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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
1650 Arch Street
Philadelphia, Pennsylvania 19103-2029

Via Facsimile and U.S. Mail

Mr. William G. Cutler
Project Coordinator
FMC Corporation
1735 Market Street
Philadelphia, PA 19103

July 27, 2001

Re: *Final Engineering Evaluation/Cost Analysis (EE/CA)*
Non-Time Critical Removal Action - Buildings
Avtex Fibers Superfund Site, Front Royal, Virginia

Dear Bill:

EPA received the final version of the of the EE/CA for the Non-Time Critical Removal Action - Buildings at the Avtex Superfund Site transmitted by letter dated June 14, 2001. As mentioned during the monthly conference call on July 9, 2001, all outstanding issues have been addressed and the EE/CA is complete. This letter serves as final approval of that document.

EPA expects to begin the public comment period towards the end of August. Please contact me at (215) 814-3229 with any questions as we move forward with the public comment process.

Sincerely,

Bonnie Gross

Bonnie G. Gross
Remedial Project Manager (3HS23)

cc: Doug Bement, FMC
Sid Curran, GF
Kevin Greene, VDEQ
Bob Keating, ERM
Walt Koehler, GF

FMC Corporation

1735 Market Street
Philadelphia Pennsylvania 19103
215 299 6000

FMC

14 June 2001

Via Overnight Mail

Ms. Bonnie G. Gross
Remedial Project Manager
U.S. Environmental Protection Agency
Hazardous Sites Cleanup Division (3HS23)
1650 Arch Street
Philadelphia, PA 19103-2029

Re: Submittal of the Final EE/CA for Non-Time-Critical Removal Action – Buildings; Avtex Fibers Superfund Site, Front Royal, Virginia

Dear Bonnie:

In accordance with Paragraph 21.A of the Consent Decree, FMC Corporation (FMC) has enclosed two copies (one unbound and one bound) of the final version the *Engineering Evaluation/Cost Analysis for the Non-Time-Critical Removal Action – Buildings* (EE/CA).

If you have any questions or comments, please feel free to call me at 215-299-6206.

Sincerely,

William G. Cutler JE 14

William G. Cutler
Project Coordinator

enclosures (2)
cc: K. Green, VADEQ
S. Curren, Gannett Fleming
W. Koehler, Gannett Fleming
M. Gutterman, USACE
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ENVIRONMENTAL RESOURCES MANAGEMENT

FMC Corporation

Engineering Evaluation/Cost Analysis for the Non-Time-Critical Removal Action – Buildings

Avtex Fibers Superfund Site Front Royal, Virginia

13 June 2001

Environmental Resources Management
2666 Riva Road, Suite 200
Annapolis, Maryland 21401

ERM

FMC Corporation

Engineering Evaluation/Cost Analysis for the Non-Time-Critical Removal Action – Buildings
Avtex Fibers Superfund Site Front Royal, Virginia

13 June 2001

Environmental Resources Management
2666 Riva Road, Suite 200
Annapolis, Maryland 21401

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Executive Summary

Executive Summary

EE/CA Purpose

FMC Corporation (FMC) has prepared this Engineering Evaluation/Cost Analysis (EE/CA) for the Non-Time Critical Removal Action – Buildings (NTCRA-Buildings) pursuant to Paragraph 21.A.c. of the Consent Decree between FMC and the United States Environmental Protection Agency (EPA) for the Avtex Fibers Superfund Site, Front Royal, Virginia (Site). The purpose of the NTCRA-Buildings project is to decontaminate the 25 acres of remaining buildings, foundations, and subgrade structures to prevent the cross-media transfer of contaminants and mitigate any unacceptable risk to on-site workers prior to and during demolition. Additionally, the project addresses the potential migration of hazardous substances from the approximately 44,000 linear feet of remaining sewers.

In accordance with the National Contingency Plan (NCP), EPA designated this response action to be a NTCRA because of concern that hazardous substances present in the remaining buildings, foundations, subgrade structures, and sewers could be released into soils, air, surface water, or ground water. As required by the NCP, an EE/CA is necessary to support a NTCRA because a planning period of at least six months exists before the removal activities are initiated.

In accordance with the Consent Decree, the purpose of the EE/CA is to propose cleanup levels and response action alternatives to:

- Decontaminate the remaining buildings and above grade structures in advance of planned demolition;
- Mitigate the potential migration of hazardous substances related to foundations and subgrade structures; and
- Mitigate the potential migration of hazardous substances related to the remaining sewers.

Nature and Extent of Contamination

Previous sampling, coupled with sampling conducted as part of this EE/CA, indicated that contaminants are present in the buildings in the form of hydrocarbon-stained concrete, PCBs associated with the hydrocarbon stains, oily liquids in sumps and pits, and particulate residues containing lead, arsenic, antimony and benzo(a)pyrene (BAP). Additionally, chemical residues in the form of caustic or acid salts are present in some of the rooms. Many rooms contain potential asbestos-containing material (PACM) around pipes and in particulate form. The Army Corps of Engineers (ACOE) will abate PACM prior to decontamination as a non-CERCLA action.

Sampling and analysis of waters and sludge in subgrade structures and tanks conducted as part of this EE/CA indicate that PCBs were not pervasive in the subgrade structures. The concentrations of PCBs in both waters and solids from the pits and sumps will not affect the approach of bulking, characterizing and disposing of water and sludge.

Field verification and a review of sewer maps were conducted to update the current extent of the sewers and manholes. Approximately 44,000 linear feet of sewers and 156 manholes remain. In 1993, Gannett Fleming, on behalf of EPA, inspected sewers and manholes, and sampled liquids in selected manholes for analysis of phenol, PCBs and zinc. The results indicated that the sewer system contains process wastes and sediments, which contain site-related contaminants, and that there is possible subsidence of lines from structural failure. No additional field data were needed during the preparation of the EE/CA to further characterize the nature and extent of contamination in the sewers, and identify and evaluate response action alternatives to mitigate the potential threat posed by the sewer contents to human health and the environment.

Streamlined Risk Evaluation

- Human Health Risks - The streamlined risk evaluation assessed potential risks to human health associated with direct contact to the building surfaces and inhalation of dust by a site construction worker during a one-year demolition project. The contaminants of concern are arsenic, PCBs, BAP, antimony and lead, which were identified to be present in dust above the site soil cleanup levels. The concentrations of contaminants detected in dust samples were below concentrations determined to be protective of demolition workers at a $1x10^{-5}$ level for carcinogens and HQ of 1.0. The human health risk evaluation suggests that no decontamination is needed to protect worker health and safety during demolition.

- Ecological Risks - Potential risk to ecological receptors, specifically terrestrial biota, is not a concern given that the buildings and sewers under current conditions do not represent a viable habitat for terrestrial biota. However, contamination associated with the sewers will need to be addressed to eliminate the need for treatment of site stormwater in the future to protect aquatic biota in the South Fork of the Shenandoah River.

- Ground Water Pathway - Contaminants within buildings and within and beneath subgrade structures have the potential to impact ground water because rainwater enters rooms in some of the buildings, and carries particulate and dissolved contamination downward into the sewers. Further, the potential exists for contaminants to migrate through cracks in floors and foundations. Consequently, the potential exists for cross-contamination of ground water from contaminants within the buildings and sewers, and that decontamination of above grade structures and remediation of sewers is needed to mitigate the potential cross media transfer of contaminants.

Remedial Action Objectives

Four response action objectives (RAOs) for the remaining buildings, foundations, subgrade structures and sewers were identified.

- RAO 1 - Decontaminate the surfaces of the remaining buildings, foundations and subgrade structures to mitigate any unacceptable risk to on-site workers during demolition and prevent cross-media transfer of contaminants.
- RAO 2 - Decontaminate the surfaces of the remaining buildings, foundations and subgrade structures to the extent that demolition debris can be disposed or recycled cost effectively.
- RAO 3 - Mitigate the potential threat to human health and ground water posed by hazardous substances present under foundations, floors and subgrade structures.
- RAO 4 - Mitigate the potential threat to human health, aquatic biota and ground water posed by hazardous substances contained in the remaining sewers and manholes.

Key Chemical-Specific ARARs

Four chemical-specific ARARs that will directly affect the NTCRA-Buildings activities include:

- The RCRA characteristic limits for ignitability, reactivity, corrosivity, and metals, and the associated RCRA Universal Treatment Standards (UTS) for decontamination wash waters, residues or debris, and tank and subgrade structure contents;
- The Toxic Substance Control Act (TSCA) limit for PCBs of 50 mg/kg;
- Decontamination standard, which will be a visual-based performance standard for a "clean debris surface," consistent with the visual-based standard set forth in 40 CFR 268.45; and
- Site soil cleanup standards developed as part of the TCRA-Buildings project to protect human health and ground water.

Response Action Alternatives

Decontaminating the buildings and above grade structures and decontaminating the foundations and subgrade structures were combined into one alternative due to the similarity between the actions. Two major decontamination tasks were included in the response action alternative: surface decontamination; and tank, pipe, ductwork decontamination. No other response action alternatives were evaluated in this EE/CA. The no action alternative consisting of no decontamination prior to demolition was determined to not be a viable alternative to meet the RAOs.

The recommended response action alternative for decontaminating all structures consists of:

- Decontamination of the buildings and other above grade structures;
- Evacuation and management of liquids and solids accumulated in pits, sumps, and other subgrade structures;
- Decontamination of the foundations and subgrade structures after removal by ACOE; and
- Evaluation/characterization of underlying soils, and management of soils that exceed the site soil cleanup standards.

None of the building contaminants are considered to be recalcitrant or difficult to remove, and therefore, less aggressive decontamination techniques such as power sweeping and washing are appropriate for the majority of the building surface area, and more aggressive decontamination such as surgical demolition may be used in localized areas with hydrocarbon stains.

This alternative satisfies RAOs 1 through 3. This alternative provides for decontamination of the building and removal of potentially contaminated materials within the buildings to mitigate any unacceptable risk to on-site workers during and after demolition. In addition, this alternative provides for the removal of hazardous substances from and beneath the foundations and subgrade structures to mitigate the potential threat to human health and ground water quality posed by the release or migration of these hazardous substances. This alternatives meets ARARs, and is cost effective and implementable.

Two response action alternatives were evaluated for the sewers and manholes: 1) excavate and remove all sewers; and 2) excavate and remove sewers above 15 feet below grade, and close the remaining sewers and manholes in place using flowable fill. The recommended response action alternative for the sewers and manholes is Alternative 1 – Excavate and

Remove All Sewers. This alternative is recommended over Alternative 2 due to effectiveness and technical feasibility issues associated with characterization and remediation of impacted soils below 15 feet.

Alternative 1 consists of the following actions:

- Evacuation and management of liquids and solids accumulated in sewers and manholes;
- Excavation and removal of all sewers, manholes and impacted soil above site soil clean-up standards;
- Backfill of the excavation to a grade determined sufficient to support redevelopment; and
- Management of removed solid wastes.

This alternative achieves the sewer RAO. The recommended alternative provides for the removal of sewers and manholes, which will mitigate the potential future direct contact with hazardous substances contained within these structures or adjacent soils. Furthermore, removal of sewers and manholes will effectively mitigate the potential for migration of hazardous constituents. Limited in-place closure, most likely of very deep sewer sections, may be necessary in support of excavation and removal when implementation details are considered.

Section 1

1.0 INTRODUCTION

1.1 PURPOSE

FMC Corporation (FMC) has submitted this Engineering Evaluation/Cost Analysis (EE/CA) for the Non-Time Critical Removal Action – Buildings (NTCRA-Buildings) pursuant to Paragraph 21.A.c. of the Consent Decree between FMC and the United States Environmental Protection Agency (EPA) for the Avtex Fibers Superfund Site, Front Royal, Virginia (Site). The purpose of the NTCRA-Buildings project is two-fold. First, the project provides for the decontamination of the remaining buildings, foundations, and subgrade structures at the Site to prevent the cross-media transfer of contaminants to air, soil, surface water and ground water, and mitigate any unacceptable risk to on-site workers prior to and during demolition. Additionally, decontamination will reduce the costs associated with debris disposition during the non-CERCLA demolition action for the remaining buildings. Second, the project addresses the potential migration of hazardous substances related to the remaining sewers.

In accordance with sections 40 CFR 300.415(b)(2)(iv) and (v) of the National Contingency Plan (NCP), EPA designated this response action to be a Non-Time-Critical Removal Action because of concern that hazardous substances present in the remaining buildings, foundations, subgrade structures, and sewers could be released into soils, air, surface water, or ground water. As required by section 40 CFR 300.415(b)(4)(i) of the NCP, an EE/CA is necessary to support a NTCRA because a planning period of at least six months exists before the removal activities are initiated.

In accordance with the Consent Decree, the purpose of the EE/CA is to propose cleanup levels, and response action alternatives to perform the NTCRA-Buildings project. Specifically, this EE/CA report evaluates response action alternatives to:

- Decontaminate the remaining buildings and above grade structures in advance of planned demolition;
- Mitigate the potential migration of hazardous substances related to foundations and subgrade structures; and
- Mitigate the potential migration of hazardous substances related to the remaining sewers.

The Consent Decree indicates that the disposal or recycle of clean scrap metal generated during the EPA's removal action is part of the NTCRA-Buildings project. However, with EPA consent, FMC elected to dispose of or recycle the clean scrap metal as part of the Time-Critical Removal Action – Buildings (TCRA-Buildings) in order to expedite the overall project schedule.

In accordance with the EPA document titled *Guidance on Conducting Non-Time-Critical Removal Actions under CERCLA (EPA 540-R-93-057, August 1993)*, the Consent Decree, and the NCP, this EE/CA includes:

1. Characterization of the nature and extent of the threat posed to public health, welfare and the environment from the actual or potential release of contaminants at and from remaining buildings, foundations, subgrade structures, and sewers;
2. Comparative evaluation of response action alternatives to mitigate unacceptable risks to human health, welfare and the environment posed by the actual or potential release of contaminants that balances cost, effectiveness and implementability;
3. Identification and discussion of applicable or relevant and appropriate requirements (ARARs), including the development of cleanup levels, for governing decontamination of buildings and related structures, and on-site reuse or off-site disposal of any debris and other materials generated from the demolition of remaining buildings, foundations, subgrade structures, and sewers; and
4. Recommendations for removal action alternative(s) for mitigating the actual or potential threat to human health or environment posed by the remaining buildings, foundations, subgrade structures, and sewers.

This EE/CA Report presents the results of the engineering and cost analysis of alternatives. This document contains sufficient detail to allow EPA to select the appropriate response action for the remaining buildings and sewers. A Response Action Plan (RAP) will be developed to guide the implementation of the selected response actions after EPA selects the removal action alternatives and an Action Memorandum is issued.

The NTCRA-Buildings project will be conducted in coordination with the non-CERCLA asbestos abatement and demolition being performed by the Army Corps of Engineers (ACOE), on behalf of the Town of Front Royal/Warren County Economic Development Authority (EDA). As part of preparation of the RAP, FMC and ACOE will develop the appropriate sequence for asbestos abatement, decontamination, demolition, and addressing subgrade structures and sewers.

1.2 *PREVIOUS AND CURRENT STUDIES*

The EE/CA was developed using information provided from previous investigations of the buildings, as well as inspection and investigations conducted by FMC as part of the NTCRA-Buildings project. The following previous studies provided a basis for the EE/CA:

- *Sewer Investigation Report*, Avtex Fibers Site, Warren County, Virginia, prepared by Gannett Fleming, Inc. for EPA Region III, February 1994; and
- *Building Investigation Report*, Avtex Fibers Site, Warren County, Virginia, prepared by Gannett Fleming, Inc. for EPA Region III, October 1994.

Additionally, analytical data collected by EPA during the building demolition Removal Action in 1997 and 1998, and data collected by Blasland, Bouck & Lee, Inc. (BB&L) on behalf of FMC in 1996 (reported to FMC in February 1997) was incorporated into the EE/CA to the extent that the data applies to the remaining buildings and structures.

Between November 1999 and May 2000, FMC collected additional information on the conditions in the buildings and sewers through the implementation of two work plans. The project was started under the 7 December 1999 document titled *Work Plan to Conduct the Engineering Evaluation/Cost Analysis for the Non-Time-Critical Removal Action – Buildings* (EE/CA Work Plan). EPA approved the EE/CA Work Plan on 9 December 1999. A 3 May 2000 document titled *Work Plan Supplement to Conduct the Engineering Evaluation/Cost Analysis for the Non-Time-Critical Removal Action – Buildings* (EE/CA Work Plan Supplement) was prepared to describe the procedures for sample collection and analysis. EPA approved the EE/CA Work Plan Supplement on 5 May 2000.

In accordance with the two work plans, data collection followed a two step approach to evaluate buildings and subgrade structures:

1. A physical characterization of the buildings and subgrade structures was performed, based on existing information on the former use and the current or past chemical inventory of the buildings, information regarding the use and chemical inventory of adjoining areas, and an updated room-by-room visual inspection; and
2. The nature and extent of contamination in the buildings and subgrade structures was further defined, based on the physical characterization and the collection and analysis of concrete samples from building walls and floors, dust sweepings, and liquids and sludges in tanks and subgrade structures.

FMC completed the first step of the evaluation through the conductance of room inspections between November 1999 and the first week of January 2000. The results of the inspections are included on the update of the Site GIS Technical Application prepared by Environmental Science and Technology, Inc. (ES&T). The second step of the evaluation was completed in May and June 2000 through the collection and analysis of samples. The inspection results and sampling data are described in Section 2.0.

1.3 *REPORT ORGANIZATION*

The remainder of this EE/CA is organized as follows:

- *Section 2.0 – Site Characterization.* This section describes the nature and extent of the threat associated with contaminants in the remaining buildings, foundations, subgrade structures, and sewers. The section also includes a streamlined risk assessment, which identifies the potential risks to human health and the environment that the response actions need to mitigate.
- *Section 3.0 - Identification of Response Action Objectives and ARARs.* The response action objectives are presented and ARARs related to meeting the objectives are identified.
- *Section 4.0 – Identification and Analysis of Response Action Alternatives.* Alternatives are identified, described, and assessed against the criteria of cost, effectiveness, and implementability. Also, the response action alternatives are compared.
- *Section 5.0 – Recommended Response Action Alternatives.* The action that best satisfies the evaluation criteria for the remaining buildings, foundations, subgrade structures, and sewers is identified. Also, a conceptual schedule for the response actions, including both the start and completion date, is presented.

Section 2

Section 2

2.0 SITE CHARACTERIZATION

2.1 BUILDINGS, ABOVE GRADE STRUCTURES AND APPERTUANCES

2.1.1 Description and Background

Beginning in 1990 after the plant was shut down, EPA initiated removal and remedial actions to begin the decommissioning of the facility. Between 1990 and 1997, EPA performed the following work under removal and remedial actions: cleaning and dismantling of the carbon disulfide storage system, chemical tank clean out and removal, line clean out, surgical demolition of structurally impaired areas such as the acid reclaim building, preparation of lab packs, stockpiling of wastes, drainage of tanks and pits, and off-site disposal of wastes.

As a result of EPA's previous demolition activities, the aerial extent of the remaining buildings is approximately 25 acres, as shown on Figure 1. The remaining buildings primarily consist of warehousing areas, dry processing areas, offices, laboratories and other manufacturing support facilities, but also include the Polymer Plant and the Power House Complex, as itemized on Table 1.

As indicated in Section 1.2, EPA and FMC have conducted several investigations to evaluate the nature and extent of contamination in the buildings. These investigations provide the basis for characterization of the remaining buildings presented in Section 2.1.2.

2.1.2 Source, Nature and Extent of Contamination

Physical Characterization

FMC completed a physical characterization of the remaining buildings to support the development of this EE/CA. The results of the inspections are described below and are summarized on Table 1. The detailed results of the inspections are included on the update of the Site GIS Technical Application prepared by Environmental Science and Technology, Inc. (ES&T). The updated database, including the results of the room inspections, was provided to EPA via a CD-ROM on 23 March 2000.

The physical characterization consisted of a room-by-room inspection of the buildings to update the previously existing information. The inspection inventoried the internal building structure, as well as any internal components, such as piping, processing equipment, staged materials and furniture. Visual evidence of potential contamination (e.g., staining, residues, etc.), any chemical inventory, the presence of high hazard materials (e.g., transformers, capacitors, etc.), and pipes or other internal components that may require ancillary decontamination methods/alternatives were recorded.

Inspection findings for each room and appurtenance were recorded on an inspection log. In addition, a digital camera was used to create a photographic record of each room. The logs and the photographs have been loaded into the updated Site GIS Technical Application prepared by ES&T. The database includes a separate entry for each room.

The inspection data recorded on each room log were used to identify methods for decontamination, evacuation of liquids and solids from pits or sumps, and preparatory work that will need to be performed by FMC or ACOE prior to conducting decontamination, such as asbestos abatement, and removal of debris or equipment. The overall findings of the inspections are summarized below.

- Hydrocarbon contamination in the form of oil-stained concrete and oily liquids in sumps and pits is pervasive, in particular in the multiple floors of the Power House, Boiler House, Polyester Spinning, Creel Room and Polymer Plant buildings. The hydrocarbon contamination has the potential to contain PCBs. The presence of PCBs in the oil stains and oily liquids will affect methods and costs associated with the decontamination or disposition of concrete. Therefore, oil-stained concrete and oily liquids were sampled and the results are described below.

- Particulate residues (sweepings) are pervasive in all the rooms. Previous sampling by EPA indicated that sweepings composite samples collected in Section II contained metals (lead) and polynuclear aromatic hydrocarbons (PAHs). The presence and magnitude of contaminants in sweepings above cleanup levels in Sections VI and VII needed to be determined during the preparation of this EE/CA to assess the need for particulate removal. The results from these analysis are described below. Although Section I was not previously sampled by EPA, it was determined that sweeping samples from Section I were not necessary for the EE/CA preparation since this section is assumed to require decontamination to remove sweepings based on historic use information. For instance, since Shipping #2 is currently used as a waste storage area, it is assumed that this room will require decontamination to remove residues/sweepings, and therefore, sampling was not necessary for purposes of preparing the EE/CA.

- Chemical residues in the form of white powder are evident in some of the rooms. These materials are caustic or acid salts based on prior EPA and BB&L samples. Surfaces containing these materials can be decontaminated using either washing or vacuuming procedures, and therefore the material did not require further characterization in order to identify and evaluate appropriate decontamination alternatives.
- Many rooms contain substantial amounts of solid waste, equipment, debris, and liquid waste in drums and tanks that need to be addressed prior to or during decontamination.
- Many rooms contain potential hazards, including: potential asbestos-containing material (PACM) around pipes and in particulate form; above ground storage tanks (ASTs), some of which are filled with product; ventilation duct work; fluorescent light ballasts that potentially contain PCBs; mercury and sodium vapor lights; lead-lined pipes and shields; hydraulic presses; and electrical switches and transformers that will require surgical demolition by ACOE.

Site Soil Cleanup Standards

In order to evaluate the magnitude of impact associated with contaminants present in the remaining buildings and structures, a screening approach was used, whereby the analytical results were compared against the site soil cleanup standards for screening purposes only. Comparison of detected results against these cleanup levels is intended for screening and discussing the potential significance of the analytical results, and these levels are not intended to be decontamination cleanup standards (decontamination cleanup standards are proposed in Section 3.3.1). These standards are generally applicable to subgrade structures and soils that may remain in place after the CERCLA cleanup work since a future site industrial or commercial worker could potentially come in contact with these materials. However, they are not applicable to buildings and structures scheduled for demolition under the ACOE non-CERCLA project, as these materials will go through another verification process to determine appropriate final disposition (i.e., on-site reuse, salvage, off-site disposal).

The risk-based numeric site soil cleanup standards for direct contact to be used in this screening are the current EPA Region III Risk-Based Concentrations for an industrial exposure scenario. The appropriate carcinogenic risk level and Hazard Quotient (HQ) used to derive the site soil cleanup standards is dependant upon the number carcinogens and the target organs of the non-carcinogenic constituents. If there more than 10 carcinogens present above a 1×10^{-6} risk level, then the 1×10^{-6} risk level is used; otherwise a 1×10^{-5} risk level is used. If the non-carcinogens, which are present above an HQ of 0.1, do not have the same target organ, then a HQ of 1 is used. However, if two or more non-carcinogens have the same target organ, a cumulative risk must be calculated based on the specific contaminants or the HQ of 0.1 may be used as a more conservative default. EPA approved these standards for use on the TCRA – Buildings project when they approved the final Remedial Action Plan for the TCRA – Buildings project on 7 October 1999, and clarified the applicability of the cancer risk level and HQ in a letter dated February 11, 2000.

As described below in Section 2.1.3, it was determined that using a $1x10^{-5}$ risk level and an HQ of 1 is appropriate for screening the contaminants present in the remaining buildings and structures.

Sampling and Analysis

Based on the data gaps identified during the room inspections, samples were collected from the buildings to characterize the nature and preliminary extent of contaminants present in concrete and dust sweepings in the buildings. Concrete samples were collected using a mechanized chipping device from locations on the floor and walls that contain oil stains within a room, and crushed using a stainless steel mortar and pestle device. The samples were collected to a depth of approximately ¼-inch below the concrete surface. Aliquots of concrete were collected on a biased basis from discrete points within oil-stained areas to create a composite sample representative of the stained concrete. Concrete samples were analyzed for PCBs. Selected concrete samples were analyzed for PAHs.

Concrete samples were collected from 24 locations in the following buildings:

- Section I, Polypropylene Spinning (sample CC-12), Creel Room (first and third floors, samples CC-11 and 06), Polyester Spinning (first through fourth floors, samples CC-10, 08, 05, 03), Polymer Plant (first through fifth floors, samples CC-09, 07, 04, 02, 01), and Adhesive Dip (first and second floors, samples CC-14, 13);
- Section II, Composite of the Men's Locker Room, Substation #1 and Switch Room (sample CC-15), grab in Ring Twisting (sample CC-17), grab in Coning (sample CC-16);
- Section VI, Power Room (sample CC-18);
- Section VII, Compressor Room (sample CC-19), Power House (second floor, samples CC-23 and 24), Boiler House (first floor, sample CC-22), and Filter House (sample CC-21); and
- River Water Pump and Filter House (sample CC-20).

The concrete chip results are presented in Table 2. The key findings for the concrete samples were as follows:

- *PCBs*. Twenty-three samples were analyzed for PCBs. Although PCBs were detected in almost all the samples, in particular Aroclor 1260, only four samples contained PCB concentrations above the site soil cleanup standards for direct contact of 29 mg/kg (10^{-5} for carcinogens). These four samples were collected from concrete in Polypropylene Spinning, Polyester Spinning first floor, Polymer Plant first floor, and Adhesive Dip second floor.
- *PAHs*. Eleven samples were analyzed for PAHs. PAHs were detected in nine of the eleven samples. However, the detected concentrations were at least an order of magnitude below the site soil cleanup standards for direct contact.

The sample results indicate that there are some PCB "hot spots" in Section I that could require aggressive decontamination. However, concentrations of PCBs and PAHs above the site soil cleanup standards for direct contact are not pervasive in the buildings.

Twelve composite sweepings samples were collected from multiple locations on the floor. Sweepings samples were analyzed for PCBs, metals and semivolatiles, including PAHs. Selected sweepings samples were analyzed for asbestos to determine whether cleanup of particulates needs to comply with ACM abatement requirements. Samples were collected from the following rooms or areas:

- Composite from Section VI, Viscose Maintenance Shop, Men's and Women's Locker Rooms, and the Truck Shop (Sample 6.05-6.08);
- Section VII, Compressor Room (Sample 7.04);
- Section VII, Power House, first and second floors (Samples 7.05A and 7.05B);
- Section VII, Boiler House, first through fifth floors (Samples 7.06A, 7.06B, 7.06F, 7.06G, and 7.06H);
- Section VII, Bag House first floor (Sample 7.11);
- Section VII, Laboratory (Sample 7.15B); and
- Composite sample from Section VII, Project Stores, Project Shops, Plastic Shop and Shops (Sample 7.16-7.20).

The dust sweepings sample results are presented in Table 3. The key findings for the sweepings samples were as follows:

- *Metals*. Four of the twelve sweepings samples were analyzed for metals. The samples were from the Section VII Compressor Room, Bag

House, Laboratory and Project Shops Composite. The results indicated that lead concentrations ranged from 341 to 10,100 mg/kg and that arsenic concentrations ranged from 17.1 to 49.1 mg/kg. Antimony was only detected above the limit of quantitation in one sample, which was the sample collected from the Laboratory (170 mg/kg antimony). The concentrations of all other metals detected in the sweepings samples were below the site soil cleanup standards for direct contact.

- *PAHs*. Nine of the twelve sweepings samples were analyzed for PAHs. The results indicated that multiple PAHs were detected in all nine samples, which included samples from Sections VI and VII. Concentrations of benzo(a)pyrene (BAP) exceeded the human health direct contact standards in two samples. The concentrations of the other PAHs detected in the sweepings samples were below the site soil cleanup standards for direct contact.
- *PCBs*. Nine of the twelve sweepings samples were analyzed for PCBs. The samples were collected from Sections VI and VII. The results indicated that Aroclor 1260 was detected in all nine samples, Aroclor 1254 was detected in eight samples, and Aroclor 1248 was detected in one sample. The concentrations of PCBs detected in eight of the nine sweepings samples analyzed for PCBs were below the site soil cleanup standards for direct contact. However, the dust sweepings sample collected from the second floor of the Power House (sample number AV-NCB-SW-7.05B) indicated 347 mg/kg for Aroclor 1260, which exceeds the site-specific soil cleanup standard.
- *Asbestos*. Eleven sweepings samples from Section VII were analyzed for asbestos. Asbestos was present at a level of 1 percent or above in four samples.

The sweepings sample results indicate that particulate matter in the buildings contain levels of lead, arsenic, antimony, asbestos, benzo(a)pyrene, and PCB above the site soil cleanup standards for direct contact.

2.1.3 *Streamlined Risk Evaluation*

The purpose of the human health risk evaluation was to identify the current or future potential human health and ecological exposures that should be prevented by a response action. In accordance with EPA guidance (EPA, 1993), this risk evaluation:

- Identifies the chemicals of concern present in the buildings;

- Provides an estimate of how and to what extent people or ecological receptors might be exposed to these chemicals;
- Provides an assessment of potential health effects (i.e., carcinogenic or non-carcinogenic) or ecological effects associated with these constituents; and
- Projects the potential risk to human health or ecological receptors that may occur if no response action is implemented at the Site.

Human Health Risks

The streamlined risk evaluation assesses potential risks to human health associated with inhalation of dust by a site construction worker during a one-year demolition project.

To determine the contaminants of concern, the sweepings samples were screened against the Region III RBCs using a $1x10^{-6}$ excess cancer risk and a HQ of 0.1. The screening focused on the sweepings samples since the dust is ubiquitous and readily available for inhalation exposure. The concrete chip samples were not considered in the screening since they were biased to floor and walls with hydrocarbon stains and represent contaminated media that is not widely available for direct contact and do not pose an inhalation risk. The results of the screening analysis are provided in Appendix A.

Based on this screening, it was determined that only eight carcinogens were detected above the $1x10^{-6}$ excess cancer risk, including: arsenic, benzo(a)anthracene, benzo(b)fluoranthene, benzo(a)pyrene (BAP), dibenz(a,h)anthracene, indeno(1,2,3-cd)pyrene, Aroclor 1254, and Aroclor 1260. Therefore, it was determined that using a $1x10^{-5}$ excess cancer risk is appropriate for establishing the carcinogenic contaminants of concern and assessing the data. In addition, it was determined that there were only three non-carcinogens, including antimony, chromium, and mercury in excess of an HQ of 0.1. Lead was also identified as a constituent of concern based on a screening against the default value of 1,000 mg/kg. Chromium and mercury do not have similar systemic effects (gastrointestinal and neurological, respectively); however, antimony has a similar systemic effect as lead (i.e., blood effects). Therefore, it was determined that using a HQ of 1 is appropriate for evaluating chromium and mercury, but that a HQ of 0.1 is appropriate for evaluating antimony on a more conservative basis.

The contaminants of concern were rescreened using the $1x10^{-5}$ excess cancer risk and a HQ of 0.1 for antimony and a HQ of 1 for other non-carcinogens. Based on this screening, it was determined that the contaminants of concern are arsenic, PCBs, BAP, antimony and lead, which were identified to be present in dust above the site soil cleanup levels. A summary of the risk-based screening analysis is provided in Appendix A.

The streamlined human health risk assessment was based on the likely exposure scenario of inhalation of dust and incidental ingestion of dust in the naso-pharyngeal area arising from construction workers performing demolition activities inside of heavy equipment. Direct contact or direct ingestion of demolished building material was not included as a likely exposure scenario because demolition workers will be wearing protective clothing (e.g., long sleeves and pants, gloves) which would preclude any direct dermal contact with demolished building materials (and subsequent ingestion of soil adhering to hands). The inhalation rate was based on moderate activity, rather than heavy activity, which is appropriate for an equipment operator inside of heavy equipment. An inhalation rate based on heavy activity would be more appropriate for a manual laborer working on the ground (i.e., outside of heavy equipment). However, it is assumed that site construction workers on the ground would be wearing respiratory protection, as well as protective clothing, due to the potential dust levels.

The estimated concentrations of the chemicals of concern noted above in building materials protective of demolition workers at a $1x10^{-5}$ level for carcinogens and HQ of 1.0 for non-carcinogens are provided below. Appendix A provides the detailed calculations that support these values.

Contaminant of Concern	Concentrations Protective of Demolition Workers (mg/ kg)
Arsenic	6,400
PCBs	5,700
Benzo(a)pyrene	15,000
Lead	51,000
Antimony	11,000

The concentrations of contaminants found in the buildings are below the concentrations determined to be protective of demolition workers, suggesting that no decontamination is necessary to protect worker health and safety during demolition. However, decontamination of the building will be needed to meet other remedial action objectives, including eliminating the potential for cross-media transfer of contaminants to ground water and ensuring that the resulting demolition debris can be managed cost-effectively.

Asbestos fibers present in the dust sweepings also pose a potential risk to site construction workers through inhalation. Although asbestos is not a CERCLA hazardous substance, the asbestos will need to be mitigated to ensure worker safety during demolition. Asbestos abatement is not a component of the NTCRA-Buildings CRECLA action, and instead, will be conducted by ACOE on behalf of EDA.

Ecological Risks

Potential risk to ecological receptors, specifically terrestrial biota, is not a concern given that the buildings under current conditions do not represent a viable habitat for terrestrial biota.

Ground Water Pathway

Contaminants within buildings and above-grade structures have the potential to impact ground water because rainwater enters rooms in some of the buildings, and carries particulate and dissolved contamination downward into the sewers. Once in the process and storm sewers, contaminants have the potential to discharge into ground water. Further, the potential exists for contaminants to migrate through cracks in floors and foundations. Consequently, the potential exists for cross-contamination of ground water from contaminants within the buildings, and decontamination is needed to mitigate this potential risk.

2.2 FOUNDATIONS AND SUBGRADE STRUCTURES

2.2.1 Unit Description and Background

The existence, condition and contents of the subgrade structures were recorded as part of the building inspections conducted between November 1999 and January 2000. The room-by-room inspections were performed to identify subgrade structures and the presence and extent of water, separate phase liquids, and sludges in the pits, sumps, trenches, basements and other subgrade structures (to the extent they were safe and accessible). The dimensions of the subgrade structure were also measured to the extent practicable.

Inspection findings for the subgrade structures were recorded on the inspection logs. In addition, a digital camera was used to create a photographic record of the subgrade structures. The logs and the photographs have been loaded into the updated Site GIS Technical Application prepared by ES&T.

Table 4 summarizes the inspection findings for the subgrade structures. The findings indicate that almost all of the pits, sumps, and other subgrade structures (e.g., tunnels and vaults) contain water. In some cases, the water contained a separate hydrocarbon phase floating on top of the surface. The depth of the water was determined to the extent the practicable and provided it was deemed to be safe.

2.2.2 *Source, Nature and Extent of Contamination*

Previous Site experience indicates that bulking and on-site pretreatment of the water for phenols and metals is technically feasible and cost-effective. However, the presence of PCBs in the water or separate phase liquids could require more extensive pretreatment, and could be costly to dispose of off-site. Therefore, limited sampling of liquids and sludge in subgrade structures and tanks was conducted as part of the EE/CA to determine whether the liquids and solids in the pits and sumps contain PCBs. Twenty-seven (27) liquid samples and four (4) sediment samples were collected from the subgrade locations listed below.

- Section I, Polymer Plant, AST #5 on the third floor, (sample LQ-01);
- Section I, Polyester Spinning, west end pit (sample LQ-02);
- Section I, Adhesive Dip, sump (sample LQ-03);
- Section VI, Acid Viscose Cellar No. 6, basement (sample LQ-04);
- Section VI, Laundry Room, two pits and two trenches (sample LQ-05);
- Section VI, Dialyzer Room, trench and pit (sample LQ-24);
- Section VI, Power Room and Substation # 2, pit (sample LQ-09);
- Section VII, Coal Unloading, two pits (samples LQ-10 and 11);
- Section VII, Compressor Room, two trenches (samples LQ-06 and 07);
- Section VII, Compressor Room, south tank (sample LQ-08);
- Section VII, Power House, two pits (sample LQ-22);
- Section VII, Tunnel between Power House and #1 Mercerizing (sample LQ-27);
- Section VII, Tunnel between South Corridor and Compressor Room – west of tool room (sample LQ-26);
- Section VII, Boiler House, pit (sample LQ-23);
- Section VII, Pump House Behind Power House, pit (sample LQ-25);
- River Water Pump and Filter House, trench (sample LQ-12); and

- Underground Electrical Vaults, conduits nos. 1 through 8 and 10 (samples LQ-13 through 21).

There were several subgrade structures that were identified in the EE/CA Work Plan Supplement to be sampled that could not be sampled. The last column on Table 4 indicates the reasons why these samples were not collected. In most cases, samples were not collected because a pit or sump was dry at the time of the sampling or misidentified during the room inspections. Sediment samples were not collected because either the pit or sump was too deep to collect safely or sediments were not present.

Table 5 presents the results of the pit, sump and tank liquid samples. The only semivolatile compounds detected were bis(2-ethylhexyl)phthalate and 4-methyphenol. Both were detected at concentrations less than 0.06 mg/l. Individual PCB aroclors were detected in 8 of 26 samples. The highest concentration was 0.909 mg/l of Aroclor 1248 found in an AST in the third floor of the Polymer plant.

Table 6 presents the results of four sediment samples collected from pits and sumps. The results indicate that PCBs were detected in two of the four samples. The highest observed concentrations are below the TSCA threshold level of 50 mg/kg that would require special disposition. The concentrations of contaminants in both liquids and solids from the pits and sumps will not affect the approach of bulking, characterizing and disposing of the liquid and sludge materials during building decontamination.

2.2.3 *Streamlined Risk Evaluation*

Human Health Risks

The subgrade sample analytical data indicates that the sediments accumulated in these structures may contain contaminants less than site-specific direct contact standards, but the liquids may contain PCBs above the ground water protection standard. Given the proximity and connection of the subgrade structures to the above grade structures, it is anticipated that the risk to human health posed by the foundations and subgrade structures are similar to those posed by the buildings and above grade structures.

The human receptors most likely to be exposed to contaminants on and beneath the foundations and subgrade structures include site construction workers responsible for the demolition and disposition of the building debris. The potential exposure pathways for these receptors would be inhalation of dust and incidental ingestion of dust in the naso-pharyngeal area. Based on the analytical data collected from the above grade structures described above, the contaminants of concern for human health are include PCBs, lead, antimony, and BAP. As discussed above in Section 2.1.3, the concentrations of contaminants found in the buildings were well below the concentrations determined to be protective of demolition workers, suggesting that decontamination is not necessary to protect worker health and safety during demolition. However, decontamination of the subgrade structures will be needed to meet other remedial action objectives, including eliminating the potential for cross-media transfer of contaminants and ensuring the demolition debris can be managed cost-effectively.

Ecological Risks

Potential risk to ecological receptors, specifically terrestrial biota, is not a concern given that the buildings and associated foundations and subgrade structures under current conditions do not represent a viable habitat for terrestrial biota.

Ground Water Pathway

The structural integrity of the pits, sumps and other subgrade structures is uncertain, and cracks and holes in subgrade structures may provide a route for contaminants to migrate to ground water. However, the fact that many of the pits and sumps contain accumulated liquids may be an indication that the structural integrity of these structures is still relatively sound such that they can retain liquids. The potential exists for cross-contamination of ground water from contaminants within the subgrade structures, and decontamination of the subgrade structures is needed to mitigate this potential risk. The potential for contaminated soil quality beneath these structures to pose a threat to ground water quality will be evaluated after demolition is complete, and the soils can be effectively accessed.

