Department of Environmental Conservation

Division of Environmental Remediation

Record of Decision

BASF Manufacturing Plant Site
Operable Unit No. 1
Rensselaer, Rensselaer County, New York
Site Number 4-42-027

September 2003

New York State Department of Environmental Conservation
GEORGE E. PATAKI, *Governor* ERIN M. CROTTY, *Commissioner*

DECLARATION STATEMENT - RECORD OF DECISION

BASF Manufacturing Plant Inactive Hazardous Waste Disposal Site
Operable Unit No. 1
City of Rensselaer, Rensselaer County, New York
Site No. 4-42-027

Statement of Purpose and Basis

The Record of Decision (ROD) presents the selected remedy for Operable Unit No.1 (OU1) of the BASF Manufacturing Plant site, a Class 2 inactive hazardous waste disposal site. The selected remedial program was chosen in accordance with the New York State Environmental Conservation Law and is not inconsistent with the National Oil and Hazardous Substances Pollution Contingency Plan of March 8, 1990 (40CFR300), as amended.

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

Assessment of the Site

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

Description of Selected Remedy

Based on the results of the Remedial Investigation and Feasibility Study (RI/FS) for the BASF Manufacturing Plant site and the criteria identified for evaluation of alternatives, the NYSDEC has selected a combination of source removal in areas of OU1 that are impacting the groundwater, an asphalt cap (which will consist of a low permeability asphalt cap over those areas not currently covered by competent pavement or buildings), and a groundwater containment system (GCS). The GCS will function so that groundwater will be captured on-site by a system of collection trenches and extraction wells, treated on-site (to remove metals, VOCs and SVOCs), then a portion of the treated groundwater (along with surfactant and biological amendments) will be re-injected to expedite the remediation of the residual water-saturated soils. The components of the OU1 remedy are as follows:

- Develop a remedial design program to provide the details of the remedy;

- Install a low permeability cap, utilizing asphalt and existing concrete, over those areas with residual soil contamination not currently covered by competent pavement or buildings. Once completed, the inspection and annual certification, maintenance, and repair of the entire cap would be required;

- Excavate the remaining source of contamination in soils near the north lagoon (Area 4A) and dispose of these excavated soils off-site;

- Excavate and dispose off-site waste sludge and underlying contaminated soils from three process building basements (considered one source area, see Figure 3) at an off-site location;

- Excavate the sludge from both lagoons and dispose off-site at an approved facility;

- Develop a soils/dust management plan to address residual contaminated soils, to properly manage the future use of the site;

- Implement institutional controls to prevent the use of groundwater and restrict future use of the site;

- Construct a groundwater containment system (GCS) to extract and treat impacted groundwater on-site, and re-inject a portion of the treated groundwater into soils with residual contamination to further assist in remediating the site;

- Develop a soil gas monitoring program to evaluate the potential for vapors (from under the cap) to impact indoor air quality by migrating into buildings; and

- Long-term groundwater monitoring.

New York State Department of Health Acceptance

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

Declaration

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

_____ _____

Date

Dale A. Desnoyers, Director
Division of Environmental Remediation

TABLE OF CONTENTS

SECTION **PAGE**

RECORD OF DECISION

BASF Manufacturing Plant Site
Operable Unit No. 1
City of Rensselaer, Rensselaer County, New York
Site No. 4-42-027
September 2003

SECTION 1: SUMMARY OF THE RECORD OF DECISION

The New York State Department of Environmental Conservation (NYSDEC), in consultation with the New York State Department of Health (NYSDOH), has selected this remedy for Operable Unit #1 (OU1) of the BASF Manufacturing Plant, a Class 2 inactive hazardous waste disposal site. The presence of hazardous waste has created significant threats to human health and/or the environment that are addressed by this remedy. As more fully described in Sections 3 and 5 of this document; 125 years of improper disposal, poor housekeeping, the disposal of residues from many operational processes (some being mixed into a sludge), and/or disposal of off-specification products during operations at the site, most of which is believed to have occurred prior to 1978, have resulted in the disposal of hazardous wastes. These hazardous wastes contain constituents such as arsenic, benzene and chlorobenzene. These wastes have contaminated the subsurface soils and groundwater at the site. These disposal activities have resulted in:

- a significant threat to human health associated with the potential for exposure to contaminated soil; and

- a significant environmental threat associated with potential impacts from arsenic and volatile organic compounds (VOCs) in the groundwater, by migrating off-site.

To eliminate or mitigate these threats, the NYSDEC has selected the following remedy for OU1:

- Develop a remedial design program to provide the details of the remedy;

- Install a low permeability cap, utilizing asphalt and existing concrete, over those areas with residual soil contamination not currently covered by competent pavement or buildings. Once completed, the inspection and annual certification, maintenance, and repair of the entire cap would be required;

- Excavate the remaining source of contamination in soils near the north lagoon (Area 4A) and dispose of these excavated soils off-site;

- Excavate the waste sludge and underlying contaminated soils from three process building basements (considered one source area, see Figure 3) and dispose at an off-site location;

- Excavate the sludge from both lagoons and dispose off-site at an approved facility;

- Develop a soils/dust management plan to address residual contaminated soils;

- Implement institutional controls to prevent the use of groundwater and restrict future use of the site;

- Construct a groundwater containment system (GCS) to extract and treat impacted groundwater on-site, and re-inject a portion of the treated groundwater into soils with residual contamination to further assist in remediating the site;

- Develop a soil gas monitoring program to evaluate the potential for vapors (from under the cap) to impact indoor air quality by migrating into buildings; and

- Long-term groundwater monitoring.

The selected remedy, discussed in detail in Section 8, is intended to attain the remediation goals identified for OU1 in Section 6. The remedy must conform with applicable (or relevant and appropriate) standards and criteria with consideration given to guidance, as appropriate. Standards and criteria are typically regulations and must be considered. Guidance refers to applicable documents that can help make determinations. This term is hereafter called SCGs.

SECTION 2: SITE LOCATION AND DESCRIPTION

The BASF Manufacturing Plant (#442027), which includes the lagoon area as part of the site, is located in the City of Rensselaer, Rensselaer County, and is 35 acres in size. The manufacturing plant and lagoon area is zoned heavy industrial, and is physically located next to the Hudson River. The manufacturing plant and lagoon area is bordered by Organichem (formerly Sterling Organics) to the north, by a Coastal power plant to the south-west, by the two other BASF sites (the nine acre landfill, #442004, and the 40 acre South 40 Site, #442022) to the southeast, by railroad tracks to the east, and the Hudson River to the west (see Figures 1 & 2).

The site will be separated into two operable units. An operable unit represents a portion of the site remedy that for technical or administrative reasons can be addressed separately to eliminate or mitigate a release, threat of release, or exposure pathway resulting from the site contamination.
OU1 includes on site contamination in the manufacturing plant and lagoon area (as described above). The second operable unit (OU2) will include off site contamination in those areas outside OU1 with potential impacts resulting from the: 1) migration of contaminated groundwater off-site to the west via the storm sewer bedding and/or through the shallow water bearing unit; 2) discharges directly from the site or through the groundwater which may have impacted sediments in the Hudson River; 3) migration

of site related contaminants to soils adjacent to the lagoon area along Riverside Avenue, and 4) airborne contamination from air emissions or particulate migration.

SECTION 3: SITE HISTORY

3.1: Operational/Disposal History

In 1881 the Hudson River Aniline and Color Works began use of the facility that is currently the BASF manufacturing plant in Rensselaer.

In 1905 the Hudson River Aniline and Color Works facility began to supplement its dyestuffs with pharmaceuticals and aspirin. In 1913 the official name was changed to the Bayer Company. The facility was seized by the United States government during both world wars, and functioned as part of the war economy. In 1968 the official name was changed to the GAF Corporation, and in 1978 BASF purchased the manufacturing plant from the GAF Corporation. The facility ceased all operations and closed in December 2000.

Routine disposal of off-specification product(s) at the southeast corner of the site (during operations at the site) resulted in the disposal of a number of hazardous wastes. Burial of arsenic-containing waste prior to lagoon construction resulted in arsenic-contaminated soil and groundwater in the north-west quarter of the site and adjacent to the waste water treatment lagoons. Poor housekeeping led to the accumulation of sludge in three process building basements and a plume of VOC contaminated groundwater in the north-west quarter of the site.

3.2: Remedial History

In 1992, the NYSDEC listed the site as a Class 2 site in the Registry of Inactive Hazardous Waste Disposal Sites in New York. A Class 2 site is a site where hazardous waste presents a significant threat to the public health or the environment and action is required.

In June 1994, a baseline environmental assessment of the wastewater lagoons was performed. This assessment included the installation of monitoring wells to determine if groundwater had been impacted by site operations and historical disposal practices. It concluded that VOCs and soluble arsenic were detected in groundwater exceeding New York State Class GA Standards. This groundwater contamination was primarily located on the manufacturing plant, up gradient of the lagoons.

BASF entered into a Consent Order (described in Section 4) on February 24, 1998.

In April 1998, a RI Work Plan for the site was developed. The scope of the RI Work Plan was agreed upon by the NYSDEC and BASF in a Scope of Work (SOW) and modified by subsequent letters of understanding.

Two additional phases of investigation for the site were performed to further define the extent of the contamination. These two phases were identified as the supplemental RI (SRI) and the additional RI activities.

SECTION 4: ENFORCEMENT STATUS

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

The NYSDEC and BASF entered into a Consent Order on February 24, 1998. The Order (#A4-0345-96-07) obligates the responsible parties to implement a RI/FS remedial program. The NYSDEC has prepared and forwarded to BASF for review a Consent Order for the implementation of the remedy for OU1.

SECTION 5: SITE CONTAMINATION

An RI/FS has been conducted to evaluate the alternatives for addressing the significant threats to human health and the environment.

5.1: Summary of the Remedial Investigation

The purpose of the RI was to define the nature and extent of any contamination resulting from previous activities at the site. The RI was conducted between April 1999 and May 2000, and the second phase between December 2000 and May 2001. The "Remedial Investigation and Supplemental Remedial Investigation Report" (dated 11/13/00) and the "Additional Remedial Activities Report" (dated 08/03/01) describe the field activities and findings of the RI in detail.

The following activities were conducted during the RI:

- Research of historical information and conduct a survey of public and private water supply wells in the area around the site.;
- A soil gas survey to locate VOC contaminated soils, possible vapor exposure pathways, areas of concern for further delineation of contamination, and analyze 134 soil gas samples from 134 locations;
- Installation of 117 soil borings and analyze 351 soil samples from those 117 soil borings;
- Installation of 12 shallow monitoring wells and 2 deep aquifer monitoring wells on-site for analysis of soils and groundwater as well as physical properties of soil and hydrogeologic conditions;

- Analyze 95 samples from 68 new and existing locations;

- Installation of 10 Geoprobe sampling points and analyze 10 discrete groundwater samples from the installation of piezometers along the sewer lines and storm water pipes to locate the gravel bedding that has been contaminated by migrating groundwater;

- Analyze 20 process residue samples from 15 locations (process building basements); and

- Analyze 20 sludge sample from 17 locations in the north and south lagoons.

To determine whether the soil and groundwater contained contamination at levels of concern, data from the investigation were compared to the following SCGs:

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

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

- Background samples taken from 5 locations at 0 to 2 feet below the ground surface. These locations were up gradient of the site, and were unaffected by historic or current site operations. The samples were analyzed for VOCs, semivolatile organic compounds (SVOCs), and inorganics (metals). The results of the analysis were compared to data from the RI (Table 1) to determine appropriate site remediation goals.

Based on the RI results, in comparison to the SCGs and potential public health and environmental exposure routes, certain media and areas of the site require remediation. These are summarized in Section 5.1.2. More complete information can be found in the RI reports.

5.1.1: Site Geology and Hydrogeology

The regional flow of groundwater is to the west (toward the Hudson River). Utilities, sewers and storm water pipes have caused anomalies to this westerly flow.

The depth to the shallow water bearing unit averages from 5 feet (along the eastern boundary) to 15 feet (near the Hudson River) below the ground surface. A clay layer separates this shallow groundwater from a deeper water bearing unit. The clay layer is approximately 18 feet below the ground surface at the treatment lagoons (where it is 40 feet thick), and approximately 5 feet below the ground surface at the eastern boundary (where it is 10 feet thick). The deep water bearing unit is a 10 feet thick layer of sand just above a layer of glacial till, which is just above the shale bedrock.

Except for the detection of benzene at 2 ppb (versus the AWQS of 1 ppb) in one of the two deep monitoring wells, only the shallow groundwater was found to have contamination. The transmissivity (or movement) of water on-site is minimal and this fact is evident in two on-site areas that were found to have no water within the shallow water bearing unit.

5.1.2: Nature of Contamination

As described in the RI reports, many soil, groundwater, waste process residue, and lagoon sludge samples were collected to characterize the nature and extent of contamination. As summarized in Table 1, the main categories of contaminants that exceed their SCGs are VOCs, SVOCs, and metals.

The VOC contaminants of concern (COCs) in soil, groundwater, and waste sludge are:

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

The SVOC COCs in soil, groundwater, and waste sludge are:

- Benzo(a)anthracene
- Benzo(a)pyrene
- Benzo(b)anthracene
- Benzo(k)anthracene
- Chrysene
- 4-Chloroaniline
- Dibenzo(a,h)anthracene
- Ideno(1,2,3-c,d)anthracene
- 2-Methylnaphthalene
- 4-Nitroaniline
- 4-Nitrophenol
- Phenol

The metal COCs in soil, groundwater, and waste sludge are:

- Arsenic
- Chromium
- Lead
- Mercury
- Zinc

5.1.3: Extent of Contamination

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

Chemical concentrations are reported in parts per million (ppm) for water, soil, and waste sludge samples.

Table 1 summarizes the degree of contamination for the COCs in subsurface soil, groundwater, sludge, and process waste residue and compares the data with the SCGs for the site. Tables 2 - 5 summarize the degree of subsurface soil contamination for COCs in the areas of concern which were addressed by the Soil Excavation interim remedial measure (IRM) described in Section 5.2. The following are the media which were investigated and a summary of the findings of the RI.

The concentration included in the parentheses after the COC is the highest concentration detected in the media for that area of the site.

Basement Process Waste Residues and Underlying Contaminated Soils

The residues from operational processes were mixed and co-mingled via overflows and leaks from building sewer systems into three separate basements located in Buildings 84, 87, and 93 as depicted on Figure 4. The waste material varied in thickness from being not present to 18 inches thick in some locations. The process residues were sampled at 16 locations (see Figure 5), each sample was analyzed for VOCs, SVOCs, and metals. Table 1 summarizes the range of concentrations of the COCs in the process waste residue and underlying soils.

The following results are for the process waste residue found in the building basements. The VOCs detected include benzene(2.2 ppm), chlorobenzene(40.1 ppm), 1,2-dichlorobenzene(48.5 ppm), 1,2-dichloroethane(11 ppm), 1,2,4-trichlorobenzene(514 ppm), toluene(11 ppm), and xylenes(11 ppm); SVOCs detected include phenol(80 ppm), and the following poly-aromatic hydrocarbons(PAHs): benzo(a)anthracene(41.7 ppm), benzo(a)pyrene(26.6 ppm), and dibenzo[a,h] anthracene(6.58 ppm); and metals detected include arsenic(73.9 ppm), chromium(27,500 ppm), lead(3,280 ppm), mercury(10.6 ppm), and zinc(1,560 ppm).

The soils below the process waste residues were also sampled at 12 locations(see Figure 6) to a depth of 1.5 feet below the process residues. Each sample was analyzed for VOCs, SVOCs, and metals. The same contaminants found in the process residues were detected in the underlying soil. The VOCs reported above the Recommended Soil Cleanup Objectives from the tables within TAGM 4046 (RSCOs) include benzene(6.4 ppm), toluene(6.4 ppm), xylenes(6.4 ppm) chlorobenzene(200 ppm), 1,2 dichlorobenzene(120 ppm), 1,2-dichloroethane(6.4 ppm), and 1,2,4- trichlorobenzene(81 ppm); SVOCs detected above RSCOs include phenol(2.7 ppm) and the following PAHs: benzo(a)anthracene(2.2 ppm) benzo(a)pyrene(2.4 ppm), and dibenzo(a,h)anthracene(4 ppm); and metals detected above RSCOs include arsenic(57.6 ppm), chromium(1,590 ppm), lead(1,510 ppm), mercury(1.5 ppm), and zinc(815 ppm).

