B12-5-15	B12-5-18
Acetone		8900 U	51 U	58 U	160 U	4000 U
Benzene		360 U	10 U	12 U	6.5 U	160 U
Bromodichloromethane		1800 U	10 U	12 U	32 U	790 U
Bromoform		1800 U	10 U	12 U	32 U	790 U
Bromomethane		1800 U	10 U	12 U	32 U	790 U
2-Butanone		8900 U	51 U	58 U	160 U	4000 U
Carbon disulfide		1800 U	10 U	12 U	32 U	790 U
Carbon tetrachloride		1800 U	10 U	12 U	32 U	790 U
Chlorobenzene		**100000**	10 U	**38**	**600**	**5900**
Chloroethane		1800 U	10 U	12 U	32 U	790 U
Chloroform		1800 U	10 U	12 U	32 U	790 U
Chloromethane		1800 U	10 U	12 U	32 U	790 U
Dibromochloromethane		1800 U	10 U	12 U	32 U	790 U
1,2-Dichlorobenzene		**400 J**	10 U	**5.9 J**	**11 J**	**220 J**
1,3-Dichlorobenzene		1800 U	10 U	12 U	32 U	790 U
1,4-Dichlorobenzene		1800 U	10 U	12 U	**7.3 J**	790 U
1,1-Dichloroethane		1800 U	10 U	12 U	32 U	790 U
1,2-Dichloroethane		1800 U	10 U	12 U	32 U	790 U
1,1-Dichloroethene		1800 U	10 U	12 U	32 U	790 U
Cis-1,2-Dichloroethene		1800 U	10 U	12 U	32 U	790 U
Trans-1,2-Dichloroethene		1800 U	10 U	12 U	32 U	790 U
1,2-Dichloroethene (total)		NA	NA	NA	NA	NA
1,2-Dichloropropane		1800 U	10 U	12 U	32 U	790 U
Cis-1,3-Dichloropropene		1800 U	10 U	12 U	32 U	790 U
Trans-1,3-Dichloropropene		1800 U	10 U	12 U	32 U	790 U
Ethylbenzene		360 U	10 U	12 U	6.5 U	160 U
2-Hexanone		7100 U	41 U	47 U	130 U	3200 U
Methylene chloride		**750 J**	**21 B**	**25 B**	**82 B**	790 U
4-Methyl-2-Pentanone		7100 U	41 U	47 U	130 U	3200 U
Styrene		1800 U	10 U	12 U	32 U	790 U
1,1,2,2-Tetrachloroethane		1800 U	10 U	12 U	32 U	790 U
Tetrachloroethene		1800 U	10 U	12 U	32 U	790 U
Toluene		360 U	**9.3 J**	**71**	**32**	160 U
1,2,4-Trichlorobenzene		1800 U	10 U	12 U	6.5 U	790 U
1,1,1-Trichloroethane		1800 U	10 U	12 U	32 U	790 U
1,1,2-Trichloroethane		1800 U	10 U	12 U	32 U	790 U
Trichloroethene		1800 U	10 U	12 U	32 U	790 U
Vinyl acetate		NA	NA	NA	NA	NA
Vinyl chloride		1800 U	10 U	12 U	32 U	790 U
M&p-Xylenes		**1300**	20 U	23 U	13 U	320 U
O-Xylene		360 U	10 U	12 U	6.5 U	160 U
Xylenes (total)		NA	NA	NA	NA	NA

Notes:
ft bls - Feet below land surface
µg/kg - Micrograms per kilogram
B - Detected in blank
J - Estimated value
U - Not detected, detection limit is shown

Table A-2. Summary of Volatile Organic Compounds Detected in Waste Samples, BASF Corporation, Closed Landfill, Rensselaer, New York

Parameter (Concentrations in µg/kg) **Sample Location:**	LF-SB-103-1	LF-SB-103-10	LF-SB-103-11	LF-SB-103-12	LF-SB-103-17	LF-SB-103-2	LF-SB-103-3	LF-SB-103-4	LF-SB-103-5	LF-SB-103-6	LF-SB-103-7
Sample Date:	04/06/04	04/09/04	04/09/04	04/09/04	05/18/04	04/06/04	04/06/04	04/06/04	04/06/04	04/08/04	04/08/04
Sample Depth (ft bls):	4-7	4-8	4-8	4-8	6.0-6.0	4-7	0-4	0-4	0-7	6-8	6-8
Sample Designation:	B9-105-13	B9-141-22	B9-142-19	B9-143-19	B11-9-2	B9-105-22	B9-106-17	B9-107-11	B9-108-5	B9-137-2	B9-137-21
Acetone	**140**	**810**	32000 U	6100 U	6100 U	**190**	**410**	170 U	3500 U	5000 U	39000 U
Benzene	**130**	**4100**	**100000**	**2500**	1200 U	**54**	**39**	**15**	**40000**	**92000**	**270000**
Bromodichloromethane	32 U	110 U	8000 U	1500 U	1200 U	33 U	41 U	42 U	870 U	1200 U	9800 U
Bromoform	32 U	110 U	8000 U	1500 U	1200 U	33 U	41 U	42 U	870 U	1200 U	9800 U
Bromomethane	32 U	110 U	8000 U	1500 U	1200 U	33 U	41 U	42 U	870 U	1200 U	9800 U
2-Butanone	160 U	540 U	40000 U	7600 U	6100 U	170 U	200 U	210 U	4300 U	6200 U	49000 U
Carbon disulfide	32 U	110 U	8000 U	1500 U	1200 U	33 U	41 U	42 U	870 U	1200 U	9800 U
Carbon tetrachloride	32 U	110 U	8000 U	1500 U	1200 U	33 U	41 U	42 U	870 U	1200 U	9800 U
Chlorobenzene	**57**	**200**	**17000**	**2000**	**23000**	33 U	41 U	42 U	**5800**	**4900**	**51000**
Chloroethane	32 U	110 U	8000 U	1500 U	1200 U	33 U	41 U	42 U	870 U	1200 U	9800 U
Chloroform	32 U	110 U	8000 U	1500 U	1200 U	33 U	41 U	42 U	870 U	1200 U	9800 U
Chloromethane	32 U	110 U	8000 U	1500 U	1200 U	33 U	41 U	42 U	870 U	1200 U	9800 U
Dibromochloromethane	32 U	110 U	8000 U	1500 U	1200 U	33 U	41 U	42 U	870 U	1200 U	9800 U
1,2-Dichlorobenzene	**42**	110 U	**2900 J**	**780 J**	1200 U	33 U	**30 J**	42 U	**510 J**	**1000 J**	**16000**
1,3-Dichlorobenzene	32 U	110 U	8000 U	1500 U	1200 U	33 U	41 U	42 U	870 U	1200 U	9800 U
1,4-Dichlorobenzene	32 U	110 U	**16000**	**520 J**	1200 U	33 U	41 U	42 U	870 U	1200 U	**6600 J**
1,1-Dichloroethane	32 U	110 U	8000 U	1500 U	1200 U	33 U	41 U	42 U	870 U	1200 U	9800 U
1,2-Dichloroethane	32 U	110 U	8000 U	1500 U	1200 U	33 U	41 U	42 U	870 U	**56000**	9800 U
1,1-Dichloroethene	**11 J**	**290**	8000 U	1500 U	1200 U	33 U	41 U	42 U	**260 J**	**260 J**	9800 U
Cis-1,2-Dichloroethene	**64**	**2700**	**3800 J**	**1400 J**	1200 U	33 U	41 U	42 U	**3100**	**6400**	9800 U
Trans-1,2-Dichloroethene	**11 J**	**290**	8000 U	**610 J**	1200 U	33 U	41 U	42 U	**660 J**	**700 J**	9800 U
1,2-Dichloropropane	32 U	110 U	8000 U	1500 U	1200 U	33 U	41 U	42 U	870 U	1200 U	9800 U
Cis-1,3-Dichloropropene	32 U	110 U	8000 U	1500 U	1200 U	33 U	41 U	42 U	870 U	1200 U	9800 U
Trans-1,3-Dichloropropene	32 U	110 U	8000 U	1500 U	1200 U	33 U	41 U	42 U	870 U	1200 U	9800 U
Ethylbenzene	**99**	22 U	1600 U	300 U	1200 U	6.7 U	**17**	8.5 U	**2200**	**830**	**5600**
2-Hexanone	130 U	430 U	32000 U	6100 U	4900 U	130 U	160 U	170 U	3500 U	5000 U	39000 U
Methylene chloride	**140 B**	**220 B**	8000 U	**380 J**	**410 JB**	**170 B**	**130 B**	**110 B**	870 U	**270 J**	9800 U
4-Methyl-2-Pentanone	130 U	430 U	32000 U	6100 U	4900 U	130 U	160 U	170 U	3500 U	5000 U	39000 U
Styrene	6.5 U	22 U	1600 U	300 U	1200 U	6.7 U	8.2 U	8.5 U	170 U	250 U	2000 U
1,1,2,2-Tetrachloroethane	32 U	110 U	8000 U	1500 U	1200 U	33 U	41 U	42 U	870 U	1200 U	9800 U
Tetrachloroethene	32 U	**150**	8000 U	1500 U	1200 U	33 U	41 U	42 U	870 U	1200 U	9800 U
Toluene	**150**	**760**	**1800**	300 U	1200 U	**110**	**75**	**130**	**870**	**1100**	2000 U
1,2,4-Trichlorobenzene	6.5 U	22 U	**7600**	**1100**	**420 J**	6.7 U	8.2 U	8.5 U	170 U	**20000**	**35000**
1,1,2-Trichloroethane	32 U	110 U	8000 U	1500 U	1200 U	33 U	41 U	42 U	870 U	1200 U	9800 U
1,1,1-Trichloroethane	32 U	110 U	8000 U	1500 U	1200 U	33 U	41 U	42 U	870 U	1200 U	9800 U
Trichloroethene	**38**	**7800**	**19000**	**11000**	1200 U	33 U	41 U	**130**	**11000**	**14000**	9800 U
Vinyl chloride	32 U	110 U	8000 U	1500 U	1200 U	33 U	41 U	42 U	**540 J**	1200 U	9800 U
M&p-Xylenes	**32**	43 U	**2000 J**	610 U	2500 U	13 U	**18**	17 U	**3700**	**2400**	**41000**
O-Xylene	**100**	22 U	**2000**	**540**	1200 U	6.7 U	8.2 U	8.5 U	**4800**	**1900**	**30000**

Notes:
ft bls - Feet below land surface
µg/kg - Micrograms per kilogram
B - Detected in blank
J - Estimated value
U - Not detected, detection limit is shown

Table A-2. Summary of Volatile Organic Compounds Detected in Waste Samples, BASF Corporation, Closed Landfill, Rensselaer, New York

