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December 1998

EPA Superfund
Record of Decision:

Woolfolk Chemical Works, Inc.
OU 3
Fort Valley, GA
8/6/1998

RECORD OF DECISION

SUMMARY OF REMEDIAL ALTERNATIVE SELECTION

WOOLFOLK CHEMICAL WORKS SITE

FORT VALLEY, PEACH COUNTY, GEORGIA

OPERABLE UNIT #3: ON-FACILITY CONTAMINATION

PREPARED BY

U. S. ENVIRONMENTAL PROTECTION AGENCY

REGION 4

ATLANTA, GEORGIA

DECLARATION
of the
RECORD OF DECISION

WOOLFOLK CHEMICAL WORKS SITE
Operable Unit Three: On-Facility Contamination

SITE NAME AND LOCATION

Woolfolk Chemical Works Superfund Site, Fort Valley, Peach County, Georgia

STATEMENT OF BASIS AND PURPOSE

This decision document (Record of Decision) presents a selected remedial action for Operable Unit (OU) #3 at the Woolfolk Chemical Works Site, Fort Valley, Georgia, developed in accordance with the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), 42 U.S.C. Section 9601 et seq., and the National Contingency Plan (NCP), 40 CFR Part 300. This decision is based on the administrative record for OU #3 at the Woolfolk Chemical Works Superfund Site ("the Site").

The State of Georgia, as represented by the Georgia Environmental Protection Division (GaEPD), has been the support agency during the Remedial Investigation and Feasibility Study process for the Site. In accordance with 40 CFR 300.430, as the support agency, GaEPD has provided input during this process. The State of Georgia has concurred with the selected remedy.

ASSESSMENT OF THE SITE

Actual or threatened releases of hazardous substances from OU #3 at the Woolfolk Site, if not addressed by implementing the response action selected in this Record of Decision (ROD), may present an imminent and substantial endangerment to public health, welfare and/or the environment.

DESCRIPTION OF SELECTED REMEDY

This operable unit is the third of four planned operable units at the Woolfolk Site. OU #1 addressed the contamination of groundwater, while OU #2 addresses contamination of soils in a proposed redevelopment project to be implemented on properties on Martin Luther King Drive and Oak Street in Fort Valley, GA. OU #3 will address contamination on the property of the former Woolfolk Chemical Works facility ("on-facility") including soils, surface/storm water system, buildings, and an existing cap at the Site. OU #4 will address remaining off-facility contamination, which includes soils, house dust, and a drainage corridor leading from the site.

The selected remedy is as follows:

On-facility Soils

- excavation, ex-situ solidification/stabilization (S/S) treatment, and off-site disposal of soils contaminated above action levels for paved areas;
- consolidation and paving with asphalt/concrete all areas with soils contaminated above action levels established for unpaved soils; and
- institutional controls to prohibit residential use of the property and require maintenance of the paving.

Existing Cap

- removal of the cap
- excavation, ex-situ S/S, and off-site disposal of material above action levels for paved areas;
- excavation with off-site disposal of material unsuitable for treatment (i.e. bricks, concrete)
- excavation with off-site disposal without treatment those material found to be non-hazardous (lime-sulphur sludges) and yet unsuitable as base material;
- consolidation and paving with asphalt/concrete all areas of the former cap;
- institutional controls to prohibit residential use of the property and require maintenance of the paving.

Buildings

- No further action on Building E;
- Demolition of Building W with off-site disposal;
- further characterization of all other buildings associated with the current or former site operations;
- demolition with off-site disposal of all buildings found to exceed the action levels for buildings if the building is considered abandoned or of limited structural integrity or limited use;
- decontamination of any building found above action levels if possible and if the building is found to be of future use. Those buildings which are not possible to decontaminate shall be demolished.

Storm Sewers

- video inspection of the storm sewer system to determine areas of deterioration;
- repair of those areas including characterization of soils beneath these deteriorated areas;
- removal of the sediments through jetting and vacuum equipment;
- disposal of the sediment may be addressed with on-facility soils, however, if this is not possible disposal will be in an appropriate landfill.

STATUTORY DETERMINATIONS

The selected remedy and the contingency remedy are protective of human health and the environment, comply with federal and state requirements that are legally applicable or relevant and appropriate, and are cost-effective. The remedy utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable, and satisfies the preference for treatment.

Because this remedy will result in hazardous substances remaining at the Site above action levels which would allow for unlimited use and for unrestricted exposure, a review will be conducted within five years after commencement of the remedial action and not less than every five years thereafter, to ensure that the remedy continues to provide adequate protection of human health and the environment.

Richard D. Green　　　　6 AUG 98

RICHARD D. GREEN　　　　DATE
DIRECTOR
Waste Management Division

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Woolfolk Chemical Works Site
Fort Valley, Georgia

1.0 SITE LOCATION AND DESCRIPTION

The Woolfolk Chemical Works Site is located in Fort Valley, Peach County, Georgia, and encompasses approximately 31 acres including the former Woolfolk Chemical Works plant and surrounding areas where contamination has spread. Businesses operating on the property of the former Woolfolk plant include SureCo, Inc., and the Marion Allen Insurance and Realty Company. Canadyne-Georgia Corporation (CGC) also owns a one acre parcel of Site property but does not maintain an active business at the Site. SureCo, Inc. continues to formulate, package, and warehouse various organic pesticides that are used primarily in the lawn and garden market but also by peach growers.

The Woolfolk Site is located in an area with mixed commercial and residential uses. Residences are located to the west, south, and east, with homes to the southeast adjoining a pecan orchard. Several businesses and light industries are located along the north, northwest, and east ends of the former plant, including the Norfolk Southern Railroad tracks and station.

For an area location map and general site map, see Figures 1.1 and 1.2, respectively.

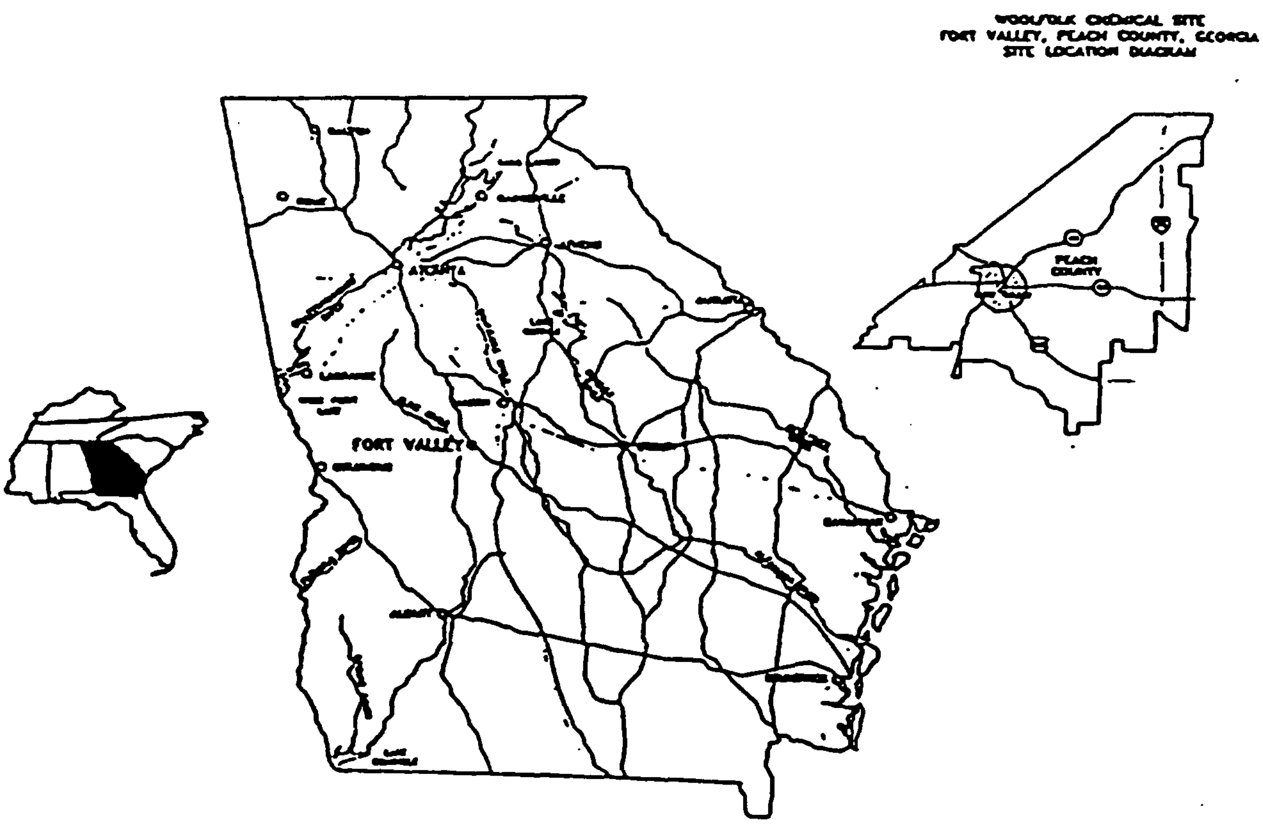

Figure 1.1: Area Map

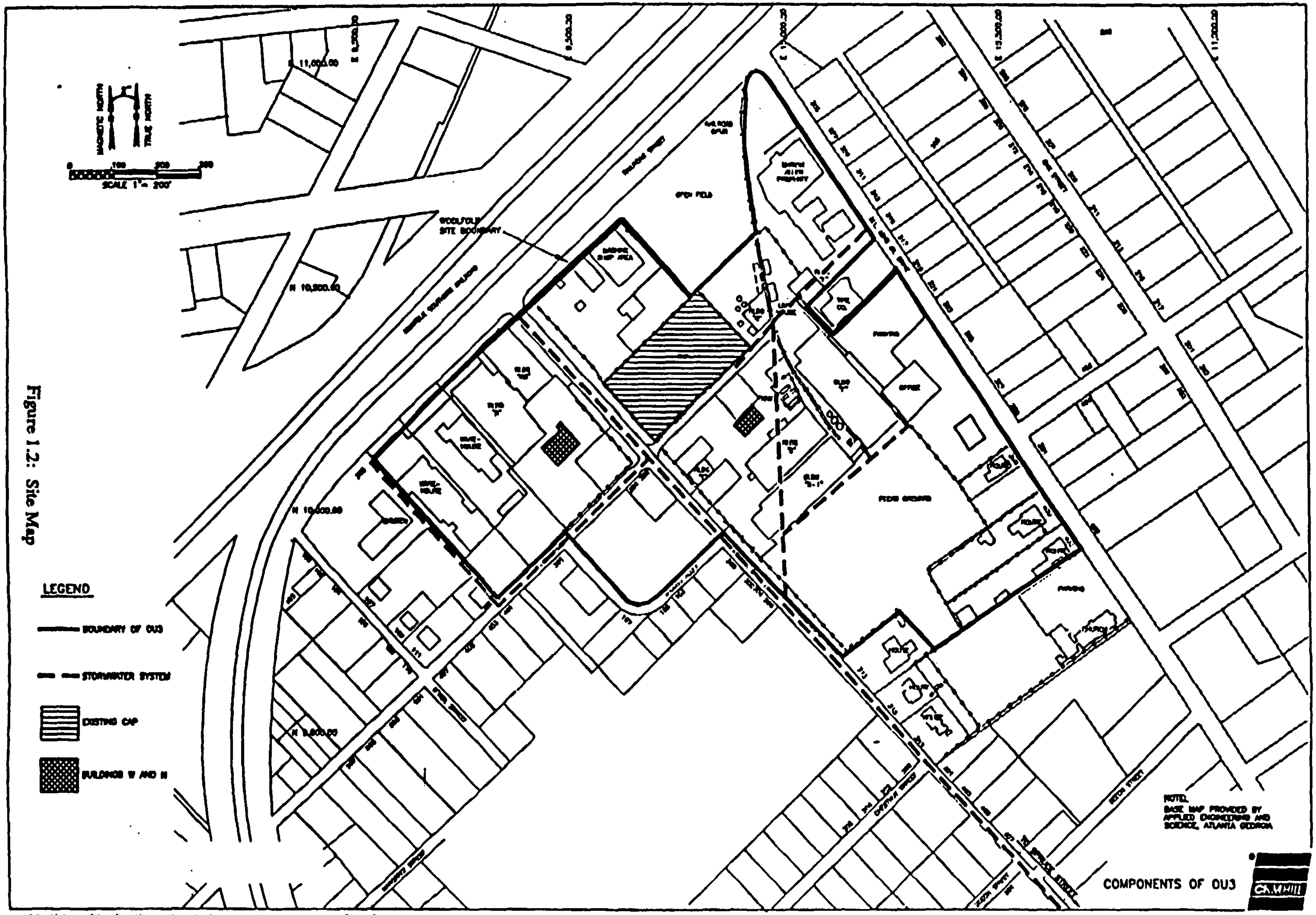

Figure 1.2: Site Map

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2.0 SITE HISTORY AND ENFORCEMENT ACTIVITIES

Since the 1910's, the Woolfolk facility has been used for the production and packaging of organic and inorganic insecticides (including arsenic and lead-based products), pesticides, and herbicides. Production was expanded during the 1950's to include the formulation of various organic pesticides, including DDT, lindane, toxaphene, and other chlorinated pesticides. These organic pesticides and other insecticides and herbicides were formulated, packaged, or warehoused at the facility.

The J. W. Woolfolk Company owned and operated the Woolfolk Facility from 1926 until 1941, when it dissolved and conveyed its assets to Woolfolk Chemical Works, Ltd. Woolfolk Chemical Works, Ltd., reorganized into the corporation Woolfolk Chemical Works, Inc., in 1972. In 1977, Reichhold, Limited acquired all of the stock of Woolfolk Chemical Works, Inc. pursuant to a stock purchase agreement. The stock purchase agreement was assigned to Canadyne Corporation, a wholly owned subsidiary of Reichhold, Limited. In 1984, Woolfolk Chemical Works, Inc., changed its name to Canadyne-Georgia Corporation (CGC). Also in 1984, assets of Woolfolk Chemical Works, Inc. were sold to the predecessor of Peach County Properties, Inc. (PCPI). PCPI is the current owner of most of the former Woolfolk property, and has leased most of the property to its affiliate, SureCo, Inc., which has formulated and packaged pesticides at the facility since 1984. Another portion of the property is leased to Georgia Ag. Chemicals, which operates a warehouse and distribution facility. CGC currently retains the title to a one acre parcel of the facility used as a landfill. Marion Allen Insurance and Realty Company also owns one parcel located northwest of the operating facility. (See Figure 1.2).

In 1986-87, Reichhold, Limited funded an interim soil remediation at the Woolfolk facility, with Applied Engineering Sciences (AES) serving as construction manager. The major remediation activities consisted of demolishing several buildings and excavating approximately 3,700 cubic yards of soil contaminated with a combined lead and arsenic concentration above 10,000 mg/kg. All soil with contamination levels above this concentration was disposed of at a permitted hazardous waste landfill in Emelle, Alabama. Other soils and debris were disposed of underneath an on-site cap on property currently owned by CGC. CGC informed the Georgia Environmental Protection Division (EPD) of the investigations and cleanup activities. In August 1987, AES submitted a document to EPD entitled "Cleanup Report for the Former Woolfolk Chemical Works Plant Facility" which summarized remedial activities conducted at the facility.

In 1986, the U.S. Environmental Protection Agency (EPA) began an investigation of the release or potential release of hazardous substances at the facility and requested all analytical data pertaining to the facility. This investigation led to the proposal to add the Site to the National Priorities List (NPL) in June 1988. In April 1989, EPA notified potentially responsible parties (PRPs) of their potential liability under CERCLA for response costs incurred at the Site. In April 1990, EPA and CGC completed negotiations on an Administrative Order on Consent (AOC) for a Remedial Investigation/Feasibility Study (RI/FS). The AOC was signed on April 24, 1990. In August 1990, the Woolfolk facility was placed on the NPL.

The Remedial Investigation was submitted to EPA by Canadyne-Georgia in November 1992. The RI was performed to document the nature and extent of contamination for affected media, including soils, groundwater, surface/storm water, sediments and air. The objective of the RI was to gather sufficient information to develop risk management options and remedial alternatives that are appropriate for the site. The risk management options are presented in the Baseline Risk Assessment which was submitted to EPA in November 1992. In 1993, the site was divided into two Operable Units (OUs); OU #1 for groundwater, and OU #2 for the remaining contaminated areas. The remedial alternatives for groundwater are presented in the Final Feasibility Study (FS) which was submitted to EPA in December 1993. A Record of Decision for OU #1, Groundwater, was issued on March 25, 1994. In April 1995, EPA further divided the site into OU #2 for properties of a proposed redevelopment project, and OU #3 for remaining portions of the site. EPA issued a Record of Decision for OU #2 on September 30, 1995. An additional operable unit, OU #4, was created in October 1995 to address remaining off-facility contamination.

During the RI/FS, arsenic contamination was found in soils in residential yards near the Woolfolk facility. The removal of residential soil contamination, relocation of some residents, together with demolition of a dioxin contaminated on-facility building, is being completed pursuant to an Unilateral Administrative Order for Removal Response activities (Removal Order) issued by EPA to CGC, Reichhold, Limited, and Canadyne Corporation on December 1, 1993. Only CGC has complied with the Removal Order to date by continuing ongoing work pursuant to the Order.

As mentioned, EPA issued a Record of Decision for the Operable Unit #1, Groundwater on March 25, 1994. Canadyne Corporation, Reichhold Limited, and Canadyne Georgia were issued an Unilateral Administrative Order to complete the Remedial Design/Remedial Action on May 23, 1994 (OU #1 Order). Only Canadyne-Georgia is complying with the OU #1 Order by implementing the on-going Remedial Design activities for OU #1. EPA issued the ROD for OU #2 on September 29, 1995. Since that time, the Peach Public Libraries (PPL) have begun construction of a new library on the OU #2 properties. The Fort Valley Redevelopment Authority has negotiated a property transfer agreement for an additional OU #2 property, the Troutman House property, which is slated for renovation to become a welcome center for the city. The 202 Oak Street property transfer agreement is currently under negotiation, as well.

3.0 HIGHLIGHTS OF COMMUNITY PARTICIPATION

EPA has made significant efforts to insure that interested parties have been kept informed and given an opportunity to provide input on activities at the Woolfolk Chemical Works site. EPA has been working with the community surrounding the Woolfolk Chemical Works since 1990. In September 1990, press releases informing the community about the NPL listing of the site were released. Subsequent interviews were held that Fall to develop a Community Relations Plan (CRP). The information repository was established in October 1990, at the Thomas Public Library, 213 Persons Street, Fort Valley, Georgia. The CRP, which was finalized in November 1990, has been placed in the information repository. In January 1991, EPA held a public meeting to discuss the start of the RI/FS.

In July 1993, EPA issued a press release and fact sheet on the findings of the RI study regarding soil contamination and health precautions recommended by the Agency for Toxic Substances and Disease Registry (ATSDR). On August 2-3, 1993, EPA conducted door-to door visits to the potentially affected residents to further distribute the fact sheet and extend our invitation to an availability session. The availability session, held on August 3, 1993 discussed the results of the RI study and ATSDR's recommendations for health precautions. Fifty people attended the session which was hosted by EPA, GaEPD, and ATSDR. Representatives of CGC were also present.

EPA's Emergency Response and Removal Branch has implemented certain actions to remove contamination from a drainage corridor extending south of the plant. EPA has also excavated the majority of the contaminated soils from residential properties, and supervised the destruction of an on-site dioxin contaminated building (Building E). Five sampling events to sample soils in residents' yards have occurred to date with results subsequently explained in meetings with the public. In addition, EPA has sampled for contamination in residential homes at the Site, and has directed the cleaning of contaminated dust from eight (8) homes. CGC is complying with the Removal Order which required the disassociation of the affected residents from contaminated soils and destruction/removal of Building E.

EPA has issued the ROD for OU#1 after allowing for public participation through the Proposed Plan and Public Comment period. The Proposed Plan for OU#1 was issued January 18, 1994 and public comment was sought from January 18 through February 17, 1994. A public meeting was also held during this comment period on February 1, 1994. A Responsiveness Summary was prepared and published as an appendix to the OU #1 Record of Decision.

Throughout the Removal and Remedial process citizens of Fort Valley, as represented by the Technical Assistance Group (TAG) partially funded by EPA, have expressed the concern of inadequate information being disseminated by EPA to the public. EPA had made available the public repository and the monies for the TAG Grant, but it was suggested that this was not adequate to get a full understanding of the Superfund process. In order to further the exchange of information between EPA and the community, EPA developed a Community Information Exchange Group. This group of 11 community-selected representatives has met in a public forum to discuss the activities of the Woolfolk Site related to OU #2 and OU #3 (which then included the off-site contamination, now in OU #4). The series of meetings has allowed in-depth discussions of the remedial alternatives and provided information to both EPA and the community relating to activities at this site prior to the formal proposed plan process.

The Feasibility Study Addendum (FSA), the Proposed Plan, and the Administrative Record (AR) for OU #2 were released to the public on June 15, 1995. The FSA and the Proposed Plan were made available in the AR, which is maintained in the EPA Region IV Docket Room, and in the information repository at the site, located at the Peach County Public Library. The notice of availability of these documents and the AR was published on July 19, 1995 in various local publications. A public comment period was held from July 19, 1995 to September 15, 1995. In addition a public meeting was held on August 29, 1995. At this meeting representatives from EPA and the State of Georgia answered questions about issues at the site and the remedial alternatives under consideration. Responses to the comments received during this comment period were presented in the responsiveness summary in Appendix A of the ROD. The ROD was published on September 29, 1995.

The Feasibility Study Addendum (FSA), the Proposed Plan, and the Administrative Record (AR) for OU #3 were released to the public on May 13, 1997. The FSA and the Proposed Plan were made available in both the AR, maintained in the EPA Region IV Docket Room, and in the information repository at the site, located at the Peach County Public Library. The notice of availability of these documents and the AR was published on May 13, 1997 in various local publications. A public comment period was held from May 14, 1997 to August 8, 1997. In addition a public meeting was held on June 12, 1997. At this meeting representatives from EPA answered questions about the remedial alternatives under consideration. The State of Georgia also attended the meeting. Responses to the comments received during the comment period are presented in the responsiveness summary in Appendix A of this document.

4.0 SCOPE AND ROLE OF OPERABLE UNITS

As described in Section 2.0, EPA has organized the work at this Superfund Site into four operable units (OUs). The operable units are:

- OU #1: Contamination of the groundwater;
- OU #2: Contamination of the soils on properties located on Martin Luther King Drive and Oak Street which are proposed for redevelopment;
- OU #3: Remaining on-facility contamination; and
- OU #4: Remaining off-facility contamination including soils, house and building dust, crawl-space soils, and the drainage corridor.

The remedy for OU #3 addresses the remaining on-facility contamination which includes soils, sediments, buildings, and the existing cap. OU #1 initiated groundwater delineation, collection of data on aquifer response for remediation, and the restoration of groundwater to prevent possible future exposure to contaminated groundwater. OU #2 addressed contamination on thirteen properties located on Martin Luther King Drive and Oak Street. Redevelopment of these properties for location of a new library, an adult education center, and an office building will minimize exposure to contamination on these properties. In addition, deed restrictions will prevent the use of these properties for residential purposes. OU #4 will address the remaining off-facility sources of contamination which include soils, house and building dust, crawl-space soils, and the drainage corridor.