The NYSDEC has determined the process waste residue and underlying soils contain listed hazardous wastes.

Lagoon Sludge

The two lagoons located on the west side of Riverside Avenue contain sludge which has accumulated over the years of operation of the wastewater treatment system. The sludge has been investigated on several occasions with the most recent work in 2002. During these investigations it was determined that the sludge in the lagoons was approximately 3 to 6 feet thick with an estimated volume that ranges from 12,570 to 18,600 cubic yards. Samples of the sludge were collected from various locations and depths throughout the lagoons on two different occasions. Samples were analyzed for VOCs, SVOCs, and metals (see Table 1). The VOCs detected include acetone(77 ppm), benzene(22 ppm), chlorobenzene(590 ppm), 1,2-dichlorobenzene(86 ppm), ethylbenzene(24 ppm), toluene(660 ppm), 1,2,4 trichlorobenzene(17 ppm) and xylenes(130 ppm); SVOCs detected include benzoic acid(120 ppm), bis(2-ethylhexyl)phthalate(82 ppm), 4-chloroaniline(160 ppm), 2-methylnaphthalene(23 ppm), 4-nitroaniline(30 ppm), 4-nitrophenol(39 ppm), and phenol(140 ppm); and metals detected include arsenic(197 ppm), chromium(4,830 ppm), mercury(19 ppm), and zinc(987 ppm).

The NYSDEC has determined that the sludge in the lagoons contains hazardous waste derived from characteristically hazardous wastes that were generated and discarded from various plant operations. These derived hazardous wastes became subject to land disposal restrictions (LDRs) after April 8, 1996. The NYSDEC considers the sludge to be a source area that will require remediation.

Subsurface Soil

Over 90 percent of the site is covered with buildings or pavement. Soils collected from the borings are therefore considered subsurface soils. The RI identified areas of concern which contained the highest concentrations of several contaminants detected throughout the Main Plant property (See Figure 3). These areas of concern are being addressed by the Soil Excavation IRM described in Section 5.2.

Outside the areas of concern, COCs were detected in the subsurface soils at lower levels and more dispersed locations. Subsurface soil samples were analyzed for VOCs, SVOCs, metals, pesticides and PCBs (see Table 1). Pesticides and PCBs were not detected at elevated levels during initial investigations and were not included in the subsequent investigations. The VOCs detected above RSCOs include benzene(0.9 ppm), chlorobenzene(19 ppm), xylene(3 ppm), 1,2 dichlorobenzene (44 ppm), 1,2-dichloroethane(5 ppm) and 1,2,4 trichlorobenzene(19 ppm); SVOCs detected above RSCOs (see definition on Page 7) include phenol(3 ppm) and the following PAHs: benzo(a)anthracence(11 ppm),benzo(a)pyrene(9 ppm), benzo(b)fluoranthene(9ppm), benzo(k)fluoranthene(3ppm), chrysene(10 ppm), dibenzo[a,h] anthracene(3 ppm), and ideno(1,2,3 - c,d) pyrene(6 ppm)); and metals detected above RSCOs in subsurface soils outside the areas of concern include arsenic(623 ppm), chromium(833 ppm),lead(660 ppm), mercury(52.5 ppm) and zinc(602 ppm).

Background soil samples were taken, at a depth of 0 to 2 feet below the ground surface, along the eastern boundary (MP-SB-19 and MP-SB-20) and at the far south-west corner of the site (MP-SB-48, MP-SB-49, and MP-SB-50) where no potential areas of concern were identified. RSCO values or the background values (which ever is higher) are typically used as the guidance values for individual COCs.

PAHs are ubiquitous in the Main Plant and the concentrations of these compounds were not indicative of waste disposal.

Soil samples which were visibly contaminated within the boring, or had relatively high photo-ionization detector readings, were selected for laboratory analysis. The following paragraphs describe the sample results for several areas of the site impacting groundwater.

Area 1

This area is located in the southeastern part of the Main Plant (See Figure 3) adjacent to the nine acre closed landfill site (# 442004). The work conducted during the RI included the collection of 26 soil samples from various intervals to a depth of 6 feet where the water table was encountered. The samples were analyzed for VOCs, SVOCs, and metals (see Table 2). The VOCs of concern detected above RSCOs include benzene(34 ppm), chlorobenzene(8,440 ppm), ethylbenzene(123 ppm), xylene(841 ppm), 1,2 dichlorobenzene(1,990 ppm), and 1,2,4 trichlorobenzene(630 ppm). The following SVOCs were reported as undetected at elevated detection limits in most sample locations due to the presence of high levels of some VOCs. The SVOCs of concern that were not detected at detection limits above RSCOs include phenol(26 ppm) and the following PAHs: benzo(a)anthracene(26 ppm), benzo (a)pyrene(86 ppm), and dibenzo[a,h]anthracene(86 ppm). The metals of concern detected above RSCOs include arsenic (1,260 ppm), chromium(239,000 ppm), and lead(19,200 ppm).

The VOCs and some SVOCs detected in Area 1 soils were contributing to groundwater contamination in this area. An IRM, discussed in Section 5.2, was completed in 2002 and addressed these contaminants.

Area 2

This area is located in the western part of the Main Plant area adjacent to Building 81(see Figure 3). The work conducted during the RI included the collection of seven samples from various intervals to a depth of approximately 6 feet where the water table was encountered. The samples were analyzed for VOCs, SVOCs, and metals (see Table 3). The VOCs detected above RSCOs include chlorobenzene(455 ppm), 1,2 dichloroethane(296 ppm), ethylbenzene(93 ppm), toluene(46 ppm), and xylenes(634 ppm); SVOCs detected above RSCOs include phenol(0.5 ppm) and the following PAHS: benzo(a)anthracene(11 ppm), benzo(a)pyrene(9 ppm), and dibenzo[a,h]anthracene(3 ppm).

The metals detected at low concentrations (slightly above RSCOs) include arsenic(48 ppm) and chromium(20 ppm).

The VOCs detected in Area 2 soils were contributing to groundwater contamination in this area. An IRM, discussed in Section 5.2, was completed in 2002 and addressed these contaminants.

Area 4B

This area is located in the western part of the Main Plant north of Building 81 (See Figure 3). The work conducted during the RI included the collection of five samples from various intervals to a depth of approximately 6 feet where the water table was encountered. The samples were analyzed for VOCs, SVOCs, and metals (see Table 4). The VOCs including benzene(0.07 ppm), chlorobenzene(20 ppm), and 1,2-dichloroethane(5 ppm) were detected at concentrations above RSCOs in one location. The SVOCs detected above RSCOs include phenol(1.2 ppm) and the following PAHs: benzo[a]anthracene(31 ppm), benzo(a)pyrene(4 ppm), dibenzo[a,h]anthracene(4 ppm). The predominant COC in this area was arsenic which was detected at a concentration of 1,560 ppm. Other metals of concern, including chromium(30.9 ppm), lead(491 ppm), mercury(1 ppm), and zinc(243 ppm) were detected at concentrations slightly above RSCOs.

The arsenic detected in this area was contributing to groundwater contamination in this area. An IRM (discussed in Section 5.2) was completed in 2002 and addressed these contaminants.

Area 4A

This area is located across Riverside Ave in the lagoon area (See Figure 3). The work conducted during the RI included the collection of samples from various intervals to a depth of approximately 14 feet where the water table was encountered. The samples were analyzed for arsenic only based upon previous investigatory work (see Table 5). Arsenic (127,000 ppm) was detected at high concentrations along the northeastern portion of the lagoon property along Riverside Ave.

The arsenic detected in this area was contributing to groundwater contamination in this area along the Hudson River. An IRM (discussed in Section 5.2), completed in 2002, addressed a large portion of these contaminants. This ROD will establish the final remedy for the remaining contaminated soils in Area 4A.

Groundwater

The groundwater on the Main Plant, east of Riverside Avenue and including the landfill, has been significantly impacted by VOCs (see Figure 7). Table 1 summarizes the groundwater data and compares it to the appropriate groundwater standard. VOCs detected in groundwater include: benzene(15 ppm), ethylbenzene(1.8 ppm), toluene(0.14 ppm), xylene(3 ppm), chlorobenzene(170 ppm), 1,2-dichloroethane(20 ppm), 1,2-dichlorobenzene(0.12 ppm), and 1,2,4-trichlorobenzene(1.5 ppm).

SVOCs and metals other than arsenic have been detected sporadically on the Main Plant property. The SVOC of concern include: benzo(a)anthracene(0.003 ppm), and phenol(0.58 ppm); and the metals of concern include: chromium (164 ppm) and lead (.0472 ppm).

Hexavalent chromium was included in the second round of sampling and was reported as undetected in 40 unfiltered groundwater samples and 16 filtered groundwater samples; 8 unfiltered groundwater samples with elevated detection limits, and 3 filtered groundwater samples with elevated detection limits. Hexavalent chromium was only detected in one unfiltered groundwater sample at a concentration of 60 ppb compared to a standard of 50 ppb.

Arsenic has been detected in monitoring wells on the western side of the Main Plant, and in the lagoon area west of Riverside Avenue. It has been detected at concentrations up to 24.3 ppm in the lagoon area and 2.16 ppm in the Main Plant area.

Site related contaminants have also been detected in the sewer bedding that borders the property along the southern and western boundaries of the Main Plant. Most notably, water samples taken from location LG-MH-7 contain benzene and chlorobenzene at 0.130 ppm and 2.6 ppm, respectively. These two compounds have also been detected in the groundwater in the landfill property which is most likely the source for the contamination.

5.2: Interim Remedial Measures

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

The RI identified distinct areas of contamination which warranted remediation as an IRM. In the Spring 2002 the NYSDEC approved two IRM work plans : the Soil Excavation IRM and the Process Buildings IRM. The nature of the wastes lend themselves to removal by straight-forward excavation/removal as opposed to in-situ or ex-situ treatment. The Soil Excavation IRM involved the removal of 23,000 tons of contaminated soil from four areas (see Figure 3), and had an estimated cost of $4,700,000. The four areas which have been addressed are: the former drum storage area (Area 1), contaminated soils adjacent to Building 81 (Area 2), arsenic contaminated soils adjacent to Building 73 (Area 4B), and arsenic contamination on the east side of the North Lagoon (Area 4A).

The approved work plan for the Process Buildings IRM involves the removal and off-site disposal of process waste and associated contaminated soils in the earthen basements of process buildings 84, 87, and 93 (see Figure 4). The Process Building IRM was started in May 2003 and will be completed prior to the comprehensive remedy presented in this ROD.

Highlights of the completed IRM include:

- Excavation of the sources impacting groundwater, during which all excavated soils (from the areas described above) were properly managed at an off-site facility. During implementation of

the IRM, BASF proposed to pre-treat some of the soils (on-site) prior to off-site disposal. The NYSDEC agreed to this proposal and notified the public prior to initiating the pre-treatment process. However, the pre-treatment was ineffective and the soils were disposed off-site at an approved facility without being pre-treated;

- Implementation of a Community Air Monitoring Program, as required by the NYSDOH; and

- Backfilling of the soil excavations at Area 1, Area 2, Area 4A and Area 4B with clean fill material.

Residual contaminated soil will remain on-site at concentrations above the NYSDEC RSCOs, at all areas excavated during the Soil Excavation IRM, and will be addressed by capping and developing a soil management plan as part of this ROD.

The results for the IRMs for each of the areas are:

Area 1

The objective was to excavate vertically to RSCOs, or 1 foot below the groundwater table within this area of concern. Excavation laterally (outside the area) was conducted to ten times RSCO in a contiguous manner. The higher concentrations of mixed metals (namely arsenic, chromium and lead) were also removed. Table 2 summarizes the RSCOs and the Pre- and Post- IRM range of concentrations. There were 87 post excavation samples taken from the bottom and side walls of the excavation. Of those samples, two contained benzene and xylene slightly above their respective RSCO. It should be noted that there were several locations where soils were removed to 1 foot below the groundwater table. In the locations where excavation extended 1 foot below the groundwater, only sidewall post excavation samples were taken. While metals of concern were not the primary driver for cleanup in this area, samples were taken at the excavation limits to establish their residual levels. The sample results for metals indicated that high levels of chromium(up to 230,000 ppm) and lead (up to 214,000 ppm) remained after the VOC cleanup levels were achieved at a depth of excavation of 6 feet. Based upon these results additional excavation was performed which removed these soils (contaminated with metals) to one foot below the groundwater table. No post excavation samples were taken since the excavation went below the groundwater table.

The lateral post excavation samples for Area 1 did have concentrations of chromium up to 83,000 ppm along the southern boundary of this area, at the landfill perimeter. This contamination will be addressed as part of the closed landfill site (ID #442004) remediation, under an executed Voluntary Agreement.

Area 2

The objective was to excavate vertically to RSCOs, or 1 foot below the groundwater table within this area of concern. Excavation laterally (outside the area) was conducted to ten times RSCO in a contiguous manner. Table 3 summarizes the RSCOs and the Pre- and Post - IRM range of concentrations. Since the soils were removed to one foot below the water table, no samples were collected from the bottom of the excavation. Four post excavation samples were taken from side walls of the excavation. Of those, no samples had detections above the RSCOs for the VOCs. Since metals and PAHs were not prevalent in this area, they were not used for establishing cleanup objectives.

Area 4B

The objective of the IRM in this area was to excavate vertically to RSCO, or 1 foot below the groundwater table, to remove soils with significant arsenic contamination within the predefined limits described in the soil IRM work plan. At the lateral limits of the excavation, soils which exhibit the hazardous toxicity characteristic for arsenic were excavated and disposed of properly. Confirmation that the excavation had removed the targeted soil was determined by TCLP. Table 4 summarizes the RSCOs and the Pre- and Post- IRM range of concentrations. The soils in this area were removed to one foot below the water table, therefore post excavation samples were only taken from side walls of the excavation. Of those post excavation samples; no VOCs were detected above RSCOs and one

failed the hazardous toxicity characteristic for arsenic. After additional soil was excavated where the soils failed the toxicity characteristic test, another sample was taken which did not fail the test.

Area 4A

The goal of the IRM conducted in this area was to remove soils significantly contaminated with arsenic down to one foot below the water table in the area along the northeast side of the north lagoon (see Figure 3). The excavation continued north and south to predefined locations based upon results from the RI, which indicated a significant drop in arsenic concentrations. At the north and south end of the excavation, confirmation that the excavation had removed the targeted soil was determined by TCLP. Excavation to the east and west was confined to the physical barriers (Riverside Avenue and the north lagoon, respectively). Post excavation samples were only taken from the walls of the excavation since excavation extended below the groundwater table. Table 5 summarizes the RSCOs for arsenic and summarizes the Pre- and Post - IRM range of concentrations.

The post excavation samples indicate that cleanup goals were not achieved along the lagoon side of the trench and along Riverside Avenue (the east side of the trench). Additional removal to achieve the cleanup goals will be necessary, and will be included as part of the final remedy being proposed in this ROD.

The remedial goals of the Soil Excavation IRM were achieved in all areas except Area 4A. As indicated above, this ROD will establish the final remedy for the remaining contaminated soils, including Area 4A.

5.3: Summary of Human Exposure Pathways:

This section describes the types of human exposures that may present added health risks to persons at or around the site. A more detailed discussion of the human exposure pathways can be found in Section 6 of the RI/Supplemental RI report.

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

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

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

Under the current land use conditions at the site, two groups of potential receptors could be exposed to site contamination in soil and groundwater:

- Trespassers.
- Construction workers.

These receptors could come in direct contact with contaminated soil. In the case of a construction worker, dermal exposure to contaminated groundwater during excavation is also a possibility. Both groups may also be exposed to contaminants via inhalation of soil particles or vapors released from groundwater. With the completion of the Soil Excavation IRM, the potential for exposure to contaminated soil is significantly reduced.

Depending on future land use conditions at the site two groups of potential receptors could be exposed to contamination present in site soil and groundwater:

- Future residents.
- Site workers / construction workers.

Both of these groups may be directly exposed to contaminants remaining in site soils. The future resident may ingest contaminants in groundwater if a private well is installed on site. As above, a site worker may also be directly exposed to contaminants in groundwater during an excavation. Both groups may also be exposed to contaminants via inhalation of soil particles or vapors released from groundwater. Inhalation of soil vapors released into a future home or workplace from contaminated groundwater is another potential route of exposure.