2.3 *SEWERS AND MANHOLES*

2.3.1 *Unit Description and Background*

Avtex Fibers Site drawings and information provided in the 1994 EPA Sewer Investigation Report indicated that there were approximately 55,000 liner feet of interconnected process waste, sanitary, and stormwater sewers, with pipe sizes ranging from 4 to 60 inches in diameter. The system included an estimated total of 200 manholes and junction boxes. However, as part of its recent Removal Action, EPA removed some of the sewers and manholes, including all the sewers and manholes from within the footprint of Section III.

As part of the development of this EE/CA, FMC reviewed the existing sewer information and performed some limited field verification to confirm the current extent of the sewers. Figure 2 indicates the current extent of sewers at the Site and Table 7 provides an inventory of the various sewers and manholes. Appendix B provides the supporting inventory information presented in Table 7. Based on FMC's review, there is currently approximately 44,000 linear feet of sewers and 156 manholes remaining at the Site. It is important to note that the linear footage estimates provided herein are based on the previously identified sewers located outside of the building foundations. There are likely some sewers located outside of the building foundations that have not been identified in Appendix B or Figure 2, and there are sewers that exist beneath the foundations of the buildings. However, it was determined that this additional footage had minimal effect on the cost estimate and did not need to be catalogued. Nonetheless, the estimated linear footages provided below are anticipated to be biased low, and actual linear footages may be slightly higher, accounting for sewers under buildings.

Provided below is a summary of the major sewer groups, based on the information presented in EPA's 1993 RI/FS Work Plan, the 1994 Sewer Investigation Report, and updated based on the recent verification evaluation.

- **Storm Sewer.** This is the single largest type of sewer, and consists of approximately 20,000 linear feet of sewer and 60 associated manholes. The storm sewer pipe diameter ranges from 2 inches to 60 inches, and the small-diameter (2 to 36 inches) pipes are constructed of terra cotta and cast iron, and the large-diameter (42-inches or over) pipes are made of concrete. The average diameter of the majority of storm sewers located in the former plant area is approximately 15 inches; however, there is approximately 2,500 linear feet of 60-inch storm sewer that runs to the west-side of the railroad tracks. The depth of the storm sewers ranges from 2-feet below grade to 25-feet below grade, with the deepest sewers located on the west-side of the former production plant area and the west-side of the railroad tracks.

- **Bleach Sewer.** It is believed that this sewer received waste from the water softening area, and this sewer merged with the sulfide sewer before reaching the WWTP. There is approximately 1,640 linear feet of bleach sewer remaining and 5 corresponding manholes. The bleach sewer diameter is 12 inches, and is believed to be of vitrified clay construction. The depth of the bleach sewer ranges from approximately 7-feet to 19-feet below grade, with an average depth of approximately 14-feet below grade.

- **Polymer Production Waste Sewer.** Because this sewer line appears to originate from the polymer building and was constructed with vitrified clay, it is assumed to be the line that carried polymer production waste. Polypropylene, a main constituent of polymer waste, was probably the primary waste product carried by this sewer. There is approximately 2,600 linear feet of polymer sewer, with 9 corresponding manholes. The diameter of polymer sewer ranges from 6 inches to 12 inches, with an average diameter of approximately 10 inches, and is believed to be vitrified clay construction. The depth of the sewers ranges from approximately 6-feet to 15-feet below grade, with an average depth of approximately 10-feet below grade.

- **Sanitary Sewer.** The sanitary sewer served the entire building area and totals approximately 8,000 linear feet, with 35 corresponding manholes. The diameter of sanitary sewer lines ranges from 2 inches to 18 inches, with an average diameter of approximately 10 inches. The sanitary sewer lines are constructed from cast iron and terra cotta, and the larger lines (i.e., greater than 8-inch) are made from terra cotta. The depth of the sanitary sewers ranges from 3-feet to 18-feet below grade, with an average depth of approximately 8-feet below grade. The deepest sewers located on the west-side of the former production plant area and the west-side of the railroad tracks.

- **Acid Sewer.** The acid sewer apparently carried acidic wastes generated by the filament process used to convert viscose to rayon in the double deck spinning and box spinning areas of the production facilities. Sewer maps indicate that the acid sewer carried wastewater to the WWTP for treatment. There is approximately 6,100 linear feet of acid sewer remaining, and 24 corresponding manholes. The diameter of the acid sewer lines ranges from 3 inches to 18 inches, with an average diameter of approximately 14 inches. The acid sewer lines are constructed from terra cotta and vitrified clay. The depth of the acid sewers ranges from 2-feet to 28-feet below grade surface, with an average depth of approximately 12-feet below grade.

- **Sulfide Sewer.** The sulfide sewer appears to originate from the Staple Area. Discharges are believed to have been dilute solutions of alkaline sodium sulfide from the yarn desulfurizing operation. There is approximately 2,100 linear feet remaining of the sulfide sewer, which is made of terra cotta, and 6 corresponding manholes. The diameter of sewer line ranges from 12 inches to 18 inches, with an average diameter of 13 inches. The depth of the sewer line ranges from 7-feet to 18-feet below grade, and the average depth is approximately 12-feet below grade.

- **Soda Sewer.** The soda sewer served the soda mercerizing, soda dissolving, and soda storage areas located in the southwest corner of the building area. There is approximately 760 linear feet remaining of the soda sewers and 4 corresponding manholes. The soda sewer lines are 10 inches or less in diameter, with an average diameter of 6 inches. The soda sewers, which are constructed of cast iron and terra cotta, have a depth ranging from 2-feet to 10-feet below grade, and an average depth of 5-feet below grade.

- **Viscose Sewer.** Process wastes produced in the churn and mix rooms were conveyed to the WWTP through the viscose sewer. Available sewer maps indicate that the viscose sewer combined with the soda sewer from the viscose cellar to the area near the acid storage tanks. Caustic soda, added to xanthate for viscose formation, and residual xanthate are suspected to be present in the viscose sewer. There is approximately 3,150 linear feet of viscose sewer remaining and 13 corresponding manholes. The diameter of viscose sewers range from 6 inches to 36 inches, and the average diameter is approximately 17 inches. The small diameter viscose sewers are constructed of cast iron and the larger diameter sewers are constructed of terra cotta. The depth of the viscose sewers ranges from 2-feet to 28-feet below grade, with an average depth of approximately 14-feet below grade. The deepest sewers are located on the west-side of the former production plant area and the west-side of the railroad tracks.

2.3.2 *Source, Nature and Extent of Contamination*

In 1993, Gannett Fleming, on behalf of EPA and as part of the Phase 1 remedial investigation, conducted an inspection of 200 manholes and associated piping, and television surveys of portions of the acid, sulfide, viscose, soda and storm sewer systems. Additionally, 28 manholes were sampled for liquids or solids for analysis of phenol, PCBs and zinc. The investigation results, which were summarized in EPA's 1994 Sewer Investigation Report, indicated that the discharge of waste acids, bases, oxidizers, caustics, and other chemicals into the sewers resulted in some corrosion of the lines. Furthermore, the study indicated that the sewer system is clogged along a number of unidentified sections because of the accumulation of process wastes and sediments, and that there is possible subsidence of lines from structural failure.

The information collected during the Gannett Fleming investigation indicates that the sewers contain an accumulation of process waste and contaminated sediment. No additional field data was needed during the preparation of the EE/CA to further characterize the nature and extent of contamination in the sewers, and identify and evaluate response action alternatives to mitigate the potential threat posed by the sewer contents to human health and the environment. However, as previously discussed, the inventory of the sewers and manholes was updated to reflect current conditions.

2.3.3 *Streamlined Risk Evaluation*

Human Health Risks

Under current conditions, any contamination present in the sewers is not accessible to complete a direct contact pathway or potential risk to human health. However, if contamination in the sewers is left unabated, future site construction workers could potentially contact contamination present in shallow sewers (upper 15 feet) during redevelopment.

Ecological Risks

Potential risk to terrestrial biota associated with contamination in the sewers is not a concern given that the sewers under current conditions do not represent a viable habitat for terrestrial biota.

Under current conditions, contamination present in the sewers does not pose a potential risk to aquatic receptors because site stormwater is collected and treated at the WWTP prior to discharge to the River. Contamination associated with the sewers will need to be addressed in order to eliminate the need for treatment of site stormwater in the future.

Ground Water Pathway

Based on limited 1994 Remedial Investigation ground water quality data from wells 107 and 207 (located near acid reclaim but removed) and wells 103 and 203, the sewers do not appear to be a source of substantive impact to ground water quality. However, the sewers do provide a pathway for surface contamination to reach the ground water table, and may represent sources of localized impacts to ground water quality. Consequently, the potential migration pathway through sewers to ground water will need to be severed by plugging or removing the sewers.

Section 3

Section 3

3.0 IDENTIFICATION OF RESPONSE ACTION OBJECTIVES AND ARARS

3.1 RESPONSE ACTION OBJECTIVES

Four response action objectives (RAOs) for the remaining buildings, foundations, subgrade structures and sewers were identified.

RAO 1 - Decontaminate the surfaces of the remaining buildings, foundations and subgrade structures to mitigate any unacceptable risk posed to on-site workers during demolition and prevent cross-media transfer of contaminants.

The first RAO is intended to ensure that unacceptable direct contact and inhalation human health risks associated with the presence of PCBs, lead, arsenic, antimony and BAP on the building surfaces will be eliminated through decontamination to the cleanup levels established in Section 3.3. The streamlined risk evaluation indicates contaminant concentrations in the dust and on concrete surfaces does not pose an unacceptable risk to site construction workers, and no decontamination is needed. Meeting this RAO, however, is necessary to ensure that the potential for cross-contamination of ground water from rainwater washing contaminants from the buildings into sewers is mitigated.

RAO 2 - Decontaminate the surfaces of the remaining buildings, foundations and subgrade structures to the extent that demolition debris can be disposed or recycled most cost effectively.

The buildings need to be decontaminated to ensure that the amount of demolition debris classified as a RCRA hazardous or a TSCA waste is minimized. Meeting this RAO will ensure that much of the decontaminated brick and concrete debris is suitable as on-site beneficial use material, and the amount of debris that needs to be disposed off-site is minimized.

RAO 3 - Mitigate the potential threat to human health and ground water posed by hazardous substances present under foundations, floors and subgrade structures.

This RAO addresses the potential contamination within and underneath the foundations, floors and subgrade structures. This RAO ensures that future site construction workers that become exposed to the soils under subgrade structures will not be subjected to any unacceptable risk.

Further, this RAO will ensure that the potential for cross-contamination of ground water from rainwater washing contaminants from the subgrade structures into the underlying soil and sewers is mitigated.

RAO 4 - Mitigate the potential threat to human health, aquatic biota and ground water posed by hazardous substances contained in the remaining sewers and manholes.

This RAO will ensure that the remaining sewers and manholes, and their contents, does not pose a threat human health of future site workers, or ground and surface water quality. Mitigation of contamination in storm and process sewers will also eliminate the need to treat site stormwater to protect aquatic biota in the River.

3.2 *GENERAL SCOPE AND INTEGRATION OF THE RESPONSE ACTIONS*

The NTCRA – Buildings response action will be implemented in an integrated manner with the ACOE non-CERCLA work through a phased sequencing of the work. The general scope of the response actions for buildings and sewers will be executed as described below. FMC activities are highlighted in bold and ACOE activities are highlighted in underline.

1. <u>ACOE will abate asbestos prior to decontamination, to the extent possible.</u>
2. **FMC will remove and stockpile loose debris (e.g., furniture, wood pallets, paper, etc.) to the extent needed to facilitate the decontamination activities.** <u>The ACOE will be responsible for the disposal of the stockpiled debris.</u>
3. **FMC will decontaminate the buildings and affixed equipment to remove chemical residues.**
4. **FMC will remove liquids and sludges from subgrade structures, and decontaminate the topside surfaces of the structures.**
5. <u>ACOE will demolish the buildings, including affixed equipment (i.e., bolted or anchored).</u>
6. <u>ACOE will separate the debris into material that can be beneficially used on-site, and material that requires off-site disposal or recycle, and manage the disposition of the waste or beneficial use streams.</u>
7. <u>ACOE will abate asbestos in subgrade structures.</u>
8. **FMC will decontaminate the subgrade structures as necessary.**
9. <u>ACOE will remove concrete slabs and foundations as necessary to facilitate redevelopment by EDA. Slabs and foundations that exist up</u>

to six feet below grade will be removed by ACOE. Slabs and foundations that exist deeper than six feet below grade will be broken apart by ACOE (to reduce the potential for future subsurface ponding of water) but left in place for subsequent evaluation by FMC.

10. **FMC will characterize and address any contaminated soil underlying or adjacent to the subgrade structures, including slabs and foundations that exist deeper than six feet below grade. Slabs and foundation below six feet below grade may remain in place provided that CERCLA impacts are adequately addressed. Preplanning efforts will be utilized in an attempt to identify areas with potential CERCLA impacts.**
11. ACOE will beneficially use subgrade concrete onsite, or dispose of the material off-site.
12. **FMC will address the sewers and associated impacted soils.**
13. **FMC will address any contamination associated with plant area soils outside of the building footprint through a separate NTCRA action.**

Note that the full nature and extent of the soil contamination under the concrete, and whether it poses a threat to ground water, will not be determined until the slabs and foundations are removed, and the soil has been characterized. Therefore, in-situ or ex-situ remediation of soil beneath the buildings and subgrade structures may be considered as part of the implementation of the RAP for the NTCRA-Buildings project. Soils surrounding the former plant area are included in OU-10 under the Consent Decree, but are being proposed by EPA and FMC to be addressed as part of the NTCRA-Buildings. Revisions to the Consent Decree are being conducted to incorporate this change. The characterization and remediation of plant area soils are not covered by this EE/CA, and instead will be addressed under a RAP supplement during the implementation of the RAP for the NTCRA-Buildings project. After completion of the integrated decontamination, demolition, sewer remediation, and soil investigation and clean-up, the former plant area will be available for re-development by EDA.

3.3 *ARAR IDENTIFICATION*

Section 300.415(j) of the NCP requires removal actions to attain ARARs under Federal or State environmental laws and regulations to the extent practicable considering the urgency of the situation and the scope of the removal. For on-site work, CERCLA actions do not require a permit, however, substantive requirements of the ARARs may need to be met. In accordance with EPA guidance (EPA, 1991), the EPA will make the final determination of ARARs and the extent to which they will be met.

Tables 8 and 9 provide the detailed list of the federal and state ARARs identified for the Avtex Site, and indicate the ones that apply to the NTCRA – Buildings response action addressed in this EE/CA. This section discusses in further detail the location, chemical, and action-specific ARARs that directly apply to the decontamination of the buildings and subgrade structures, and remediation of the sewers.

3.3.1 *Chemical-Specific*

Chemical-specific ARARs are risk-based numeric limitations or methodologies that establish acceptable quantities or concentrations of a contaminant on a site-specific basis. The chemical-specific ARARs that will affect the NTCRA-Buildings activities include the following:

- The RCRA characteristic limits for ignitability, reactivity, corrosivity, and metals (40 CFR 261 Subpart C), and the associated RCRA Universal Treatment Standards (UTS) (40 CFR 268.48), for decontamination wash waters, residues or debris, and tank and subgrade structure contents;
- The Toxic Substance Control Act (TSCA) for Polychlorinated Biphenyl (PCB) Manufacturing, Processing, Distribution in Commerce, and Use Prohibitions (40 CFR 761, as amended in 29 June 1998 Federal Register – Disposal of PCB's);
- Decontamination standard, which will be a performance standard of visibly clean with respect to dust and chemical residues on the building surfaces; and
- Site soil cleanup standards developed as part of the TCRA-Buildings project to protect human health and ground water.

The applicability of these ARARs is discussed below.

RCRA Hazardous Waste

Numeric limits are provided in 40 CFR 261 Subpart C to determine whether a waste is a RCRA characteristic hazardous waste based on ignitability, corrosivity, reactivity, and/or toxicity. These numerical limits will have direct applicability to the characterization of the various waste materials generated and managed during the NTCRA-Buildings, including containerized wastes, sludges in tanks and subgrade structures, liquids, decontamination waste waters, and excavated soil.

Wastes exhibiting a hazardous characteristic or listed hazardous waste, as defined in 40 CFR 261 Subpart D, are subject to the Land Disposal Restriction (LDR) universal treatment standards (UTS). The LDR and UTS for hazardous wastewaters and non-wastewaters were finalized in the 26 May 1998 Federal Register (Land Disposal Restrictions Phase IV, 63 FR 28556). The UTS are either numeric-based or technology-based standards that must be met prior to land disposal of a particular waste. The UTS applies to both the constituent that caused the waste to exhibit a hazardous characteristic or to be a listed hazardous waste, as well as underlying hazardous constituents (UHC) that are reasonably expected to be present in the waste.

PCB Waste

The Toxic Substance Control Act (TSCA) PCB Manufacturing, Processing, Distribution in Commerce, and Use Prohibitions specified in 40 CFR Part 761, as amended in 29 June 1998 Federal Register (Disposal of PCBs ["Mega Rule"], 63 FR) stipulate standards for PCB remediation wastes and other wastes containing PCBs. These regulations include threshold concentrations to categorize the specific remediation wastes, and to determine which on-site management, temporary storage, cleanup, and disposal requirements provided in 40 CFR 761.50-761.79 apply.

The PCBs contained in concrete samples from portions of the Polyester Spinning and Polymer Plant may meet the definition of a "PCB remediation waste" provided in 40 CFR 761.3. Therefore, based on this data, the solid waste would be managed in accordance with the bulk remediation waste requirements in 40 CFR 761.61 pertaining to remediation waste containing PCBs $\geq$ 50 mg/kg.

Decontamination Clean-up Standards

The streamlined human health risk evaluation for the buildings indicates that the concentrations of contaminants on or within the buildings are below levels that pose a risk to a site construction worker during demolition. However, decontamination of building surfaces is needed to protect ground water and ensure efficient disposition of demolition debris. The decontamination standard will be a performance standard of visibly clean with respect to dust and chemical residues on the building surfaces. Additionally, numeric standards for RCRA and TSCA waste described above will also apply. The decontamination clean-up standards are described below.

<u>Visual-Based Standard</u>

The visual-based decontamination performance standard will based upon the RCRA debris decontamination standard set forth in 40 CFR 268.45 (Treatment Standards for Hazardous Debris). It is important to note that the standards in 40 CFR 268.45 are rigorous standards that were developed to allow debris contaminated with RCRA listed hazardous waste to be delisted through decontamination. The remaining buildings are not contaminated with RCRA listed hazardous waste. Nonetheless, the 40 CFR 268.45 standards provide an established visual-based performance standard that may be used during the NTCRA-Buildings. This standard will be applied to all decontaminated building surfaces. Specifically, the visual-based performance standard will be to decontaminate the building surfaces to a "clean debris surface," which will be defined as:

- The surface, when viewed without magnification, shall be free of visible contaminated soil and hazardous waste except that residual staining from soil and waste consisting of light shadows, slight streaks, or minor discoloration, and soil and waste in cracks, crevices, and pits may be present provided that such staining and waste and soil in cracks and crevices, and pits shall be limited.

A visual-based decontamination performance standard is appropriate for three reasons. First, the objectives of the NTCRA-Buildings are to: 1) mitigate the risk to human health and the environment due to the release of contaminants prior to and during demolition of the buildings, and 2) improve final demolition debris disposition by maximizing on-site re-use. The streamlined risk evaluation demonstrates that the existing contamination in the buildings does not pose a risk to construction workers. Therefore, it is not necessary to decontaminate the buildings prior to demolition to mitigate the risk. In essence, the risk-based levels for construction worker safety are already achieved. FMC's primary objective in decontaminating the buildings, at this point, is to facilitate a more favorable demolition debris disposition for ACOE non-CERCLA work. ACOE's sampling of demolition debris that they generate will provide the verification that any materials remaining on site meet the site-specific standards approved by EPA and VADEQ.

Second, the on-going coarse fraction debris characterization being performed under the TCRA-Buildings project is a field demonstration for decontamination and a visual standard, and supports the effectiveness of a visual decontamination standard. The coarse fraction debris was generated as a result of EPA's demolition of some of the most severely contaminated building areas. In many cases, due to structural concerns or the initial intent to dispose of the debris in an on-site landfill, these areas were not decontaminated prior to demolition. The TCRA-Buildings analytical data demonstrate that the contamination associated with this demolition debris is generally concentrated in the fine fraction portion of the debris, and the coarse fraction debris is significantly less impacted. Therefore, by removing the friable contamination (e.g., dust, salts, etc.)

through sweeping, washing or other surficial decontamination technique, the building media can be rendered inert. This is supported by TCRA-Buildings analytical data for cleaned debris. Based on these data, of the 28 coarse fraction lots sampled only one contained contaminants that exceeded the site-specific cleanup standards for unrestricted re-use. This empirical evidence supports that the building materials (e.g., masonry, etc.) can be effectively decontaminated by water washing or other surficial decontamination techniques and that visual inspection is a suitable means to confirm decontamination.

Third, once the buildings are decontaminated and demolished, the resultant debris will be characterized by the ACOE to determine disposition (e.g., on-site beneficial use, off-site disposal). This characterization will be an integral component to ACOE's management of the demolition debris. ACOE has indicated that it intends to perform this characterization in accordance with the approach established by FMC, EPA and VADEQ for the TCRA-Building debris management activity. The collection and analysis of samples for total and SPLP metals and PAHs will determine debris disposition. The material may be inert and acceptable as backfill material, or may be classified as solid waste that could be beneficially used in the basin closures or disposed off-site at a solid waste landfill.

Based upon visual inspection, a joint decision between FMC and EPA will be made whether the degree of staining warrants sampling to verify that surface has been appropriately decontaminated.

<u>Concentration-Based Standard</u>

The decontamination performance standard for PCB contaminated areas will be a concentration-based standard. The concentration-based standard will be the site-specific direct contact standards (i.e., 29 mg/kg for Arochlors 1221, 1232, 1242, 1248, 1254, and 1260; and 820 mg/kg for Arochlor 1016).

The decontamination approach for the areas contaminated with PCB will involve power washing and/or more aggressive removal techniques (e.g., scarification, surgical demolition) if necessary. Once the area has been decontaminated, concrete chip samples will be collected to verify that the concentration-based standard is attained. The concrete chip samples will be collected based on a grid sampling approach consistent with the procedures stipulated in 40 CFR 761 Subpart O (*Sampling to Verify Completion of Self-Implementing Cleanup and On-Site Disposal of Bulk PCB Remediation Waste and Porous Surfaces in Accordance with §761.61(a)(6)*), as well as the sampling protocols stipulated in 40 CFR

Subpart P (*Sampling Non-Porous Surfaces for Measurement-Based Use, Reuse, and On-site or Off-Site Disposal Under §761.61(a)6) and Decontamination Under §761.79(b)(3))*. The general approach is described below.

A square-based sampling grid system will overlay the entire area that was decontaminated for PCB. The grid axes will be oriented roughly north-south and east-west, unless the geometry or other condition of the room or sample area is such that an alternate orientation is more practical. The grid intervals will be spaced 1.5 meters (5 feet) apart. Discrete concrete chip samples will be collected from randomly selected grid intervals. The number of samples to collect will be dependent upon the size of the area decontaminated. A minimum of three samples will be collected from each decontamination area, regardless of the size of the decontamination area. However, for larger decontamination areas, 10 percent of the grid intervals will be sampled, provided at least three samples are collected (i.e., for a sample area with 20 grid intervals, three samples would be collected not two).

It is important to note that the sampling protocols in 40 CFR 761 Subpart O are designed such that every grid interval is sampled. FMC is proposing to incorporate the 10 percent approach due to the large areas to be decontaminated. The 10 percent approach is consistent 40 CFR 761 Subpart P which provides for sampling 10 percent of the grid intervals for large nearly flat non-porous surfaces contaminated with a single source of PCB. FMC believes that this sampling approach will appropriately characterize the PCB concentration and verify that the area has been adequately decontaminated. If every grid were sampled, the total number of concrete chip samples would be impracticably high. For instance, for a decontamination area 50 feet wide by 50 feet long, over 120 chip samples would be collected. Alternatively, utilizing the 10 percent approach, 12 samples would be collected.

For significantly large sampling areas, composite sampling may be considered, consistent with 40 CFR 761 Subpart O. Composite samples would be collected by dividing the entire sampling area into sub-sampling areas, and then collecting composites within each sub-sampling area. The composites would be comprised of discrete aliquots collected as described above. For instance, if a 100 foot by 100 foot decontamination area was to be sampled, rather than collecting a discrete sample from 10 percent of the grid intervals (i.e., 44 samples), the decontamination area could be subdivided into 16 sub-sampling areas (25 feet by 25 feet). A composite sample would be collected from each sub-sampling area by collecting aliquots from three randomly selected grid intervals within the sub-sampling area, thus generating 16 composite samples.

Based on historic sample results and information, post-decontamination sample results, and/or visual inspection, the necessity for additional samples or larger sampling grids will be determined jointly between FMC and EPA.

Site Soil Cleanup Standards

FMC proposes to use the site soil cleanup standards developed and used for the TCRA – Buildings project for addressing potential contaminants in soils during the NTCRA – Buildings project. Two soil standards will be used; the site-specific human health direct contact standards to protect human health and site-specific ground water protection soil standards to protect ground water quality. The risk-based numeric standards to be used as site-specific human health direct contact standards for soils will be the current EPA Region III Risk-Based Concentrations for an industrial/commercial exposure scenario. As previously stated, the appropriate excess cancer risk factor used will be dependent upon the number of carcinogens, and the appropriate Hazard Quotient (HQ) will be dependent upon the target organ(s) of the non-carcinogens. Based on the extensive analytical data gathered during the TCRA-Buildings and during the preparation of this EE/CA, it is anticipated that a $1x10^{-5}$ risk level for carcinogens and a Hazard Quotient (HQ) of 1 for non-carcinogenic effects will be appropriate to use for the site soil cleanup standards. However, the use of a $1x10^{-5}$ risk for carcinogens and a hazard quotient (HQ) of 1.0 for non-carcinogens is only appropriate if it can be demonstrated that there are no more than 10 carcinogens present in excess of the $1x10^{-6}$ risk level and that the non-carcinogens exceeding an HQ of 0.1 do not have the same target organ. Otherwise, the standards will need to be lowered to $1x10^{-6}$ for carcinogens, and for non-carcinogens the cumulative risk of multiple compounds affecting the same target organ must not exceed 1.0, or alternatively an HQ of 0.1 can be used as a conservative default value. EPA approved these standards for use on the TCRA – Buildings project (Remedial Action Plan for the TCRA – Buildings project approved by EPA on 7 October 1999; and EPA's letter February 11, 2000 letter).

The site-specific ground water protection soil standards (i.e., ground water protection standards) developed and applied on the TCRA-Buildings project will be used to identify allowable chemical concentrations in soil. The objective of the ground water protection standard is to ensure that ongoing or future contamination of the ground water does not occur. Since there are no current or potential future human or ecological receptors to ground water from beneath the former Avtex plant area, a traditional, risk-based approach is unwarranted. As a conservative approach, consistent with EPA guidance and allowing for Site ground water as a drinking water source (however unlikely), the ground water protection standard is based primarily on the Safe Drinking Water Act (SDWA) Maximum Contaminant Level (MCL), applied as described below.

The standards were developed using a two step approach based on EPA's "Soil Screening Guidance: Users Guide" (July 1996), and the "Soil Screening Guidance: Technical Background Document" (May 1996). The approach first involves using Synthetic Precipitation Leaching Procedure (SPLP) data to determine the concentration of a contaminant that could be leached from the soil into pore water. The second step consists of applying a dilution attenuation factor (DAF) of 10 to conservatively estimate the concentration that would occur in ground water beneath the source soils.

The ground water protection standard for a specific contaminant is determined by dividing the SPLP concentration by the DAF of 10. Except for arsenic, this "diluted" SPLP value will then be compared to the MCL provided under the Safe Drinking Water Act, or in the absence of an MCL, the current Region III risk-based screening level for the ingestion of tap water. Arsenic will be compared to 5 ug/L, which is considered to be more appropriate than the current MCL (50 μg/L) and is within EPA's acceptable risk range. The SDWA MCL's were established as maximum permissible levels of contaminants in water that is delivered to any user of a public water system. Therefore, using MCL's as a comparative standard is protective of a theoretical ground water user, and in fact very conservative given that there are no current or anticipated future ground water users at or downgradient of the building area. The ground water protection soil cleanup standards that are below the established standard will be considered protective.

Other Chemical-Specific ARARs

Other potential Federal and State chemical-specific ARARs to be considered (TBC) include:

- The Federal Clean Air Act (42 USC 7401);
- Guidance on Remedial Action for Superfund sites with PCB Contamination (OSWER Directive 9355.4-01);
- Virginia Solid Waste Management Regulations (9 VAC 20-80-10-790);
- Virginia Hazardous Waste Management Regulations (9 VAC 20-60-12 to 1505);
- Virginia Air Pollution Control Law (Code of Virginia Sections 10.1-1300 et seq.);

- Virginia Regulations for the Control and Abatement of Air Pollution (9 VAC 5);
- Virginia Ambient Air Quality Control Standards (9 VAC 5-30-20 to 80)
- Virginia Erosion and Sediment Control Law (Code of Virginia Sections 10.1-560 et seq.);
- Virginia Erosion Control Handbook.

FMC will control and direct all storm water run-off and decontamination wash water to the on-site WWTP for treatment prior to discharge. Water may be pre-treated prior to discharge to the WWTP. Therefore, management of these waters will be performed in accordance with the applicable chemical-specific requirements of the on-site WWTP National Pollutant Discharge Elimination System (NPDES) permit and the Unilateral Administrative Order. Actions performed by FMC during the NTCRA-Building activities will comply with the substantive requirements of these ARARs.

3.3.2 *Location-Specific*

Location-specific ARARs consist of restrictions placed on the conduct of activities because they occur in a specific location, such as wetlands or floodplains. There are no location-specific ARARs identified for the NTCRA-Buildings project.

3.3.3 *Action-Specific*

Action-specific ARARs are activity-based requirements on actions taken with respect to contaminants. These requirements define acceptable treatment, storage, and disposal procedures for hazardous substances.

Action-specific ARARs that will directly affect the TCRA-Buildings activities include the following:

- The Virginia Solid Waste Management Regulations (9 VAC 20-80-10 to 790);
- The identification and management of hazardous waste (40 CFR Parts 261-265 and 9 VAC 20-60-12 to 1505); and
- The identification and management of PCB waste (40 CFR Parts 761).

Virginia Solid Waste Management Regulations

The Virginia Solid Waste Management Regulations (9 VAC 20-80) are ARARs that have a direct bearing on waste generation and management during

NTCRA-Building project. These regulations will have direct applicability to the characterization of the various waste materials generated and managed during the NTCRA-Buildings, including containerized wastes, sludges in tanks and subgrade structures, liquids, decontamination waste waters, and excavated soil that are not hazardous waste.

Demolition debris management will be ACOE's responsibility, and two sections of the Virginia Solid Waste Management Regulations (9 VAC 20-80) will affect their management of the demolition debris. First, 9 VAC 20-80-60 D 5 exempts "landfilling of solid waste which includes only rocks, brick, block, dirt, broken concrete and road pavement, and which contains no paper or yard wastes" from the regulations "provided no open dump, hazard, or public nuisance" is created. The TCRA – Buildings project has showed that the building demolition debris, which contains brick and broken concrete, can be cleaned and the inert material would then be exempted from Virginia solid waste regulations. Second, the Virginia regulations (9 VAC 20-80-10) classify rubble, concrete, broken bricks and blocks as "inert waste" which is "chemically stable from further degradation and considered to be non-reactive." Based on the Virginia regulations and Virginia's 24 July 2000 approval for on-site beneficial use of fine fraction demolition debris for basin closures, it is concluded that decontaminating the building surfaces, which are predominately concrete and brick, will render the demolition debris inert, such that it can be used on-site as fill material.

Identification and Management of Hazardous Waste

The identification and management of hazardous waste (40 CFR Parts 261-265 and 9 VAC 20-60-12 to 1505) could affect the NTCRA-Building activities. Accumulated wastes and generated wastes will be characterized using analytical data and generator knowledge, and, if determined to be RCRA hazardous waste, managed in accordance with these requirements. RCRA hazardous liquids, sludges and soils managed during the NTCRA-Buildings will be stored on-site in accordance with the requirements of 40 CFR 262.34 and 9 VAC 20-60-262 B.4 (relating to accumulation time) and managed off-site at Subtitle C facility approved to accept CERCLA waste. Available information indicates that the building demolition debris and other accumulated sludges are not listed hazardous wastes. However, waste may be characterized to determine hazardous characteristics to ensure it is non-hazardous.

Identification and Management of PCB Waste

The identification and management of PCB waste (40 CFR Parts 761) could affect the NTCRA-Building activities. PCB-contaminated debris removed from the buildings may be characterized in accordance with 40 CFR 761 Subpart N, and if determined to contain PCBs, will be managed in accordance with the requirements of 40 CFR Parts 761.61. PCB containing liquids, sludges, soils, and remediation debris removed from or generated during the NTCRA - Building activities will be stored on-site in accordance with the requirements of 40 CFR 761.65, and managed off-site in accordance with 40 CFR 761.61.

Other Action-Specific ARARs

Other potential federal action-specific ARARs for the NTCRA-Building activities include:

- Off-site landfills must comply with the October 1993 amendment to the NCP requiring facilities accepting CERCLA cleanup wastes to be in compliance with federal and state requirements;
- Treatment of characteristic hazardous wastes subject to RCRA LDR (40 CFR 268);
- Identification and management of hazardous waste (40 CFR Parts 261-264);
- Transportation and disposal of hazardous waste (49 CFR, Parts 107, 171-500);
- Handling and transportation of ACM (40 CFR 61); and
- Occupational Safety and Health Standards (29 CFR Parts 1910, 1926 and 1904).

Other potential Virginia and local action-specific ARARs for the demolition debris management activities include:

- Solid Waste Management Regulations (9 VAC 20-80-10 to 790), including Management of soil contaminated with petroleum products (9 VAC 20-80-700) and PCB waste (9 VAC 20-80-650);
- Control of airborne fugitive dust emissions during loading and transport to an on-site or off-site landfill in accordance with Virginia air quality regulations (9 VAC 5-50-60 to 120);
- Virginia Ambient Air Quality Control Standards (9 VAC 5-30-20 to 80);
- Management of storm water runoff and wash waters (4 VAC 3-20-10 to 251) and in accordance with Virginia Water Control Regulations (9 VAC 25-10 to 610);
- Management of hazardous waste (9 VAC 20-60-12 to 1505)
- Transportation of hazardous materials (9 VAC 20-110-10 to 130);

- Maintenance of sediment and erosion control plan for earth moving activities (4 VAC 50-30-10 to 110); and
- Transportation and handling of ACM (9 VAC 20-80-640).

The actions performed by FMC during the NTCRA-Buildings activities will comply with the substantive requirements of these ARARs. FMC will implement on-site support actions to comply with the fugitive dust emission controls, storm water runoff and wash water management, and erosion and sedimentation control requirements. In addition, all operations will be performed in accordance with the Site-Wide HASP and appropriate OSHA requirements.

Section 4

Section 4

4.0 IDENTIFICATION AND ANALYSIS OF RESPONSE ACTION ALTERNATIVES

The identification and analysis of response action alternatives for the three main NTCRA-Building tasks, namely buildings and other above grade structures, foundations and subgrade structures, and sewers and manholes, have been evaluated against the major criteria identified in the EPA *"Guidance on Conducting Non-time Critical Removal Actions Under CERCLA"* (EPA, August 1993 EE/CA Guidance): effectiveness, implementability and cost. The assembled alternatives are subsequently evaluated against the followed by an evaluation of the following five additional criteria:

- Overall protection of human health and the environment;
- Compliance with ARARs;
- Long-term effectiveness and permanence;
- Reduction of toxicity, mobility or volumes through treatment; and
- Short-term effectiveness.

4.1 BUILDINGS, OTHER ABOVE GRADE STRUCTURES, FOUNDATIONS AND SUBGRADE STRUCTURES

Decontaminating the buildings and other above grade structures and decontaminating the foundations and subgrade structures have been combined into one alternative evaluation due to the similarity between the actions. There are two additional response actions associated with the foundation and subgrade structures: 1) removal and management of accumulated liquids and solids; and 2) characterization and management of potentially impacted underlying soil. However, the practical alternatives for these two response actions are limited to removal and management, and therefore, the identification and analysis of alternative technologies for these actions is not incorporated into the discussion below, but have been incorporated into the assembled alternative presented in Section 4.1.2.

The objective of this response action is to decontaminate the remaining buildings, above grade structures, foundations, and subgrade structures to mitigate the migration of contaminants until the remaining buildings and structures are demolished. During the period prior to demolition, the decontamination is intended to prevent the cross-media transfer of contaminants to air, soil and ground water, and mitigate any unacceptable risk to on-site workers. Additionally, decontamination will facilitate the anticipated non-CERCLA demolition action of the remaining buildings and reduce the costs associated with debris disposition.

As presented in the *Work Plan to Conduct the EE/CA for the NTCRA-Buildings*, the objective of the physical characterization and subsequent sample collection and analysis, was to allow the buildings or areas to be qualitatively segregated by degree of contamination, such as "low, medium, or high". Conceptually, "low" and "medium" levels would require primarily surficial decontamination techniques, such as sweeping, vacuuming, or power washing, whereas "high" levels would require more aggressive techniques, such as solvent extraction, scarification, or selective removal/demolition. The criteria considered to rank the areas into these categories includes degree of contamination, type of contaminants, and the type of media contaminated (e.g., dust/sweepings, concrete, etc.).

Based on an evaluation of the inspection findings, the analytical results from samples collected within the buildings, and analysis of risk posed to construction workers during demolition, the majority of the buildings are within a "low" to "medium" category, and there are only a few areas which would constitute a "high" degree of contamination. Specifically, the major physical decontamination issues are dust removal, and addressing moderate petroleum hydrocarbon stains and low level PCB contamination. The major chemical decontamination issue is lead present in fine debris/sweepings on the various building floors. Although there are numerous areas with localized or moderately sized petroleum hydrocarbon stains, the PCB concentrations and SVOC concentrations in concrete associated with these stains do not pose an unacceptable risk to site construction workers due to the lack of direct contact and inhalation exposure pathway, as well as the relatively low contaminant concentrations. As such, the petroleum hydrocarbon contamination is relatively surficial, and has not significantly penetrated into the concrete, and therefore would represent a low to medium decontamination concern. The areas that constitute "high" decontamination concerns, which would require aggressive decontamination techniques, include the localized areas where PCBs have penetrated the concrete.

In regards to the subgrade structures, the physical inspection findings indicated that almost all of the pits, sumps, and other subgrade structures (e.g., tunnels and vaults) contain water. In some cases, the water contained a separate hydrocarbon phase floating on top of the water surface. The results of the recent sampling indicate that there are some accumulated waters with slightly elevated PCB concentrations. These accumulated waters and any associated solids would require removal and management as part of the decontamination process. Following removal of accumulated water and solids, the structures themselves may require decontamination, similar to the above grade structures. However, due to the presence of liquids, it was not possible to perform a comprehensive visual inspection of many of the subgrade structures, which would support the selection of a particular decontamination technique. Therefore, upon removal of accumulated waters and associated solids from subgrade structures, FMC will inspect each subgrade structure to identify potential environmental and/or structural concerns and select an appropriate decontamination approach. Subgrade structure inspections will be conducted on an on-going basis to expedite and facilitate the execution of the NTCRA. FMC will document the inspection findings in an inventory and will submit the findings and proposed decontamination techniques to EPA for approval prior to commencing decontamination activities. The inspection findings will be transmitted to EPA via the weekly site meetings, weekly reports, and/or other similar mechanism.

In addition to the surface-related contamination, the management/ decontamination of tanks, piping, and ductwork is a significant component to the overall decontamination of the buildings. The majority of process-related tanks and piping that would contain chemicals/contaminants of significant concern have been removed during previous removal actions. However, some of the tanks and piping within the Polymer Plant complex, the Power House Complex, and the Mercerizing No. 1/Viscose Cellar No. 6 area still exist, and may contain chemical residues that require removal prior to disposal, or special management/disposal. Furthermore, although no samples have been collected from the air ventilation ductwork, it is anticipated that the ducts contain contaminants at levels similar to those found in dust sweeping samples that require decontamination. A critical consideration for this response action is the integration with ACOE's asbestos abatement approach.