5.0 SUMMARY OF SITE CHARACTERISTICS

The major Site characteristics presented in the RI/FS Study are summarized below.

5.1 GEOLOGY/PHYSIOGRAPHY

- The Site is located in downtown Fort Valley, which has a population of approximately 9,000 people. Surrounding land use is classified as industrial, commercial, and residential. The majority of the former Woolfolk facility consists of buildings, storage tanks, and stockpiles of equipment. A pecan orchard located on the southern portion of the facility is fenced. Residential properties border this fence to the south and east.

- To the northeast of the former Woolfolk facility, eighteen (18) properties were contaminated by past activities. Under the Removal program these properties were either bought and fenced by CGC, or cleaned to a standard set by the removal program for clean-up of residential properties. Thirteen (13) of these properties have been bought and most of the former buildings have been razed. These properties have been fenced and are the site of a future library, an adult education center, and a welcome center. The library is now under construction and the welcome center in the final planning stages for renovation. The properties which had soils contaminated with arsenic above 100 ppm were cleaned by removing the soils for final disposal at an off-site landfill. These 13 properties were the subject of the OU #2 decision.

- There were twenty-two (22) other properties and five (5) road shoulder areas which were subject to the removal action started in 1993. The properties found to be above the residential standards set by the removal program were either fenced, with residents relocated elsewhere, and converted to commercial use or cleaned for residential use. A portion of a drainage corridor leading south of the facility was also cleaned under the removal action due to its proximity to the residential areas. The long-term effectiveness of the removal action will be evaluated under OU #4.

- There are currently (18) eighteen buildings within in the OU#3 areas in various conditions including twelve (12) related to SureCo operations, three (3) former residential properties owned by CGC, one (1) associated with Marion Allen, and two (2) associated with Antione's Machine Shop. The majority of the buildings continue to be used for pesticide, insecticide, and herbicide production and packaging by SureCo, Inc. Building E was demolished under the removal action and the debris disposed of in Coffeeville, Kansas, and is not included into the eighteen mentioned. Building W was evaluated as part of the Remedial Investigation and found to have contaminated dust levels. The majority of the buildings were investigated in January 1997 and the subject of an EPA memorandum dated February 27, 1997 to the Administrative Record documenting the various potential for each of these buildings to cause exposure of contamination to people or to result in releases of contamination into the environment.

- The Woolfolk Site is located in what is physiographically known as the Fort Valley Plateau District. This district lies within the Coastal Plain Province of Georgia just south of the "fall line," which marks the boundary between the Piedmont and Coastal Plain Provinces. This district is characterized by broad, flat to very gently rolling surfaces, sloping gently to the southeast. Surface soils are moderately drained and generally consist of sandy and silty clays to clayey and silty sands.

- Several southeast flowing creeks dissect the Fort Valley Plateau District. It is bounded to the west by the Flint River and on the east by the Ocmulgee River. Although the Flint River borders this district along its western boundary, almost the entire district lies within the drainage basin of the Ocmulgee River. Surface runoff leaving the Facility is collected by the City's storm sewer system. The storm water flows generally to the east, southeast and south discharging to a series of local creeks within 1 mile from the facility. These creeks discharge to Mosy Creek approximately 7.5 miles to the east and into Big Indian Creek approximately 4 miles to the southeast.

- Topography at the Site has land surface elevations which vary from 516 feet above mean sea level (MSL) at the northern end of the Site to 510 feet above MSL to the south. The slope is generally around 1 percent. A man-made mound (cap) installed during an interim clean-up by CGC, approximately 170 feet by 300 feet, with a maximum elevation of 520 feet above MSL, has been constructed at the north central portion of the Site. The cap consists of, from top to bottom, grass, 24-inches of topsoil, a filtering geotextile, 12-inches of granular drainage material, a 30-mil High Density Polyethylene (HDPE) flexible membrane liner (FML), 24-inches of compacted clay, and geotextile fabric on the subbase to the compacted clay.

5.2 HYDROGEOLOGY

- The Site is underlain by several hundred feet of unconsolidated sediments consisting of interbedded layers of sand, silt, and clay. (See Figure 5-1 of the ROD for OU #1). For simplification purposes, EPA has divided these into four main units which are called the Surficial Aquifer, the Upper Cretaceous (UC) Water Table Aquifer, the UC Confined Aquifer, and the Tuscaloosa Aquifer. The RI, the FS approved for OU #1, and the Record of Decision for OU #1 present a more in-depth discussion of the aquifers.

- Under the EPA groundwater classification system, groundwater in the surficial aquifer and the Upper Cretaceous aquifers is considered Class IIb groundwater (a potential drinking water source), while ground water in the Tuscaloosa aquifer is considered Class IIa groundwater (a current source of drinking water).

- The direction of the groundwater flow in the surficial aquifer is generally toward the southeast. Leakage occurs through the surficial perching unit from the surficial aquifer into the Upper Cretaceous sediments below.

- The water table in the Upper Cretaceous Water Table aquifer indicates that groundwater flows generally to the north and northeast beneath most of the Site, to the west in western parts of the Site, and to the east in the southeast portion of the Site.

- The hydraulic head contours in the Upper Cretaceous confined aquifer generally conform to those of the Upper Cretaceous water table aquifer, indicating that groundwater flows primarily to the northeast and east. There is also a component of the flow toward the northwest in the Upper Cretaceous confined aquifer, along the northwest side of the Site and westward in the western part of the Site. Hydraulic heads in the Upper Cretaceous confined aquifer are typically below those of the water table, indicating vertical groundwater flow from the Upper Cretaceous water table aquifer into the Upper Cretaceous confined aquifer.

- Hydraulic head measurements in the Tuscaloosa aquifer beneath most of the Site indicate groundwater flow toward the southeast. These measurements also show a reversal in groundwater flow direction in and beyond the northwestern part of the facility. The direction of flow toward the northwest is consistent with the expected effects of pumping groundwater from the Tuscaloosa aquifer by the City of Fort Valley's wells.

- Further plume delineation efforts for the Site are currently underway in accordance with the OU #1 ROD and Remedial Design Work Plan. The groundwater contamination found beneath the site and beneath off-site properties will be addressed as part of OU #1.

- Hydraulic and lithological data indicate the potential for groundwater flow vertically downward beneath the former Woolfolk facility. The general nature of the perched surficial unit makes it likely for the groundwater to leak downward through this unit. Downward flow is also indicated by a comparison of the hydraulic-head gradients of the Upper Cretaceous Aquifers and the Tuscaloosa Aquifer.

5.3 MEDIA CONTAMINATION

In a baseline risk assessment and a subsequent addendum, discussed in Section 6.0, EPA required evaluation of the risks and the development of performance measures associated with the contaminated soils on the OU #3 properties. Using the RI data from the facility, EPA established that the contaminants of concern for the soils are:

Inorganic compounds: antimony, arsenic, cadmium, lead, manganese;
Semi-volatile organic compounds: benzo(a)pyrene, hexachlorobenzene; and,
Pesticides: BHC (alpha, beta, delta, gamma), Chlordane, DDD, DDT, Dieldrin, and Toxaphene.

5.3.1 SOIL CONTAMINATION

- At the Woolfolk Site, two series of soils are identified: The Greenville series and the Grady Series. The Greenville Series soil commonly has a 4- to 8-inch surface layer of dark reddish-brown or dark brown fine sandy loam and a subsoil of dark red, friable sandy clay. The Grady Series soil has a dark gray to black fine sandy loam or sandy clay loam surface layer (5 to 10 feet) and a subsoil of firm gray clay that is sometimes mottled.

- During the RI, several pesticides (toxaphene, DDD, DDE, DDT, dieldrin, BHCs), arsenic, and lead were detected in both surface (0 to 1 foot) and subsurface (generally 1 to 8 feet) soil samples collected from locations on and off the former Woolfolk plant site. Areas with elevated concentration of one or more of these constituents include the tank farm, Area A cap, Building W, Building S, west boundary of Marion Allen Insurance and Realty company property, and the area northeast of the limehouse (See Figure 1-2 from the Remedial Investigation dated November, 1992).

- In general, the RI found that volatile and semivolatile organic compounds were not detected as frequently as arsenic, lead, or pesticides in either the surface or subsurface soil samples. In addition, the concentrations of volatile and semivolatile organic compounds were lower than the other constituents.

- Approximately 30 cubic yards of soil beneath building E were found to contain dioxin. This soil was not excavated during the removal action demolition activities, but was paved and fenced to prevent exposure.

- The delineation and removal of residential soil contamination was completed pursuant to a UAO issued by EPA to CGC on December 1, 1993. Residential properties were sampled as part of the Removal Order. Soils samples were taken from 0 to 6 inches and tested for inorganics, extractable organics, and pesticides/PCB's. These analyses were conducted to determine whether of chemicals present in on-facility surface soils above the 10^{-6} excess cancer risk level in the Baseline Risk Assessment were also present in residential soils. The effectiveness of this action for the long-term will be evaluated under OU#4.

- A summary of the contaminants of concern for the soils on the site for OU #3 is presented in Table 6-1.

5.3.2 EXISTING CAP

- The existing cap was constructed in 1987 to contain contaminated soil, lime-sulphur sludges, and building debris from the 1986 CGC remediation of a lead-arsenate building. Angle boring samples were taken during the RI to determine the material beneath the cap. Several pesticides (DDT, DDE, chlorodanes, BHCs, heptachlor, and toxaphene), arsenic and lead were detected in samples collected from below the cap.

- In the fall of 1996, CGC also collected samples via horizontal borings to further characterize the capped material. Discrete samples were analyzed for pesticides, volatile organics, and semi-volatile organic chemicals. A variety of contaminants were found ranging in depths from 7 to 25 feet below the cap surface. CGC did not follow EPA and GaEPD recommendations regarding the sampling effort; however, the results, which indicate high levels of contamination, are not doubted.

5.3.3 STRUCTURE CONTAMINATION

- Building W and Building E at the former Woolfolk facility were constructed primarily of wood and sheet metal, with wood flooring. Chemicals have been absorbed within the wood floors and have migrated through the floors to the underlying soils. Also, the wood rafters in Building W have pesticide dust on them as a result of using this building to make pesticides in powder form. Building W is located on the property formerly leased by Georgia Ag Chem to the west of the former Woolfolk plant. Organic pesticides were formulated and packaged in the building. Building E was located at the east end of the former Woolfolk plant. Elevated levels of arsenic, lead, pentachlorophenol, and dioxin were found in soil samples taken from the area beneath and adjacent to Building E during the Remedial Investigation.

- From 1978 to 1979, several 30- and 55-gallon drums of Silvex were brought into Building E and repackaged in pint and quart containers. Some of the silvex, which contained 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD) as a contaminant, was disposed on the wood floors, resulting in localized contamination of the floors and underlying soil with silvex, TCDD, 2,4-dichlorophenoxyacetic acid and 2,4,5-trichlorophenoxyacetic acid. Building E has been demolished by CGC under EPA's oversight pursuant to a Unilateral Administrative Order issued by EPA to CGC, Reichhold, Limited, and Canadyne Corporation. Debris from this demolition has been disposed in an off-site permitted treatment and disposal facility in Coffeeville, Kansas.

- Building W was identified as a potential source of contamination from the former pesticide manufacturing practices; however, this building is not currently in use. Organic pesticides were formulated in this building. Elevated levels of arsenic and lead were found in surface soil samples taken from the area beneath and adjacent to the building during the RI. Dust and wood samples were collected from the building on February 23, 1996. The wood sampling was not part of the initial sampling and analysis plan , so the appropriateness of the procedures and locations for the samples could not be verified by EPA. However, dust sampling results indicate the presence of elevated levels of arsenic, lead, a-BHC, and DDT.

- In April 1997, on-site buildings determined to be in use and not characterized were investigated by EPA. There is a potential that the current operator could leave the site due to redevelopment efforts on-going at the site and due to the potential effects that the remediation efforts would cause to the business. EPA has determined that there is a potential for the release of contamination to the environment if the on-site buildings are improperly decontaminated or demolished. In a memorandum to the file, EPA recommended that eighteen (18) buildings, all on-site buildings and a number of off-site buildings, be further characterized to determine the potential for this release.

5.3.2 SURFACE WATER AND SEDIMENT CONTAMINATION

- The RI sampling results indicated that surface/storm water flowing off-site contained only trace levels of DDT, benzoic acid, and pentachlorophenol.

- The RI results of sediment sampling from the former Woolfolk facility indicated that pesticide concentrations, with the exception of toxaphene, are generally higher on the facility than downstream (intersection of Preston and Spruce streets). Toxaphene concentrations were detected at levels up to 12 mg/kg downstream and were detected in three out of four samples throughout the stormwater conveyance system. The inorganic constituent results of the sediment samples indicated that arsenic levels were generally higher on the facility than upstream or downstream. No consistent pattern was observed with the lead results.

- As part of the Removal Action, EPA and CGC further characterized contamination in the drainage corridor leading south of the facility. The Removal Action addressed the short-term potential for exposure to contaminated material by removing this material from an area approximately ½ mile in length along the drainage corridor. Further characterization of this ditch is currently on-going and will be addressed in a subsequent ROD as part of OU #4.

5.3.4 AIR CONTAMINATION

- A total of 24 chemicals were detected in on-site air samples taken during RI sampling consisting of 6 volatile organics, 4 semi-volatile organics, 12 pesticides/herbicides, and 2 inorganics (lead and arsenic).

5.3.5 GROUNDWATER CONTAMINATION

- Groundwater contamination is outlined in the ROD for OU #1. The groundwater contamination levels for each of the aquifers at this Site are presented in Table 6-1 of the ROD for OU #1. The performance standards (levels required to attain groundwater remediation) are established in Table 6-9 of the OU #1 ROD. A comparison of these two tables gives a view of the contamination at the site. Groundwater remediation activities under OU #1 are currently in the Remedial Design stage.

- The levels of contamination exceed the performance standards established in the OU #1 ROD in the surficial, Upper Cretaceous (UC) water table, and UC confined aquifers. Trace contaminants have been detected directly beneath the site in the Tuscaloosa aquifer although recent sampling has indicated no detection of chemicals.

- The City of Fort Valley water wells, which draw water from the Tuscaloosa aquifer, had never shown any measurable levels of contamination until March 1997. Measurable levels of tetrachloroethene (PCE) were detected in MW-4T initially and then subsequently in City Wells #1 and #2. This contamination is currently being evaluated to determine if the source is related to the Woolfolk site.

5.3.5.1 GROUNDWATER PROTECTION SOIL ACTION LEVELS

Soil action levels are based on several site-specific factors which are generally evaluated in both the baseline risk assessment and in the fate and transport evaluations. Action levels have been developed to protect child trespassers, construction workers, and industrial workers (based on the BRAA in Appendix C of the Feasibility Study Addendum (FSA)) and to provide groundwater protection beneath soils.

The groundwater protection levels were calculated for COPCs which, based on historical groundwater data and migration potential, have migrated or may migrate to groundwater. Groundwater protection levels for these chemicals were calculated based on two scenarios:

- Groundwater protection levels to define which soils can remain unremediated without producing an adverse impact on groundwater quality.
- Groundwater protection levels to define which soils can be left in place underneath pavement without producing an adverse impact on groundwater quality.

Groundwater protection levels are concentrations of COPCs in the soils which would generate leachate with contaminant concentrations that would maintain the quality of the groundwater at concentrations below their respective MCLs or other groundwater goals. A range of groundwater protection levels were calculated for the Woolfolk site based on modeling parameters that were either somewhat conservative or very conservative. The modeling results are presented in Appendix D of the FSA. EPA selected groundwater protection levels for this OU3 ROD within the range of calculated levels based on a variety of risk management criteria. Groundwater protection levels were not selected for COPCs that have not been detected more than once in groundwater at or near the site. Therefore, the list of COPCs for which groundwater protection goals were developed was reduced to 10. The selected levels for this ROD are presented in Appendix D of the FSA.

For those areas that do not include paving, the soil cleanup goals are the lower of the risk-based goals (discussed in Section 6.0) and the groundwater protection goals for unpaved soils. For scenarios that include paving, it is assumed that the soil may still be contacted periodically by a construction worker who would need to access utility lines, so for paving scenarios, the cleanup goals are a combination of groundwater protection goals for paved soils presented in the FSA and risk-based exposure goals for a construction worker, whichever are lower. Table 6-6 summarizes the soil cleanup levels for the potential future conditions that may exist at the Woolfolk site following implementation of the actions in this ROD.

6.0 SUMMARY OF SITE RISKS

CERCLA directs EPA to conduct a baseline risk assessment to determine whether a Superfund Site poses a current or potential future threat to human health and the environment in the absence of any remedial action. The baseline risk assessment provides the basis for determining whether or not remedial action is necessary and the justification for performing remedial action. The Final Baseline Risk Assessment (BRA) of the Site was submitted in November 1992. The BRA addresses the risk posed by site substances identified as Chemicals of Potential Concern (COPCs). In November, 1995, EPA Region 4 issued guidance on the criteria to be used in identification of site-specific COPCs. Using this guidance, the COPCs were reevaluated for OU #3. The final COPC list and the basis for their selection is given in an addendum to the BRA presented in Appendix C of the Feasibility Study Addendum (FSA) for OU #3 dated April 1997. In Appendix C of the FSA, EPA evaluated the contaminant concentrations on the Site (OU #3) to address the risks associated with current and proposed future use of the property. The BRA addendum is the basis for the health based cleanup levels presented in this section. The Remedial Investigation and Baseline Risk Assessment have identified the media contaminated by the chemicals of concern. OU #3, addressed in this ROD, will manage contamination of the on-site contaminated media.

Measurable concentrations of many of the chemicals of potential concern were found in the soil, sediment, and air samples from the facility. For those receptor populations identified in the baseline risk assessment (i.e. on-site workers, trespassers), ingestion and exposure to soil, sediment, and air are complete exposure pathways under a current industrial use scenario. These pathways also represent a health threat to child and adult residents under a future residential land use scenario.

EPA also developed cleanup standards for buildings as an Appendix to the BRA addendum in Appendix C of the FSA. Both Buildings E and W showed excessive levels of contamination in the dust samples. Building E was demolished under the Removal Action while Building W risks are addressed in this Record of Decision.

Actual or threatened releases of hazardous substances from this Site, if not addressed by implementing the response action selected in this ROD, may present an imminent and substantial endangerment to public health, welfare, or the environment.

6.1 CHEMICALS OF CONCERN

The chemicals which were carried through the risk assessment process are referred to as chemicals of potential concern (COPC). COPCs were selected on the basis of the following criteria: (1) their potential to unfavorably affect human health; (2) their persistence and/or mobility in the environment; (3) their presence in groundwater at levels above federal maximum contaminant levels (MCLs); (4) their presence in environmental media at levels exceeding background levels; (5) the number of environmental media affected; and (6) the frequency of their detection in soil, air, groundwater, surface water, or sediment.

Chemicals are included in this Summary of Site Risk Section if the results of the risk assessment indicate that a contaminant might pose a significant current or future risk. These chemicals are referred to as contaminants of concern (COC). The criteria for determining the contaminants of concern are those contaminants that contribute to a pathway that exceeds a 10^{-4} risk or Hazard Index (HI) of 1; chemicals contributing risks to these pathways were included if their individual carcinogenic risk contribution was greater than 10^{-6} or their noncarcinogenic Hazard Quotient (HQ) was greater than 0.1. The BRA established the initial list of contaminants of potential concern for soils, sediments and air. The BRA addendum reevaluated the list for soils by using the maximum soils concentrations and the following criteria: (1) Comparison to the risk-based soil screening concentrations developed by EPA Region 3; (2) Comparison to two times the average site-specific background concentration (for naturally occurring inorganic chemicals only); and (3) qualification as an essential human nutrient. The COC's for which remedial goals were calculated in the BRA addendum are presented in Table 6-1. The maximum and mean concentration of the contaminant for each of these contaminants is also presented in Table 6-1.

The contaminants of concern for sediments and air were not reevaluated in the BRA addendum. The BRA determined that there is need for action due to the level of risk calculated due to contaminated sediments and the concentrations found in the air. Sediment alternatives in the original FSA did not envision leaving a portion of less contaminated sediments in place and, therefore, there was no need to establish a cleanup standard. For air, EPA believes, and will verify once the remedial action is complete, that the soils alternatives will significantly reduce the air concentrations. This reduction in concentrations will lower the risk to well within acceptable levels; the verification standards established for this pathway are presented in Table 6-8. Standards for air monitoring during the remedial action phase will be established during the remedial design.

6.2 EXPOSURE ASSESSMENT

Whether a chemical is actually a concern to human health and the environment depends not only on the innate toxicity but also upon the likelihood of exposure, i.e. whether the exposure pathway is currently complete or could be complete in the future. A complete exposure pathway (a sequence of events leading to contact with a chemical) is defined by the following four elements:

- A source and mechanism of release from the source,
- A transport medium (e.g. surface water,) and mechanisms of migration through the medium,
- The presence or potential presence of a receptor at the exposure point, and
- A route of exposure (ingestion, inhalation, dermal absorption).

If all four elements are present, the pathway is considered complete.
An evaluation was undertaken of all potential exposure pathways which could connect chemical sources at the Site with potential receptors. All possible pathways were first hypothesized and evaluated for completeness using EPA's criteria. Current potentially complete exposure pathways for remaining on-site contamination are:

- inhalation of particulate and vapor-phase chemicals in air by on-site workers (construction and industrial) and off-site residents,
- incidental ingestion of contaminated soil by on-site workers and trespassers, and
- dermal contact with contaminated soil by on-site workers and trespassers.

The future pathways represent exposure pathways which could exist, in the future, if the current exposure conditions change. Exposure by each of these pathways was mathematically modeled using generally conservative assumptions. Future exposure pathways are:

- inhalation of particulate and vapor-phase chemicals in air by future on-site residents,
- incidental ingestion of contaminated soil by future on-site residents,
- dermal contact with contaminated soil by future on-site residents.

The exposure point concentrations for each of the chemicals of concern and the exposure assumptions for each pathway were used to estimate the chronic daily intakes for the potentially complete pathways. The chronic daily intakes were then used in conjunction with cancer potency factors and noncarcinogenic reference doses to evaluate risk.

The major assumptions defining exposure frequency and duration that were considered in the exposure assessment were:

- The body weights for receptors are assumed to be 70 kilograms for adults and 15 kgs for children.
- Ingestion rates are estimated as 50 milligrams per day for workers, 100 milligrams per day for child trespasser, and 480 milligrams per day for construction workers. The fraction ingested from contaminated sources is estimated as 0.5 for the child trespasser and workers and 1 for the construction worker.
- Exposed skin surface areas for dermal contact are estimated as 5,800 cm^2 for workers, 4,000 cm^2 for the child trespasser, and 17, 550 cm^2 for construction workers. The soil adherence factor is estimated as 1.0 mg/cm^2, except for the industrial worker which is 0.5 mg/cm^2.