5.4: Summary of Environmental Impacts

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

Except for the detection of benzene at 2 ppb (versus the AWQS of 1 ppb) in one of the two deep monitoring wells, only the shallow groundwater (water bearing unit) was found to have contamination. The transmissivity (or movement) of water on-site is minimal and this fact is evident in two on-site areas that did not have any water in the shallow water bearing unit.

The Fish and Wildlife Impact Analysis, which is included in the RI/SRI report, presents a detailed discussion of the existing and potential impacts from the site to fish and wildlife receptors. The following environmental exposure pathways and ecological risks have been identified:

- via groundwater, containing benzene and chlorobenzene, migrating away from the site along the southern border of the main plant parking lot and closed landfill, where three municipal storm water sewers are buried. These storm water sewers are believed to discharge to the Hudson River. Site contamination has impacted the groundwater in the shallow water bearing unit.

- via groundwater west of Riverside Avenue and around the lagoons, containing high levels of arsenic, migrating toward (and potentially impacting) the Hudson River.

The determination of whether or not the Hudson River is being impacted by the plumes described above, and to what extent, will be addressed during the OU2 activities.

SECTION 6: SUMMARY OF THE REMEDIATION GOALS

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

The remediation goals for OU1 are to eliminate or reduce to the extent practicable:

- Infiltration of surface water into the soils and/or the release of contaminants from the soils into on-site groundwater that may create exceedances of groundwater AWQS;

- Exposure of persons and wildlife at or around OU1 to contaminated surface soils on-site;

- Exposure of persons at or around OU1 to contaminated sub-surface soils during any future intrusive activity;

- Migration of the contaminated groundwater off-site, causing exceedances of AWQS off-site;

- Exposure of flora or fauna to off-site contaminated groundwater migration that does not meet NYSDEC Class GA Ambient Water Quality Criteria; and

- Impact upon indoor air quality from soil vapors migrating into buildings.

SECTION 7: SUMMARY OF THE EVALUATION OF ALTERNATIVES

The selected remedy must be protective of human health and the environment, be cost-effective, and comply with other statutory requirements; then utilize permanent solutions, alternative technologies, or resource recovery technologies to the maximum extent practicable. Potential remedial alternatives for OU1 of the BASF Manufacturing Plant site were identified, screened and evaluated in the November 26, 2001, FS report entitled ”Feasibility Study Report - BASF Rensselaer” which is available at the document repositories mentioned previously.

The NYSDEC accepts the FS for its technical information, but does not agree with the FS Report regarding the results of the evaluations presented. Also, the completed Soil Excavation IRM was not reflected in the FS. The NYSDEC has included its own evaluations in this ROD.

In this ROD, Alternative 7 was assembled for evaluation by combining the groundwater re-injection system in Alternative 5 with the groundwater collection and treatment system of Alternative 6. There are four alternatives which address contaminated groundwater (Alternatives 4, 5, 6 and 7). These groundwater alternatives will be evaluated against the criteria together. There are two soil alternatives (Alternatives 2 and 3) addressing the soil contamination that remains on-site, and will be evaluated against the criteria together.

A summary of the remedial alternatives that were considered for OU1 are discussed below. The present worth represents the amount of money invested in the current year that would be sufficient to cover all present and future costs associated with the alternative. This enables the costs of remedial alternatives to be compared on a common basis. As a convention, a time frame of 30 years is used to evaluate present worth costs for alternatives with an indefinite duration. This does not imply that operation, maintenance, or monitoring would cease after 30 years if remediation goals are not achieved.

7.1: Description of Remedial Alternatives

The potential remedies are intended to address the contaminated soils, groundwater, and waste sludge at OU1. Alternatives were developed to address contaminated soils (Alternatives 2 and 3) and contaminated groundwater (Alternatives 4, 5, 6, and 7) on the manufacturing plant itself.

The following remedial elements are common to all the alternatives. They address either source removal or are standard elements of a comprehensive engineering and institutional control program. They will be required for any of the alternatives selected. Engineering and institutional controls are required since contaminants above RSCOs will remain on-site under any of the alternatives.

- To be protective of groundwater, complete the approved contaminated soil source area IRM described in Section 5.2 by excavating the remaining source of contamination in the soils near the lagoon (Area 4A), and disposal of these excavated soils off-site (at an approved facility);

- To be protective of groundwater and to eliminate a major source of listed hazardous waste, implement the approved process building IRM work plan described in Section 5.2 by removing, stabilizing as necessary, and disposing of off-site (at an approved facility) the process building basement sludge and underlying contaminated soils;

- To eliminate a major source of hazardous waste; excavate, stabilize (dewater), pre-treat as necessary for VOCs and dispose of (at an approved facility) the sludge from the wastewater treatment lagoons off-site;

- To be protective of worker safety and the health of the adjacent community, develop a soils/dust management plan to address residual contaminated soils that may be excavated from the site during future redevelopment, or disturbed during building demolition/raising;

- To be protective of public health, implement institutional controls to prevent the use of groundwater and restrict future use of the site;

- To be protective of public health, develop a soil gas monitoring program to evaluate the potential for vapors (from under the cap) to impact indoor air quality by migrating into buildings; and

- To ensure the effectiveness of the proposed remedy for OU1, institute a long-term groundwater monitoring program.

Capital costs included in the following remedial alternative descriptions do not include the $1,770,000 cost of the basement sludge and underlying contaminated soil removal; the $5,400,000 cost of lagoon sludge removal; storm water system modification; nor the gas venting, control of vapor migration, and monitoring. These are common items to all the alternatives being considered and their costs will be added to the total capital cost of the proposed remedy in Section 8 of the ROD.

Alternative 1: No Further Action

The No Further Action alternative recognizes remediation of OU1 conducted under previously completed IRMs. To evaluate the effectiveness of the remediation completed under the IRM, only continued monitoring is necessary.

This alternative would leave OU1 in its present condition and would not provide any additional protection to human health or the environment. The annual O&M cost for monitoring the groundwater would be $12,500 for 30 years. The total present worth cost for monitoring the groundwater would be $397,000.

SOIL REMEDIATION ALTERNATIVES

Alternative 2: Excavation and Off-Site Disposal of Unsaturated Soils Greater than NYSDEC TAGM 4046 Recommended Soil Cleanup Objectives (RSCOs)

Present Worth:	$ 42,323,200
Capital Cost:	$ 41,926,200
Annual O&M:	$ 12,500
Time to Implement	18 months - 2 years

This alternative includes excavation and off-site disposal of the accessible unsaturated soils which are greater than their RSCO value. Accessibility requires that the majority of the on-site buildings be

demolished (at an estimated cost of $13,760,000) prior to excavation activities. This alternative would remove these accessible soils to a depth one foot below the water table. Soils deeper than one foot below the water table would not be accessible, due to the technical difficulty of the construction requirements for sheeting and dewatering the large area to be excavated. The saturated soils will remain on-site. After excavating to one foot below the water table, these areas would be back-filled with clean off-site material.

The total areal extent is approximately twenty acres, and the depth to the water table varies from five to fifteen feet below the land surface. About 187,840 cubic yards of non-hazardous waste and about 9,870 cubic yards of hazardous waste (a total of 197,710 cubic yards of material) would be excavated. Waste characterization samples would be taken for every 1000 cubic yards of material excavated.

Alternative 3: Asphalt and Concrete Pavement Cap

Present Worth:	$ 2,014,800
Capital Cost:	$ 1,309,800
Annual O&M:	$32,500
Time to Implement	1 year

This alternative would include a low permeability asphalt and concrete cap over all areas with residual soil contamination. The cap would be a combination of new asphalt, competent existing asphalt, buildings and parking/loading areas. This alternative would minimize the potential of human and/or animal direct contact with the underlying soils and greatly reduce the rate of infiltration of surface water. It must be presumed that the existing buildings would remain in place and function as part of the cap (see Figure 8).

The areas to be capped with new asphalt would be approximately 2.5 acres in the lagoon area and 2.5 acres in the main plant, with an approximate thickness of twelve inches. The asphalted areas would consist of eight inches of subbase and four inches of asphaltic pavement. Once completed, the inspection and annual certification, maintenance, and repair of the entire cap would be required.

GROUNDWATER REMEDIATION ALTERNATIVES

Alternative 4: In-situ Chemical Oxidation of VOC Source Areas

Present Worth:	$ 5,356,500
Capital Cost:	$ 4,959,500
Annual O&M:	$ 12,500
Time to Implement	6 months - 9 months

This alternative includes in-situ (in place and below the ground surface) chemical oxidation within the groundwater (or in the vicinity of the selected groundwater source area) on-site. The area that would

be treated is located in the north-west quarter of the main plant (includes Area 2 and Area 4B), is approximately 191,000 square feet, and contains a large plume of VOC and SVOC contamination.

This alternative would destroy organic contamination within the subsurface (in-situ) by using a blend of catalysts, oxidizers and viscosity enhancers (called an agent). The agent would be injected through a delivery system designed specifically for OU1. The success of this type of remediation would be limited by the even distribution of the agent, therefore it is estimated that 1,330 injection points would be required to treat 191,000 square feet. Chemical oxidation would only be applicable to this limited area at the Manufacturing Plant site, would not address the metals contamination, and can potentially mobilize metals into the groundwater.

Alternative 5: Extraction, Treatment and Re-injection into VOC Source Areas

Present Worth:	$ 3,573,000
Capital Cost:	$ 1,634,400
Annual O&M:	$112,800
Time to Implement	9 months - 1 year

This alternative includes the construction, operation, and maintenance of a groundwater extraction, treatment and re-injection system. This would only address the VOC contaminated groundwater plume in the north-west quarter of OU1 (see Figure 9) that would be captured (and collected) by a system of collection trenches and extraction wells, treated on-site, then re-injected. The re-injection phase addresses the residual soils acting as a source to this plume in the north-west quarter of the site by flushing (mobilizing) the contamination and expediting the remediation of those residual soils. The proposed system would be located in the north-west quarter of the site and consist of a network of piping, extraction wells, interceptor trenches, and approximately 30 re-injection wells.

The treatment phase would potentially include equalization (which prevents the collection system from being overwhelmed by a slug of higher contamination), metals removal, and VOC/SVOC removal. The individual components may be modified, removed and/or replaced during the design phase. All of the treated water would be re-injected and the system would operate at an estimated optimal flow rate of 20 - 30 gallons per minute (gpm) to contain the plume. The treated water would meet all applicable discharge limits.

Alternative 6: Containment, Collection and On-site Treatment of Groundwater

Present Worth:	$ 3,949,900
Capital Cost:	$ 1,547,400
Annual O&M:	$ 142,900
Time to Implement	9 months - 1 year

This alternative includes the construction, operation, and maintenance of a groundwater extraction and treatment system. All the contaminated groundwater on-site would be captured on-site (and collected) by a system of collection trenches and extraction wells (see Figure 7); treated on-site, then discharged to the Rensselaer County Sewage Treatment Plant (also known as a publicly owned treatment works (POTW)) or the Hudson River. The proposed collection system would consist of an extensive network of piping, extraction wells, interceptor trenches, and a groundwater treatment system that would operate at an estimated 80 - 100 gpm.

The treatment phase would potentially include equalization, metals removal, and VOC/SVOC removal. The individual components may be modified, removed and/or replaced during the pre-design phase. All the treated water would meet all appropriate discharge limits.

Alternative 7: Combination of Alternative 5 and Alternative 6

Present Worth:	$ 4,328,600
Capital Cost:	$ 1,926,600
Annual O&M:	$142,900
Time to Implement	9 months - 1 year

This alternative combines the groundwater re-injection system in Alternative 5 with the comprehensive (on-site) groundwater collection and treatment system of Alternative 6. Contaminated groundwater would be captured on-site (and collected) by a system of collection trenches and extraction wells and treated on-site using a water treatment system. After being treated, a portion of the treated water (estimated to be 20 - 30 gpm) would be re-injected into the VOC contaminated residual soils to assist in cleansing these soils (see Figure 9). The remainder of the treated groundwater would be discharged to either a POTW or the Hudson River.

If re-injection becomes no longer viable at some future date, all the treated groundwater would be discharged to either a POTW or the Hudson River for the remainder of the life of the groundwater capture, collection and on-site treatment system.

The treatment phase would include the same equalization, metals removal, and VOC/SVOC removal as proposed for Alternatives 6. The individual components may be modified, removed and/or replaced during the pre-design phase. All treated water would meet all appropriate discharge limits.

7.2 Evaluation of Remedial Alternatives

The criteria to which potential remedial alternatives are compared are defined in 6 NYCRR Part 375, which governs the remediation of inactive hazardous waste disposal sites in New York State. The first two evaluation criteria are termed “threshold criteria” and must be satisfied in order for an alternative to be considered for selection.

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

Groundwater Alternatives 6 and 7 would require treatment of the groundwater on-site, with each of these alternatives providing a similar level of protection for human health and the environment. Alternatives 6 and 7 would eliminate plume migration off-site. Groundwater Alternatives 4 and 5 would significantly reduce the concentration of the organic contaminants on-site, but would not stop the contaminated groundwater from migrating off-site. It would also not address the arsenic groundwater contamination in the main plant and lagoon areas. Therefore, Alternative 4 or Alternative 5 (by itself) would not protect human health and the environment off-site.

Soils Alternatives 2 and 3 would be protective of human health from exposure to contaminated soils. Alternative 3 would not remove any contaminated soils, however it would reduce the potential for direct contact and migration of contaminants into groundwater through the construction of a cap. Alternative 2 would provide the greatest level of protection to human health and the environment (by itself) since the largest volume of contaminated soils would be removed from OU1, reducing the potential for direct contact and the migration of contaminants into groundwater.

The no further action alternative (Alternative 1) would not be protective, and will not be considered for the remaining evaluation criteria.

2. Compliance with New York State Standards, Criteria, and Guidance (SCGs). Compliance with SCGs addresses whether or not a remedy would meet applicable environmental laws, regulations, and other standards and criteria. In addition, this criterion includes the consideration of guidance which the NYSDEC has determined to be applicable on a case-specific basis.

The most significant SCGs for OU1 are:
* New York State Ambient Water Quality Standards and Guidance Values (AWQS).
* Determination of Soil Cleanup Objectives and Cleanup Levels from Technical and Administrative Guidance Memorandum (TAGM) HWR-94-4046, (RSCOs).

None of the groundwater alternatives would satisfy groundwater standards on-site in a reasonable time frame, because of the technical impracticality of removing the contamination located below the groundwater table. AWQS would be met off-site (over time) for groundwater Alternatives 6 and 7, as they would control off-site migration of contaminated groundwater, where as Alternatives 4 and 5 would not control off-site migration. Even though Groundwater Alternatives 4 and 5 would significantly reduce the concentration of most of the organic contaminants on-site, they would not achieve their respective AWQS on-site. Alternatives 4 and 5 would also not address the arsenic related groundwater contamination. The treatment system for Alternatives 6 and 7 would contain a pre-treatment step to remove metals. A groundwater monitoring program will remain in place for as long as needed to confirm compliance with groundwater AWQS off-site.

Even though Soils Alternative 3 would not meet the TAGM objectives for the COCs since contaminated soils would be capped in place, it would prevent surface exposure and direct contact. Soils Alternative 2 would only meet the TAGM objectives for the contaminants present in the accessible unsaturated soils.

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

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

Groundwater Alternatives 5, 6 and 7 would require approximately 12 months to complete construction and involve intrusive activity to install the trenches, pipes, and recovery wells for groundwater collection. Therefore, they would have a short-term adverse impact upon the community. Groundwater Alternative 4 would require 6 to 9 months to complete construction, but does not require intrusive activities. Therefore, Alternative 4 would have very little short-term adverse impact upon the workers, the community, and the environment.