Therefore, for this EE/CA, two major decontamination tasks have been evaluated: surface decontamination; and tank, pipe, ductwork decontamination. In addition, since the most effective approach to decontaminating the structures will depend on the type of contamination and/or media, the selected alternative will be an assembly of decontamination techniques. As such, the alternative analysis for decontamination is presented as a technology-based analysis, to facilitate the evaluation of a given technology for a particular type of contamination and/or media, and to allow a combination of the most effective decontamination techniques to be assembled into a complete response action alternative.

Lastly, the no action alternative consisting of no decontamination prior to demolition is not a viable alternative and was not included in the EE/CA. In the absence of decontamination, the disposition of the demolition debris would be uncertain. A portion of the debris could potentially require placement in a hazardous waste landfill (for example due to leachable lead), and could require management as a solid waste. As shown during the TCRA – Buildings project, segregation and decontamination of debris after bulk demolition is inefficient and costly.

4.1.1 *Technology Evaluation*

The following presents an evaluation of decontamination techniques that are considered appropriate for surface decontamination of the building structures and for decontaminating tanks, pipe, and ductwork. Each of these techniques may be appropriate for decontaminating some portion of the buildings depending on the nature of contamination and the media that is contaminated, and it is not likely that only one technique by itself will be appropriate. Therefore, the following evaluation is structured to evaluate the decontamination techniques by effectiveness, implementability, and cost with respect to nature of contamination and media type. In this manner, the most appropriate technique can be selected for a specific decontamination situation, and from this a complete response action alternative can be developed which will consist of a combination of techniques. It should be noted that modification of decontamination techniques is expected during the RAP preparation process as details are further examined.

Surface Decontamination Techniques

Based on the evaluation of the inspection findings and analytical data, the surface decontamination techniques that have been considered include a range of aggressive to less aggressive techniques, including selective/surgical demolition, scarification, power washing, vacuuming, and sweeping. A brief description of each technique is provided below.

- **Sweeping and vacuuming** are used to physically remove dry and/or relatively dry surficial contamination. Sweeping and vacuuming can be performed manually or using mechanical industrial sweepers/vacuums depending on the size of the area to be decontaminated and the presence of obstructions or other constraints within the footprint to be decontaminated (e.g., excessive equipment). Sweeping and vacuuming are the least aggressive techniques considered in this EE/CA, and are effective for bulk removal of particulate contamination. Options to these techniques include: wet methods, which adds water during the sweeping or vacuuming process, which assists in dust control and helps solublize/flush contaminants; and high efficiency particulate air (HEPA) filters, which assist in controlling hazardous dust emissions during sweeping or vacuuming.

- **Power washing** decontaminates by removing contaminants both through physical pressure exerted by the pressurized water and by utilizing water as a solvent to help extract surficial contaminants. Power washing is more aggressive than sweeping and vacuuming, and is more effective on recalcitrant surficial contamination, such as chemical residues/staining. Options to this technique include: high-pressure washing; steam cleaning; and the use of surfactants as an additive to the wash water. These options assist in removing more recalcitrant residues.

- **Scarification** is a process of removing a thin section of a concrete or similar surface by means of a series pneumatically driven piston heads. The piston heads chip off the concrete surface, typically up to a depth of approximately one-inch. Scarification is considered an aggressive decontamination approach, and is considered for removing contaminants that have penetrated into the shallow surface of concrete or similar surface and for extensive, open area decontamination.

- **Selective/surgical demolition** is a process of removing localized sections of the building structure or internal components to remove the contaminated media. Selective/surgical demolition can be performed manually by disassembly of equipment, or mechanical techniques, such as pneumatic hammering (e.g., jackhammer) or saw cutting. Selective/surgical demolition is considered an aggressive decontamination approach, and is considered for removing contaminants that have penetrated into the shallow and/or deep media surface. This technique is appropriate for large areas of significant contamination or very localized areas of decontamination, especially in more confined areas where scarification is limited.

Table 10 provides a comparison of these surface decontamination techniques, including the advantages and disadvantages with respect to effectiveness and implementability, and cost effectiveness. Based on this comparison, FMC believes that a combination of the following techniques will be most appropriate to decontaminate the buildings:

- Wet Sweeping – removal of low to moderate surface contamination;

- HEPA Vacuuming – removal of residual asbestos contamination or in areas where wet sweeping may not be practical due to space constraints or dust control considerations;

- High-pressure Power Washing – removal of localized chemical residues and staining; and

- Selective/Surgical Demolition – removal of the concrete from several localized areas that have been identified to contain PCBs in the shallow concrete surface.

All of these techniques are effective for decontaminating low to moderate levels of contamination; however, sweeping, vacuuming and power washing are significantly more implementable/practical than selective/surgical demolition. Sweeping represents the most cost effective technique, followed by power washing and then vacuuming. For highly contaminated areas, high-pressure power washing may be effective, but to a lesser degree and with less certainty than selective/surgical demolition. However, selective/surgical demolition is less cost effective and presents additional potential physical hazards to workers due to the aggressive nature of the process.

A description of how these techniques would be used as part of the response action alternative and further evaluation of the assembled alternative is provided in Section 4.1.2.

Tanks, Pipe, and Ductwork Decontamination

The tanks and piping have been separated as process and non-process. Non-process tanks and piping include the fire-water system, steam system, and water system. These systems are anticipated to be free of contamination, and will not require decontamination. Process tanks and piping include the obvious process systems (e.g., Polymer Plant complex tanks and piping, caustic lines, etc.) and also include the brine system and ammonia chiller system. The brine system is considered a "process system" because chromium was historically added to the brine as an antibacterial and anticorrosive additive, and therefore, chromium contamination is a potential decontamination concern. The process systems are anticipated to require a greater degree of decontamination due to the potential presence of residual liquids or solids containing hazardous constituents.

It is important to note that hydraulic fluids or other materials encased in or integral to machinery, pumps or other equipment (e.g., mercury switches, fluorescent light ballast, etc.) are considered to be part of the equipment (i.e., facility) and do not pose an unacceptable risk to site workers or the potential for the cross-media transfer of contaminants if handled properly prior to and during facility demolition. Management of these materials is considered to be a part of the non-CERCLA work, and ACOE will handle these materials during removal and scrapping of the equipment under the non-CERCLA demolition project.

Ductwork will need to be decontaminated. The ductwork will likely contain some degree of contamination that will require decontamination as a result of long term accumulation of air-borne contaminants.

Additionally, one of the most significant considerations to managing/decontaminating the tanks and piping is the integration of ACOE's asbestos abatement work and FMC's CERCLA decontamination tasks for those tanks and pipes wrapped in asbestos. Therefore, evaluation presented below separates the task into two major categories: tanks, piping, and ductwork without asbestos; and tanks, piping, and ductwork with asbestos.

The two approaches for decontaminating the tanks, piping, and ductwork without asbestos include an in-situ approach and ex-situ approach. In both approaches, the equipment would be drained to remove free flowing residual materials and then decontaminated with water wash. However, in the in-situ approach the equipment would be flushed/decontaminated in-place and would remain in place until demolition of the buildings. In the ex-situ approach, the equipment would be removed to facilitate decontamination and subsequently stockpiled for off-site disposal or recycle.

The three approaches for decontaminating the tanks, piping, and ductwork wrapped in asbestos include (FMC's activity shown in bold and ACOE activity shown in underline):

- **Drain, Flush/Decontaminate In-Place,** Wrap and Remove Equipment for disposal as ACM (most appropriate for piping);
- Remove ACM, **Drain, In-situ Flush/Decontaminate, and Leave In-Place**; and
- Remove ACM, **Drain, Remove Equipment, Ex-situ Flush/ Decontaminate, and Stockpile** for off-site disposal or recycle.

FMC believes that a combination of the following techniques will be most appropriate to address the tanks, piping and ductwork:

- Equipment without asbestos;
  - Non-process tanks and piping – **drain and in-situ decontamination, and**
  - Process tanks, piping and ductwork – **drain and ex-situ decontamination.**
- Equipment with asbestos;

- Non-process tanks and piping – **drain**, remove bulk asbestos from tanks and large diameter pipes and leave equipment in place, and wrap small diameter pipes for complete removal and disposal as ACM, and

- Process tanks, piping and ductwork – remove asbestos, **drain, and remove equipment for ex-situ decontamination.**

A description of how these techniques would be used as part of the response action alternative and further evaluation of the assembled alternative is provided in Section 4.1.2.

4.1.2 Response Action Alternative

Alternative Description

The response action alternative consists of the following tasks:

- Decontamination of the buildings and other above grade structures;
- Evacuation and management of liquids and solids accumulated in pits, sumps, and other subgrade structures;
- Decontamination of the foundations and subgrade structures;
- Demolition and removal of foundations and subgrade structures (by ACOE);
- Decontamination of the underside of subgrade structures; and
- Evaluation/characterization of underlying soils, and management of soils that exceed the site soil cleanup standards.

Based on the information compiled during the physical characterization and an evaluation of the recent and historical analytical data, the most prevalent contamination is dust/sweepings containing lead. This contamination is not considered to be recalcitrant or difficult to remove since it is present as particulates, and therefore, less aggressive decontamination techniques are appropriate for the majority of the building surface area. However, there are localized areas of more recalcitrant contamination, typically petroleum residues and caustic salts. In these localized areas, more aggressive decontamination will be necessary. Furthermore, there are two types of tank, pipe and ductwork scenarios (i.e., asbestos and non-asbestos) that will be encountered. As such, the response action alternative for decontaminating the buildings and subgrade structures involves a combination of techniques, as described below.

Prior to initiation of decontamination, ACOE will abate asbestos to the extent possible. Asbestos abatement will likely consist of bulk removal and vacuuming or wet sweeping of asbestos particulates. FMC will support the ACOE by treating wash waters on-site generated during asbestos abatement.

The first step in the decontamination process would be loose debris removal, and lab pack and removal of other containerized waste materials. The loose debris removal is needed to facilitate decontamination and would be performed using a combination of heavy equipment and manual methods. Although there may be some accumulated dust or residue on the loose debris, it is expected that the loose debris will be characterized as non-hazardous solid waste, and handled as demolition debris by ACOE. In the event that the accumulated dust or residue may cause the debris to be characterized as hazardous waste, FMC would take responsibility of decontaminating the debris by such methods as washing or vacuuming. The loose debris would then be stockpiled by FMC for subsequent off-site disposal during the demolition phase by ACOE. Fixed equipment would be left in place for decontamination by FMC, if necessary, and removal by ACOE during the demolition phase. Containerized and lab pack waste would be removed and consolidated as appropriate for off-site disposal by FMC.

Following the debris and containerized waste removal, the tanks, piping and ductwork would be decontaminated. Ductwork would be physically removed and relocated to an on-site decontamination area. The ductwork would be sized to facilitate visual inspection to assess the need for decontamination. As necessary, the ductwork would be decontaminated by FMC to a visually clean surface using a water wash. The ductwork would be stockpiled by FMC for off-site future disposal or recycle by ACOE.

The tanks and piping would be managed following ACOE asbestos abatement. Once the asbestos has been removed from the tanks and piping, the non-process tanks and pipes would be drained by FMC, and left in-place for future removal during the demolition phase. Process tanks and pipes would be drained and removed by FMC to facilitate decontamination. The process tanks and pipes would be relocated to an on-site decontamination area and cleaned to the extent practicable by FMC with a water wash. Tanks and pipes that can be cleaned to allow for off-site recycle (i.e., visually clean) will be segregated from those that will require off-site disposal.

Next, the majority of the building surface area would be decontaminated by FMC by wet sweeping. Wet sweeping would remove the dust, sweepings and other gross, friable residues present on floors of the buildings. The wet sweeping would be supplemented with industrial vacuuming using a HEPA filter to remove the dust, sweeping and other gross, friable residues from confined areas (e.g., tight office areas, etc.) where the wet sweeping may have limited access, or in areas where residual asbestos is a significant concern (e.g., Power House Complex). Following the sweeping and vacuuming, localized high-pressure power washing would be performed on areas of visible residual staining that was not removed by sweeping and vacuuming. The localized high-pressure power washing would be applied to those areas with more recalcitrant contamination, especially the Polymer Plant Complex and Power House Complex due to oil residues and PCBs, and the Mercerizing No. 1 area due to the caustic residues. Sweeping or other area-wide decontamination will not be performed on walls or ceilings because the majority of the potentially contaminated media is accumulated on the floors. However, some localized decontamination of walls and ceilings may be performed where significant contamination is visually evident, such as oil residues or accumulated salts on walls and ceilings.

Lastly, surgical demolition would be performed in the areas in which power washing proves to be ineffective (by both a visual and analytical determination) in removing PCBs from concrete. The concrete sampling and analysis suggests that that PCBs have penetrated the concrete, including areas in the Polymer Plant and the second floor of Adhesive Dip. In the Polymer Plant, PCBs were contained in the Therminol heat exchange system, which was an integral part of the process, and was stored in tanks and distributed through pipes and pumps. Therefore, the release of PCBs in the Polymer Plant was potentially widespread due to potential process equipment leaks.

The PCBs in the Power House Complex were primarily associated with localized releases from transformers. It is important to note, that although PCBs were detected in the Power House Complex, the concrete sampling indicates that the PCBs have not penetrated into the floor to a degree that would require surgical demolition or other more aggressive techniques to meet the RAOs. Therefore, it is expected that power washing will be effective in removing the PCBs from the concrete in the Power House Complex. As described in Section 3.3.1, post-decontamination sampling and analysis of the PCB cleanup areas will be used to confirm attainment of PCB concentration-based standards.

The physical inspection findings indicated that almost all of the pits, sumps, and other subgrade structures (e.g., tunnels and vaults) contain water. The first step of decontamination of the pits, sumps, and other subgrade structures would consist of the evacuation of the water and sludge. Previous Site experience indicates that bulking and on-site pretreatment of the water for phenols, metals, and low-level PCBs is technically feasible and cost-effective. Based on the results of the recent sampling, it appears that there are some accumulated waters with slightly elevated PCB concentrations. In light of the recent upgrades to the on-site WWTP (e.g., filtration, activated carbon), these accumulated waters may be effectively treated in the on-site WWTP. However, for some of the accumulated waters that contain higher PCB concentrations, pretreatment (e.g., filtration, carbon adsorption) may be performed prior to discharge to the SB-1 to further reduce PCB loading to the WWTP.

The water would be bulked in a portable tank or similar temporary storage structure (such as the Spray Ponds), pretreated on-site to the extent necessary, and discharged to the WWTP. Hydrocarbon liquids (non-aqueous phase) would be decanted or otherwise separated from aqueous phase liquids and would be disposed of off-site. Sludge will be bulked and disposed off-site as a solid waste.

Upon removal of accumulated waters and associated solids from subgrade structures, FMC will inspect each subgrade structure to identify potential environmental and/or structural concerns and select an appropriate decontamination approach. Subgrade structure inspections will be conducted on an on-going basis to expedite and facilitate the execution of the NTCRA. The results of these inspections and proposed decontamination procedures will be submitted to EPA for approval prior to commencing decontamination activities. It is anticipated the majority of the subgrade structures would be decontaminated via wet sweeping or power washing; however, certain areas may require more aggressive decontamination, such as the sumps and drain lines in the Polymer Plant Complex where historical analytical data indicates high levels of PCBs in residues remaining in these structures. The necessity of more aggressive decontamination techniques may be confirmed through collection of samples during the decontamination phase, or may be assumed to be necessary based on the previous data or visual inspection.

The wastes generated from the decontamination process would include both solid and liquid wastes, and likely include some RCRA hazardous waste, PCB-contaminated waste, asbestos-containing waste, and non-hazardous solid wastes. Solid wastes and non-aqueous wastes generated during the decontamination process would be collected, consolidated, sampled and characterized as necessary, and disposed off-site, in accordance with local, state, and federal regulations. Aqueous wastes would be evaluated for management in the on-site WWTP. Debris, scrap and other material removed during the decontamination process will be stockpiled for management by ACOE during the demolition phase.

The decontamination standard will be the visual-based performance standard of a "clean debris surface," defined in Section 3.3.1, for the building surfaces. Based on the on-going TCRA-Buildings activities, FMC believes that a visual standard is an effective means of assessing whether surfaces are cleaned adequately. The primary means of decontamination verification would be visual inspection, but would be supplemented by post-decontamination concrete chip samples collected from the PCB cleanup areas, as described in Section 3.3.1.

An evaluation of impact to soil would be performed following removal/demolition of subgrade structures by ACOE. Slabs and foundations that exist up to six feet below grade will be removed by ACOE. However, as approved by the Warren County Economic Development Authority, slabs and foundations that exist deeper than six feet below grade will be broken apart by ACOE (to reduce the potential for future subsurface ponding of water) but left in place for subsequent evaluation by FMC as described below.

Due to the potential migration of contaminants through the foundations and/or subgrade structures to underlying soils, it will be necessary to assess the nature and extent of impact to soils within each foundation and subgrade area and consider alternatives to mitigate the impact. FMC will characterize and address any contaminated soil underlying or adjacent to the subgrade structures, including slabs and foundations that exist deeper than six feet below grade. Slabs and foundation below six feet below grade may remain in place provided that CERCLA impacts are adequately addressed. Preplanning efforts will be utilized in an attempt to identify areas with potential CERCLA impacts.

The approach to addressing these soils would be consistent to that being used during the TCRA-Buildings project. Specifically, as foundations or subgrade areas are demolished, soil samples would be collected and analyzed to determine if they exceed the site soil cleanup standards. In the event impacted soils are identified, they would be either excavated by FMC for off-site disposal or on-site beneficial use, or remediated using in-situ or ex-situ methods. Specific remediation approaches for the soils under subgrade structures will be addressed during the RAP implementation. In addition, the foundation material removed would be decontaminated as necessary to remove impacted residual soils.

Effectiveness

Effectiveness addresses the ability of an alternative to meet the RAOs and to be protective of human health and the environment. Text in bold highlights the individual evaluation criteria identified in EPA's EE/CA guidance (EPA, 1993).

This alternative would be **effective** in satisfying the RAOs of **protecting** against direct contact with and inhalation of potentially hazardous constituents prior to, during, and following demolition of the buildings by **removing** these potentially hazardous constituents from the buildings. The decontamination residues containing potentially hazardous constituents would be **treated** on-site or off-site and/or **disposed** off-site. As such, by removing, treating, and/or disposing the contaminants, this alternative provides **long-term protection** against release to the environment and direct contact.

The major potential **short-term impact** would be the accidental release of hazardous constituents during the decontamination process. Although engineering controls would be implemented during the process, such as dust control and run-on/runoff controls, there is the potential for accidental release of contaminants. However, it is not expected that these would be significant nor would they result in an off-site migration of contaminants. Furthermore, this potential short-term impact is inherent to any alternative. The potential hazards posed to workers would include the common physical and chemical hazards associated with building decontamination and demolition work, and managing materials contaminated with heavy metals, PCBs, and/or asbestos. These hazards can be adequately managed through health and safety controls.

This alternative can achieve compliance with chemical-specific and action-specific **ARARs**.

Implementability

Implementability addresses the technical feasibility of performing the alternative and the availability of the resources required to implement the alternative. Text in bold highlights the individual evaluation criteria identified in EPA's EE/CA guidance (EPA, 1993).

This alternative is **technically feasible**, and the technologies and resources to implement the various decontamination techniques are readily **available** and common practice in the industry. However, a major technical feasibility issue with this alternative, or any other alternative, is the integration of asbestos abatement with the decontamination activities. In typical building decontamination and demolition projects, asbestos abatement is usually performed prior to building decontamination. However, due to the presence of other contaminants in certain areas within the buildings, it may be necessary to perform some of the decontamination prior to abatement. Although this is feasible, it presents a logistics and sequencing concern, and will require integration and planning with the ACOE. FMC and ACOE have already initiated the planning and integration process.

There should be no significant objections to this alternative by the **state or the community**. Based on the RAOs, the decontamination alternative adequately protects against the potential migration of contaminants prior to, during, and following demolition.

Cost

Table 11 presents the total estimated cost for decontaminating the buildings, foundations and subgrade structures. FMC believes that the decontamination techniques selected for the alternative are cost effective. The estimated cost of $2,724,000 is based on an estimation of a number of unit quantity variables, including but not limited to square footage to be decontaminated using a particular technique, daily production rates using each decontamination approach, amount of residue and waste to be generated, and estimated volume of impacted underlying soil.

4.2 *SEWERS AND MANHOLES*

The objective of the removal action for the sewers and manholes is to mitigate the potential threat to human health and the environment posed by the sewers and manholes and their contents. The alternatives for managing the process, sanitary, and storm sewers include the following:

1. Excavate and dispose of sewers, perform post-excavation soil sampling and remediate soils with contaminant levels in excess of site soil cleanup standards, and then backfill the excavations; and
2. In-place closure, by grouting the sewers with flowable fill, and leave any soils with contaminant levels in excess of site soil cleanup standards in place.

As presented in the *Work Plan to Conduct the EE/CA for the NTCRA-Buildings*, in-place decontamination of sewers and plugging was considered as a potential alternative. However, upon further evaluation of the physical condition of the sewers and manholes, it is unlikely that in-place decontamination techniques would be implementable for all sewer sections. The poor condition of some of the sewers (e.g., broken sewers, plugged sewers, and collapsed sewers) would limit access for in-place decontamination equipment to certain sewer lengths. Therefore, a response action alternative that only includes in-place decontamination would not be a practical approach to achieve the RAOs. Therefore, in-place decontamination as a stand-alone alternative is not retained for consideration. However, in-place decontamination is retained for consideration as a technique to be used in conjunction with other techniques as part of a potential response action alternative. Although the physical condition of the sewers may adversely affect the implementability of the filling, by filling/plugging the manholes and inverts, the potential migration of hazardous constituents can be mitigated by filling.

Closure of the process and storm sewers will eliminate the conduit for stormwater runoff from the former production plant area to the Sulfate Basins. However, since the majority of the buildings will have been demolished prior to closing the plant area storm sewers, the majority of precipitation will fall directly on to soil and infiltrate into the soil, and the need to manage plant area stormwater runoff will be significantly reduced.

4.2.1 *Technology Evaluation*

The following presents an evaluation of the two techniques that have been considered for addressing all of or portions of the sewers and manholes: excavation and removal and in-place closure using flowable fill. The following evaluation is structured to evaluate each technique by its effectiveness, implementability, and cost with respect to condition of the sewers. In this manner, the most appropriate technique can be selected for a specific situation, and from this two response action alternatives have been developed that consist of a combination of techniques.

Excavation and Removal

Excavation and removal involves the physical removal of the sewers and manholes through excavation of the surface soil, overburden soil and sewer line components using heavy construction equipment. Excavated soils would be stockpiled for visual inspection, field screening and/or chemical characterization to assess whether the soil contains constituents in excess of the site soil cleanup standards, as described below. The excavated sewer line components would be segregated for decontamination and off-site disposal, recycling or onsite beneficial use. The soils excavated from adjacent to the sewers and manholes (i.e., an approximate one foot radius around sewers and manholes), as well as visually impacted soils or soils that exceed field screening criteria, would be stockpiled in 500 cubic yard lots for chemical characterization.

This technique is an aggressive approach, and for shallow sewer lines, is implementable and cost effective. However, as the depth of excavation increases, cost limitations and implementability issues become more significant. Common excavators have a typical excavation depth of up to 15 feet below grade surface. In order to reach greater depths, it is necessary to "bench down" to provide a stable work platform for the excavator that is at lower elevation. Benching down is performed by excavating the surrounding area to create a working platform at a lower grade elevation, which results in substantially more excavation work and soils management.

During the course of excavation, visual inspections and field screening would be performed on an ongoing basis to assess the potential presence of contamination. In addition, post-excavation inspections, field screening, and soil sampling would be performed to verify that impacted soil has been appropriately removed from the excavations. The approach to be used to characterize soils associated with the excavation of sewers would be as follows:

- Surface soils (0-2 feet below grade surface) would be stripped and stockpiled in 500 cubic yard lots. Each 500 cubic yard lot would be sampled to characterize the soil with respect to the site-specific soil cleanup standards to determine disposition options (e.g., on-site backfill, on-site beneficial use, or off-site disposal). Characterization results would be compared to both direct contact and ground water protection standards.
- Subsurface soils or overburden soils (2 feet below grade surface to 1 foot above the sewers) would be visually inspected and field screened using headspace photoionization detector (PID) and hydrogen sulfide monitors, and soil pH measurements. Soil samples would be collected based on the results of visual inspection and field screening, or if the analytical results for the 0-2 foot sample are above site cleanup standards. For purposes of the EE/CA, it is assumed that 25 percent of the excavated overburden soil would require sample analysis.
- Adjacent soils (soils within an approximate 1-foot radius of sewer) would be staged in 500 cubic yard lots and sampled to characterize the soil with respect to the site-specific soil cleanup standards to determine disposition options (e.g., on-site backfill, on-site beneficial use, or off-site disposal).
- Post-excavation soils would be characterized using a tiered approach.
  - First, the post-excavation soils would be visually inspected for evidence of potential contamination (e.g., staining, residues, etc.).
  - Second, the visual inspection would be supplemented with field screening methods, including but not limited to pH screening, hydrogen sulfide monitors and PID to screen the sidewalls and

bottoms of the excavations. In the sewers proximate to the Polymer Plant and the Power House, FMC may also collect soil samples for PCB field screening. The field screening would be performed on 50-foot intervals or more frequently if there is visual evidence of potential contamination, such as stained soil or broken sewer lines.

- Third, soil sample analysis would be used to further characterize soils. Samples will be collected based on the results of the visual inspection and field screening. The results of these samples would be compared to direct contact standards and ground water protection soil cleanup standards. In the event that post-excavation sample exceeds one or more the site-specific soil cleanup standards, additional post-excavation samples would be collected to further define the extent of contamination. Impacted soil would be excavated (or treated in place if more practical) and subsequent post-excavation samples would be collected to confirm that the impacted soil has been appropriately removed/treated. For purposes of the EE/CA cost estimates, it is assumed that one post-excavation sample would be collected every 400 linear feet of sewer.

There is some uncertainty regarding the constituents of concern associated with each sewer type due to the interconnections between the sewers. Therefore, the suite of analyses for the soil samples associated with the sewer removal would be developed in consideration of the primary constituents of concern at the Site (e.g., metals, PCB) and the type of contamination suspected in the sewers (e.g., Viscose Sewer - carbon disulfide and phenol). For cost estimating purposes, FMC has assumed that the majority of the soil samples would be analyzed for a broad suite of analyses at an off-site laboratory (e.g., Total Metals, Total SVOC, Total PCB, SPLP Metals, and SPLP SVOC), but it would be possible to analyze some soil samples for a more focused suite of analyses (e.g., Total PCB, SPLP Metals, and SPLP SVOC). The average cost for the broad suite of analyses is assumed to be $1,700 per sample, which includes sample collection, sample analysis at an off-site laboratory, and validation. The average cost for the focused suite of analyses is assumed to be $1,100 per sample, which includes sample collection, sample analysis at an off-site laboratory, and validation. The actual suite of analyses will be dependent upon the constituents of concern associated with the sewer, and will be detailed in the NTCRA-Buildings RAP supplement for the sewer project. Additionally, the field screening and analytical data gathered during implementation of the NTCRA-Buildings should enable the suite of analysis of subsequent samples to be focused further.

Although for cost estimating purposes it has been assumed that samples will be analyzed at an off-site laboratory, FMC will evaluate and propose to utilize an on-site laboratory to better facilitate the soil sampling/screening process described above. An on-site laboratory will provide rapid sample analytical turnaround (i.e., one to three days depending on the analysis), whereas the standard off-site laboratory analytical turnaround is typically two weeks. Rapid analytical turnaround will expedite determination of the nature and extent of contamination in the soils and whether additional sampling and excavation is necessary. Expediting determinations will improve the efficiency of sewer removal by allowing "real-time" decisions regarding the extent of excavation and/or analytical parameters to be made prior to removing substantial lengths of sewer and by limiting the necessity to backtrack to areas excavated two weeks earlier. In addition, rapid analytical turnaround will reduce the duration that excavations remain open, which will help reduce water management issues and safety concerns, as well as reduce the scope and duration of soil stockpile management.

An on-site laboratory would be required to meet the Data Quality Objectives of the Site-Wide Quality Assurance Project Plan (QAPP) and use of an on-site laboratory would require prior EPA approval. This issue would be addressed more thoroughly during the preparation of the RAP Supplement for sewer removal.

In-Place Closure

The sewers and manholes could be closed in-place using flowable fill or similar low-strength cementitious material. Flowable fill is typically comprised of 90 percent coal fly ash and 5 to 10 percent Portland cement, and has the ability to flow under gravity or pumped conditions. Flowable fill is used for in-place closure of underground storage tanks and utility lines. The flowable fill would be pumped into the inlets, outlets, manhole inverts, and manholes to encapsulate any waste contained in the sewers and to mitigate the potential for the sewers and manholes to act as a conduit for contaminant migration. Although the structural integrity of some of the sewer lines may be compromised, by grouting closed the inlets, outlets and manholes, the conduit is effectively sealed.

Historic ground water analytical data supports that the sewers are not a source of impact to ground water (this will be further evaluated with the OU-7 ground water characterization efforts). If the sewers are not a source for ground water impact, an aggressive approach, such as excavation and removal, may not be necessary to mitigate the potential migration of contaminants to ground water, and that in-place closure is an appropriate approach. However, to mitigate potential further direct contact exposure, it may be necessary to remove residual contamination within or adjacent to shallow sewers, which could be encountered during future redevelopment activities. The potential for the sewers to be a source of ground water contamination will be confirmed with the ongoing OU-7 ground water sample analytical data. If the OU-7 ground water data indicates that the sewers may be a source of impact to ground water, it may be necessary to excavate the sewers to effectively mitigate the migration of contaminants.

Comparative Analysis

The cost effectiveness of excavation and removal versus in-place closure depends on the depth and diameter of the sewers. Excavation and removal is cost effective for shallow sewers, but becomes less cost effective at depths greater than 15 feet for the average sewer diameter. Therefore, two alternatives have been considered:

- Excavate and remove all sewers; and
- Excavate and remove sewers above 15 feet below grade, and close the remaining deep sewers and manholes in place using flowable fill.

Further evaluation of the assembled alternative is provided below.

4.2.2 *Response Action Alternative Evaluation*

4.2.2.1 *Alternative 1 – Excavate and Remove All Sewers*

The first response action alternative considered involves the complete excavation and removal of all the sewers and manholes, including those that are not specifically identified in the Figure 2 and/or Appendix B. This alternative would involve the physical removal of the sewers and manholes through excavation of the surface and overburden soil and sewer line components using heavy construction equipment. This alternative assumes that

Excavated surface and overburden soils would be stockpiled for visual inspection, field screening and/or chemical characterization, as described above in Section 4.2.1. The excavated sewer line components would be segregated for decontamination and off-site disposal as solid waste, off-site recycling or on-site beneficial use. The soils excavated from adjacent to the sewers and manholes (i.e., an approximate 1-foot radius around the sewer and manholes) would be stockpiled in 500 cubic yard lots for chemical characterization. As described above, post-excavation inspections, field screening, and soil sampling would be performed to verify that impacted soil has been appropriately removed from the excavations.

Soils excavated during the sewer removal work, as well as post-excavation soils, would be visually inspected, field screened and sampled as described above. Solid residues removed from the sewers and manholes would be segregated, sampled and characterized, and disposed off-site as non-hazardous or hazardous waste, as appropriate. Liquids removed from the sewers would be contained and sampled to evaluate appropriate on-site or off-site disposition. Liquids may be evacuated from sewers and/or manholes prior removal. Efforts would be made to manage liquids on-site in the WWTP; however, it may be necessary to manage some liquids off-site (e.g., non-aqueous liquids, highly contaminated waters).

For purposes of the EE/CA, FMC has assumed the following samples will be collected as part of this alternative:

- 63 surface soil samples, which is based on the estimated volume of surface soil to be removed (one sample per 500 cubic yard lot);
- 67 overburden soil samples, which is based on the assumption that 25 percent of the overburden soil removed will require sampling (one sample per 500 cubic yard lot);
- 38 adjacent soil samples, which is based on the estimated volume of adjacent soil to be removed from a 1-foot radius around the sewers (one sample per 500 cubic yard lot);
- 111 post-excavation soil samples, which based on one sample per 400 linear feet; and
- 42 quality assurance/quality control samples (e.g., matrix spike, matrix spike duplicate, and blind duplicate samples at a frequency of one per 20 samples).

For cost estimating purposes, FMC has split the 320 samples noted above into two groups – a broad suite of analyses, and a focused suite of analyses. FMC has assumed that 274 samples will be analyzed for the broad suite of analyses, and 46 samples will be analyzed for the focused suite of analyses. The basis of this split considers that certain overburden soil samples collected at depth will only require SPLP analysis for comparison to site-specific ground water protection soil cleanup standards, and will not also require totals analyses to compare against the direct contact standards. As described above, average cost for the broad suite of analysis is assumed to be $1,700 per sample, and the average cost for the focused suite of analysis is assumed to be $1,100 per sample.

In addition, FMC has also assumed that 40 waste characterization samples would be collected from the residues removed from the sewers to determine appropriate off-site disposition.

Soil sampling would be performed to determine the suitability of the soil for use as backfill or beneficial use material. Soils that meet site soil cleanup standards would be used as backfill for the excavation or beneficial use material, as appropriate. Soils that do not meet the site soil cleanup standards will be evaluated for on-site treatment or off-site disposition, as appropriate. If post-excavation soils exceed one or more the site-specific soil cleanup standards, additional post-excavation samples would be collected to further define the extent of contamination. Impacted soil would be excavated (or treated in place if more practical) and subsequent post-excavation samples would be collected to confirm that the impacted soil has been appropriately removed/treated.

Once a particular sewer or manhole has been excavated and impacted soils have been removed, the excavation would be backfilled to a grade determined to be consistent with site redevelopment. The excavation would be backfilled with soil that meets the site soil cleanup standards, inert solid waste with unrestricted beneficial use (e.g., coarse fraction, fine fraction), or clean imported fill.

Effectiveness

This alternative would be **effective** in satisfying RAO 3 of **protecting human health and the environment.** By **removing** the sewers and manholes and the hazardous constituents adjacent to and/or contained within these structures, the potential direct contact with and migration of potentially hazardous constituents is mitigated. The sewers and other removed wastes containing potentially hazardous constituents would be **disposed** off-site or on-site in the WWTP, as appropriate. As such, by removing, treating, and/or disposing the contaminants, this alternative provides **long-term protection** against release to the environment and direct contact.

The major potential **short-term impact** would be the accidental release of hazardous constituents during the excavation and removal process. Although engineering controls would be implemented during the process, such as dust control, berms, dykes, and other run-on/runoff controls, there is the potential for accidental release of contaminants. However, it is not expected that these would be significant or would they result in an off-site migration of contaminants. The potential hazards posed to workers would include the common physical and chemical hazards associated with demolition and excavation work, and managing materials contaminated with heavy metals and PCBs. These hazards can be adequately managed through health and safety controls.

This alternative can achieve compliance with chemical-specific and action-specific **ARARs**.

Implementability

This alternative is **technically feasible**. The technologies and resources to excavate and remove the sewers are **readily available** and common practice in the industry. As previously described, excavation to a depth greater than 15 feet would require benching down. Although this is technically feasible, it requires a greater area of disturbance and soils management, and may also require significant dewatering operations to manage water accumulated in the excavation. In addition, the deeper excavations present a greater worker health and safety concerns associated with excavation stability.

There should be no significant objections to this alternative by the **state or the community**. Based on the RAO, the excavation and removal alternative adequately protects against the potential migration of and direct contact with contaminants.

Cost

Table 12 presents the total estimated cost for excavating and removing the sewers and manholes. The estimated cost of $2,982,000 is based on an estimation of a number of unit quantity variables, including but not limited to linear footage of sewers, depth of sewers, and amount of residue and contaminated soil to be generated. Due to the uncertainty of the nature and extent of contamination associated with the sewers, this estimated cost includes a 20 percent contingency and a conservative estimate for the number of samples that will be required.

4.2.2.2 *Alternative 2 – Excavate and Remove with In-Place Closure*

The second response action alternative considered involves a combination of excavation and removal and in-place closure. Specifically, shallow sewers would be excavated and removed, and deep sewers and manholes would be closed in-place with flowable fill.

Sewers and manholes located up to 15 feet below grade would be excavated and removed as described above in Section 4.2.2.1, including the management of surface soil, overburden soil, and impacted soils, sewer line components, and solid and liquid residues.

Sewers located at depths greater than 15 feet below grade and those portions of manholes located below 15 feet below grade would be closed in-place with flowable fill. Prior to pumping flowable fill into the sewers or manholes, accumulated liquids and solids would be evacuated to the extent practicable to better facilitate and control the placement of the flowable fill. Vacuums and pumps would be used to remove the accumulated liquids and solids. Removal activities would be performed from the surface to the extent practicable and monitored with video equipment; however, some confined space entry may be required to facilitate removal of material from specific sewers or manholes. Removed liquids and solids would be contained and characterized to determine appropriate management. Solids residues would be managed off-site. Liquid residues and wash waters would be managed to the extent practicable on-site in the WWTP; however, it may be necessary to manage some liquids off-site (e.g., non-aqueous liquids, highly contaminated liquids).

After removal of accumulated liquids and solids, the flowable fill would be mixed on-site using the Site fly ash and Portland cement. The flowable fill would be pumped into the sewers via the inlets, outlets and inverts located within the manholes. The pumping of the flowable fill would be performed in a systematic progression, beginning at the initial sewer inlets and progressing down-sewer. By proceeding in this manner, liquids or solids remaining in the sewers will be displaced to down-sewer manholes or outlets, and may be removed and managed concurrent with the closure process. Flowable fill would be pumped into a sewer until the flowable fill is observed at the closest down-stream outlet. In some instances, blockages in the sewer or collapsed sewer sections may restrict the flow of the flowable fill through the sewer. In these cases, the flowable fill would be pumped in the inlet until forward flow is no longer possible, and then flowable fill would be pumped back up the corresponding sewer outlet to effectively plug the section of sewer. Once all the sewers to a given manhole have been filled, the manhole would be filled with flowable fill.

Effectiveness

This alternative may not be completely **effective** in satisfying RAO 3 of **protecting human health and the environment.** The potential for a current or future site worker to contact potentially hazardous constituents in and around sewers is mitigated by removing the sewers located at a depth up to 15 feet below grade and the hazardous constituents. Further, there is no reasonable direct contact pathway for exposure to sewers or soils below 15 feet. By removing accumulated liquids and solids from sewers and manholes below 15 feet, and closing these sewers and manholes in-place, the potential migration of hazardous constituents within the sewer is mitigated. However, any contaminants that have been released from the sewers would remain in the soil surrounding the sewer, and could be a source for future ground water quality impacts. Identification and remediation of these impacted soils will be problematic and costly.

The excavated sewers and other removed wastes containing potentially hazardous constituents would be **disposed** off-site or on-site in the WWTP, as appropriate. Any residual hazardous constituents remaining in the sewers and manholes closed in-place would be **contained** within the entombed structure. Any residual hazardous constituents remaining in the entombed sewers and manholes, or in adjacent soils are not likely to pose a threat to ground water quality. However, in the absence of empirical data to substantiate this fact, it is uncertain as to whether this alternative provides **long-term protection** against release to the environment.

The major potential **short-term impact** would be the accidental release of hazardous constituents during the excavation and removal process or during the pumping of the flowable fill. Although engineering controls would be implemented during the process, such as dust control, berms, dykes, and other run-on/runoff controls, there is the potential for accidental release of contaminants. However, it is not expected that these would be significant or would they result in an off-site migration of contaminants. The potential hazards posed to workers would include the common physical and chemical hazards associated with demolition and excavation work, and managing materials contaminated with heavy metals and PCBs. These hazards can be adequately managed through health and safety controls.

This alternative can achieve compliance with chemical-specific and action-specific **ARARs**.

Implementability

This alternative may not be completely **technically feasible**. The alternative is feasible with respect to the technologies and resources needed to excavate and remove the sewers and to manufacture and inject flowable fill. These resources are readily **available** and common practice in the industry. Further, the presence of ample quantities of fly ash on-site makes this alternative cost-effective.

However, there are two technical feasibility concerns associated with this alternative. First, this alternative requires the ability to pump flowable fill through partially blocked or collapsed sewers, which could prove to be difficult. However, by pumping from both the inlets and outlets of the sewers, it is anticipated that the sewers can be effectively plugged. Second, the identification and remediation of impacted soils surrounding the sewers will be difficult and costly.

There may be objections to this alternative by the **state** and **community** since this alternative may not adequately protect against the potential migration of contaminants present in soils surrounding the sewers.