Table 6-1
Woolfolk RI Soil Analytical Results for Contaminants of Concern

Contaminant	Surface Soils (mg/kg)		Subsurface Soils (mg/kg)	
	Maximum	Arith. Mean	Maximum	Arith. Mean
INORGANICS				
Antimony	291	8.1	21.2	3.81
Arsenic	18,700	363	2,480	224
Cadmium	19	0.87	4.1	0.71
Lead	1.610	137	500	39
PESTICIDES				
α-BHC	2.9	0.13	1.8	0.07
β-BHC	5.5	0.14	0.39	0.03
δ-BHC	0.85	0.06	0.33	0.02
γ-BHC (lindane)	1.0	0.07	0.68	0.03
α-Chlordane	8.5	0.35	1.2	0.14
γ-Chlordane	8.5	0.36	1.7	0.15
4,4'-DDD	29	0.73	1.8	0.10
4,4'-DDT	79	2.39	44	1.08
Dieldrin	3.6	0.23	0.22	0.03
Toxaphene	2.700	32.7	280	6.28
SEMIVOLATILES				
Benzo(a)pyrene	4.0	0.29	0.215	0.191
Hexachlorobenzene	4.0	0.29	0.215	0.190
DIOXINS AND FURANS				
2,3,7,8-TCDD Equivalents	0.037	0.015	0.007	0.0012

Note: Non-detects are reported at ½ the analytical detection limit.

Table 6-2 Reference Doses and Slope Factors for the Chemicals of Potential Concern						
	Inhalation		Oral		Dermal	
Chemical	Chronic RfD (mg/kg/day)	Slope Factor (mg/kg/day)$^{-1}$	Chronic RfD (mg/kg/day)	Slope Factor (mg/kg/day)$^{-1}$	Chronic RfD (mg/kg/day)	Slope Factor (mg/kg/dy)$^{-1}$
Antimony	—	—	4.00E-04	—	4.00E-06	—
Arsenic	—	1.50E+01	3.00E-04	1.50E+00	2.70E-04	1.67E+00
Cadmium	—	6.30E+00	1.00E-03	—	5.00E-05	—
α-BHC	—	6.30E+00	3.00E-04	6.30E+00	3.00E-04	6.30E+00
β-BHC	—	1.90E+00	3.00E-04	1.80E+00	3.00E-04	1.80E+00
δ-BHC	—	—	3.00E-04	—	3.00E-04	—
γ-BHC (Lindane)	—	1.30E+00	3.00E-04	1.30E+00	3.00E-04	1.30E+00
Chlordane	—	1.30E+00	6.00E-05	1.30E+00	4.80E-05	1.63E+00
4,4'-DDD	—	—	—	2.40E-01	—	3.00E-01
4,4'-DDT	—	3.40E-01	5.00E-04	3.40E-01	4.00E-04	4.25E-01
Dieldrin	—	1.60E+01	5.00E-05	1.60E+01	3.15E-05	2.54E+01
Toxaphene	—	1.10E+00	—	1.10E+00	—	1.69E+00
Benzo(a)pyrene	—	3.10E+00	—	7.30E+00	—	9.13E+00
Hexachloro-benzene	—	1.60E+00	8.00E-04	1.60E+00	6.40E-04	2.00E+00
2,3,7,8-TCDD Equivalents	—	1.50E+05	—	1.50E+05	—	1.67E+05
— USEPA has not derived an RfD or Slope Factor.						

- The ventilation rates (VR) are estimated as 20 m^3/day for adults and 15 m^3/day for children. The child trespasser is on-site for less than 1 day. The VR is multiplied by an exposure time factor of 0.33 which effectively reduces the portion of air breathed on site to 1/3 of the day or 5 m^3/day.

- The exposure frequency is 250 days/year for workers, 60 days/year for the construction worker, and 75 days/year for the child trespasser.

- The duration of exposure was assumed to be 25 years for workers and future residents, 9 years for child trespasser and future child resident, and 1 year for construction worker.

6.3 TOXICITY ASSESSMENT

Toxicity values are used in conjunction with the results of the exposure assessment to characterize site risk. EPA has developed critical toxicity values for carcinogens and noncarcinogens. These critical toxicity values are listed in Table 6-2. Cancer slope factors (CSFs) have been developed for estimating excess lifetime cancer risks associated with exposure to potentially carcinogenic chemicals. Cancer slope factors are derived from the results of human epidemiological studies or chronic animal bioassays to which animal-to-human extrapolation and uncertainty factors have been applied. CSFs, which are expressed in units of (mg/kg/day)$^{-1}$, are multiplied by the estimated intake of a potential carcinogen, in mg/kg/day, to provide a high end estimate of the excess lifetime cancer risk associated with exposure at that intake level. The term "high end" reflects the conservative estimate of the risks in order to reflect risk to the small percentage of people with the highest exposure assumptions.

Reference doses (RfDs) have been developed by EPA for indicating the potential for adverse health effects from exposure to chemicals exhibiting noncarcinogenic effects. RfDs, which are expressed in units of mg/kg/day, are estimates of lifetime daily exposure levels for humans, including sensitive individuals. Estimated intakes of chemicals from environmental media can be compared to the RfD.

RfDs are derived from human epidemiological studies or animal studies to which uncertainty factors have been applied (e.g., to account for the use of animal data and limited human data to predict effects on humans). These uncertainty factors help ensure that the RfDs will not underestimate the potential for adverse noncarcinogenic effects to occur.

6.4 RISK CHARACTERIZATION

Human health risks are characterized for potential carcinogenic and noncarcinogenic effects by combining exposure and toxicity information. Excessive lifetime cancer risks are determined by multiplying the estimated daily intake level with the cancer slope factor. These risks are probabilities that are generally expressed in scientific notation (e.g., 10^{-6}). An excess lifetime cancer risk of 10^{-6} indicates that, as a plausible upper limit, an individual has a one in one million additional (above their normal risk) chance of developing cancer as a result of site-related exposure to a carcinogen over a 70-year lifetime under the assumed specific exposure conditions at a site.

EPA considers individual excess cancer risks in the range of 10^{-4} to 10^{-6} as protective; however, the 10^{-6} risk level is generally used as the point of departure for setting individual chemical cleanup levels at Superfund sites. The point of departure risk level of 10^{-6} expresses EPA's preference for remedial actions that result in risks at the more protective end of the risk range.

Potential concern for noncarcinogenic effects of a single contaminant in a single medium is expressed as the hazard quotient (HQ) (or the ratio of the estimated intake derived from the contaminant concentration in a given medium to the contaminants' reference dose). A HQ which exceeds one (1) indicates that the daily intake from a scenario exceeds the chemical's reference dose. By adding the HQs for all contaminants within a medium or across all media and appropriate pathways to which a given population may reasonably be exposed, the Hazard Index (HI) can be generated. The HI provides a useful reference point for gauging the potential significance of multiple contaminant exposures within a single medium or across media. An HI which exceeds unity indicates that there may be a concern for potential health effects resulting from the cumulative exposure to multiple contaminants within a single medium or across media.

A summary of the risk characterization is provided in Table 6-3 and Table 6-4.

Table 6-3
Risk Characterization Summary for the Current Land Use Scenario
Surface Soils, Sediment, and Air

Exposure Source	Receptor	Hazard Index	Additional Lifetime Cancer Risk
		RME Case	RME Case
Surface Soil	Worker	1.1	2E-04
	Off-Site Adult	0.4	1E-04
	Off-Site Child	3.9	2E-04
Sediment	Off-Facility Child	3.4	2E-04
Air	Worker	0.8	7E-05
	Adult	1.09	1E-04
	Child	2.53	6E-05

Table 6-4 Risk Characterization Summary for the Hypothetical Future Residential Land Use Scenario Surface Soils and Air			
Exposure Source	**Receptor**	**Hazard Index**	**Additional Lifetime Cancer Risk**
		RME Case	**RME Case**
Surface Soil	Adult	9.91	2E-03
	Child	83.2	4E-03
Building E Soil	Adult	11.06	7E-03
	Child	92.7	1E-02
Air	Adult	1.09	1 E-04
	Child	2.53	6 E-05

TABLE 6-5 SUMMARY OF UNCERTAINTIES ASSOCIATED WITH RISK ASSESSMENT		
Assumption	**Estimated Magnitude of Effect on Risk**	**Direction of Effect on Risk Estimate**
Environmental Sampling and Analysis		
Errors in chemical analysis	Low	Over or underestimate risk
Fate and Transport Modeling		
Chemical concentrations reported as "below method detection limit" are used at one-half detection limit when calculating mean chemical concentrations	Low	Over or underestimate risk
Toxicological Data		
Hazard indices (HIs) were developed assuming all toxic effects were additive.	Low-Moderate	Overestimate risk
Animal data extrapolated to human toxicity	Low-Moderate	Most likely overestimates risk
Exposure Parameters		
Conservative values were used for exposure duration, frequency, and intake levels.	Low-Moderate	Overestimate risk

Throughout the risk assessment process, uncertainties associated with evaluation of chemical toxicity and potential exposures arise. For example, uncertainties arise in derivation of toxicity values for reference doses (RfDs) and carcinogenic slope factors (CSFs), estimation of exposure point concentrations, fate and transport modeling, exposure assumptions and ecological toxicity data. Because of the conservative nature of the risk assessment process, risk estimated in this assessment may overestimate the true risk associated with potential exposure at OU #3 of the Woolfolk Chemical Site. Uncertainties for the OU #3 at the Woolfolk Chemical Site are enumerated in Table 6-5.

6.5 ECOLOGICAL RISK/ HISTORICAL SITES

An ecological assessment evaluates potential hazardous effects on non-human species at Superfund sites. It may be a qualitative or quantitative appraisal of the actual and potential effects on the environment of a Superfund site. Not all sites provide a suitable ecological habitat. Many sites in industrial areas have little or no wildlife. The appropriate level of effort for assessing ecological risk is determined on a site-by-site basis.

The Woolfolk facility is located adjacent to the central business district of Fort Valley, Georgia, and the surrounding community consists of residential homes and small businesses. A qualitative assessment of the potential ecological effects for OU#3 at the Woolfolk Chemical Works facility determined that the facility poses no significant ecological impacts on the facility itself. It has yet to be determined whether the Woolfolk facility effects any designated wetlands due to the fact that the closest wetland is more than three miles from the Facility. The facility itself is not located in designated wetlands. The Woolfolk facility is not located within either the 100-year or 500-year floodplain. EPA is evaluating the effects of the facility on the drainage canal leading from the facility. The risks associated with the drainage ditch will be addressed under OU #4.

It is unlikely that the facility property itself affects either of the three identified endangered species (i.e., the Red-Cockaded Woodpecker, Kirtland's Warbler, or the Bald Eagle) that reside in the geographical area for the following reasons: 1) There are no records or reported sightings of any of these species in Peach County, and 2) the Facility and surrounding area do not provide the critical types of habitat needed for these endangered or threatened species, and (3) the urban setting.

There are two historical sites listed in Peach County, Georgia. These sites include the Peach County Courthouse located on West Church Street, and Strother's Farm located near the Peach/ Macon County line. It is unlikely that the Facility adversely affects the use of these historical sites or their cultural value because they are located at least ½ mile from the Facility.

There are no wild and scenic rivers or designated wilderness areas in Peach County. The Facility does not affect any coastal zones or coastal barriers.

6.6 BUILDINGS

During Woolfolk's operational history, activities in the buildings may have released contaminants that were deposited onto and adhered to building walls, floors, and other items inside of the building. EPA documented the potential for release from the buildings at the Woolfolk Site in January 1997. Sampling results from Building W, performed in February 1996, and the analysis performed in Appendix C of the Feasibility Study Addendum for OU#3, has determined that there exist a potential risk to the contaminants in Building W, and that there is need for further study during the Remedial Design of other on-site structures.

The analysis in Appendix C of the FSA, determined the extent to which remediation was necessary in Building W and will form the basis for future investigations of buildings and the action appropriate for those structures. Cleanup goals were calculated to protect potential users (workers and trespassers) from unacceptable risks. The pathways of exposure were considered to be: inhalation of resuspended dust, ingestion of contaminated material on the surface, and dermal contact with the contaminated dust. Ingestion was assumed to occur from resuspended material deposited on items that come in contact with a receptor's mouth (e.g. tobacco, hands, food, etc.) and coming directly from contact with contaminated surfaces. Dermal exposure would require contact by bare skin to either contaminated surfaces or through dust falling directly on bare skin.

Intake of the chemicals was considered to be the average amount of the chemical at the body's exchange boundary. The intake was calculated using the chemical concentration which comes in contact with the body, the contact rate, the exposure frequency and duration, the body weight, and the averaging time over which the exposure occurs. These calculation are dependent on time expressed in terms of chronic (7 years or more) and lifetime (70 years).

The following assumptions were made to determine the cleanup goals for the buildings. For inhalation, it was assumed that 20% of resuspended dust is respirable. For ingestion, it was assumed that 10% of the contamination from a 10 cm^2 area is ingested. For dermal exposure, it's assumed that 10% of the contamination is removed from the surface during each exposure and that this source is not depleted. A resuspension factor of 10^{-5} m^{-1} was selected as indicative of site work, characterizing the activities as routine occupational activities. The number of air exchanges in the building in an hour was assumed to be 0.5. The air concentration was assumed to be constant over time.

For the industrial worker, the exposure frequency was set at 250 days/year, the exposure duration at 25 years, and the body weight at 70 kg. For the child trespasser, the exposure frequency was set at 75 days/year, the exposure duration at 9 years, and the body weight at 40 kg. A full summary of the factors used is presented in Appendix C of the FSA.

6.7 PERFORMANCE STANDARDS

The establishment of health-based performance standards serves as an important means of guiding remedial activities. A health-based approach is utilized when performance standards promulgated by state or federal agencies are not available for contaminants in soil, as well as for certain groundwater contaminants. The approach to developing health-based standards is derived from the risk assessment process. The risk assessment is essentially a process by which the magnitude of potential cancer risks and other health effects at a site can be evaluated quantitatively. A performance standard is established by back-calculating a health protective contaminant concentration, given exposure assumptions and a target cancer risk or a hazard index which are deemed acceptable and realistic. The concept of the performance standard inherently incorporates the concept of exposure reduction which allows remedial alternatives to be flexible.

The soil at the Woolfolk Chemical site currently contains concentrations of Site-related contaminants at levels which would pose an unacceptable risk (cumulative risk in excess of 10^{-4}) to human health. Actual or threatened releases of hazardous substances from this Site, if not addressed by implementing the response action selected in this ROD, may present an imminent and substantial endangerment to public health, welfare, or the environment.

The performance standards for soil are contained in Table 6-6. Soil action levels are based on several site specific factors which are generally evaluated in both the baseline risk assessment and in the fate and transport evaluations. The performance standards in Table 6-6 will be protective of the on-site workers, residents and trespassers. Actions levels to protect the future on-site resident (adult or child) have not been established, because future residential use will be prevented through institutional controls, including deed restrictions. EPA has determined that these levels will also be protective with respect to all routes of exposure, i.e. ingestion, inhalation, and dermal.

Table 6-7 presents the standards for cleanup to be used for the buildings. These standards are considered to be concentrations and loading factors which when used together will determine the need for remedial action in buildings.

Table 6-8 presents the standards for verification to be used for the post-remediation air sampling. These values were determined using the RME intake values presented in the BRA. Goals were established for the most sensitive receptor and represent a 10-5 cancer risk or hazard quotient of 1.

6.7.1 DIOXIN PERFORMANCE STANDARDS

The area where dioxin contamination has been found is beneath the former Building E footprint with soil dioxin concentrations ranging from non-detect to 37 ppb (TEQs). The area contaminated with dioxin was paved over as part of a previous removal action. Soil in the vicinity of the paved area has also been sampled and concentrations of soil dioxin range from non-detect to 0.69 ppt (TEQs). The area contaminated with dioxin is also contaminated with arsenic at levels above performance standards developed for arsenic for this site.

The proposed plan for the ROD for OU3 for the Woolfolk site identified a dioxin soil cleanup level of 1.0 ppb (TEQs) for surface soils (Surface soils are defined as being between 0-2 feet). Surface soils with concentrations greater than 1.0 ppb (TEQs) were to be paved or, if greater than 3.0 ppb (TEQs), excavated and removed off-site. The proposed plan also identified a level of 3.0 ppb (TEQs) for soil below pavement.

A consistent dioxin soil cleanup policy has been an objective of the Superfund program for some time. Subsequent to the development of the Proposed Plan for OU #3, a formal policy was developed by the Agency and issued as OSWER Directive No. 9200.4-26 dated April 13, 1998. That Directive established a surface soil level of 5 to 20 ug/kg dioxin TEQ as a preliminary remediation goal (PRG) for industrial sites. Soil levels of dioxin not exceeding this range were determined to be generally protective of public health and the environment. EPA has not identified site-specific extenuating circumstances that would warrant a final cleanup goal for OU #3 different from the PRG established in the Directive. Therefore, the lower value of this protective range, i.e. 5 ug/kg, was selected for the dioxin cleanup level shown in this ROD (Table 6-6).

It should be noted, however, that the actual dioxin levels left on the site after remediation will very likely be lower than the values stated in the Proposed Plan because of the co-location of dioxin contamination with other site-related contamination.

Surface soil areas having dioxin levels less than 5 ug/kg have levels of arsenic that will require remediation. Therefore, dioxin contaminated soil will be removed in the process of achieving the cleanup goals for arsenic contaminated soil. Post remediation confirmatory sampling will indicate the actual level achieved.

Table 6-6:

Soil Cleanup Goals for OU#3 at the Woolfolk Chemical Site

Chemical	Unpaved Soils (mg/kg)	Basis	Paved Soils (mg/kg)	Basis
Antimony	76	Risk	76	Risk
Arsenic	113	GW	317	Risk
Cadmium	1.5	GW	512	Risk
Lead	624	GW	5,537	Risk
α-BHC	0.0013	GW	0.31	GW
β-BHC	0.018	GW	4.5	GW
δ-BHC	0.057	GW	23	GW
γ-BHC	0.062	GW	9.7	GW
Chlordane	36	Risk	36	Risk
DDD	37	Risk	37	Risk
DDT	61	GW	1,230	Risk
Dieldrin	0.081	GW	24	Risk
Hexachlorobenzene	0.13	GW	28	GW
Toxaphene	37	Risk	356	Risk
Benzo(a)pyrene	6.4	Risk	58	Risk
Pentachlorophenol	440	Risk	3,790	Risk
2,3,7,8-TCDD TEQ	0.005	Risk	0.005	Risk

Notes:
Concentrations in mg/kg.
GW - Groundwater Protection Goal.

Table 6-7:

Building Cleanup Goals for OU#3 at the Woolfolk Chemical Site

Chemical	Concentration (mg/kg)	Basis	Loading (mg/m^2)
Antimony	76	Risk	6.9
Arsenic	317	Risk	190
Cadmium	512	Risk	8.7
Lead	1,993	Risk	849
α-BHC	8	Risk	2.3
β-BHC	29	Risk	2.2
δ-BHC	568	Risk	45
γ-BHC	34	Risk	3.2
Chlordane	36	Risk	2.5
DDD	37	Risk	14
DDT	137	Risk	6.2
Dieldrin	2.5	Risk	0.2
Hexachlorobenzene	29	Risk	2.1
Toxaphene	37	Risk	2.5
Benzo(a)pyrene	6.4	Risk	2.1

Table 6-8:

Verification Goals for Air Monitoring

Chemical	Goal (mg/m^3)	Basis
Arsenic	$5.7x10^{-5}$	Non-cancer
DDT	$5.0x10^{-5}$	Cancer
a-BHC	$1.4x10^{-5}$	Cancer
b-BHC	$4.7x10^{-5}$	Cancer
d-BHC	$1.4x10^{-5}$	Cancer
g-BHC	$6.6x10^{-5}$	Cancer
a-Chlorodane	$6.6x10^{-5}$	Cancer
g-Chlorodane	$6.6x10^{-5}$	Cancer
Dieldrin	$5.3x10^{-6}$	Cancer
Heptachlor	$1.9x10^{-5}$	Cancer
Carbon Disulphide	$4.5x10^{-3}$	Non-Cancer
Trichloroethene	$1.4x10^{-2}$	Cancer

Notes:
1) Cancer risk were highest for the off-site adult resident while the non-cancer risks were highest for the off-site child resident. 2) Data used for calculating these goals was taken from the Baseline Risk Assessment for the Woolfolk Chemical Works Site, Industrial Compliance, 1992. The process used for calculating these goals is documented in letters from Brian Magee, Weston, to Timothy R. Woolheater, EPA, dated November 25 and December 10, 1997.

7.0 DESCRIPTION OF ALTERNATIVES

The following is a description of remedial alternatives evaluated to provide a range of cleanup options for Operable Unit #3 at the Woolfolk Site. The alternatives for the remediation of contaminated soil in OU #3 at the Woolfolk Chemical Works Site were evaluated in the Feasibility Study Addendum (FSA) and presented in the Proposed Plan for the Site. The alternatives are grouped by the four areas of concern at OU #3: on-facility soils (including Building E soils); on-facility capped area; on-facility buildings; and the stormwater sewer system. Tables 7-1 through 7-4 present the remedial alternatives.

The assembled site-specific alternatives represent a range of distinct waste-management strategies addressing the human health and environmental concerns posed by Operable Unit #3. Although the selected remedial alternative may be further refined during the predesign and design phases, the analysis presented below reflects the fundamental components of the various alternatives considered feasible for this Site.

7.1 ON-SITE SOIL ALTERNATIVES

7.1.1 ALTERNATIVE 1: NO ACTION

The no action alternative is carried through the screening process as required by the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This alternative is used as a baseline for comparison with other alternatives that are developed. Under this alternative, EPA would take no further action to minimize the contamination threat posed by the on-site contamination. No institutional controls or other remedial actions are implemented under the no-action alternative. There is no cost associated with this alternative since no additional activities would be conducted.

7.1.2 ALTERNATIVE 2: PAVING OF CONTAMINATED AREAS

This alternative includes paving, with concrete or asphalt, all areas with contaminant concentrations exceeding target action levels for unpaved soils presented in Table 6-6. Land use restrictions would need to be put in place for contaminated areas as a means of protecting human health and the environment. The overall objective of the land use restrictions would be to maintain pavement; control development, construction, and access to contaminated soil areas; and prohibit residential use of the property. The paving would require periodic inspections in order to determine any maintenance requirements.

Approximately 348,500 square feet of the site would be capped with concrete or asphalt. Concrete would be placed in locations that have heavy truck activity. These locations are around Buildings W, G, S, S-1, N, F, and the tank farm. The paving material would be placed over existing asphalt or concrete surfaces. Areas with potential car traffic would have approximately four inches of asphalt placed over existing asphalt or over four inches of base aggregate in unpaved areas. The asphalt mix would be 2.5-inch thick binder coarse overlain by 1.5-inch Department of Transportation (DOT) Type "F" surface coarse. This upper layer will lessen the percentage of void space in the asphalt to limit permeability. To further lessen the permeability of the pavement and to help reduce the occurrence of cracks and crack promulgation in the asphalt, an appropriate asphalt paving geotextile shall be used under all sections of the paving. Some paving activities may require the excavation and disposal of materials in order to maintain grade. This material would be disposed in an appropriate landfill. All paving would be staged to minimize disruption to SureCo's activities.