Soils Alternative 2 would require up to 2 years to complete, involves excavation of the contaminated soils, and would have the greatest short-term adverse impacts. A significant amount of truck traffic would be expected for Alternative 2, hauling fill to the site and contaminated material from the site. Noise would be generated from operating the construction equipment. These impacts would be minimized through conventional and remedial construction practices approved by the NYSDEC and the NYSDOH. Soils Alternative 3 would require approximately 12 months to complete, does not require intrusive activities, and therefore would have much less of a short-term adverse impact upon the workers, the community, and the environment. Materials would have to be hauled in, in order to construct a cap over the remainder of the unpaved areas, but would have less of an impact on the workers, the community, and the environment than Alternative 2. In summary, although both Alternatives 2 and 3 have short-term impacts, which can be minimized, the handling of a great volume of material in a limited space in Alternative 2 increases that alternative's potential for impact upon the workers, the community, and the environment.

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

Groundwater Alternatives 6 and 7 offer long-term effectiveness with preventative maintenance of the pumping equipment and treatment equipment. Alternatives 7 would have the added benefit of re-injecting the treated groundwater back into the contaminated residual soils (where the mobilization of

metals is not a risk) in order to help flush contamination from these soils. The effectiveness of the containment, collection and treatment systems would be continually evaluated through a groundwater monitoring program. Alternative 4 would present the highest long-term risk since it would leave contaminants above standards, both treated (organic contaminants) and untreated (metals).

Soils Alternative 2 would be the most effective and permanent in the long-term(for soils contamination) because it would remove all accessible unsaturated soils containing hazardous constituents above TAGM objectives. Contamination would remain in the saturated soils after implementation of Alternative 2. Soils Alternative 3 would not remove additional contaminated soils, beyond the sources targeted for removal during the Soil Excavation IRM (arsenic contaminated soil under the northeast corner of the berm for the north lagoon and west of Area 4A will be removed as part of the ROD), and has more potential for long-term risk. Both Alternatives 2 and 3 would include institutional controls to provide long-term human health protection.

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

Groundwater Alternatives 6 and 7 would contain the contaminant plume on-site thereby greatly reducing the mobility of the contamination. Groundwater Alternative 4 would treat the organic contaminants in-situ thereby reducing their mobility, however it would not address the arsenic contamination down gradient of the main plant in the vicinity of the lagoons. All of the groundwater alternatives also reduce the volume and toxicity of contaminants in the groundwater via treatment. Alternatives 5 and 7 have the added benefit of re-injecting the treated groundwater back into the contaminated residual soils (in the north-west quarter of the site) in order to help flush contamination from these soils. However, re-injecting the treated groundwater may only be viable if there is sufficient recharge to the shallow water bearing unit. The effectiveness of the capture, collection and treatment system must be continually evaluated through a groundwater monitoring program and annual certification.

Soils Alternative 3 would reduce the mobility of the contamination, without treatment, by placing a low permeability asphalt cap over the site. The cap would reduce surface water infiltration thereby reducing the potential for contaminant migration. Soils Alternative 2 would provide the greatest reduction in volume of contaminated soils present at the site by removing all of the accessible contaminated unsaturated soils that are above RSCOs.

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

All four of the groundwater alternatives can be implemented. Qualified contractors with the necessary personnel, equipment, and material would be available for each of these alternatives. Alternatives 5, 6

and 7 would require that the substantive technical requirements of a water discharge permit be complied with. Since there is no water discharge associated with Alternative 4, this administrative requirement would not be necessary.

The soils alternatives also can be implemented. Qualified contractors with the necessary personnel, equipment, and material would be available for each of these alternatives. Alternative 2 would be the most difficult to implement, from both a technical and administrative viewpoint, since it involves the removal, storage, and off-site transport of 197,710 cubic yards of impacted soils (down to 1 foot below the groundwater table). Alternative 3 would not involve the removal of contaminated soils, but materials would have to be brought on-site to construct the asphalt cap.

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

The present worth costs for the groundwater alternatives range from $3,573,000 to $5,356,500. Alternative 5 would be the least expensive and Alternative 4 the most expensive. Soils Alternative 3 would cost $2,014,800. Alternative 2 would be the most expensive alternative at $42,323,200.

This final criterion is considered a "modifying criterion" and is taken into account after evaluating those above.

8. Community Acceptance - Concerns of the community regarding the RI/FS reports and the PRAP have been evaluated. The responsiveness summary (Appendix A) presents the public comments received and the manner in which the NYSDEC addressed the concerns raised.

Most of the people sending comments expressed a concern that cleaning to pre-industrial conditions is mandatory to have a complete cleanup. Cleaning up to pre-industrial (also called pre-disposal) conditions is often not practicable nor required.

SECTION 8: SUMMARY OF THE SELECTED REMEDY

Based on the Administrative Record (refer to Appendix B) and the discussion presented below, the NYSDEC has selected a combination of Alternatives 3 and 7 as the remedy for OU1. Alternative 3, an asphalt cap, will consist of a low permeability asphalt cap over those areas not currently covered by competent pavement or buildings. Alternative 7, a combination of Alternatives 5 and 6, will involve constructing a groundwater containment system (GCS) so that groundwater will be captured on-site by a system of collection trenches and extraction wells, treating the groundwater on-site (to remove metals, VOCs and SVOCs), then re-injecting a portion of the treated groundwater (along with surfactant and biological amendments) to expedite the remediation of the residual water-saturated soils. The remainder of the treated groundwater will be discharged to either a POTW or directly to the Hudson

River in conformance with NYSDEC discharge limitations. If re-injection is not viable at some future date, all the treated groundwater will be discharged to either a POTW or directly to the Hudson River.

The selected remedy is based on the evaluation of the seven alternatives developed for this site. With the exception of the No Further Action alternative, each of the alternatives will comply with the threshold criteria.

Because the soil alternatives (Alternatives 2 and 3) and the groundwater alternatives (Alternatives 4-7) are comparable regarding the threshold criteria, the five balancing criteria are particularly important in selecting a final remedy for OU1. Alternatives 3 and 7 best achieve the primary balancing criteria described in Section 7.2. They will achieve the remediation goals for OU1 by capping the residual soils that create the potential threat to public health and the environment, greatly reduce the source of contamination to groundwater, and restore groundwater quality to the extent practicable.

The soils alternatives are similar with respect to the balancing criteria. With the highly contaminated soils in the source areas removed during the Soil Excavation IRM (except for under the northeast corner of the berm for the north lagoon and west of Area 4A), the impact upon groundwater has been greatly reduced. Alternative 3 will not actively remove the remaining contaminated soils from the source areas (arsenic contaminated soil under the northeast corner of the berm for the north lagoon and west of Area 4A will be removed as part of the ROD), but instead will place a low permeability cap over all these areas. Although both Alternatives 2 and 3 have short-term impacts, which can be minimized, the difficulty in handling a great volume of material in a limited space , for Alternative 2, increases the potential for impact upon the community while providing similar protection to human health and the environment. Additionally, the time needed to implement Alternative 3 will be shorter than for Alternative 2. Alternative 2 involves a significant increase in cost while providing similar protection to human health and the environment.

The groundwater alternatives are similar with respect to the balancing criteria. The equipment needed for removing VOCs, SVOCs, and metals (during pre-treatment) from the groundwater is the same for Alternatives 6, and 7. Alternative 7 has the additional benefit of re-injecting the treated groundwater into the volatile saturated soils (taken from Alternatives 5) . The remaining volume of treated groundwater will be discharged to a POTW or the Hudson River in conformance with NYSDEC discharge limitations for the remainder of the life of the remedial system.

The estimated present worth cost to implement the comprehensive remedy (including the "common remedial element" costs that are required for any alternative being used in the comprehensive remedy (see Table 6 - Remedial Alternative Costs) is $13,187,400. The cost to construct the remedy is estimated to be $10,406,400. The annual operation and maintenance cost for years 0 to 30 is estimated to be $164,600. The total present worth for (a minimum of) 30 years of annual operation and maintenance is estimated to be $2,781,000.

The elements of the selected remedy are as follows:

1. A remedial design program to verify the components of the conceptual design and provide the details necessary for the construction, operation and maintenance, and monitoring of the remedial program. Any uncertainties identified during the RI/FS will be resolved;

2. A low permeability asphalt and concrete cap over those areas with residual soils contamination not currently covered by competent pavement or buildings. Once completed, the inspection and annual certification, maintenance, and repair of the entire cap would be required;

3. Completion of the removal of the source of contamination in the soils near the north lagoon on the west side of Area 4A, and disposal of these excavated soils off-site (at an approved facility). The soils on the east side of Area 4A will be addressed as part of OU2;

4. Removal of the process building basement sludge and underlying contaminated soils and disposal (which may require stabilization) of these excavated materials off-site (at an approved facility);

5. Excavation, stabilization (dewatering), pretreatment as necessary for VOCs, and off-site disposal (at an approved facility) of the sludge from both treatment lagoons;

6. Development of a soils/dust management plan to address residual contaminated soils that may be excavated from the site during future redevelopment, or disturbed during building demolition. The plan will require soils characterization and, where applicable, disposal/reuse in accordance with NYSDEC regulations;

7. Imposition of an institutional control in such form as the NYSDEC may approve that will require compliance with the approved soils management plan;

   Imposition of an institutional control in such form as the NYSDEC may approve that will prevent future residential and inappropriate commercial/institutional use of the site, and the use of groundwater as a source of potable or process water without necessary water quality treatment as determined by the Rensselaer County Department of Health and NYSDOH.

   The property owner will complete and submit to the NYSDEC an annual certification until the NYSDEC notifies the property owner in writing that this certification is no longer needed. This submittal will contain certification that the engineering and institutional controls put in place, pursuant to the Record of Decision, are still in place, have not been altered, and are still effective;

8. Construction of a groundwater containment system (GCS), which will extract impacted groundwater, treat the groundwater on-site, and inject the treated groundwater into the soils with residual contamination at the source areas. If re-injection is no longer viable at some future date, all the treated groundwater will be discharged to either the Rensselaer POTW or the Hudson River;

9. A soil gas monitoring program to evaluate the potential for vapors (from under the cap) to impact indoor air quality by migrating into buildings; and

10. A long term monitoring program will be instituted. Off-site monitoring wells will be sampled along the western and southern boundaries to assure that the contamination levels in the groundwater continue to decrease by eliminating the sources. This program will allow the effectiveness of the asphalt cap and groundwater collection system to be monitored and will be a component of the operation and maintenance for the site.

SECTION 9: HIGHLIGHTS OF COMMUNITY PARTICIPATION

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

- Repositories for documents pertaining to the site were established.
- A public contact list, which included nearby property owners, elected officials, local media and other interested parties, was established.
- Fact sheets were sent to all interested parties to advise them when an availability session, IRM activities, and a public meeting to discuss the PRAP were taking place.
- A public meeting was held on March 4, 2003, to present and receive comment on the PRAP.
- A responsiveness summary (Appendix A) was prepared to address the comments received during the public comment period for the PRAP.

TABLE 1 Nature And Extent of Contamination Range of sampling dates; April 1999- June 2002				
Waste Process Residue in Buildings 84, 87, 93	**Contaminants of Concern**	**Concentration Range (ppm)[a,d,e]**	**SCG[b] (ppm)[a,c]**	**Frequency of Exceeding SCG**
Volatile Organic Compounds	Benzene	ND to 2.2 (U)	NA	NA
	Toluene	ND to 11.3	NA	NA
	Xylene	ND to 11(U)	NA	NA
	Chlorobenzene	ND to 40.1	NA	NA
	1,2-Dichloroethane	ND to 11(U)	NA	NA
	1,2-Dichlorobenzene	ND to 48.5	NA	NA
	1,2,4-Trichlorobenzene	ND to 514	NA	NA
Semivolatile Organic Compounds	Benzo(a)anthracene	ND to 41.7	NA	NA
	Benzo(a)pyrene	ND to 26.6	NA	NA
	Dibenzo(a,h)anthrcene	ND to 6.58	NA	NA
	Phenol	ND to 80	NA	NA
Metals	Arsenic	ND to 73.9	NA	NA
	Chromium	18.2 to 27,500	NA	NA
	Lead	39.7 to 3,280	NA	NA
	Mercury	ND to 10.6	NA	NA
	Zinc	ND to 1,560	NA	NA

TABLE 1 (cont'd) Nature And Extent of Contamination Range of sampling dates; April 1999- May 2001				
Underlying Soils in Buildings 84, 87, 93	**Contaminants of Concern**	**Concen'tion Range (ppm)[a,d,e]**	**SCG[b] (ppm)[a,c]**	**Frequency of Exceeding SCG**
Volatile Organic Compounds	Benzene	ND to 6.4 (U)	0.06	6 of 12
	Toluene	ND to 6.4(U)	5.5	3 of 12
	Xylene	ND to 6.4(U)	1.2	2 of 12
	Chlorobenzene	ND to 200	1.7	7 of 12
	1,2-Dichloroethane	ND to 6.4(U)	0.1	9 of 12
	1,2-Dichlorobenzene	ND to 120	7.9	3 of 12
	1,2,4-Trichlorobenzene	ND to 81	3.4	6 of 12
Semivolatile Organic Compounds	Benzo(a)anthracene	ND to 2.2	0.224	9 of 12
	Benzo(a)pyrene	ND to 2.4(U)	0.061	12 of 12
	Dibenzo(a,h)anthracene	ND to 4(U)	0.014	12 of 12
	Phenol	ND to 2.7	0.03	12 of 12
Metals	Arsenic	ND to 57.6	7.5	6 of 12
	Chromium	24.2 to 1,590	10	12 of 12
	Lead	ND to 1,510	400	3 of 12
	Mercury	ND to 1.5	0.1	8 of 12
	Zinc	ND to 815	87*	6 of 12

* As per TAGM 4046 this represents a background value established for the site

TABLE 1 (cont'd) Nature and Extent of Contamination Range of sampling dates: April 1999- May 2001				
Lagoon Sludge	**Contaminants of Concern**	**Range of Concentrations ppm[d]**	**SCG[b] (ppm)[a,c]**	**Frequency of Exceeding SCG**
Volatile Organic Compounds	Acetone	ND - 77	NA	NA
	Benzene	ND - 22	NA	NA
	Chlorobenzene	ND - 590	NA	NA
	1,2-Dichlorobenzene	ND - 86	NA	NA
	Ethylbenzene	ND - 24	NA	NA
	1,2,4-Trichlorobenzene	ND - 17	NA	NA
	Toluene	1.8 - 660	NA	NA
	Xylenes	1.4 - 130	NA	NA
Semi-volatile Organic Compounds	Benzoic Acid	ND - 120	NA	NA
	Bis (2-ethylhexyl)phthalate	ND - 82	NA	NA
	4-Chloroaniline	ND - 160	NA	NA
	2-Methylnaphthalene	ND - 23	NA	NA
	4-Nitroaniline	ND - 30	NA	NA
	4-Nitrophenol	ND - 39	NA	NA
	Phenol	ND - 140	NA	NA
Metals	Arsenic	20.7 - 197	NA	NA
	Chromium	467 - 4,830	NA	NA
	Mercury	0.557 - 19	NA	NA
	Zinc	227 - 987	NA	NA

TABLE 1 (cont'd) Nature And Extent of Contamination Range of sampling dates; April 1999- May 2001				
Subsurface Soil Outside the Areas	**Contaminants of Concern**	**Concentration Range (ppm)[a,d,e]**	**SCG[b] (ppm)[a]**	**Frequency of Exceeding SCG[e]**
Volatile Organic Compounds	Benzene	ND to 0.9	0.06	23 of 150
	Xylene	ND to 3	1.20	10 of 150
	Chlorobenzene	ND to 19	1.70	17 of 150
	1,2- Dichloroethane	ND to 5	0.10	26 of 150
	1,2-Dichlorobenzene	ND to 44	7.90	10 of 70
	1,2,4-Trichlorobenzene	ND to 19	3.40	17 of 70
Semi-volatile Organic Compounds	Benzo(a)anthracene	ND to 11	0.224	15 of 70
	Benzo(a)pyrene	ND to 9	0.061	30 of 70
	Benzo(b)fluoranthene	ND to 9	1.1	5 of 70
	Benzo(k)fluoranthene	ND to 3	1.1	5 of 70
	Chrysene	ND to 10	0.4	8 of 70
	Dibenzo(a,h)anthrcene	ND to 3	0.014	20 of 70
	Ideno(1,2,3-c,d)pyrene	ND to 6	3.2	1 of 70
	Phenol	ND to 3	0.030	14 of 70
Metals	Arsenic	ND to 623	7.50	233 of 290
	Chromium	ND to 833	10.0	62 of 70
	Lead	ND to 660	400	12 of 70
	Mercury	ND to 52.5	0.1	42 of 70
	Zinc	ND to 602	87.0*	42 of 70