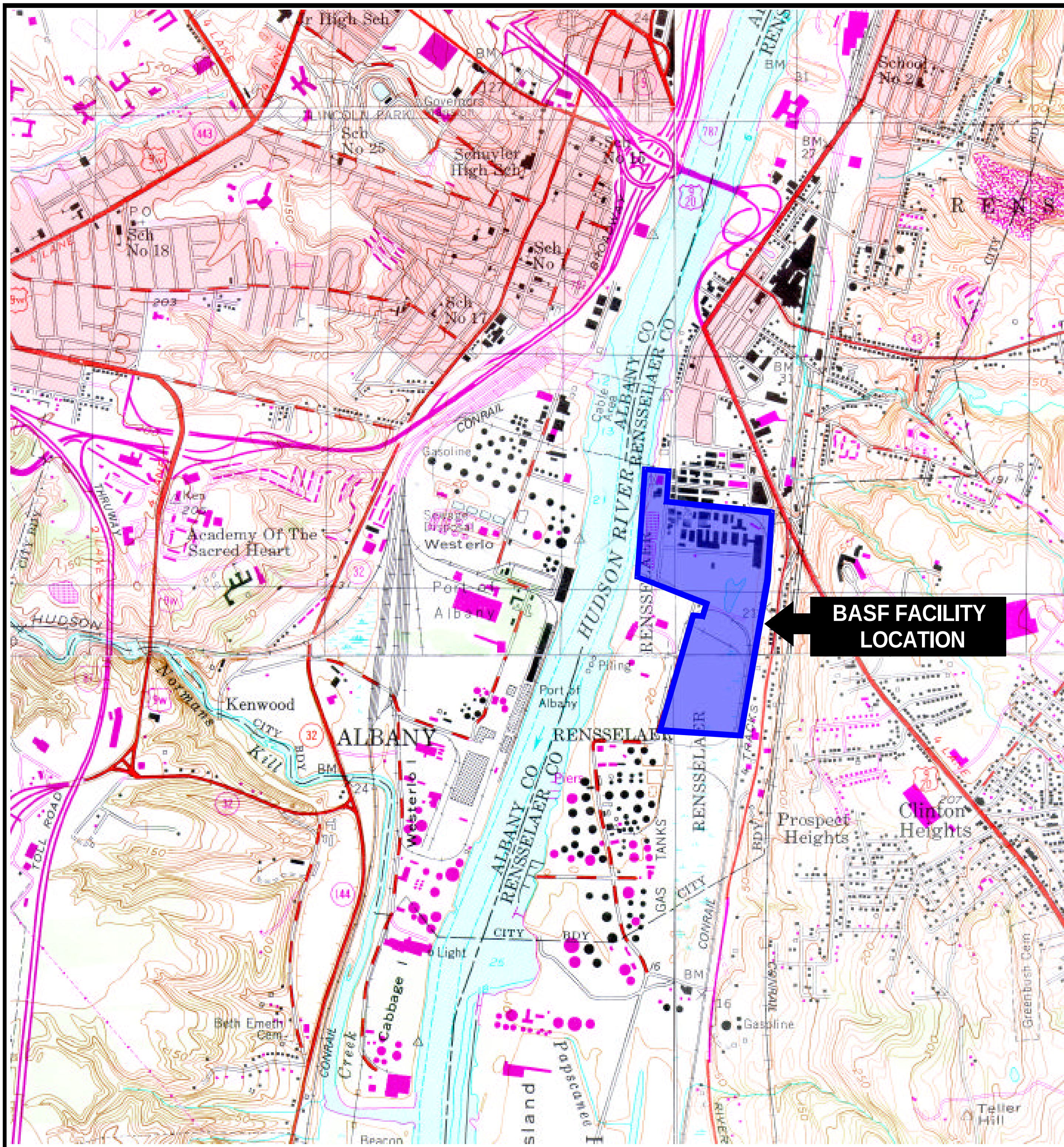
Parameter (Concentrations in µg/kg) **Sample Location:**	LF-SB-103-9	LF-SB-107-5	LF-SB-107-6	LF-SB-111-2	LF-TP-5-10	LF-TP-5-11	LF-TP-5-13	LF-TP-5-14	LF-TP-6-3	LF-TP-6-7	LF-TP-7-4
Sample Date:	04/09/04	04/08/04	04/08/04	04/06/04	04/07/04	04/07/04	04/07/04	04/07/04	04/05/04	04/07/04	04/05/04
Sample Depth (ft bls):	0-8	0-4	4-8	3-4	4-8	1-4	2-3	3-4	2-3	0-4	4-6
Sample Designation:	B9-141-2	B9-130-19	B9-131-13	B9-94-13	B9-119-2	B9-119-21	B9-121-8	B9-122-2	B9-91-6	B9-112-2	B9-85-11
Acetone	5200 U	3600 U	3500 U	36 U	120000 U	**1400**	**440**	3500 U	**110**	**450**	140 U
Benzene	**6700**	**26000**	**38000**	**9.5**	6200 U	**60**	**9.6**	170 U	**2.5**	**84**	**1100**
Bromodichloromethane	1300 U	890 U	870 U	9.1 U	31000 U	31 U	32 U	870 U	6.4 U	37 U	34 U
Bromoform	1300 U	890 U	870 U	9.1 U	31000 U	31 U	32 U	870 U	6.4 U	37 U	34 U
Bromomethane	1300 U	890 U	870 U	9.1 U	31000 U	31 U	32 U	870 U	6.4 U	37 U	34 U
2-Butanone	6500 U	4500 U	4300 U	45 U	150000 U	150 U	160 U	4300 U	32 U	180 U	170 U
Carbon disulfide	1300 U	890 U	870 U	9.1 U	31000 U	**160**	**120**	870 U	6.4 U	37 U	**26 J**
Carbon tetrachloride	1300 U	890 U	870 U	9.1 U	31000 U	31 U	32 U	870 U	6.4 U	37 U	34 U
Chlorobenzene	**5200**	**5200**	**16000**	**23**	**1600000**	**640**	**330**	**13000**	**1.7 J**	**320**	**1900**
Chloroethane	1300 U	890 U	870 U	9.1 U	31000 U	31 U	32 U	870 U	6.4 U	37 U	34 U
Chloroform	1300 U	890 U	870 U	9.1 U	31000 U	31 U	32 U	870 U	6.4 U	37 U	34 U
Chloromethane	1300 U	890 U	870 U	9.1 U	31000 U	31 U	32 U	870 U	6.4 U	37 U	34 U
Dibromochloromethane	1300 U	890 U	870 U	9.1 U	31000 U	31 U	32 U	870 U	6.4 U	37 U	34 U
1,2-Dichlorobenzene	**500 J**	890 U	**510 J**	9.1 U	31000 U	**8.4 J**	32 U	870 U	6.4 U	**100**	**53**
1,3-Dichlorobenzene	1300 U	890 U	**260 J**	9.1 U	31000 U	31 U	32 U	870 U	6.4 U	**14 J**	34 U
1,4-Dichlorobenzene	**1500**	890 U	870 U	9.1 U	31000 U	31 U	32 U	870 U	6.4 U	**11 J**	34 U
1,1-Dichloroethane	1300 U	890 U	870 U	9.1 U	31000 U	31 U	32 U	870 U	6.4 U	37 U	34 U
1,2-Dichloroethane	1300 U	890 U	870 U	9.1 U	31000 U	**180**	32 U	870 U	6.4 U	**66**	34 U
1,1-Dichloroethene	**2700**	890 U	870 U	9.1 U	31000 U	31 U	32 U	870 U	6.4 U	37 U	34 U
Cis-1,2-Dichloroethene	**18000**	890 U	870 U	9.1 U	31000 U	31 U	32 U	870 U	6.4 U	**15 J**	34 U
Trans-1,2-Dichloroethene	**3000**	890 U	870 U	9.1 U	31000 U	31 U	32 U	870 U	6.4 U	37 U	34 U
1,2-Dichloropropane	1300 U	890 U	870 U	9.1 U	31000 U	31 U	32 U	870 U	6.4 U	37 U	34 U
Cis-1,3-Dichloropropene	1300 U	890 U	870 U	9.1 U	31000 U	31 U	32 U	870 U	6.4 U	37 U	34 U
Trans-1,3-Dichloropropene	1300 U	890 U	870 U	9.1 U	31000 U	31 U	32 U	870 U	6.4 U	37 U	34 U
Ethylbenzene	**6800**	**4300**	**28000**	**2.5**	6200 U	**10**	6.4 U	170 U	1.3 U	7.4 U	**89**
2-Hexanone	5200 U	3600 U	3500 U	36 U	120000 U	120 U	130 U	3500 U	26 U	150 U	140 U
Methylene chloride	**300 J**	890 U	870 U	**5.1 JB**	31000 U	**100 B**	**230 B**	**210 J**	**9.2 B**	**150 B**	**75 B**
4-Methyl-2-Pentanone	5200 U	3600 U	3500 U	36 U	120000 U	120 U	130 U	3500 U	26 U	150 U	140 U
Styrene	260 U	180 U	170 U	1.8 U	6200 U	6.2 U	6.4 U	170 U	1.3 U	7.4 U	6.8 U
1,1,2,2-Tetrachloroethane	1300 U	890 U	870 U	9.1 U	31000 U	31 U	32 U	870 U	6.4 U	37 U	34 U
Tetrachloroethene	**700 J**	890 U	870 U	9.1 U	31000 U	31 U	32 U	870 U	6.4 U	37 U	34 U
Toluene	**1700**	**3800**	**79000**	41	6200 U	**270**	**80**	170 U	**11**	**270**	**280**
1,2,4-Trichlorobenzene	**1700**	180 U	**570**	1.8 U	6200 U	**8.7**	6.4 U	170 U	1.3 U	**20**	6.8 U
1,1,2-Trichloroethane	1300 U	890 U	870 U	9.1 U	31000 U	31 U	32 U	870 U	6.4 U	37 U	34 U
1,1,1-Trichloroethane	1300 U	890 U	870 U	9.1 U	31000 U	31 U	32 U	870 U	6.4 U	37 U	34 U
Trichloroethene	**100000**	890 U	870 U	9.1 U	31000 U	**10 J**	32 U	870 U	6.4 U	**11 J**	34 U
Vinyl chloride	1300 U	890 U	870 U	9.1 U	31000 U	31 U	32 U	870 U	6.4 U	37 U	34 U
M&p-Xylenes	**25000**	**14000**	**88000**	**7.6**	**7700 J**	**32**	**9.1 J**	350 U	2.6 U	**13 J**	**67**
O-Xylene	**51000**	**4100**	**33000**	1.8 U	6200 U	**14**	6.4 U	170 U	1.3 U	7.4 U	**27**

Notes:
ft bls - Feet below land surface
µg/kg - Micrograms per kilogram
B - Detected in blank
J - Estimated value
U - Not detected, detection limit is shown

Table A-2. Summary of Volatile Organic Compounds Detected in Waste Samples, BASF Corporation, Closed Landfill, Rensselaer, New York

Parameter (Concentrations in µg/kg)	Sample Location:	PE-A1-S-18-3	PE-A1-S-18-3	PE-A1-S-18-4	PE-A1-S-23-1	PE-A1-S-23-3	PE-A1-S-23-4
	Sample Date:	04/06/04	04/06/04	04/06/04	04/06/04	04/06/04	04/06/04
	Sample Depth (ft bls):	0-4	4-5	5-6	3-4	0-4	4-8
	Sample Designation:	B9-96-5	B9-96-17	B9-97-13	B9-98-2	B9-98-19	B9-99-12
Acetone		**520**	160 U	170 U	36000 U	2900 U	200000 U
Benzene		**410**	**780**	**28**	**550000**	**210**	**1500000**
Bromodichloromethane		42 U	40 U	42 U	8900 U	720 U	50000 U
Bromoform		42 U	40 U	42 U	8900 U	720 U	50000 U
Bromomethane		42 U	40 U	42 U	8900 U	720 U	50000 U
2-Butanone		210 U	200 U	210 U	45000 U	3600 U	250000 U
Carbon disulfide		42 U	40 U	42 U	8900 U	720 U	50000 U
Carbon tetrachloride		42 U	40 U	42 U	8900 U	720 U	50000 U
Chlorobenzene		**110**	**360**	**150**	**180000**	**810**	**3200000**
Chloroethane		42 U	40 U	42 U	8900 U	720 U	50000 U
Chloroform		42 U	40 U	42 U	8900 U	720 U	50000 U
Chloromethane		42 U	40 U	42 U	8900 U	720 U	50000 U
Dibromochloromethane		42 U	40 U	42 U	8900 U	720 U	50000 U
1,2-Dichlorobenzene		42 U	40 U	**33 J**	**67000**	**13000**	**190000**
1,3-Dichlorobenzene		42 U	40 U	42 U	8900 U	720 U	50000 U
1,4-Dichlorobenzene		42 U	40 U	**56**	**4500 J**	720 U	**16000 J**
1,1-Dichloroethane		42 U	40 U	42 U	8900 U	720 U	50000 U
1,2-Dichloroethane		42 U	40 U	42 U	8900 U	**380 J**	50000 U
1,1-Dichloroethene		42 U	40 U	42 U	8900 U	720 U	50000 U
Cis-1,2-Dichloroethene		42 U	40 U	42 U	8900 U	720 U	50000 U
Trans-1,2-Dichloroethene		42 U	40 U	42 U	8900 U	720 U	50000 U
1,2-Dichloropropane		42 U	40 U	42 U	8900 U	720 U	50000 U
Cis-1,3-Dichloropropene		42 U	40 U	42 U	8900 U	720 U	50000 U
Trans-1,3-Dichloropropene		42 U	40 U	42 U	8900 U	720 U	50000 U
Ethylbenzene		**9.9**	**15**	**15**	1800 U	**240**	**890000**
2-Hexanone		170 U	160 U	170 U	36000 U	2900 U	200000 U
Methylene chloride		**55 B**	**48 B**	**100 B**	8900 U	**150 J**	50000 U
4-Methyl-2-Pentanone		170 U	160 U	170 U	36000 U	2900 U	200000 U
Styrene		8.5 U	7.9 U	8.5 U	1800 U	140 U	10000 U
1,1,2,2-Tetrachloroethane		42 U	40 U	42 U	8900 U	720 U	50000 U
Tetrachloroethene		42 U	40 U	42 U	8900 U	720 U	50000 U
Toluene		**420**	**180**	**130**	**3500**	140 U	**16000**
1,2,4-Trichlorobenzene		8.5 U	7.9 U	8.5 U	1800 U	**660**	**44000**
1,1,2-Trichloroethane		42 U	40 U	42 U	8900 U	720 U	50000 U
1,1,1-Trichloroethane		42 U	40 U	42 U	8900 U	720 U	50000 U
Trichloroethene		42 U	40 U	42 U	8900 U	720 U	**34000 J**
Vinyl chloride		42 U	40 U	42 U	8900 U	720 U	50000 U
M&p-Xylenes		**23**	**22**	**120**	**9500**	**620**	**3700000**
O-Xylene		**41**	**38**	**78**	**7700**	140 U	**1100000**