It is likely that the existing monitoring well scheme would provide sufficient groundwater monitoring capability; however, this would be re-examined during the Remedial Design. Future replacement of the concrete and asphalt caps would be required as they become worn and cracked which would be addressed in the Operation and Maintenance (O&M) Plan. Implementation of this alternative would not require any excavation of contaminated soil or debris; therefore, no Corrective Action Management Units (CAMUs) are defined for this alternative. Institutional controls would also be required to control development, restrict construction activities without proper protective clothing, and prevent residential use.

7.1.3 ALTERNATIVE 3: EXCAVATION WITH ON-SITE DISPOSAL

Alternative 3 includes excavation of all soils with contaminant concentrations exceeding target action levels for paved areas, as presented in Table 6-8. Areas with contamination above action levels for unpaved areas, as presented in Table 6-8, would be paved with concrete or asphalt. Excavated soil and debris would be disposed in an on-site Subtitle C landfill constructed as part of the remediation. The alternative would require the displacement or demolition of Building W, as well, to address the soils beneath this building.

Approximately 11,789 cubic yards of soil, concrete, and asphalt debris would be excavated and disposed of in the on-site landfill. Tree removal in areas such as the pecan orchard would also be required. Because waste materials will be removed and managed under this alternative, the CAMU is defined in Section 7.1.7 of this ROD and handling techniques will be designated under the remedial design. The largest tract available for an on-site landfill is the pecan orchard area, which covers approximately 2 acres. The height of the landfill will be dependant upon the depth of excavation; however, the waste thickness would be approximately 5.4 feet. Due to the limited space available on the site, a waiver of the landfill buffer requirements would be necessary to place the landfill on-site.

Table 7-1: Operable Unit #3 Alternatives
On-Facility Soils

Alternative Number	Medium	Remedial Action	Capital Cost (thousands)
1	Soil	No Action	$ 0
2	Soil	Paving, with concrete or asphalt, all areas with contaminated soil concentrations greater the target action levels for unpaved areas.	$ 1,972
3	Soil	Excavation of contaminated soils with concentrations exceeding the action levels for paved areas. Paving, with concrete or asphalt, all areas with contaminant concentrations remaining in soils greater than target action levels for unpaved areas. Disposal of excavated soil and debris in on-site Subtitle C landfill constructed as part of remediation.	$ 5,206
4	Soil	Treat soils by in-situ stabilization/solidification for arsenic concentrations exceeding target action levels for paved areas. Paving, with concrete or asphalt, all areas above the target action levels for unpaved areas. Redistribution of excess volume of solidified soil on-site or dispose of in an off-site landfill.	$ 4,605
5	Soil	Excavation of soils with contaminant concentrations exceeding target action levels for paved areas. Treat hazardous soils by ex-situ stabilization/solidification. Paving, with concrete or asphalt, all areas with contaminants remaining in soils above action levels for unpaved areas. Disposal of treated soil, untreated soil, and debris in on-site Subtitle D landfill.	$ 6,298
6	Soil	Excavation of soils with contaminant concentrations exceeding target action levels for paved areas. Treat hazardous soils by ex-situ stabilization/solidification. Paving, with concrete or asphalt, all areas with contaminant concentrations remaining in soils greater than the target action levels for unpaved areas. Disposal of treated soil, untreated soil, and debris in an appropriate off-site landfill.	$ 6,567

Land use restrictions requiring cap and pavement maintenance would also be necessary to protect construction workers that may excavate through the pavement and in the landfill area. Restrictions would also be placed on the property to ensure that the cap would not be excavated, the property is used for non-residential purposes, and any excavation is carried out with properly protective equipment and gear. Soils with arsenic concentrations above the action levels for unpaved areas would be paved, which would require long-term maintenance.

A Subtitle C landfill would be constructed in a manner consistent with RCRA design requirements. Contaminated soil and debris would not be treated before disposal. As long as the soil and debris remain on-site and in areas of existing contamination, the CAMU regulations allow consolidation of remediation waste without triggering the land disposal regulations (LDR); however, a waiver of LDR must be obtained if the landfill is considered a permanent solution. If treatment was required, this would effectively result in this alternative being equivalent to Alternative #5. Paving of contaminated areas, excluding excavated areas, would be done as described in Alternative 2.

7.1.4 ALTERNATIVE 4: IN-SITU STABILIZATION/SOLIDIFICATION TREATMENT

Alternative 4 includes in-situ treatment of contaminated soils by stabilization/solidification (S/S). All soils with contaminant concentrations exceeding target action levels for paved areas would be treated by in-situ stabilization/ solidification. Areas with contaminant concentrations remaining in soils greater than the target action levels for unpaved areas would be paved with concrete or asphalt. The excess volume generated by the S/S treatment would be redistributed on the site or disposed of off-site in an appropriate landfill.

Approximately 11,789 cubic yards of contaminated soil with contaminant concentrations greater than the action levels for paved areas would be treated by in-situ S/S. Treatability studies, performed in 1992, indicate that this type of treatment can reduce arsenic solubility by 95 percent or greater. In-situ treatment would be accomplished by mixing the S/S reagent into the contaminated soil using a rotary tilling device or an auguring device. In-situ S/S can be performed at shallow depths (1 to 2 feet) by using a hollow-tine injector mounted on a tractor. The reagent is pumped through the equipment and mixed with the soil. The depth of remediation is limited by the tractor's size and traction. Soil requiring treatment to greater depths probably would be treated by auger-mixing methods. Because some waste materials would be removed and managed under this alternative, the CAMU is defined in Section 7.1.7 and handling techniques will be designated under the remedial design.

S/S increases the volume of treated material. Some areas of the site may be amenable to an increase in elevation due to the additional volume, while some may not. Assuming a 25% increase after treatment, any contaminated soil depth exceeding 4 feet will probably require relocation of the volume increase, in order to limit the increased elevation. The specifics of handling the excess material, through on-site redistribution or off-site disposal, would be defined during the remedial design. Treated areas would be paved with concrete or asphalt to minimize infiltration contact with the S/S material. S/S treatment of the organic contamination would be tested during the remedial design. Significant quality assurance would be required to ensure the in-situ process achieved adequate and uniform mixing. All treated areas would be paved as in Alternative #2 in order to limit exposure to the material and limit moisture contact with the stabilized material. The S/S treatment operations would be scheduled in a manner to minimize, to the extent feasible, interference with the SureCo operations.

Building W would require displacement or demolition to address the soils beneath this building. Land use restrictions ensuring that contaminated areas remain covered, paving is maintained, and residential use is prohibited would be required, because only soil above target action levels for paved areas would be treated or removed from the site and disposed at an off-site landfill. Contaminated soils below the action levels for paved areas but above the action levels for unpaved areas would be paved and would require long-term maintenance.

7.1.5 ALTERNATIVE 5: EXCAVATION, EX-SITU S/S TREATMENT, ON-SITE DISPOSAL

Alternative 5 includes excavation of soils with contaminant concentrations exceeding target action levels for paved areas. The soils which are RCRA hazardous wastes by characteristic would be treated using ex-situ S/S. Areas with contaminant concentrations remaining in soils above the target action levels for unpaved areas would be paved with concrete or asphalt. Treated soil, untreated soil, and debris would be disposed of in an on-site Subtitle D landfill. This option would require the displacement or demolishing of Building W in order to address the soils beneath this building. It would also require the use of land-use restrictions prohibiting use of landfill areas, restricting residential use, and ensuring maintenance of the pavement.

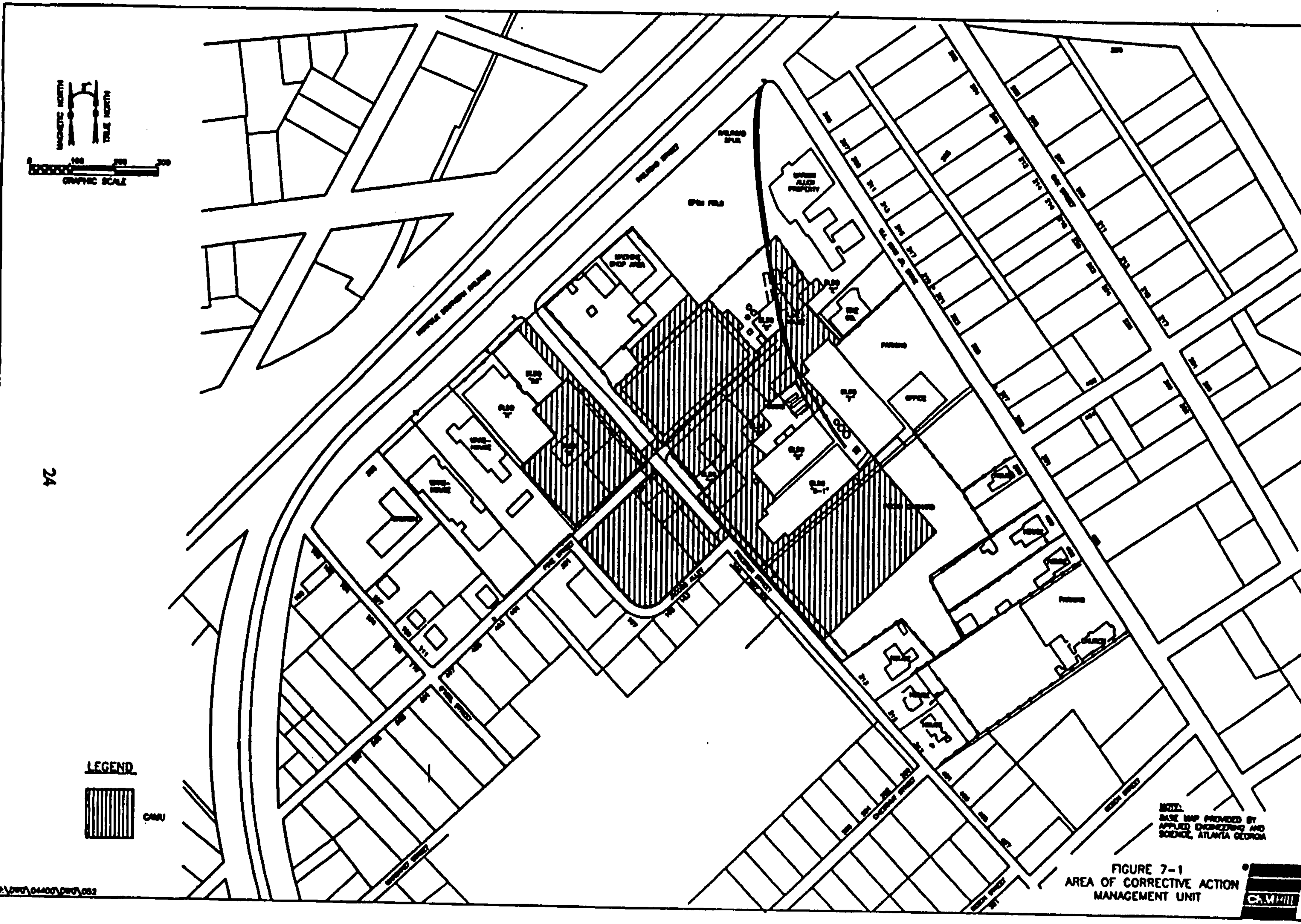


FIGURE 7-1
AREA OF CORRECTIVE ACTION
MANAGEMENT UNIT

This alternative is similar to Alternative 3 except that ex-situ S/S treatment would be conducted on soils which exceed the Toxicity Leaching Characteristic Procedure (TCLP) limit for the contaminants. These soils would be treated and the treated soil placed in an on-site Subtitle D landfill. On-site soils are not listed hazardous wastes under RCRA, but would be sampled and analyzed by the TCLP to determine areas that would be classified as characteristically hazardous waste. These analyses would be used to segregate hazardous and nonhazardous soil.

Approximately 8,842 cubic yards of the 11,789 cubic yards of excavated soil and debris are assumed to need treatment under this alternative. Because of the volume increase due to S/S, a total volume of 13,999 cubic yards of material would be placed in the landfill. A waiver of the landfill buffer requirements would be required to place a landfill on-site. Paving and other land improvements would be performed over areas with contamination exceeding the action levels for unpaved areas. Land use restrictions, similar to Alternative #3, would be required, because only soil with contaminants above the target action levels for paved areas would be removed and disposed in the on-site landfill. Soils exceeding the action levels for unpaved areas would be paved and would require long-term maintenance. Because waste materials would be removed and managed under this alternative, a CAMU is defined in Section 7.1.7 and handling techniques for the CAMU will be designated under the remedial design.

7.1.6 ALTERNATIVE 6: EXCAVATION, EX-SITU S/S TREATMENT, OFF-SITE DISPOSAL

Alternative 6 involves excavation of soils with contamination exceeding target action levels for paved areas. Areas with contamination concentrations remaining in soils greater than the action levels for unpaved soils would be paved with concrete or asphalt as per Alternative #2. Soils which are RCRA hazardous wastes by characteristic would be treated by ex-situ S/S. Treated soil, untreated soil, and debris would be disposed of in an appropriate off-site Subtitle D landfill.

This alternative is similar to Alternative 5 except that the contaminated material would be transported to an appropriate off-site landfill for disposal. Approximately 8,842 cubic yards of the 11,789 cubic yards of excavated soil and debris are assumed to need treatment under this alternative. Because of the volume increase due to S/S, a total volume of 13,999 cubic yards, or approximately 24,315 tons, of material would be placed in the landfill. Soils with contaminant concentrations between action levels for unpaved and paved soils will be consolidated on-site to limit the contaminated area remaining where paving will be required. Areas of excavated material would have clean fill placed and sodded or paved depending on the original surface material. Those areas with soils above the actions levels for unpaved areas will be consolidated and paved as per Alternative #2. Because waste materials would be removed and managed under this alternative, the CAMU is defined in Section 7.1.7 and handling techniques will be designated under the remedial design.

Land use restrictions prohibiting residential use of the property and requiring maintenance of the paved portions of the site would be required, because only soil with contaminant concentrations above target action levels for paved areas would be removed from the site and disposed at an off-site landfill. Soils with contaminants above action levels for unpaved areas would be paved and would require long-term maintenance.

7.1.7 CORRECTIVE ACTION MANAGEMENT UNIT (CAMU)

To facilitate the handling and processing of contaminated soil on-site, a corrective action management unit (CAMU) will be designated for the site. The transport, treatment, and storage of RCRA hazardous wastes during the remedial action is allowed within and between CAMUs without invoking land disposal restrictions (LDRs) or other relevant RCRA requirements, thus facilitating remediation on-site (40 CFR 264.552).

Since the wastes at the Site have not been identified as a listed hazardous waste, CAMUs would be needed only where the material is hazardous by TCLP. Since TCLP results are not available for most of the wastes, a CAMU will be designated for all areas that exceed the action levels for paved areas or worker protection levels, which indicates that excavation and/or soil relocation may be performed. The CAMU also includes potential areas for treatment and storage of wastes.

The CAMU regulations do not require that the area be one contiguous area, so the roads near the site can be excluded from the CAMU. The delineation of the CAMU, shown in Figure 7-1, satisfy the decision criteria for CAMU establishment, such as "minimizing future releases" and that the CAMU "minimize the land area of the facility upon which wastes will remain in place after closure" by allowing consolidation of wastes within one area for potential treatment or storage. The CAMU is designated in order that it may be applicable to soils alternatives, #3, #4, #5, and #6; cap alternative #4; building alternative #3 and #4; and stormwater system alternative #2.

7.2 EXISTING CAP ALTERNATIVES

7.2.1 ALTERNATIVE 1: NO ACTION

The no action alternative is carried through the screening process as required by the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This alternative is used as a baseline for comparison with other alternatives that are developed. Under this alternative, EPA would take no further action to minimize the threat posed by the contamination under the existing on-site cap. No institutional controls or other remedial actions are implemented under the no-action alternative. There is no cost associated with this alternative since no additional activities would be conducted.

7.2.2 ALTERNATIVE 2: OPERATION AND MAINTENANCE OF THE CAP

Alternative 2 leaves the cap in place and includes development of an operation and maintenance (O&M) program for the existing cap. The structural integrity of the cap would be periodically monitored to ensure that any erosion, cracks, or holes which appeared would be repaired. Land use restrictions would be implemented to protect human health and the environment by prohibiting future residential use of the property and requiring long-term operation and maintenance of the cap.

Table 7-2: Operable Unit #3 Alternatives
Existing Cap

Alternative Number	Medium	Remedial Action	Capital Cost (thousands)
1	Soil	No Action	$ 0
2	Soil	Leave cap in place and provide operation and maintenance of cap. Cap would be periodically monitored. Land use restrictions would be implemented.	$ 62
3	Soil	Leave cap in place and provide O&M of cap, as well as, periodic groundwater monitoring and additional soils sampling beneath the cap. If groundwater contamination increased significantly, leaks in cap would be located and repaired. Cap would be periodically monitored. Land use restrictions would be implemented.	$ 543
4	Soil	Excavation of material beneath cap. Treatment and disposal of material in off-site Subtitle D landfill. Land use restrictions would be implemented.	$ 2,462
5	Soil	Removal of cap and in-situ treatment of contaminated soil. Debris would be excavated and disposed of in off-site landfill. Treated area would be paved with asphalt. Land use restrictions would be implemented.	$ 1,852

7.2.3 ALTERNATIVE 3: OPERATION AND MAINTENANCE OF THE CAP WITH MONITORING

Alternative 3 leaves the cap in place and includes an O&M program for the cap, as well as periodic groundwater monitoring of contaminant levels in the groundwater. The monitoring system would consist of a minimum of 3 wells screened in the surficial aquifer immediately downgradient from the landfill and one well screened upgradient from the landfill.

Additional sampling of the material beneath the cap would also be performed to determine if soils exceed protective levels for soils beneath the cap. If groundwater sampling results indicated that contaminant concentrations in the groundwater are increasing, actions would be taken to find and repair leaks in the cap. The structural integrity of the cap would be periodically monitored to ensure that any erosion, cracks, or holes which appeared would be repaired. Land use restrictions would be implemented to protect human health and the environment.

7.2.4 ALTERNATIVE 4: EXCAVATION, TREATMENT AND OFF-SITE DISPOSAL

Alternative 4 involves excavation of the cap and the material beneath the cap. The contaminated excavated material would be treated and disposed in an appropriate off-site landfill. Approximately 8,000 cubic yards of material would be transported off-site. Some of the material may require stabilization/solidification (S/S) treatment because of its elevated contaminant concentrations. Treatment of the hazardous constituents would add approximately 25 percent to the total volume and increase the weight, resulting in a post-treatment volume of 9,000 cubic yards. The 9,000 cubic yards would require approximately 450 truck loads to transport all the material to an off-site disposal facility. The area of the cap would then be backfilled with soils from areas below action levels for paved soils. Once in place these soils would then be paved. On-site land use restrictions would apply because contaminated soils above the target action levels for unpaved areas would remain on-site. The land use restrictions would prevent future residential use and require long-term maintenance of the pavement.

7.2.5 ALTERNATIVE 5: IN-SITU STABILIZATION/SOLIDIFICATION TREATMENT

Alternative 5 involves removal of the cap and in-situ treatment of the lime-sulfur sludges and contaminated soil. Approximately 3,000 cubic yards of lime-sulfur sludges were placed underneath the cap along with 500 cubic yards of brick and masonry debris. A total of 7,500 cubic yard of soil and sludges were estimated to require treatment. S/S treatment is not feasible for the brick and masonry debris and is not required for a portion of the lime-sulfur sludges. Therefore, the debris would be excavated and disposed of off-site in a Subtitle D landfill. Then the remaining contaminated soil and sludges would be S/S treated and left in place. S/S would add approximately 25 percent to the total volume, resulting in a post-treatment volume of approximately 9,375 cubic yards. Following S/S treatment, the clean cap soils would be used as backfill and the area would be regraded and covered with asphalt pavement. A treatability study would also be performed to ensure that treatment of the organic material is effective. On-site land use restrictions would be instituted because the waste material would be left on-site. The land use restrictions would prevent future residential use and require that the property remain paved or beneath a building and require long-term maintenance of the cover (building or pavement).

7.3 BUILDINGS ALTERNATIVES

7.3.1 ALTERNATIVE 1: NO ACTION

The no action alternative is carried through the screening process as required by the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This alternative is used as a baseline for comparison with other alternatives that are developed. Under this alternative, EPA would take no further action to minimize the threat posed by the on-site contamination from buildings. No institutional controls or other remedial actions are implemented under the no-action alternative. There is no cost associated with this alternative since no additional activities would be conducted.

7.3.2 ALTERNATIVE 2: SECURE BUILDING

Alternative 2 includes securing buildings which are contaminated at levels exceeding the action levels for buildings (as presented in Table 6-8) to prevent human exposure to the potentially contaminated interiors. This alternative would also prevent infiltration of rain water that might lead to migration of contaminants from the building's interiors to the soils below and dispersion of dust within the building by wind. This would include renovating the roofs, windows, and other building components, as necessary. The buildings could be secured by either locking the doors to prevent on-site worker access or by fencing to prevent access around the buildings. If the soils alternatives 2, 3, 4, 5, and 6 were implemented, it would be necessary to relocate those buildings with contamination in the soils beneath them. The relocation would be to another area on-site with soils below the target action levels for paved areas.

At present, Building W is the only building determined to have contamination levels exceeding the action levels for buildings. However, under this alternative, additional sampling would be conducted to determine if any other buildings are contaminated at levels which require that actions be taken. Building E has already been demolished under the removal action.

7.3.3 ALTERNATIVE 3: DECONTAMINATION

Under Alternative 3 buildings would remain closed and would be decontaminated to remove mobile contaminants. Dust inside the buildings would be removed by vacuuming or pressure washing and collecting the material in bags or drums for disposal. The waste generated would be characterized and disposed of in an appropriate facility. If the soils alternatives 2, 3, 4, 5, and 6 were implemented, it would be necessary to displace those buildings with contamination in the soils beneath them. The relocation would be to another area on-site with soils below the target action levels for paved areas.

Following decontamination, samples of the structural components would be collected and analyzed for contaminants of concern to determine whether contaminants have been adsorbed into the structural materials. If the analytical results indicate that the structure does not pose an unacceptable risk to on-site workers, then the remediation will be complete. If the results of the analyses indicate levels of contamination which pose an unacceptable risk to on-site workers, the structure will be demolished and disposed of in either an on-site or off-site landfill.

At present, Building W is the only building determined to have contamination levels exceeding the action levels for buildings. However, under this alternative, additional sampling would be conducted to determine if any other buildings are contaminated at levels which require that actions be taken. Building E has been demolished under the removal action.