* As per TAGM 4046 this represents a background value established for the site

TABLE 1 (cont'd) Nature And Extent of Contamination Sampling date May 2001				
GROUNDWATER	**Contaminants of Concern**	**Concentration Range (ppm)[a,d,e]**	**SCG[b] (ppm)[a]**	**Frequency of Exceeding SCG[e,f]**
Volatile Organic Compounds	Benzene	ND to 15	0.001	24 of 78
	Ethylbenzene	ND to 1.8	0.005	15 of 78
	Toluene	ND to 0.14	0.005	15 of 78
	Xylene	ND to 3	0.005	15 of 78
	Chlorobenzene	ND to 170	0.005	24 of 78
	1,2-Dichloroethane	ND to 20	0.0006	45 of 78
	1,2-Dichlorobenzene	ND to 0.12	0.003	39 of 77
	1,2,4-Trichlorobenzene	ND to 1.5	0.005	6 of 77
Semi-volatile Organic Compounds	Benzo(a)anthracene	ND to .003	.00002	1 of 67
	Phenol	ND to 0.58	0.0001	39 of 67
Metals	Arsenic	ND to 24.3	0.025	19 of 77
	Chromium	ND to 164	0.050	9 of 77
	Hexavalent Chromium	ND to 550(U)	0.050	9 of 50
	Lead	ND to 0.0472	0.025	1 of 77

TABLE 2
Summary of Subsurface Soil Sampling Results for Area 1
Pre- and Post-IRM sampling

	Contaminants of Concern	NYSDEC RSCOs ppm	Pre - IRM Range of Concentrations ppm[d]	Post - IRM Range of Concentrations ppm[d]
Volatile Organic Compounds	Benzene	.06	.210 - 34	.067 - .083
	Chlorobenzene	1.7	4.0 - 8,440	ND - < 1.7
	1,2-Dichlorobenzene	7.9	ND- 1,990	ND - < 7.9
	1,2,4-Trichlorobenzene	3.4	17.7 - 630	ND - < 3.4
	Ethylbenzene	5.5	14 - 123	ND - < 5.5
	Xylenes	1.2	6.8 - 841	2.0 - 3.7
Semi-Volatile Organic Compounds	Benzo(a)anthracene	0.224	ND- 26	Not analyzed
	Benzo(a)pyrene	.061	ND - 86	Not analyzed
	Dibenzo (a,h)anthracene	.014	ND - 86	Not analyzed
	Phenol	.030	ND - 26	Not analyzed
Metals	Arsenic	7.5	11 - 1260	10 - 917
	Chromium	10	13.5 - 239,000	67 - 8,761
	Lead	400	655 - 19,200	ND - 586

TABLE 3
Summary of Subsurface Soil Sampling Results for Area 2
Pre- and Post-IRM sampling

	Contaminants Of Concern	NYSDEC RSCOs ppm	Pre - IRM Range of Concentrations ppm[d]	Post - IRM Range of Concentrations ppm[d]
Volatile Organic Compounds	Chlorobenzene	1.7	ND - 455	ND - < 1.7
	1,2-Dichloroethane	.100	ND - 296	ND - < 0.1
	1,2- Dichlorobenzene	7.9	ND- 4	ND- < 7.9
	Ethylbenzene	3.4	ND - 93	ND - < 5.5
	Toluene	5.5	ND - 46	ND - < 1.5
	Xylenes	1.2	ND - 634	ND - < 1.2
Semi-volatile Organic Compounds	Benzo (a)anthracene	0.224	0.372 - 11	Not analyzed
	Benzo (a) pyrene	0.061	0.123 - 9	Not analyzed
	Dibenzo (a,h) anthracene	0.014	0.400 - 3	Not analyzed
	Phenol	0.030	0.200 - 0.5	Not analyzed
Metals	Arsenic	7.5	19.5 - 48	Not analyzed
	Chromium	10	13.1 - 20	Not analyzed

TABLE 4
Summary of Subsurface Soil Sampling Results for Area 4B
Pre- and Post-IRM sampling

	Constituent	NYSDEC RSCOs ppm	Pre - IRM Range of Concentrations ppm[d]	Post - IRM Range of Concentrations ppm[d]
Volatile Organic Compounds	Chlorobenzene	1.7	ND - 20	ND - < 1.7
	1,2-Dichloroethane	0.1	ND - 5	ND - < 0.1
	Benzene	.06	ND - .07	ND - < .06
	1,2,4-Trichlorobenzene	3.4	ND- 4	ND - < 3.4
Semi-volatile Organic Compounds	Benzo(a)anthracene	.224	.372 - 31	Not analyzed
	Benzo (a) pyrene	0.061	0.130 - 4	Not analyzed
	Dibenzo(a,h)anthracene	0.014	0.380 - 4	Not analyzed
	Phenol	0.030	0.12 - 1.2	Not analyzed
Metals	Arsenic	7.5	1,120 - 1,560	29 - 1,880*
	Chromium	10	15.7 - 30.9	10.7 - 309
	Lead	400	33 - 491	13.3 - 508
	Mercury	0.1	ND - 1	ND - 0.348
	Zinc	87**	ND - 243	ND - 208

* Soils did not exhibit hazardous toxicity characteristics and therefore did not require further excavation per the approved Soils Excavation IRM work plan. See Section 5.2: Interim Remedial Measures for further details.

** As per TAGM 4046 this represents a background value established for the site

TABLE 5 Summary of Subsurface Soil Sampling Results for Area 4A Pre- and Post-IRM sampling				
	Constituent	**NYSDEC RSCOs ppm**	**Pre - IRM Range of Concentrations ppm[d]**	**Post - IRM Range of Concentrations ppm[d]**
Metals	Arsenic	7.5	13 - 127,000	3.9 - 61,500

Footnotes for Tables 1- 5

a ppm = parts per million, which is equivalent to milligrams per kilogram, mg/kg, in soil;

b SCG = standards, criteria, and guidance values;

c NA - Not applicable - There are no recommended cleanup objectives for contaminants in waste material.

d ND - Not detected

e Includes exceedances for sampling results which reported detection limits at or above the applicable SCG denoted by (U) adjacent to concentration

f Includes sampling results for samples taken from monitoring wells, sewer bedding and piezometers.

Table 6 Remedial Alternative Costs				
Remedial Alternative		**Capital Cost**	**Annual OM&M**	**Total Present Worth**
1	No Further Action	$0	$12,500 - 30yrs	$397,000
2	Excavation and Off-Site Disposal of Unsaturated Soils Greater than NYSDEC RSCOs	$41,926,200	$12,500 - 30yrs	$42,323,200
3	Asphalt and Concrete Pavement Cap	$1,309,800	$32,500 - 30yrs	$2,014,800
4	In-situ Chemical Oxidation of VOC Source Areas	$4,959,500	$12,500 - 30yrs	$5,356,500
5	Extraction, Treatment and Re-injection into VOC Source Areas	$1,634,400	$112,800 - 30yrs	$3,573,000
6	Containment, Collection and On-Site Treatment of Groundwater	$1,547,400	$142,900 -30yrs	$3,949,400
7	Combination of Alternative 5 and Alternative 6	$1,926,600	$142,900 - 30yrs	$4,328,600
	Proposed Remedy (Alternatives 3 and 7) Costs	$3,236,400	$164,600	$6,343,400
	Common Remedial Elements (lagoon sludge removal, storm water system modification, gas controls, and building basement sludge removal*) Costs**	$7,170,000	N/A	$7,170,000
	Total Present Work Costs of Proposed Remedy	$10,406,400	$164,600	$13,187,400

*See capital costs on page 17 for the cost of individual elements.
**These costs do not include the estimated $4,700,000 for the Soil Excavation IRM.

APPENDIX A

Responsiveness Summary

RESPONSIVENESS SUMMARY

BASF Manufacturing Plant
Operable Unit No. 1
City of Rensselaer, Rensselaer County, New York
Site No. 4-42-027

The Proposed Remedial Action Plan (PRAP) for the BASF Manufacturing Plant site, was prepared by the New York State Department of Environmental Conservation (NYSDEC) in consultation with the New York State Department of Health (NYSDOH) and was issued to the document repositories on February 14, 2003. The PRAP outlined the remedial measure proposed for the contaminated sludge, soil, and groundwater at the BASF Manufacturing Plant site.

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

A public meeting was held on March 4, 2003, which included a presentation of the Remedial Investigation (RI) and the Feasibility Study (FS) as well as a discussion of the proposed remedy. The meeting provided an opportunity for citizens to express their concerns and comment on the proposed remedy. These comments have become part of the Administrative Record for this site. The public comment period for the PRAP was extended from March 14, 2003 to April 16, 2003.
The comments have been grouped by topic. In instances where many people have made the same comment, the comment is presented and responded to only once and may be paraphrased for clarity. A letter dated April 16, 2003, was received from the Rensselaer County Legislature. Letters were received from the following organizations: The Rensselaer County Greens, The Community Action Network, and the Sierra Club. Several letters were received from individuals expressing the need for a complete cleanup. These letters were sent by the following individuals: Jeanne Casatelli, David Hunt, Susan Beers, Daniel Spilman, Francis X. Farrell, Jacquelyn Brickman, Michael Mancini, Geri Purcell, and Barbara Farrell. Comment letters received from the City of Rensselaer and BASF (the responsible party) are attached at the end of the responsiveness summary.

Similar comments may be addressed by referring to a previous response number. The following are the comments received, with the NYSDEC's responses:

COMMENT 1: I know that the NYSDEC has been aware of the pollution on this site for decades. I have read a report that identified three sites as extremely hazardous back in the '70's. Despite that, nothing has been done on this. And now we have waited, as was mentioned, for years for this clean-up report.

RESPONSE 1: The NYSDEC is not aware of the report being referenced. The landfill (which was capped in 1985) and the South 40 (investigated in 1988 and determined to be a Class 3 site in 1992) are both being addressed as part of the NYSDEC Voluntary Cleanup Program. The Manufacturing Plant was put on the inactive hazardous waste site registry immediately after the on-site plume of contaminated groundwater was discovered in 1992.

COMMENT 2: The site should be cleaned up to pre-industrial conditions.

RESPONSE 2: It is not always practical or feasible to clean sites to pre-industrial (also known as pre-disposal) conditions. Each site is evaluated individually. Remediating to pre-industrial conditions would involve installing sheet piling, demolishing all buildings, implementing significant dewatering efforts, and backfilling across about 20 acres to a depth of about 15 feet with clean material. Additionally, groundwater would have to be managed to insure that the clean backfill was not re-contaminated. The NYSDEC and NYSDOH believe that a remedy incorporating Alternative 3 (estimated to be thirteen million dollars) or a remedy incorporating Alternative 2 (estimated to be fifty-three million dollars) would both address all impacted media, effectively eliminate all significant threats, and protect human health and the environment. Marginal additional protection of human health and the environment would be achieved by seeking pre-industrial conditions for a significant increase in cost.

COMMENT 3: What really needs to be done is for DEC to come back with one clean-up proposal for the entire eighty-eight acres.

RESPONSE 3: The BASF property totals 88 acres and consists of three separately listed sites: the manufacturing plant, the closed landfill, and the South 40 storage area. The NYSDEC has consistently investigated separately listed sites in the Registry individually. Therefore, the closed landfill and the South 40 were not included as part of the Manufacturing Plant site.

BASF's operation of the facility did not include the use of the closed landfill nor the South 40. Voluntary Agreements have been signed with BASF to address the closed landfill (April 2002) and the South 40 (November 2001). The closed landfill and South 40 are currently being investigated, and will be addressed after the appropriate final remedy is determined and implemented. The groundwater collection system (GCS) being proposed will control, collect and treat the groundwater before leaving the closed landfill until the current investigation at the closed landfill is completed and a proper remedial plan has been implemented.

On numerous occasions, a site has been divided into operable units because each unit can be investigated and remediated independently, and the remedial plan for the first operable unit(s) can be expedited. Establishing operable units does not eliminate the requirement that the entire site needs to be addressed. Please refer to page 2 of the Record of Decision (ROD). The Manufacturing Plant site is separated into two operable units because there is sufficient technical data to reach a sound conclusion for the on-site, operable unit 1 (OU1), remedy before investigating off-site, operable unit 2 (OU2). This will allow the remedial action for OU1 to be expedited without jeopardizing the remedial investigation or the remedial plan associated with OU2.

OU2 is a combination of those areas outside of OU1 that are not currently being addressed as part of the Voluntary Cleanup Program. These areas have the potential for environmental impacts resulting from the: 1) migration of contaminated groundwater off-site to the west via the storm sewer bedding and/or through the shallow water bearing unit; 2) discharges directly from the site or through the groundwater which may have impacted sediments in the Hudson River; 3) migration of site related contaminants to soils adjacent to

the lagoon area along Riverside Avenue; and 4) migration of airborne contamination through air emissions or particulate migration to off-site areas.

COMMENT 4: This SCGs phrase (this SCGs acronym) is used quite a bit throughout the report, but yet it is inadequately defined .

RESPONSE 4: The acronym SCGs stands for standards, criteria and guidance. Both standards and criteria are typically regulations, and these regulations must be considered. Guidance refers to applicable documents that can help make determinations. This clarification has been added to page 2 of this ROD. Page 5 of this ROD identifies the SCGs for this site.

COMMENT 5: Is the nine acre land fill the same as the five acre land fill?

RESPONSE 5: Yes. The name that has been used for the Class 4 landfill has been the "5-acre landfill" because of the initial estimate of its size. During the RI, the size of the landfill was estimated to be closer to nine acres. All references to the term "five acre landfill" have been changed to "nine acre landfill".

COMMENT 6: There's little information given on why Alternative 4 was rejected. Somebody mentioned Alternative 4. There's practically nothing given in the report as to why that was rejected.

RESPONSE 6: As described in Section 7.1, Chemical oxidation has a limited area where it would be applicable within OU1 because chemical oxidation only addresses organic contamination and at the same time could potentially mobilize metals.

COMMENT 7: On page 17, there's a discussion of the five balancing criteria that are used to determine which clean-up remedy should be selected. There's no information about how each of those five criteria are weighted, but it appears that cost gets the most weighting.

RESPONSE 7: There are five balancing criteria, but eight criteria in total. The eight criteria are: Protection of Human Health and the Environment - an overall evaluation of each alternative's ability to protect public health and the environment; Compliance with New York State Standards, Criteria, and Guidance (SCGs) - whether or not a remedy would meet applicable environmental laws, regulations, other standards, other criteria , and includes the consideration of guidance which the NYSDEC has determined to be applicable; Short-term Effectiveness - the potential short-term adverse impacts of the remedial action upon the community, the workers, and the environment during the construction and/or implementation (including the length of time needed to achieve the remedial objectives) are evaluated; Long-term Effectiveness and Permanence - the long-term effectiveness of the remedial alternatives after implementation; Reduction of Toxicity, Mobility or Volume - where preference is given to alternatives that permanently and significantly reduce the toxicity, mobility or volume of the wastes at the site; Implementability - evaluates the technical and administrative feasibility of implementing each alternative and includes the difficulties associated with the construction of the remedy and the ability to monitor its effectiveness; Cost-Effectiveness - compares capital costs and operation, maintenance, and monitoring costs for each alternative on a present worth basis (where cost-effectiveness is the last balancing criterion evaluated and if two or more alternatives have met the requirements of the other criteria, it can be used as

the basis for the final decision); and Community Acceptance - considers the concerns of the community regarding the RI/FS reports and the PRAP, and a responsiveness summary (Appendix A) presents the public comments received and the manner in which the NYSDEC addressed the concerns raised.

The five balancing criteria are short-term effectiveness; long-term effectiveness; reduction in toxicity, mobility or volume; implementability; and cost-effectiveness. The five balancing criteria are weighted approximately equally, but flexibility is allowed on a site by site basis to accommodate for any site being particularly sensitive to one of the criteria than the others. Cost is not considered until the balancing criteria determine that two alternatives are similarly protective.

COMMENT 8: I think the PRAP is really skimpy. It needs to be withdrawn, and it needs to be redone.

RESPONSE 8: A PRAP is intended to be a summary (not a reiteration) of the findings in the RI and FS reports. This PRAP is more detailed and lengthy than the typical PRAP. The aforementioned reports are available in the repositories.