Cost

Table 13 presents the total estimated cost for excavating and removing the sewers and manholes. The estimated cost of $2,580,000 is based on an estimation of a number of unit quantity variables, including but not limited to linear footage of sewers, depth of sewers, diameter of sewers, and amount of residue and waste to be generated. Due to the uncertainty of the nature and extent of contamination associated with the sewers, this estimated cost includes a 20 percent contingency and a conservative estimate for the number of samples that will be required.

4.2.3 *Comparison of Alternatives*

The key difference between the two alternatives is the uncertainty associated with characterization of impacted soils surrounding the sewers below a depth of 15 feet. Alternative 1 is considered to be more effective in meeting the RAO and technically feasible compared to Alternative 2 based on the ability to access the potentially impacted soils below 15 feet through deep excavations. The total estimated cost associated with Alternative 1 is 16 percent higher than the cost for Alternative 2. However, Alternative 2 does not include costs for verification sampling to determine the presence of soil contamination surrounding the sewers.

In conclusion, FMC has selected Alternative 1 as the optimum sewer remediation approach. However, as RAP preparation proceeds, there may be specific sewer sections, most likely very deep sections, that are best addressed by plugging due to technical difficulties or excessive cost that are not currently foreseen. While Alternative 1 is selected as the overall best approach, in-place closure of specific sewer sections may be a component of the final response action.

Section 5

5.0 RECOMMENDED RESPONSE ACTION ALTERNATIVES

The recommended alternatives for the three major NTCRA-Buildings tasks and the reasons for selecting each alternative is summarized below.

5.1 BUILDINGS, ABOVE GRADE STRUCTURES, FOUNDATIONS AND SUBGRADE STRUCTURES

The recommended response action alternative for decontaminating the buildings, other above grade structures, foundations and subgrade structures consists of the following:

- Decontamination of the buildings and other above grade structures;
- Evacuation and management of liquids and solids accumulated in pits, sumps, and other subgrade structures;
- Decontamination of the foundations and subgrade structures;
- Decontamination of the underside of subgrade structures after removal by the ACOE; and
- Evaluation/characterization of underlying soils, and management of soils that exceed the site soil cleanup standards.

Based on the information compiled during the physical characterization and an evaluation of the recent and historical analytical data, the most prevalent contamination is dust containing lead. This contamination is not considered to be recalcitrant or difficult to remove, and therefore, less aggressive decontamination techniques are appropriate for the majority of the building surface area, and more aggressive decontamination would be used in localized areas.

This alternative satisfies RAOs 1 through 3. This alternative provides for decontamination of the building and removal of potentially contaminated materials within the buildings to mitigate any unacceptable risk to on-site workers during and after demolition. In addition, this alternative provides for the removal of hazardous substances from and beneath the foundations and subgrade structures to mitigate the potential threat to human health and ground water quality posed by the release or migration of these hazardous substances. This alternative would also meet ARARs. Lastly, this alternative is cost effective and implementable.

5.2 SEWERS AND MANHOLES

The recommended response action alternative for the sewers and manholes is Alternative 1 – Excavate and Remove All Sewers. This alternative is recommended over Alternative 2 – Excavate and Remove with In-Place Closure due to effectiveness and technical feasibility associated with characterization and remediation of impacted soils below 15 feet.

Alternative 1 consists of the following major tasks:

- Evacuation and management of liquids and solids accumulated in sewers and manholes;
- Excavation and removal of all sewers, manholes and impacted soil above site soil clean-up standards;
- Backfill of the excavation to a grade determined sufficient to support redevelopment; and
- Management of removed solid wastes.

This alternative achieves the sewer RAO. The recommended alternative provides for the removal of sewers and manholes, which will mitigate the potential future direct contact with hazardous substances contained within these structures or adjacent soils. Furthermore, removal of sewers and manholes will effectively mitigate the potential for migration of hazardous constituents. Limited in-place closure may be necessary in support of excavation and removal when implementation details are considered.

5.3 CONCEPTUAL SCHEDULE

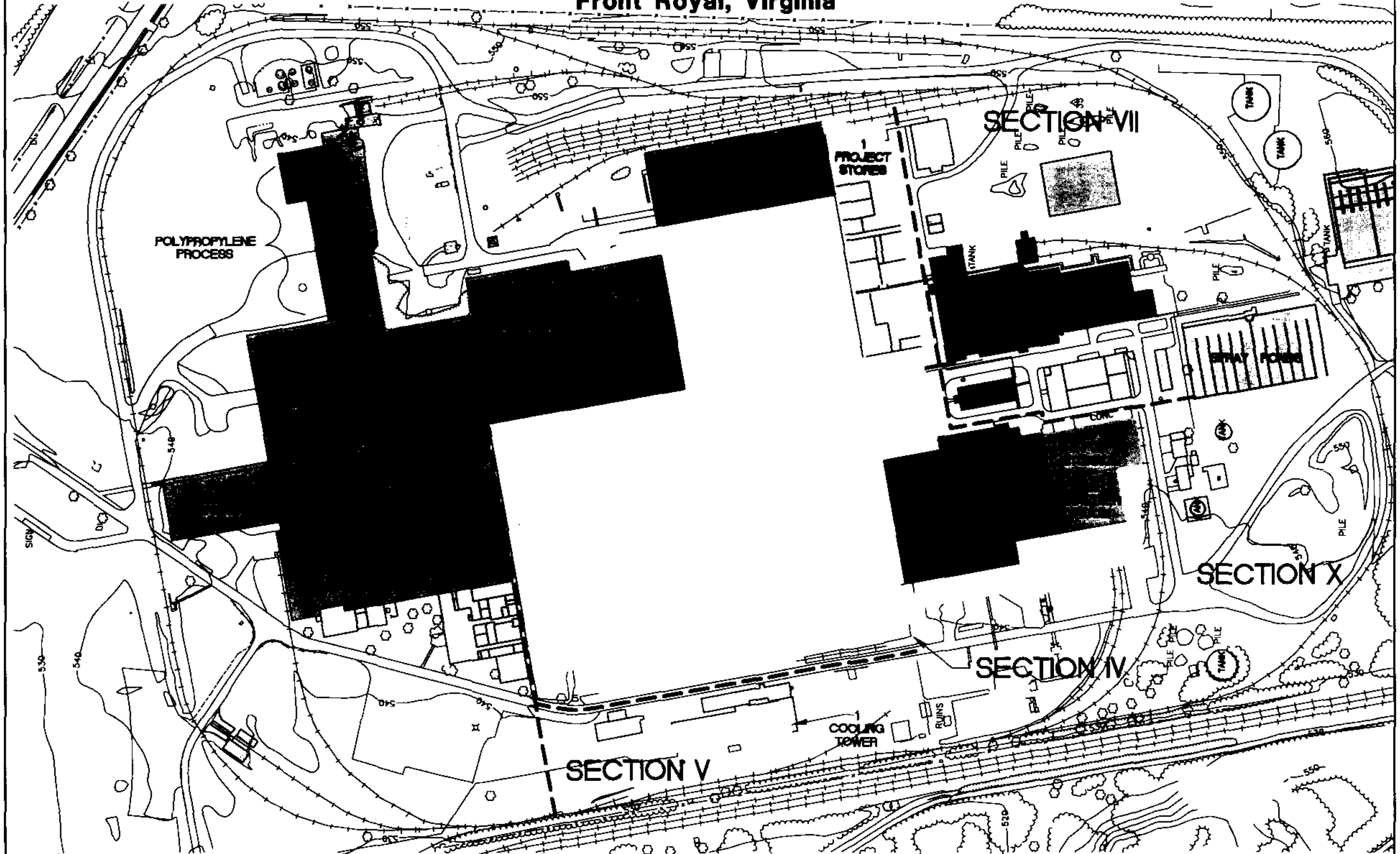
Figure 3 shows that the conceptual schedule for implementation of the NTCRA-Buildings. This conceptual schedule integrates the anticipated ACOE asbestos abatement and building demolition activities. The recommended alternatives and the conceptual schedule are consistent with the EDA conceptual redevelopment plan.

Figures

Figures

Figures

Figure 1
Delineation of Remaining Buildings
Avtex Fibers Superfund Site
Front Royal, Virginia



Legend

Appurtenances

Office Areas

Polymer Plant Lab, Viscose 6, Soda Press #1, Mercerizing #1, Power House Related Structures

Warehouse Areas

320 160 0 320
Scale in Feet

ERM

10556.23.01/08.29.00-SCH/08.30.00-SCH/I101-1F

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Figure 2
Delineation of Remaining Sewers and Manholes
Avtex Fibers Superfund Site
Front Royal, Virginia

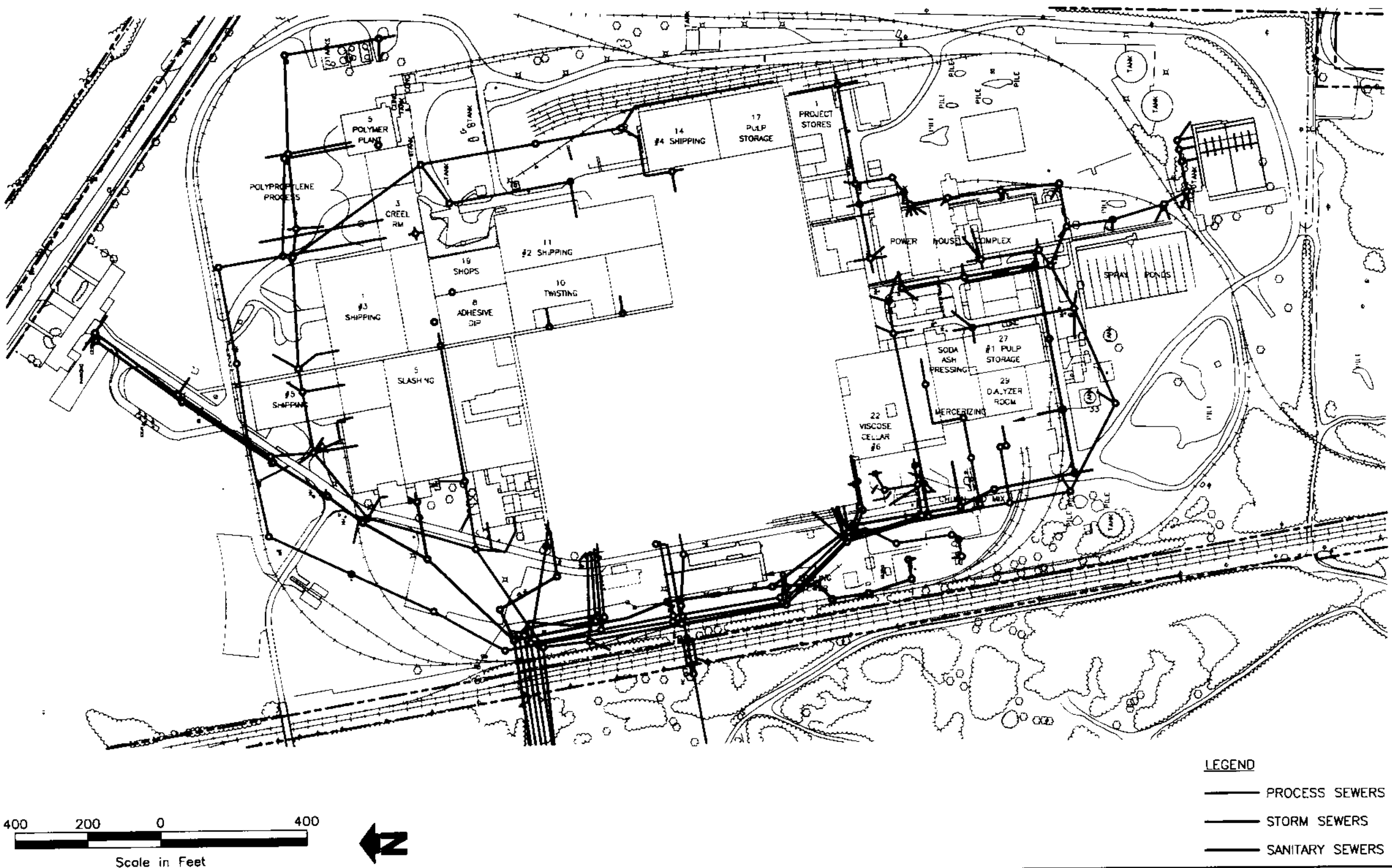

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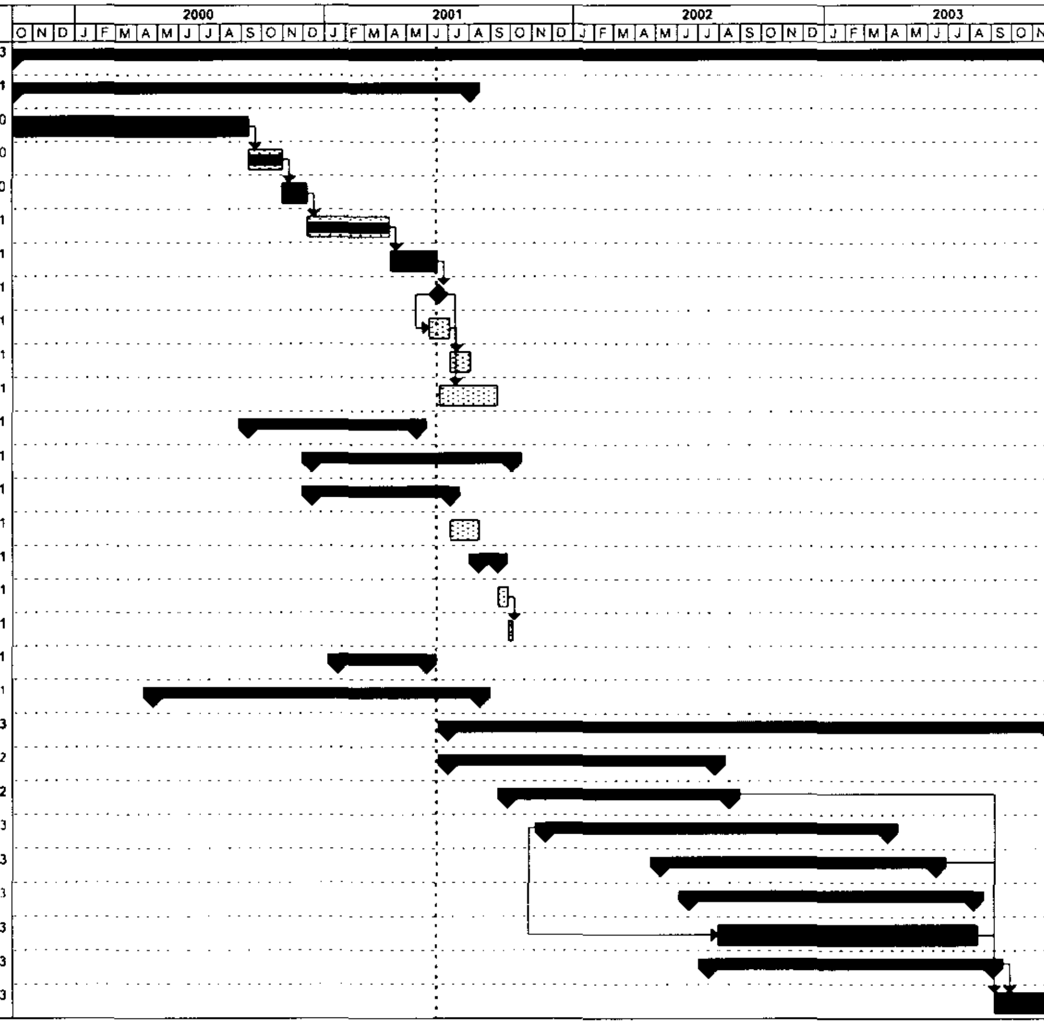
Figure 3 - Preliminary Coordinated Schedule for FMC's Non-Time-...ical Building Removal Action and ACOE's Non-CERCLA Activities
Avtex Fibers Superfund Site
Front Royal, Virginia

ID		Task Name	Duration	Start	Finish
1		**FMC NTCRA-BUILDINGS AND ACOE NON-CERCLA BUILDINGS**	**1084 days**	**Tue 10/5/99**	**Fri 11/28/03**
2		**EE/CA Preparation**	**478 days**	**Tue 10/5/99**	**Fri 8/3/01**
3	✓	FMC Prepare EE/CA	49 wks	Tue 10/5/99	Mon 9/11/00
4	✓	EPA Review and Comment on EE/CA	36 days	Tue 9/12/00	Tue 10/31/00
5	✓	FMC Response to Comments and Prepare Bold-Strikethru EE/CA	27 days	Wed 11/1/00	Thu 12/7/00
6	✓	EPA Review and Comment on Bold-Strikethru EE/CA	86 days	Fri 12/8/00	Fri 4/6/01
7	✓	FMC Resolve Comments & Prepare and Submit Final EE/CA	10 wks	Mon 4/9/01	Fri 6/15/01
8		EPA Review and Approves Final EE/CA	1 day	Mon 6/18/01	Mon 6/18/01
9		EPA Prepares and Issues Proposed Plan	30 edays	Mon 6/4/01	Wed 7/4/01
10		Proposed Plan 30-Day Public Comment	30 edays	Wed 7/4/01	Fri 8/3/01
11		**EPA Prepares and Issues Action Memorandum**	60 days	Tue 6/19/01	Mon 9/10/01
12		**FMC/ACOE Initial Planning and Integration**	**176 days**	**Wed 9/13/00**	**Wed 5/16/01**
27		FMC Response Action Plan (RAP) Preparation	**209 days**	Fri 12/15/00	**Wed 10/3/01**
28		**FMC Prepare RAP**	**144 days**	Fri 12/15/00	**Wed 7/4/01**
32		EPA Review and Comment	6 wks	Thu 7/5/01	Wed 8/15/01
33		**FMC Revise RAP**	**20 days**	**Thu 8/16/01**	**Wed 9/12/01**
37		EPA Review and Approves Revised RAP	2 wks	Thu 9/13/01	Wed 9/26/01
38		**FMC Submits Final RAP**	**1 wk**	**Thu 9/27/01**	**Wed 10/3/01**
39		**FMC Contractor Procurement**	**94 days**	**Mon 1/22/01**	**Thu 5/31/01**
46		ACOE Planning and Preparation	343 days	Wed 4/26/00	Fri 8/17/01
79		**FMC/ACOE Implementation (1)**	**630 days**	**Mon 7/2/01**	**Fri 11/28/03**
80		ACOE Conducts Asbestos Abatement	280 days	Mon 7/2/01	Fri 7/26/02
85		**FMC Conducts Building Decontamination**	**232 days**	**Thu 9/27/01**	**Fri 8/16/02**
91		ACOE Conducts Abovegrade Structure Demolition	357 days	Thu 11/22/01	Fri 4/4/03
96		**FMC Conducts Subgrade Decontamination**	**287 days**	**Thu 5/9/02**	**Fri 6/13/03**
101		ACOE Conducts Subgrade Structure Demolition	297 days	Thu 6/20/02	Fri 8/8/03
106		**FMC Removes Sewers and Manholes**	**270 days**	**Thu 8/1/02**	**Wed 8/13/03**
107		**FMC Addresses Soil under Subgrade Structures**	**297 days**	**Thu 7/18/02**	**Fri 9/5/03**
112		**FMC Prepares Final Report**	**60 days**	**Mon 9/8/03**	Fri 11/28/03



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Project: NTCRA Bldg Avtex Schd 1055
Date: Wed 6/13/01 3:29 PM

Task | Summary | Rolled Up Progress | Split
Progress | Rolled Up Task | External Tasks | Rolled Up Split
Milestone | Rolled Up Milestone | Project Summary

(1) Coordinate with ACM Abatement and Demolition Activities

Schedule could extend based on delays in preparation or review of deliverables

Tables

Tables

Tables

TABLE 1 - REMAINING BUILDINGS, ABOVE GRADE STRUCTURES AND APPURTENANCES

SUMMARY TABLE

Section Number	*Estimated Floor Area*[1] *(square feet)*	*Estimated Pipe length*[2] *(linear feet)*	*Estimated Debris volume*[3] *(cubic yards)*	*Estimated Liquid Volume*[4] *(gallons)*	*Estimated Decon Debris Volume*[5] *(cubic yards)*	*Estimated Decon Water Volume*[6] *(gallons)*	*Estimated HEPA*[7] *(sq. ft.)*	*Estimated Sweep*[8] *(sq. ft.)*	*Estimated Concrete*[9] *(cu. yds.)*	*Estimated Power Wash*[10] *(sq. ft.)*
Section I	454,209	50,175	3,941	46,470	188	2,760	59,060	360,547	85	23,000
Section II	198,988	15,060	2,120	33,065	49	990	0	176,464	10	8,250
Section V	21,380	400	190	0	25	60	0	0	0	500
Section VI	209,666	55,480	4,030	27,267	85	2,911	1,540	166,372	35	24,256
Section VII	221,672	68,180	2,134	76,211	259	2,190	0	206,765	25	18,250
TOTALS	1,105,915	189,295	12,415	183,013	605	8,911	60,600	910,148	155	74,256

1 Floor area represents area calculated for each room and each floor.
2 Pipe length represents length of exposed piping calculated for each room.
3 Debris volume corresponds to the estimated volume of loose debris in each room.
4 Liquid volume corresponds to the estimated volume of liquids contained in pits, tanks, and sumps in each room.
5 Estimated decon debris volume corresponds to the volume of waste generated during the sweeping of each room.
6 Estimated decon water volume corresponds to the volume of water generated during power washing.
7 Estimated HEPA corresponds to the area in each room and each floor that requires HEPA vacuuming.
8 Estimated sweep corresponds to the area in each room and each floor that requires power sweeping.
9 Estimated concrete corresponds to the area in each room and each floor that requires surgical removal of concrete by jack hammering.
10 Estimated power wash corresponds to the area in each room and each floor that requires power washing.

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TABLE 1 - REN VG BUILDINGS, ABOVE GRADE STRUCTURES AND APPURTENANCES

Building Name	Room No./Desc.	Key Environmental Concerns	Key Detections[1]	Floor Area (sq. ft.)	Estimated Pipe length (linear ft.)	Estimated Debris volume (cu. yds.)	Estimated Liquid Volume (gallons)	Proposed Decon Method	Estimated Decon Debris Volume (cu. yds.)	Estimated Decon Liquid Volume (gallons)	Estimated HEPA (sq. ft.)	Estimated Sweep (sq. ft.)	Estimated Concrete (cu. yds.)	Estimated Power Wash (sq. ft.)
#3 Shipping	1.01	Contains 2 55-gal drums - 1 containing oil and 1 containing water, 22 boxes of unused PACM insulation, 2 pallets with batteries, 50 lbs. soda ash, and miscellaneous debris.		57,888	0	100	110	-Remove drums and debris -Sweep	22	0		57,888		
	1.01 - Roof	No key environmental concerns. The roof is not deemed safe to walk on, however, because it is composed entirely of metal.		0	0	0	0	n/a	0	0				
Polypropylene Spinning	1.02	Contains hydraulic presses, 1 water storage tank, 15 PCB transformers, and 9 55-gal drums of PCB powerhouse mezzanine clean-up residue. There are 2 pits/sumps present, 1 sewer manhole, oil staining on the floor and in the pits, and a floor drain west of the elevated PCB platform containing an unknown solid material.	Multiple Metals detected: Pb = 1,470 ug (W-5, wipe) PCB=553 mg/kg, CC-12, composite	29,784	5,000	100	200	-Remove drums and debris -Sweep -Power wash oil stains -Remove 1 cu. yd. PCB materials -Remove PCB stained concrete	36	240		29,784	25	2,000
	1.02 - Roof	No key environmental concerns. There are 4 aluminum houses present and several pipes of various size coming through the roof.		0	0	0	0	n/a	0	0				
Creel Room	1.03 A&B - 1st Floor	Contains several 55-gal drums and 5-gal containers filled with oil and gasoline as well as 45 boxes of PACM pipe insulation and misc. nonprocess equipment. There is oil staining on the floor of 1.03B and there is one pit (4'x4'x3") in 1.03A.	PCB=4.29 mg/kg, CC-11, composite	19,440	1,500	300	550	-Remove drums and debris -Power wash oil stains -HEPA vacuum	8	60	19,440			500
	1.03 C - 2nd Floor	Contains misc. nonprocess equip., including blowers with motors and water pumps. There is minor oil staining under the pumps, PCB capacitor and substation.	ND (BW-01, wipe) ND (BW-02, wipe) 1260 = 6.0 ug/wipe (BW-03, wipe) 1260 = 1.4 ug/wipe (BW-04, wipe)	3,744	100	100	0	-Remove debris -Power wash oil stains	0	60		3,000		500
	1.03 D,E,F,G,H, I,J - 3rd Floor	These rooms have: 4 large vats that contain liquefied polypropylene pellets, a furnace, 2 dust collections tanks, smelting pots, and containers full of oily gear. There is significant oil staining around the vats and the furnace as well as sub-room J.	PCB=1.12 mg/kg, CC-06, compostie	8,760	2,000	10	0	-Remove equipment and tiles, drain oil -Power wash oil stains	0	120		8,000		1,000
	1.03 - Roof; 1st and 2nd floors	Several ventilation units and electric motors are present on this roof, along with aluminum houses, roof drains, and pipes coming through the roof. There is minor oil residue around the motors.		0	0	2	0	-Remove equipment -Wipe up oil residue (if necessary)	0	0				
Polyester Spinning	1.04 A - 1st Floor	Contains 3 large pits (8'x20') that are 4' deep and contain 3' of unknown liquid. There are pumps, pipes, transformers, 4 empty ASTs and *miscellaneous debris also present. There is oil* staining along the E wall and in substation rooms.	1260 = 3,300 ug/wipe; multiple metals detected (W 6, wipe) Aldrin = 0.12 ug/L, Heptachlor epoxide = 0.15 ug/L, Dieldrin = 0.098 ug/L, 4,4 - DDE = 0.11 ug/L BEPH = 9 ug/L (L-2, liquid) PCB=ND, LQ02 PCB=9470 mg/kg, CC-10, composite	10,502	300	100	11,000	-Remove debris -Power wash oil stains -Remove PCB stained concrete	25	240		8,000	25	2,000

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TABLE 1 - REI NG BUILDINGS, ABOVE GRADE STRUCTURES AND APPURTENANCES

Building Name	*Room No./Desc.*	*Key Environmental Concerns*	*Key Detections*[1]	*Floor Area (sq. ft.)*	*Estimated Pipe length (linear ft.)*	*Estimated Debris volume (cu. yds.)*	*Estimated Liquid Volume (gallons)*	*Proposed Decon Method*	*Estimated Decon Debris Volume (cu. yds.)*	*Estimated Decon Liquid Volume (gallons)*	*Estimated HEPA (sq. ft.)*	*Estimated Sweep (sq. ft.)*	*Estimated Concrete (cu. yds.)*	*Estimated Power Wash (sq. ft.)*
	1.04 B - 2hd Floor	Contains 4 partially full oil tanks [2 non-PCB heating oil & 2 finish oil], ventilation ducts, an electrical inverter, and various spare parts. There are also Therminol heating units whose interior surfaces are likely to contain oil from the heating units. There is oil staining in vicinity of the former machinery and also oil staining in various areas from overhead motors.	PCB=7.43 mg/kg, CC-08, composite	12,862	3,000	100	7,000	-Drain and flush tanks -Power wash oil stains	0	120		12,000		1,000
	1.04 C - 3rd Floor	Contains spinning equipment, motors, pipe insulation, control panels, and other misc. equip. There is oil staining in the SE corner of the room, and oil pans present in the spinning motors. Polyester process lines, which contain polyester residue, go through the floor.	PCB=11.3 mg/kg, CC-05, composite	12,862	45	100	0	-Power wash oil stains -Sweep	5	60		12,862		500
	1.04 D - 4th Floor	Contains misc. motors and equipment, a lead radiation shield, steel piping used for polyester pellets, 2 humidifiers, 2 particulate vacuum tanks, and 1 empty storage tank. There is oil present in the motors, particulate in the vacuum tanks, product in SS piping, and dust in the bottom of the humidifiers.	PCB=3.04 mg/kg, CC-03, composite	12,862	1,000	100	5,200	-Remove debris -Power wash oil stains	0	60		12,000		500
	1.04 - Roof	No key environmental concerns. The roof is composed of tar paper, insulation and corrugated steel. There are ventilation units, aluminum houses, roof drains, and several pipes also present.		0	0	1	0	-Remove debris	0	0				
Polymer Plant	1.05 A - 1st Floor	Contains thermal pumps & pipelines, a heat exchanger unit, electrical control panels, 1 hot well overflow tank, 1 box of unidentified white fibrous material, and 1 hopper container polymer chips. There are also 7 plugged floor drains, 1 sewer containing process waste, and 2 pits full of polymer chips. Waste in the Therminol conveyance lines, solid material inside the sealed floor drains, and potential contamination of wall surfaces are also of concern. There is significant oil staining throughout the room.	1248 = 81 ug/wipe (W-1, wipe) 1248 = 38,000 ug/wipe (W-2, wipe) PCB=137 mg/kg, CC-09, composite	11,620	5,000	100	1,500	-Remove debris -HEPA vacuum -Power wash oil stains -Remove PCB stained concrete	14	360	11,620		10	3,000
	1.05 B & C - 2nd Floor	Contains 6 tanks of various contents (1- strad dryer vacuum, 1- recovered E.6, 2-flash tanks, 1 - unknown, 1-product water) present along with lab equipment, including 2 fume hoods with a small amount of black powder present. Oil staining is prevalent throughout the room and ductwork, and the interior walls of the ventilation system have a build-up of oil-like materials.	PCB=21.7 mg/kg, CC-07, composite	11,620	3,000	100	1,200	-Drain and flush tanks -Power wash oil stains	0	120		9,000		1,000
	1.05 D - 3rd Floor	Contains equip. related to transport of finishing oils and processing of polyester chips, including storage tanks, heated lines, etc. There is oil staining across floor and ceiling, and it is concentrated in areas where pumps & tanks located. The wall surfaces, especially the wall in the Control Room and the wall between the Therminol area and the stairwell access area, are also of concern.	1254 = 110 ppm (SED-5, solid) 1248 = 79 ppm (SED-1, solid) 1248 = 53 ug/wipe - 440 ug/wipe (W-3 to W-5, wipes) PCB=909 ug/L, LQ-01 PCB=11.5 mg/kg, CC-04, composite	10,375	3,000	600	180	-Remove equipment and tanks -Power wash oil stains -Sweep -Remove PCB stained concrete	9	240		10,375	5	2,000

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Building Name	Room No./Desc.	Key Environmental Concerns	Key Detections[1]	Floor Area (sq. ft.)	Estimated Pipe length (linear ft.)	Estimated Debris volume (cu. yds.)	Estimated Liquid Volume (gallons)	Proposed Decon Method	Estimated Decon Debris Volume (cu. yds.)	Estimated Decon Liquid Volume (gallons)	Estimated HEPA (sq. ft.)	Estimated Sweep (sq. ft.)	Estimated Concrete (cu. yds.)	Estimated Power Wash (sq. ft.)
	1.05 E - 4th Floor	Contains 5 ASTs, 2 of which contain polymerizer and 3 with unknown contents related to polymerizer. There are salts on the floor, oil stains on the floor & ceiling, and large, uncontained puddles on the floor.	1248 = 32 - 300 ug/wipe (W-6 to W-9, wipes) 1248 = 31 ppm (SED-2, solid) PCB=17.5 mg/kg, CC-02, composite	7,840	5,000	100	0	-Drain and flush ASTs -Sweep -Power wash oil stains	3	120		7,840		1,000
	1.05 F - 5th Floor	Contains polymer process related parts and pumps, fume hood, tanks, 8 ASTs with 1 AST 1/4 full of product (likely oil). There is a white fibrous material covering the floor as well as significant oil stains on the floor.	1248 = 100 ug/wipe (W-10, wipe) 1248 = 400 ug/wipe (W-11, wipe) 1248 = 80 ppm (SED-3, solid) 1254 = 9.3 ppm (SED-4, solid)	4,970	4,000	180	1,000	-Drain and flush tanks -Sweep -Power wash oil stains -Remove PCB stained concrete	7	120		4,970	5	1,000
	1.05 - Roof	Contains 1 3000-gal Therminol tank, 5 HVAC units, 2 ventilation systems, 1 small aluminum house, and a motor on the elevator top that likely contains oil. There are many pipes coming through the roof and as well as significant amounts of PACM pipe.		0	0	100	3,000	-Drain and flush tank -Remove equipment -Wipe up oil residue (if necessary)	0	0				
Tin House	1.07	No key environmental concerns. The tin house was flattened due to structural instability. There is residual transite paneling as well as an intact concrete base. No staining observed.		400	30	10	0	n/a	0	0				
Adhesive Dip	1.08 A - 1st Floor	Contains various testing equip, adhesive mixers, containers of cardboard cones, 1 trench for underground ventilation, and 1 sump 6' deep filled with liquid (likely water). The machinery is coated in adhesive residue and there is minor oil staining on the floor. Suspected contaminant is the catalyst for 51 finish oil: 8-D butyl tin dilaurate and N-ethyl morpholine. There may be oily leakage from the PCB transformer bank GH-9 on the upper floor and from the electrical leads that pass through the ceiling.	PCB=ND, LQ-03 PCB=2.91 mg/kg, CC-14	28,000	3,000	100	1,200	-Remove debris -Power wash oil stains	0	360		25,000		3,000
	1.08 B - 2nd Floor	Contains ventilation units, motors, fans, 2 5-gal cans of oil, 2 full 55-gal drums with unknown contents, and several floor & storm drains. There is minor oil staining on the floor as well as under the transformer. The N half of the room has standing water 1/2" deep. There may also be oily leakage from the PCB transformer bank GH-9 located in the southwest corner of the room.	PCB=940 mg/kg, CC-13	14,000	1,700	60	120	-Remove debris -Power wash oil stains -Remove PCB-contaminated concrete (if necessary)	0	120			15	1,000
	1.08 - Center and Lower Roof	Contains 2 ventilation units, 1 cooling unit, 7 motors, 2 aluminum houses and 2 roof drains. The motors could potentially contain oil.		0	0	60	0	-Remove equipment -Wipe up oil residue (if necessary)	0	0				
CS_2 Tank	1.09	No key environmental concerns. The CS_2 tank area is no longer present and no foundation is evident.		0	0	0	0	n/a	0	0				
Twisting	1.10	Contains twisting equipment, shelves, spare parts, containers of rayon yarn, 2 floor drains, 2 process waste trenches, roof drains, and vent systems. There is minor residue staining under the process equipment.	Chrysotile = 1% (T-01, floor sweepings)	3,500	6,000	100	0	-Sweep	1	0		3,500		

TABLE 1 - REI VG BUILDINGS, ABOVE GRADE STRUCTURES AND APPURTENANCES

Building Name	Room No./Desc.	Key Environmental Concerns	Key Detections[1]	Floor Area (sq. ft.)	Estimated Pipe length (linear ft.)	Estimated Debris volume (cu. yds.)	Estimated Liquid Volume (gallons)	Proposed Decon Method	Estimated Decon Debris Volume (cu. yds.)	Estimated Decon Liquid Volume (gallons)	Estimated HEPA (sq. ft.)	Estimated Sweep (sq. ft.)	Estimated Concrete (cu. yds.)	Estimated Power Wash (sq. ft.)
	1.10 - Roof	The center roof contains 2 ventilation units, 1 cooling unit, 7 motors, 2 aluminum houses, and 2 roof drains. The motors could possibly contain oil. The roof above the lab also has several pipes, roof drains, and ventilation systems.		0	0	60	0	-Remove equipment -Wipe up oil residue (if necessary)	0	0				
#2 Shipping	1.11	Many containers of various contents present: 135 roofing tar containers, 27 paint cans, 10 mobil dispensers, 1 55-gal drum oily spots off floor, 12 55-gal "acid" and "oil", 27 grease and oil containers, 100 unlabelled glass jars of unidentified liquids and solids and 3 500-gal plastic containers filled with liquids. There is oil staining on the floor.		64,090	1,500	170	3,000	-Power wash oil stains -Sweep	25	60		64,090		500
Up-twisting	1.12	Contains twisting machines, lockers, storage racks, a methyl orange shower, and 1 tank for holding methyl orange. There is minor oil staining beneath twisters and large equip. There are also 2 pits; one is a scale pit and the other is a grated drain for the methyl orange shower. A transformer substation was located on the roof above this room.	Chrysotile = 1% (UP-01, floor sweepings)	26,600	300	300	400	-Power wash oil stains -Sweep	10	60		26,600		500
#4 Shipping	1.14	Various containers of unknown contents stored here and one daytank present. There is also used PPE and asbestos present, both of which should be removed soon. There is some oil staining on the railroad spur.	pH = 13.5, CS_2 = 530,000 ug/L, Phenol = 5 ug/L (BT-1, Baker Tank)	28,000	1,000	100	0	-Empty daytank -Remove debris -HEPA vacuum	11	0	28,000			
	1.14 - Roof	Contains a pile of misc debris and 12 roof drains. Roofing material is tar paper with prefabricated cement slabs below.		0	0	10	0	-Remove debris	0	0				
Pulp Storage	1.17	Containers of bulk waste from other areas of the site are present. There is oil staining present on the railroad spur. Room also contains 3 ventilation ducts and 12 drains.		33,936	1,000	200	0	-Remove debris	0	0		33,000		
Shops	1.19 A & B	Contains motors, pumps, valves, electrical equip, several cans containing oily residue, 2 pits, and 8 ventilation trenches. There are acid salts from battery corrosion on the floor as well as small areas of oil staining in the shop area. There may be oil in the pits as well as in the lifts.		19,400	400	200	500	-Remove oil from pits and lifts -Sweep -Power wash oil stains	7	120		19,400		1,000
	1.19 - Roof	No key environmental concerns. Contains 2 blowers, 3 roof drains, and 2 pipes. The roof is composed of tar paper, foam insulation, and corrugated steel.		0	0	2	0	-Remove debris (one lead-lined pipe)	0	0				
Physical Testing Room	1.20	Contains various lab testing equip (oven, centrifuge, glassware, fume hood, sinks, etc.). There is a 5 sq. ft trench that was used for chemical waste as well as a large liquid stain (unidentified) on the floor outside SW corner of the main lab.		3,838	100	100	200	-Power wash oil stains	0	30		3,838		250
No. 6 Fuel Oil Pump House	1.21	Contains #6 fuel oil heaters, pumps & pipelines, and several containers: 10 pts diesel fuel conditioner, 1 pt brake fluid, 18 5-gal buckets of Enviro 500 Lock Down, 3 empty 5-gal buckets once containing hydraulic oil, and 20 125 ml sample jars that contain an oily substance. #6 fuel oil spills cover 50% of floor area, 20% of walls, and 5% of ceiling.		1,400	350	75	0	-Power wash oil stains	1	60		1,400		500

TABLE 1 - REI 'NG BUILDINGS, ABOVE GRADE STRUCTURES AND APPURTENANCES

Building Name	Room No./Desc.	Key Environmental Concerns	Key Detections[1]	Floor Area (sq. ft.)	Estimated Pipe length (linear ft.)	Estimated Debris volume (cu. yds.)	Estimated Liquid Volume (gallons)	Proposed Decon Method	Estimated Decon Debris Volume (cu. yds.)	Estimated Decon Liquid Volume (gallons)	Estimated HEPA (sq. ft.)	Estimated Sweep (sq. ft.)	Estimated Concrete (cu. yds.)	Estimated Power Wash (sq. ft.)
Fan House	1.22 A, B & C	Contains ventilation units, a classroom area, an equipment storage/cleaning area with motors, gears, and drums of debris, 3 50-lb bags of trisodium phosphate in area 1.22 A, a 50 gal container of oil, a 1-gal container of kerosene, several 5-gal pails of roofing tar, various 55-gal drums of debris, and a 300 gal tub half full of water with an oily sheen. There is oily residue in the vent system and 2 oil reservoirs for electrical switches in the area.		8,816	800	100	75	-Remove debris	0	0		8,000		
#2 Fuel Oil Tank Farm	No number given	Contains 7 pumps associated with tanks and pump dispenser, 2 tank pads, 4 20,000-gal #2 fuel oil ASTs, and 1 20,000-gal empty AST. The pump dispenser is covered in oil residue. The vegetation in the pumping area is stressed.		7,000	1,000	100	10,000	-Drain and flush tanks -Remove stained soil (if present)	3	30				250
Roof of Engineering School/Training	No number given	No key environmental concerns. Contains 5 roof drains and the sides of the fan house have 1600' of possible transite panels. Roof is composed of cinders, cork, and concrete.						n/a	0	0				
Kerosene tank and small building	No number given	Kerosene tank contains approx. 35-gal kerosene and the small metal building near the road houses piping and has a 100 sq ft transite roof. Tank may have overflowed, resulting in potential soil contamination		100	50	1	35	-Drain kerosene and remove tank -Evaluate removal of contaminated soil prior to NTCRA	0	0				
Acrylonitrile Tank	No number given	Tank was removed.		n/a	n/a	n/a	n/a	n/a	n/a	n/a				
		TOTALS		454,209	50,175	3,941	46,470		188	2,760	59,060	360,547	85	23,000