Table 7-3: Operable Unit #3 Alternatives
Building W

Alternative Number	Medium	Remedial Action	Capital Cost* (thousands)
1	Building	No Action	$ 0
2	Building	Secure Building W to prevent human exposure to its potentially contaminated interior, infiltration of rain water that might lead to migration of contaminants from the building, and dispersion of dust within the building.	$ 350
3	Building	Decontaminate Building W to remove mobile contamination. The building would remain out of operation.	$283
4	Building	Demolition of Building W and disposal of debris in an off-site landfill. The building would be decontaminated as in Alternative 3 before demolition.	$ 261

* Capital costs are based on the analysis of two buildings (N and W). The costs will increase if other buildings are added to the action, however, the increase would be proportional for each alternative except the No-Action alternative.

7.3.4 ALTERNATIVE 4: DEMOLITION, DECONTAMINATION, AND DISPOSAL OFF-SITE

Alternative 4 includes demolishing buildings and disposing of the buildings' debris in an appropriate landfill. The debris would be sampled to determine if it is hazardous by the Toxicity Characteristic Leaching Procedures (TCLP). The assumption used for the cost estimate is that the debris would not be TCLP hazardous and could be transported and landfilled at a Subtitle D landfill for disposal without treatment.

The buildings would require special preparation. For example, Building W was a dry packaging site and some preparatory work would be performed to minimize the risks that contamination would be released during demolition. All buildings would be inspected and decontaminated as described in Alternative 3. Piping, tanks, and other equipment inside the buildings would be removed before demolition. During demolition, the buildings would be sprayed with water to minimize the dust generation. Once these measures are taken, the buildings would be demolished. The soil under the buildings would be handled in accordance with the selected on-site soil alternative.

At present, Building W is the only building determined to have contamination levels exceeding the action levels for buildings. However, under this alternative, additional sampling would be conducted to determine if any other buildings are contaminated at levels which require that actions be taken. Building E has already been demolished under the removal action.

7.4 STORMWATER SYSTEM ALTERNATIVES

7.4.1 ALTERNATIVE 1: NO ACTION

The no action alternative is carried through the screening process as required by the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This alternative is used as a baseline for comparison with other alternatives that are developed. Under this alternative, EPA would take no further action to minimize the contamination threat posed by the on-site contamination. No institutional controls or other remedial actions are implemented under the no-action alternative. There is no cost associated with this alternative since no additional activities would be conducted.

7.4.2 ALTERNATIVE 2: DECONTAMINATION

Alternative 2 would remove all sediments from the stormwater system along O'Neil, Preston (from Railroad to Spruce Street), and Pine (from MLK to O'Neil streets) including stormsewers which pass through or on the Site. Once the sediments have been removed, they would be analyzed to determine the proper disposal procedure.

This alternative would begin with a video or visual inspection of the stormwater system to determine the condition of the pipe and the extent of sediment and debris in the system. The results of this inspection would determine whether any areas are damaged and provide a significant potential pathway for release of decontamination fluids during remediation. If the potential for release is high, then pipeline repairs would be implemented prior to decontamination.

The decontamination method would be jetting followed by vacuuming. A truck mounted with jetting and vacuum equipment would be required. A hose with the jetting nozzle would be inserted upgradient in the line through a catch basin or manhole. The vacuum hose would be dropped through the entry point, and water pumped through the hose at approximately 125 gallons per minute. The jetting line would be pulled downstream through the pipe, washing out any sediment.

The vacuum hose would pump the sediment and water from the pipe into a tank mounted on the truck. The water and solids would be pumped into an on-site tank to allow the solids to settle. The water and sediment would be analyzed to determine the proper disposal method. Potential water disposal options would be the local publicly owned treatment works or a treatment, storage, and disposal facility permitted under RCRA, depending upon the results of the analyses. An estimated 53 cubic yards of sediment would be managed with the on-site soil, if appropriate. If the on-site sediment cannot be treated with the on-site soil, it would be disposed of off-site in an appropriate off-site landfill.

Jetting equipment can process 400 to 500 feet of pipe between access holes. A daily production rate of 800 to 1,000 feet of pipe can be expected if the level of sediment is less than a third of the pipe diameter. The jetting equipment uses 7,000 to 10,000 gallons of water per day. The major system requirements are a supply of water and a location for storing the solids.

Table 7-4: Operable Unit #3 Alternatives Stormwater System			
Alternative Number	Medium	Remedial Action	Capital Cost (thousands)
1	Sediment	No Action	$ 0
2	Sediment	Remove all sediment, on-site and off-site, from the stormwater system. Once the sediments have been removed, they would be analyzed to determine the proper disposal procedure.	$ 280
3	Sediment	Abandon stormwater pipe and construct new stormwater system. Abandoned pipe would be filled with concrete to contain sediment.	$ 1,145

7.4.3 ALTERNATIVE 3: ABANDONMENT AND REPLACEMENT OF EXISTING SYSTEM

Alternative 3 requires abandoning the stormwater pipe that runs under the site and along Preston Street (from Railroad to just south of Jacobs Alley) and constructing a new stormwater system. Abandonment would prevent further migration of any contaminated sediments and prevent future contact of stormwater with sediments from the site. The on-site portions of the system would be abandoned by filling the pipe with concrete, thus containing any sediment present in the pipe. The off-site portions of the stormwater system along Preston Street (From just south of Jacobs Alley to Spruce Street) and O'Neil and Pine (From O'Neil to Preston) streets would be decontaminated. A new on-site stormwater system would be constructed and tied into existing pipes downgradient of the site. The line replacement would be conducted after the overlying soils have been remediated to minimize contact with the contaminants.

8.0 SUMMARY OF THE COMPARATIVE ANALYSIS OF ALTERNATIVES

This section of the ROD provides the basis for determining which alternative provides the best balance of the criteria in Section 121 of CERCLA and in Section 300.430 of the NCP. The major objective of the FS Addendum was to develop, screen, and evaluate alternatives for remediation of OU #3.

EPA evaluated each alternative by the standard criteria shown in Table 8-1 to determine which provided the best overall balance. To be considered as a remedy, the alternative must be protective of human health and the environment, and comply with applicable or relevant and appropriate requirements (ARARs) or receive a waiver from compliance with ARARs. ARARs for the Site are discussed in Section 8.2 and Appendix B.

The selected alternative must meet the threshold criteria of overall protection of human health and the environment and compliance with all ARARs (or be granted a waiver for compliance with ARARs). Any alternative that does not satisfy both of these requirements is not eligible for selection. The Primary Balancing Criteria are the technical criteria upon which the detailed analysis is primarily based. The final two criteria, known as Modifying Criteria, assess the public's and the state agency's acceptance of the alternative. Based on these final two criteria, EPA may modify aspects of a preferred alternative or decide that another alternative provides a more appropriate balance.

The following analysis is a summary of the evaluation of the OU #3 alternatives for remediating the remaining on-site contamination. A comparison is made between each of the alternatives for achievement of a specific criterion.

Table 8-1: Breakdown of Evaluation Criteria		
THRESHOLD CRITERIA	PRIMARY BALANCING CRITERIA	MODIFYING CRITERIA
-Overall protection of human health and the environment	-Long-term effectiveness	-State acceptance
-Compliance with ARARs (or invoking a waiver)	-Reduction of toxicity, mobility, or volume through treatment	-Community acceptance
	-Short-term effectiveness	
	-Implementability	
	-Cost	

Threshold Criteria

8.1 OVERALL PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT

The assessment of this criterion describes how each alternative, as a whole, achieves and maintains protection of human health and the environment. This criterion provides the final check to determine which of the alternatives best provides for adequate protection of human health and the environment.
This criterion draws on the assessments conducted under other criteria, especially long-term effectiveness and permanence, short-term effectiveness, and compliance with ARARs.

8.2 COMPLIANCE WITH ARARs

The evaluation of the ability of the alternatives to comply with ARARs includes a review of chemical-specific, action-specific, and location-specific ARARs. Applicable requirements are those cleanup standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under federal or state law that specifically address a hazardous substance, pollutant or contaminant, location, action, or other circumstances at a CERCLA site. Relevant and appropriate requirements are those cleanup standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under federal or state law that are not directly applicable to a hazardous substance, pollutant or contaminant, location, action, or other circumstances at a CERCLA site but address problems or situations sufficiently similar to those encountered at the CERCLA site, and whose use is well suited to the particular site. The judgement of the relevance and appropriateness of a requirement to a remedial action depends on the substances in question, the physical nature of the site, or other circumstances at the site.

In order to comply with CERCLA requirements, selected remedial actions must attain ARARs unless a waiver is invoked. Performance standards for a remedial action will generally be based on chemical-specific and location-specific ARARs or health-based levels.

In the event that an ARAR does not exist, other pertinent guidelines and standards should be considered. These guidelines and standards are commonly referred to as To-Be-Considered (TBC). Risk-specific doses (RSDs), reference doses (RFDs), health advisories (HAs) and state and federal guidelines and criteria, etc. are examples of TBCs.

The evaluation of the ability of an alternative to comply with ARARs includes a detailed review of the action- and location-specific ARARs, which are presented in Appendix B. No location-specific ARARs were found to be applicable to any of the alternatives. Chemical-specific ARARs also are presented in Appendix B.

Primary Balancing Criteria

8.3 LONG-TERM EFFECTIVENESS AND PERMANENCE

This criterion evaluates the long-term effectiveness of the alternatives in maintaining protection of human health and the environment after the remedial objectives have been met. The evaluation compares the risk remaining for each of the alternatives after meeting the objectives. The primary focus of this evaluation is the extent and effectiveness of the controls that may be required to manage the risk posed by untreated wastes. It ensures that the magnitude of the residual risk and adequacy/reliability of the controls of the remedial action are addressed.

8.4 REDUCTION OF TOXICITY, MOBILITY, OR VOLUME THROUGH TREATMENT

This criterion compares the alternatives' specific treatment technologies' anticipated performance. It addresses the statutory preference for selecting remedial actions that employ treatment technologies that permanently and significantly reduce toxicity, mobility, or volume of the hazardous substances as their principal element.

8.5 SHORT-TERM EFFECTIVENESS

The assessment of this criterion examines the comparative effectiveness of each of the alternatives in protecting human health and the environment during the construction and implementation of a remedy until the response objectives have been met. Factors to consider are: protection of the community, protection of the workers, environmental impacts, and the time until the remedial objectives are met.

8.6 IMPLEMENTABILITY

This criterion evaluates the technical and administrative feasibility of the alternatives and the availability of the required goods and services. The following factors are considered: Construction and operation, reliability of the technology, ease of undertaking additional remedial action, monitoring conditions, coordination with other offices and agencies, availability of disposal services, availability of services, equipment, and materials.

8.7 COST

This criterion evaluates the capital, operation, and maintenance costs of the alternatives. Capital costs are direct (construction) and indirect (non-construction and overhead) costs. Operation and Maintenance costs are post-construction costs necessary to ensure the continued effectiveness of the remedial action.

Modifying Criteria

8.8 STATE ACCEPTANCE

The assessment of this criterion describes the state's position and key concerns related to the various alternatives considered. The State of Georgia, as represented by the Georgia Environmental Protection Division (GaEPD), has been the support agency during the Remedial Investigation and Feasibility Study process for the Woolfolk Chemical Works site. In accordance with 40 CFR 300.430, as the support agency, GaEPD has provided input during this process.

8.9 COMMUNITY ACCEPTANCE

The assessment of this criterion involves reviewing comments from the community and gauging the level of community support or opposition for the various alternatives. EPA has included a Responsiveness Summary in Appendix A of this ROD, which addresses those comments.

8.10 COMPARISON OF THE ALTERNATIVES WITH THE CRITERIA

8.10.1 ON-SITE SOIL ALTERNATIVES

Present contamination levels are not protective for industrial or residential use. Thus, Alternative 1 (No Action) does not provide for protection of current or future uses of the OU #3 property. The risk posed from the site would not decrease. The risk of potential exposure would continue from the contaminated soils and migration of contamination would continue through soil-contaminant leaching, wind dispersion, storm water runoff, and infiltration. Because Alternative 1 does not meet the threshold criterion of protection of human health and the environment, it is not discussed or considered further.

Alternative 2, Paving Contaminated Areas, protects human health by preventing contact with on-site soil above target action level for unpaved soils. Covering the contaminated soil would reduce migration of contaminants through wind erosion, infiltration, or direct human or animal contact. Long-term effectiveness is decreased relative to all the other alternatives, except No Action, due to the need for a long-term monitoring program, the need for repairs whenever the paving deteriorates, and potential exposure to an unprotected excavation worker. The cleanup goals for paved soils would not be met on significant portions of the site so that even when paved, contamination from these areas may pose a threat to groundwater and to the construction workers. Should the proposed alternative fail, the potential for further contamination of the groundwater is higher than other alternatives, except No Action. The potential for failure is also higher since the remedy is dependant on a long-term Operation & Maintenance (O&M) plan being implemented effectively. The potential for failure and not meeting the target action level for paved soils results in this alternative not meeting guidelines used to establish protectiveness of the remedy, and therefore this doesn't meet the threshold criteria of protectiveness. There would be no reduction of toxicity, mobility, nor volume of the contamination through treatment under this alternative because there would be no treatment. The adverse short-term effects are minimal; however, long-term use of the property would have to be limited. Because soil above the target action levels would be left on-site, restrictions, such as requiring personal protection equipment during excavation, would be instituted to protect the on-site worker from exposure. Implementation of this alternative would be relatively easy. This alternative has the lowest cost, except for the no action alternative (#1). Both the community and the State commented that paving alone does not satisfy their concerns with the site.

Alternative 3, Excavation with Onsite Landfill, protects human health by removing soils above the target action levels and placing them in a landfill. Landfilling the soil prevents contact and contaminant migration caused by wind erosion or infiltration. The potential for contaminant migration caused by infiltration is less than Alternative 2, due to the cap and liner system of the landfill. If some of the soils exceed TCLP limits and are, therefore, considered hazardous, then the landfill would not meet LDRs and minimum siting requirements, and a waiver would need to be obtained. With proper maintenance, long-term effectiveness and permanence would be achieved. Reduction of toxicity, mobility, and volume through treatment criteria is not met because there is no treatment. Adverse short-term impacts during excavation and landfill construction can be minimized by implementing dust suppression measures; however, these risks are higher than with Alternatives #1 and #2. Implementability of this alternative is more complex than Alternative 2; however, the technology is well-known and easily implementable. Care would need to be taken with regard to traffic in the area and protection of residents. The costs of this alternative are higher than the costs of Alternatives 1, 2, and 4; however, the cost of this alterative is lower than Alternatives 5 and 6. The State commented that would oppose a waiver of the ARARs for both disposal and the siting requirements due to the nature of the surrounding residential community. Members of the community were overwhelmingly opposed to the construction of another landfill in their community.

Alternative 4, In-Situ S/S Treatment, would provide long-term protection by treating and paving the soil, which would prevent human or animal contact with on-site contaminated soil. This alternative provides greater overall long-term protection than Alternative 3 because the contaminated soil is treated before paving. The treatment process renders the soil non-hazardous and provides a greater protection of groundwater due to the reduced leachability of the contaminants, even in areas of broken pavement. The reduction of toxicity and volume of contamination through treatment is not achieved; however, the mobility of the contaminants is reduced by S/S treatment. The short-term risks are the highest of any of the alternatives due to the high dust levels associated with the treatment process. However, the risks during treatment and relocation of some of the treated material would be reduced by using exclusion zones, engineering controls, and varying work schedules. The implementability of the in-situ process is more difficult due to utility lines and areas which cannot be accessed with heavy machinery. There is also a need for considerable quality assurance to ensure that there is adequate mixing of the contaminated soils with the treatment material. This alternative is more costly than alternatives 1 and 2;

however, less costly than the other alternatives. The State objects to this remedy due to the uncertainty of treating the organic material using the solidification process. Though treatability studies could be performed to confirm the effectiveness of the treatment process, there is no guarantee that, through the natural process of degradation, these organic chemicals would not be released in the future. Community members objected to this alternative because they do not want to be subject to further experimentation, and they were concerned that the treatment may not be effective.

Alternative 5, S/S Treatment and On-site Landfill, protects human health by excavation, treatment, and landfilling of the soil. Soil that exhibits hazardous characteristics would be treated using ex-situ S/S and landfilled along with the other excavated soils. Alternative 5 may be slightly more protective than Alternative 3 because of the soils being treated before placement in the landfill; however, the landfill in this alternative would not have a leak detection system underneath the primary protective liner. There is no reduction in toxicity or volume by treatment through this alternative; however, reduction in mobility is achieved by the S/S process. The short-term risks during treatment and placement of the treated material would need to be addressed using exclusion zones, engineering controls, and varying work schedules. ARARS regarding landfill siting requirement would not be met, and would require a waiver. Implementability of this alternative is comparable to Alternative 3, less difficult than Alternative 4 and more difficult than alternatives 1 and 2. The costs for this alternative the higher than all of the alternatives except Alternative 6. The State has commented that a waiver of ARARs for landfill siting would not be appropriate for this site due to the surrounding residential areas. The community has been adamant in its disapproval of landfill construction in the community, as well.

Alternative 6, S/S Treatment and Offsite Subtitle D Landfill, is protective from a long-term prospective for the site, but transfers the contaminated and treated soil and its associated risks from one site to another. This alternative provides long-term protection by removing the contaminated soil and disposing it in an engineered and permitted landfill. Treatment and off-site landfilling would significantly reduce future human contact and contaminant migration at the site. All ARARs would be met. There would be no reduction of toxicity or volume through treatment; however, mobility would be reduced by S/S treatment. The short-term risks of this alternative are higher than alternatives 1, 2, 3, and 5 due to the high volumes of soils handling during excavation and treatment. However, protection measures such as exclusion zones, dust suppression, traffic controls, temporary relocation of workers and residents, and varying work schedules can reduce these short-term effects. These add to the difficulty in implementability; however, this alternative is considered easier to implement than alternative 4. The risks associated with accidents due to the amount of truck traffic to the off-site disposal facility are the highest for this alternative. This is the most expensive alternative for the soils. This is the preferred alternative of both the State and the community.

In summary, Alternative #1 and #2 are not acceptable because they do not meet the two threshold balancing criteria for the site, overall protectiveness and ARAR compliance. Alternatives #3 and #5, although they would meet the overall protectiveness requirements, they would require waivers of key ARARs, which would make these less preferable. Alternative #4 protects human health and the environment, meets all ARARs, is protective in the long-term if the treatment is proven effective on organic contaminants, reduces mobility of the contamination, and is one of the least costly. However, Alternative #4 also has the highest short-term risks, though these can be reduced; and implementability of Alternative 4 is the most difficult of the alternatives. The treatment process is not guaranteed to be effective should the S/S soils become disturbed or when natural degradation occurs which could result in the potential for the release of contamination. Alternative #6, though it is the most costly and has a relatively high short-term risk, also provides the greatest protection of human health and the environment. Alternative #6 also meets all ARARs, is protective in the long-term, reduces mobility through treatment, transfers the contamination to a better regulated facility, and is the preferred alternative for both the State and the community.

8.10.2 EXISTING CAP ALTERNATIVES

Implementation of Alternative 1 (No Action) would not meet EPA's criteria for protection of human health and the environment, even though the materials under the existing cap are isolated from both human and environmental receptor populations. Since there is no O&M program, any risk posed by leaving the materials under the existing cap would not be decreased, and the pathways of exposure could foreseeably reopen as the cap materials age without repair. Since this does not provide for the overall protection of human health and the environment, a primary balancing criteria, this would not be an acceptable alternative.

Any risk from the materials under the existing cap for Alternatives 2 or 3 would be less than under Alternative 1 because the long-term integrity of the cap would be maintained. Adding a maintenance program under Alternatives 2 and 3 would, therefore, be protective of human health and the environment, as long as land use restrictions are maintained and enforced. In the event that the cap should fail, early detection would be provided for under the regular inspection programs for these alternatives. Alternative 3 provides additional early warning through the groundwater monitoring program. If the cap were to fail both alternatives provide for the repair or replacement of the cap. Both Alternatives provide for the long-term protection of the community; however, they leave open the potential that further action will be required due to failure of the cap, thereby reducing long-term effectiveness. Neither provide for reduction of toxicity, mobility, or volume of the contamination through treatment. The short-term risks and costs are minimized due to the limited actions required. The implementability of both alternatives is far easier than alternatives 4 and 5. Alternative 2 is easiest because there would be no monitoring wells installed as there are in Alternative 3. The State is of the opinion that the cap has failed and may have been illegally installed. The community has these concerns and is further discouraged by the limitation on the use of the property in the future. The community particularly opposes the maintenance of a landfill in its midst. Therefore, alternatives 1, 2 and 3 are the least preferred alternatives for both the State and the community.

Alternative 4 provides for the overall protection of the environment through removal of the cap and S/S treatment of the contaminated materials and disposal of this material off-site. This alternative would meet ARARs, would be protective in the long-term, reduces the mobility of treated material, and moves the material to a better regulated site. This alternative is relatively difficult to implement in comparison to alternatives 1, 2, and 3; however, it is easier than alternative 5. Alternative 4 is the most preferred by both the State and the community. However, short-term risks are higher than alternatives 1, 2, and 3 and this is the most expensive remedy.

Alternative 5 also includes removal of the cap and S/S treatment of contaminated material. Under Alternative 5, however, contaminated material is treated through in-situ S/S and remains on-site. Alternative 5 meets ARARs, provides for long-term protection, reduces mobility but not toxicity or volume through treatment, and is less costly than Alternative 4 but more costly than Alternatives 1, 2, and 3. However, alternative 5 provides the greatest short-term risk to the community due to the level of dust produced through treatment. The treatment process is also the most difficult to implement and leaves the potential for organic contaminant release should the treated material degrade or be disturbed. The State prefers Alternative 4 to Alternative 5 due to the potential for future failure of the S/S treatment. The community also prefers the off-site disposal option of alternative 4 because there is protection from the risk of treatment failure and greater flexibility for future use of this property.

In summary, Alternative 1 does not protect human health and the environment and, therefore, does not meet the threshold criteria of overall protectiveness. Alternatives 2 and 3 meet the threshold criteria; however, Alternatives 2 and 3 are less favored after application of the primary balancing criteria due to the potential for future release and need for repair or replacement of the cap. These two alternatives also are disfavored under the modifying criteria due to the State and community opposition. Alternatives 4 and 5 meet all threshold and primary balancing criteria. Alternative 4 is more costly than Alternative 5; however, Alternative 4 provides the greatest long-term protection, greater ease in implementation, and greater short-term effectiveness. Alternative 4 is further supported by being the preferred alternative for both the State and community. Alternative 5 meets the threshold criteria and the primary balancing criteria. It is less costly than Alternative 4 but raises the question of whether the treatment process will fail and require additional work in the future. This alternative would also further create greater limitations on future use of the property than Alternative 4.

8.10.3 BUILDING ALTERNATIVES

Data on the extent of building contamination is available only for buildings E and W (Building E was addressed under the removal action). However, since the current operator has suggested that operations may move, there is a potential that through unsupervised demolition or attempted decontamination of buildings that contaminants may be released into the environment. The data gaps do not hinder the decision for all buildings because the range of alternatives for contaminated buildings is limited and these alternatives have been evaluated fully for buildings known to be contaminated. A similar analysis would be relevant to other buildings later determined to be contaminated. Further, alternatives for the buildings can be developed and used as contingencies depending on the results of the characterization. In other words, if a building is not contaminated no further action will be required. If a building is contaminated and has potential for future use, and can be decontaminated, then this will be implemented. If a building is contaminated and either has no potential future use or cannot be decontaminated, then the building will be demolished. The following comparison of alternatives is completed for Building W and, once further data is available for the other buildings, then a similar process will be followed for addressing contingencies.