COMMENT 9: We'd like the Department to extend the public comment period for two or three more weeks beyond March 17th, just to give everyone time to get their written comments in.

RESPONSE 9: Agreed. The comment period was extended to April 16, 2003, and a letter stating that fact was mailed to all interested persons on the contact list on March 7, 2003.

COMMENT 10: We would like the Department to make clear in the ROD, or in some public notice, whether there's going to be another order to address off-site concerns, or whether you're simply going to be enforcing this order.

RESPONSE 10: The existing Order on Consent will be used to conduct an RI/FS for OU2 to investigate any potential impacts immediately after the OU1 ROD is signed. Implementation of a remedy for OU2 would require a new Consent Order with BASF.

COMMENT 11: You also identified a risk of vapor generation on page two of the PRAP. We would ask that the risk of that vapor generation be assessed now. If you're capping and you know that there's going to be vapor that's generating, it could either pop a cap or it could go out the sides. That vapor's going to go somewhere. You've said that the assessment will be done after the ROD. Have soil gas vapors migrated outside the property boundaries of the site?

RESPONSE 11: Any future re-use of the site could significantly change the existing conditions for vapor migration. The evaluation of an actual scenario (at the time a future re-use of the site is being proposed) is more productive. Once the cap is in place vapor wells will be installed as part of the O&M plan and monitored periodically to assess the potential for subsurface vapor migration and the need for mitigation. Assessment prior to placement of the cap would be premature because the information would no longer be useful once conditions for vapor migration have changed. Also, the prevention of vapor migration into new buildings is a recognized design criteria and the NYSDOH would evaluate the potential impacts on indoor air quality.

Vapor migration has not been investigated.

COMMENT 12: The dust and demolition plan should be available to the public for comment. How are you going to bring the public back in to comment on some of the deliverables that BASF will have to make.

RESPONSE 12: The NYSDEC will mail a fact sheet (describing the remedial action plan and the general schedule of the major activities to implement the plan) before finalizing the Remedial Design, mail a fact sheet (describing the start date for remedial construction, the major construction activities and their general schedule) before finalizing the Remedial Construction, hold an availability session (to explain the upcoming Remedial Construction and address public questions and concerns) before the Remedial Construction begins, and send out a public notification announcing the completion of the remedial construction activities and describing the post construction operation and maintenance activities planned.

COMMENT 13: You can't abandon buildings, call them a cap, and not impose a long-term maintenance obligation on those buildings.

RESPONSE 13: A long-term maintenance plan will be included in the design of the cap and included in the Operation and Maintenance (O&M) Plan.

COMMENT 14: We think there's too much contamination that's left on the site. There's about eighty-five percent of the area outside of the IRM's that have arsenic above SCGs. Post-excavation samples show concentrations of metals 100 times (arsenic) to 1000 times (chromium) above RSCO. Why weren't these soils removed?

RESPONSE 14: The objective of the Soil Excavation IRM was to remove contaminated soil impacting groundwater. Consequently, there are areas with soil contamination above RSCO in areas where groundwater impacts were not observed. The potential human exposures will be addressed by the cap. Contaminated areas to be excavated were initially identified by evaluating where groundwater detections were above standards and drawing a perimeter (or box) around those boreholes believed to be the source of those samples exceeding the standards. The cleanup objective (vertically) for the contaminated areas selected for excavation was below RSCO values within the "box" drawn around those boreholes. Post excavation samples were taken and further excavation was conducted in a contiguous manner whenever the post excavation results were greater than 10 times the RSCO values. Post excavation values less than ten times the RSCO values did not warrant further excavation because the RI results indicate that groundwater will not be impacted.

Contamination will remain within OU1 at low levels, spread over a wide area, without any increased opportunity for exposure. Thus, the NYSDEC and NYSDOH maintain that removing the contamination that is/was impacting groundwater, then capping the remaining contamination is an appropriate cleanup that is protective of human health and the environment.

The remedial goal for Area 1 and Area 2 was to remove VOC and SVOC contamination which was impacting groundwater along with the higher concentrations of inorganics (e.g. chromium 250,000 ppm) which were mixed and co-mingled. The post excavation samples for Area 1 did have concentrations of chromium up to 83,000 ppm along the southern boundary of this area at the landfill perimeter. This contamination will be

addressed as part of the closed landfill site (ID #442004) remediation, under an executed Voluntary Agreement.

The goal for the arsenic contamination in Area 4A and Area 4B was to remove areas defined by the remedial investigation as areas of higher concentration which were impacting groundwater. The area to be excavated was defined by RI data, the physical limits of areas that could be safely excavated, and (at the perimeter of the defined limits) soils which failed the hazardous waste toxicity characteristic leaching protocol (TCLP). The IRM was complete on the main plant property area 4B (see Figure 3 in the ROD). However, additional soil will have to be removed in the lagoon area during the OU1 comprehensive remedy since soils at the northeast corner of the north lagoon berm and along the west edge of Area 4A failed TCLP. Two locations failing TCLP are adjacent to Riverside Avenue and will be addressed as part of OU2.

There was one location which exceeded 100 times the RSCO for arsenic(LG-SB-113, 0-2 ft. interval) and 14 locations which had concentrations above 10 times the RSCO, but none of these locations impact groundwater. The NYSDEC concluded that removal of these additional soils would have doubled the volume of soils while only removing an additional 4 percent of the arsenic. The soil IRM in the lagoon area removed 85-90% of the arsenic contamination at OU1. The IRM removed soils contaminated with arsenic at concentrations up to 127,000 ppm which had the highest potential for impacting groundwater. Additional removal is planned for soils which failed to meet TCLP when the lagoons are remediated and the remaining soil is accessible.

COMMENT 15: *"Since metals and PAHs were not prevalent in this area, they were not used for establishing cleanup objectives"* (PRAP, Section 5.2, p.10). Considering that soil samples show levels of lead and zinc 10 times above RSCOs and that other samples in the immediate vicinity show levels of most metals 10 to 100 times above RSCOs, why weren't samples taken? At what concentration can a contaminant be considered "prevalent"?

RESPONSE 15: This comment is specific to Area 2. Table 3 shows only arsenic in this area (no lead or zinc) and VOCs impacting groundwater. Based upon the RI it is believed that PAHs are ubiquitous in the Main Plant and that the concentrations of these compounds were not indicative of waste disposal.

The NYSDEC believes that both the metals and PAHs were properly addressed. It is typical during a remedial investigation to determine the contaminants of concern (COCs) and use those for establishing the cleanup levels. Samples were not taken because it is also typically assumed that if there are other contaminants, they are removed with the COCs and do not need to be sampled for individually. While isolated pockets were detected above the RSCO values, contiguous areas of elevated concentrations were not detected in this area. The concentration at which a contaminant is considered prevalent is site specific and is determined for each site individually.

COMMENT 16: I'm not convinced by your presentation that the process is going to help the river. In fact, I heard mention of dumping more into it. And it seemed like to me the presentation mentioned no consideration of the river at all.

RESPONSE 16: The Hudson River is an important resource and will be evaluated carefully in OU2. Materials will not be dumped into the Hudson River as part of the remedy for OU1. Discharging some or

all of the treated groundwater into the Hudson River would only be allowed if all applicable discharge limits can be met.

COMMENT 17: How are we to comment on a plan when the information isn't available, and the work that went into developing it, is not sufficient? There's no information on how you're going to maintain this, the fencing, or what should happen if there's a change in use.

RESPONSE 17: The NYSDEC believes that there exists sufficient information to determine an appropriate final remedy for the Manufacturing Plant site. Maintenance of the remedy and institutional controls will be approved during the design phase. Any proposed changes in use to the site, post remediation, that would impact the remedial plan (such as building demolition, etc) would require the owner to give notice to the NYSDEC of such proposals (375-1.6). Further, any activity that will or is reasonably anticipated to prevent or interfere significantly with any proposed, ongoing, or completed program at any listed site, or that will or is reasonably anticipated to, expose the public health or the environment to a significantly increased threat of harm or damage at any listed site is prohibited. The proponent of the activity may demonstrate to the dept that the proposed activity will not have such an effect (375-1.2(2)).

COMMENT 18: I'm told that BASF would not even prepare their own PRAP. That you basically prepared it for them, and they signed off on it. That tells me that they don't have a big interest here.

RESPONSE 18: PRAPs are generally created by the NYSDEC independent of the responsible party. Once the PRAP is released, the responsible party (in this case BASF) comments on the proposed remedy in the same manner as any other interested party.

COMMENT 19: When you dug your collection trenches, you were going to go right across Riverside Avenue without notifying the city. And it wasn't until the city came and told you about it, that you stopped.

RESPONSE 19: The NYSDEC allowed the responsible party to install the GCS trenches, but did not approve any work plan(s). The NYSDEC also made it very clear to BASF that they were expected to secure all required permits for that work.

COMMENT 20: Don't make the assumption that Besicorp is going to move right in and everything will be great. Right now it's a proposal, and should it not go farther, we want to be able to make sure that we have a site that we can market for its future use.

RESPONSE 20: The remedial plan is based on the reasonably anticipated current and future use as a commercial property, but without taking into account any specific plan for a future use. The NYSDEC cannot assume that any proposed specific plan for a future use will be implemented. The property owner has the right to restrict the re-use of their property.

The NYSDEC does not identify future use. The property owner controls future use. The NYSDEC encourages BASF to assist in economic redevelopment, but the NYSDEC cannot compel BASF through the Order on Consent to do so. The remedy was selected based on the evaluation criteria. If a new property owner desires a less restrictive use of the property and additional remediation is proposed, with NYSDEC

approval the restriction against residential use can be reconsidered if the new site conditions are protective of the new use.

COMMENT 21: Alternative 5 is extraction treatment and re-injection of groundwater into the VOC source areas. That means you're going to take the groundwater out, shoot it up in the air, and let it go back down again. Alternative 6 is containment collection and on-site treatment of ground water. Now groundwater comes from rain, and rain keeps coming and it keeps filling things up. Containment and collection of the next thirty years of rain water is just an impossibility. How do you expect to on-site treat something that's five feet under ground ?

RESPONSE 21: Please refer to Section 7.1 of the ROD for accurate descriptions of Alternative 5 and Alternative 6. The GCS trenches and recovery wells will be designed with enough capacity (gallons per minute) to control the groundwater, collect it before migrating off-site, and direct it to the treatment system. The treatment system will be designed to handle the volume of groundwater being collected and treat it for as long as necessary. As a convention, thirty years is assumed for the purpose of estimating a cost for alternatives with an indefinite end date.

COMMENT 22: For you to come back here and endorse a no-cleanup solution, just cap it and forget it, really doesn't convince me that you're going to take all these comments that you've heard today seriously.

RESPONSE 22: All comments received through April 16, 2003, were accepted and have been considered.

COMMENT 23: I (Mr. Eric Daille, representing the Rensselaer County Greens) asked earlier about this entire parking area. According to this letter I gave the DEC, a letter signed by Mr.Gubitz, he saw barrels being dumped in the parking area. And when I asked if there was any investigation of the soils there, he showed me a map that indicated that obviously none was done. They tested the gas in the soil, looking for VOCs and SVOCs. And when asked why they didn't test the soil for metals, they told us "Well, according to the soil gas investigation and according to the history of the site there was no need to do further soil investigation."

RESPONSE 23: Mr. Eric Daille called Daniel Lightsey on April 15, 2003, to withdraw the concern that drums were buried in the parking lot area.

COMMENT 24: The Department never did any investigating or talking with ex-workers at BASF. We did, and we got statements from one person, Roger Scale, who used to work at GAF and BASF. And we also gave this statement to DEC a couple of years ago. We keep on finding new people who are willing to speak out about the horrendous things that they saw or that they did themselves.

RESPONSE 24: Mr. Scale's statement does not concern OU1. It concerns the on-going investigation at the closed landfill as part of the NYSDEC Voluntary Cleanup Program (VCP) and is being considered.

COMMENT 25: I wanted to find out what kind of deed restriction we were going to have on this site. You're going to put a deed restriction on the groundwater, and I'm sure nobody will want to drink the water there. You tell us that there will be a deed restriction for commercial and industrial use. What does that mean?

RESPONSE 25: In addition to the groundwater restrictions that are necessary to be protective, soil related restrictions will be detailed and approved as part of the remedial design phase of the remedial program for this site. An example of what the restrictions may look like is attached to this responsiveness summary (page A21). A restriction to commercial/industrial use limits the future use of the site to these types of commercial activities unless and until the NYSDEC and NYSDOH agree that other uses would also be protective of human health.

The remedy will require the use of deed restrictions to prohibit the future use of the site for residential purposes without prior approval by the NYSDEC. The property owner will be required to file with the Rensselaer County Clerk a document containing this restriction on future use as well as a paragraph whereby the property owner, and all future owners, consent to the enforcement of the deed restrictions by the NYSDEC. The Department cannot state with any legal certainty the names of other persons or entities who, in addition to the NYSDEC, may have standing to enforce the deed restrictions. Also see the reference to the annual certification requirement mentioned in Response 35.

COMMENT 26: I was trying to understand the rationale for why cleaning up for twelve million would have been chosen over the forty million dollar cleanup? And the only thing I could find, in writing anyway, was that someone -- ENCON apparently -- was concerned that the additional truck traffic of taking two hundred thousand yards of dirt out of there would be too disruptive to the community. Has there been any comparison between the number of trucks that it would take to do that, relative to the number of trucks that would come into the community if the newsprint outfit was to come in? I'd much rather have trucks taking out the garbage of BASF and be done with it once.

RESPONSE 26: As described in detail in Section 7.2; when compared to a remedy using Alternative 3 (estimated to be thirteen million dollars), a remedy using Alternative 2 (estimated to be fifty-three million dollars) provides only marginal additional protection for human health and the environment. Truck traffic impact(s) is a specific short term impact associated with Alterative 2. It was one of the considerations taken into account when Alternative 2 was evaluated and was compared to all other impacts, but was not critical to the determination on its own.

COMMENT 27: What I want for someone to tell me is how expensive it would be so the site can be clean? Can it be clean enough for children to play on it?

RESPONSE 27: The recommended remedy is estimated to cost thirteen million dollars and is designed to be protective of public health and the environment. Also see Section 7.2 for more detailed information. Once implemented, the elements of this remedy will prevent exposure to harmful levels of residual contamination by future users of the site. Because the property is currently zoned heavy industrial, the intent is that OU1 not be used as a play area. Institutional controls will be put in place to restrict the use of this site as a play area for children. A future property owner could perform additional remedial activities in order to meet the requirements to make the area a play area. As stated in Response 17, a change in use would require reevaluation.

COMMENT 28: If the Closed Landfill is not remediated immediately after remediation of the North 40 and the South 40 (an easier task), these two sites will be redeveloped and there will be no room for a staging area for the Capped Landfill.

RESPONSE 28: Additional locations have been identified as potential staging areas. BASF will have to evaluate and address any consequences associated with redevelopment. Also see Response 17.

COMMENT 29: Regarding lead, why are Tables 1, 2 and 4 using a RSCO value (400 ppm) when all the Roux Assoc. [consultant to BASF] generated documents had been using the average background value (24.75 ppm)?

RESPONSE 29: The NYSDEC typically uses 400 ppm for lead as a recommended site cleanup objective, and has done so at sites intended for unrestricted use. The RSCO values were established to be protective of public health and the environment, including groundwater, using 400ppm does not cause the remedy to be less protective. Roux Associates used 24.75 ppm in their documents for reporting purposes. It is not uncommon for the RSCO not to equal site background, however, that doesn't mean in such instance that the RSCO isn't protective.

COMMENT 30: We object to the suggestion made in the Lagoon Closure Work Plan (LCWP) that *"the South Lagoon will be left in place for future development."* What if a future developer does not need a lagoon?

RESPONSE 30: The "Lagoon Closure Work Plan" being referenced is not approved. As stated on pages 1, 15, and 25 in the ROD , all the sludge from both lagoons will be removed and properly disposed at an approved off-site facility. The remediation of the lagoon area will be protective of human health and the environment, and does not assume how the site will be redeveloped (nor by whom).

COMMENT 31: We disagree with the statement in the Groundwater Collection IRM Plan, Section 1.1 (p.3) that *"these IRMs (Areas 1,2 and 4) will remove over 80 percent of the mass of sources of VOCs and SVOCs to groundwater."*

RESPONSE 31: The Groundwater Collection IRM Work Plan was not approved, therefore the accuracy of any statement(s) contained in it has not been determined.