Notes:
ft bls - Feet below land surface
µg/kg - Micrograms per kilogram
B - Detected in blank
J - Estimated value
U - Not detected, detection limit is shown



QUADRANGLE LOCATION

N

SOURCE:
USGS;1980.Albany,New York;
USGS;1980.TroySouth, New York
USGS;1980.Delmar,New York
USGS;1980.EastGreenbush, New York
7.5 MinuteTopographic Quadrangles

0 2000'

Title:

SITE LOCATION MAP

Preparedfor: BASFCORPORATION
FLORHAMPARK,NEWJERSEY

ROUX
ROUXASSOCIATES,INC.
EnvironmentalConsulting & Management

Compiledby: O.R.	Date: 20MAY05	FIGURE
Preparedby: R.K.	Scale: ASSHOWN	1
ProjectMgr.: O.R.	Office: NY	
FileNo.: BF1143101.CDR	ProjectNo.: 25111Y27	

N:\PROJECTS\BF251Y\BF11Y.431\BF1143101.CDR

AERIAL PHOTOGRAPH DATE : SPRING 2001

N

Title:

SITE AREAS

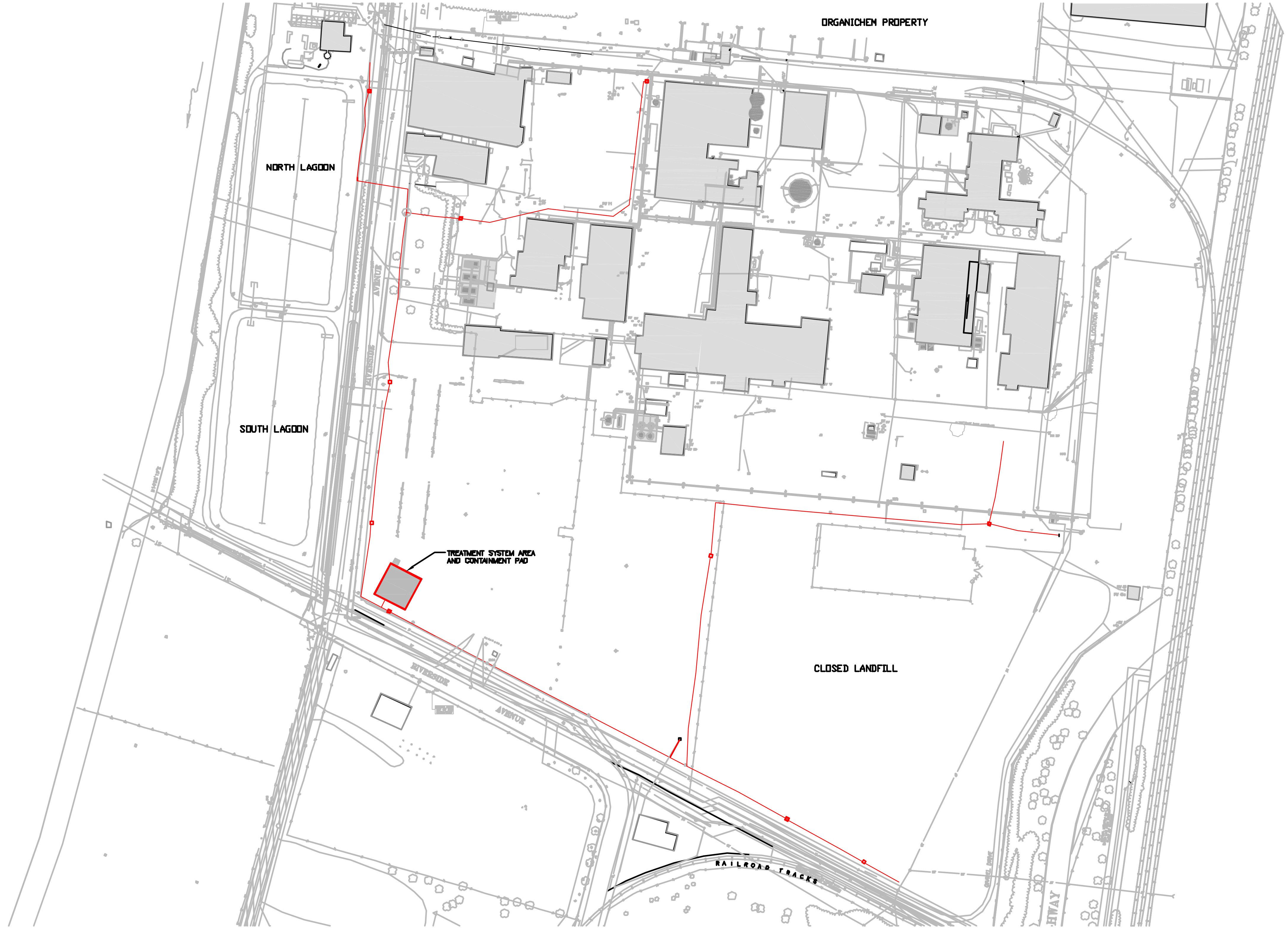
RENSSELAER, NEW YORK FACILITY

Prepared For:

BASF CORPORATION
FLORHAM PARK, NEW JERSEY

ROUX ASSOCIATES INC
Environmental Consulting & Management

Compiled by: N.E.	Date: 5/23/05	FIGURE
Prepared by: NE	Scale: 1" = 450'	2
Project Mgr: N.E.	Office: NY	
File No: BF1143104.WOR	Project: 25111Y27	



MAP REFERENCES:

1. ALTA/ACSM LAND TITLE SURVEY LANDS NOW OR FORMERLY OF BASF WYANDOTTE, CORPORATION PREPARED FOR BESICORP–EMPIRE DEVELOPMENT, LLC, CITY OF RENSSELAER, RENSSELAER COUNTY, NEW YORK, PREPARED BY C.T. MALE ASSOCIATES DATED JANUARY 31, 2001, DWG. NO. 01–114R.
2. TOPOGRAPHIC SURVEY LANDS NOW OR FORMERLY OF BASF WYANDOTTE, CORPORATION, PREPARED FOR BESICORP–EMPIRE DEVELOPMENT, LLC, CITY OF RENSSELAER, RENSSELAER COUNTY, NEW YORK, PREPARED BY C.T. MALE ASSOCIATES DATED JANUARY 28, 2001, DWG. NO. 01–109.
3. RECORD SURVEY OF GCS AREAS 2, 3, 4, 5, 6 AND 7 PREPARED FOR OBRIEN AND GERE ENGINEERS, INC., PREPARED BY C.T. MALE ASSOCIATES P.C., DATED JULY 2, 2003, DWG NO. 03–460. MODIFICATIONS TO GCS AREA 3 IN 2004 ARE BASED ON FIELD MEASUREMENTS PROVIDED BY O'BRIEN AND GERE OF NORTH AMERICA, INC. IN FEBRUARY 2005.

NOTES:

1. SURVEY INFORMATION PROVIDED BY C.T. MALE ASSOCIATES, P.C. 50 CENTURY HILL DRIVE, LATHAM, NY 12110.
2. NORTH ORIENTATION AND BEARING BASED ON MAP REFERENCE NO. 1.
3. ELEVATIONS ARE IN FEET RELATIVE TO THE NATIONAL GEODETIC VERTICAL DATUM, 1929 (NGVD 29), HEREINAFTER REFERRED TO AS MEAN SEA LEVEL. ALL HORIZONTAL LOCATIONS ARE IN FEET RELATIVE TO THE NEW YORK STATE PLANE COORDINATE SYSTEM, NYE 3101, NORTH AMERICAN DATUM, 1927.
4. LOCATIONS FOR THE FOLLOWING COMPONENTS OF THE GROUNDWATER EXTRACTION AND TREATMENTSYSTEM ARE BASED ON FIELD MEASUREMENTS PROVIDED BY O'BRIEN AND GERE OF NORTH AMERICA, INC. IN FEBRUARY 2005:
   A. GCS AREAS 1 AND 3;
   B. DISCHARGE TRENCHING TO CB–1; AND
   C. TREATMENT SYSTEM AREA AND CONTAINMENT PAD.
5. EXISTING AND PROPOSED RE–INJECTION AREAS AND RELATED TRENCHES NOT SHOWN FOR CLARITY.

LEGEND

LOCATION OF GROUNDWATER EXTRACTION AND DISCHARGE TRENCHES

N

200' 0 200'

Title: **GROUNDWATER EXTRACTION AND TREATMENT SYSTEM SITE PLAN**

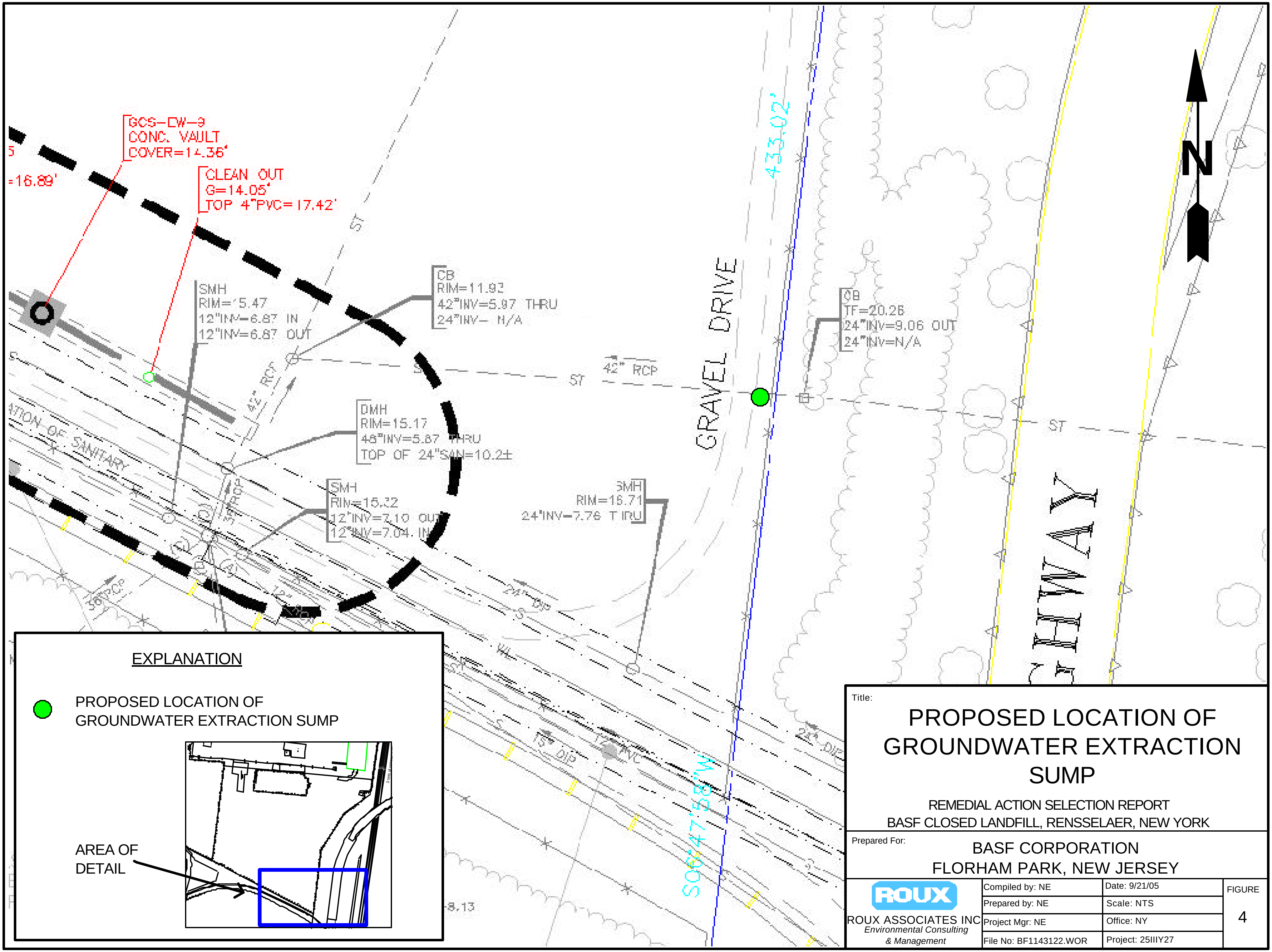
BASF CLOSED LANDFILL, RENSSELAER, NEW YORK

Prepared For: BASF CORPORATION

FLORHAM PARK, NEW JERSEY

ROUX ASSOCIATES, INC.
Environmental Consulting & Management

Compiled by: O.R.	Date: 20MAY05	FIGURE
Prepared by: O.R.	Scale: 1" = 125'	3
Project Mgr: O.R.	Office: NY	
File No: BF1143102	Project: 25111Y27	