[1] EPA Samples
BW, W-wipe
D, DU-dust
L-liquid

FMC Samples
CC-concrete chip
LQ-liquid
SD-sediment
SW-sweeping/dust

AR106873

TABLE 1 - REM NG BUILDINGS, ABOVE GRADE STRUCTURES AND APPURTENANCES

Building Name	Room No./Desc.	Key Environmental Concerns	Key Detections [1]	Floor Area (square feet)	Estimated Pipe Length (linear feet)	Estimated Debris Volume (cubic yards)	Estimated Liquid Volume (gallons)	Proposed Decon Method	Estimated Decon Debris Volume (cubic Yards)	Estimated Decon Liquid Volume (gallons)	Estimated Sweep (sq. ft.)	Estimated Concrete (cu. yds.)	Estimated Power Wash (sq. ft.)
#5 Shipping	2.01	Contains approx. 350 containers of varying sizes and contents. The floor is stained with oily residue and contains numerous chemicals in powder and hard solid form on the S side of the room. The oily stains may be PCB related because PCB capacitors were stored in the southeast corner of the room. There is also 1 manhole leading to a storm sewer.	Bis(2-ethylhexyl)phthalate (BEHP) = 44,000 ug/kg (DU-5, dust) BEHP = 17,000 ug/kg (D-2, dust)	30,000	0	200	3,600	-Sweep -Power wash oil stains -Remove PCB stained concrete	17	120	30,000	5	1,000
#1 Shipping	2.02	Contains freon chiller, compressor, battery charging stations, empty gas cans, and oil storage tanks. There is one pit present that contains rainwater and there is an oil puddle and associated staining around the freon chiller.	Multiple metals detected: Al = 6,360 ug, Ba = 3,610 ug, Pb = 698 ug, Zn = 3,540 ug (W-3, wipe) Multiple metals detected BAP = 49 mg/kg lead = 14,900 mg/kg (DU-4, dust) BEHP = 17 mg/kg lead = 1,830 mg/kg (D-2, dust)	30,000	2,000	10	18,000	-Drain and flush tanks -Sweep -Remove debris -Power wash oil stains	0	120	30,000		1,000
Women's Locker Room	2.03	No key environmental concerns. Contains floor drains, toilets, sanitary sewers, etc.		4,500	1,000	20	0	-Remove debris	0	0			
Switch Room	No number given	This room is associated with Substation #1. There are numerous floor stains located in the vicinity of former switch gear (switch gear has been removed).						-Power wash oil stains	n/a	30			250
Substation #1	No number given	Contains 5 transformer units that have been drained, but it is not known whether they have been flushed. Substation 1A was located outside along the south wall of the Switch Room and was a PCB unit removed by Avtex prior to closing of the plant. There is oil staining on the floor where transformers sit.						-Flush transformers -Remove PCB stained concrete	5	0		5	
Men's Locker Room	2.04	Contains floor drains, toilets, sanitary sewers, and several high voltage switches. There are oil stains on the floor by the switch room that may have been tracked in from the switch room.	PCB=1.16 mg/kg, CC-15, composite	1,800	350	20	0	-Power wash oil stains	0	30			250
Slashing	2.05	Contains fume hoods, ventilation ducts, 2 100-gal stainless steel tanks with residue on the inside, floor drains, 1 trench of unknown depth with unknown contents, and one sump with unknown contents. There is oil staining on the floor around equipment.	BEHP = 67 ug/L (L-3, liquid) BEHP = 23,000 ug/kg, lead = 1,700 mg/kg (DU-3, dust) ND PCBs; Several metals detected: Pb = 48.8 ug, Zn = 42.8 ug (W-2, wipe) BEHP = 17,000 ug/kg, lead = 1,830 mg/kg (D-2, dust)	46,200	3,600	400	1,500	-Drain and flush tanks -Sweep -Power wash oil stains	18	120	46,200		1,000
Ring Twisting	2.06	Contains 32 55-gal drums - 26 are empty and 6 contain water. The floor area has spotty chemical and/or oily staining on it - in some areas it is ponded. Oil catch pans are present and contain very thick oil. There is also 1 stormwater sewer present beneath the floor.	BEHP = 7,100 ug/L (DU-2, dust) BEHP = 17,000 ug/kg, lead = 1,830 mg/kg (D-2, dust) PAH=ND, CC-17	19,200	260	300	250	-Remove debris -Sweep -Power wash oil stains	0	240	19,200		2,000

TABLE 1 - REI   'NG BUILDINGS, ABOVE GRADE STRUCTURES AND APPURTENANCES

Building Name	Room No./Desc.	Key Environmental Concerns	Key Detections [1]	Floor Area (square feet)	Estimated Pipe Length (linear feet)	Estimated Debris Volume (cubic yards)	Estimated Liquid Volume (gallons)	Proposed Decon Method	Estimated Decon Debris Volume (cubic Yards)	Estimated Decon Liquid Volume (gallons)	Estimated Sweep (sq. ft.)	Estimated Concrete (cu. yds.)	Estimated Power Wash (sq. ft.)
TTD Area	2.07 A	Contains spools, winding machines, racks, and one storm sewer located below the floor. There is a 10 ft diameter oil stain on the floor on the N side of the room.		8,750	450	60	0	-Remove debris -Power wash oil stains	0	30			250
	2.07 B	Contains office furniture, testing equipment, and a 50 gal NaOH/Starch container that is leaking onto the surrounding floor and is almost empty. There is also 1 stormwater sewer present beneath the floor.		1,750	775	80	50	-Sweep	1	0	1,750		
Carding Room	2.09	Contained carding machines and ventilation ducts. There are slightly oily stains present *underneath the carding machines. There is* also 1 stormwater sewer present beneath the floor.	ND PCBs; Several metals detected: Al= 99.9 ug, Zn = *418 ug* (W-4, wipe)	1,809	200	220	0	-Remove debris -Power wash oil stains	0	60	1,800		500
Research & Development	2.10	No key environmental concerns. Room empty.		n/a	n/a	n/a	n/a	n/a	n/a	n/a			
Dispensary	2.11 A-H; doctor's office, exam rooms and pharmacy	No key environmental concerns. Contains shelving, lab glassware, medical equipment, tables, sinks, floor drains, and 2 carboys [Room 2.11C]. The floor is buckled in certain areas.		3,600	1,600	60	0	-Remove debris	n/a	n/a			
Coning	2.12	Contains coning machines with full oil reservoirs, a vacuum unit, and 4 55-gal drums (one contains water; 3 contain shop garbage). There are solid, liquid, and oily stains located on the floor throughout the room. A storm sewer access, which could be a pathway for contaminants, is located adjacent to the north transite wall of this room.	Multiple contaminants detected lead = 20,700 mg/kg (DU-7, dust) BEHP = 17,000 ug/kg lead = 1,830 mg/kg (D-2, dust) PCB=0.1 mg/kg, CC-16	19,200	1,520	300	55	-Remove debris -Sweep -Power wash oil stains	7	120	19,200		1,000
Analytical Lab "A"	2.13	Contains lab equip (glassware, pipettes, etc), transformers, a distilled water filter system, sinks (+ assoc. pipes) and 2 55-gal drums filled with what appears to be water. There is also one pit/sump one ft deep with unknown contents and several 1930s style switch-like devices attached to the wall above a drop ceiling that may contain PCBs.		450	100	10	210	-Remove debris	0	0	450		
Analytical Lab "B"	2.14	Contains balances, fume hood, sinks, and pipes/drains assoc. with the sinks. There is an unknown black/purple hard solid material present on the floor in two areas and possible Hg contamination around the Hg storage closet.		242	55	10	0	-Remove debris -Mercury may be present - use Hg vacuum if necessary	0	0	242		
Analytical Labs "C" and "D"	2.15	No key environmental concerns. Contains fume hood and microscope.		150	10	10	0	-Remove debris	0	0	150		
Main Analytical Lab	2.18 - "F" and "D"	Contains gas chromatograph, ventilation duct, and a sewer line below the sink. There appears to be some staining around the sink. (Radioactive material was previously stored here).	Several metals detected; ND PCBs (W-1, wipe)	540	110	15	0	-Remove debris	0	0	540		
R&D Analytical	2.18	Contains gas chromatograph, misc lab equip., a sink, and ventilation ducts. Some chemical staining around sink.		540	110	10	0	-Remove debris	0	0	540		
Chemical Storage	2.19	Contains shelving and ventilation ducts. There is a pile of solid powder-like material in corner of room and some staining on the shelves.		252	50	10	0	-Remove debris -Sweep	0.1	0	252		

AR106875

TABLE 1 - REI NG BUILDINGS, ABOVE GRADE STRUCTURES AND APPURTENANCES

Building Name	Room No./Desc.	Key Environmental Concerns	Key Detections[1]	Floor Area (square feet)	Estimated Pipe Length (linear feet)	Estimated Debris Volume (cubic yards)	Estimated Liquid Volume (gallons)	Proposed Decon Method	Estimated Decon Debris Volume (cubic Yards)	Estimated Decon Liquid Volume (gallons)	Estimated Sweep (sq. ft.)	Estimated Concrete (cu. yds.)	Estimated Power Wash (sq. ft.)
R&D Lab	2.20	Contains lab testing equip., centrifuge, empty glassware, air conditioning units, lab benches with natural gas lines, and ventilation ducts. There is a pile of white solid material on the floor in the corner.		2,700	800	60	0	-Remove debris -Sweep	1	0	2,700		
Fabric Test Lab	2.21	Contains a fume hood, various fiber testing equip, one sink, and one AC unit. There is light staining within the fume hood.		1,128	200	40	0	-Remove debris	0	0	1,000		
Finish Control Lab	2.22	Contains distilling apparatus, glassware, fumehood (with natural gasoline inside), one AC unit, and a lab bench. There is slight staining on the lab benchtop.		480	150	15	0	-Remove debris	0	0	480		
Dye Lab	2.23	Contains ovens, ventilation unit, and a cleanout located on the floor by the door. There is a stain on the floor around the autoclave.		480	200	15	0	-Remove debris -Power wash oil stains	0	30	480		250
Standard Solution Lab	2.24	Contains 2 fume hoods, one AC unit, one lab sink, shelving, and various testing equip. There are stains on the benchtops and a white powder on one of the shelves.		480	60	15	0	-Remove debris -Sweep	0.2	0	480		
Standard Physical Testing Lab	2.25	Contains moisture testers, ovens, a sink and ventilation ducts. There is staining on the floor under one ventilation duct.		2,035	400	15	0	-Remove debris -Power wash oil stains	0	30			250
Beam Storage	2.26	Contains office furniture, transformers, and ventilation ducts. There is an orange stain on the floor along one wall.	Multiple contaminants detected lead = 11,500 mg/kg, BEHP = 77,000 ug/kg (DU-6, dust)	15,000	360	150	0	-Remove debris -Power wash stains	0	60	15,000		500
East Slashing Fanhouse	2.27	No key environmental concerns. Contains a fan motor and some piping likely used for steam or water.		2,500	100	15	0	-Remove motor	0	0	2,500		
East Coning Fanhouse	2.28	No key environmental concerns. Room empty		n/a	n/a	n/a	n/a	n/a	n/a	n/a			
West Slashing Fanhouse	2.29	No key environmental concerns. Contains a fan motor and some piping likely used for steam or water.		2,500	100	15	0	-Remove motor	0	0	2,500		
Southeast Slashing Fanhouse	No number given	Empty		n/a	n/a	n/a	n/a	n/a	n/a	n/a			
Cafeteria	No number given	No key environmental concerns. Contains tables, chairs, walk-in freezer, and a ventilation system.		1,702	400	30	0	-Remove debris	0	0			
Subroom SW of Cafeteria	No number given	Contains unknown type of machine, unidentified small containers on metal shelves, and misc debris, including ceiling tiles, tires, and wood.		1,000	100	15	9,400	-Remove debris	0	0	1,000		
Corporate Office Area	No number given	No key environmental concerns.	Multiple contaminants detected BEHP = 130 mg/kg, Pb = 2,890mg/kg (D-1, dust)	n/a	n/a	n/a	n/a	n/a	n/a	n/a			
TOTAL				198,988	15,060	2,120	33,065		49	990	176,464	10	8,250

[1] EPA Sample: BW, W-wipe; D, DU-dust; L-liquid
FMC Samples: CC-concrete chip; LQ-liquid; SD-sediment; SW-sweeping/dust

AR106876

TABLE 1 - RE[illegible] NG BUILDINGS, ABOVE GRADE STRUCTURES AND APPURTENANCES

Building Name	*Room No./Desc.*	*Key Environmental Concerns*	*Key Detections*	*Floor Area (square feet)*	*Estimated Pipe Length (linear feet)*	*Estimated Debris Volume (cubic yards)*	*Estimated Liquid Volume (gallons)*	*Proposed Decon Method*	*Estimated Decon Debris Volume (cubic yards)*	*Estimated Decon Liquid Volume (gallons)*	*Estimated Power Wash (sq. ft.)*
[illegible]											
Cooling Tower	5.01	Currently used as a basin where coarse fraction decon is performed. There are (3) basins present that contain water and sediment. There may be some PCBs in the sludge/sediment and PCB contamination of the concrete vault.		17,280	0	90	0	-Containerize sludge	25	0	
CS_2 Recovery Area	5.05	Contains (2) CS_2 recovery tanks (6000 gal each) - one tank is on the ground and the other is on an unstable elevated structure. There may also be some underground piping assoc with the recovery process.		n/a	200	60	0	-Dispose of carbon	0	0	
Soft Water Pump House	5.09	Contains pumps, a water storage tank, and (2) white and (1) green tanks with unknown contents. There are also (4) 55 gal drums and several pails containing hydraulic oil and grease. There are (4) pits/sumps 2' deep present that contain oil and water.	pH = 7.8 (SW-1, liquid) ND (pump house, liquid)	4,100	200	40	0	-Remove drums and pails -Drain and flush tanks	0	60	500
	5.09 - Roof	No key environmental concerns. Roof is empty		n/a	0	0	0	-Separate lead flashing	0	0	
TOTAL				21,380	400	190	0		25	60	500

AR106877

TABLE 1 - RE 'NG BUILDINGS, ABOVE GRADE STRUCTURES AND APPURTENANCES

Building Name	Room No./Desc.	Key Environmental Concerns	Key Detections[1]	Floor Area (square feet)	Estimated Pipe Length (linear feet)	Estimated Debris Volume (cubic yards)	Estimated Liquid Volume (gallons)	Proposed Decon Method	Estimated Decon Debris Volume (cubic yards)	Estimated Decon Liquid Volume (gallons)	Estimated HEPA (sq. ft.)	Estimated Sweep (sq. ft.)	Estimated Concrete (cu. yds.)	Estimated Power Wash (sq. ft.)
Stores	6.01 A-D	No key environmental concerns. Contains shelves that are 30% stocked with misc spare parts and lab equipment. No staining present but floor is covered by water and littered with debris.		24,000	2,500	200	0	-Remove debris	0	0		20000		
Laundry Room	6.02	Contains 4 industrial washing machines, wheelbarrows, bundles of cloth, one compressed air storage tank, 2 pits 4' deep partially filled with liquid and 2 trenches with unknown contents. There is minor oil staining on the floor around the washers as well as significant amounts of debris.	PCB=ND, methylphenol=57 ug/L, LQ-05	2,556	800	100	2	-Remove debris -Power wash oil stains	0	20		2500		165
Viscose Maintenance Shop	6.05	No key environmental concerns. Contained shelving, bench, desk, spare parts, lockers, grinder, drill press, and tables.	PCB=10 mg/kg, SW-6.05-6.08, composite	3,456	250	100	0	-Remove debris	1.3	0		3456		
Men's Locker Room	6.06	No key environmental concerns. Contains lockers and locker room related fixtures, such as showers and drains.	PCB=10 mg/kg, Pb=3,350 mg/kg, SW-6.05-6.08, composite	3,456	250	100	0	-Remove debris	1.3	0		3456		
Women's Locker Rooms	6.07	No key environmental concerns. Contains lockers and locker room related fixtures, such as showers and drains.	PCB=10 mg/kg, Pb=3,350 mg/kg, SW-6.05-6.08, composite	3,456	400	100	0	-Remove debris	1.3	0		3456		
Truck Shop	6.08	Contains forklift battery chargers, batteries, one fork truck, and misc parts and motors. 60% of the floor is oil stained and there are battery acid salts and fine grey powder (lead sulfate) on the floor.	PCB=10 mg/kg, Pb=3,350 mg/kg, SW-6.05-6.08, composite	3,384	500	100	0	-Remove debris -Sweep -Power wash oil stains	1	240		3384		2000
Oil Storage	6.10	No key environmental concerns. Oil storage drums are no longer present and there is no evidence of staining on the floor. There is one trench that likely served as a pipe run.		1,275	0	0	0	n/a	0	0				
Carpentry Shop	6.11	Contains various small grinders and spare parts (the woodworking equip. is no longer present). There is minor oil staining on the floor. The floor is composed of buckled wooden blocks soaked in Creosote.		6,561	200	100	0	-Remove debris -Remove wooden blocks -Power wash floor	3	787				6561
Engineering Office	6.13	No key environmental concerns. Contains office furniture and misc debris. The floor is composed of buckled wooden blocks soaked in Creosote. There is massive water damage to all surfaces and structures in the room.		2,430	300	100	0	-Remove debris -Remove wooden blocks -Power wash floor	1	292				2430
Women's Locker Rooms	6.17	No key environmental concerns. Contains lockers and locker room related fixtures.		1,650	250	100	0	-Remove debris	0	0				
Café	6.20	No key environmental concerns. Room contains misc. items behind the partition walls.		1,705	200	200	10	-Remove debris	0	0				
Paint Shop	6.21	Contains 3 fume hoods and some staining from paint overspray.		1,575	0	200	0	-Remove debris	0	0				

AR106878

TABLE 1 - RE' 'NG BUILDINGS, ABOVE GRADE STRUCTURES AND APPURTENANCES

Building Name	Room No./Desc.	Key Environmental Concerns	Key Detections[1]	Floor Area (square feet)	Estimated Pipe Length (linear feet)	Estimated Debris Volume (cubic yards)	Estimated Liquid Volume (gallons)	Proposed Decon Method	Estimated Decon Debris Volume (cubic yards)	Estimated Decon Liquid Volume (gallons)	Estimated HEPA (sq. ft.)	Estimated Sweep (sq. ft.)	Estimated Concrete (cu. yds.)	Estimated Power Wash (sq. ft.)
~~Acid~~-Viscose Cellar No. 6	6.22	Contains 7 trenches with viscose residue present (viscose tanks no longer present), one pit with unknown contents, a pumping system and a sump (unknown contents). There is some oil staining along one wall and several brine pipes that crisscross the room.		43,740	30,000	200	4,500	-Remove debris -Power wash oil stains and trenches	0	360		30000		3000
Mercerizing #1 & Soda Press #1 (located above)	6.26 A	Contains pumps, compressors, motors, hydraulic ram, hoppers, and 2 1000-gal potassium permanganate tanks. There are two deep pits and two deep (15') trenches (trenches actually in 6.26 B) that have caustic contents. There is caustic soda all over the floor as well as spots of very basic water. Each compressor has an oil reservoir and there are stains in, on, and around the motors and pumps.	Metals detected (M-01, solid) Metals detected (M-02, solid) pH = 11.6 (C-01, solid) pH = 10.9 (C-02, solid) pH = 11.6, Phenol-d5 = 60 ug/L, Nitrobenzene-d5 = 36 ug/L (L-01, liquid) pH = 9.9 1254 = 5.6 mg/kg (SL-01, sludge) pH = 11.2, 1254 = 3.0 mg/kg (S-01, solid)	24,000	200	200	2,000	-Remove debris -Drain and flush tanks -Sweep -Power wash oil stains	9	480		24000		4000
	6.26 B	Contains hoppers full of caustic pulp/soda, 2 55-gal drums of unknown contents, and 2 trenches (see 6.26 A). There is caustic soda on the floor and areas with puddles of very basic water.		24,000	13,000	200	18,000	-Remove drums -Remove caustic from hoppers -Sweep	9	240		24000		2000
	6.26 C	Contains 2 55-gal drums, one empty and one with unknown contents. The floor contains some caustic as well as a stain that appears to be water.		7,360	3,000	0	55	-Remove drums -Sweep	3	60		7360		500
#1 Pulp Storage	6.27	Contains motors, pumps, gears, spare parts, an elevator, several bulk waste containers and an electric crane. There are spots of oil staining on the floor underneath the motors, pumps, etc. and there may also be some caustic & caustic water on the floor. PCB contaminated material was stored in the southwest corner of the room.		24,480	100	200	0	-Remove debris -Sweep -Power wash oil stains -Remove PCB stained concrete	9	60		22480		500
Dialyzer Room	6.29 A,B,C,D	Contains 2 55-gal drums with unknown contents, one sump 2' deep with unknown contents, several trenches and pits, and spare parts and misc. debris in the welding cage area. There is some caustic on the floor and some oil staining on one side of the room.	PCB=1.38 ug/L, LQ-24	19,440	2,000	200	110	-Remove debris -Sweep -Power wash oil stains	8	30		19400		250
Ladder Storage Area	6.38	No key environmental concerns. Contains ladders and a refrigerator.		300	20	200	0	-Remove debris	0	0				

TABLE 1 - REꟷ VG BUILDINGS, ABOVE GRADE STRUCTURES AND APPURTENANCES

Building Name	Room No./Desc.	Key Environmental Concerns	Key Detections[1]	Floor Area (square feet)	Estimated Pipe Length (linear feet)	Estimated Debris Volume (cubic yards)	Estimated Liquid Volume (gallons)	Proposed Decon Method	Estimated Decon Debris Volume (cubic yards)	Estimated Decon Liquid Volume (gallons)	Estimated HEPA (sq. ft.)	Estimated Sweep (sq. ft.)	Estimated Concrete (cu. yds.)	Estimated Power Wash (sq. ft.)
Ventilation Room	6.39	Contains motors, fans, ventilation units, 1 20-gal drum of white powder, 1 5-gal bucket of "ANSUL Plus Fifty" for dry chemical extinguishers, 2 5-gal buckets glycerine, and a small tank.		1,380	300	200	10	-Remove drum -Sweep	1	0		1380		
Electric Storage Room	6.40	Contains various electrical equipment, 2 quarts of unknown oily liquid, and 1/2 gal of paint thinner. There is approx. 9 sq ft of oil staining on the floor, some of which may be PCB related (some electrical components had contained PCBs).		840	150	200	1	-Remove debris -Power wash oil stains -Remove PCB stained concrete	10	12			10	100
Heat Exchanger Room/Cooker	6.41	Contains fume hoods, misc. debris, and a suspended storage tank that likely holds acid (H2SO4). There are also acid salts present on the floor.	ND (PR-01, oil)	1,500	150	200	100	-Remove debris -Drain and flush tank -Sweep	1	0		1500		
Power Room	6.42	Contains switches, transformers, other high voltage power distribution accessories, 1 drum containing 15 gal of possible PCB oils, 4 small cans of high voltage insulating compound, many 18 oil containing reservoirs associated with the transformers & switches, 2 small propane tanks, and a pit in the SE corner which contains oil and piping. There are some oily stains on the floor, especially around the switches.	1260 = 8.7 mg/kg (CR-1, solid) 1260 = 3.8 mg/kg (CR-2, solid) 1260 = 7.4 ug/wipe (CR-3w, wipe) PCB=ND, LQ-09 PCB=0.48 mg/kg, CC-18	1,113	150	200	1,729	-Remove debris -Empty tanks -Power wash oil stains -Remove PCB stained concrete	25	30			25	250
Tool Lock-up Shop	6.43	Contains small areas of oil staining throughout the room.		1,600	100	200	0	-Power wash oil stains	0	30				250
Cloth Room	6.44	No key environmental concerns. Contains PACM pipe wrap on floor.		2,485	500	200	0	-HEPA vacuum	1	0				
Lead Shop	6.45	Contains a smelter, furnace, hydraulic press, sink, and one 1 750-gal AST with unknown contents. There is a significant amount of dust that likely contains a high percentage of lead, and there is oil staining in the smelter area.	Multiple metals detections: (LS-1) As = 41.4 mg/kg Pb = 391 mg/kg Zn = 265 mg/kg Multiple metals detections: (LS-2) Pb = 3,440 mg/kg Zn = 1,830 mg/kg	1,540	60	200	750	-Drain and flush tank -HEPA vacuum -Power wash oil stains	0.6	30	1,540			250
Pump House Behind Lead Shop	6.46	Contains 3 pumps with associated piping. There is oil (likely #6) covering the entire floor, which may total be approx. 100 gal. Oil dry has been used to control the spread; however, it is difficult to determine if there are any subgrade features in the room.		384	100	30	0	-Drum oil dry and oil -Power wash floor	0.1	240				2000
TOTAL				209,666	55,480	4,030	27,267		85	2,911	1,540	166372	35	24256

Assuming 4-inch average diameter of pipe in Viscose Cellar 6 and room 6.26 B

[1] EPA Samples: BW, W-wipe; D, DU-dust; L-liquid
FMC Samples: CC-concrete chip; LQ-liquid; SD-sediment; SW-sweeping/dust

AR106880

TABLE 1 - REV 'NG BUILDINGS, ABOVE GRADE STRUCTURES AND APPURTENANCES

Building Name	Room No./Desc.	Key Environmental Concerns	Key Detections[1]	Estimated Floor Area (square feet)	Estimated Pipe Length (linear feet)	Estimated Debris Volume (cubic yards)	Estimated Liquid Volume (gallons)	Proposed Decon Method	Estimated Decon Debris Volume (cubic yards)	Estiamted Decon Liquid Volume (gallons)	Estimated Sweep (sq. ft.)	Estimated Concrete (cu. yds.)	Estimated Power Wash (sq. ft.)
Project Stores	7.01	There is an unidentified gray powder present along corner walls and shelves. Room also contains boxes of cardboard cylinders, pipe fittings and shelves.		8,100	700	300	0	-Remove debris -Sweep	3	0	8100		
Paint, Gas & Cylinder Stores	7.01 A	No key environmental concerns.		250	0	2	0	-Sweep	0.1	0	250		
Gas & Cylinder Store	7.02 A	Contains: 12 30.5-oz containers of carbon dioxide, 15 30-lb. tanks of propane, 1 30-lb tank of refrigerant, and 4 50-lb tanks of propane. There is coal dust runoff collected along the walls that appears to have washed into the room from the coal shed area.		420	0	2	0	-Remove debris -Sweep	0.2	0	420		
	7.02 B	Contains 2 one gal cans of paint and ventilation ducts. Water is ponded in several areas - no other staining present.		595	100	20	1	-Remove debris	0	0			
Coal Unloading	7.03	Contains one electric crane (approx 10,000 lbs), an elevator and 3 13' deep pits containing water. There are oil stains around the motors as well as white salt stains and coal stains on the floor. PCBs may be present in the solids at the bottom of the elevator shaft, which is underwater.	PCB=ND, LQ-10 and LQ-11	3,055	100	100	30,000	-Remove debris -Sweep -Power wash oil stains -Remove PCB stained concrete	5	60	3055		500
Compressor Room	7.04	Contains ammonia and freon chillers, compressors, electric motors (may contain oil), ammonia pumps, 8 air and vacuum tanks, and one brine mixing tank. There is moderate to severe oil staining on the floor and on the machines and there is one trench that also has oil in it. The walls may be PCB contaminated from leakage from the PCB transformer bank located on the roof overlooking the south wall of the compressor room.	Pb = 392 ug/L Cr = 217 ug/L Ba = 109 ug/L (CRCS-1, liquid) Pb = 132 ug/L Cr = 93 ug/L Ba = 124 ug/L (CRC-1, liquid) ACM=1.3%, Pb=9,820,SW-7.04 PCB=ND, LQ-06 and LQ-07 PCB=1.25 mg/kg, CC-19 PCB=16 ug/L, LQ-08 PCB=4 ug/L, SED-08	29,000	10,000	100	20,000	-Remove debris -Power wash oil stains	20	120	20000		1000
Power House	7.05 A	Contains pumps, pipes, condenser units, one crane, 5 5000-gal condensate tanks, and 3 empty 1000-gal tanks that once held hydraulic oil. There are oil stains on the floor and around the machines. The battery room is empty and has a stained floor. The walls of both floors of the Power House have potential PCB contamination.	1248 = 180 mg/kg 1260 = 99 to 77,000 mg/kg (PHSS-1 to 4, solids) 1254 = 8.9 mg/kg 13.0 mg/kb (PHSS-9, solid) 1260 = 1.0 to 36 ug/wipe (PHW-1 to 10 [except 8], wipes) PCB=10.2, ACM<1, SW-7.05A PCB=ND, LQ-22 ND (PHO-1, liquid)	14,400	2,000	100	5,000	-Remove debris -Sweep -Power wash oil stains	22	240	14400		2000

AR106881

TABLE 1 - RE NG BUILDINGS, ABOVE GRADE STRUCTURES AND APPURTENANCES

Building Name	Room No./Desc.	Key Environmental Concerns	Key Detections[1]	Estimated Floor Area (square feet)	Estimated Pipe Length (linear feet)	Estimated Debris Volume (cubic yards)	Estimated Liquid Volume (gallons)	Proposed Decon Method	Estimated Decon Debris Volume (cubic yards)	Estiamted Decon Liquid Volume (gallons)	Estimated Sweep (sq. ft.)	Estimated Concrete (cu. yds.)	Estimated Power Wash (sq. ft.)
[redacted]													
	7.05 B - 2nd Floor	Contains switches with oil reservoirs, 5 turbines, one crane, one 5000-gal condensate tank. There are oil stains on the floor. The walls of both floors of the Power House have potential PCB contamination.	1260 = 4,600 ppm (PH-1, solid) 1260 = 280 ppm (PH-2, solid) 1260 = 110 ug/wipe (PH-3w, wipe) 1260 = 26 ug/wipe (PH-4w, solid) 1260 = 6.4 mg/kg (PHSS-10, solid) 1260 = 2.6 mg/kg ND (PHW-8, solid) ACM=1%, PCB=347 mg/kg, benzo(a)pyrene=13.7 mg/kg SW-7.05B PCB=0.770 mg/kg, CC-23 PCB=12.9 mg/kg, CC-24	10,800	1,000	100	5,000	-Remove debris -Sweep -Power wash oil stains -Remove PCB stained concrete	42	120	10800	25	1000
Boiler House	7.06 A	Contains 5 boilers, 10 bowl mills, 3 pumps, 2 vacuum tanks, one pit, and one sump with unknown contents. There are severe oil stains throughout the room and the floor and equipment are covered with coal dust. The walls may also be PCB-contaminated.	ACM=3.75%, PCB=1.3 mg/kg, SW-7.06A PCB=0.107 mg/kg, CC-22 PCB, SVOC=ND, LQ-23	18,540	10,000	100	1,000	-Remove debris -Sweep -Power wash oil stains -Remove PCB stained concrete	29	240	18540		2000
	7.06 B - 2nd Floor	Contains 5 boilers, 2 heater tanks, 2 2000-gal tanks with unknown contents and 2 55-gal drums filled with trash. The room has a thick layer of coal dust everywhere (up to 3" deep on floor and machines) and also has thick oil staining, with one large oil puddle (1/2" deep) dripping to the floor. The walls may also be PCB-contaminated.	PCB=0.208, ACM<1%, SW-7.06B	20,700	10,000	100	0	-Remove debris -Sweep -Power wash oil stains -Remove PCB stained concrete	32	360	20700		3000
	7.06 F - 3rd Floor	Contains 5 boilers and one condensate unit. There are oil stains on the floor and the machinery as well as coal dust layering the entire floor. There is a yellow solid in and around the coal hopper in the corner of the room. Some floor grates are buckling. The walls may also be PCB-contaminated.	ACM=5.3%, PCB=0.079 mg/kg, SW-7.06F	20,700	10,000	100	0	-Remove debris -Sweep -Power wash oil stains -Remove PCB stained concrete	32	240	20700		2000
	7.06 G - 4th Floor	Contains the tops/roofs of 5 boiler units. Oil stains and coal dust are prevalent throughout the room. The walls may also be PCB-contaminated.	PCB=0.157 mg/kg, ACM<1%, SW-7.06G	20,700	10,000	100	0	-Remove debris -Sweep -Power wash oil stains -Remove PCB stained	32	240	20700		2000
	7.06 H - 5th Floor	Contains blowers and misc. machinery. There is dust falling out of the blower that has been deposited on the floor and there are also oil stains on the machinery. The brine solution holding tank is located on the Boiler House roof. The tank has corroded and the contents have been spilled on the roof.	PCB=1.81, ACM<1%, SW-7.06H	20,700	2,500	100	0	-Remove debris -Sweep -Power wash oil stains -Remove PCB stained concrete	32	240	20700		2000

AR106882

TABLE 1 - REI 'NG BUILDINGS, ABOVE GRADE STRUCTURES AND APPURTENANCES

Building Name	Room No./Desc.	Key Environmental Concerns	Key Detections[1]	Estimated Floor Area (square feet)	Estimated Pipe Length (linear feet)	Estimated Debris Volume (cubic yards)	Estimated Liquid Volume (gallons)	Proposed Decon Method	Estimated Decon Debris Volume (cubic yards)	Estiamted Decon Liquid Volume (gallons)	Estimated Sweep (sq. ft.)	Estimated Concrete (cu. yds.)	Estimated Power Wash (sq. ft.)
1st Floor Shop	7.07	One 5000-gal underground tank containing #2 fuel oil and 2 cut-off drums containing oil residue are present. There is also moderate oil staining on the floor. This room is adjacent to Boiler House room 7.06, with a floor to ceiling fence and 25 ft. passageway separating the two rooms. The open passageway could be a conduit for contaminants between the two rooms.		2,000	1,000	60	5,000	-Remove debris -Drain and remove or inert fill UST -Sweep -Power wash oil stains	1	30	2000		250
	7.07 A	Contains one 55-gal drum 3/4 full of possible #6 fuel oil and one 55-gal drum (cut-off) 1/3 full of possible #6 fuel oil. There is severe oil staining on the entire floor and on the piping.		1,000	1,500	50	110	-Remove drums -Power wash oil stains	0	120			1000
Locker Room	7.08	Contains lockers, showers, toilets, and a sink. There is potential for contaminants that were tracked in from the boiler house room. Water pipes insulated with asbestos run along the ceiling.		650	300	90	0	-Remove debris -Sweep	0.3	0	650		
Bag House	7.11	Contains blowers, motors, filters, and one 1000-gal tank with unknown contents. There is dust and minor oil staining on the floor.	As=49.1 mg/kg, SW-7.11	8,550	2,000	100	0	-Drain and flush AST -Sweep -Power wash oil stains	3	30	8550		250
Chemical Stores	7.12	Contains spare parts, 2 transformers, shelves, 2 motors, and RAP table listed chemicals in bags. The floor is covered with powders (likely spilled from bags) and water puddles.		12,000	1,500	150	0	-Remove debris -Sweep	5	0	12000		
Filter House	7.13	Rooms A,B,C,& D - Contained mixers, spare parts, sand filters, pump well, toilet, trash, lab bench, and refrigerator.	PCB=0.203 mg/kg, CC-21					-Remove debris	0	0			
Lumber	7.14	No key environmental concerns. Contains miscellaneous debris on floor.		2,325	0	90	0	-Remove debris	0	0			
Laboratory	7.15	Room B - Contains 7 50-lb bags of "Agri-Flow Salt", lead lined sinks and countertops, glassware, 7 fume hoods and 10 mercury thermometers. There are also trenches containing piping, as well as overhead pipes.	Pb=8,850 mg/kg, SW-7.15B	7,200	2,000	30	0	-Remove debris -Separate lead and mercury	0	0	7200		
Project Stores - workshop	7.16 A&B	Contains some floor staining as well as some pipe trenches.	Pb=10,100 mg/kg, benzo(a)pyrene=16 mg/kg, SW-7.16-7.20	4,000	1,000	30	0	-Remove debris	0	0	4000		
Project Stores - storage area	7.17	Contains fume hood, 2 HVAC units, and misc. debris on floor. There is a 5 ft. diameter residual oil stain on the shelves.	Pb=10,100 mg/kg, benzo(a)pyrene=16 mg/kg, SW-7.16-7.20	4,800	1,200	30	0	-Remove debris	0	30	4800		250
Project Shops	7.18	Contains a ventilation system and has two large oil stains on the floor.	Pb=10,100 mg/kg, benzo(a)pyrene=16 mg/kg, SW-7.16-7.20	3,200	500	30	0	-Remove debris -Power wash oil stains	0	30	3200		250
Plastic Shop	7.19	Contains 3 sand blaster units and extensive ventilation ducts. The room is very dusty and also contains 1 pit in NE corner containing what appears to be sand.	Pb=10,100 mg/kg, benzo(a)pyrene=16 mg/kg, SW-7.16-7.20	3,600	100	60	0	-Remove debris -Sweep	1	0	3600		
Shops	7.20	No key environmental concerns. Contains on electric switch reading "oil emersion RSGD type line start."	Pb=10,100 mg/kg, benzo(a)pyrene=16 mg/kg, SW-7.16-7.20	2,400	200	60	0	-Remove debris	0	0	2400		

TABLE 1 - RE NG BUILDINGS, ABOVE GRADE STRUCTURES AND APPURTENANCES

Building Name	Room No./Desc.	Key Environmental Concerns	Key Detections[1]	Estimated Floor Area (square feet)	Estimated Pipe Length (linear feet)	Estimated Debris Volume (cubic yards)	Estimated Liquid Volume (gallons)	Proposed Decon Method	Estimated Decon Debris Volume (cubic yards)	Estiamted Decon Liquid Volume (gallons)	Estimated Sweep (sq. ft.)	Estimated Concrete (cu. yds.)	Estimated Power Wash (sq. ft.)
Pump House Behind Power House	7.23	Contains a pump and the top of a UST. The entire floor is covered with a 6' deep water/oil mix with a strong odor. It is difficult to observe any subgrade features. There is potential for petroleum-related contamination of the brick walls and the sediments at the bottom of the room may contain PCBs.	PCB=ND, LQ-25	187	80	30	10,100	-Remove debris -Power wash walls and floor	0	30			250
River Water Pump & Filter House	No number given	Contains a pump system inside a pit, a small pump on the second level, sand filter/hoppers, and one empty trench. There are misc. spotty areas with a white powdery stain, a yellow/green/white stain on upper level which runs down the wall to lower level, and an oil stain in the pit. The room also contains a transformer unit (hulk) that may be PCB contaminated. The pump area is 3 to 4 feet below water, and the surface of the water has oil floating on it.	PCB=ND, LQ-12 PCB=0.065 mg/kg, CC-20	1,800	400	100	0	-Remove debris -Power wash walls and floor	0	60			500
Other	No number given	Coal shed, no. 6 fuel tanks, and spray ponds. There is sediment on the floor of the spray ponds. There are 2 2-million gal oil ASTs with #6 oil residue and staining on the floor and walls of each AST.		0	0	0	0	-ASTs decontaminated	0	0			
TOTAL				221,672	68,180	2,134	76,211		259	2,190	206,765	25	18,250

[1] EPA Samples FMC Samples
BW, W-wipe CC-concrete chip
D, DU-dust LQ-liquid
L-liquid SD-sediment SW - sweepings/dust

AR106884

TABLE 2 - DATA SUMMARY - CONCRETE CHIP SAMPLES

SECTION 1

Sample ID# -		AV-NCB-CC-12(05/11/00)	AV-NCB-CC-11(05/11/00)	AV-NCB-CC-06(05/09/00)	AV-NCB-CC-10(05/11/00)
Sample Location -		1.02A Polypropylene Spinning	1.03A Creel Room 1st Floor	1.03D&J Creel Room 3rd Floor	1.04A Polyester Spinning 1st Floor
Laboratory -	Screening Level[1]	Lancaster Labs	Lancaster Labs	Lancaster Labs	Lancaster Labs
Sample Date -	EPA's RBC	5/11/00	5/11/00	5/9/00	5/11/00
PCBs (mg/kg)					
PCB-1016	820	ND<35	ND<0.35	ND<0.087	ND<690
PCB-1221	29	ND<35	ND<0.35	ND<0.087	ND<690
PCB-1232	29	ND<35	ND<0.35	ND<0.087	ND<690
PCB-1242	29	ND<35	ND<0.35	0.416	ND<690
PCB-1248	29	ND<35	ND<0.35	ND<0.087	ND<690
PCB-1254	29	**129**	0.96	0.705	ND<690
PCB-1260	29	**424**	3.33	ND<0.087	**9,470**
PAHs(mg/kg)					
Naphthalene	41,000	ND<2.8	ND<1.4	ND<5.5	ND<14
Acenaphthylene	No RBC	ND<2.8	ND<1.4	7.4	ND<14
Acenaphthene	120,000	ND<2.8	ND<1.4	ND<5.5	ND<14
Fluorene	82,000	ND<0.28	ND<0.14	ND<0.55	ND<1.4
Phenanthrene	No RBC	ND<0.11	0.071	ND<0.23	1.65
Anthracene	610,000	ND<0.051	ND<0.026	0.32	ND<0.25
Fluoranthene	82,000	ND<0.051	0.134	ND<0.10	ND<0.25
Pyrene	61,000	0.4	0.37	1.79	ND<1.4
Benz(a)anthracene	78	0.237	0.082	0.122	ND<0.15
Chrysene	7,800	5.22	1.3	4.39	39
Benzo(b)fluoranthene	78	0.06	0.175	ND<0.041	ND<0.1
Benzo(k)fluoranthene	780	0.05	0.044	ND<0.041	ND<0.1
Benzo(a)pyrene	7.8	0.14	0.227	ND<0.062	ND<0.15
Dibenz(a,h)anthracene	7.8	ND<0.051	0.175	ND<0.10	ND<0.25
Benzo(g,h,i)perylene	No RBC	ND<0.16	0.271	ND<0.33	ND<0.810
Indeno(1,2,3-cd)pyrene)	78	0.19	0.164	ND<0.23	ND<0.560

Sample ID# -		AV-NCB-CC-08(05/10/00)	AV-NCB-CC-05(05/09/00)	AV-NCB-CC-03(05/09/00)	AV-NCB-CC-09(05/10/00)
Sample Location -		1.04B Polyesteer Spinning 2nd Floor	1.04C Polyester Spinning 3rd Floor	1.04D Polyester Spinning 4th Floor	1.05A Polymer Plant 1st Floor
Laboratory -	Screening Level[1]	Lancaster Labs	Lancaster Labs	Lancaster Labs	Lancaster Labs
Sample Date -	EPA's RBC	5/10/00	5/9/00	5/9/00	5/10/00
PCBs (mg/kg)					
PCB-1016	820	ND<0.35	ND<1.7	ND<0.18	ND<35
PCB-1221	29	ND<0.35	ND<1.7	ND<0.18	ND<35
PCB-1232	29	ND<0.35	ND<1.7	ND<0.18	ND<35
PCB-1242	29	ND<0.35	2.6	1.64	ND<35
PCB-1248	29	3.51	ND<1.7	ND<0.18	**79**
PCB-1254	29	3.27	8.7	1.4	**58**
PCB-1260	29	0.65	ND<1.7	ND<0.18	ND<35
PAHs(mg/kg)					
Naphthalene	41,000	N/A	N/A	N/A	N/A
Acenaphthylene	No RBC	N/A	N/A	N/A	N/A
Acenaphthene	120,000	N/A	N/A	N/A	N/A
Fluorene	82,000	N/A	N/A	N/A	N/A
Phenanthrene	No RBC	N/A	N/A	N/A	N/A
Anthracene	610,000	N/A	N/A	N/A	N/A
Fluoranthene	82,000	N/A	N/A	N/A	N/A
Pyrene	61,000	N/A	N/A	N/A	N/A
Benz(a)anthracene	78	N/A	N/A	N/A	N/A
Chrysene	7,800	N/A	N/A	N/A	N/A
Benzo(b)fluoranthene	78	N/A	N/A	N/A	N/A
Benzo(k)fluoranthene	780	N/A	N/A	N/A	N/A
Benzo(a)pyrene	7.8	N/A	N/A	N/A	N/A
Dibenz(a,h)anthracene	7.8	N/A	N/A	N/A	N/A
Benzo(g,h,i)perylene	No RBC	N/A	N/A	N/A	N/A
Indeno(1,2,3-cd)pyrene)	78	N/A	N/A	N/A	N/A

Notes:
ND - analyte not detected above reported limit of quantitation
Results are reported as "dry basis" results.
N/A - Not Analyzed
[1] Site screening levels for direct contact with soil under industrial setting using HQ=1 and 1x10[illegible] for excess cancer risk.