COMMENT 32: High levels of arsenic, lead and zinc are present in soils east of Bldg. 61. Also, groundwater samplings show elevated levels of VOCs. We believe that, despite groundwater elevations in this area indicating a slow down gradient toward the North, groundwater in that area, and throughout the site, generally flows west-southwest, as all studies show, thus countering the northward down gradient effect. This, we believe, explains why the existing perforated pipe does not seem to be effective in draining contaminated soils (MP-PP-2 shows no significant traces of VOCs and the source of arsenic, as the RI points out, is thought to be related to arsenic-laden soils north-northeast of the lagoon, not from groundwater at the northeast corner of the plant site). Also, although groundwater elevation indicate a northward down gradient, the site's groundwater generally flows west-southwest and is likely to counteract the said down gradient. Therefore, contaminants in AOC 3 are likely to be migrating in that direction, impacting groundwater.

RESPONSE 32: The only accurate way of determining the local groundwater direction is by the groundwater elevations. Paths of least resistance cause localized changes in groundwater direction contrary to the general flow direction for a particular region. The local changes in the groundwater flow are accurately described in the RI.

COMMENT 33: Re: Area of Concern 3, We dispute the position, made in the Soil IRM Plan, p.7, that, *"because mercury is not present in groundwater, this area will be addressed by capping only."* How does that comply with NYS SGCs? Considering that this area (around MP-MW 104) coincide with an area *"where saturated fill is not present"*, can the results of MP-MW 104 be reliable? Since this area is not saturated (with water), removal of soils would be made easier.

RESPONSE 33: The purpose of removing the contaminated soil is to prevent the migration of the contaminants into the groundwater. Capping this area will prevent water infiltration that might cause contaminants to migrate into the groundwater. Since Area 3 is not saturated with groundwater and will be capped to prevent precipitation from flushing mercury out of the soil in Area 3, the mercury in this soil cannot migrate into the groundwater.

COMMENT 34: In regard to short term effectiveness of Alternative 2 versus Alternative 3, the NYSDEC assumes in its assessment that no intrusive activities would occur in the short-term, thus minimizing adverse impacts on the community. We expect that no sooner than Alternative 3 is completed, BEDCO or any other party interested in developing the site, would (within the two years estimated for Alternative 2, still within our definition of "short-term") start to excavate the site to install subsurface structures such as 7 foot foundations, pile driving perforating through to the lower water table, down to solid rock, and installing underground conduits and piping, thus creating as much, if not more, traffic, noise and dust, potentially impacting the community, workers and the environment. Therefore we argue that short-term impacts are comparable in Alternatives 2 and 3.

RESPONSE 34: The NYSDEC cannot assume that any proposed specific plan for a future use will be implemented. Without assuming any specific plan for redevelopment, The short term effectiveness during the implementation of Alternative 3 would be greater than that of Alternative 2.

COMMENT 35: Do not assume that once the site is capped, and groundwater is collected, there would not be exposure later. As soon as the cap is installed, a developer may come, possibly the day after the cap is completed, and rip open the entire site expose the site to the elements, expose workers and the community to particles, excavate 10,000s of contaminated soils, drive pile through the clay layer dividing water tables, installing deep foundations hundreds of feet long and wide, creating new underground flows that could render the GCS ineffective.

RESPONSE 35: Any change in site conditions that may render the GCS ineffective would cause the system to be re-evaluated. The system would then be repaired, have components added, or be re-designed to re-establish the integrity of the collection system. Also refer to site and soil use studies to be included in the deed restrictions. Compliance with those requirements will insure remediation requirements are maintained. The site owner will also have to provide annual certification that the components (which includes deed restrictions) are in place.

COMMENT 36: We provided DEC with a lengthy and revealing statement from Roger Scales who worked at GAF and BASF in different capacities. We also provided a written statement by Franklin Gubitz who witnessed the burying of "hundreds" of metal drums just south of Bldg 83.

RESPONSE 36: The statement from Roger Scales is in reference to the closed landfill that is currently being investigated within the NYSDEC Voluntary Cleanup Program. The statement by Mr. Gubitz originally referenced drums being buried in the parking lot area. On April 15, 2003, Eric Daille phoned Dan Lightsey to withdraw the concern that drums were buried in the parking lot area. Mr. Daille's revised concern is that these drums may have been buried near building 83. No indication of a massive deposit of drums within OU1 was identified during the extensive remedial investigation, the NYSDEC needs additional evidence to support this concern.

COMMENT 37: We believe that the collection trenches should extend from MP-MW 103 (northeast corner of the site) west to Riverside Avenue, then south along the east side of Riverside Avenue, all the way to the southwest corner of the site, to join another GCS extending from the extreme southeast corner of the Capped Landfill. Two extraction wells along the southern boundary of the Manufacturing Plant/Capped Landfill site are certainly not sufficient.

RESPONSE 37: The GCS design must be approved as part of the final remedy. Any sections found to be deficient would have components added to them, be re-designed, or be replaced with more effective components. Once the design is approved and operational; if any deficiencies are found, additional wells and/or trenches will be added so that the plume(s) is contained on-site.

COMMENT 38: The PRAP presents an evaluation of six potential remedial alternatives (excluding "no action"). However, of these alternatives, only alternative 2 included an evaluation of potential soil excavation. The City, as noted above, believes that additional soil removal alternatives should be evaluated. (Suggested additional alternatives are discussed in more detail below).

RESPONSE 38: Any assembled alternative which excavates more soil than described in Alternative 3 but less soil than described in Alternative 2 would not provide significant additional protection to human health and the environment. The NYSDEC believes that a sufficient number of alternatives have been evaluated. Further, your recommendation for excavating 6 feet below the ground surface is the same as Alternative 2. The NYSDEC and NYSDOH believe that Alternatives 2 and 3 adequately address the unsaturated soils.

COMMENT 39: Section 8 of the PRAP presents a summary of the proposed remedy with some comparison to the evaluation criteria listed in section 7.2. The City believes that it would be useful to develop a matrix table that rates each remedial alternative being considered with respect to the evaluation criteria.

RESPONSE 39: The NYSDEC believes the narrative (presented in Section 7.2) is sufficient.

COMMENT 40: Page 7 of the PRAP indicates that background soil sampling was done at the site to evaluate guidance values for COCs. It is further stated that PAHs are ubiquitous in the Main Plant and that the concentrations of these compounds are not indicative of waste disposal. While the City acknowledges that PAHs were detected in background samples, these PAH levels were detected at concentrations of 1 ppm or less. In comparison, tables 1-4 of the PRAP indicate that PAHs are present at many portions of the site at levels that significantly exceed these background concentrations. The City does not agree with DEC's conclusion that PAHs are not associated with waste disposal, nor does the data support the DEC's conclusion.

RESPONSE 40: The NYSDEC believes that our interpretation is correct. There were no source areas with PAH concentrations at levels indicative of a release of highly concentrated materials which contained PAHs (i.e., pure product like fuel oil). The concentrations of PAHs detected at the site are above background, but could easily be associated with minor spills, residual contamination, or asphalt (which is present throughout the site), that are not indicative of an unknown release of contamination.

COMMENT 41: A review of the soil borings contained in the November 2000 and August 2001 investigation reports indicates that there are several areas that may require additional sampling or investigation. Several soil borings had very high organic vapor readings, i.e. above 1000-2000 PID units. These borings include LG-SB-101, 105, 108, 109, 124, 125; and SB-5, 61, 63. DEC should review these locations to ensure that existing VOC sampling in these areas is sufficient to adequately characterize the site. Furthermore, there are a number of other locations that have high organic vapors, sheens, or petroleum odors at or below the top of the water table. These locations should be assessed for the potential presence of non-aqueous phase liquid, both lighter and more dense than water (LNAPL, DNAPL, respectively). Specifically, an oil-water interface probe should be utilized in SB-60; MW-106, 109, 111; and PZ-111, 113, 118 and 119 to check for the presence of separate phase LNAPL and DNAPL. If free product is found, its remediation should be considered.

RESPONSE 41: Soil in the vicinity of LG-SB-124, -125, SB-5, -61 - 63, was remediated as part of the IRMs performed during the summer/fall 2002. The presence of LNAPL or DNAPL was not observed during the investigation. If an unforseen change in circumstance occurs, LNAPL or DNAPL can be added to the sampling plan. If free product was found at some future point in time, its remediation could be added to the final remedy at that future point in time.

COMMENT 42: On pages 5 and 11 of the PRAP, it is stated that only the shallow groundwater (water bearing unit) was found to have contamination. This statement appears to contradict data presented in the August, 2001, remedial investigation report (table 17) which indicates that benzene was present at levels above the groundwater standard in well MW-114. Acetone was also detected in that well and in MW-113, although below groundwater standards. DEC should note these results in evaluating alternatives for additional groundwater remediation and/or monitoring. The data does not completely support an assertion that only shallow groundwater has been impacted.

RESPONSE 42: Benzene was detected at 2ppb versus the standard of 1ppb. Acetone was detected at 6ppb for all three samples taken on April 26, 2001, and is believed to be a laboratory error. As a precaution, both monitoring wells MW-113 and -114 will be included as part of the long-term monitoring plan. The O&M plan will include a contingency to evaluate any future indication that the deep groundwater may need remediation.

COMMENT 43: As acknowledged in the PRAP and the site investigation reports, subsurface utilities at the site are influencing groundwater flow and have been impacted by contaminated groundwater. Since these utilities provide subsurface preferential pathways for contaminant migration, their offsite impacts need to be addressed and appropriate on-site remedies implemented. This evaluation should not be postponed to some future time. The utilities of concern include the City storm sewer and sanitary lines that run beneath Riverside Ave, the City storm sewer along the south side of the plant that discharges directly to the Hudson River, the BASF sanitary sewers north of the lagoons, and the gravel trench that surrounds the lagoons (see Appendix A of the August 2001 investigation report).

RESPONSE 43: These potential off-site impacts will be investigated as part of OU2.

COMMENT 44: The PRAP presents conceptual information on a groundwater collection system that is proposed for the site. While it appears that the proposed system layout will generally restrict off site shallow groundwater migration, figure 7 of the PRAP suggests that contaminated groundwater may have already migrated beyond the proposed collection trench at the southwest corner of the site, just to the east of the lagoons. Groundwater contamination should be investigated and remediated, if necessary, on the adjacent Coastal Corporation property. Furthermore, the proposed groundwater remedy needs to ensure that site utilities discussed above do not continue to provide off-site migration pathways. Deeper groundwater migration should also not be ignored and should be investigated off-site.

RESPONSE 44: As part of the scope of work for OU2, each of these items will be addressed.

COMMENT 45: The City and the public have a right to review and comment upon the investigation of the site landfill and the area that is now called the "South 40". When will the investigation of these areas be made public and what public participation process will be provided before the DEC approves of the investigation of these areas? What public comment process will be provided before a remedial action is selected for these areas of the site?

RESPONSE 45: The closed landfill and South 40 are currently being addressed as part of the NYSDEC Voluntary Cleanup Program. This program provides for notification of investigation activities through issuance of a fact sheet at the start of the process and provides for public review and comment on subsequent remedial plans.

COMMENT 46: What information is known about contaminated sediments in the Hudson River adjacent to the site and along the banks of the River contiguous and to the south of the site? What is the extent of contamination along Riverside Avenue to the north and south of the site?

RESPONSE 46: A limited number of samples were taken of the sediments adjacent to the site (at the request of Besicorp) at the point of a possible water discharge. Only PCBs were detected. The extent of contamination along Riverside Avenue is not known. As part of the scope of work for OU2, each of these items will be addressed (see Response 44).

COMMENT 47: What is the areal extent of contamination along sewer lines, sewer bedding, water supply lines and other subsurface utility trenches that were identified on the site?

RESPONSE 47: Samples were taken in the sewer lines and sewer bedding along Riverside Avenue and along the southern boundary of OU1. Not every sewer line, sewer bedding, supply line and utility trench was sampled. The level of contamination in the samples taken was less than ten times RSCOs. Therefore, these areas were not further delineated. The sewer lines, sewer bedding, supply lines and utility trenches not sampled as part of OU1 will be addressed during the OU2 investigation.

COMMENT 48: In the event that the buildings, which at present serve as caps, are demolished in the future, will the DEC require that soils that are now under the buildings be sampled and, if heavily contaminated, be removed from the site for proper disposal?

RESPONSE 48: A soil/dust management plan will be developed as part of the comprehensive remedy, as is typical, and will be included in the O&M Plan. The purpose of the soil/dust management plan is to address all future disturbances of the remaining soils and maintain the same level of protection for human health and the environment (or higher) .

COMMENT 49: What is the nature and concentration of chemical contamination under the lagoons and is such contamination migrating to the Hudson River?

RESPONSE 49: Arsenic is the contaminant of concern in the area which extends under the lagoon. This contamination will be addressed after the sludge has been removed, stabilized, and properly disposed off-site at an approved facility. The purpose of the removal is to eliminate any potential migration to the Hudson River.

COMMENT 50: What is the tentative date for BASF to submit an OU2 off-site investigation plan? Prior to the issuance of the ROD for OU1 on-site contamination, will the DEC require that BASF submit the investigation plan for OU2 and commit to implement such an investigation?

RESPONSE 50: The NYSDEC has initiated negotiations with BASF, but an end date to these negotiations has not be established. BASF was not required to submit the OU2 work plan prior to issuance of this ROD.

COMMENT 51: Did the operations at the BASF plant site ever release airborne contamination, through air emissions or particulate migration to off-site areas? What investigation has taken place to confirm that off-site surface soil contamination in adjacent neighborhoods does not exist? If no such data has been gathered, how can DEC state in Section 5.2 of the PRAP that the purpose of the RI was to determine the extent of contamination?

RESPONSE 51: See the reference to OU2 in Response 44.

COMMENT 52: Since contamination has migrated from, and continues to migrate from, the Landfill and such contamination is well above applicable environmental standards, why has the DEC not listed the Landfill as an inactive hazardous waste site that presents a significant threat to the environment?

RESPONSE 52: As explained in greater detail in Response 3, a Voluntary Agreement has been signed with BASF to address the closed landfill (April 2002). Should BASF terminate the agreement (or if the NYSDEC terminates the agreement) the closed landfill will be reclassified and remediation will continue using the NYSDEC's RI/FS process.

COMMENT 53: Does the detection of high levels of vinyl chloride at piezometer 23 (282,000 micrograms per liter) indicate a serious vinyl chloride contaminant source? What investigation of this area was conducted to determine whether this high level detection is a significant environmental issue or not? If piezometer 23 was damaged, did BASF install a monitoring well in the area to determine the reliability of past sampling results?

RESPONSE 53: BASF did replace the damaged piezometer 23 and the sample results did not reproduce the 282,000 ug per liter being referenced. The NYSDEC does not believe that the first sample result was accurate and does not believe there is a significant environmental issue.

COMMENT 54: Since arsenic levels as high as 13,000 parts per million were detected at the South 40, and the applicable guidance value is 7.5 parts per million, why is the DEC not first determining the extent of such contamination so that a comprehensive remedial action for the entire site can be developed rather than a piecemeal approach to the site? Given the high levels of arsenic detected throughout the South 40, why has the DEC not reclassified the area as a significant threat to the environment?

RESPONSE 54: See Responses 45 and 52.

COMMENT 55: Since the BASF feasibility study was not accepted by the DEC, why wasn't BASF deemed to be in violation of the Order on Consent? Since the remedial investigation did not include both on-site and off-site contamination, why wasn't BASF deemed to be in violation of the Order on Consent?

RESPONSE 55: The NYSDEC did not approve the FS, but the document contained sufficient technical information for the NYSDEC to complete an independent evaluation of the remedial alternatives which were set forth in the PRAP. As explained in greater detail in Response 3: on numerous occasions, a site has been divided into operable units because each unit can be investigated and remediated independently, and the remedial plan for the first operable unit(s) can be expedited. The off-site issues will be addressed under the current Consent Order as OU2.

COMMENT 56: What evaluation has been conducted to determine whether the lagoons leak?