Title:

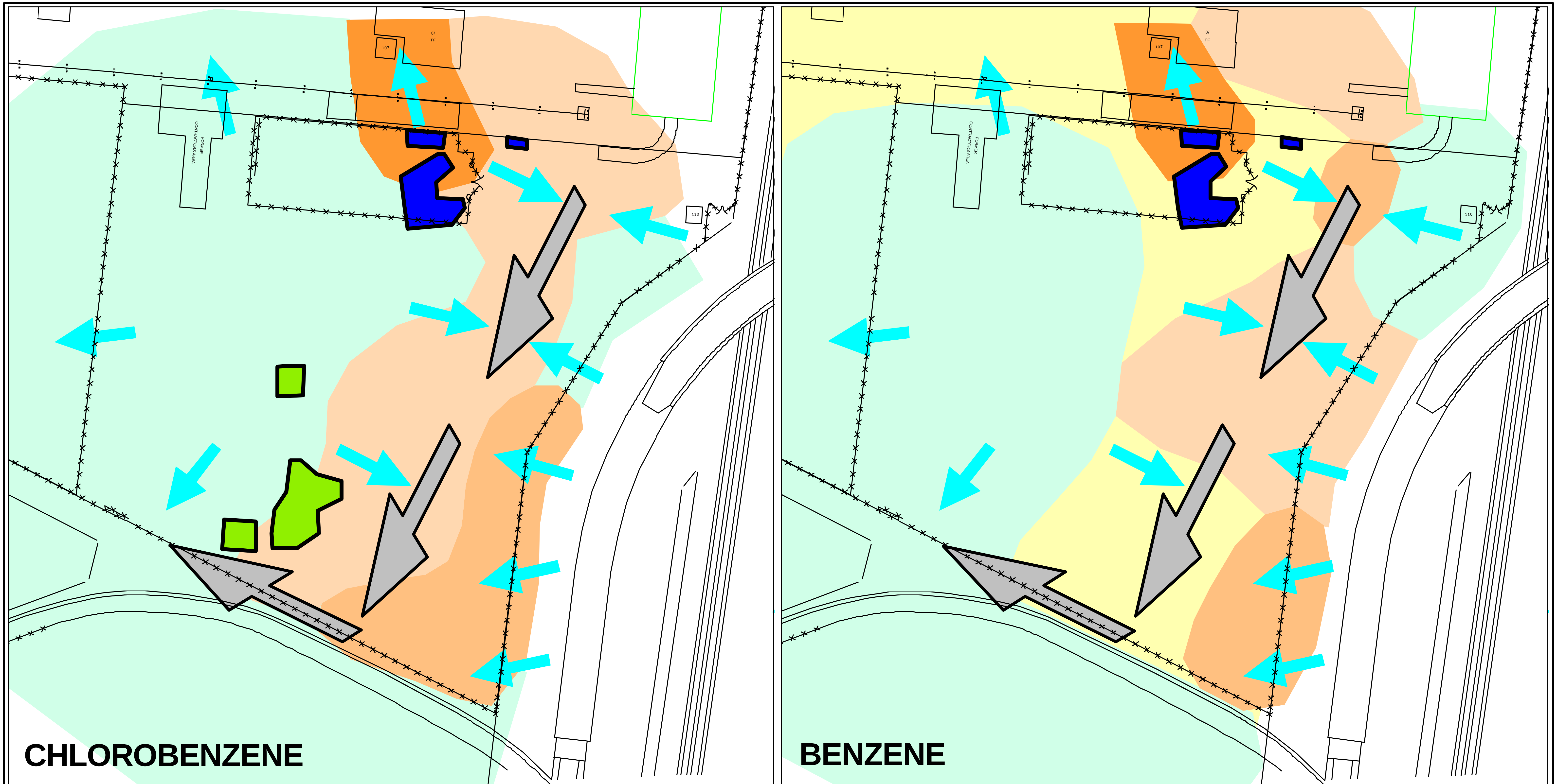
PROPOSED LOCATION OF GROUNDWATER EXTRACTION SUMP

REMEDIAL ACTION SELECTION REPORT
BASF CLOSED LANDFILL, RENSSELAER, NEW YORK

Prepared For:
BASF CORPORATION
FLORHAM PARK, NEW JERSEY

ROUX ASSOCIATES INC
Environmental Consulting & Management

Compiled by: NE	Date: 9/21/05	FIGURE
Prepared by: NE	Scale: NTS	4
Project Mgr: NE	Office: NY	
File No: BF1143122.WOR	Project: 25IIIY27	



CHLOROBENZENE IN GROUNDWATER (ug/L)

- > 10,000
- >100
- >10
- ND

APPROXIMATE EXTENT OF BENZENE AND CHLOROBENZENE SOURCE AREA

APPROXIMATE EXTENT OF AREA OF HIGH CHLOROBENZENE IN SOIL (NOT A GROUNDWATER SOURCE AREA)

INFERRED DIRECTION OF GROUNDWATER FLOW (MARCH 2002)

INFERRED DIRECTION OF GROUNDWATER FLOW IN SEWER BEDDING

BENZENE IN GROUNDWATER (ug/L)

- > 100,000
- >1,000
- >100
- >10
- ND

Title:

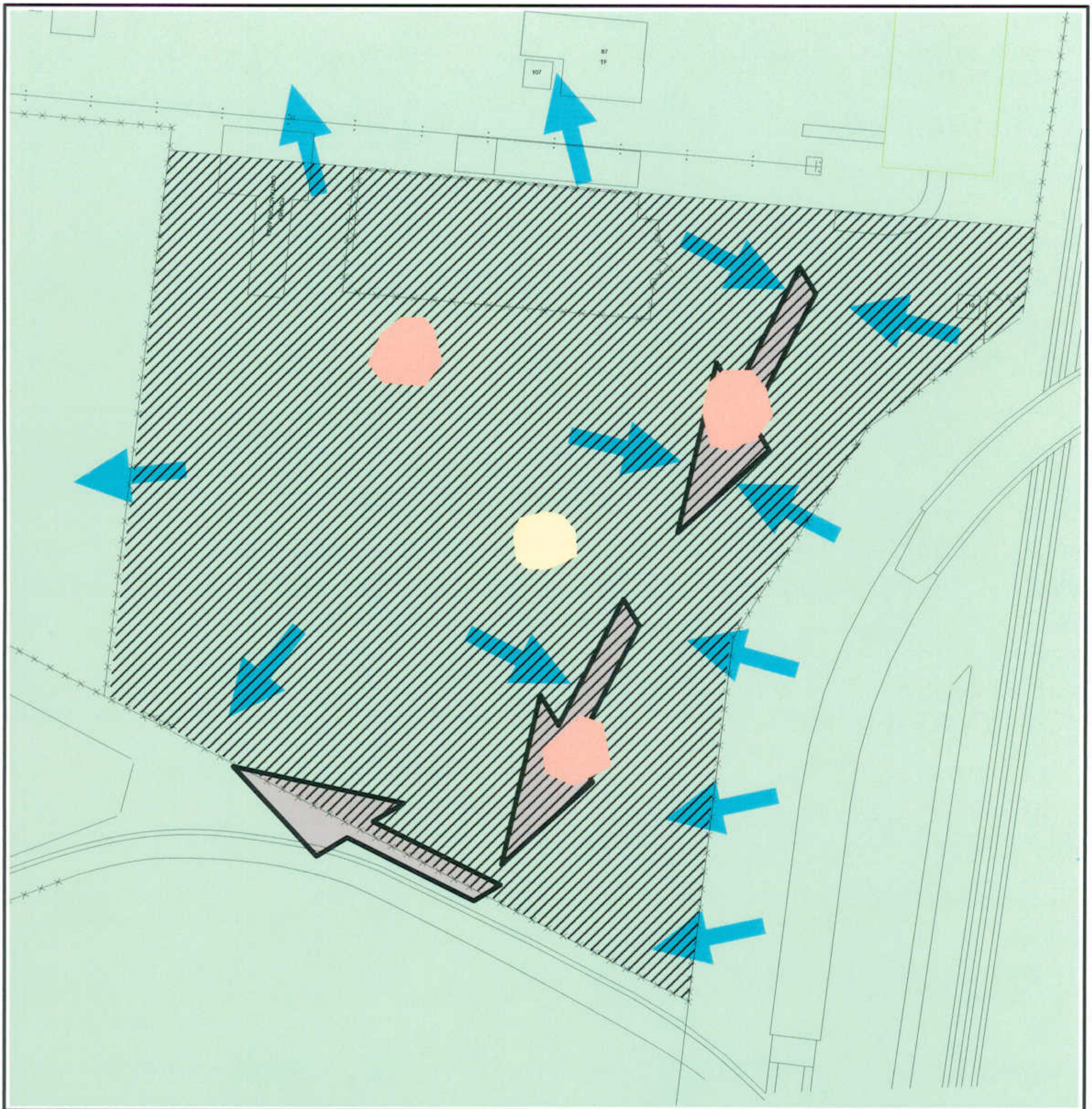
CONCEPTUAL RELATIONSHIP BETWEEN VOCs IN SOIL AND GROUNDWATER

REMEDIAL ACTION SELECTION REPORT
BASF CLOSED LANDFILL, RENSSELAER, NEW YORK

Prepared For:
BASF CORPORATION
FLORHAM PARK, NEW JERSEY

ROUX ASSOCIATES INC
Environmental Consulting & Management

Compiled by: NE	Date: 9/21/05	FIGURE
Prepared by: NE	Scale: 1"=120'	5
Project Mgr: NE	Office: NY	
File No: BF1143105.WOR	Project: 25111Y27	



(hatched)	AREA OF WIDE-SPREAD OCCURANCES OF ARSENIC, CHROMIUM AND LEAD IN LANDFILL SOIL
(yellow)	AREA OF CHROMIUM DETECTION IN GROUNDWATER ABOVE AWQS
(pink)	AREA OF ARSENIC DETECTIONS IN GROUNDWATER ABOVE AWQS
(green)	AREA WHERE ARSENIC, CHROMIUM AND LEAD NOT DETECTED IN FILTERED GROUNDWATER
(blue arrow)	INFERRED DIRECTION OF GROUNDWATER FLOW
(grey arrow)	INFERRED DIRECTION OF GROUNDWATER FLOW IN SEWER BEDDING

AWQS - NYSDEC AMBIENT WATER QUALITY STANDARDS

Title:

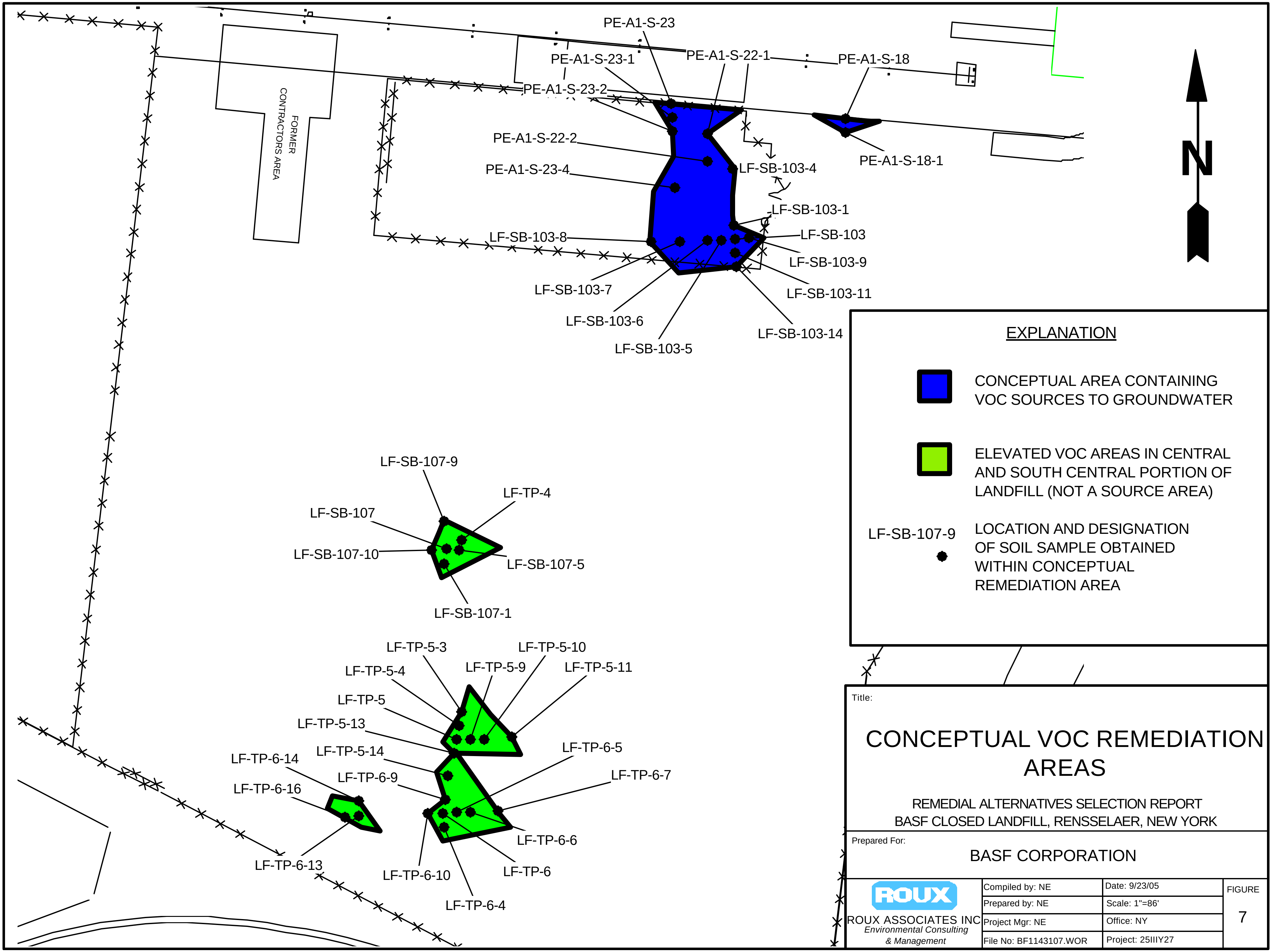
CONCEPTUAL RELATIONSHIP BETWEEN METALS IN SOIL AND GROUNDWATER

REMEDIAL ACTION SELECTION REPORT
BASF CLOSED LANDFILL, RENSSEALER, NEW YORK

Prepared For:

BASF CORPORATION
FLORHAM PARK, NEW JERSEY

ROUX	Compiled by: N.E.	Date: 9/21/05	FIGURE
	Prepared by: NE	Scale: 1" = 125'	6
ROUX ASSOCIATES INC Environmental Consulting & Management	Project Mgr: N.E.	Office: NY	
	File No: BF1143106.WOR	Project: BF25111Y27	



Title:

CONCEPTUAL VOC REMEDIATION AREAS

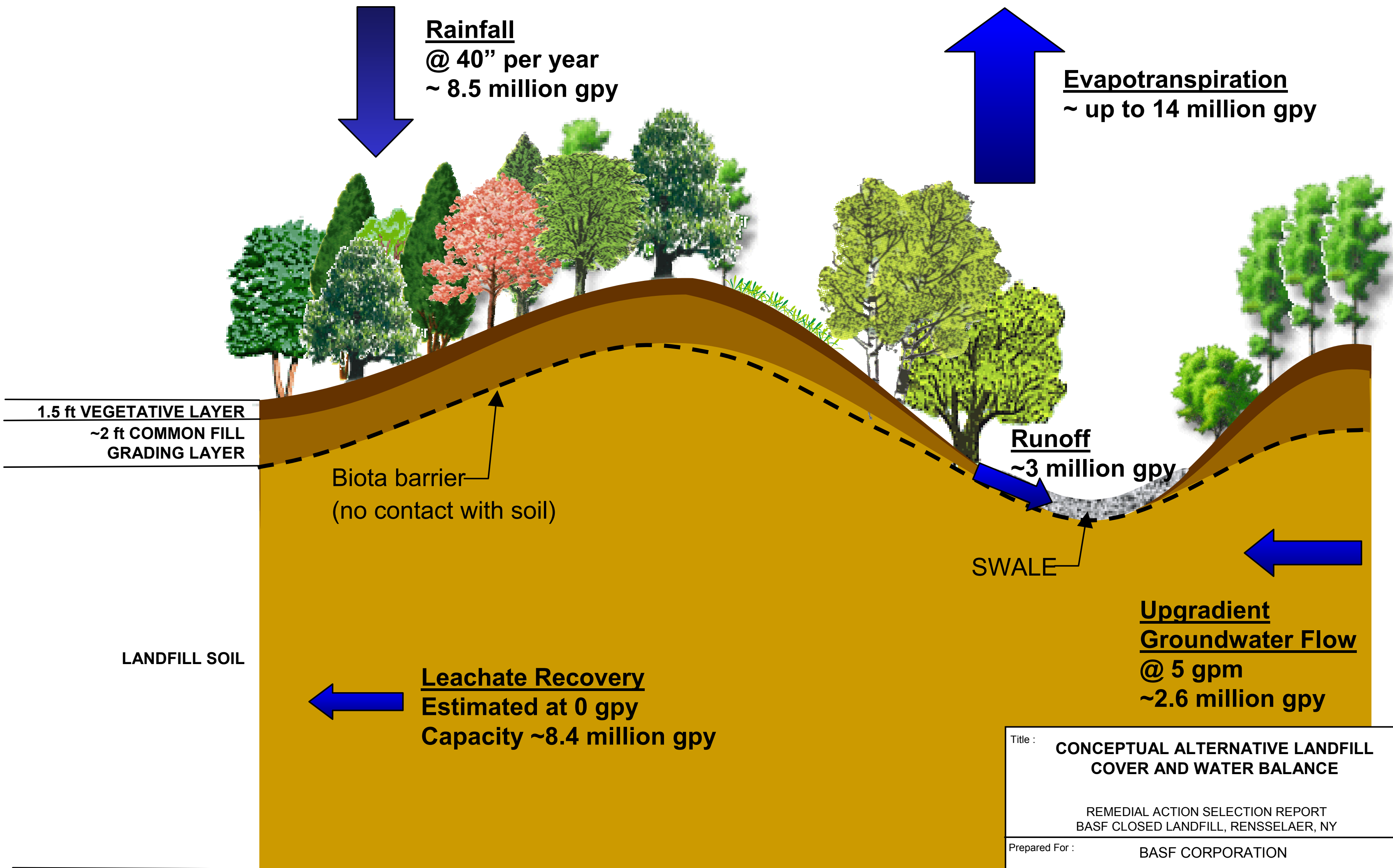
REMEDIAL ALTERNATIVES SELECTION REPORT
BASF CLOSED LANDFILL, RENSSELAER, NEW YORK

Prepared For:

BASF CORPORATION

ROUX ASSOCIATES INC
Environmental Consulting & Management

Compiled by: NE	Date: 9/23/05	FIGURE
Prepared by: NE	Scale: 1"=86'	7
Project Mgr: NE	Office: NY	
File No: BF1143107.WOR	Project: 25IIIY27	



Notes:
gpy – gallons per year
gpm – gallons per minute

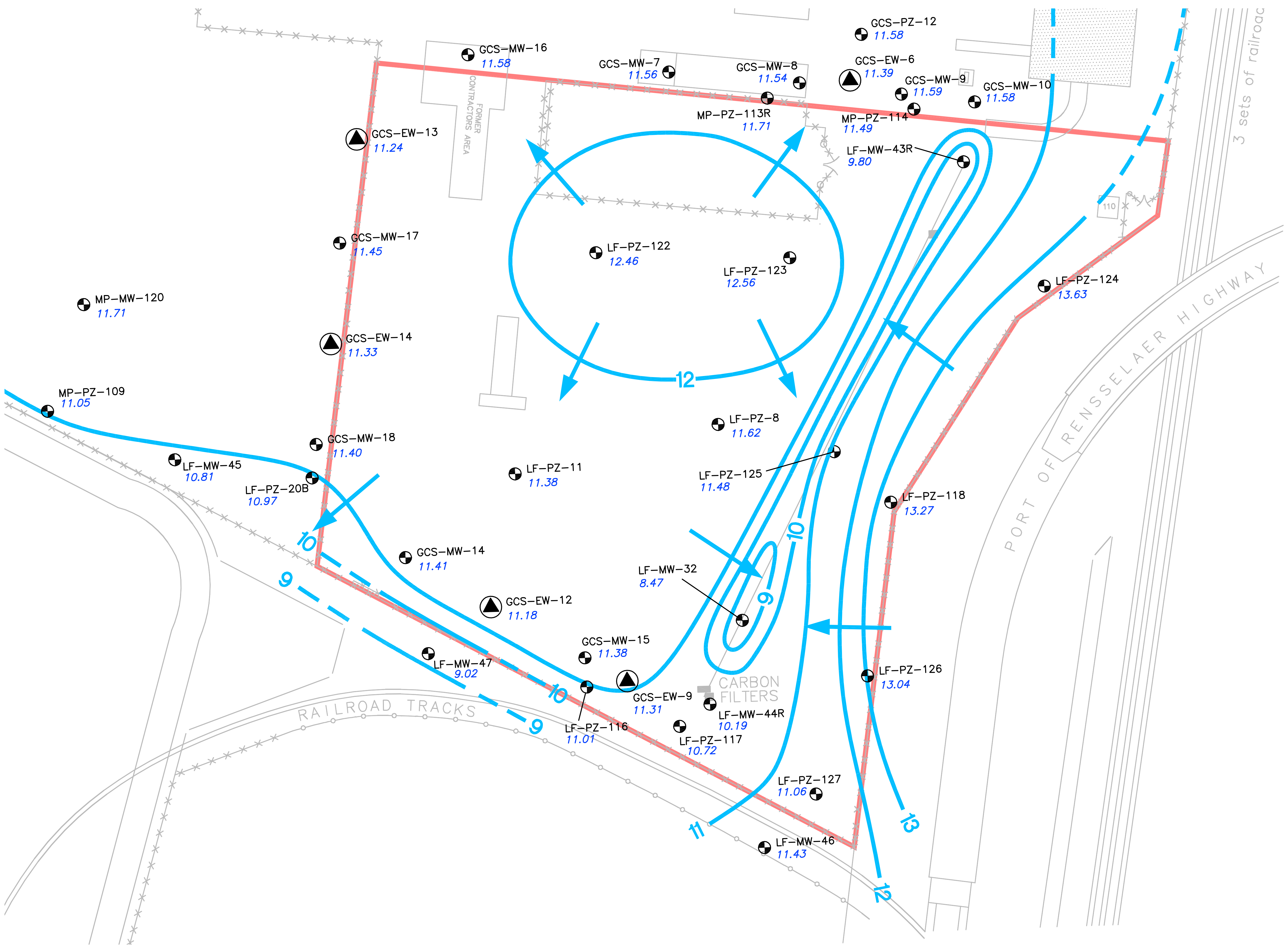
Title : **CONCEPTUAL ALTERNATIVE LANDFILL COVER AND WATER BALANCE**

REMEDIAL ACTION SELECTION REPORT
BASF CLOSED LANDFILL, RENSSELAER, NY

Prepared For : BASF CORPORATION

ROUX ASSOCIATES, INC
Environmental Consulting & Management

Compiled By : AL	Date : 5/20/05	FIGURE
Prepared By : AL	Scale : NTS	8
Project Manager : OR	Office: NY	
File No: BF1143103.PPT	Project : 25111Y27	



LEGEND

LOCATION PREFIXES

MP – MAIN PLANT

LF – LANDFILL

GCS – GROUNDWATER COLLECTION SYSTEM

EXISTING BUILDING

FORMER BUILDING

STORM SEWER GRATE

LF-MW-32 MONITORING WELL LOCATION AND DESIGNATION

LF-PZ-118 PIEZOMETER LOCATION AND DESIGNATION

GCS-EW-14 GCS EXTRACTION WELL SUMP LOCATION AND DESIGNATION

11.31 WATER-LEVEL ELEVATION IN FEET RELATIVE TO MEAN SEA LEVEL

12 CONTOUR OF EQUAL WATER LEVEL ELEVATION IN FEET RELATIVE TO MEAN SEA LEVEL (DASHED WHERE INFERRED)

INFERRED DIRECTION OF FLOW

BOUNDARY OF CLOSED LANDFILL

BARBED WIRE FENCE

CHAINLINK FENCE

NOTES:

(1) BASE MAP ADAPTED FROM PLATE 1, "REMEDIAL INVESTIGATION WORKPLAN" (MALCOLM PIRNIE, INC., 1998)

(2) WATER LEVELS MEASURED ON NOVEMBER 9, 2004.