Alternative 1 (No Action) does not meet EPA's criteria for protection of human health or the environment because risks associated with the contamination in Building W would not be reduced. Risk of exposure remains unchanged due to the potential for contaminant migration by wind dispersion, storm water runoff, and infiltration of the building materials, or through unregulated demolition of the building.

Alternatives 2, 3, and 4 all address the threshold criteria for protection of human health and the environment and meeting all ARARs. The following addresses the primary and modifying balancing criteria. Alternative 2 would decrease the potential for contaminant migration by securing windows and repairing any leaks in the roof, so that wind or precipitation could not spread contamination remaining inside the building. The contamination is not reduced and poses a potential threat, if the securing mechanisms are not maintained or should the building be demolished in the future. The building may also need to be relocated to address the soils below it as per the soils alternatives. This alternative would not pose significant short-term risks; however, would require dust and noise reduction while securing and moving the building for remediation of the soils beneath the building. Alternative 2 is relatively easy to implement. The costs for alternative 2 are the most excessive of the alternatives. Besides Alternative 1, this is the least preferred by the State and community.

Alternative 3 would use decontamination to remove the surface contamination source for potential migration of contamination due to direct contact, wind dispersion, or precipitation. This alternative provides long-term protection if the contamination has not been imbedded in the building material and would not become available in the future. Due to the age and detail of Building W, the decontamination process may not be effectively implemented. There would be no reduction in toxicity, mobility, or volume through treatment. The volume would be transferred to another site. The short-term risks are not significant; however, dust and noise would be present during the action. This alternative can not be implemented with ease due to the nature and age of the building. The decontamination process may be difficult for Building W. Alternative 3 is the second most expensive alternative; however, these cost are comparable to Alternative 4. The State commented that if it is possible to decontaminate the building then they do not object to this alternative. The community commented that their preference would be demolition of the building as per Alternative 4.

Alternative 4 would remove the entire building from the site, which would ensure protection of human health and the environment. Alternative 4 achieves the greatest level of long-term protection of the alternatives. It is also the least costly, though these costs are comparable to Alternative 3. Short-term risks are considered to be greater than the other alternatives due to the demolition process. The implementability and costs of this alternative are comparable to Alternative 3. The State gave no preference between alternative 3 and 4; however, the community preferred this alternative for Building W.

In summary, for the contaminated Building W, all of the alternatives except No Action meet the threshold criteria. Alternative 4 provides the greatest reduction in risk for the long-term and is most effective since the building is eliminated. None of the alternatives reduce toxicity, mobility, or volume through treatment. The short-term risks are greatest for Alternative 4 due to the demolition process; however, this is also one of the least costly alternatives and relatively easy to implement. The State regarded both Alternative 3 and 4 effective while the community preferred demolition of the building.

8.10.4 STORMWATER SYSTEM ALTERNATIVES

Implementation of Alternative 1 (No Action) would not meet EPA's criteria for protection of human health and the environment because potentially contaminated sediments in the storm water system lines would remain unaddressed. Contaminant migration would continue through storm water runoff and sediment migration. In addition, if the storm water lines are found to be damaged, storm water could discharge through any breach in the line and provide a pathway for infiltration and leachate generation.

Implementation of Alternative 2 would meet EPA's threshold criteria for protection of human health and the environment and meetings of ARARS because contaminated sediments in the storm water system would be removed from the sewer lines. The decontamination fluids would be disposed of offsite, either in a POTW or a TSDF, to eliminate decontamination fluids as a potential source of risk to human health or the environment. Recovered sediments would be managed either onsite or offsite in a manner consistent with the remedial alternative selected for the onsite soil remediation. This alternative reduces the long-term threat due to the removal of the sediments. There is no reduction in toxicity, mobility, or volume through treatment. A reduction in volume would occur on-site; however, these volumes would only be transferred to another more secure location. The short-term risks are minimal and the technology is easily implementable. The costs are significantly lower than alternative 3 yet greater than alternative 1. The State preferred this alternative and the community did not comment on it.

Alternative 3 would also meet EPA's criteria for protection of human health and the environment because contaminated sediments in the storm water system would be permanently encapsulated in the existing sewer lines, thereby preventing contact with both human and environmental receptor populations. The long-term effectiveness is dependant upon the ability of the sediments to be mixed with the encapsuling material. The long-term effectiveness also depends on the ability of the existing storm sewers to remain intact. Natural degradation of the sewers would likely occur over the long-term. There is no reduction in toxicity, mobility or volume through treatment. A reduction in mobility would occur if the encapsuling technology is effective. Short-term effectiveness is comparable to alternative 2. Implementability, however, will be difficult and require substantial effort to determine whether the contamination has been adequately encapsulated. The cost of this alternative is the most expensive of all of the alternatives. The State did not prefer this remedy due to the difficulty in encapsulating the contamination. The community did not state a preference.

9.0 SUMMARY OF SELECTED REMEDY

Based upon consideration of the requirements of CERCLA, the NCP, the detailed analysis of alternatives and public and state comments, EPA has selected a remedy for Operable Unit 3 of the Site. The selected remedy provides for the following:

On-site Soils
- excavation, ex-situ solidification/stabilization (S/S) treatment, and off-site disposal of soils above action levels for paved soils;
- consolidation of soils above action levels for unpaved soils but below action levels for paved areas and paving with asphalt/concrete all such soils; and
- institutional controls.

Existing Cap
- removal of the cap
- excavation, ex-situ S/S, and off-site disposal of material above action levels for paved areas;
- excavation with off-site disposal of material unsuitable for treatment (i.e. bricks, concrete)
- excavation with off-site disposal without treatment those materials found to be non-hazardous (lime-sulphur sludges) and yet unsuitable as base material;
- consolidation of the remaining material and paving with asphalt all areas of the former cap;
- institutional controls.

Buildings
- No further action on Building E;
- Demolition of Building W;
- further characterization of all other buildings associated with the current or former site operations;
- demolition of all buildings found to exceed the action levels if the building is considered abandoned or of limited structural integrity or limited use;
- decontamination, with off-site disposal of waste material in an appropriate disposal facility, of any building found above action levels, if possible and if the building is found to be suitable for future use. Those buildings which are not possible to decontaminate shall be demolished and disposed of in an appropriate off-site landfill.

Storm Sewers
- video inspection of the storm sewer system to determine areas of deterioration;
- repair of those areas including characterization of soils beneath these deteriorated areas;
- removal of the sediments through jetting and vacuum equipment;
- disposal of the sediment may be addressed with on-site soils; however, if this is not possible disposal will be in an appropriate landfill.

At the completion of this remedy, the risk associated with this Site has been calculated at 10^{-5} which is determined to be protective of human health and the environment. The present worth cost of the selected remedy is estimated at $6,567,000 for the on-site soil, $2,462,000 for the existing cap, $261,000 for Building W and N (this cost may increase if additional buildings are determined to require action), and $280,000 for the storm water system for a total present worth cost of $9,570,000.

9.1 REMEDY DESCRIPTION

9.1.1 ON-SITE SOIL REMEDY

The selected remedy for contaminated on-site soils is excavation of soils above action levels for paved areas, ex-situ solidification/stabilization, with off-site disposal. The general methodology for remediation under this alternative includes:

- Excavate soils above action levels for paved areas set in Section 6 (Table 6-6) of this ROD.
- Treat those excavated soils determined to be characteristically hazardous using an ex-situ solidification/stabilization technique in order that TCLP criteria are met for off-site disposal.
- Consolidate soils below the action levels for paved areas yet above the action levels for unpaved areas in one area to minimize the areas with contamination remaining on-site (which will need to be paved).
- Pave with concrete or asphalt areas with contaminant concentrations above the action levels for unpaved areas.
- Restore the site to pre-excavation condition in those areas where excavation has occurred and the levels fall below the action levels for unpaved areas.
- implement institutional controls, including deed restrictions, to ensure that contaminated soils remain paved, or covered by a building, and that the property is not converted to residential use. Institutional controls for this remedy must be consistent with controls placed for other portions of this remedy and those for other operable units.

This remedy includes excavation of approximately 13,999 cubic yards of soil with contamination exceeding target action levels for paved areas. The Feasibility Study Addendum (FSA) estimated that approximately 8,842 cubic yards of the 13,999 cubic yards of excavated soil and debris would be need to be treated. Due to the increase in volume associated with ex-situ S/S treatment, an estimated total of 24,315 tons of material will be disposed of at an off-site landfill. Soils with contaminant concentrations below action levels for paved areas but above action level for unpaved areas will be consolidated on-site to limit the area remaining on-site with higher concentrations. The area of consolidated material will be paved. Areas of excavated material will have clean fill placed and sodded or paved depending on the original surface material. Because waste materials would be removed and managed under this alternative, a CAMU is defined in Section 9.1.1.1 and handling techniques will be designated under the remedial design.

Paving will be with concrete in locations that have heavy truck activity. These locations are around Buildings W, G, S, S-1, N, F, and the tank farm. The paving material will be placed over existing asphalt or concrete surfaces. Areas with potential car traffic will have approximately four inches of asphalt placed over existing asphalt or over four inches of base aggregate in unpaved areas. The asphalt mix will be 2.5-inch thick binder coarse overlain by 1.5-inch Department of Transportation (DOT) Type "F" surface coarse. This upper layer will lessen the percentage of void space in the asphalt to limit permeability. To further lessen the permeability of the pavement and to help reduce the occurrence of cracks and crack promulgation in the asphalt, an appropriate asphalt paving geotextile will be used under all sections of the paving. Some paving activities may require the excavation and disposal of materials in order to maintain grade. This material would be disposed in an appropriate landfill.

S/S treatability testing was performed in 1992 on Woolfolk soil mainly for consideration of the in-situ alternative. This study is also indicative of the effectiveness of meeting TCLP requirements for disposal in an off-site nonhazardous waste (Subtitle D) landfill. Two separate vendor processes were examined and a formulation utilizing large quantities cement and fly ash mixed with the soil was found to be successful in reducing the arsenic solubility by 95 percent. Some improvements on the S/S procedure proposed may be achievable if alternative additives are effective at the Woolfolk site. Further treatability testing may be necessary for the other contaminants or to identify a new more effective technology during the remedial design.

It will be necessary to monitor the air both during and after the remediation activities to ensure compliance with the standards set in Table 6-8 in this ROD. The contaminant levels found in ambient air, documented in the RI and BRA, are found to be above protective levels for air. However, it is believed that by implementing the remedial activities for contaminated soils that these levels will be reduce to below air standards. In order to verify this, EPA will require monthly air monitoring to be performed on the site for a minimum of one year after completion of the remedial action. Air monitoring will also be performed during the remedial action as will be set out in the remedial design.

The remedy may have some impacts on the SureCo operation, which may be active during implementation of this remedy. In addition, most of the soil contamination requiring treatment is in industrial areas that generate significant traffic. Therefore, the remedial design/actions must be planned and implemented in a manner that limits the impact to the on-site operator, and is protective of the on-site worker. Traffic considerations, due to the significant truck traffic, will also be taken into account in the design, by designing the remedy in a way that minimizes the negative effects of the traffic. For example, some streets may be closed temporarily in order to dedicate those streets to remediation traffic.

Land use restrictions will be required, because only soil with contaminant concentrations above target action levels for paved areas will be removed from the site and disposed at an off-site landfill. Soils with contaminants above action levels for unpaved areas will be paved and will require long-term operation and maintenance.

9.1.1.1 CORRECTIVE ACTION MANAGEMENT UNIT (CAMU)

To facilitate the handling and processing of contaminated soil on-site, a corrective action management unit (CAMU) will be designated for the site. The transport, treatment, and storage of hazardous wastes during the remedial action is allowed within and between CAMUs without invoking land disposal restrictions (LDRs) or other relevant RCRA requirements, thus facilitating remediation on-site (40 CFR 264.552).

Since the wastes at the Woolfolk site have not been identified as a listed hazardous waste, CAMUs would be needed only in areas where the material is hazardous by TCLP. Since TCLP results are not available for most of the wastes, a CAMU will be designated for all areas that exceed the action levels for paved areas or worker protection levels and, therefore , will have excavation and/or soil relocation performed. The CAMU also includes potential areas for treatment and storage of wastes.

The CAMU regulations do not require that the area be one contiguous area, so the roads near the site can be excluded from the CAMU. The delineation of the CAMU, shown in Figure 7-1, satisfies the decision criteria for CAMU establishment, such as "minimizing future releases" and that the CAMU "minimize the land area of the facility upon which wastes will remain in place after closure" by allowing consolidation of wastes within one area for potential treatment or storage. The CAMU is designated in order that it may be applicable to soils, cap, building, and storm water system remedies.

9.1.2 EXISTING CAP REMEDY

The selected remedy for the existing cap is excavation of cap, excavation of contaminated soils above action levels for paved areas, ex-situ solidification/stabilization, and off-site disposal in an appropriate landfill. The general methodology for remediation under this alternative includes:

- removal of the cap and stockpiling clean soils,
- excavation of soils above the action levels for paved areas,
- ex-situ S/S of RCRA hazardous waste soils,
- excavation with off-site disposal of material unsuitable for treatment (i.e. bricks, concrete)
- excavation with off-site disposal without treatment of those materials found to be non-hazardous (lime-sulphur sludges) and yet unsuitable as base material;
- off-site disposal of treated and untreated soils originally above action levels for paved areas,
- consolidation of soils above the action levels for unpaved areas but below the action levels for paved areas (including those with similar material from the soils remedy) and paving with asphalt all areas of the former cap;
- institutional controls, including deed restrictions, preventing future residential use and limiting the long-term removal of pavement.

This alternative includes removal of the cap and excavation of soils and sludges with contaminant concentrations above the action levels for paved areas or unsuitable as base material. The contaminated excavated material would be disposed in an appropriate off-site landfill. Approximately 8,000 cubic yards of material would be excavated for transportation off-site. It was estimated that 4,000 cubic yards of the material may require ex-situ S/S treatment because of its elevated contaminant concentrations. Treatment of the hazardous constituents would add approximately 25 percent to the total volume of treated material and increase the weight, resulting in a post-treatment total volume of approximately 9,000 cubic yards to be disposed in an off-site landfill.

Certain materials used for the cap may not have been contaminated since the cap was built. These materials would be stockpiled on the site and used as fill material. The final elevation of the area must be lowered to be consistent with the elevations of the current operating facility. Any excess material will be disposed of appropriately. There are also sludges and debris which were originally disposed of in the cap and are inappropriate as base material for the final grade. These materials will be disposed of in an appropriate landfill.

Paving requirements are stipulated under the soils remedy. Further treatability testing of the S/S process may be necessary to ensure that it is effective for various contaminants and to potentially identify a better S/S technology during the remedial design. The remedial design/actions must also be planned and be implemented in a manner that limits the impact to the on-site operator, to the extent feasible, and is protective of the on-site worker. Traffic considerations, due to the significant truck traffic, will also be taken into account in the design. The capped area is part of the CAMU explained in section 9.1.1.1 and the soils can be managed in a similar manner as that remedy. Land use restrictions will be required, because only soil with contaminant concentrations above target action levels for paved areas will be removed from the site and disposed at an off-site landfill. Soils with contaminants above action levels for unpaved areas will be paved and will require long-term operation and maintenance. Land-use restrictions will prohibit residential use of the property and will require maintenance of the pavement.

9.1.3 BUILDINGS REMEDY

This remedy includes no further action on Building E, demolition of Building W, and further characterization of all other buildings associated with the Site to determine the need for decontamination or demolition. Building E was adequately addressed during the 1993 Removal Action. This building was demolished and disposed of off-site. EPA will require no further action with respect to this building.

Building W will require demolition with off-site disposal of all building debris. The debris will be sampled to determine the appropriate landfill requirements. Initial preparatory work will require the decontamination of the building in order to limit the potential for migration of the contamination. Piping, tanks, and other equipment inside the building will have to be removed before demolition. During demolition, dust control measures will also be implemented. Soils underlying the building will be addressed as part of the soils remedy.

Due to the potential for the current operator to relocate and the site to be redeveloped, there is a need to address a potential for release from other buildings associated with the site, as well. The buildings with the greatest potential for release or harm to workers include buildings N, G, and the former Duke packing shed. Building F may be of concern, as well, because the existing building was built in the same location as the smaller former building. If decontamination had not occurred, the existing building may have contaminants in the underlying soils. Those buildings which represent a more limited concern for release are buildings S, S-1, R, R-1, T, and the Truss warehouse. The former warehouses A & B (currently owned by Marion Allen) and the current Sureco offices may represent a concern if the former structures were not properly decontaminated prior to renovation. The buildings with the least potential for action include the Sureco and Marion Allen offices.

All of these buildings will be adequately characterized during the remedial design. Dust, wood samples (if appropriate), and other material (if the potential for storing contamination exists) will be taken to determine if contamination exists in these buildings beyond the target action levels established in the Baseline Risk Assessment Addendum and presented in Table 6-7 of this ROD. If contamination above acceptable levels is found, then a determination will be made with respect to the potential of decontaminating the building. As part of this determination the usefulness and soundness of the structure will be evaluated to determine the whether decontamination is a reasonable solution. If so, dust and other material inside the building will be removed by vacuuming or pressure washing and collecting the material in bags or drums for off-site disposal in an appropriate manner. A confirmation sampling program will be developed to ensure the decontamination process is effective. If this program determines that the building can not be decontaminated then the building would be demolished. If a building needs to be demolished, then this will be accomplished in a manner similar to Building W.

9.1.4 STORM WATER SYSTEM REMEDY

This remedy is designed to remove all sediment from the storm water system, both onsite and offsite to the end of the sewer system south of Lavender Street. Once the sediments have been removed, they would be analyzed to determine the proper disposal procedure.

There would be an initial video or visual inspection of the storm water system to determine the condition of the pipe and the extent of sediment and debris in the system. The results of this inspection would determine whether any areas are damaged and provide a significant potential pathway for release of decontamination fluids during remediation. If the potential for release is high, then pipeline repairs will be implemented prior to decontamination. In areas where the pipeline is found in poor condition pipe bedding materials and underlying soils will be sampled to determine the need for removal and proper disposal.

The chosen decontamination method is jetting followed by vacuuming. A truck mounted with jetting and vacuum equipment is required. A hose with the jetting nozzle is inserted upgradient in the line through a catch basin or manhole. The vacuum hose is dropped through the entry point, and water is pumped through the hose at approximately 125 gallons per minute. The jetting line is pulled downstream through the pipe, washing out any sediment.

The vacuum hose pumps the sediment and water from the pipe into a tank mounted on the truck. The water and solids would be pumped into an onsite tank to allow the solids to settle. The water and sediment would be analyzed to determine the proper disposal method. Potential water disposal options will be the local POTW or a TSDF permitted under RCRA, depending upon the results of the analyses. An estimated 53 cubic yards of sediment would be managed with the onsite soil, if appropriate. If the onsite sediment cannot be addressed with the onsite soils, then it would be disposed of offsite in an appropriate landfill.

9.2 PERFORMANCE STANDARDS FOR SOILS AND BUILDINGS

The performance standards for soils and buildings are presented in Table 6-6 and 6-7 of this ROD, respectively.

9.3 SOIL AND BUILDINGS TESTING

Soil and Buildings testing shall be conducted on the site to determine the effectiveness of meeting the soil and building performance standards outlined in Tables 6-6 and 6-7, respectfully. Performance standards will be met when the confirmatory sampling effort shows all samples have been remediated to a level at or below the performance standard. Confirmatory sampling will include testing of any soil or building left in place. All soil and buildings shall meet the appropriate performance standard.

9.4 COST

For excavation, ex-situ stabilization/solidification treatment with off-site disposal of on-site soils, including the existing cap, demolition of Building W and N, and the storm water system remediation, the estimated present worth cost of the remedy is $9,570,000. These costs include planning and design fees, as well as mobilization and implementation. The capital costs are estimated to be $8,766,000; the total present worth of operation and maintenance cost is estimated at $804,000.

10.0 STATUTORY DETERMINATION

Under its legal authorities, EPA's primary responsibility at Superfund sites is to undertake remedial actions that achieve adequate protection of human health and the environment. In addition, Section 121 of CERCLA establishes several other statutory requirements and preferences. These specify that, when complete, the selected remedial action for this Site must comply with applicable or relevant and appropriate environmental standards established under Federal and State environmental laws. The selected remedy also must be cost-effective and utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. Finally, the statute includes a preference for remedies that employ treatment to permanently and significantly reduce the volume, toxicity, or mobility of hazardous wastes as their principal element. The following sections discuss how the selected remedy meets these statutory requirements.

10.1 PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT

The selected remedy protects human health and the environment by removing, treating and isolating threats at Operable Unit 3 of the Site in the contaminated soil, sediment and buildings. The selected remedy provides protection of human health and the environment by eliminating, reducing, and controlling risk through treatment, engineering controls, and/or institutional controls. Certain contaminated surface and subsurface soils and the existing cap soils at Operable Unit 3 of the Site will be excavated and treated (if necessary) with ex-situ stabilization/solidification prior to being disposed off-site. The remainder of the contaminated soils will be consolidated to minimize areal extent prior to being paved with asphalt or concrete. The soils cleanup will meet a 10^{-5} risk-based level, or a level which is protective of groundwater, whichever is more stringent.

10.2 ATTAINMENT OF THE APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARs)

Remedial actions performed under CERCLA must comply with all applicable or relevant and appropriate requirements (ARARs). All alternatives considered for the Woolfolk OU3 site were evaluated on the basis of the degree to which they complied with these requirements. The selected remedy was found to meet or exceed all ARARs, including those listed in Appendix B.

Waivers

Section 121 (d)(4)(C) of CERCLA provides that an ARAR may be waived when compliance with an ARAR is technically impracticable from an engineering perspective. No waivers are necessary with respect to the selected remedy.

Other Guidance To Be Considered

Other Guidance To Be Considered (TBCs) include health based advisories and guidance. TBCs have been utilized in estimating incremental cancer risk numbers for remedial alternatives at the site. The risk numbers are evaluated relative to the normally accepted point of departure risk range of 10^{-4} to 10^{-6}. The State of Georgia's Hazardous Substance Response Act (HSRA) was also considered in choosing the performance standards for this site.

10.3 COST EFFECTIVENESS

The estimated cost of EPA's selected remedy is $9,570,000. Cost effectiveness is determined by comparing the cost of all alternatives being considered with their overall effectiveness to determine whether the costs are proportional to the effectiveness achieved. EPA evaluates the incremental cost of each alternative as compared to the increased effectiveness of the remedy. The selected remedy does cost more than the no action alternative; however, effectiveness achieved by the remedy justifies the higher cost. The selected remedy also costs more than other alternatives which were studied. However, the remedy achieves greater State and community acceptance and long-term protectiveness which justifies the additional cost. The remedy is considered cost effective.