RESPONSE 56: In 1994, an investigation was performed (titled the "BASF/Sterling Organics Wastewater Lagoons Baseline Assessment", June 1994) that found the lagoons were not leaking. In addition, the depth of water in the lagoons are maintaining a difference in elevation from each other (which would not occur if the lagoons were leaking) and the purple colored water contained within the lagoons would have been seen in the groundwater samples (similar to a dye trace) if the lagoons were leaking.

COMMENT 57: What is the estimated time frame for off-site groundwater to achieve compliance with applicable groundwater standards? The DEC uses the term 'over time' but fails to give any estimate, whether such estimate is in decades or centuries. If an estimate can be provided, what are the assumptions and calculations used to make such an estimate?

RESPONSE 57: The time required to achieve compliance is not known. For consistency sake, a default value of 30 years is assumed for the purpose of cost estimation. A more accurate estimated time frame will be established as the system is operated and optimal cleanup rates are determined.

COMMENT 58: Since the extent of off-site migration has not yet been determined, why can't the DEC authorize BASF to implement the remedial actions for OU1 as an Interim Remediation program pending a complete remediation program after the comprehensive investigation of off-site, the Landfill and the South 40? What is the scientific, as compared to the administrative, reason for the issuance of a ROD for OU1 rather than an authorized IRM for OU1?

RESPONSE 58: The NYSDEC has the necessary technical data to reach a sound conclusion for the on-site (OU1) remedy, is able to address the on-site issues in a timely manner, and the issuance is consistent with the handling of other sites.

COMMENT 59: Does the DEC acknowledge the jurisdiction of the City in issuing permits with regard to the demolition and construction of buildings on the site? Does the DEC ROD have any affect on the authority of the City's planning board, zoning board or building inspector?

RESPONSE 59: The ROD does not include the future demolition or construction of buildings. The NYSDEC requests that all responsible parties, their consultants, and their contractors properly notify the affected municipality(s) and acquire all appropriate permits. The ROD does not change any current authority of the City of Rensselaer.

COMMENT 60: Has DEC evaluated whether installation of driven piles for future building foundations could allow shallow groundwater contamination to reach deeper groundwater resources? What conclusion has the DEC reached with regard to whether future construction activities could allow further migration of hazardous substances?

RESPONSE 60: There has not been an evaluation conducted regarding piles. No conclusions regarding potential migration have been evaluated since each work plan for a proposed future use would be evaluated and approved on a case by case basis.

COMMENT 61: In the event that buildings are demolished on the site, will the DEC require that construction debris be sampled for contamination before disposal plans are made with regard to such debris? What type of sampling of the debris will be required?

RESPONSE 61: No. The type of sampling would be determined by the disposal facility receiving the material. Also see Response 60.

COMMENT 62: In the event that off-site sampling indicates that the BASF has contaminated off-site areas and that contamination from on-site continues to contaminate off-site areas, what mechanism will exist to compel BASF to implement additional remedial measures at OU1?

RESPONSE 62: The NYSDEC will request that BASF sign a Consent Order which will require BASF to address all areas in OU1 which cause or materially contribute to a significant threat to human health or the environment. If BASF declines to sign such an Order, the Department will consider all of its enforcement options, including the use of environmental laws such as the Clean Water Act.

COMMENT 63: The PRAP does not accurately reflect BASF's involvement on the site. A review of historical documentation and aerial photos indicates that most of the contamination on this site was in place before BASF acquired the site in 1978.

RESPONSE 63: The text of the ROD reads "125 years of improper disposal, poor housekeeping, the disposal of residues from many operational processes (some being mixed into a sludge), and/or disposal of

off-specification products during operations at the site, most of which is believed to have occurred prior to 1978, have resulted in the disposal of hazardous wastes."

COMMENT 64: Roux Associates, Inc. has reviewed the above summary in the PRAP and believes that it under-represents the scope of the investigation performed by BASF and the large amount of analytical data collected for soil, groundwater, sludge and process residue samples throughout the Site.

RESPONSE 64: The text on page 4 in the ROD has been revised to include the items related to the RI/RSI and the Additional Remedial Activities Report that were not included in the PRAP.

COMMENT 65: BASF believes that the re-injection of treated groundwater is not necessary or technically practicable.

RESPONSE 65: The concept of re-injection was presented in the FS prepared for, and submitted by, BASF as a technically practicable component of a groundwater treatment system, which was retained as part of the final groundwater alternative proposed in the FS. BASF's consultant evaluated treatment of contaminated groundwater and re-injection of treated groundwater in the Feasibility Study and concluded that it was technically practicable. However, they did not recommend use of this alternative past a two year time frame because of cost considerations, even though the RI concluded that contaminated GW was migrating from the site. The NYSDEC believes re-injection is necessary because it will accelerate remediation of the site and will provide for a more positive hydraulic control of groundwater.

When the Department developed the PRAP, groundwater treatment was included as a component of the remedy because of the off-site migration of contaminated groundwater potentially impacting the Hudson River. Re-injection of contaminated groundwater was included in the PRAP because it will flush the contamination from the source areas, potentially reducing the time frame that the groundwater treatment system has to be operated. A re-injection system should be designed for the 20-30 gpm flow rate proposed in the November 2001 FS and a pilot study conducted to determine the applicability of the technology.

COMMENT 66: BASF does not believe that a separate operable unit for the off-site area is necessary.

During the RI, potential routes for off-site migration of dissolved constituents in groundwater were investigated. In most cases, there was no evidence of off-site migration. BASF intends to conduct additional investigation in the southwest corner of the manufacturing plant to confirm the absence of off-site migration. The following summarizes the investigative activities performed by BASF to date:

- Groundwater beneath Organichem property was investigated during the RI. No indication of off-site migration of dissolved constituents in groundwater related to the BASF Site was observed.
- Groundwater beneath the South 40 Parcel was investigated during a Site Investigation by BASF. No evidence of off-site migration of dissolved constituents in groundwater was observed.
- BASF is currently planning to install off-site monitoring wells to determine whether off-site migration is occurring from the southwest corner of the Main Plant. It is probable that sewer bedding is preventing significant off-site-migration at this location.
- BASF has already installed collection trenches to prevent migration of groundwater along sewer bedding that runs beneath the southern border of the Main Plant and beneath Riverside Avenue.

- A 2001 investigation of the Hudson River sediments indicated that low concentrations of arsenic exist at relatively uniform concentrations at three locations: immediately adjacent to the lagoon area; over 500 feet across the river and slightly upstream; and, at the upstream end of the BASF-owned waterfront. Since there was no trend of increasing arsenic concentration closer to the BASF-owned waterfront and immediately adjacent to arsenic impacted areas identified during the RI and remediated during the IRM, the low-level arsenic observed in the Hudson River sediments is not likely to have resulted from discharge of groundwater containing dissolved arsenic.

RESPONSE 66: The NYSDEC believes that an investigation is required off-site (OU2). This data will be reviewed and considered when establishing the scope of work for a remedial investigation for OU2.

COMMENT 67: BASF is proceeding with the removal of sludge in the basements of Buildings 84, 87 and 93 under an IRM program.

RESPONSE 67: The combination of the approved work plan (from May of 2002) and an addendum dated March 26, 2003, were approved on April 18, 2003. The anticipated completion date is currently December 31, 2003.

COMMENT 68: The summary of IRM activities for Area 4A (Lagoon Area soil) does not accurately present the scope of remedial activities performed. With the exception of approximately 1,500 cubic yards of arsenic-impacted soil on the west side of Area 4A under the lagoon berm, Area 4A was remediated as part of the Soil IRM.

RESPONSE 68: Completion of the Area 4A source removal is now part of the comprehensive remedy presented in this ROD. The design for that removal, and the post excavation sampling results, must be approved by the NYSDEC.

COMMENT 69: The Lagoons do not contain listed hazardous wastes.

RESPONSE 69: The language in the ROD has been changed to reflect the NYSDEC's determination that the lagoon sludge contains hazardous waste derived from a characteristically hazardous waste and became subject to LDRs after April 8, 1996.

Addendum
Example of Restrictions for Future Use

1. On-site Excavation or Disposal of Soils is Prohibited. There shall be no excavation of soils at the facility or removal of soil from the site until such time that the NYSDEC has approved a Soil Management Plan.

a. Soil Management Plan. At any time, the proponent of such onsite excavation or disposal of soils ("proponent") may submit to the NYSDEC for review and approval, a plan that describes procedures for soil excavation and removal of soils from the facility. The plan shall be designed to protect human health and the environment. Until this plan is approved, no excavation or soil removal is allowed. Should the proponent decide to submit a Soil Management Plan, at minimum the plan shall include:

i. Soil sampling. Include appropriate practices, protocols, and procedures for sampling soils to determine the concentration of contaminants.

ii. Health and Safety Plan. The plan shall describe the health and safety requirements and general procedures to be followed during the excavation of soils. The plan shall be designed to minimize the possibility that personnel at the facility and the surrounding community will be injured or exposed to site contaminants during excavation of such soils.

iii. Off-Site Disposal. Should soil be disposed off-site, the plan shall include a hazardous waste determination to verify whether deposition into a secure hazardous waste landfill or a solid waste landfill is necessary.

iv. Implementation. The proponent may implement the Soil Management Plan at any time after NYSDEC approval.

1. Building Demolition and Re-use or Disposal of Demolition Materials . There shall be no demolition of buildings at the facility and on-site re-use or off-site disposal of demolition materials (“materials management”) until such time that the NYSDEC has approved a Building Demolition and Materials Management Plan.

a. Building Demolition and Materials Management Plan. At any time, the proponent of such onsite demolition and materials management ("proponent") may submit to the NYSDEC for review and approval, a plan that describes procedures for building demolition and on-site re-use or off-site disposal from the facility. The plan shall be designed to protect human health and the environment. Until this plan is approved, no demolition or materials management is allowed. Should the proponent decide to submit a Building Demolition and Materials Management Plan, at minimum the plan shall include:

i. Building Sampling. Include appropriate practices, protocols, and procedures for sampling Aggregate materials to determine the concentration of contaminants.

ii. Health and Safety Plan. The plan shall describe the health and safety requirements and general procedures to be followed during the demolition of buildings and subsequent management of materials . The plan shall be designed to minimize the possibility that personnel at the facility and the surrounding community will be injured or exposed to site contaminants during building demolition and subsequent management of such materials.

iii. Off-Site Disposal. Should demolished materials be disposed off-site, the plan shall include a hazardous waste determination to verify whether deposition into a secure hazardous waste landfill or a solid waste landfill is necessary.

iv. On-site Re-use. Should demolished materials be used on-site the proponent will need prior NYSDEC approval.

v. Implementation. The proponent may implement the Building Demolition and Materials Management Plan at any time after NYSDEC approval.

2. Declaration of Limited Use and Restrictions. No later than **thirty (30)** days after the effective date of Record of Decision for this site, BASF, or the owner of the site at that time, as the case may be, shall submit to the NYSDEC for review and approval a declaration of limited use and restrictions, to run with the land, that will in perpetuity notify any potential purchasers of the property of the contamination present at the property. At a minimum, the language of such declaration shall include provisions that:

a. State that soils and buildings with elevated levels of contaminants is being left in place on-site and that this contamination may pose an unacceptable health risk should they be improperly handled, managed or disposed.

b. Limit the land parcel to industrial or commercial use only without specific approval from the New York State Departments of Environmental Conservation and Health.

c. Prohibit the extraction of water from beneath the surface of the premise other than for remedial purposes without specific approval from the New York State Departments of Environmental Conservation and of Health.

d. Notify future land owners, that under the authority of the New York State Department of Environmental Conservation, an existing hazardous waste remedial program is ongoing to address the on-site and off-site contamination in soils and groundwater.

e. Prohibit the excavation and removal of soils at the facility or removal of soil from the facility unless undertaken in accordance with a NYSDEC-approved Soil Management Plan submitted to the NYSDEC by the proponent that describes procedures for soil excavation and removal of soils from the facility and that is designed to protect human health and the environment. At a minimum, such a plan shall include:

i. protocols and procedures for sampling soils to determine the concentration of contaminants.

ii. a description of the health and safety requirements and general procedures to be followed during the excavation of soils. The plan shall be designed to minimize the possibility that personnel at the facility and the surrounding community will be injured or exposed to site contaminants during excavation of such soils.

iii. should soil be disposed off-site, a hazardous waste determination to verify whether deposition into a secure hazardous waste landfill or a solid waste landfill is necessary.

The proponent may implement the Soil Management Plan at any time after NYSDEC approval.

f. Prohibit the demolition and management of demolished materials unless undertaken in accordance with a NYSDEC-approved Building demolitions and Materials Management Plan submitted to the NYSDEC by the proponent that describes procedures for building demolition removal management of demolished materials from the facility and that is designed to protect human health and the environment. At a minimum, such a plan shall include:

i. protocols and procedures for sampling of building materials to determine the concentration of contaminants.

ii. a description of the health and safety requirements and general procedures to be followed during the building demolition and subsequent management of demolished materials. The plan shall be designed to minimize the possibility that personnel at the facility and the surrounding community will be injured or exposed to site contaminants during building demolition and management of demolished materials.

iii. should the demolished materials be re-used on-site the proponent will need prior NYSDEC approval.

iv. should demolished materials be disposed off-site, a hazardous waste determination to verify whether deposition into a secure hazardous waste landfill or a solid waste landfill is necessary.

The proponent may implement the Building Demolition and Materials Management Plan at any time after NYSDEC approval.

The instrument shall be recorded and filed with the Rensselaer County Clerk, and proof of recording and filing shall be submitted to the NYSDEC within **thirty (30)** days of the Department's approval of the language of such declaration.

APPENDIX B

Administrative Record

Administrative Record

BASF Manufacturing Plant
Operable Unit No. 1
Site No. 4-42-027

4. Proposed Remedial Action Plan for the BASF Manufacturing Plant site, Operable Unit No. 1, dated February 2003, prepared by the NYSDEC.

5. Order on Consent, Index No. A4-0345-96-07, between NYSDEC and BASF, executed on February 24, 1998.

6. "BASF/Sterling Organics Wastewater Lagoons Baseline Assessment - Rensselaer, New York", June 1994, prepared by Malcolm Pirnie, Inc.

7. "Remedial Investigation Work Plan", April 1998, prepared by Malcolm Pirnie, Inc.

8. "Remedial Investigation and Supplemental Remedial Investigation Report - BASF Rensselaer", November 2000, prepared by Roux Associates, Inc.

9. "Additional Remedial Investigation Activities - BASF Rensselaer", Volume 1 of 2, August 2001, prepared by Roux Associates, Inc.

10. "Additional Remedial Investigation Activities - BASF Rensselaer", Volume 2 of 2, August 2001, prepared by Roux Associates, Inc.

11. Letter to Roux Associates, Inc., waiving the NYSDEC's approval of a Feasibility Study work plan, August 2001.

12. Final Draft - "Feasibility Study Report - BASF Rensselaer", November 2001, prepared by Roux Associates, Inc.

13. "Soil Excavation IRM Work Plan", May 2002, prepared by Roux Associates, Inc.

14. "Process Building IRM Work Plan', May 2002, prepared by Roux Associates, Inc.

15. "Citizens Participation Plan", April 1999, prepared by Roux Associates, Inc.

16. Fact Sheet for the availability session to discuss the IRM work plans, May 2002.

17. Fact Sheet for the start of the Soil Excavation IRM, June 2002.

18. Fact Sheet for the on-site treatment of waste during the Soil Excavation IRM, October 2002.

19. Fact Sheet for the March 4, 2003, public meeting to discuss the PRAP, February 2003.

20. Fact Sheet for the start of the Process Building Basement IRM, April 2003.

21. Transcript - recording the public comments given as part of the public meeting, March 2003, prepared by the Associated Reporters Int'l, Inc.

22. Letter dated March 27, 2003 from BASF.

23. Letter dated April 16, 2003 from Young, Sommer...L.L.C. (legal counsel for the City of Rensselaer).

24. Letter dated April 16, 2003 from the Rensselaer County Legislature.

25. Letters received from organizations were sent by the following organizations: The Rensselaer County Greens, The Community Action Network, and the Sierra Club.

26. Several letters were received from individuals expressing the need for a complete cleanup. These letters were sent by the following individuals: Jeanne Casatelli, David Hunt, Susan Beers, Daniel Spilman, Francis X. Farrell, Jacquelyn Brickman, Michael Mancini, Geri Purcell, and Barbara Farrell.