Title:

GROUNDWATER ELEVATIONS NOVEMBER 9, 2004

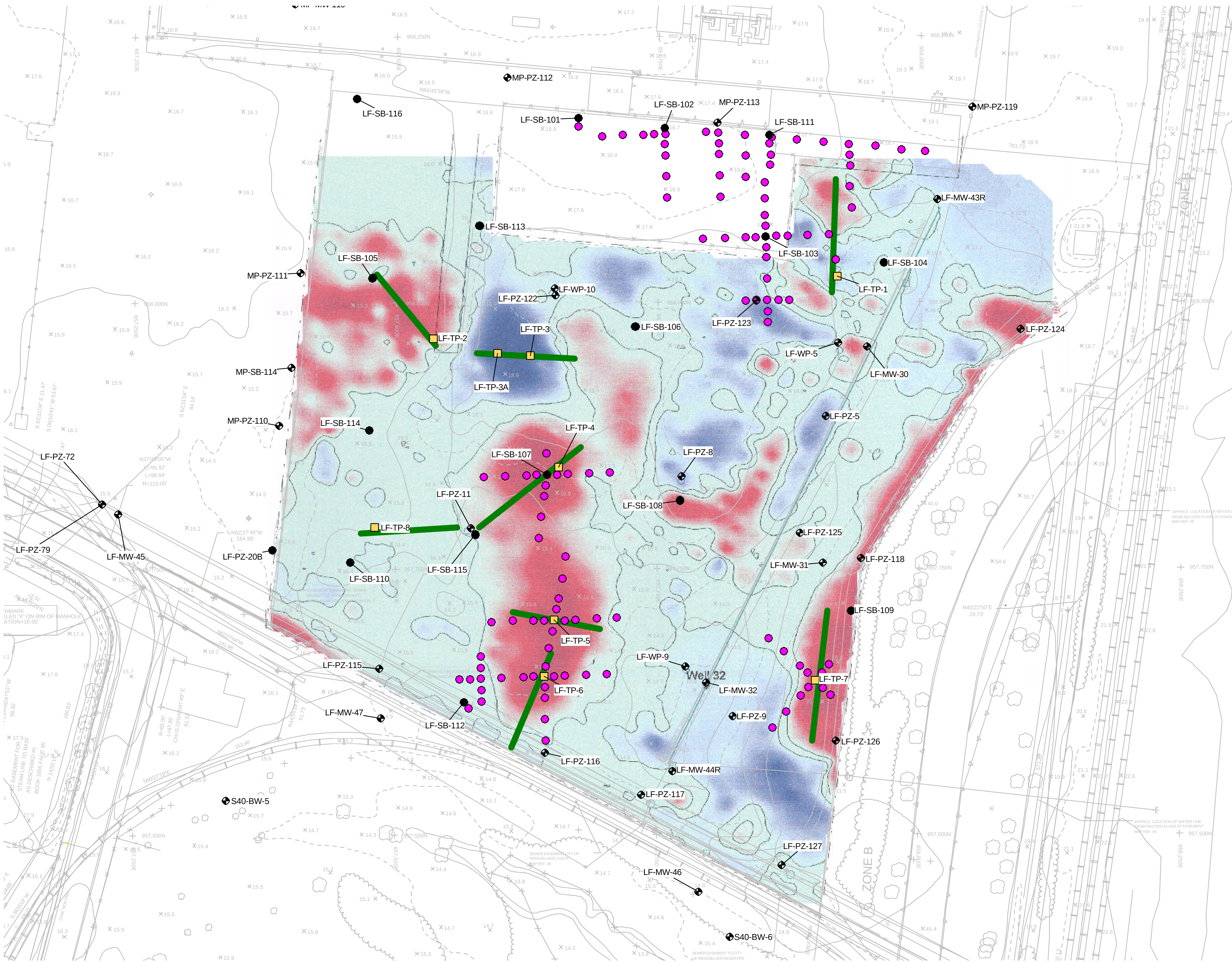
REMEDIAL ACTION SELECTION REPORT
RENSSELAER, NEW YORK FACILITY

Prepared For:
BASF CORPORATION
FLORHAM PARK, NEW JERSEY

ROUX ASSOCIATES, INC.
Environmental Consulting & Management

Compiled by: M.R.	Date: 23JUN05	PLATE
Prepared by: B.H.C.	Scale: AS SHOWN	1
Project Mgr: O.R.	Office: NY	
File No: BF1143108	Project: 25111Y27	

\BF251Y\BF11Y\431\BF1143108.DWG



EXPLANATION

LF-PZ-117 — LOCATION AND DESIGNATION OF MONITORING WELL

LF-MW-32 — LOCATION AND DESIGNATION OF PIEZOMETER

LF-SB-103 — LOCATION AND DESIGNATION OF SOIL BORING SAMPLED DURING SITE INVESTIGATION

LOCATION OF SOIL BORING SAMPLED DURING HOT SPOT DELINEATION

LOCATION OF TEST TRENCH

LF-TP-4 — LOCATION OF TEST TRENCH SAMPLE

GEOPHYSICAL SURVEY

Increasing Metallic Interference

-40 -36 -32 -28 -24 -20 -16 -12 -8 -4 0 4 8 12 16 20 24 28 32 36 40

Inphase Response (ppt)

N

Title:

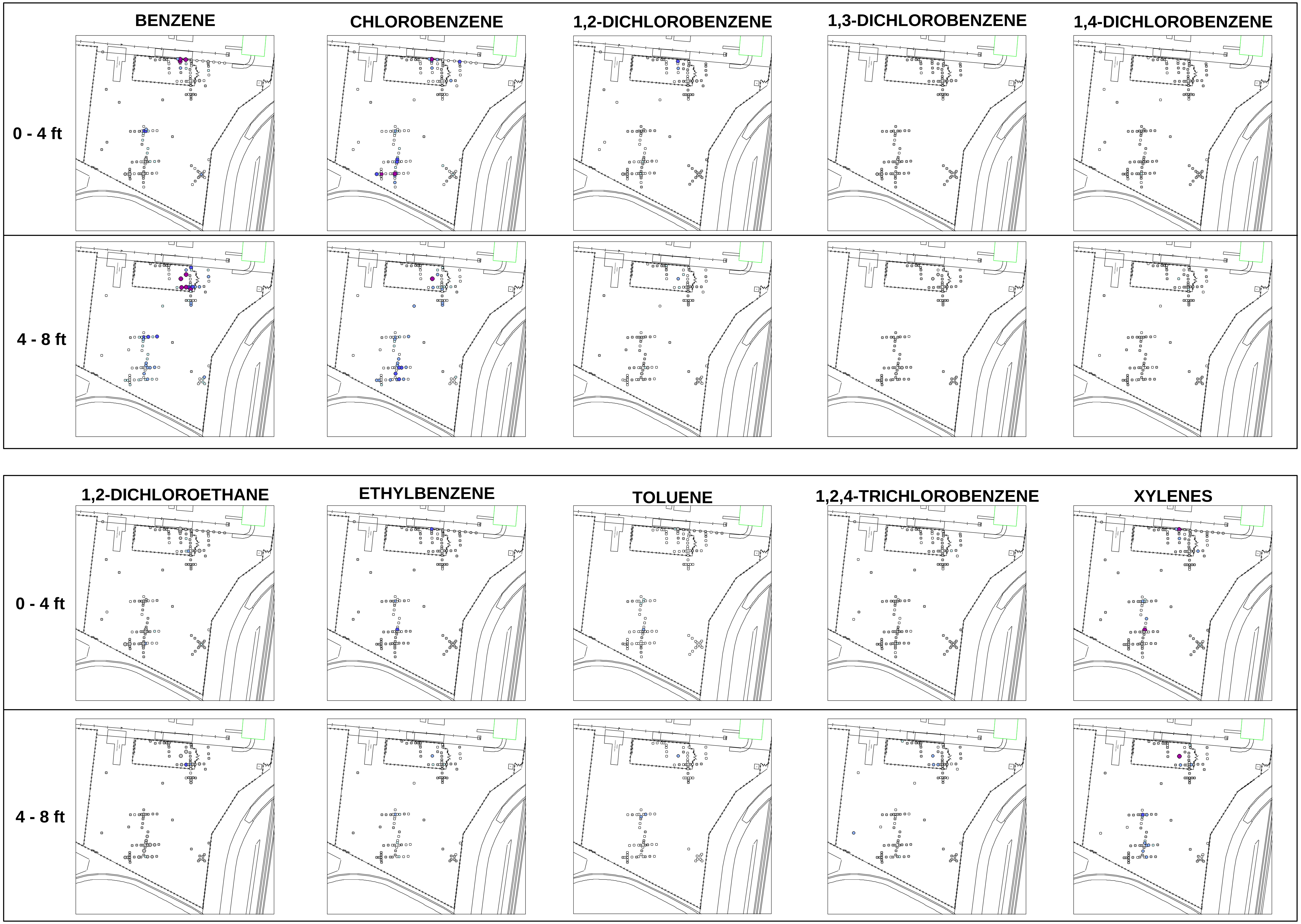
LANDFILL SAMPLING LOCATIONS

REMEDIAL ACTION SELECTION REPORT
BASF CLOSED LANDFILL, RENSSELAER, NEW YORK FACILITY

Prepared For:
BASF CORPORATION
FLORHAM PARK, NEW JERSEY

ROUX ASSOCIATES INC
Environmental Consulting & Management

Compiled by: NE	Date: 9/21/05	PLATE
Prepared by: NE	Scale: 1"=70'	2
Project Mgr: NE	Office: NY	
File No: BF1143123.WOR	Project: 25111Y27	



SYMBOL KEY

- GREATER THAN 1,000 X RSCOs
- GREATER THAN 200 X RSCOs
- GREATER THAN 10 X RSCOs
- GREATER THAN RSCOs
- LESS THAN RSCOs

- NOT DETECTED AT CONCENTRATIONS GREATER THAN 1,000 X RSCOs
- NOT DETECTED AT CONCENTRATIONS 100 TO LESS THAN 1,000 X RSCOs
- NOT DETECTED AT CONCENTRATIONS 10 TO LESS THAN 100 X RSCOs
- NOT DETECTED AT CONCENTRATIONS 1 TO LESS THAN 10 X RSCOs

NOTES:
RSCOS - RECOMMENDED SOIL CLEANUP OBJECTIVES

RSCOS:
BENZENE - 60 UG/KG
CHLOROBENZENE - 1,700 UG/KG
1,2-DICHLOROBENZENE - 7,900 UG/KG
1,3-DICHLOROBENZENE - 1,600 UG/KG
1,4-DICHLOROBENZENE - 8,500 UG/KG
1,2-DICHLOROETHANE - 100 UG/KG
ETHYLBENZENE - 5,500 UG/KG
TOLUENE - 1,500 UG/KG
1,2,4-TRICHLOROBENZENE - 3,400 UG/KG
XYLENES - 1,200 UG/KG

UG/KG - MICROGRAMS PER KILOGRAM

N

Title:
VOLATILE ORGANIC COMPOUNDS IN SOIL

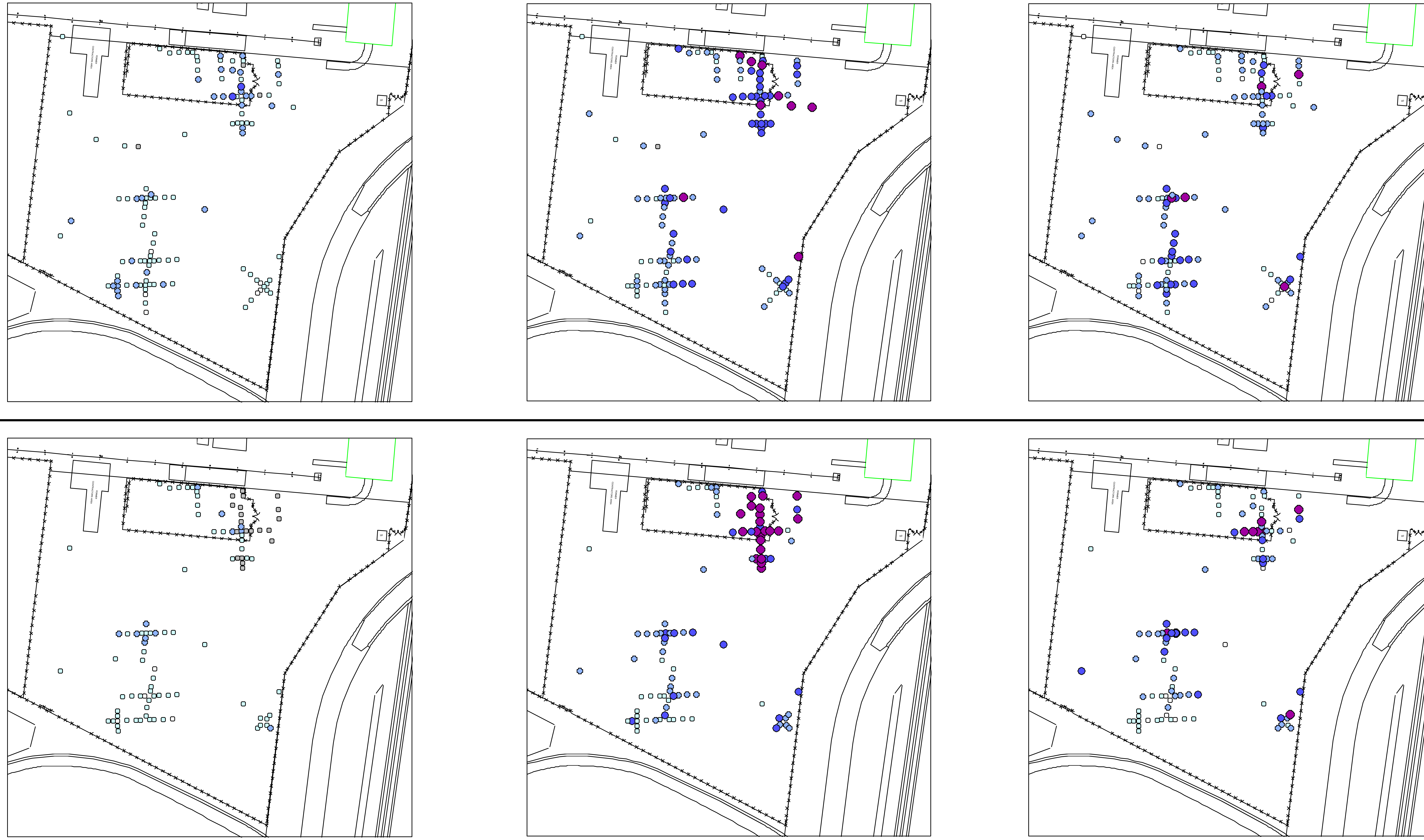
REMEDIAL ACTION SELECTION REPORT
BASF CLOSED LANDFILL, RENSSELAER, NEW YORK FACILITY