10.4 UTILIZATION OF PERMANENT SOLUTIONS TO THE MAXIMUM EXTENT PRACTICABLE

EPA believes the selected remedy is the most appropriate cleanup solution for the Woolfolk OU3 site and provides the best balance among the evaluation criteria for the remedial alternatives evaluated. This remedy provides effective protection in both the short-term and long-term to potential human and environmental receptors, is implement able, and is cost-effective. The selected remedy achieves a permanent solution for OU3 to the maximum extent practicable by treating the most contaminated material through S/S treatment and disposing of the contaminated material in an appropriate offsite landfill.

10.5 PREFERENCE FOR TREATMENT AS A PRINCIPAL ELEMENT

The statutory preference for treatment will be met because the selected remedy treats the most contaminated soil, which is the principal threat posed by the Site, prior to its disposal off-site.

11.0 DOCUMENTATION OF SIGNIFICANT CHANGES

EPA initially proposed in-situ solidification/stabilization as the most appropriate technology for implementing the soils remedy. After receiving comments from the State and community, EPA determined that a more acceptable solution for the site would be to remove the most contaminated material from the site. The State commented that the S/S technology has not been proven effective as a treatment process for pesticides and other organic contamination. They were also uncomfortable about leaving S/S material in a residential area. The community also expressed concerns regarding the S/S process and wanted to ensure that the process would be appropriate if at some future time the site would be redeveloped. At the same time, other community members believe that further delays which would be caused by the S/S treatment studies are unacceptable. They stated specifically that they did not want to be the subject of any more experiments on the site and preferred to have the soils disposed of in another more appropriate location. EPA agrees that the S/S would require confirmatory sampling and that the in-situ process would require considerable quality assurance that makes the technology inappropriate for this particular site. There would be the need for additional treatability testing. Even if the treatability testing showed a successful treatment process, there is no guarantee that future use of the property would not compromise the effectiveness of the treatment. EPA, therefore, has changed its preference for on-site soils to Alternative 6 in the proposed plan, as explained in further detail in this ROD. This is also the stated preferred remedy of both the State and the local community.

EPA has also changed the preferred remedy for the existing cap. The State believes that the cap was created illegally because RCRA characteristic hazardous waste material may have been inappropriately disposed of beneath the cap. Both the State and the community were clear that they did not approve of having capped contaminated soils located in close proximity to a residential area. Removing the capped area will achieve greater long-term protectiveness by eliminating the risk that cap failure would cause further groundwater contamination. Removing the capped area will also allow for greater flexibility in future land use without creating a risk of exposure to contamination in the capped area. The State also believes that the monitoring of the cap may prove to be difficult due to the chosen remedy for OU #1 which will result in the dewatering of the perching unit which was proposed as the groundwater monitoring zone. EPA has, therefore, changed the remedy for the existing cap to Alternative # 4 in the proposed plan, which provides for removal of the capped area, as explained in further detail in this ROD. This is also the stated preferred remedy of both the State and the local community.

EPA revised the performance standards for lead in building dust and for lead in soils that are beneath pavement. Both of these scenarios are difficult to evaluate due to the risk assessment models used to determine cleanup values for lead. In the case of lead in buildings, the original cleanup value was set at 16 mg/m^2. This was re-evaluated based on the public's comment and set at 849 mg/m^2. This value better reflects the potential for risk at the site due to building dust. The original number proposed for soils underneath pavement was set at 1,000,000 mg/kg. This value was based on the potential for those soils to effect groundwater. EPA reconsidered this value for the potential worker who may excavate this material due to redevelopment of the site. This re-evaluation resulted in the new performance standard of 5,537 mg/kg. The process for determining these value was documented in the Administrative Record.

As explained in Section 6.7.1 of this ROD, EPA has changed the dioxin cleanup level from 1.0 ppb (TEQ) for unpaved surface soils and 3 ppb (TEQ) for paved soils to a uniform level of 5 ppb (TEQ) based on the recently issued OSWER Directive No. 9200.4-26. The Directive established a surface soil level of 5 to 20 ppb (TEQ) as a preliminary remediation goal (PRG) for industrial sites. However, as noted in Section 6.7.1, this change in dioxin cleanup levels is not expected to effect the actual dioxin levels left on-site after remediation because other site-related contaminants are co-located with the dioxin contamination and will require remediation.

APPENDIX A:

RESPONSIVENESS SUMMARY

WOOLFOLK CHEMICAL WORKS SITE

RECORD OF DECISION, OPERABLE UNIT #3:

FORT VALLEY, PEACH COUNTY, GEORGIA

RESPONSIVENESS SUMMARY
WOOLFOLK CHEMICAL WORKS SITE
OPERABLE UNIT #3: ON-FACILITY CONTAMINATION
FORT VALLEY, PEACH COUNTY, GEORGIA

The U.S. Environmental Protection Agency (EPA) held a public comment period from May 14, 1997 through August 8, 1997 for interested parties to give input on EPA's Proposed Plan for Remedial Action at the Woolfolk Chemical Superfund Site in Fort Valley, Peach County, Georgia. A public meeting was conducted by EPA on June 12, 1997, at Fort Valley State University in Fort Valley. At the meeting EPA presented the Proposed Plan for the Woolfolk Chemical Works Site, Operable Unit #3, which was based on the results of the Remedial Investigation and Feasibility Study (RI/FS).

A responsiveness summary is required to document how EPA addressed citizen comments and concerns about the Site, as raised during the public comment period. All comments summarized in this document have been factored into the final decision of the remedial action for the Woolfolk Site.

This responsiveness summary for the Woolfolk Site is divided into the following sections.

I. Overview - This section discusses the recommended alternative for remedial action and the public reaction to this alternative.

II. Background on Community Involvement and Concerns: This section provides a brief history of community interest and concerns regarding the Woolfolk Site.

III. Summary of Major Questions and Comments Received During the Public Comment Period and EPA's Responses: This section presents comments submitted during the public comment period and provides the responses to these comments.

IV. Concerns to be Addressed in the Future: This section discusses community concerns of which EPA should be aware during future actions.

I. Overview

The preferred remedial alternative was presented to the public in a Proposed Plan released on May 14, 1997. A public meeting was held June 12, 1997 with about 300 people attending. EPA held a 30-day comment period from May 14 to June 14 and extended it to July 14 upon requests from the public for the extension. EPA then extended the comment period to August 8 upon request of a potentially responsible party who had not been provided access to certain EPA files. EPA announced the public meeting and comment period in the Fort Valley Leader-Tribune and the Macon Telegraph prior to the start of the comment period. EPA also mailed out the proposed plan to approximately 700 people on the Woolfolk Site mailing list.

The proposed plan addressed four areas of concern and proposed EPA's preferred alternative for each. The four areas included the buildings on the Woolfolk property, the on-site soils, the capped area, and the storm water system draining across the Woolfolk property.

People making comments for the record at the public meeting expressed little support for the proposed plan. All commenters at the meeting indicated that the community wanted the material under the cap removed and taken out of Fort Valley. A few commenters stated that all contaminated soils on the Woolfolk property should be cleaned up. Those mentioning this area of concern did not seem to agree with the agency's proposal to cover some areas with lower levels of contamination with pavement. In general, commenters did not address the other two areas of concern (site buildings and the storm water system) and did not indicate a preference for any cleanup alternatives for addressing contamination in buildings or the storm water system.

II. Background on Community Involvement and Concerns

EPA has made significant efforts to insure that interested parties have been kept informed and given an opportunity to provide input on activities at the Woolfolk Chemical Works site. EPA has been working with the community surrounding the Woolfolk Chemical Works since 1990. In September 1990, press releases informing the community about the NPL listing of the site were released. Subsequent interviews were held that Fall to develop a Community Relations Plan (CRP). The information repository was established in October 1990, at the Thomas Public Library, 213 Persons Street, Fort Valley, Georgia. The CRP, which was finalized in November 1990, has been placed in the information repository. In January 1991, EPA held a public meeting to discuss the start of the RI/FS.

In July 1993, EPA issued a press release and fact sheet on the findings of the RI study regarding soil contamination in residential areas and health precautions recommended by the Agency for Toxic Substances and Disease Registry (ATSDR). On August 2-3, 1993, EPA conducted door-to door visits to the potentially affected residents to further distribute the fact sheet and extend our invitation to an availability session. The availability session, held on August 3, 1993 discussed the results of the RI study and ATSDR's recommendations for health precautions. Fifty people attended the session which was hosted by EPA, the Georgia Environmental Protection Division (GaEPD), and ATSDR. Representatives of Canadyne-Georgia Corporation (CGC) were also present.

EPA's Emergency Response and Removal Branch determined the extent of off-site contamination which needed immediate response, excavated contaminated soils from the majority of residential properties, and completed the destruction of an on-site, dioxin-contaminated building (Building E). This work was conducted under EPA oversight by CGC, which is complying with an Unilateral Administrative Order (UAO) requiring the disassociation of the affected residents from contaminated soils and destruction/removal of Building E. EPA has met numerous times with the residents individually and held public meetings throughout this process.

The Feasibility Study, the Proposed Plan, and the Administrative Record (AR) for Operable Unit (OU) #1, which addressed contaminated groundwater, were released to the public on January 18, 1994. These two documents were made available in both the EPA Region IV Docket Room and the information repository at the site. The notice of availability of these documents and the AR was published on January 18, 1994 in various local publications. A public comment period was held from January 18, 1994 to February 17, 1994. In addition a public meeting was held on February 1, 1994. At this meeting representatives from EPA, ATSDR, and the State of Georgia answered questions about problems at the site and the remedial alternatives under consideration for addressing contaminated groundwater. Comments on the OU#1 Proposed Plan were addressed in the Responsiveness Summary attached to the OU #1 Record of Decision (ROD).

EPA also hosted a series of five meeting with a group of eleven community members representing different views throughout the community. The group formed under the already existing TAG group and was called the Community Information Exchange Group (CEIG). The purpose of the group was to allow EPA to explain to a greater degree the activities at the site while receiving input from the community on issues of concern to the community. The CIEG met from March through June 1995 and concentrated on issues related to OU #2 and future actions at the Site. OU #2 addressed certain off-site properties proposed for redevelopment as a library.

A Feasibility Study Addendum, a Proposed Plan, and an Administrative Record for OU #2 were prepared and made available to the public on July 18, 1995. These two documents were made available in both the AR, maintained in the EPA Region 4 Docket Room, and the information repository near the site. The notice of availability of these documents and the AR was published on July 18, 1995 in various local publications. A public comment period was held from July 18, 1995 to September 15, 1995. In addition a public meeting was held on August 29, 1995. At this meeting representatives from EPA and the State of Georgia answered questions about problems at the site and the remedial alternatives under consideration. EPA addressed those comments in the responsiveness summary in Appendix A of the Operable Unit #2 Record of Decision (ROD).

EPA provided a fact sheet to the community in February of 1996 on the status of all cleanup activities at the Woolfolk Site. EPA continued to work with the Woolfolk Citizens Response Group (WCRG), the recipient of EPA's Superfund Technical Assistant Grant (TAG), and their technical advisor, throughout 1996 and 1997 on groundwater issues, the design for the groundwater cleanup remedy (Operable Unit #1), redevelopment of the properties addressed by the Operable Unit #2 ROD, and on Operable Unit #3 issues. In addition, EPA responded to numerous letters and phone calls from citizens and to Congressional inquiries to insure that the Fort Valley community had sufficient information on Superfund activities at the Woolfolk Site

III. Summary of Major Questions and Comments Received During the Public Comment Period and EPA's responses

Concern 1: The Existing Cap; a majority of the comments related to the proposal for the existing cap requested that the contamination below the cap be removed from the site. The comments stated that it did not make sense to have a hazardous waste landfill in the vicinity of a residential neighborhood, that the landfill is illegal, affects groundwater, and limits future redevelopment potential, that the clay liner is too porous, the organic liner is dubious (considering the bulldozer which was photographed as penetrating it), that the actual contamination is unknown, and that the drainage layer is too permeable. The proposed remedy was also not considered to be a permanent solution by many commenters.

The PRP commented that historical groundwater contamination showed similar levels in the groundwater when comparing levels prior to cap installation and after cap installation. The PRP believes that the proposed remedy is protective and that the other remedies would significantly increase short-term risk and cost without a measured improvement in the long-term risk. The PRP also outlined some of the benefits of the cap over the past 10 years since it was installed, including limiting the spread of contamination and lessening the potential threat of the Site.

EPA Response: In response to the comments received, EPA has changed the remedy for the existing cap to provide for removal of the cap and the contamination below it for treatment and disposal off-site. EPA concurs that the landfill was inappropriately placed in residential surroundings. Though it is difficult to determine the actual occurrence of an illegal action, there may have been material placed in the landfill which may make it illegal. It has not been determined that the cap is affecting groundwater directly; however, the potential does exist if the cap were found to fail. EPA also concurs that the future use of this property is limited due to the existing cap.

EPA agrees that the historical information does not indicate that the cap has failed. EPA does agree that the short-term risks increase in the community if the capped material is removed; however, EPA also believes that a measured decrease in the long-term risks can be achieved by removing the capped contamination from the site. This reduction in long-term risk would result from excavating and treating the material with subsequent removal of the contamination from the site. Once placed off-site, the material would be properly managed through an off-site facility thereby adding a level of protectiveness which may not be achieved at the site. In addition, removal of the capped material is strongly favored by the community and the State.

<u>Concern 2:</u> One commenter objected to the use of deed restrictions to prevent future residential use of the Site property.

<u>EPA Response:</u> Deed restrictions and other institutional controls are commonly use by EPA in situations where remaining contamination may pose a risk if the use of contaminated property is not restricted, but would be protective if land use is limited in a particular way. For example, deed restrictions prohibiting groundwater use are sometimes used to protect people until groundwater remediation goals are met. Deed restrictions are also often used to prevent residential use of property where remaining contamination would pose a risk under a residential scenario but would be protective under a commercial or industrial scenario. The selected remedy for Operable Unit 3 requires deed restrictions to prevent residential use of the former Woolfolk Chemical Works facility property. This property is already being used for commercial/industrial purposes. Deed restrictions are more likely to be used when the property is already used commercially and the likelihood of future residential use is low. The use of deed restrictions allows the cost of cleanup to be limited where the cost of cleaning up to a more stringent standard is not justified by the probable future land use of the property.

<u>Concern #3</u> The owner of most of the Site property objected to the use of deed restrictions limiting use of the property and indicated that it would not consent to such deed restrictions.

<u>EPA Response:</u> EPA understands that the property owner would prefer to maintain unlimited options for use of the property. However, EPA must select a cleanup option which provides the best balance among the selection criteria. In this case, the remedy which provides the best balance among selection criteria includes deed restrictions as a remedy component. While enforcement issues are not properly the subject of discussion in the record of decision, EPA notes that, as owner of portion of the Site, the commenter is itself a potentially responsible party which can be held liable for the cost of remediation. Accordingly, the property owner can be compelled to adopt the deed restrictions which are a component of the remedy. The property owner indicates that the prior owner of the property had promised to fully remediate the property; however, EPA's cleanup action is independent of any contractual or other claims that may exist between the current and former owner.

<u>Concern #4:</u> The current owner/operator of most of the site property objects to sampling and remediation of buildings which are currently in use.

<u>EPA Response:</u> EPA is responsible for ensuring the protection of public health and the environment from contamination at the Site. EPA's responsibility includes protection of current and future on-site workers, who may be affected by contamination which has been released or may be released in or from buildings. Further, the current owner/operator has indicated there is a significant possibility that it will move its business to another location. Should on-site buildings be abandoned, there is a risk that they would be improperly decontaminated or demolished, resulting in the release of contamination into the environment, and in the continued threat of exposure of people to contamination. EPA's cleanup action is intended to be a final action for the Operable Unit 3 property, and EPA would be failing in its mission to provide protection of public health and the environment if it ignored the possible presence of contamination from the Site in any on-site buildings.

<u>Concern #5:</u> The PRP objected to EPA's decision to address buildings currently in use by the current

owner/operator of the Site. Specifically, the PRP objects to EPA's cleanup decision regarding buildings which have not yet been characterized. The PRP also questioned whether CERCLA authority could be used to address the buildings because the PRP does not believe that contamination in buildings presents the requisite release into the environment.

<u>EPA Response:</u> EPA has evaluated the buildings historic use to determine the potential that the buildings are contaminated. Additionally, EPA has characterized building W and determined a cleanup level for buildings. Accordingly, EPA has adequate information upon which to base contingent decisions for buildings that would be implemented if testing during design indicates that the buildings are, like building W, contaminated above safe levels. EPA believes it is appropriate to move forward based upon this available information, and gather additional information during remedial design, rather than further delaying action to reduce risk at the Site. The PRP claims that EPA should only address buildings no longer in use, but nothing in CERCLA provides that the continuing use of a contaminated area renders that area outside of CERCLA's scope.

CERCLA authority may also be used whenever there is a release or threat of release into the environment. The current owner/operator of the buildings, has indicated there is a strong possibility it will move its operations to another location. Given the uncertain future use of the site, there is a strong possibility that the buildings will be abandoned and improperly decontaminated or demolished. This could result in unacceptable releases of contamination into the environment. Moreover, as with house dust in off-facility residences, some of the building contamination is the result of releases into the environment which ultimately migrated into building interiors, rather than the result of strictly interior releases. For example, tracking of soil from the site into buildings and the migration of windblown contamination into buildings is the result of a release into the environment which it is EPA's responsibility under CERCLA to track and remediate.

<u>Concern #6:</u> The PRP commented that the current owner and operator of the Site should be ordered to participate in implementing the OU3 remedy.

<u>EPA Response:</u> This comment relates to EPA enforcement and, while EPA will carefully consider all enforcement options, this is not an issue that is properly the subject of discussion in the ROD, which deals with selection of remedy issues.

<u>Concern #7:</u> The PRP argued that any decontamination of buildings still in use would only be temporary because the buildings would be recontaminated by ongoing site operations.

<u>EPA Response:</u> EPA cannot absolutely prevent recontamination of property. However, as a site subject to CERCLA remedial action, EPA is responsible for addressing existing contamination. Should the site be recontaminated by a future operator, a variety of state and federal authorities can address any threat posed by such contamination. Ideally, current and future operations will be managed in a way that prevents significant recontamination, and in accordance with regulatory requirements.

<u>Concern #8:</u> The PRP argues that EPA's decision to address site buildings is inappropriate because no balancing of costs has occurred.

<u>EPA Response:</u> EPA has analyzed the relative cost of the alternatives with respect to Building W and N, and the available alternatives and their relative costs would be comparable for any building found to require cleanup action. The range of feasible alternatives, and their respective relative costs, would not be expected to differ greatly from building to building.

Concern #9: One commenter makes the point that "...the USEPA finally admits what the HRS noted a decade ago - there are no effective aquicludes down to the bottom of the misnamed "confined" Cretaceous aquifer". The commenter further makes the point that if there was an effective aquiclude above the Tuscaloosa aquifer, it has been punctured by numerous monitoring wells, and by city water-supply wells. This statement implies that these wells have compromised the integrity of hydraulic confinement between the Tuscaloosa aquifer and overlying, more contaminated ground water.

The commenter also expresses a concern about abandonment of deeper monitoring wells at the facility. Furthermore, the commenter expresses concern about the interconnection between the Upper Cretaceous water table aquifer and Upper Cretaceous confined aquifer, and the probability of success of the Operable Unit 1 ground-water remedial action if "the downward component" in these aquifers predominates. The commenter notes that removal of the continuing source(s) of contamination is necessary (presumably to effectively remediate or limit further contamination of the ground water). The commenter finally notes that pumping at or near the source makes more sense (presumably makes more sense than attempting to remove contaminants from zones further from the source).

EPA Response: The EPA has known for some time, since at least the completion of the Woolfolk Remedial Investigation in 1992, that the confining layer above the aquifer is leaky. The Remedial Investigation identified site-related ground-water contamination in samples from numerous wells in the aquifer. Prior to the Remedial Investigation, groundwater sampling of several of these wells had indicated contamination in the Upper Cretaceous confined aquifer; this sampling had been of a relatively limited scope and was not performed under EPA oversight, making the results of such sampling inconclusive from EPA's perspective.

An aquifer test conducted prior to the Remedial Investigation had clearly established a degree of hydraulic connection between the Tuscaloosa aquifer and the overlying Upper Cretaceous confined aquifer before any wells were installed under EPA oversight during the Remedial Investigation (reference the 1992 Remedial Investigation Report, Section 3.5.2.3). Some degree of enhanced hydraulic connection between aquifers is possible around poorly constructed wells. However, with respect to wells installed at the Woolfolk site, ground-water monitoring has not demonstrated comparable ground-water contaminant concentrations or water levels between paired, or nearby Upper Cretaceous confined aquifer and Tuscaloosa aquifer ground-water monitoring points (MW-35 compared to MW-7T; MW-2R compared to MW-2T; MW-34 compared to MW-26; MW-24 compared to MW-5T). Thus, one would conclude there is no environmental or hydrologic significance to any possible enhanced aquifer hydraulic communication around these wells. It is also noted that an evaluation of the hydraulic properties of the lower hydraulic conductivity layers above the Tuscaloosa aquifer indicated an overall vertical hydraulic conductivity of 0.37 feet per day (reference Remedial Investigation Report, Section 3.5.2.3). This value clearly indicates the potential for movement of water through the upper confining sequence for the Tuscaloosa aquifer.

With regard to well abandonment, EPA does typically require grouting the well bore to minimize hydraulic connection between aquifers. In this hydrogeologic setting, any grouted boreholes would result in much less hydraulic communication between the deeper aquifers than would the naturally occurring geologic materials.

Site investigations have identified a strong downward component of ground-water flow in the Upper Cretaceous water table aquifer. This aquifer is in fact a very leaky confining sequence for the underlying

Upper Cretaceous confined aquifer. As such, the commenter is correct with regard to the Upper Cretaceous water table aquifer-the strong vertical component of ground-water flow may limit the effectiveness of any ground-water remedial actions focused in that specific geologic material. In the Upper Cretaceous confined aquifer, there is a greater component of horizontal flow, and the pump and treat remedial action is therefore anticipated to generally be more effective. It is a goal of the EPA to limit or arrest any further ground-water migration of site contaminants, including vertical contaminant migration into the Tuscaloosa aquifer. Woolfolk Operable Unit 1 (ground-water remediation) is designed to accomplish that goal, regardless of its degree of effectiveness in completely restoring ground-water quality in the Upper Cretaceous water table or Upper Cretaceous confined aquifers. While pumping water from the Upper Cretaceous confined aquifer will cause some enhanced downward migration of contaminants from the overlying leaking confining sequence of the Upper Cretaceous water table aquifer, this process is already occurring to a significant degree under ambient conditions. If further downward contaminant migration is not arrested, Tuscaloosa aquifer ground water may eventually become contaminated by constituents now present in only the overlying aquifers.

The EPA agrees that contaminant source removal is important in this regard; however, for purposes of eliminating additional contaminant migration to ground water, isolation of the source from the environment may be as effective as outright removal. Furthermore, portions of the groundwater remedial action for this site involve contaminant removal from the uppermost, surficial aquifer. However, in order to effectively arrest further ground-water contaminant migration, pumping from some deeper wells is necessary.