AR106885

TABLE 2 - DATA SUMMARY - CONCRETE CHIP SAMPLES

SECTION I

Sample ID# -		AV-NCB-CC-07(05/10/00)	AV-NCB-CC-07(05/10/00)D	AV-NCB-CC-04(05/09/00)	AV-NCB-CC-02(05/08/00)
Sample Location -		1.05B Polymer Plant 2nd Floor	1.05B Polymer Plant 2nd Floor	1.05D Polymer Plant 3rd Floor	1.05E Polymer Plant 4th Floor
Laboratory -	Screening Level[1]	Lancaster Labs	Lancaster Labs	Lancaster Labs	Lancaster Labs
Sample Date -	EPA's RBC	5/10/00	5/10/00	5/9/00	5/8/00
PCBs (mg/kg)					
PCB-1016	820	ND<6.9	ND<7	ND<1.8	ND<1.8
PCB-1221	29	ND<6.9	ND<7	ND<1.8	ND<1.8
PCB-1232	29	ND<6.9	ND<7	ND<1.8	ND<1.8
PCB-1242	29	ND<6.9	ND<7	11.5	15.1
PCB-1248	29	21.7	22.6	ND<1.8	ND<1.8
PCB-1254	29	ND<6.9	ND<7	ND<1.8	2.4
PCB-1260	29	ND<6.9	ND<7	ND<1.8	ND<1.8
PAHs(mg/kg)					
Naphthalene	41,000	ND<28	2.2	N/A	N/A
Acenaphthylene	No RBC	ND<28	9.4	N/A	N/A
Acenaphthene	120,000	ND<28	ND<1.4	N/A	N/A
Fluorene	82,000	ND<2.8	ND<0.14	N/A	N/A
Phenanthrene	No RBC	4.8	6.3	N/A	N/A
Anthracene	610,000	ND<0.51	ND<2.6	N/A	N/A
Fluoranthene	82,000	ND<0.51	ND<2.6	N/A	N/A
Pyrene	61,000	ND<2.8	3.17	N/A	N/A
Benz(a)anthracene	78	ND<0.31	ND<1.5	N/A	N/A
Chrysene	7,800	135	187	N/A	N/A
Benzo(b)fluoranthene	78	ND<0.2	ND<1	N/A	N/A
Benzo(k)fluoranthene	780	ND<0.2	ND<1	N/A	N/A
Benzo(a)pyrene	7.8	ND<0.31	ND<1.5	N/A	N/A
Dibenz(a,h)anthracene	7.8	ND<0.51	ND<2.6	N/A	N/A
Benzo(g,h,i)perylene	No RBC	ND<1.6	ND<8.2	N/A	N/A
Indeno(1,2,3-cd)pyrene)	78	ND<1.1	ND<5.6	N/A	N/A

Sample ID# -		AV-NCB-CC-01(05/08/00)	AV-NCB-CC-14(05/12/00)	AV-NCB-CC-13(05/12/00)
Sample Location -		1.05F Polymer Plant 5th Floor	1.08A Adhesive Dip 1st Floor	1.08B Adhesive Dip 2nd Floor
Laboratory -	Screening Level[1]	Lancaster Labs	Lancaster Labs	Lancaster Labs
Sample Date -	EPA's RBC	5/8/00	5/12/00	5/12/00
PCBs (mg/kg)				
PCB-1016	820	ND<0.35	ND<0.35	ND<700
PCB-1221	29	ND<0.35	ND<0.35	ND<700
PCB-1232	29	ND<0.35	ND<0.35	ND<700
PCB-1242	29	3.76	ND<0.35	ND<700
PCB-1248	29	ND<0.35	ND<0.35	ND<700
PCB-1254	29	0.86	1.93	ND<700
PCB-1260	29	ND<0.35	0.98	940
PAHs(mg/kg)				
Naphthalene	41,000	N/A	N/A	N/A
Acenaphthylene	No RBC	N/A	N/A	N/A
Acenaphthene	120,000	N/A	N/A	N/A
Fluorene	82,000	N/A	N/A	N/A
Phenanthrene	No RBC	N/A	N/A	N/A
Anthracene	610,000	N/A	N/A	N/A
Fluoranthene	82,000	N/A	N/A	N/A
Pyrene	61,000	N/A	N/A	N/A
Benz(a)anthracene	78	N/A	N/A	N/A
Chrysene	7,800	N/A	N/A	N/A
Benzo(b)fluoranthene	78	N/A	N/A	N/A
Benzo(k)fluoranthene	780	N/A	N/A	N/A
Benzo(a)pyrene	7.8	N/A	N/A	N/A
Dibenz(a,h)anthracene	7.8	N/A	N/A	N/A
Benzo(g,h,i)perylene	No RBC	N/A	N/A	N/A
Indeno(1,2,3-cd)pyrene)	78	N/A	N/A	N/A

Notes:
ND - analyte not detected above reported limit of quantitation
Results are reported as "dry basis" results.
N/A - Not Analyzed
[1] Site screening levels for direct contact with soil under industrial setting using HQ=1 and 1×10^{-5} for excess cancer risk.

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TABLE 2 - DATA SUMMARY - CONCRETE CHIP SAMPLES

SECTION II

Sample ID# - / Sample Location - / Laboratory - / Sample Date -	Screening Level [1] EPA's RBC	AV-NCB-CC-15(05/15/00) 2.04 Mens Locker Room, Substation #1, Switch Room Lancaster Labs 5/15/00	AV-NCB-CC-17(05/15/00) 2.06 Ring Twisting Lancaster Labs 5/15/00	AV-NCB-CC-16(05/15/00) 2.12 Coning Lancaster Labs 5/15/00
PCBs (mg/kg)				
PCB-1016	820	ND<0.18	N/A	ND<0.018
PCB-1221	29	ND<0.18	N/A	ND<0.018
PCB-1232	29	ND<0.18	N/A	ND<0.018
PCB-1242	29	1.16	N/A	ND<0.018
PCB-1248	29	ND<0.18	N/A	0.031
PCB-1254	29	ND<0.18	N/A	0.051
PCB-1260	29	ND<0.18	N/A	0.021
PAHs(mg/kg)				
Naphthalene	41,000	N/A	ND<11	ND<12
Acenaphthylene	No RBC	N/A	ND<11	ND<12
Acenaphthene	120,000	N/A	ND<11	ND<12
Fluorene	82,000	N/A	ND<1.1	ND<1.2
Phenanthrene	No RBC	N/A	ND<0.47	ND<0.47
Anthracene	610,000	N/A	ND<0.21	ND<0.21
Fluoranthene	82,000	N/A	ND<0.21	ND<0.21
Pyrene	61,000	N/A	ND<1.1	ND<1.2
Benzo(a)anthracene	78	N/A	ND<0.13	ND<0.13
Chrysene	7,800	N/A	ND<0.47	ND<0.47
Benzo(b)fluoranthene	78	N/A	ND<0.085	ND<0.086
Benzo(k)fluoranthene	780	N/A	ND<0.085	ND<0.086
Benzo(a)pyrene	7.8	N/A	ND<0.13	ND<0.13
Dibenzo(a,h)anthracene	7.8	N/A	ND<0.21	ND<0.21
Benzo(g,h,i)perylene	No RBC	N/A	ND<0.68	ND<0.68
Indeno(1,2,3-cd)pyrene)	78	N/A	ND<0.47	ND<0.47

SECTION VI

Sample ID# - / Sample Location - / Laboratory - / Sample Date -	Screening Level [1] EPA's RBC	AV-NCB-CC-18(05/16/00) 6.42 Power Room Lancaster Labs 5/16/00
PCBs (mg/kg)		
PCB-1016	820	ND<0.18
PCB-1221	29	ND<0.18
PCB-1232	29	ND<0.18
PCB-1242	29	0.3
PCB-1248	29	ND<0.18
PCB-1254	29	ND<0.18
PCB-1260	29	0.18
PAHs(mg/kg)		
Naphthalene	41,000	N/A
Acenaphthylene	No RBC	N/A
Acenaphthene	120,000	N/A
Fluorene	82,000	N/A
Phenanthrene	No RBC	N/A
Anthracene	610,000	N/A
Fluoranthene	82,000	N/A
Pyrene	61,000	N/A
Benzo(a)anthracene	78	N/A
Chrysene	7,800	N/A
Benzo(b)fluoranthene	78	N/A
Benzo(k)fluoranthene	780	N/A
Benzo(a)pyrene	7.8	N/A
Dibenzo(a,h)anthracene	7.8	N/A
Benzo(g,h,i)perylene	No RBC	N/A
Indeno(1,2,3-cd)pyrene)	78	N/A

Notes:
ND - analyte not detected above reported limit of quantitation
Results are reported as "dry basis" results.
N/A - Not Analyzed

[1] Site screening levels for direct contact with soil under industrial setting using HQ=1 and 1×10^{-5} for excess cancer risk.

TABLE 2 - DATA SUMMARY - CONCRETE CHIP SAMPLES

SECTION VII

Sample ID# - Sample Location - Laboratory - Sample Date -	Screening Level [1] EPA's RBC	AV-NCB-CC-19(05/16/00) 7.04 Compressor Room Lancaster Labs 5/16/00	AV-NCB-CC-23(05/19/00) 7.05B Power House 2nd Floor Lancaster Labs 5/19/00	AV-NCB-CC-24(05/22/00) 7.05B Power House 2nd Floor Lancaster Labs 5/22/00	AV-NCB-CC-22(05/18/00) 7.06A Boiler House 1st Floor Lancaster Labs 5/18/00
PCBs (mg/kg)					
PCB-1016	820	ND<0.18	ND<0.17	ND<3.5	ND<0.017
PCB-1221	29	ND<0.18	ND<0.17	ND<3.5	ND<0.017
PCB-1232	29	ND<0.18	ND<0.17	ND<3.5	ND<0.017
PCB-1242	29	ND<0.18	ND<0.17	ND<3.5	ND<0.017
PCB-1248	29	ND<0.18	ND<0.17	ND<3.5	ND<0.017
PCB-1254	29	ND<0.18	ND<0.17	ND<3.5	ND<0.017
PCB-1260	29	1.25	0.77	12.9	0.107
PAHs(mg/kg)					
Naphthalene	41,000	N/A	N/A	ND<1.4	ND<14
Acenaphthylene	No RBC	N/A	N/A	ND<1.4	ND<14
Acenaphthene	120,000	N/A	N/A	ND<1.4	ND<14
Fluorene	82,000	N/A	N/A	ND<0.14	2.7
Phenanthrene	No RBC	N/A	N/A	0.113	6.68
Anthracene	*610,000*	N/A	N/A	*ND<0.026*	*2.81*
Fluoranthene	82,000	N/A	N/A	0.133	1.53
Pyrene	61,000	N/A	N/A	0.21	10.4
Benzo(a)anthracene	78	N/A	N/A	0.057	0.83
Chrysene	7,800	N/A	N/A	ND<0.057	0.78
Benzo(b)fluoranthene	78	N/A	N/A	0.055	0.19
Benzo(k)fluoranthene	780	N/A	N/A	0.025	0.12
Benzo(a)pyrene	7.8	N/A	N/A	0.034	0.29
Dibenzo(a,h)anthracene	7.8	N/A	N/A	ND<0.026	ND<0.26
Benzo(g,h,i)perylene	No RBC	N/A	N/A	ND<0.082	ND<0.82
Indeno(1,2,3-cd)pyrene)	78	N/A	N/A	ND<0.057	ND<0.57

Sample ID# - Sample Location - Laboratory - Sample Date -	Screening Level [1] EPA's RBC	AV-NCB-CC-22(05/18/00)D 7.06A Boiler House 1st Floor Lancaster Labs 5/18/00	AV-NCB-CC-21(05/18/00) 7.13 Filter House Lancaster Labs 5/18/00	AV-NCB-CC-20(05/16/00) River Water Pump & Filter House Lancaster Labs 5/16/00
PCBs (mg/kg)				
PCB-1016	820	ND<0.018	ND<0.018	ND<0.017
PCB-1221	29	ND<0.018	ND<0.018	ND<0.017
PCB-1232	29	ND<0.018	ND<0.018	ND<0.017
PCB-1242	29	ND<0.018	ND<0.018	ND<0.017
PCB-1248	29	ND<0.018	ND<0.018	ND<0.017
PCB-1254	29	ND<0.018	0.112	0.019
PCB-1260	29	0.104	0.091	0.046
PAHs(mg/kg)				
Naphthalene	41,000	ND<35	N/A	N/A
Acenaphthylene	No RBC	ND<35	N/A	N/A
Acenaphthene	120,000	ND<35	N/A	N/A
Fluorene	82,000	4.5	N/A	N/A
Phenanthrene	No RBC	12.1	N/A	N/A
Anthracene	610,000	4.92	N/A	N/A
Fluoranthene	82,000	3.12	N/A	N/A
Pyrene	61,000	22.5	N/A	N/A
Benzo(a)anthracene	78	1.85	N/A	N/A
Chrysene	7,800	1.5	N/A	N/A
Benzo(b)fluoranthene	78	0.48	N/A	N/A
Benzo(k)fluoranthene	780	0.31	N/A	N/A
Benzo(a)pyrene	7.8	0.75	N/A	N/A
Dibenzo(a,h)anthracene	7.8	ND<0.64	N/A	N/A
Benzo(g,h,i)perylene	No RBC	ND<2.1	N/A	N/A
Indeno(1,2,3-cd)pyrene)	78	ND<1.4	N/A	N/A

Notes:
ND - analyte not detected above reported limit of quantitation
Results are reported as "dry basis" results.
N/A - Not Analyzed
[1] Site screening levels for direct contact with soil under industrial setting using HQ=1 and $1x10^{-5}$ for excess cancer risk.

Sample ID - Sample Location - Laboratory - Sample Date -	Screening Level [1] EPA's RBC	AV-NCB-SW-6.05-6.08-1(05/10/00) Composite - 6.05 - 6.08 Lancaster Labs 5/10/00	AV-NCB-SW-7.04-01(05/11/00) 7.04 Compressor Room Lancaster Labs 5/11/00	AV-NCB-SW-7.05A(05/16/00) 7.05A Power House 1st Floor Lancaster Labs 5/16/00	AV-NCB-SW-7.05B(05/16/00) 7.05B Power House 2nd Floor Lancaster Labs 5/16/00	AV-NCB-SW-7.06A(05/17/00) 7.06A Boiler House 1st Floor Lancaster Labs 5/17/00	AV-NCB-SW-7.06B(05/17/00) 7.06B Boiler House 2nd Floor Lancaster Labs 5/17/00
TAL Metals (mg/kg)							
Antimony	82	N/A	ND<100	N/A	N/A	N/A	N/A
Arsenic	38	N/A	27.4	N/A	N/A	N/A	N/A
Barium	140,000	N/A	8,090	N/A	N/A	N/A	N/A
Beryllium	4,100	N/A	ND<2.6	N/A	N/A	N/A	N/A
Cadmium	1,000	N/A	[6	N/A	N/A	N/A	N/A
Chromium	6,100	N/A	2,150	N/A	N/A	N/A	N/A
Cobalt	120,000	N/A	N/A	N/A	N/A	N/A	N/A
Copper	82,000	N/A	1,190	N/A	N/A	N/A	N/A
Lead	1,000	N/A	9,820	N/A	N/A	N/A	N/A
Manganese	41,000	N/A	1,130	N/A	N/A	N/A	N/A
Mercury	No RBC	N/A	56	N/A	N/A	N/A	N/A
Nickel	41,000	N/A	298	N/A	N/A	N/A	N/A
Selenium	10,000	N/A	ND<5.2	N/A	N/A	N/A	N/A
Silver	10,000	N/A	ND<10	N/A	N/A	N/A	N/A
Thallium	140	N/A	12	N/A	N/A	N/A	N/A
Vanadium	14,000	N/A	57	N/A	N/A	N/A	N/A
Zinc	610,000	N/A	11,900	N/A	N/A	N/A	N/A
Semivolatiles TCL (mg/kg)							
Di-n-butylphthalate	200,000	6.5	ND<1.8	N/A	N/A	N/A	N/A
Butylbenzylphthalate	410,000	ND<3.4	12	N/A	N/A	N/A	N/A
bis(2-Ethylhexyl)phthalate	4,100	6.9	11	N/A	N/A	N/A	N/A
Dimethylphthalate	20,000,000	ND<3.4	ND<1.8	N/A	N/A	N/A	N/A
Di-n-octylphthalate	41,000	ND<3.4	ND<1.8	N/A	N/A	N/A	N/A
Carbazole	2,900	6.8	ND<1.8	N/A	N/A	N/A	N/A
2-Methylnaphthalene	41,000	ND<3.4	ND<1.8	N/A	N/A	N/A	N/A
PAHs (mg/kg)							
Naphthalene	41,000	ND<3.4	ND<1.8	ND<14	ND<56	N/A	N/A
Acenaphthylene	No RBC	ND<3.4	ND<1.8	ND<14	ND<56	N/A	N/A
Acenaphthene	120,000	ND<3.4	ND<1.8	ND<14	ND<56	N/A	N/A
Fluorene	82,000	ND<3.4	ND<1.8	ND<1.4	ND<5.6	N/A	N/A
Phenanthrene	No RBC	38	9.5	1.62	37	N/A	N/A
Anthracene	610,000	6.7	2.6	0.5	25.2	N/A	N/A
Fluoranthene	82,000	65	11	1.24	40.6	N/A	N/A
Pyrene	61,000	55	14	ND<1.4	48.9	N/A	N/A
Benzo(a)anthracene	78	31	5.6	0.37	16	N/A	N/A
Chrysene	7,800	37	6.2	ND<0.57	14.3	N/A	N/A
Benzo(b)fluoranthene	78	39	6.1	0.33	11	N/A	N/A
Benzo(k)fluoranthene	780	23	2.6	0.14	6.44	N/A	N/A
Benzo(a)pyrene	7.8	29	4.5	0.25	13.7	N/A	N/A
Dibenz(a,h)anthracene	7.8	5.5	ND<1.8	ND<0.26	1.6	N/A	N/A
Benzo(g,h,i)perylene	No RBC	19	2.9	ND<0.83	15.2	N/A	N/A
Indeno(1,2,3-cd)pyrene	78	22	3.7	ND<0.57	6.3	N/A	N/A
PCBs (mg/kg)							
PCB-1016	820	ND<1.8	N/A	ND<1.8	ND<88	ND<.17	ND<0.018
PCB-1221	29	ND<1.8	N/A	ND<1.8	ND<88	ND<.17	ND<0.018
PCB-1232	29	ND<1.8	N/A	ND<1.8	ND<88	ND<.17	ND<0.018
PCB-1242	29	ND<1.8	N/A	ND<1.8	ND<88	ND<.17	ND<0.018
PCB-1248	29	ND<1.8	N/A	ND<1.8	ND<88	ND<.17	ND<0.018
PCB-1254	29	3	N/A	4.3	ND<88	0.51	0.077
PCB-1260	29	7	N/A	5.9	347	0.79	0.131
ACM	No RBC	N/A	1.30%	<1%	1.00%	3.75%	<1%

Notes:
ND - analyte not detected above reported limit of quantitation
Results are reported as "dry basis" results
N/A - Not Analyzed

[1] EPA Region III Risk Based Concentrations (RBC) for direct contact with soil under industrial setting using HQ=1 (except antimony) and $1x10^{-5}$ for excess cancer risk. Antimony is based on HQ=0.1, due to similar systemic effects as lead. Lead value based on typical commercial/industrial exposure. Chromium direct contact exposure standard based on Cr^{+6}.

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Sample ID - Sample Location - Laboratory - Sample Date -	Screening Level[1] EPA's RBC	AV-NCB-SW-7.06B(05/17/00)D 7.06B Boiler House 2nd Floor Lancaster Labs 5/17/00	AV-NCB-SW-7.06F(05/17/00) 7.06F Boiler House 3rd Floor Lancaster Labs 5/17/00	AV-NCB-SW-7.06G(05/17/00) 7.06G Boiler House 4th Floor Lancaster Labs 5/17/00	AV-NCB-SW-7.06H(05/17/00) 7.06H Boiler House 5th Floor Lancaster Labs 5/17/00	AV-NCB-SW-7.11(05/18/00) 7.11 Bag House 1st Floor Lancaster Labs 5/18/00	AV-NCB-SW-7.15B(05/18/00) 7.15B Laboratory Lancaster Labs 5/18/00	AV-NCB-SW-7.16-7.20(05/18/00) 7.16-7.20 Project Shops Lancaster Labs 5/18/00
TAL Metals (mg/kg)								
Antimony	82	N/A	N/A	N/A	N/A	ND<100	170	ND<100
Arsenic	38	N/A	N/A	N/A	N/A	49.1	8.7	17.2
Barium	140,000	N/A	N/A	N/A	N/A	718	920	4,220
Beryllium	4,100	N/A	N/A	N/A	N/A	ND<2.6	ND<2.6	ND<2.6
Cadmium	1,000	N/A	N/A	N/A	N/A	ND<10	44	ND<10
Chromium	6,100	N/A	N/A	N/A	N/A	166	169	629
Cobalt	120,000	N/A	N/A	N/A	N/A	15.3	87	36.2
Copper	82,000	N/A	N/A	N/A	N/A	330	615	2,000
Lead	1,000	N/A	N/A	N/A	N/A	341	8,850	10,100
Manganese	41,000	N/A	N/A	N/A	N/A	689	478	1,280
Mercury	No RBC	N/A	N/A	N/A	N/A	0.82	108	73
Nickel	41,000	N/A	N/A	N/A	N/A	102	802	494
Selenium	10,000	N/A	N/A	N/A	N/A	10	ND<5.3	ND<5.1
Silver	10,000	N/A	N/A	N/A	N/A	ND<10	ND<11	12
Thallium	140	N/A	N/A	N/A	N/A	ND<10	ND<11	ND<10
Vanadium	14,000	N/A	N/A	N/A	N/A	77	20	40
Zinc	610,000	N/A	N/A	N/A	N/A	3100	40,000	8,810
Semivolatiles TCL (mg/kg)								
Di-n-butylphthalate	200,000	N/A	N/A	N/A	N/A	120	13	N/A
Butylbenzylphthalate	410,000	N/A	N/A	N/A	N/A	ND<.35	17	N/A
bis(2-Ethylhexyl)phthalate	4,100	N/A	N/A	N/A	N/A	1.8	110	N/A
Dimethylphthalate	20,000,000	N/A	N/A	N/A	N/A	0.43	ND<8.7	N/A
Di-n-octylphthalate	41,000	N/A	N/A	N/A	N/A	ND<.35	43	N/A
Carbazole	2,900	N/A	N/A	N/A	N/A	ND<.35	ND<8.7	N/A
2-Methylnaphthalene	41,000	N/A	N/A	N/A	N/A	0.51	ND<8.7	N/A
PAHs (mg/kg)								
Naphthalene	41,000	N/A	N/A	ND<14	ND<6.9	0.5	ND<8.7	ND<350
Acenaphthylene	No RBC	N/A	N/A	ND<14	ND<6.9	N/A	N/A	ND<350
Acenaphthene	120,000	N/A	N/A	ND<14	ND<6.9	N/A	N/A	ND<350
Fluorene	82,000	N/A	N/A	ND<1.4	ND<0.69	N/A	N/A	ND<35
Phenanthrene	No RBC	N/A	N/A	1.31	0.61	0.67	ND<8.7	38
Anthracene	610,000	N/A	N/A	0.4	0.34	N/A	N/A	34.5
Fluoranthene	82,000	N/A	N/A	0.44	0.21	0.6	ND<8.7	72.6
Pyrene	61,000	N/A	N/A	ND<1.4	ND<0.69	0.45	ND<8.7	71
Benzo(a)anthracene	78	N/A	N/A	ND<0.15	0.078	N/A	N/A	14.7
Chrysene	7,800	N/A	N/A	ND<0.56	ND<.28	N/A	N/A	24
Benzo(b)fluoranthene	78	N/A	N/A	ND<0.1	ND<0.051	N/A	N/A	20.9
Benzo(k)fluoranthene	780	N/A	N/A	ND<0.1	ND<0.051	N/A	N/A	10.2
Benzo(a)pyrene	7.8	N/A	N/A	ND<.15	ND<0.077	N/A	N/A	16
Dibenz(a,h)anthracene	7.8	N/A	N/A	ND<0.25	ND<0.13	N/A	N/A	ND<6.5
Benzo(g,h,i)perylene	No RBC	N/A	N/A	ND<0.81	ND<0.41	N/A	N/A	24
Indeno(1,2,3-cd)pyrene	78	N/A	N/A	ND<0.56	ND<0.28	N/A	N/A	ND<14
PCBs (mg/kg)								
PCB-1016	820	ND<0.018	ND<0.018	ND<0.017	ND<0.17	N/A	N/A	N/A
PCB-1221	29	ND<0.018	ND<0.018	ND<0.017	ND<0.17	N/A	N/A	N/A
PCB-1232	29	ND<0.018	ND<0.018	ND<0.017	ND<0.17	N/A	N/A	N/A
PCB-1242	29	ND<0.018	ND<0.018	ND<0.017	ND<0.17	N/A	N/A	N/A
PCB-1248	29	ND<0.018	ND<0.018	ND<0.017	1.32	N/A	N/A	N/A
PCB-1254	29	0.122	0.034	0.062	0.18	N/A	N/A	N/A
PCB-1260	29	0.217	0.045	0.095	0.31	N/A	N/A	N/A
ACM	No RBC	<1%	5.30%	<1%	<1%	ND	<1%	ND

Notes:
ND - analyte not detected above reported limit of quantitation
Results are reported as "dry basis" results.
N/A - Not Analyzed

[1] EPA Region III Risk Based Concentrations (RBC) for direct contact with soil under industrial setting using HQ=1 (except antimony) and $1x10^{-5}$ for excess cancer risk. Antimony is based on HQ=0.1, due to similar systemic effects as lead. Lead value based on typical commercial/industrial exposure. Chromium direct contact exposure standard based on Cr^{+6}.

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TABLE 4 - REMAINING SUBGRADE STRUCTURES

Building Name	*Room No.*	*Description of Subgrade Structure*	*Sample Media*	*Analysis*
SECTION I				
Polypropylene Spinning	1.02	(2) pits located in center of room below hydraulic press - (2'x2'x2') containing water and oil and (1) sewer manhole. One press unit still contains hyrdaulic oil.	liquid	No sample collected - pits dry
Creel Room	1.03 A&B	(1) pit (4'x4'x3") with unknown contents located in 1.03 A	liquid	No sample collected - pits dry
Polyester Spinning - 1st floor	1.04 A	(3) pits (8'x20'x4') containing 3' of liquid on the west end of the room	liquid	PCB = ND
Polymer Plant - 1st floor	1.05 A	(1) sewer containing process waste and (2) pits (10'x10'x10') full of polymer chips	n/a	n/a
Adhesive Dip	1.08 A	(1) trench for underground ventilation and (1) sump 6' deep filled with liquid (likely water)	liquid	PCB = ND
Twisting	1.10	(2) process waste trenches	n/a	n/a
Up-twisting	1.12	(2) pits - one is a scale pit (3'x3'x3') and the other is a grated drain area for the methyl orange shower	n/a	n/a
Shops	1.19 A&B	(3) ventilation trenches that run the length of the room and (2) pits (10'x10'x4") beneath the high voltage area that appear to be secondary containment and may contain PCBs	liquid	No sample collected - pits dry
Physical Testing Lab	1.20	(1) trench approximately 20' long (located southern end of room) that was used for chemical waste and contains lab waste	n/a	n/a
SECTION II				
Shipping No. 1	2.02	(1) pit (6'x6'x2') that contains rainwater and (1) pipe sewer	n/a	n/a
Slashing	2.05	(1) open trench (run length of east side of room- approximately 300' long) and (1) pit/sump in center of room (5' x 8') with contents previously sampled by EPA.	n/a	n/a
Analytical Lab "A"	2.13	(1) pit/sump one foot deep with unknown contents	liquid	No sample collected - pit not found
SECTION VI				
Laundry Room	6.02	(2) trenches (50'x1'x6") which run (1) behind and (1) in front of the washers and (2) pits - (1) 6'x3'x4' which is filled with liquid, and (1) 7'x40'x4' which has liquid approx. one ft. deep.	liquid	PCB = ND, 4-methylphenol = 57 ug/L
Viscose Cellar 6	6.22	(7) trenches 4" deep that run the entire length of the room that may contain viscose residue and (1) pit in the NE corner with unknown contents that is 5'x5'x25'.	liquid	bis(2-ethylhexyl) phthalate = 10 ug/L
Soda Press #1	6.26 A	(2) trenches 15' deep that run along the N and S walls and (2) deep pits on the N and S ends of the room that all have caustics.	n/a	n/a
	6.26 B	(2) trenches that are shared with 6.26 A (see above)	n/a	n/a
Dialyzer Room	6.29 A, B, C, D	(1) large sump in the NE corner and several trenches and pits throughout room 1'x1'x1' that have caustics; unknown viscous material on the floor below the water. A sublevel is located against the north wall under/adjacent to the raised platform.	liquid viscous material	PCB = 1.38 ug/L No sample collected - viscose material not accessible to sample
Power Room & Substation #2	6.42	(1) pit 50 sq. ft in SE corner with possible PCBs	liquid	PCB = ND, bis(2-ethylhexyl) phthalate = 28 ug/L

TABLE 4 - REMAINING SUBGRADE STRUCTURES

Building Name	*Room No.*	*Description of Subgrade Structure*	*Sample Media*	*Analysis*
SECTION VII				
Coal Unloading	7.03	(3) pits - (1) 10'x10'x13' on west side of wall and the other (2) under grates. They all appear to contain water. There is also one elevator shaft, which is underwater and may contain contaminated solids.	liquid-composite	PCB = ND, bis(2-ethylhexyl) phthalate = 12 ug/L
			solid/sludge	No sample collected - solids not accessible to sample
Compressor Room	7.04	(1) pit on N side of room 12'x100' containing 18-24" of water, (1) trench 8"x8"x30' in SE corner containing some oil, and the subgrade floor, located near the former transformer explosion area, contains sludge.	liquid	PCB = 16.1, LQ-08
			sludge	PCB = 3.6 ug/L, Pb = 9,820 mg/kg, ACM = 1.3%
Power House	7.05 A - 1st Floor	(2) pits - one containing water and the other with unknown contents	liquid	PCB = ND
Tunnel: Between Power House and #1 Mercerizing	No number given	Contains a pipe chase for brine lines and steam lines and contains sludge. Tunnel is in close proximity to Substation #2.	liquid, sludge	PCB = 31 ug/L, Sed-09, PCB = ND, LQ-27
Tunnel: Between South Corridor and Compressor Room; west of tool room	No number given	Contains a pipe chase for brine lines, steam lines, and power cables.	liquid, sludge	PCB = ND
Tunnel: Between South Corridor and Compressor Room; under oil storage room	No number given	Contains a pipe chase for brine lines, steam lines, and power cables.	liquid, sludge	PCB = ND
Tunnel: Between Compressor Room and Turbine Room	No number given	Areas of the water flume between the Spray Pond and the Power House contain sludge.	liquid, sludge	No sample collected - determined to be redundant with other Tunnel samples (see above)
Boiler House	7.06A	(1) pit 8'x4'x3' in the SE corner with unknown contents, (1) sump 2'x2' in the NW corner with unknown depth and unknown contents.	liquid	SVOCs, PCB = ND
Shops	7.07 A	(1) trench on the N side of room 20'x12"x12" containing pipes and dirt	n/a	n/a
Laboratory	7.15	(2) trenches 5 ' deep containing pipes	n/a	n/a
Project Stores - Workshop	7.16 A&B	(2) trenches 4'x4'x4' that contain pipes	n/a	n/a
Plastic Shop	7.19	(1) pit in NE corner 20'x20' with unknown depth containing what appears to be sand - this pit was used to contain and recirculate sand blasting material, including painted materials.	n/a	n/a
Pump House Behind Power House	7.23	Contains a UST, but entire floor is covered with a 6' deep water/oil mix so it is difficult to observe subgrade features.	liquid on floor sampled (not UST contents)	PCB = ND
River Water Pump & Filter House	No number given	(1) pit 20'x30'x10' in NW corner that is empty but has an oil stain and (1) empty trench on E side of room	n/a	n/a

TABLE 4 - REMAINING SUBGRADE STRUCTURES

Building Name	*Room No.*	*Description of Subgrade Structure*	*Sample Media*	*Analysis*
Underground Electrical Vaults (primarily located outside of buildings)	No number given	Underground vaults approx. 8 to 10 feet deep with side dimensions between 5x6 and 10x10 feet. Some vaults are partially filled with water and may contain PCB sediment.	liquid sludge	No sample collected - conduits sampled (see below)
Electrical Conduits	No number given	Various conduits around building area.	liquid	Conduit # / PCB ug/L 1 940 2 93 3 43 4 22 5 4.1 6 ND 7 ND 8 ND 10 ND

n/a - Not applicable; this subgrade was not identified for sampling in the EE/CA Work Plan Supplement.
ND - Not detected above the limit of quantitation

TABLE 5 - DATA SUMMARY - LIQUID SAMPLES

SECTION I

Sample ID# -	AV-NCB-LQ-02(05/09/00)	AV-NCB-LQ-01(05/08/00)	AV-NCB-LQ-03(05/09/00)
Sample Location -	1.04A Polyester Spinning 1st Floor	1.05D Polymer Plant 3rd Floor	1.08A Adhesive Dip 1st Floor
Laboratory -	Lancaster Labs	Lancaster Labs	Lancaster Labs
Sample Date -	5/9/00	5/8/00	5/9/00
Semivolatiles TCL (mg/L) [1]			
bis(2-Ethylhexyl)phthalate	N/A	N/A	N/A
4-Methylphenol	N/A	N/A	N/A
PCBs (mg/L)			
PCB-1016	ND<0.0005	ND<0.05	ND<0.00048
PCB-1221	ND<0.0005	ND<0.05	ND<0.00048
PCB-1232	ND<0.0005	ND<0.05	ND<0.00048
PCB-1242	ND<0.0005	**0.909**	ND<0.00048
PCB-1248	ND<0.0005	ND<0.05	ND<0.00048
PCB-1254	ND<0.0005	ND<0.05	ND<0.00048
PCB-1260	ND<0.0005	ND<0.05	ND<0.00048

SECTION VI

Sample ID# -	AV-NCB-LQ-05(05/10/00)	AV-NCB-LQ-04(05/10/00)	AV-NCB-LQ-04(05/10/00)D	AV-NCB-LQ-24(05/18/00)	AV-NCB-LQ-09(05/15/00)
Sample Location -	6.02 Laundry Room	6.22 Viscose Cellar	6.22 Viscose Cellar	6.29 Dialyzer Room	6.42 Power Room
Laboratory -	Lancaster Labs	Lancaster Labs	Lancaster Labs	Lancaster Labs	Lancaster Labs
Sample Date -	5/10/00	5/10/00	5/10/00	5/18/00	5/15/00
Semivolatiles TCL (mg/L) [1]					
bis(2-Ethylhexyl)phthalate	ND<0.009	**0.01**	**0.02**	N/A	**0.028**
4-Methylphenol	**0.057**	ND<0.01	ND<0.01	N/A	ND<0.010
PCBs (mg/L)					
PCB-1016	ND<0.00048	N/A	N/A	ND<0.00049	ND<0.00048
PCB-1221	ND<0.00048	N/A	N/A	ND<0.00049	ND<0.00048
PCB-1232	ND<0.00048	N/A	N/A	ND<0.00049	ND<0.00048
PCB-1242	ND<0.00048	N/A	N/A	ND<0.00049	ND<0.00048
PCB-1248	ND<0.00048	N/A	N/A	**0.00063**	ND<0.00048
PCB-1254	ND<0.00048	N/A	N/A	**0.00075**	ND<0.00048
PCB-1260	ND<0.00048	N/A	N/A	ND<0.00049	ND<0.00048

Notes:
ND - analyte not detected above reported limit of quantitation
[1] *Sample analyzed for TCL Semivolatile organics; only those compounds that were detected above the reported method detection limit are shown.*
N/A - Not Analyzed