Prepared For:
BASF CORPORATION
FLORHAM PARK, NEW JERSEY

ROUX ASSOCIATES INC
Environmental Consulting & Management

Compiled by: NE	Date: 9/21/05	PLATE
Prepared by: NE	Scale: 1" = 150'	3
Project Mgr: N.E.	Office: NY	
BF1143120.WOR	Project: 25111Y27	

	ARSENIC	CHROMIUM	LEAD
0 - 4 ft			
4 - 8 ft			



SYMBOL KEY

- GREATER THAN 1,000 X RSCOs
- GREATER THAN 100 X RSCOs
- GREATER THAN 10 X RSCOs
- GREATER THAN RSCOs
- LESS THAN RSCOs
- NOT DETECTED

NOTES

RSCOs - RECOMMENDED SOIL CLEANUP OBJECTIVES

RSCOs:
ARSENIC - *7.5 MG/KG
CHROMIUM - 10 MG/KG
LEAD - *25 MG/KG

* - SITE BACKGROUND ESTABLISHED DURING RI

MG/KG - MILLIGRAMS PER KILOGRAM

N

Title:

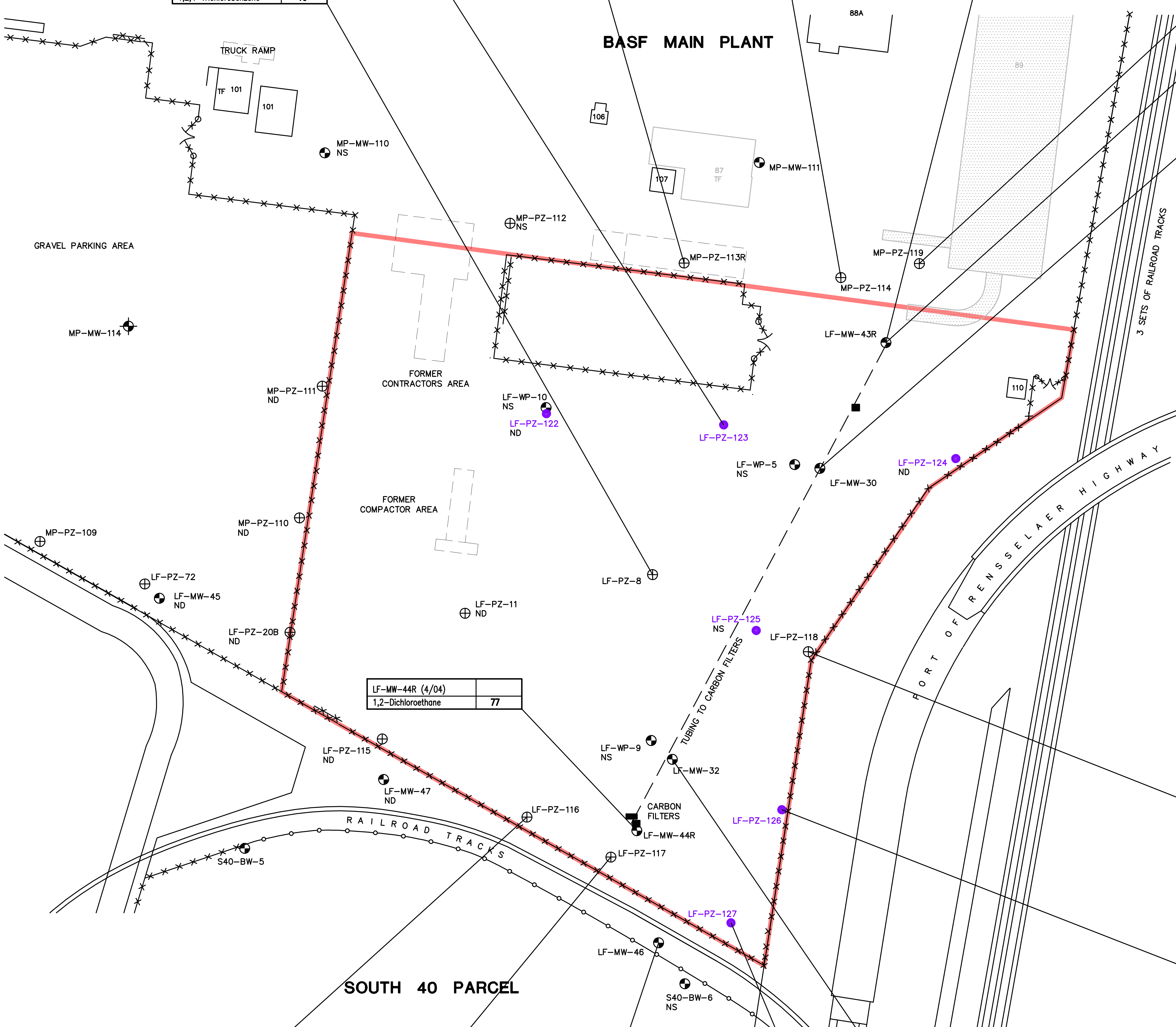
METALS IN SOIL

REMEDIAL ACTION SELECTION REPORT
BASF CLOSED LANDFILL, RENSSELAER, NEW YORK FACILITY

Prepared For:
BASF CORPORATION
FLORHAM PARK, NEW JERSEY

ROUX ASSOCIATES INC
Environmental Consulting & Management

Compiled by: NE	Date: 9/20/05	PLATE 4
Prepared by: NE	Scale: 1" = 150'	
Project Mgr: N.E.	Office: NY	
BF1143119.WOR	Project: 25111Y27	



LF-PZ-8 (4/04)	
Benzene	210
Chlorobenzene	180
Toluene	33
M&P Xylenes	28
O Xylene	12
1,2-Dichlorobenzene	39
1,4-Dichlorobenzene	62
Ethylbenzene	9.8
Methylene Chloride	6.1
1,2,4-Trichlorobenzene	16

LF-PZ-123 (4/04)	
Benzene	3.7

MP-P2-113R (4/04)	
1,2-Dichlorobenzene	73,000
1,4-Dichlorobenzene	16,000
Benzene	120,000
Chlorobenzene	87,000

MP-P2-114 (4/04)	
1,2-Dichlorobenzene	18
Benzene	85
Chlorobenzene	96
Ethylbenzene	16
M&P Xylenes	22
O Xylene	16

LF-MW-48R (4/04)	
1,2-Dichlorobenzene	24
Benzene	5,900
Chlorobenzene	43

MP-PZ-119 (4/04)	
Benzene	860
Chlorobenzene	220
Ethylbenzene	1,100
M&P Xylenes	2,400
O Xylene	820
Toluene	380

LF-MW-43R (4/04)	
Benzene	5,900
Chlorobenzene	43
1,2-Dichlorobenzene	24

LF-MW-30 (4/04)	
Benzene	120
Chlorobenzene	340
1,4-Dichlorobenzene	71
Ethylbenzene	12
M&P Xylenes	32
1,2 Dichlorobenzene	620

NYSDEC AWQS	
Benzene	1
Chlorobenzene	5
1,2-Dichlorobenzene	3
1,3-Dichlorobenzene	3
1,4-Dichlorobenzene	3
1,2,4-Trichlorobenzene	5
1,2-Dichloroethane	0.6
Ethylbenzene	5
Toluene	5
Xylenes (total)	5

Concentrations in micrograms per liter (ug/L)

LF-MW-44R (4/04)	
1,2-Dichloroethane	77

LF-PZ-118 (4/04)	
Benzene	120
Chlorobenzene	680
Ethylbenzene	22
M&P Xylenes	14
1,2,4-Trichlorobenzene	1,000
1,2-Dichlorobenzene	22
1,3-Dichlorobenzene	310
1,4-Dichlorobenzene	150

LF-PZ-126 (4/04)	
Benzene	2,600
Chlorobenzene	1,300
1,2-Dichlorobenzene	20
1,3-Dichlorobenzene	12
1,4-Dichlorobenzene	17
Ethylbenzene	42
M&P Xylenes	48
O Xylene	11
1,2,4-Trichlorobenzene	150

LF-PZ-116 (4/04)	
Benzene	42
Chlorobenzene	260

LP-PZ-117 (4/04)	
Benzene	9.1
Chlorobenzene	610
1,2-Dichloroethane	11

LF-MW-46 (4/04)	
1,2-Dichloroethane	15

LF-PZ-127 (4/04)	
Benzene	2,000
Chlorobenzene	1,300

LF-MW-32 (4/04)	
Benzene	11
Chlorobenzene	110
1,3-Dichlorobenzene	7.1
1,4-Dichlorobenzene	3.7

LEGEND

LOCATION PREFIXES
LF – LANDFILL
MP – MAIN PLANT
S40 – SOUTH 40

EXISTING BUILDING
FORMER BUILDING
CONCRETE PAD
STORM SEWER GRATE
BARBED WIRE FENCE
CHAINLINK FENCE
LF-MW-30 LOCATION AND DESIGNATION OF EXISTING MONITORING WELL
MP-PZ-110 LOCATION AND DESIGNATION OF EXISTING PIEZOMETER
MP-MW-114 LOCATION AND DESIGNATION OF DOUBLE CASED MONITORING WELL SCREENED IN LOWER SAND AND GRAVEL UNIT
LF-PZ-124 LOCATION AND DESIGNATION OF PIEZOMETER INSTALLED DURING CLOSED LANDFILL INVESTIGATION
BOUNDARY OF CLOSED LANDFILL

SAMPLE LOCATION AND DATE OF SAMPLE

LF-MW-32 (4/04)		Duplicate
Benzene	11	11
Chlorobenzene	130	120

ANALYTE

AWQS AMBIENT WATER QUALITY STANDARDS AND GUIDANCE VALUES
ND VOCS NOT DETECTED OR DETECTED BELOW NYSDEC AWQS
NS NOT SAMPLED
NYSDEC NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
VOCs VOLATILE ORGANIC COMPOUNDS

100' 0 100'

NOTES:

1. ALL CONCENTRATIONS ARE IN MICROGRAMS PER LITER (ug/L).

Title:

SUMMARY OF VOCs DETECTED ABOVE NYSDEC AWQS IN GROUNDWATER

REMEDIAL ACTION SELECTION REPORT
RENSSELAER, NEW YORK FACILITY

Prepared For:
BASF CORPORATION
FLORHAM PARK, NEW JERSEY

ROUX ASSOCIATES, INC.
Environmental Consulting & Management

Compiled by: M.R.	Date: 23JUL05	PLATE
Prepared by: R.K.	Scale: AS SHOWN	5
Project Mgr: N.E.	Office: NY	
File No: BF1143110	Project: 25111Y27	