SECTION VII

Sample ID# -	AV-NCB-LQ-10(05/15/00)	AV-NCB-LQ-11(05/15/00)	AV-NCB-LQ-08(05/15/00)	AV-NCB-LQ-06(05/11/00)	AV-NCB-LQ-07(05/11/00)
Sample Location -	7.03 Coal Unloading	7.03 Coal Unloading	7.04 Compressor Room - S. Tank	7.04 Compressor Room	7.04 Compressor Room
Laboratory -	Lancaster Labs	Lancaster Labs	Lancaster Labs	Lancaster Labs	Lancaster Labs
Sample Date -	5/15/00	5/15/00	5/15/00	5/11/00	5/11/00
Semivolatiles TCL (mg/L) 1					
bis(2-Ethylhexyl)phthalate	*0.012*	*ND<0.010*	*N/A*	*0.01*	*0.026*
4-Methylphenol	ND<0.010	ND<0.010	N/A	ND<0.01	ND<0.01
s (mg/L)					
PCB-1016	ND<0.00048	ND<0.00047	ND<0.0025	ND<0.00047	ND<0.00048
PCB-1221	ND<0.00048	ND<0.00047	ND<0.0025	ND<0.00047	ND<0.00048
PCB-1232	ND<0.00048	ND<0.00047	ND<0.0025	ND<0.00047	ND<0.00048
PCB-1242	ND<0.00048	ND<0.00047	ND<0.0025	ND<0.00047	ND<0.00048
PCB-1248	ND<0.00048	ND<0.00047	ND<0.0025	ND<0.00047	ND<0.00048
PCB-1254	ND<0.00048	ND<0.00047	**0.0096**	ND<0.00047	ND<0.00048
PCB-1260	ND<0.00048	ND<0.00047	**0.0063**	ND<0.00047	ND<0.00048

Sample ID# -	AV-NCB-LQ-22(05/17/00)	AV-NCB-LQ-22(05/17/00)D	AV-NCB-LQ-23(05/18/00)	AV-NCB-LQ-25(05/18/00)
Sample Location -	7.05A Power House 1st Floor	7.05A Power House 1st Floor	7.06A Boiler House 1st Floor	7.23 Pump House Behind Power House
Laboratory -	Lancaster Labs	Lancaster Labs	Lancaster Labs	Lancaster Labs
Sample Date -	5/17/00	5/17/00	5/18/00	5/18/00
Semivolatiles TCL (mg/L) 1				
bis(2-Ethylhexyl)phthalate	N/A	N/A	ND<0.009	N/A
4-Methylphenol	N/A	N/A	ND<0.009	N/A
PCBs (mg/L)				
PCB-1016	*ND<0.00047*	*ND<0.00048*	*ND<0.00048*	*ND<0.00047*
PCB-1221	ND<0.00047	ND<0.00048	ND<0.00048	ND<0.00047
PCB-1232	ND<0.00047	ND<0.00048	ND<0.00048	ND<0.00047
PCB-1242	ND<0.00047	ND<0.00048	ND<0.00048	ND<0.00047
PCB-1248	ND<0.00047	ND<0.00048	ND<0.00048	ND<0.00047
PCB-1254	ND<0.00047	ND<0.00048	ND<0.00048	ND<0.00047
PCB-1260	ND<0.00047	ND<0.00048	ND<0.00048	ND<0.00047

Notes:
ND - analyte not detected above reported limit of quantitation
[1] Sample analyzed for TCL Semivolatile organics; only those compounds that were detected above the reported method detection limit are shown.
N/A - Not Analyzed

TABLE 5 - DATA SUMMARY - LIQUID SAMPLES

OTHER AREAS

Sample ID# -	AV-NCB-LQ-12(05/16/00)	AV-NCB-LQ-13(05/16/00)	AV-NCB-LQ-14(05/16/00)	AV-NCB-LQ-15(05/16/00)	AV-NCB-LQ-16(05/16/00)
Sample Location -	River Water Pump & Filter House	Electrical Conduit #1	Electrical Conduit #2	Electrical Conduit #3	Electrical Conduit #4
Laboratory -	Lancaster Labs	Lancaster Labs	Lancaster Labs	Lancaster Labs	Lancaster Labs
Sample Date -	5/16/00	5/16/00	5/16/00	5/16/00	5/16/00
Semivolatiles TCL (mg/L) 1					
bis(2-Ethylhexyl)phthalate	N/A	N/A	N/A	N/A	N/A
4-Methylphenol	N/A	N/A	N/A	N/A	N/A
PCBs (mg/L)					
PCB-1016	ND<0.00047	ND<0.25	ND<0.01	ND<0.0025	ND<0.010
PCB-1221	ND<0.00047	ND<0.25	ND<0.01	ND<0.0025	ND<0.010
PCB-1232	ND<0.00047	ND<0.25	ND<0.01	ND<0.0025	ND<0.010
PCB-1242	ND<0.00047	ND<0.25	ND<0.01	ND<0.0025	ND<0.010
PCB-1248	ND<0.00047	**0.94**	**0.093**	ND<0.0025	ND<0.010
PCB-1254	ND<0.00047	ND<0.25	ND<0.01	**0.0285**	**0.022**
PCB-1260	ND<0.00047	ND<0.25	ND<0.01	**0.0145**	ND<0.010

Sample ID# -	AV-NCB-LQ-17(05/16/00)	AV-NCB-LQ-18(05/16/00)	AV-NCB-LQ-19(05/16/00)	AV-NCB-LQ-20(05/16/00)	AV-NCB-LQ-21(05/16/00)
Sample Location -	Electrical Conduit #5	Electrical Conduit #6	Electrical Conduit #7	Electrical Conduit #8	Electrical Conduit #10
Laboratory -	Lancaster Labs	Lancaster Labs	Lancaster Labs	Lancaster Labs	Lancaster Labs
Sample Date -	5/16/00	5/16/00	5/16/00	5/17/00	5/17/00
Semivolatiles TCL (mg/L) 1					
bis(2-Ethylhexyl)phthalate	N/A	N/A	N/A	N/A	N/A
4-Methylphenol	N/A	N/A	N/A	N/A	N/A
PCBs (mg/L)					
PCB-1016	ND<0.001	ND<0.001	ND<0.0025	ND<0.0025	ND<0.0025
PCB-1221	ND<0.001	ND<0.001	ND<0.0025	ND<0.0025	ND<0.0025
PCB-1232	ND<0.001	ND<0.001	ND<0.0025	ND<0.0025	ND<0.0025
PCB-1242	ND<0.001	ND<0.001	ND<0.0025	ND<0.0025	ND<0.0025
PCB-1248	ND<0.001	ND<0.001	ND<0.0025	ND<0.0025	ND<0.0025
PCB-1254	**0.0041**	ND<0.001	ND<0.0025	ND<0.0025	ND<0.0025
PCB-1260	ND<0.001	ND<0.001	ND<0.0025	ND<0.0025	ND<0.0025

Sample ID# -	AV-NCB-LQ-26(05/22/00)	AV-NCB-LQ-27(05/23/00)
Sample Location -	Tunnel: S. Corridor West of Tool Room	Tunnel: Between Power House and Mercerizing #1
Laboratory -	Lancaster Labs	Lancaster Labs
Sample Date -	5/22/00	5/23/00
Semivolatiles TCL (mg/L) 1		
bis(2-Ethylhexyl)phthalate	N/A	N/A
4-Methylphenol	N/A	N/A
PCBs (mg/L)		
PCB-1016	ND<0.00048	ND<0.005
PCB-1221	ND<0.00048	ND<0.005
PCB-1232	ND<0.00048	ND<0.005
PCB-1242	ND<0.00048	ND<0.005
PCB-1248	ND<0.00048	ND<0.005
PCB-1254	ND<0.00048	ND<0.005
PCB-1260	ND<0.00048	ND<0.005

Notes:
analyte not detected above reported limit of quantitation
ple analyzed for TCL Semivolatile organics; only those compounds that were detected above the reported method detection limit are shown.
.. - Not Analyzed

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TABLE 6 - DATA SUMMARY - SEDIMENT SAMPLES

SECTION VII

Sample ID# -	AV-NCB-SED-08(05/15/00)	AV-NCB-SED-11(05/23/00)	AV-NCB-SED-10(05/23/00)
Sample Location -	7.04 Compressor Room - S. Tank	7.04 Compressor Room	7.23 Pump Behind Power House
Laboratory -	Lancaster Labs	Lancaster Labs	Lancaster Labs
Sample Date -	5/15/00	5/23/00	5/23/00
PCBs (mg/L)			
PCB-1016	ND<0.0025	ND<0.005	ND<0.005
PCB-1221	ND<0.0025	ND<0.005	ND<0.005
PCB-1232	ND<0.0025	ND<0.005	ND<0.005
PCB-1242	ND<0.0025	ND<0.005	ND<0.005
PCB-1248	ND<0.0025	ND<0.005	ND<0.005
PCB-1254	ND<0.0025	ND<0.005	ND<0.005
PCB-1260	**0.0036**	ND<0.005	ND<0.005

OTHER AREAS

Sample ID# -	AV-NCB-SED-09(05/23/00)
Sample Location -	Tunnel: Btwn. Power House and *Mercerizing #1*
Laboratory -	Lancaster Labs
Sample Date -	5/23/00
PCBs (mg/L)	
PCB-1016	ND<0.005
PCB-1221	ND<0.005
PCB-1232	ND<0.005
PCB-1242	ND<0.005
PCB-1248	ND<0.005
PCB-1254	**0.031**
PCB-1260	ND<0.005

Notes:
ND - analyte not detected above reported limit of quantitation
Results are reported as "dry basis" results.

TABL - *SEWER AND MANHOLE INVENTORY SUMMARY*

	Potential Constituents of Concern [1]	Construction Material	Statistics	Influent Pipe Diameter (inches)	Influent Pipe Invert In (fbg)	Effluent Pipe Diameter (inches)	Effluent Pipe Invert Out (fbg)	Effluent Pipe Length [2] (feet)	Total Length Sewer Line [3] (feet)	Manholes Total #	Manholes Diameter (feet)	Manholes Depth (feet)
Sanitary	Unknown	Cast Iron	Average/Total	9	8	11	11	7130	8010	35	4.8	10.7
	Hg in manhole	Terra Cotta	Min	2	3	6	5				4.0	5.0
	B-2		Max	18	17	18	18				5.4	17.8
Storm	PCB	Concrete	Average/Total	15	8	31	13	12835	19970	60	5.6	13.0
		Cast Iron	Min	2	2	12	3				4.0	2.9
			Max	60	25	60	25				12.0	25.0
Soda	NaOH	Terra Cotta	Average/Total	6	5	9	7	605	760	4	5.0	10.1
	Phenol	Cast Iron	Min	4	2	8	3				5.0	7.2
			Max	10	10	10	10				5.0	12.9
Sulfide	H_2S	Terra Cotta	Average/Total	13	12	12	12	1995	2130	6	5.0	12.8
	sodium sulfide		Min	12	7	12	7				5.0	7.5
	zinc sulfate		Max	18	18	12	18				5.0	18.0
Acid	Sulfuric Acid	Terra Cotta	Average/Total	14	12	18	15	4780	6100	24	5.3	14.7
	H_2S	Vitrified Clay	Min	3	2	10	3				3.0	2.3
			Max	40	28	24	28				10.0	28.3
Bleach	Unknown	Vitrified Clay	Average/Total	12	13	12	14	1540	1640	5	4.8	14.5
			Min	12	7	12	7				4.0	7.2
			Max	12	19	12	19				5.0	18.5
Viscose	CS_2	Cast Iron	Average/Total	13	10	17	14	2825	3150	13	4.8	14.0
	Phenol	*Terra Cotta*	Min	6	2	10	2				4.0	2.8
			Max	24	28	36	28				6.0	28.5
Polymer	PCB	Vitrified Clay	Average/Total	10	10	11	10	2115	2590	9	4.3	10.2
			Min	6	7	8	6				4.0	6.9
			Max	12	15	12	15				5.0	15.1
								Totals	44350	156		

1 - The list of Potential Constituents of Concern are considered preliminary based on existing information; due to the potential cross connections and use of the various sewers, it is possible for other constituents to be present.

2 - The "Effluent Pipe Length" is the estimated total linear feet of sewer discharging from manholes, but does not include the length of the influent pipes which feed the first upstream manhole. Additional detail of the sewer and manhole inventory is appended to this EE/CA.

3 - The "Total Length of Sewer Line" is the estimated total length of all sewers inclusive of influent pipes, but does not include all sewers located beneath building foundations. These lengths we obtained from the Site GIS Application developed by ES&T.

Table 8 ***Potential Federal Applicable or Relevant and Appropriate Requirements for the NTCRA-Buildings at the Avtex Fibers Superfund Site***

ARARs/ TBC	Description	Category
Chemical-Specific		
Hazardous Waste Requirements (RCRA Subtitle C, 40 CFR, Part 261-264) RCRA Land Ban Requirements (40 CFR, PART 268)	Response actions may result in the generation and management of RCRA characteristically hazardous waste. Standards applicable to identifying, treating, storing, and disposing hazardous wastes.	Applicable
Toxic Substance Control Act (40 CFR 761)	Response actions may require decontamination and management of PCB-contaminated media. Standards applicable to identifying, treating, storing, and disposing PCB-contaminated wastes.	Applicable
Site-Specific Human Health Direct Contact Soil Cleanup Standards	Response actions may require decontamination to achieve the human health-based direct contact cleanup standards.	Applicable
Site-Specific Ground Water Protection Soil Cleanup Standards	Response actions may require decontamination to achieve the human health-based ground water protection cleanup standards.	Applicable
Toxic Substance Control Act (40 CFR 763)	Response actions may require decontamination and management of Asbestos-containing materials. Standards applicable to identifying, treating, storing, and disposing ACM wastes.	Applicable
Clean Air Act (42 USC 7401) - National Ambient Air Quality Standards (NAAQS) (40 CFR Part 5) - National Emission Standards for Hazardous Air Pollutants (NESHAP) (40 CFR Part 5)	Response action may result in the release of particulate contaminants and/or asbestos to the air	Applicable
Site-Specific Effluent Limits for the discharge of treated water from the WWTP (Clean Water Act, National Pollutant Discharge Elimination System)	Response action may result in water being treated in the WWTP. Treated effluent must meet the effluent limits in the AOC.	Applicable
Location-Specific		
There are no location-specific ARARs for the NTCRA-Building activities		

Table 8 (continued) ***Potential Federal Applicable or Relevant and Appropriate Requirements for the NTCRA-Buildings at the Avtex Fibers Superfund Site***

ARARs/ TBC	Description	Category
Action-Specific		
Hazardous Waste Requirements (RCRA Subtitle C, 40 CFR, Part 261-264) RCRA Land Ban Requirements (40 CFR, PART 268)	Response action may require off-site disposal of contaminated material. Standards applicable to identifying, treating, storing, and disposing hazardous wastes.	Applicable
Toxic Substance Control Act (40 CFR 761)	Response actions may require decontamination and management of PCB-contaminated media. Standards applicable to identifying, treating, storing, and disposing PCB-contaminated wastes.	Applicable
Toxic Substance Control Act (40 CFR 763)	Response actions may require decontamination and management of Asbestos-containing materials. Standards applicable to identifying, treating, storing, and disposing ACM wastes.	Applicable
Clean Air Act (42 USC 7401) - National Emission Standards for Hazardous Air Pollutants (NESHAP) (40 CFR Part 5)	Response action may result in the management of asbestos and potential release of asbestos to the air	Applicable
OSHA Requirements (29 CFR, Parts 1910, 1926, and 1904) Threshold Limit Values, American Conference of Governmental Industrial Hygienists	Required protection for workers engaged in response action implementation. May be applicable to air concentrations during response action.	Applicable
DOT rules for Hazardous Materials Transport (49 CFR, Parts 107, 171.1-500)	Response action may include off-site treatment and disposal.	Applicable

Table 9 Potential Virginia Applicable or Relevant and Appropriate Requirements for the NTCRA-Buildings at the at the Avtex Fibers Superfund Site

ARARs/ TBC	Description	Category
Chemical-Specific		
Virginia Waste Management Act, Va. Code Ann. Sections 10.1-1400 to 1457 (1998): Virginia Hazardous Waste Regulations (VHWR) (9 VAC 20-60-12 to 1505)	Response actions may result in the generation and management of RCRA characteristically hazardous waste. Standards applicable to identifying, treating, storing, and disposing hazardous wastes.	Applicable
Virginia Solid Waste Management Regulations (VSWMR) (9 VAC 20-80-10 to 790)	Response actions may result in the generation and management of non-hazardous and/or special solid waste. Standards applicable to identifying, treating, storing, and disposing hazardous wastes.	Applicable
Virginia Air Pollution Control Law, Va. Code Ann. Sections 10.1-1300 to 1326 (1998) Virginia Regulations for the Control and Abatement of Air Pollution (9 VAC 5) Virginia Ambient Air Quality Standards (9 VAC 5-30-20 to 80) Virginia Standards of Performance for Visible Emissions and Fugitive Dust/Emissions [Rule 5-1] (9 VAC 5-50-60 to 120)	Response action may result in the release of particulate contaminants and/or asbestos to the air.	Applicable
Virginia Erosion and Sediment Control Law, Va. Code Ann. Sections 10.1-560 to 571(1998); and the Virginia Erosion Control Handbook Virginia Water Control Regulations (9 VAC 25-10 to 610)	Soil disturbances will require compliance with erosion and sedimentation control statutes.	Applicable
Location-Specific		
There are no location-specific ARARs for the NTCRA-Building activities		

Table 9 (continued) Potential Virginia Applicable or Relevant and Appropriate Requirements for the NTCRA-Buildings at the at the Avtex Fibers Superfund Site

ARARs/ TBC	Description	Category
Action-Specific		
Virginia Waste Management Act, Va. Code Ann. Sections 10.1-1400 to 1457 (1998): Virginia Hazardous Waste Regulations (VHWR) (9 VAC 20-60-12 to 1505) Virginia Solid Waste Management Regulations (VSWMR) (9 VAC 20-80-10 to 790) Virginia Regulations for the Transportation of Hazardous Materials (9 VAC 20-110-10 to 130)	Response action may require off-site disposal of contaminated material. Standards applicable to identifying, treating, storing, and disposing hazardous, non-hazardous and special wastes.	Applicable
Virginia Air Pollution Control Law, Va. Code Ann. Sections 10.1-1300 to 1326 (1998) Virginia Regulations for the Control and Abatement of Air Pollution (9 VAC 5) Virginia Ambient Air Quality Standards (9 VAC 5-30-20 to 80) Virginia Standards of Performance for Visible Emissions and Fugitive Dust/Emissions [Rule 5-1] (9 VAC 5-50-60 to 120)	Response action may result in the management of waste, which could result in the release of particulate contaminants and/or asbestos to the air.	Applicable
Virginia Erosion and Sediment Control Law, Va. Code Ann. Sections 10.1-560 to 571(1998); and the Virginia Erosion Control Handbook Virginia Water Control Regulations (9 VAC 25-10 to 610)	Soil disturbances will require compliance with erosion and sedimentation control statutes.	Applicable
Virginia Stormwater Management Act, Va. Code Ann. Sections 10.1-603.1 to 603.15 (1998) Virginia Stormwater Management Regulations (4 VAC 3-20-10 to 251)	Stormwater will need to be managed for all land-disturbing activities that disturb more than one acre of land.	Applicable

Table 10 Potential Building Decontamination Techniques

Decontamination Technique	Effectiveness/ Implementability	Cost
Sweeping, Brushing	Advantages • Effective on removing low to high levels of solid and friable residues • Effective as a gross removal for porous & non-porous surfaces • Implementable in broad areas and tight confines • Equipment readily available • Generates a relatively dry/solid decontamination waste, easily controlled/contained, and does not add volume to the waste • Low Cost Disadvantages • Less effective for liquid contamination and recalcitrant contamination • Limited effectiveness contamination penetrated into porous surfaces • In highly contaminated areas, may pose airborne contaminated dust concern, but may be augmented with wet methods to reduce concern	$0.20/square foot
Industrial Vacuuming with HEPA filter	Advantages • Effective on removing low to high levels of solid and friable residues • Effective as a gross removal for porous & non-porous surfaces • Effective in areas with dust with high concentrations of hazardous constituents (e.g., asbestos) • Implementable in broad areas and tight confines • Generates a relatively dry/solid decontamination waste, easily controlled/contained, and does not add volume to the waste • Equipment readily available Disadvantages • Less effective for liquid contamination and recalcitrant contamination • Limited effectiveness contamination penetrated into porous surfaces • Moderate Cost	$1.00/square foot

Table 10 Potential Building Decontamination Techniques

Decontamination Technique	Effectiveness/ Implementability	Cost
Power Water Wash	Advantages • Effective on removing low to high levels of solid and liquid residues, and more recalcitrant contamination • Effective for non-porous surfaces, and surficial removal from porous surface • May be augmented with steam or surfactants to remove contaminants penetrated into shallow subsurface of porous surfaces • Implementable in broad areas and tight confines • Equipment readily available • Low-Moderate Cost Disadvantages • Limited effectiveness contamination that is deeply penetrated into porous surfaces • Generates a liquid or sludge decontamination waste, which may require engineering controls/containment, and adds to the waste volume requiring management	$0.50/square foot
Scarification	Advantages • Effective on removing low to high levels of most recalcitrant contamination • Effective for removal from contamination penetrated up to 1" into porous surface • Implementable in broad areas • Equipment available Disadvantages • Effectiveness limited to concrete or concrete-like materials, not effective on metallic or other non-masonry surfaces • Limited effectiveness/Implementability in tight confines • Generates a liquid/concrete decontamination waste, which may require engineering controls/containment, and adds to the waste volume requiring management • High Cost	$8/square foot

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Table 10 Potential Building Decontamination Techniques

Decontamination Technique	Effectiveness/ Implementability	Cost
Selective Demolition/Dismantlement	Advantages • Effective on removing low to high levels of most recalcitrant contamination • Effective for removal from contamination non-porous and porous media, including deeply penetrated contamination • Implementable in broad areas or tight confines, using manual techniques (jackhammer) or mechanical techniques (bobcat w/hammer) • Equipment available Disadvantages • Aggressive approach, structural stability a concern • Potential to generate airborne contamination • May require support equipment and personnel not typically used with other decontamination techniques • High Cost, manual techniques Very High Cost	Range: $130/cy (backhoe w/hammer) to $620/cy (jackhammer)

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Table 11
Estimated Cost for Buildings, Above Grade Structures and Subgrade Structures Decontamination
NTCRA-Buildings
Avtex Fibers Superfund Site, Front Royal, Virginia

	Item Description	Quantity	Unit	Unit Cost	Item Cost
I.	***Site Preparation***				
	Mobilization/Demobilization	1	Lump Sum	$50,000	$50,000
	Surface Water Controls (and removal)	1	Lump Sum	$10,000	$10,000
	Dust Controls and Monitoring (and removal)	1	Lump Sum	$50,000	$50,000
II.	***Debris Removal***				
	Remove Debris	12,000	Cubic Yards	$22	$262,400
	Remove and Decontaminate Pipes and Ductwork[1]	1,110,000	Square Feet	$0.25	$277,500
III.	***General Decontamination***				
	Sweep	910,000	Square Feet	$0.20	$182,000
	HEPA Vacuum	61,000	Square Feet	$1.00	$61,000
	Power washing	74,300	Square Feet	$0.50	$37,200
	Liquid Removal from tanks, equipment, etc. for Disposal	10,000	Gallons	$1.00	$10,000
	Liquid Removal/Mng for On-Site Treatment (pipes, sumps, pits, etc.)	230,000	Gallons	$0.35	$80,500
	Verification Sample Collection and Analysis	100	Sample	$500	$50,000
IV.	***Decontamination of PCB Contaminated Areas***				
	Drain Source of PCBs from Equipment, pipes, transformers	500	Gallons	$50	$25,000
	Selective Demolishing of Concrete (bobcat w/hammer & jackhammer)	155	Cubic Yards	$400	$62,000
	Verification Sample Collection and Analysis	80	Sample	$500	$40,000
V.	***Waste Disposal and Treatment***				
	Debris Disposal (stockpiled for ACOE disposal)	0	Tons	$0	$0
	Pipe and Ductwork Disposal (stockpiled for ACOE management)	0	Tons	$0	$0
	On-Site Treatment of Wastewater (removed liquids and washwater)	500	Kgal	$50	$25,000
	Hazardous solid waste [2,3,4]	300	Tons	$120	$36,000
	Non-hazardous solid waste [2,3,4]	800	Tons	$43	$34,400
	Hazardous liquids (PCB Oil, haz waste, etc.)	2,000	Gallons	$4	$8,000
	Non-hazardous liquids (oils, etc.)	5,000	Gallons	$2	$10,000
	Sampling and analytical - waste characterization	100	Samples	$1,700	$170,000
VI.	***Soil Beneath Subgrade Structures***				
	Sampling and Analytical of Subgrade Soils	*100*	*Samples*	*$1,700*	*$170,000*
	Off-site Management of Solid Waste (assumed volume)	5,000	Tons	$43	$215,000
	Stockpile for Onsite Beneficial Use (assumed volume)	5,000	Tons	$5	$25,000
	Construction Total (CT)[5]				$1,891,000
	Permitting and Legal (5%)				$94,600
	Design and Resident Engineering (15%)				$283,700
	Total Capital Costs				$2,269,300
	Contingency (20%)				$453,900
	Projected Opinion of Probable Cost				**$2,724,000**

Assumptions:
Army Corps removes asbestos from pipes, tanks, fixtures, walls, etc. throughout each room prior to debris removal, where possible.
Pipes of less than 3-inch diameter with PACM are removed a disposed of as PACM by the ACOE.
Pipes 3-inches in diameter or greater will have ACM removed in place by the ACOE; then drained, flushed, and stockpiled by FMC.
General loose debris will be removed and stockpiled by FMC, but disposed by ACOE.

1 On average, pipes and ductwork can be removed from 7,500 square feet of floorspace per crew per day.
2 Debris, vacuum, and sweeping waste weigh 1.3 tons/cubic yard.
3 Includes miscellaneous non-hazardous and hazardous CERCLA-related solid waste, such as containerized waste, salts, etc. Hazardous waste also includes PCB-contaminated concrete removed as part of decontamination and assumes that PCB will be between 50-500 mg/kg.
4 1/8-inch dirt and dust to be removed from Sections I, II, V, and VI. 1/2-inch dirt and dust to be removed from Section VII.
5 Indirect construction costs have been incorporated into direct construction costs.

Table 12
Estimated Cost for Sewer & Manhole Alternative 1 - Excavate and Remove All Sewers
NTCRA-Buildings
Avtex Fibers Superfund Site
Front Royal, Virginia

	Item Description	Quantity	Unit	Unit Cost	Item Cost
I.	***Site Preparation***				
	Mobilization/Demobilization	1	Lump Sum	$50,000	$50,000
	Erosion and Sediment Controls	1	Lump Sum	$10,000	$10,000
	Surface Water Controls and Dewatering	1	Lump Sum	$25,000	$25,000
	Dust Controls and Monitoring	1	Lump Sum	$50,000	$50,000
II.	***Sewer & Manhole Excavation, Backfill and Compaction***				
	Process Sewers				
	Process Sewers <15' bgs (Total Footage 10,555)	10,610	Cubic Yards	$13	$137,930
	Process Sewers >15' bgs (Total Footage 5,815)	8,415	Cubic Yards	$16	$134,640
	Process Sewer Manholes (61 Manholes)	590	Cubic Yards	$44	$25,960
	Storm Sewers				
	Storm Sewer Line <15' bgs (Total Footage 15,715)	21,480	Cubic Yards	$13	$279,240
	Storm Sewer Line >15' bgs (Total Footage 4,255)	7,400	Cubic Yards	$16	$118,400
	Storm Sewer Manholes (60 Manholes)	710	Cubic Yards	$44	$31,240
	Sanitary Sewers				
	Sanitary Sewer Line <15' bgs (Total Footage 7,375)	6,275	Cubic Yards	$13	$81,580
	Sanitary Sewer Line >15' bgs (Total Footage 635)	880	Cubic Yards	$16	$14,080
	Sanitary Sewer Manholes (35 Manholes)	250	Cubic Yards	$44	$11,000
	Additional Import Fill and place (assume 10% of removed volume) [1]	5,660	Cubic Yards	$12	$67,920
III.	***Decontamination & Disposal Costs***				
	Pipe and Manhole Debris Decontamination[2]	2,550	Cubic Yards	$25	$63,750
	Off-site Management of Solid Waste (10% excavated soils)	7,920	Tons	$43	$340,560
	Decontamination Water - On-site management & treatment	20,000	Gallons	$0.50	$10,000
	Residue Load, Transport, Disposal [3]	730	Tons	$43	$31,390
	Waste Characterization Sampling & Analysis (Residues)	40	Sample	$1,700	$68,000
	Soil Sample Collection, Analysis & Validation (Broad Suite)	274	Sample	$1,700	$470,000
	Soil Sample Collection, Analysis & Validation (focused suite)	46	Sample	$1,100	$50,000
	Pipe Disposal[4]	0	Lump Sum	$0.00	$0.00
	Construction Total (CT)[5]				$2,070,700
	Regulatory review / Legal (5%)				$103,500
	Design and Resident Engineering (15%)				$310,600
	Total Capital Costs				$2,484,800
	Contingency (20%)				$497,000
	Projected Opinion of Probable Cost				**$2,982,000**

Assumptions:

[1] Imported fill is included to account for an assumed 25% of removed material is not suitable for backfill in the plant area.

[2] Pipe and Manhole debris decontamination is based on an average pipe diameter of 12" and wall thickness of 3", and an average manhole size 5' in diameter and 13' deep and wall thickness of 8". Cost is based on current debris cleaning estimated costs at the Site.

[3] Residue volume estimate based on assumed average pipe diameter of 12" and an average manhole size of 5' in diameter and 13' deep, and the pipes and manholes are 1/4 full of residue.

[4] Excavated sewers and manholes will be disposed of by ACOE.

[5] Indirect construction costs have been incorporated into direct construction costs.

Table 13

Estimated Cost for Sewer & Manhole Alternative 2 - Excavate and Remove with In-Place Closure

NTCRA-Buildings

Avtex Fibers Superfund Site

Front Royal, Virginia

Item Description	Quantity	Unit	Unit Cost	Item Cost
I. Site Preparation				
Mobilization/Demobilization	1	Lump Sum	$50,000	$50,000
Erosion and Sediment Controls	1	Lump Sum	$10,000	$10,000
Surface Water Controls and Dewatering	1	Lump Sum	$25,000	$25,000
Dust Controls and Monitoring	1	Lump Sum	$50,000	$50,000
II. Pipe Removal				
Process Sewers				
Process Sewers <15' bgs (Total Footage 10,555)	10,610	Cubic Yards	$13	$137,930
Process Sewer Manholes (61 manholes to 15' bgs)	490	Cubic Yards	$44	$21,560
Storm Sewers				
Storm Sewer Line <15' bgs (Total Footage 15,715)	21,480	Cubic Yards	$13	$279,240
Storm Sewer Manholes	630	Cubic Yards	$44	$27,720
Sanitary Sewers				
Sanitary Sewer Line <15' bgs (Total Footage 7,375)	6,275	Cubic Yards	$13	$81,580
Sanitary Sewer Manholes	240	Cubic Yards	$44	$10,560
Additional Import Fill and place (assume 10% of removed volume) [1]	4,000	Cubic Yards	$12	$48,000
III. Plug Lines with Flowable Fill				
Process Sewers				
Process Sewers >15' bgs (Total Footage 5,815)	265	Cubic Yards	$100	$26,500
Process Sewer Manholes (24 manholes >15' bgs, avg of 21' bgs)	100	Cubic Yards	$100	$10,000
Storm Sewers				
Storm Sewer Line >15' bgs (Total Footage 4,255)	2,240	Cubic Yards	$100	$224,000
Storm Sewer Manholes (19 manholes >15' bgs, avg of 21')	80	Cubic Yards	$100	$8,000
Sanitary Sewers				
Sanitary Sewer Line >15' bgs (Total Footage 635)	15	Cubic Yards	$100	$1,500
Sanitary Sewer Manholes (8 manholes >15' bgs, avg 16.6' bgs)	10	Cubic Yards	$100	$1,000
IV. Decontamination & Disposal Costs				
Pipe and Manhole Debris Decontamination[2]	2,160	Cubic Yards	$25	$54,000
Off-site Management of Solid Waste (10% excavated soils)	5,600	Tons	$43	$240,800
Decontamination Water - On-site management & treatment	17,000	Gallons	$0.50	$8,500
Residue Load, Transport, Disposal [3]	650	Tons	$43	$27,950
Waste Characterization Sampling & Analysis (Residues)	35	Sample	$1,700	$59,500
Soil Sample Collection, Analysis & Validation (Broad Suite)	194	Sample	$1,700	$330,000
Soil Sample Collection, Analysis & Validation (focused suite)	0	Sample	$1,100	$0
Pipe Disposal[4]	0	Lump Sum	$0.00	$0.00
Construction Total (CT)[2]				$1,733,400
Regulatory review / Legal (5%)				$86,700
Design and Resident Engineering (15%)				$260,000
Total Capital Costs				$2,080,100
Contingency (20%)				$499,300
Projected Opinion of Probable Cost				**$2,580,000**

Assumptions:

[1] Imported fill is included to account for an assumed 25% of removed material is not suitable for backfill in the plant area.

[2] Pipe and Manhole debris decontamination is based on an average pipe diameter of 12" and wall thickness of 3", and an average manhole size 5' in diameter and 13' deep and wall thickness of 8". Cost is based on current debris cleaning estimated costs at the Site.

[3] Residue volume estimate based on assumed average pipe diameter of 12" and an average manhole size of 5' in diameter and 13' deep, and the pipes and manholes are 1/4 full of residue.

[4] Excavated sewers and manholes will be disposed of by ACOE.

[5] Indirect construction costs have been incorporated into direct construction costs.

Appendices

Appendices

A

Appendix A
Calculations of Chemical Concentrations in Buildings Protective of Demolition Workers

Estimation of Chemical Concentrations in Building Materials Protective of Demolition Workers
Avtex Fibers Superfund Site
Front Royal, Virginia

	Chemical concentrations in building materials protective of demolition workers (mg/kg)
Arsenic*	6,400
PCBs*	5,700
Benzo(a)pyrene*	15,000
Lead	51,000
Antimony	11,000

*Based on lowest estimated concentrations from cancer/noncancer calculations.

Risk Based Screening Summary - FMC Sweeping Samples
Avtex Fibers Site
Front Royal, Virginia

	Number of Detections	Number of Samples	Maximum Detected Concentration	Sample with Max Concentration	Industrial Soil Region III RBC[1]	c/nc[2]	Non-Carcinogen Target Organ (source)	Max Concentration > Industrial RBC?	Site Soil Level[14]	Max Concentration > Site Soil Level?
TAL Metals (mg/kg)										
Antimony	1	4	170	SW-7.15B(5/18/00)	82	nc	Blood effects (3)	[redacted]	82	[redacted]
Arsenic	4	4	49.1	SW-7.11(5/18/00)	3.8	c		[redacted]	38.0	[redacted]
Arsenic	4	4	49.1	SW-7.11(5/18/00)	61.3 (15)	nc	Skin & cardiovascular effects (3)	no	613.0	no
Barium	4	4	8,090	SW-7.04-01(5/11/00)	14,000	nc	Cardiovascular & kidney effects (3)	no	140,000	no
Beryllium	0	4	N/A	N/A	410	nc	Gastrointestinal effects (3)	no	4,100	no
Cadmium	2	4	44	SW-7.15B(5/18/00)	100	nc	Kidney effects (3)	no	1,000	no
Chromium	4	4	2,150	SW-7.04-01(5/11/00)	610	nc	Respiratory and skin effects (4, 10)	[redacted]	6,100	no
Cobalt	3	3	87	SW-7.15B(5/18/00)	12,000	nc	Respiratory (11) and thyroid (4) effects	no	120,000	no
Copper	4	4	2,000	SW-7.16-7.20(5/18/00)	8,200	nc	Gastrointestinal effects (3)	no	82,000	no
Lead	4	4	10,100	SW-7.16-7.20(5/18/00)	N/A	N/A	Blood and brain effects (6)	[redacted]	1,000	[redacted]
Manganese	4	4	1,280	SW-7.16-7.20(5/18/00)	4,100	nc	Neurological effects (3)	no	41,000	no
Mercury	4	4	108	SW-7.15B(5/18/00)	20	nc	Neurological effects (3)	[redacted]	200	no
Nickel	4	4	802	SW-7.15B(5/18/00)	4,100	nc	Decreased body and organ weight effects (3)	no	41,000	no
Selenium	1	4	10	SW-7.11(5/18/00)	1,000	nc	Skin & hair & nail effects (3)	no	10,000	no
Silver	1	4	12	SW-7.16-7.20(5/18/00)	1,000	nc	Skin effects (3)	no	10,000	no
Thallium	1	4	12	SW-7.04-01(5/11/00)	14	nc	Blood (3) & liver (7) effects & hair loss (4, 7)	no	140	no
Vanadium	4	4	77	SW-7.11(5/18/00)	1,400	nc	Respiratory & blood effects (7)	no	14,000	no
Zinc	4	4	40,000	SW-7.15B(5/18/00)	61,000	nc	Blood effects (3)	no	610,000	no
Semivolatiles TCL (mg/kg)										
Di-n-butylphthalate	3	4	120	SW-7.11(5/18/00)	20,000	nc	Eye effects (5, 8)	no	200,000	no
Butylbenzylphthalate	2	4	17	SW-7.15B(5/18/00)	41,000	nc	Increased liver & brain weight effects (3)	no	410,000	no
bis(2-Ethylhexyl)phthalate	4	4	110	SW-7.15B(5/18/00)	410	c		no	4,100	no
Dimethylphthalate	1	4	0.43	SW-7.11(5/18/00)	2,000,000	nc	Gastrointestinal and neurological effects (8)	no	20,000,000	no
Di-n-octylphthalate	1	4	43	SW-7.15B(5/18/00)	4,100	nc	Gastrointestinal (5) and neurological effects	no	41,000	no
2-Methylnaphthalene	1	4	0.51	SW-7.11(5/18/00)	4,100	nc	Decreased weight effects (3)	no	41,000	no
PAHs(mg/kg)										
Naphthalene	1	9	0.5	SW-7.11(5/18/00)	4,100	nc	Decreased weight effects (3)	no	41,000	no
Acenaphthylene	0	7	N/A	N/A	No RBC			N/A	No RBC	N/A
Acenaphthene	0	7	N/A	N/A	12,000	nc	Liver effects (3)	no	120,000	no
Fluorene	0	7	N/A	N/A	8,200	nc	Blood effects (3)	no	82,000	no
Phenanthrene	8	9	38	SW-7.16-7.20(5/18/00)	No RBC	N/A	Skin effects (9, 13)	N/A	No RBC	N/A
Anthracene	7	7	34.5	SW-7.16-7.20(5/18/00)	61,000	nc	Skin effects (5, 9)	no	610,000	no
Fluoranthene	8	9	72.6	SW-7.16-7.20(5/18/00)	8,200	nc	Liver & kidney & blood effects (3)	no	82,000	no
Pyrene	5	9	71	SW-7.16-7.20(5/18/00)	6,100	nc	Kidney effects (3)	no	61,000	no
Benzo(a)anthracene	6	7	31	SW-6.05-6.08-1(5/10/00)	7.8	c		[redacted]	78.0	no
Carbazole	1	4	6.8	SW-6.05-6.08-1(5/10/00)	290	c		no	2,900	no
Chrysene	4	7	37	SW-6.05-6.08-1(5/10/00)	78	c		no	780	no
Benzo(b)fluoranthene	5	7	39	SW-6.05-6.08-1(5/10/00)	7.8	c		[redacted]	78.0	no
Benzo(k)fluoranthene	5	7	23	SW-6.05-6.08-1(5/10/00)	78	c		no	780	no
Benzo(a)pyrene	5	7	29	SW-6.05-6.08-1(5/10/00)	0.78	c		[redacted]	7.8	[redacted]
Dibenz(a,h)anthracene	2	7	5.5	SW-6.05-6.08-1(5/10/00)	0.78	c		[redacted]	7.8	no
Benzo(g,h,i)perylene	4	7	24	SW-7.16-7.20(5/18/00)	No RBC	N/A		N/A	No RBC	N/A
Indeno(1,2,3-cd)pyrene	3	7	22	SW-6.05-6.08-1(5/10/00)	7.8	c		[redacted]	78.0	no
PCBs (mg/kg)										
PCB-1016	0	9	N/A	N/A	82	c		no	820	no
PCB-1221	0	9	N/A	N/A	2.9	c		no	29	no
PCB-1232	0	9	N/A	N/A	2.9	c		no	29	no
PCB-1242	0	9	N/A	N/A	2.9	c		no	29	no
PCB-1248	1	9	1.32	SW-7.06H(5/17/00)	2.9	c		no	29	no
PCB-1254	8	9	4.3	SW-7.05A(5/16/00)	2.9	c		[redacted]	29	no
PCB-1260	9	9	347	SW-7.05B(5/16/00)	2.9	c		[redacted]	29	[redacted]

Notes:
(1) EPA Region III Risk Based Concentrations (RBC) for direct contact with soil under industrial setting using HQ=0.1 and $1x10^{-6}$ for excess cancer risk.
Chromium direct exposure standard based on Cr^{+6}. Mercury RBC is based on methylmercury. RBCs from 5 October 2000 table
(2) c/nc = carcinogenic effects/noncarcinogenic effects
(3) USEPA IRIS data base; USEPA, 2001
(4) Beliles, 1994 (Patty's Industrial Hygiene and Toxicology)
(5) Lewis, 1992 (Sax's Dangerous Properties of Industrial Materials)
(6) ATSDR, 2000 (Toxicological profile for lead)
(7) USEPA, 1997 (HEAST)
(8) Bisesi, 1994 (Patty's Industrial Hygiene and Toxicology)
(9) Cavender, 1994 (*Patty's Industrial Hygiene and Toxicology*)
(10) ATSDR, 2000 (Toxicological Profile for Chromium)
(11) ATSDR, 2000 (Toxicological Profile for Cobalt)
(12) ATSDR, 2000 (ToxicologicalProfile for Vanadium)
(13) ATSDR, 2000 (Toxicological Profile for Phenanthrene)
(14) Screening against site soil cleanup standards for direct contact with soil $1x10^{-5}$ for excess cancer risk because less than 10 exceedances at 10^{-6} were present. HQ=1 was used for non-carcinogens, except antimony.
An HQ=0.1 was used conservatively for antimony because systemic effects of antimony are similar to that of lead (Note: the default value for lead of 1,000 mg/kg does not change).
(15) The industrial soil RBC for arsenic based on noncarcinogenic effects used the oral RfD of $3X10^{-4}$ mg/kg-d and a target hazard quotient of 0.1. Used default exposure variables for industrial workers from USEPA Region III RBC Technical Background Information (USEPA, 1999).
N/A - not applicable

Estimation of Chemical Concentrations in Building Materials Protective of Demolition Workers
Avtex Fibers Superfund Site
Front Royal, Virginia

Exposure Parameters for Demolition Worker

Parameter	Value	Units	Source
Body Weight (BW)	70	kg	USEPA, 1997; Tables 7-4 and 7-5: average across 50th percentile for men and women ages 18-74 years
Exposure Frequency (EF)	250	d/y	Assume 5 days per week for 50 weeks
Exposure Duration (ED)	1	y	Assume a one-year demolition project
Exposure Time (ET)	8	hr/d	Standard work day
Intake Rate - inhalation (Inh) *	1.5	m3/hr	Moderate activity for outdoor workers (USEPA, 1997: Table 5-23)
Intake Rate - ingestion (Ing)	360	ug/d	Potential ingestion of deposited particulates in the nasopharyngeal area (assumed 50% based on range of 20 to 80%; Kennedy and Valentine, 1994); ET x Inh x PM10 x 0.5
PM10	60	ug/m3	Assume grading, excavation, and demolition activities (MADEP, 1995)
Conversion Factor (CF)	1E-09	kg/ug	
Risk	1E-05	unitless	Mid-range of USEPA's target risk goal range of 10^{-6} to 10^{-4}
Hazard Quotient (HQ)	1	unitless	HQ of 1 or lower are not likely to be associated with systemic effects
Averaging Time - cancer (ATc)	25550	d	70 years x 365 d/yr
Averaging Time - noncancer (ATn)	365	d	Exposure duration x 365 d/yr
Oral Bioavailability - Arsenic	0.8	unitless	TNRCC, 1996

* For inhalation exposures to chemicals other than lead, the inhalation rate is the reasonable maximum exposure (RME); whereas an average inhalation rate is assumed for lead exposures.