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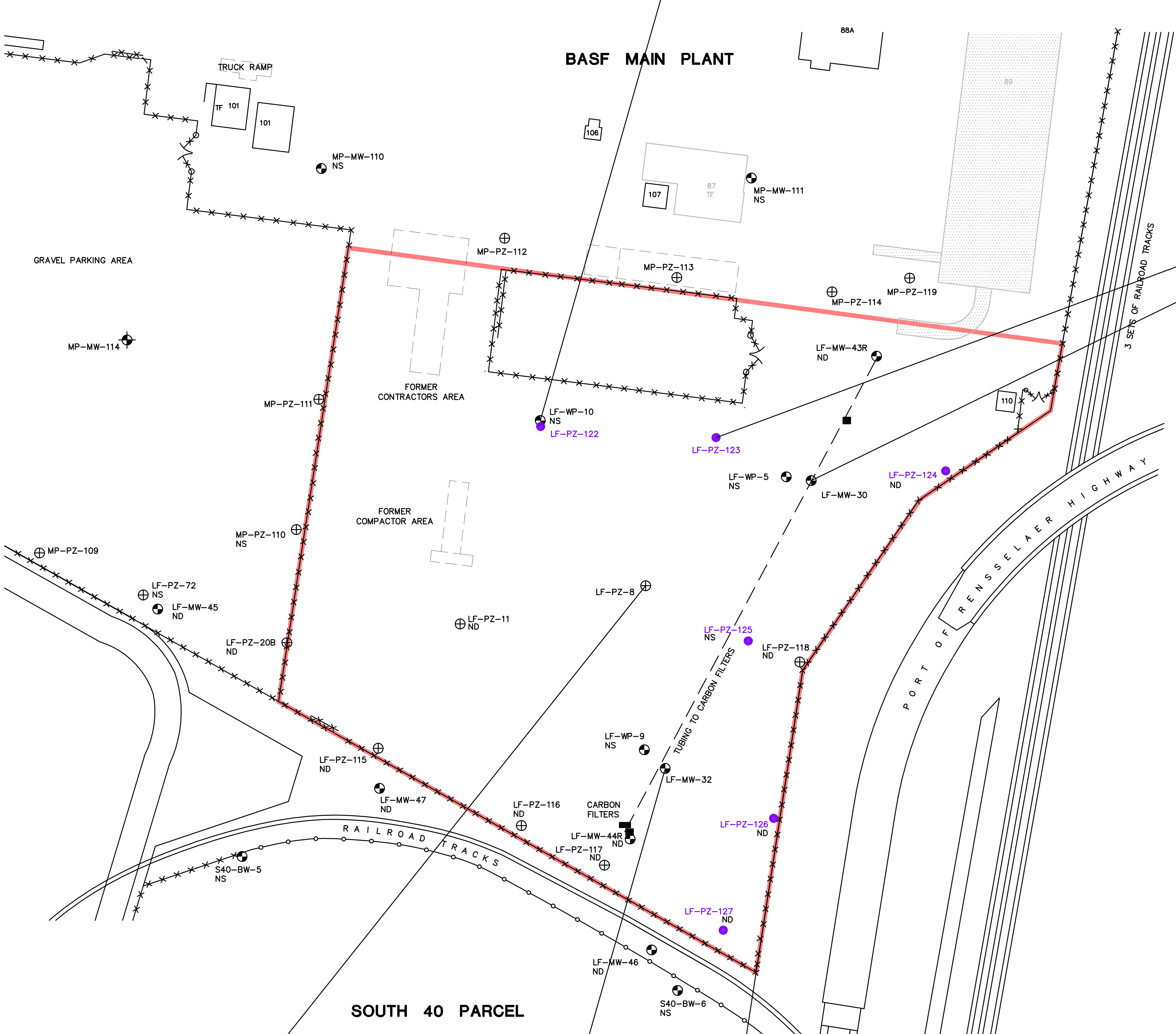

LF-PZ-122 (4/04)	Filtered
Arsenic	260

LF-PZ-123 (4/04)	Filtered
Zinc	3,800

LF-MW-30 (4/04)	Filtered
Arsenic	29
Thallium	5.3
Nickel	820
Zinc	16,000

LF-PZ-8 (4/04)	Filtered
Cadmium	24
Chromium	87
Nickel	1,100
Zinc	44,000

LF-MW-32 (4/04)	Filtered
Antimony	120
Arsenic	29
Cadmium	17

NYSDEC AWQS	
Antimony	3
Arsenic	25
Cadmium	5
Chromium	50
Copper	200
Lead	25
Mercury	0.7
Nickel	100
Thallium	0.5
Zinc	2,000

Concentrations in micrograms per liter (ug/L)

LEGEND

LOCATION PREFIXES

LF – LANDFILL
MP – MAIN PLANT
S40 – SOUTH 40

EXISTING BUILDING

FORMER BUILDING

CONCRETE PAD

STORM SEWER GRATE

BARBED WIRE FENCE

CHAINLINK FENCE

LF-MW-30 LOCATION AND DESIGNATION OF EXISTING MONITORING WELL

MP-PZ-110 LOCATION AND DESIGNATION OF EXISTING PIEZOMETER

MP-MW-114 LOCATION AND DESIGNATION OF DOUBLE CASED MONITORING WELL SCREENED IN LOWER SAND AND GRAVEL UNIT

LF-PZ-124 LOCATION AND DESIGNATION OF PIEZOMETER INSTALLED DURING CLOSED LANDFILL INVESTIGATION

BOUNDARY OF CLOSED LANDFILL

SAMPLE LOCATION AND DATE OF SAMPLE

LF-MW-30 (4/04)	Filtered
Arsenic	29
Thallium	5.3
Nickel	820
Zinc	16,000

ANALYTE

AWQS AMBIENT WATER QUALITY STANDARD STANDARDS AND GUIDANCE VALUES

ND NOT DETECTED

NS NOT SAMPLED

NYSDEC NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

NOTES:

1. ALL CONCENTRATIONS ARE IN MICROGRAMS PER LITER (ug/L).

100' 0 100'

Title:

SUMMARY OF METALS DETECTED ABOVE NYSDEC AWQS IN GROUNDWATER

REMEDIAL ACTION SELECTION REPORT
RENSSELAER, NEW YORK FACILITY

Prepared For:

BASF CORPORATION
FLORHAM PARK, NEW JERSEY

ROUX

ROUX ASSOCIATES, INC.
Environmental Consulting & Management

Compiled by: M.R.	Date: 23JUN05	PLATE
Prepared by: R.K.	Scale: AS SHOWN	6
Project Mgr: N.E.	Office: NY	
File No: BF1143111	Project: 25111Y27	

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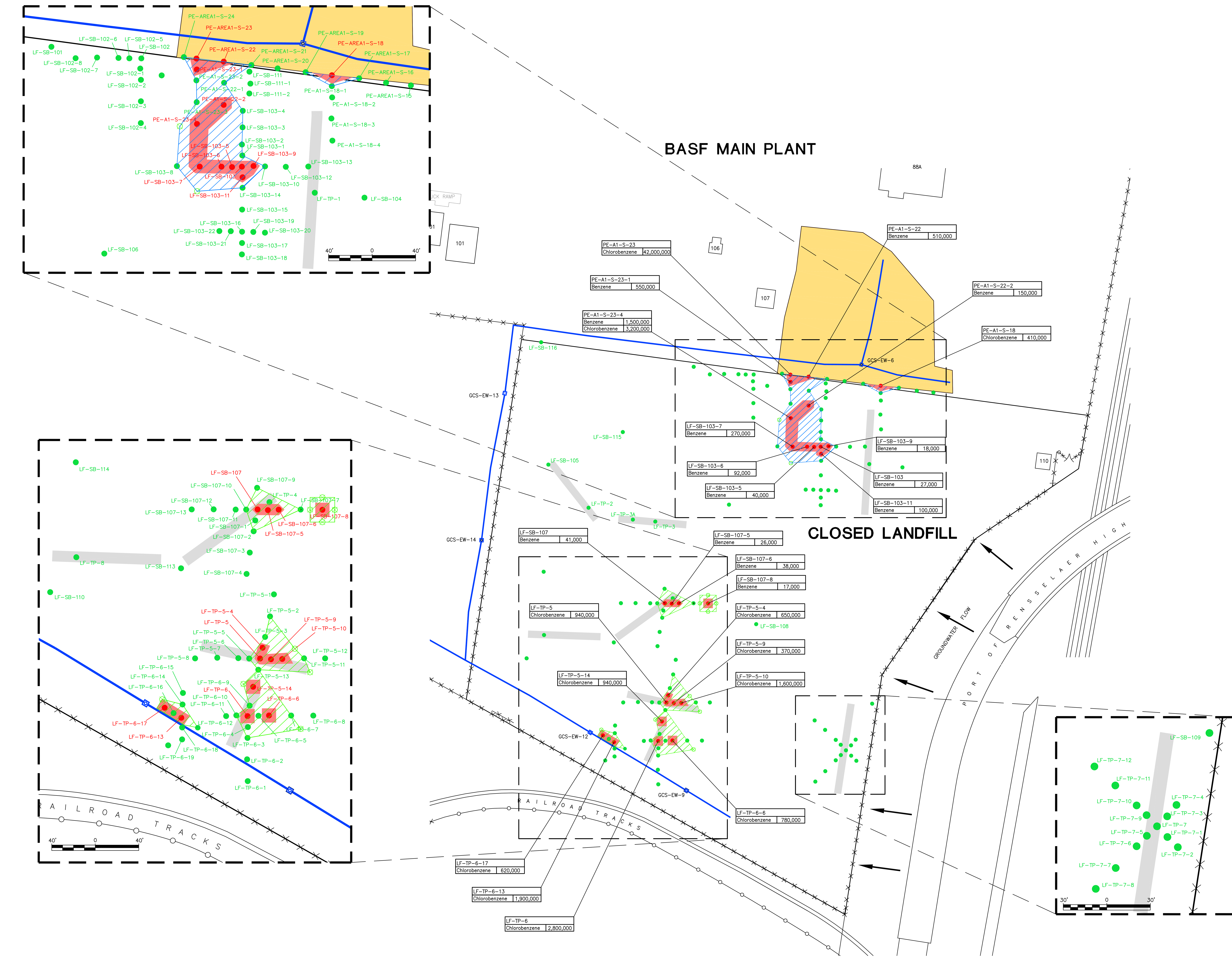

LEGEND

- ELEVATED VOC AREAS (BENZENE DETECTED AT CONCENTRATIONS ABOVE 12,000 UG/KG AND CHLOROBENZENE DETECTED AT CONCENTRATIONS ABOVE 340,000 UG/KG)
- PROPOSED PRE-DELINEATED AREAS TO BE EXCAVATED UNDER REMEDIAL ALTERNATIVE 3A (SEE NOTE 1)
- PROPOSED PRE-DELINEATED AREAS TO BE EXCAVATED UNDER REMEDIAL ALTERNATIVE 3 (SEE NOTE 1)
- LF-TP-5-10 — LOCATION AND DESIGNATION OF SOIL SAMPLE WITH BENZENE GREATER THAN 12,000 UG/KG OR CHLOROBENZENE GREATER THAN 340,000 UG/KG
- LF-TP-7-11 — LOCATION AND DESIGNATION OF SOIL SAMPLE WITH BENZENE LESS THAN OR EQUAL TO 12,000 UG/KG OR CHLOROBENZENE LESS THAN OR EQUAL TO 340,000 UG/KG
- LIMITS OF PROPOSED EXCAVATION BASED ON VARIOGRAM ANALYSIS PROVIDED IN ATTACHMENT 1
- LOCATION OF TEST PITS INSTALLED AND SAMPLED IN 2002
- EXISTING BUILDING
- CONCRETE PAD
- AOC-1 (PREVIOUSLY EXCAVATED AND BACKFILLED WITH CLEAN SOIL TO 1 FOOT BELOW THE WATER TABLE DURING THE SOIL IRM)
- CHAINLINK FENCE
- BOUNDARY OF CLOSED LANDFILL
- EXISTING GROUNDWATER COLLECTION TRENCH

SAMPLE DESIGNATION

PE-A1-S-23-4	
Benzene	1,500,000
Chlorobenzene	3,200,000

ANALYTE — MAXIMUM CONCENTRATION IN UG/KG

UG/KG – MICROGRAMS PER KILOGRAM

NOTES

1. PROPOSED LIMITS OF EXCAVATION WERE BASED ON EXTENSIVE SAMPLING SUPPLEMENTED WITH THE STATISTICAL ANALYSIS PROVIDED IN APPENDIX A. ACCORDINGLY, THE COLLECTION AND ANALYSIS OF POST-EXCAVATION SIDEWALL SAMPLES IS NOT WARRANTED.

DEFINITIONS

IRM INTERIM REMEDIAL MEASURE

VOCs VOLATILE ORGANIC COMPOUNDS

60' 0 60'

Title: **PROPOSED EXCAVATION AREAS FOR REMEDIAL ALTERNATIVES 3 AND 3A**

REMEDIAL ACTION SELECTION REPORT
BASF CLOSED LANDFILL, RENSSELAER, NEW YORK

Prepared For:
BASF CORPORATION
FLORHAM PARK, NEW JERSEY

ROUX ASSOCIATES, INC. *Environmental Consulting & Management*

Compiled by: O.R.	Date: 01AUG05	PLATE
Prepared by: G.M.	Scale: AS SHOWN	7
Project Mgr: O.R.	Office: NY	
File No: BF1143121	Project: 25111Y27	