Note: The exposure parameters presented above are for workers using heavy equipment (i.e., no direct contact with demolition materials) for demolition, loading, and grading. The assumption is that workers would perform demolition activities without getting into direct contact with materials. Thus, the only potential exposure pathways would be inhalation of dust particles and incidental ingestion of deposited particles in the naso-pharyngeal area of the respiratory tract. The potential for any worker on the ground to come into contact with demolition materials is unlikely because of the use of protective equipment typical for these types of activities (i.e., long sleeves and pants, gloves). Further, it was assumed respiratory protection would be worn by a worker on the ground. Therefore, there is not direct contact between chemicals in building materials and the skin with subsequent transfer to the mouth (i.e., incomplete pathway).

Estimation of Chemical Concentrations in Building Materials Protective of Demolition Workers
Avtex Fibers Superfund Site
Front Royal, Virginia

Toxicity Factors

	Reference Dose (RfD) (mg/kg-day)		Slope Factor (SF) $(mg/kg\text{-}day)^{-1}$	
	Oral	**Inhalation**	**Oral**	**Inhalation**
Arsenic	0.0003	NA	1.5	15
PCB	0.00002	NA	2	2
Benzo(a)pyrene	NA	NA	7.3	3.1
Antimony	0.0004	NA	NA	NA

Source: Integrated Risk Information System (IRIS) (USEPA, 2000)

Chemical Concentrations (mg/kg) in Building Material Considered Protective of Worker Health

	Based on Cancer Effects	Based on Noncancer Effects
Arsenic	6.4E+03	1.1E+05
PCBs	3.3E+04	5.7E+03
Benzo(a)pyrene	1.5E+04	NA
Antimony*	NA	1.1E+04

Equations to Calculate Chemical Concentrations in Building Materials

Based on Cancer Effects:

[chemical] = BW x ATc x Risk/(EF x ED x ((PM10 x CF x Inh x ET x SFinhalation) + (Ing x CF x B_{As} x SForal)))

Based on Noncancer Effects:

[chemical] = BW x ATn x HI/(EF x ED x ((PM10 x CF x Inh x ET/RfDinhalation) + (Ing x CF x B_{As} /RfDoral)))

Note: *The B_{As} term is only used in the above equations for arsenic;*
we assumed that the oral bioavailability for PCBs and benzo(a)pyrene is equal to 1.
* - Chemical concentration for antimony is conservatively based on a hazard quotient of 0.1 because systemic effects are similar to that of lead.

Estimation of Lead Concentrations in Building Materials Protective of Demolition Workers
.vtex Fibers Superfund Site
Front Royal, Virginia

Blood lead level in adults which maintains a 95% probability that fetal blood lead level is below 10 ug/dL:

Parameter	Value	Units	Source
$PbB_{adult/central}$	4.34 (4.23)	ug/dL	Estimated using equation below
$PbB_{fetal0.95}$	10	ug/dL	USEPA, 1996
Parameter	**Value**	**Units**	**Source**
Central Blood lead level ($PbB_{central}$)	4.23	ug/dL	Estimated using equation above
Baseline Blood Lead Level ($PbB_{baseline}$)	1.7	ug/dL	NHANES III data base (USPHS, 1997); women of child bearing age, living in southern US
Biokinetic Slope Factor (BKSF)	0.4	ug/dL	Change in blood lead per ug change in daily lead uptake (USEPA, 1996)
Exposure Frequency (EF)	250	d	Assume 5 days per week for 50 weeks
Averaging Time (AT)	365	d	
Intake Rate - ingestion (Ing)	0.00024	g/d	Potential ingestion of deposited particulates in the nasopharyngeal area (assumed 50% based on range of 20 to 80%; Kennedy and Valentine, 1994)
$AF_{particulate}$	0.12	unitless	Fraction of ingested lead absorbed into blood stream (USEPA, 1996)
Intake Rate - inhalation (Inh)	Estimated		Estimated using equation below
Air Lead Level (Pb_{air})	Estimated		Estimated using Inh x PM10 x CF
PM10	60	ug/m3	Assume grading, excavation, and demolition activities (MADEP, 1995)
'onversion Factor (CF)	1.00E-06	kg/mg	
Inhalation Rate (IR_{air}) *	24	m3/d	USEPA, 1996
H	0.33	hr/day/hr-day	Event Duration (Bowers and Cohen, 1998)
AFair	0.32	unitless	*Fraction of inhaled lead deposited in and absorbed through lungs (Bowers et al, 1994)*

* For inhalation exposures to chemicals other than lead, the inhalation rate is the reasonable maximum exposure (RME); whereas an average inhalation rate is assumed for lead exposures.
Note: Values in ( ) correspond to EPA's response to previous FMC lead calculations and represent nationwide NHANES III phase I data.

The following equation is used to estimate particulate and air lead levels that are considered protective of worker health.

$$PbB_{central} = PbB_{baseline} + ((BKSF \times EF/AT) \times ((Pb_{particulate} \times Ing \times AF_{particulate}) + (Pb_{air} \times Inh \times H \times AF_{air}))$$

$PbB_{central}$	$PbB_{baseline}$	BKSF	EF	AT	$Pb_{particulate}$	Ing	$AF_{particulate}$	Pb_{air}	Inh	H	AF_{air}
4.23	1.7	0.4	250	365	**51000**	0.00024	0.12	3.06E+00	24	0.33	0.32

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B

Appendix B
Sewer and Manhole Inventory

Sanitary Sewer Line

	Manhole		Influent Pipe			Effluent Pipe					
ID	Diameter (feet)	Depth (feet)	Diameter (inches)	Direction In	Invert In (fbg)	Diameter (inches)	Direction Out	Invert Out (fbg)	Connects	Length (feet)	Average Depth (fbg)
NB - 1	5.00	7.33	6	E	4.25						
			6	SW	4.92						
			6	NE	7.58						
			6	NE	7.58						
			6	SW	7.67	12	S	7.83	B - 1 to B - 2	175	8.71
B - 2	5.00	9.83	4	NE	3.75						
			6	NW	4.75						
			5	SW	5.00						
			6	N	6.25						
			10	NE	6.58						
			4	NW	7.58						
			5	E	9.50						
			12	N	9.58	8	S	9.67	B - 2 to B - 3	195	9.88
B - 3	5.00	10.42	8	N	10.08	8	W	10.08	B - 3 to B - 4	210	9.63
B - 4	5.00	9.58	8	E	9.17	8	W	9.25	B - 4 to B - 5	195	8.83
B - 5	5.00	8.67	5	N	4.00						
			8	E	8.42	8	W	8.42	B - 5 to B - 6	175	7.75
B - 6	5.00	7.17	10	S	6.92						
			8	E	7.08	8	N	7.17	B - 6 to B - 7	225	???
B - 7	???	???	8	S	???	8	NW	???	B - 7 to B - 8	105	???
B - 8	5.00	12.58	6	E	5.00						
			8	SE	12.25	8	N	12.25	B - 8 to B - 11	300	???
B - 9	5.00	17.75	2	N	2.75						
			4	E	7.67						
			4	N	9.58						
			10	E	11.17	12	W	18.00	B - 9 to B - 10	65	???
B - 10	???	???	12	E	???	???	NW	???	B - 10 to B - 11	55	???
B - 11	???	???	8	S	???						
			???	SE	???	15	NW	???	B - 11 to B - 12	280	???
B - 32	???	???	???	S	???	8	W	???	B - 32 to B - 33	55	???

Sanitary Sewer Line

	Manhole		Influent Pipe			Effluent Pipe					
ID	Diameter (feet)	Depth (feet)	Diameter (inches)	Direction In	Invert In (fbg)	Diameter (inches)	Direction Out	Invert Out (fbg)	Connects	Length (feet)	Average Depth (fbg)
B - 33	4.00	5.33	8	E	4.83	8	N	5.00	B - 33 to B - 34	125	???
B - 34	4.00	6.00	8	S	???	8	N	???	B - 34 to B - 35	105	???
B - 35	4.00	5.75	8	S	???	8	NE	???	B - 35 to B - 36	60	???
B - 36	???	???	8	SW	???	8	N	???	B - 36 to B - 12	125	???
B - 12	5.00	10.33	8	S	7.00						
			15	SE	9.50	15	N	9.67	B - 12 to B - 13	290	10.92
B - 13	5.00	12.67	15	S	12.17	15	NW	12.33	B - 13 to B - 14	440	13.58
B - 15	5.00	6.83	6	SE	5.50						
			8	E	6.58	10	NW	6.83	B - 15 to B - 16	180	5.92
B - 24	5.00	9.33	5	SE	9.08						
			5	NW	9.08	6	SW	9.17	B - 24 to B - 23	290	7.25
B - 23	4.00	5.50	6	NE	5.33	6	SW	5.42	B - 23 to B - 22	300	7.29
B - 22	5.00	9.33	6	NE	9.17	6	SW	9.17	B - 22 to B - 21	175	10.63
B - 21	5.00	16.25	6	NE	12.08	8	SW	16.00	B - 21 to B - 20	120	16.13
B - 20	5.42	16.33	6	E	3.75						
			8	NE	16.25	10	SW	16.25	B - 20 to B - 18	205	16.75
B - 19	5.00	6.50	4	N	3.50						
			6	NE	3.67						
			6	E	3.75	8	W	6.17	B - 19 to B - 18	160	5.25
B - 18	5.00	17.75	8	E	4.33						
			10	NE	17.25	12	SW	17.50	B - 18 to B - 16	245	16.17
B - 16	5.00	16.25	10	SE	5.00						
			12	NE	14.83	15	SW	16.25	B - 16 to B - 14	90	14.88
B - 14	5.00	15.25	15	NE	13.50						
			15	SE	14.83	18	W	15.00	B - 14 to B - 25	510	14.29
B - 25	5.00	13.83	18	E	13.58	18	W	13.58	B - 25 to B - 26	395	14.79
B - 26	5.00	16.67	18	E	16.00	18	W	16.17	B - 26 to B - 27	375	11.21
B - 27	5.00	6.25	8	W	6.25						
			18	E	6.25	18	N	6.25	B - 27 to B - 28	535	???

Sanitary Sewer Line

	Manhole		Influent Pipe			Effluent Pipe					
ID	Diameter (feet)	Depth (feet)	Diameter (inches)	Direction In	Invert In (fbg)	Diameter (inches)	Direction Out	Invert Out (fbg)	Connects	Length (feet)	Average Depth (fbg)
B - 28	4.00	5.00	18	S	???	???	W	???	B - 28 to B - ??	240	???
B - 29	5.00	15.92	16	S	14.50	16	NW	14.50	B - 29 to B - 30	75	???
B - 30	???	???	16	SE	???	???	N	???	B - 30 to B - 31	55	???
B - 31	???	???	???	S	???	???	NW	???	B - to WTP		???
Number of Manholes 35											
AVG	4.8	10.7	9		8	11		11	Total Lgth	7130	
MIN	4.0	5	2		2.75	6		5			
MAX	5.4	17.75	18		17.25	18		18			

??? - Information not available

Sources: *EPA 1994 Sewer Investigation Report* - Appendix A developed by Gannett Flemming, Inc. of Baltimore, Maryland
Process Sewer System Layout drawings developed by Gannett Fleming, Inc. of Baltimore, Maryland, dated 07/28/94

AR106922

Storm Sewer Line

	Manhole		Influent Pipe			Effluent Pipe					
ID	Diameter (feet)	Depth (feet)	Diameter (inches)	Direction In	Invert In (fbg)	Diameter (inches)	Direction Out	Invert Out (fbg)	Connects	Length (feet)	Average Depth (fbg)
A	4.00	6.50	8	W	6.50						
			12	S	6.50	12	N	6.50	A to B	265	???
B	8.00	11.58	12	S	???	24	NW	???	B to H	270	???
H	5.00	10.67	16		9.83						
			18		9.83						
			24		9.83			9.83			
C	6.00	10.17	27	S	9.50						
			27	E	9.83						
			27	N	10.08	30	W	10.00	C to NA - 1	80	10.67
NA - 8	4.00	7.25	15	S	4.25						
			24	N	7.25	24	W	7.25	NA - 8 to NA - 4	???	
NA - 4	6.00	10.17	14	E	8.75						
			20	S	8.75	48	N	9.08	NA - 4 to NA - 3	240	
NA - 3	???	???	48	S	???	48	N	???	NA - 3 to NA - 2	325	???
NA - 7	5.00	11.25	6	NW	5.50						
			18	W	10.58	20	N	10.67	NA - 7 to NA - 6	340	10.71
NA - 6	4.00	11.58	6	W	4.00						
			18	S	10.75	20	NE	11.00	NA - 6 to NA - 2	130	11.83
NA - 2	6.00	12.67	6	E	4.75						
			48	S	12.42						
			20	SW	12.67	48	NW	12.50	NA - 2 to NA - 1	435	11.92
NA - 1	6.00	11.83	6	SW	7.42						
			30	E	11.33						
			48	SE	11.33	48	W	11.50	NA - 1 to A - 4	310	12.83
A - 4	6.00	15.17	10	SE	4.08						
			6	W	6.42						
			6	NW	9.00						
			6	NE	14.08						
			48	E	14.17	48	W	14.75	A - 4 to A - 5	65	16.04
A - 5	6.00	17.58	11	NE	3.50						
			12	SE	7.67						

AR106923

Storm Sewer Line

ID	Manhole Diameter (feet)	Manhole Depth (feet)	Influent Pipe Diameter (inches)	Influent Pipe Direction In	Influent Pipe Invert In (fbg)	Effluent Pipe Diameter (inches)	Effluent Pipe Direction Out	Effluent Pipe Invert Out (fbg)	Effluent Pipe Connects	Length (feet)	Average Depth (fbg)
			48	E	17.33	48	W	17.33	A - 5 to A - 6	170	16.13
A - 1	5.00	10.67	6	N	9.25						
			6	NE	9.75						
			4	N	10.17						
			8	SE	10.17						
			6	NE	10.17						
			8	NW	10.33	12	SW	10.25	A - 1 to A - 2	285	7.75
A - 2	5.00	5.58	6	NW	4.67						
			12	NE	5.25						
			8	SW	5.33						
			10	SE	5.50	15	SW	5.42	A - 2 to A - 3	305	7.17
A - 3	5.00	8.92	15	NE	8.92	15	S	8.33	A - 3 to A - 6	115	10.13
A - 6	6.00	15.33	4	SE	4.00						
			10	SE	5.50						
			8	N	6.00						
			10	E	6.08						
			15	N	11.92						
			48	E	14.92	48	SW	15.08	A - 6 to A - 7	235	15.21
A - 7	5.67	15.50	6	SE	3.25						
			8	SE	4.25						
			8	N	6.58						
			8	N	12.00						
			48	NE	15.33	48	SW	15.33	A - 7 to A - 9	310	15.67
A - 18	6.00	2.92	12	E	2.50	12	W	2.75	A - 18 to A - 8	375	3.63
A - 8	5.00	17.83	6	N							
			12	E	4.50	30	W	17.83	A - 8 to A - 9	190	15.63
A - 9	10.00	16.00	15	S	3.58						
			30	E	13.42						
			48	NE	16.00	54	SW	15.67	A - 9 to A - 10	325	12.96
NA - 9	4.00	4.83	6	S	3.25						
			6	E	4.83						

AR106924

Storm Sewer Line

Manhole			Influent Pipe			Effluent Pipe					
ID	Diameter (feet)	Depth (feet)	Diameter (inches)	Direction In	Invert In (fbg)	Diameter (inches)	Direction Out	Invert Out (fbg)	Connects	Length (feet)	Average Depth (fbg)
			8	N	4.83	15	W	4.83	NA - 9 to NA - 10	275	
A - 44	5.00	8.67	8	E	3.58						
			6	W	3.83						
			4	NW	4.17						
			8	N	4.92						
			8	SW	5.92						
			8	SE	6.08						
			6	SW	6.83						
			8	S	6.83						
			8	W	8.75	15	E	8.67	A - 44 to A - 43	150	9.17
A - 43	5.00	9.67	6	NW	4.42	27	S	9.58	A - 43 to NA - 13	125	10.25
			15	W	9.67	27	E	9.58	A - 43 to NA - 10	55	9.50
NA - 10	6.00	9.33	8	N	5.25						
			8	NE	6.00						
			8	NE	7.17						
			15	E	8.33						
			27	W	9.42	27	S	9.33	NA - 10 to NA - 11	105	9.63
NA - 11	5.00	9.92	27	N	9.92	27	SW	9.92	NA - 11 to NA - 13	50	10.58
NA - 13	6.00	11.25	6	N	3.42						
			3	N	3.75						
			3	N	4.08						
			8	W	9.33						
			27	N	10.92						
			27	NE	11.25	27	SW	11.25	NA - 13 to A - 42	35	10.67
A - 42	5.00	10.17	6	SW	3.08						
			8	NW	4.17						
			6	SW	5.25						
			10	NE	5.25						
			24	SE	5.25						
			8	W	5.33						
			4	SW	7.58						

AR106925

Storm Sewer Line

Manhole			Influent Pipe			Effluent Pipe					
ID	Diameter (feet)	Depth (feet)	Diameter (inches)	Direction In	Invert In (fbg)	Diameter (inches)	Direction Out	Invert Out (fbg)	Connects	Length (feet)	Average Depth (fbg)
			27	NE	10.08	27	S	10.17	A - 42 to A - 41	105	10.33
A - 41	5.00	10.33	3	SE	2.42						
			8	NW	2.58						
			3	SE	3.50						
			12	N	3.67						
			4	W	5.75						
			27	N	10.50	27	S	10.75	A - 41 to A - 40	145	
A - 40	???	9.58	6	W	2.58						
			27	N	9.50	27	S	9.75	A - 40 to A - 39	165	10.83
A - 39	5.00	11.92	6	NW	8.00						
			6	NW	8.33						
			8	NW	10.00						
			27	N	11.92	30	W	11.92	A - 39 to A - 33	120	13.54
A - 38	5.00	17.75	10	SE	6.00						
			2	S	6.83						
			15	S	15.00	12	W	17.75	A - 38 to A - 37	25	17.71
A - 37	5.00	17.67	4	SE	4.83						
			15	S	14.83						
			12	E	17.67	12	W	17.75	A - 37 to A - 36	35	17.42
A - 36	5.00	18.00	2	S	6.67						
			2	S	7.00						
			12	S	15.08						
			12	E	17.08	15	W	17.25	A - 36 to A - 35	80	17.33
A - 35	5.00	17.75	15	NW	12.92						
			12	W	16.17						
			15	E	17.42	18	N	16.83	A - 35 to A - 35A	70	14.17
A - 35A	4.00	11.92	21	W	11.33						
			18	S	11.50						
			12	NE	11.83	18	NW	10.33	A - 35A to A - 34	150	???
A - 34	5.00	11.00	6	SE	5.58						
			15	W	10.00						

Storm Sewer Line

	Manhole		Influent Pipe			Effluent Pipe					
ID	Diameter (feet)	Depth (feet)	Diameter (inches)	Direction In	Invert In (fbg)	Diameter (inches)	Direction Out	Invert Out (fbg)	Connects	Length (feet)	Average Depth (fbg)
			18	SE	???	24	N	11.00	A - 34 to A - 33	130	11.88
A - 33	5.00	15.17	3	NW	2.42						
			6	SW	3.42						
			12	E	9.25						
			4	N	12.75						
			24	S	12.75						
			30	E	15.17	30	NW	15.08	A - 33 to A - 31	115	14.46
A - 30	5.00	6.08	4	NW	3.25						
			8	W	3.25						
			5	SE	3.75						
			4	S	4.58						
			8	NW	5.50						
			8	NE	5.58						
			8	N	6.25						
			10	E	6.25	15	S	6.25	A - 30 to A - 32	160	7.50
A - 32	5.00	10.92	5	W	3.92						
			6	E	5.33						
			5	SE	5.67						
			15	N	8.75	15	SW	10.92	A - 32 to A - 31	55	11.00
A - 31	5.00	13.83	8	N	4.42						
			8	N	5.83						
			15	E	11.08						
			30	SE	13.83	36	W	13.83	A - 31 to A - 28	135	14.33
A - 29	5.00	7.42	8	NW	3.92						
			8	N	4.25						
			4	NE	5.08						
			10	NE	5.25						
			8	W	5.50	15	S	7.42	A - 29 to A - 28	285	7.54
A - 28	5.00	14.83	6	E	2.50						
			6	W	6.83						
			15	N	7.67						

Storm Sewer Line

	Manhole		Influent Pipe			Effluent Pipe					
ID	Diameter (feet)	Depth (feet)	Diameter (inches)	Direction In	Invert In (fbg)	Diameter (inches)	Direction Out	Invert Out (fbg)	Connects	Length (feet)	Average Depth (fbg)
			36	E	14.83	36	SW	14.83	A - 28 to A - 27	285	13.33
A - 27	5.00	11.83	6	SE	3.33						
			6	NE	8.33						
			36	NE	11.83	36	NW	11.83	A - 27 to A - 26	275	10.96
A - 26	5.00	10.08	8	E	5.75						
			36	SE	10.08	36	N	10.08	A - 26 to A - 24	170	9.29
A - 25	???	8.00	12	E	8.00	14	W	8.00	A - 25 to A - 24	155	8.04
A - 24	5.00	8.58	8	E	6.83						
			14	E	8.08						
			36	S	8.50	36	N	8.92	A - 24 to A - 22	225	10.17
A - 45	5.00	7.83	4	NW	5.33						
			6	SE	6.17						
			8	NE	6.50						
			8	E	7.08	15	W	8.00	A - 45 to A - 46	90	8.54
A - 46	5.00	9.00	8	NE	4.50						
			4	NW	4.67						
			8	S	5.00						
			8	SE	6.00						
			15	E	9.08	21	W	9.00	A - 46 to A - 23	420	9.67
A - 23	4.00	10.33	2	S	2.25						
			6	E	3.00						
			8	NE	6.83						
			10	NW	9.42						
			21	E	10.33	24	W	10.25	A - 23 to A - 22	90	8.21
A - 22	5.00	11.50	24	E	6.17						
			36	S	11.42	36	N	11.42	A - 22 to A - 21	235	11.79
A - 21	5.00	22.92	36	S	12.17						
			18	NE	13.75	36	NW	22.92	A - 21 to A - 17	240	23.96
A - 56	5.00	17.00	12	SW	3.42						
			6	SW	4.67						
			8	N	6.83						

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Storm Sewer Line

	Manhole		Influent Pipe			Effluent Pipe					
ID	Diameter (feet)	Depth (feet)	Diameter (inches)	Direction In	Invert In (fbg)	Diameter (inches)	Direction Out	Invert Out (fbg)	Connects	Length (feet)	Average Depth (fbg)
			14	NW	7.17						
			8	NE	7.33	18	W	11.50	A - 56 to A - 17	50	14.25
A - 17	6.00	25.00	10	S	7.33						
			12	E	12.00						
			18	E	17.00						
			36	SE	25.00	36	N	25.00	A - 17 to A - 16	290	24.42
A - 16	5.00	23.83	27	E	16.00						
			36	S	23.83	36	N	23.83	A - 16 to A - 11	260	24.25
A - 11	6.00	24.67	10	SW	6.33						
			24	SE	19.33						
			36	S	24.67	48	N	24.67	A - 11 to A - 10	130	24.83
A - 10	10.00	25.00	10	S	6.00						
			54	NE	10.25						
			48	S	25.00	60	W	25.00	A - 10 to A - 50	650	24.58
A - 50	8.00	24.17	60	E	24.17	60	W	24.17	A - 50 to A - 51	710	17.08
A - 51	8.00	19.00	60	E	10.00	60	NW	19.00	A - 51 to A - 54	230	15.42
A - 54	12.00	18.25	60	SE	11.83	60	W	17.00	A - 54 to A - 55	635	16.88
A - 55	8.00	16.75	60	E	16.75	60	W	16.75	A - 55 to Out 003	355	8.38
Number of Manholes 60											
AVG	5.6	13.0	15		8	31		13	Total Lgth	12835	
MIN	4.00	2.92	2.00		2.25	12.00		2.75			
MAX	12.00	25.00	60.00		25.00	60.00		25.00			

??? - Information not available

Sources: *EPA 1994 Sewer Investigation Report* - Appendix A developed by Gannett Flemming, Inc. of Baltimore, Maryland
Process Sewer System Layout drawings developed by Gannett Fleming, Inc. of Baltimore, Maryland, dated 07/28/94

Soda Sewer Line

	Manhole		Influent Pipe			Effluent Pipe					
ID	Diameter (feet)	Depth (feet)	Diameter (inches)	Direction In	Invert In (fbg)	Diameter (inches)	Direction Out	Invert Out (fbg)	Connects	Length (feet)	Average Depth (fbg)
D - 0									D - 0 to D - 1		
D - 1	5.00	12.92	4	SE	1.83						
			4	N	2.83						
			4	NE	2.92	8	W	3.17	D - 1 to D - 2	110	4.67
D - 2	5.00	7.17	4	NW	2.33						
			6	NE	2.58						
			4	W	3.42						
			6	SW	4.92						
			8	E	6.17	10	W	7.00	D - 2 to D - 3	125	8.42
D - 3	5.00	10.33	10	NE	8.92						
			10	E	9.83	10	N	9.92	D - 3 to D - 5	370	9.38
Number of Manholes 4											
AVG	5.0	10.1	6		5	9		7	Total Lgth	605	
MIN	5.00	7.17	4.00		1.83	8.00		3.17			
MAX	5.00	12.92	10.00		9.83	10.00		9.92			

??? - Information not available

Sources: *EPA 1994 Sewer Investigation Report* - Appendix A developed by Gannett Flemming, Inc. of Baltimore, Maryland
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AR106930

Sulfide Sewer Line

	Manhole		Influent Pipe			Effluent Pipe					
ID	Diameter (feet)	Depth (feet)	Diameter (inches)	Direction In	Invert In (fbg)	Diameter (inches)	Direction Out	Invert Out (fbg)	Connects	Length (feet)	Average Depth (fbg)
D - 12	5.00	11.00	15	W	9.75						
			18	SE	12.67	12	NW	10.75	D - 12 to D - 10	235	13.67
D - 10	5.00	16.92	12	SE	16.58	12	S	16.58	D - 10 to D - 16	465	
D - 16	5.00	15.33	12	E	15.08	12	W	15.25	D - 16 to D - 19	450	16.42
D - 19	5.00	18.00	12	E	17.58	12	W	17.58	D - 19 to D - 22	370	12.58
D - 22	5.00	8.33	12	E	7.58	12	N	7.25	D - 22 to D - 27	355	7.17
D - 27	5.00	7.50	12	S	7.08	12	SW	7.33	D - 27 to	120	

Number of Manholes 6

AVG	5.0	12.8	13		12	12		12	Total Lgth	1995
MIN	5.00	7.50	12.00		7.08	12.00		7.25		
MAX	5.00	18.00	18.00		17.58	12.00		17.58		

??? - Information not available

Sources: *EPA 1994 Sewer Investigation Report* - Appendix A developed by Gannett Flemming, Inc. of Baltimore, Maryland
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Acid Sewer Line

Manhole			Influent Pipe			Effluent Pipe					
ID	Diameter (feet)	Depth (feet)	Diameter (inches)	Direction In	Invert In (fbg)	Diameter (inches)	Direction Out	Invert Out (fbg)	Connects	Length (feet)	Average Depth (fbg)
C - 21	5.00	6.17	10	N	4.5	10	E	6.17	C - 21 to C - 22	50	6.63
C - 22	5.00	7.33	10	W	7.08	10	NE	7.33	C - 22 to C - 23	25	8.00
C - 23	5.00	9.00	10	SW	8.33						
			10	SW	8.67	10	N	10.75	C - 23 to C - 24	155	10.46
C - 24	5.00	10.50	10	S	10.17	10	N	10.50	C - 24 to C - 3	145	10.67
C - 3	5.00	23.17	10	S	10.83						
			6	SE	13.33						
			4	N	13.92						
			16	NE	14.50						
			10	S	14.67						
			10	NE	23.00	15	NW	23.33	C - 3 to C - 4	260	22.42
C - 4	5.00	21.67	15	E	6.92						
			15	E	10.67						
			8	S	16.92						
			15	W	19.67						
			15	SE	21.50	15	N	21.50	C - 4 to C - 5	300	22.79
C - 5	5.00	24.08	6	NE	13.83						
			15	S	24.08	15	N	24.08	C - 5 to C - 7	205	24.33
C - 7	5.00	24.58	10	W	5.50						
			12	E	9.33						
			15	SE	10.67						
			15	S	24.58	15	NW	24.58	C - 7 to C - 6	195	23.96
C - 6	5.00	23.83	21	E	3.50						
			21	E	20.67						
			15	SE	23.33	21	SW	23.67	C - 6 to C - 10	370	24.17
C - 10	5.00	24.67	21	NE	24.67	18	W	24.67	C - 10 to C - 11	460	26.42
C - 11	5.00	28.33	18	E	28.17	15	W	28.17	C - 11 to C - 12	480	21.29
C - 12	4.00	15.17	15	E	14.42	15	N	14.42	C - 12 to D - 26	345	14.79

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Acid Sewer Line

	Manhole		Influent Pipe			Effluent Pipe					
ID	Diameter (feet)	Depth (feet)	Diameter (inches)	Direction In	Invert In (fbg)	Diameter (inches)	Direction Out	Invert Out (fbg)	Connects	Length (feet)	Average Depth (fbg)
D - 26	5.00	15.25	15	W	15.17						
			15	S	15.17	15	SW	15.17	D - 26 to NCA - 7	70	11.17
NCA - 7	5.00	7.67	24	SE	6.17						
			15	NE	7.17	18	W	6.58			
N - 14	5.00	2.58	24	N	2.42						
			14	NE	2.50						
			14	SW	2.50	24	SE	2.58	N - 14 to N - 19	40	
N - 19	5.00	2.25									
D - 28	5.00	15.42	8	SE	2.33						
			15	E	4.92						
			3	SE	6.08						
			16	E	10.42						
			3	W							
			3	E	14.25	16	S				
N - 18											
NCA - 1	5.00	15.25	21	NE	15.25	21	NW	15.25	NCA - 1 to NCA - 2	140	10.29
NCA - 2	6.00	19.17	21	SE	5.33						
			40	NE	19.17	24	W	19.17	NCA - 2 to NCA - 3C	30	
NCA - 3C	3.00	17.00							NCA - 3C to NCA - 3B	60	
NCA - 3B	9.50	17.33	6	E	17.33						
			6	W	17.33						
			6	W	17.33						
			24	W	17.33	24	W	17.33	NCA - 3B to NCA - 3A	100	13.71
NCA - 3A	10.00	10.83	24	E	7.58						
			6	E	10.92						
			6	E	10.83						

Acid Sewer Line

	Manhole		Influent Pipe			Effluent Pipe					
ID	Diameter (feet)	Depth (feet)	Diameter (inches)	Direction In	Invert In (fbg)	Diameter (inches)	Direction Out	Invert Out (fbg)	Connects	Length (feet)	Average Depth (fbg)
			24	E	10.08	24	W	10.08	NCA - 3A to NCA - 3	20	10.50
NCA - 3	5.00	11.67	24	E	10.92	24	W	11.00	NCA - 3 to NCA - 4	395	12.38
NCA - 4	5.00	14.42	10	N	12.00						
			24	E	13.75	24	W	13.83	NCA - 4 to NCA - 5	395	10.83
NCA - 5	5.00	8.67	24	E	7.83	24	NW	8.00	NCA - 5 to NCA - 6	540	
NCA - 6	5.00	6.25	15	E	3.75						
			24	SE	5.17	Rock-lined Ditch			NCA - 6 to Ditch	0	

Number of Manholes 24

AVG	5.3	14.7	14		12	18		15	Total Lgth	4780
MIN	3.00	2.25	3.00		2.33	10.00		2.58		
MAX	10.00	28.33	40.00		28.17	24.00		28.17		

??? - Information not available

Sources: *EPA 1994 Sewer Investigation Report* - Appendix A developed by Gannett Flemming, Inc. of Baltimore, Maryland
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Bleach Sewer Line

	Manhole		Influent Pipe			Effluent Pipe					
ID	Diameter (feet)	Depth (feet)	Diameter (inches)	Direction In	Invert In (fbg)	Diameter (inches)	Direction Out	Invert Out (fbg)	Connects	Length (feet)	Average Depth (fbg)
D - 11	4.00	14.83	12	E	9.92						
			12	S	11.08	12	NE	14.83	D - 11 to D - 9	230	15.92
D - 9	5.00	17.33	12	SW	17.00	12	W	17.00	D - 9 to D - 15	455	15.88
D - 15	5.00	14.75	12	E	14.75	12	SW	14.75	D - 15 to D - 18	445	16.63
D - 18	5.00	18.50	12	NE	18.50	12	SW	18.50	D - 18 to D - 21	390	12.83
D - 21	5.00	7.17	12	NE	7.17	12	S	7.17	D - 21 to D - 22	20	7.21
Number of Manholes 5											
AVG	4.8	14.5	12		13	12		14		1540	
MIN	4.00	7.17	12.00		7.17	12.00		7.17			
MAX	5.00	18.50	12.00		18.50	12.00		18.50			

??? - Information not available

Sources: *EPA 1994 Sewer Investigation Report* - Appendix A developed by Gannett Flemming, Inc. of Baltimore, Maryland
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AR106935

Viscose Sewer Line

	Manhole		Influent Pipe			Effluent Pipe					
ID	Diameter (feet)	Depth (feet)	Diameter (inches)	Direction In	Invert In (fbg)	Diameter (inches)	Direction Out	Invert Out (fbg)	Connects	Length (feet)	Average Depth (fbg)
D - 29	???	5.00	24	E	5.00	24	S	5.00	D - 29 to D - 25	90	
D - 25	5.00	6.67	12	E	1.50						
			6	SE	2.67						
			12	N	3.50						
			8	NW	5.17	36	W	6.67	D - 25 to D - 4	85	
D - 4	5.00	7.00	12	E	4.75	10	N	6.50	D - 4 to D - 5	210	7.67
D - 5	4.00	10.25	6	SW	4.42						
			10	S	8.83						
			12	E	9.58	15	NW	9.83	D - 5 to D - 6	255	9.33
D - 6	5.00	22.25	15	SE	8.83						
			15	N	20.33	15	N	22.25	D - 6 to D - 7	305	23.75
D - 7	5.00	25.25	15	S	25.25	15	N	25.25	D - 7 to D - 8	380	24.92
D - 8	5.00	25.58	10	N	10.58						
			15	S	24.58	15	W	25.58	D - 8 to D - 17	370	25.29
D - 17	6.00	25.00	15	E	25.00	15	W	25.00	D - 17 to D - 20	460	26.42
D - 20	4.00	28.50	15	E	27.83	15	SW	27.83	D - 20 to D - 23	450	21.17
D - 23	4.00	14.50	15	NE	14.50	15	NW	14.50	D - 23 to N - 17	180	
N - 17	5.00	4.67	15	S	2.17						
			14	NE	2.75						
			15	E	3.42	16	NW	3.50	N - 17 to D - 33	40	
D - 33	5.00	4.50	16	NW	4.00						
			16	E	4.17	10	W	4.42			
N - 15	5.00	2.75	14	NE	2.17	14	SE	2.25	N - 15		
Number of Manholes 13											
AVG	4.8	14.0	13		10	17		14		2825	
MIN	4.00	2.75	6.00		1.50	10.00		2.25			
MAX	6.00	28.50	24.00		27.83	36.00		27.83			

??? - Information not available

<u>Sources:</u> *EPA 1994 Sewer Investigation Report* - Appendix A developed by Gannett Flemming, Inc. of Baltimore, Maryland
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Polymer Sewer Line

	Manhole		Influent Pipe			Effluent Pipe					
ID	Diameter (feet)	Depth (feet)	Diameter (inches)	Direction In	Invert In (fbg)	Diameter (inches)	Direction Out	Invert Out (fbg)	Connects	Length (feet)	Average Depth (fbg)
I	4.00	7.58	8	SW	7.08	8	W	7.08	I to J	270	7.25
J	4.00	7.58	6	SE	6.83						
			8	E	7.42	10	N	7.50	J to K	275	7.79
K	4.00	8.17	10	S	8.08	12	W	7.83	K to L	270	7.21
L	4.00	6.92	12	E	6.58	12	W	6.42	L to M	215	8.25
M	4.00	10.25	12	E	10.08	12	W	10.08	M to N	270	11.63
N	5.00	13.67	12	E	13.17	12	SW	12.83	N to O	250	13.88
O	4.00	15.08	12	NE	14.92	12	SW	14.92	O to P	250	14.08
P	4.50	13.25	12	NE	13.25	12	SW	13.17	P to Q	225	11.08
Q	5.00	9.00	12	NE	9.00	12	S	9.00	Q to D - 8	90	9.79

Number of Manholes 9

AVG	4.3	10.2	10	10	11	10	2115
MIN	4.00	6.92	6.00	6.58	8.00	6.42	
MAX	5.00	15.08	12.00	14.92	12.00	14.92	

??? - Information not available

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