Concern #10: Concern expressed regarding high-level arsenic contamination in soils as representative of a threat to ground water.

EPA Response: Soil remedial action objectives are discussed in Section 5 of the Feasibility Study Addendum for Operable Unit 3. In addition to strictly risk-based remedial goals for protection of human health, the EPA considers protection of the environment. Specific to soils at the Woolfolk site, the concern about protection of the environment focuses on the underlying ground-water resources, which represent both a potential and actual source of drinking water for the Fort Valley community.

The threat to ground water from arsenic-contaminated soils above the water table results from the combined factors of the soil contamination, and water movement through those soils. Arsenic soil contamination above the water table is not a threat to ground water unless it is carried downward by percolating water. Conversely, a large amount of percolating ground water does not in itself pose a threat to underlying ground water. Contaminants must be present in the percolating water to present a threat.

In order to evaluate the threat to ground water from soil contamination above the water table, the EPA has used a soil-water contaminant transport model. This model assumes that some relatively small amount of contaminant in the percolating water would be acceptable with respect to the ground-water concentrations protective of human health. The model defines, with a reasonable degree of certainty, the conservative (i.e. minimum) soil contaminant concentration which could generate a percolating water contaminant concentration that is a threat to the ground-water resource.

The volume and rate of migration of percolating water through the soils underlying the cap is predicted to be extremely small, relative to the volume and rate of migration of percolating water through uncapped soils at the site. As a result of the cap's influence on the volume and rate of water movement through the soils under the cap, the amount of arsenic in the percolating water under the cap which would mix with ground water in a given period of time is exceedingly small. Thus, the concentration of arsenic in that percolating water (and in the soil) could be extremely high, without significantly affecting the underlying ground water. It is important to note however that actual, measured concentrations of arsenic in the soil under the cap do not begin to approach the predicted soil arsenic concentration under the cap which would result in significant ground-water impacts. Thus, for arsenic, the worst-case conditions which are actually present in soils under the cap are considered protective with respect to soil contaminant migration to ground water.

Concern #11: Concern about a storm water contaminant pathway to drinking-water wells.

EPA Response: The Remedial Investigation Report, Section 2.8, noted that no private water-supply wells have been identified within a 2-mile radius of the Woolfolk facility. There is no reason to believe that wells more than 2 miles from the Woolfolk site have been contaminated from storm-water runoff leaving the site. Sampling of storm-water runoff within and in the immediate area of Woolfolk OU3 has revealed no levels of contaminants that would indicate a current significant ground-water threat from that surface-water. However, it is quite likely that higher levels of contaminants were present in the surface-water runoff in the past. The best indicator of the level of site contaminants in past storm-water discharge is the level of sediment contamination observed along the storm-drainage pathway downstream of the site (southeastward, along Preston Street), continuing into a storm-water drainage ditch encompassing Woolfolk OU4 (area south of Lavender Street). Surface and shallow subsurface soil and sediment samples from the open drainage ditch downstream of Woolfolk OU3 have revealed concentrations of several contaminants which are attributable to the Woolfolk site. These contaminants have primarily been lower mobility pesticides which are not associated with significant levels of ground-water contamination beneath the OU3 area. However, a few contaminant concentrations have been detected in these soil or sediment samples which exceed the OU3 soil remedial goals for ground-water protection. It is unknown with certainty if these contaminated sediments represent a threat to ground water, although the nature and distribution of this sediment and soil contamination indicates it is much less of a threat to ground water than the contaminated soil which is (or once was) present in the OU3 area. Further investigation of contaminated soil and sediment along the storm-water pathway is planned during the OU4 investigation. This additional data will be considered to determine if there is any potential concern about ground-water contamination from those soils and sediments.

Concern #12: Concern about the Fort Valley municipal wells near the site.

EPA Response: This concern would not properly be addressed as a part of the OU3 soil remedial action at the Woolfolk site. With respect to the municipal wells closest to the Woolfolk site, they are currently not being used as a source of drinking water because of observed groundwater contamination by tetrachloroethylene (PCE), a common industrial solvent and degreasing compound. The source of this PCE contamination is under investigation. Several options are available to address the PCE contamination in water from these wells, including permanent well abandonment. The source, nature and extent of the PCE contamination in the Tuscaloosa aquifer may influence any decision regarding abandonment of the municipal wells. Additionally, ongoing investigations of the PCE contamination, and monitoring of Woolfolk groundwater remedial actions should better define the potential threat to the municipal wells from Woolfolk site groundwater contamination and may influence any decisions made regarding continued use of the municipal wells. The EPA is unaware of any additional water-supply wells which are threatened as a result of the groundwater contamination from the Woolfolk site. One intent of the groundwater remediation at the Woolfolk site is to effectively arrest any further migration of groundwater contaminants, and the EPA believes that this goal is attainable.

Concern #13: PRP concern regarding the methodology used to calculate soil remedial goals for ground-water protection.

EPA Response: The comment indicates that the methodology selected by the EPA for the determination of soil remedial goals is inconsistent with EPA guidance, and soil remedial goals should therefore be recalculated using established EPA guidance. EPA guidance on calculation of soil remedial goals for ground-water protection allows for considerable latitude in selection of the model, consistent with universal modeling practices and applicability of the model to a specific set of site conditions. Regardless of the nonspecific "EPA guidance" cited in this comment, the specific model selected by the EPA (Multimed) is the same model previously used by CGC's contractor during the contaminant fate and transport analysis presented in the Woolfolk Remedial Investigation Report. In recent EPA guidance (U.S. Environmental Protection Agency, Office of Emergency and Remedial Response, Soil Screening Guidance: Technical Background Document Publication 9355.4-17A, May, 1996), the Multimed model is characterized as follows: "MULTIMED is appropriate for simulating contaminant migration in soil and can be used to model vadose zone attenuation of leachate concentrations derived from a partition equation." With these considerations in mind, EPA selected this model for evaluation of soil contaminant leaching to ground water at the Woolfolk site. As an additional observation, the Multimed model has been used at other NPL sites to guide selection of soil remedial goals for ground-water protection.

A significant difference between the EPA's modeling performed as a part of the Feasibility Study Addendum for Operable Unit 3 and modeling which would be done using the "Summers Model", which is referenced by CGC as a model they proposed for evaluating the soil contaminant leaching to ground water (discussion on page 1 of the CGC July 11 letter attachment comments on Appendix D to the Feasibility Study Addendum) is that the Multimed model can be run such that the contaminant source is not considered to be fixed with respect to concentration or mass over time. A modeling methodology which considers the contaminant source term to be consistent over time is appropriate for many conditions, but was considered by the EPA to impart a conservatism to the model results (calculation of soil remedial goals which are probably lower than are necessary for ground-water protection) which was generally inappropriate for the Woolfolk OU3 analysis, considering site conditions. Based on the Woolfolk site conceptual model, adjustments were incorporated into the Woolfolk Multimed modeling analysis which, in an appropriately conservative manner, considered some reduction in source strength over time.

Concern #14: One commenter recommended the consistent use of the geometric mean throughout the Feasibility Study Addendum, including Table 2-1.

EPA Response: Table 2-1 presents the arithmetic mean, which, in the context of defining soil contamination relative to the maximum concentration, is a valid statistic. The use of the geometric mean or median in calculations specific to soil remedial goals for ground-water protection was chosen by the EPA such that values considered to represent the average condition for the site were not biased toward a high estimate of the average.

Concern #15: The commenter requested discussion of the SPLP test results in Section 2.2 of the Feasibility Study Addendum.

EPA Response: Section 2.2 discusses the nature and extent of contamination for OU3, and therefore does not include any information concerning contaminant leachability from site soils. The SPLP data were considered by the EPA in the calculation of soil remedial goals, and a discussion of how those data were incorporated in the EPA analysis is included in Appendix D.

Concern #16: EPA methodologies to develop action levels for OU3.

EPA Response: EPA believes the methodologies used to develop soil action levels for protection of ground water at the Woolfolk site are appropriate, given the inherent uncertainties in soil contaminant transport modeling, the prolonged Woolfolk site production and formulation of a variety of pesticides, leading to the documented extensive ground-water contamination beneath the site, and the complex hydrogeology of the site, which makes subsurface contaminant transport modeling difficult. EPA has acknowledged that for this site, there is an uncertainty in any soil contaminant transport modeling, and thus uncertainty in calculations of soil remedial goals for ground-water protection (September 26, 1995, December 11, 1995, and March 3, 1997 memoranda from William N. O'Steen to Tim Woolheater, Woolfolk Remedial Project Manager).

Concern #17: PRP Review Comments on the Operable Unit 3 Feasibility Study Addendum, Appendix D-Overall Summary. Presented in May 1997 submittal. The PRP expressed further concern regarding the process EPA used to calculate the soil remedial goals for groundwater protection .

EPA Response: After consideration of all available site data, including the nature and distribution of the observed soil contamination data, the EPA determined that the Summers model approach for defining soil remedial goals would probably be overly conservative. Therefore, the Multimed model, which was initially used by CGC's contractor to evaluate soil contaminant leaching at the site (Remedial Investigation Report, Chapter 5), was used by the EPA to calculate soil remedial goals. This model was developed for the EPA and has been used at other NPL sites to generate soil remedial goals for ground-water protection. To allow for the considerable uncertainties associated with soil contaminant transport at this particular site, the EPA elected to consider all available, site-specific data regarding soil contaminant leachability, rather than limit the analysis to one small data set (contained in the document "Woolfolk Chemical Works Capped Area Investigation", CH2M Hill, 1996). This latter document contained soil leachability data (Kd values) which EPA believes may not be representative of the range or average of Kd values present across the Woolfolk site. Additionally, for some soil contaminants, the EPA considered the available, site-specific Kd data to be so limited that procedures which could be used to estimate the Kd over a wider area within the site were essential to evaluate the range of potential Kd values which might be observed across the Woolfolk site. After considering the wide variability in observed and estimated Kd values, much of which is a result of inherent spatial variation in soil contaminant leachability, rather than in the method used to calculate or estimate the Kd, the EPA also decided that derivation of a range of potential soil remedial goals for each contaminant was needed to reflect the uncertainties in the estimated average soil contaminant leachability. From this range, the EPA selected a Kd value to be input into the Multimed model, based on the nature and extent of ground-water contamination at the site (ground-water contaminants which were more prevalent and found at higher concentrations were considered more conservatively in the modeling), and the degree of uncertainty in the estimate of the average value for a contaminant-specific soil leachability value (average Kd). The apparent inconsistencies in the EPA's approach reflect the differing levels of confidence, and concern, regarding the various site soil contaminant propensities to leach to ground water. EPA's calculation of soil remedial goals is fully documented in the site Administrative Record.

Concern #18: A PRP comment objects to the selection of a soil remedial goal of 113 mg/Kg for Operable Unit 3 because it is not based on modeling results representing contaminant distributions or site characteristics associated with OU3.

EPA Response: This conclusion is incorrect. The EPA and CGC have disagreed for several years about the soil arsenic remedial goal for ground-water protection, and, prior to the development of the first draft of the Feasibility Study Addendum, the EPA had calculated a soil remedial goal for the OU3 area of 100 mg/Kg (March 7, 1994 memorandum from William N. O'Steen to Timothy R. Woolheater). This 100 mg/Kg soil remedial goal was developed in response to CGC's previous comments on an EPA soil arsenic remedial goal for the Woolfolk site which did not consider a "dilution factor" applicable to the site. EPA considered this comment by CGC valid. As a result, EPA increased its calculated soil remedial goal from 84 mg/Kg to 100 mg/Kg, using a dilution factor of 0.4. At that time, the EPA strongly believed that the PRP-selected dilution factor of 0.35 was not adequately conservative for the Woolfolk site. Subsequent to that EPA position regarding the "dilution factor", the EPA acknowledged that the CGC-calculated dilution factor was a possibility. In a memorandum from William N. O'Steen to Timothy R. Woolheater dated August 25, 1994, the EPA tacitly acknowledged the possibility that a soil arsenic remedial goal based on the CGC's dilution factor of 0.35 might be appropriate for the Woolfolk site. That remedial goal would be 113.8 mg/Kg, using the EPA's previous evaluation for the OU3 area, and CGC's OU3 area dilution factor of 0.35. Thus, a 113 mg/Kg arsenic soil remedial goal is based on conditions which EPA then considered potentially applicable to the OU3 area. It is true that from the range of potential soil remedial goals for arsenic calculated by the EPA in the Feasibility Study Addendum, (reference Feasibility Study Addendum, Appendix D, Table D-8), the EPA selected an arsenic remedial goal which is near the low end of the range. It is also correct that the 113 mg/Kg soil arsenic remedial goal selected by the EPA was not specifically modeled as a part of the OU3 Feasibility Study Addendum modeling. The 113 mg/Kg soil arsenic remedial goal was generated using the "Summers Model" (referenced on the first page of CGC's Appendix D review comments) and the "dilution factor" developed by CGC. EPA based the selection of the 113 mg/Kg goal on the range of values calculated by EPA using the Multimed model, the widespread soil and ground-water contamination by arsenic at the Woolfolk site, and the environmental persistence and mobility of arsenic, relative to other soil contaminants which are a concern with respect to ground water. Furthermore, EPA has consistently maintained a position that the threat to ground water from contaminated soils is probably greater for the Woolfolk site (the Operable Unit 3 area), in comparison to the area of peripheral soil contamination which constitutes Operable Unit 2. Thus, the soil arsenic remedial goal for unpaved areas at Operable Unit 3 should be at least as conservative, in EPA's opinion, as the 113 mg/Kg soil arsenic remedial goal for Operable Unit 2. In fact, the EPA believes that a soil arsenic remedial goal for the Operable Unit 3 which is slightly lower than 113 mg/Kg is probably more appropriate, but, as previously noted, EPA has acknowledged some level of uncertainty in the soil remedial goal calculations. Had the EPA either selected a slightly higher aquifer dilution factor or slightly higher Kd value in the Multimed "no decay" modeling (results in Feasibility Study Report, Appendix D, Table D-2), an arsenic remedial goal of 113 mg/Kg would have been calculated. EPA selected the 113 mg/Kg goal as a value which uses CGC's selected dilution factor, is consistent with the Operable Unit 2 soil arsenic remedial goal, and is near the low end of the range of arsenic remedial goals which EPA considers as potentially appropriate for Operable Unit 3 soils.

<u>Concern #19:</u> A PRP comment further asserts that soil remediation goals for site contaminants were developed by the EPA on the assumption that they pose the same risk to human health and the environment, have the same environmental persistence, and will behave in the environment in a manner similar to arsenic.

<u>EPA Response:</u> This conclusion is incorrect. Because of the complex relationships between these contaminant toxicity-persistence-mobility factors, the EPA devised a generalized method to define the degree of conservatism applied, considering the range of soil remedial goals which might be appropriate for the site, to select a soil remedial goal from within that range. This method acknowledged the degree of ground-water contamination by a specific contaminant, relative to arsenic ground-water contamination. Where a ground-water contaminant was detected at an average concentration much higher above its ground-water remedial goal than was the case for arsenic, a relatively more conservative soil remedial goal for that contaminant was selected from the range of soil remedial values calculated using the Multimed model. Conversely, where there was relatively less ground-water contamination, a less conservative soil remedial value within the range was selected by the EPA. This approach is intuitively valid, although it is not strictly quantitative. The method is considered an improvement over a deterministic approach which does not consider the inherent uncertainties in soil contaminant transport modeling, and which applies a "one size fits all" approach to remedial goals, rather than using site-

specific data analysis to guide a remedial decision.

Concern #20: A subsequent comment stated that "...EPA also rejected its own soil action levels..."

EPA Response: The procedure outlined in the December 16 memorandum did not determine a soil action level directly, but only provided guidance on where, within a potential range of soil action levels defined by Multimed, the appropriate action level should probably be, given the degree of ground-water contamination by a specific contaminant present at the site. Where the procedure may have indicated a very low level of ground-water contamination present, relative to the arsenic ground-water contamination, the highest soil remedial goal obtained by the Multimed model was selected. In other words, the upper limit of the validity of this soil remedial goal refinement approach was the highest soil remedial goal calculated using the Multimed model, which was the actual tool used to evaluate soil contaminant leaching to ground water.

Concern #21: Comments were given by the PRP on the March 3, 1997 memorandum from William N. O'Steen to Timothy R. Woolheater. The concerns and responses are presented below.

EPA Response: The PRP questioned the EPA's use of the soil-water partioning coefficient (Kd) values in EPA modelling. EPA's purpose in defining a statistical range of the estimated average Kd was to make the selection of input to the soil contaminant and fate transport modeling more consistent with recent EPA policy concerning the use of probabilistic techniques in risk assessment. In this regard, the point estimates of the median and geometric mean Kd statistics were reported, and the memorandum in question discussed the validity of using these values. This analysis considered data obtained before the SPLP test results were generated. EPA acknowledges that their use of the confidence limits on the geometric mean statistic was inappropriate. However, for the calculation of soil remedial goals for ground-water protection (Feasibility Study Addendum, Appendix D, Tables D-2 through D-7), the selected Kd for all of the compounds discussed in the referenced March 3, 1997 memorandum is justifiable based on a statistical confidence interval analysis of the median Kd. The bias in EPA's statistical analysis of the confidence interval on the geometric mean does not apply to the statistical analysis of the median. EPA's position is that for the Woolfolk site, uncertainty analysis in evaluation of the Kd values is very strongly indicated. For those contaminants discussed in the March 3, 1997 memorandum, the Kd values used in the Multimed modeling are approximately equal to, or higher than, the 80% lower confidence on the median estimated Kd, when all data considered by the EPA, including the SPLP results, are statistically evaluated. Therefore, the EPA believes that the Kd values used in modeling calculations of soil remedial goals for ground-water protection are conservative, but are valid for the calculations.

The comment further addresses the validity of combining SPLP soil leaching data with data from other previously used soil leaching tests for evaluating contaminant leachability from site soils. The SPLP test is probably the most valid test for estimating the soil contaminant leaching potential due to percolation of acidic rainwater through a soil. However, the data set of SPLP values is extremely small, relative to the observed inherent variability in the contaminant leaching potential of site soils. Thus, use of the SPLP data alone would probably provide a very poor estimate of the average soil contaminant leaching characteristics for the entire facility, particularly considering that the soils for this SPLP testing were collected from a limited area within the site. With respect to the various soil leaching tests, there is generally some degree of overlap of test results, which indicates that to a certain degree, tests results are a factor of the intrinsic soil contaminant leaching potential, and not the test procedure employed. Furthermore, the observed soil pH in several onsite soil samples is low (Remedial Investigation Report, Table 3-1), which suggests that the EP toxicity and TCLP tests did not result in an extreme bias due to testing the leaching potential of soils by using a low pH extract on a soil with a high pH. To increase the size of the data set, soil leachability test results from the Remedial Investigation were also considered by the EPA. The Remedial Investigation leaching tests used distilled water as the leaching medium, which is not likely to be a reasonable approximation of either precipitation falling on the site, or water percolating through contaminated site soils. It has previously been acknowledged by the EPA that uncertainty exists in the true, representative average measure of soil contaminant leaching potential at this site. Because of the degree of uncertainty present, EPA has favored a conservative approach in selecting the measure of soil contaminant leaching potential to predict a soil remedial goal which would be protective of ground water.

The comment states on page 6, comment 2, that EPA , in the March 3, 1997 memorandum, has stated that use of site-specific Kds is inappropriate. This comment is incorrect. The memorandum states that the sole use of the site-specific Kds generated by the small number of SPLP tests on soils from a limited part of the Woolfolk site to predict site-wide soil contaminant leaching potential is inappropriate. In the absence of an adequate site-specific data set for the soil contaminant leaching properties of many soil contaminants of concern, the EPA had to rely on some literature values for the inherent, contaminant-specific leachability of site contaminants, in order to estimate the soil contaminant leachability from different parts of the site. The EPA prefers site-specific data to literature values. However, EPA considers that the use of an inadequate data base to make a critical decision on Woolfolk Operable Unit 3 soil contaminant transport model input would be an insupportable decision.

The comment also states that the soils beneath the cap are more contaminated, and (therefore) provide a more conservative estimate of contaminant mobility. The relationship between soil contaminant mobility and soil contaminant concentration has not been demonstrated for this site. When the EPA attempted in the past (William N. O'Steen, memorandum of January 3, 1994 to Tim Woolheater, Woolfolk Chemical Remedial Project Manager) to develop a statistical relationship between the soil arsenic concentration and the soil arsenic leachability (using what was then, and is now, the largest soil leachability data set for any of the site contaminants), CGC commented to the EPA "The small amount and large variability of data on soil and effluent concentrations that can then be used to calculate distribution coefficients does not warrant the level of statistical analysis performed by the EPA. The inherent variability of the values of distribution coefficients imposes a high level of uncertainty on any results obtained by this method." The EPA concluded, in a memorandum from William N. O'Steen to Tim Woolheater dated March 7, 1994, that CGC's comment was correct, and that soil contaminant concentration was probably not a good predictor of soil contaminant leaching potential at the site.

On page 6, point 3, the comment states that EPA use of the median in one instance, and the geometric mean in another instance, is an inconsistent application of environmental data. Both the median and geometric mean are indicators of an average value for a set of environmental data. At least one of these "point estimate" measures of the average tend to be less biased than the arithmetic mean, where an underlying sample population is not normally distributed. However, in some cases, the median, or geometric mean may be the less biased statistical measure of the average value. For instance, where a data set contains a number of relatively low values and a few extremely high values, the geometric mean statistic is probably a less appropriate measure of the average value. Conversely, where a small data set includes a sub-equal number of low and high values, with few or no "middle" values, there would be considerable uncertainty in the true average value, and the geometric mean statistic would be an appropriate estimate of the average, if one is concerned about potentially overestimating the average value for a particular variable. As previously noted, there is some problem in EPA's development of a statistical confidence limit on the geometric mean value, as pointed out by CGC. Regardless, when uncertainty analysis is factored into the Kd calculations, all Kd values used by the EPA in the Multimed modeling are fully justifiable on the basis of the median statistic, and its uncertainty. Thus, the arguments concerning the geometric mean and median statistics have no practical significance.

On page 6, comment 4 reiterates that CGC believes the TCLP test does not provide a reasonable measure of soil contaminant leachability, and that the SPLP test is a preferred method of indicating soil contaminant leachability. The comment then states that CGC has been willing to accept the TCLP data in the absence of more applicable site-specific data. EPA's position is that the site-specific SPLP data are too limited in order to make decisions regarding soil remedial goals for ground-water protection which are applicable to the entire Woolfolk site (Operable Unit 3). Furthermore, the degree to which the TCLP data, or any other soil contaminant leaching test results are biased with respect to the Woolfolk soils cannot be quantified. Thus, one cannot weight the test results to account for a more appropriate test procedure. The EPA has taken the most reasonable and defensible approach, which is to consider all of the available data in analysis of soil contaminant leaching potential.

Comment 5, pages 6 and 7 indicates that the EPA memorandum incorrectly interpreted, and utilized, data from the Soil Treatability Study Report. The EPA memorandum did incorrectly state or imply that there are eleven soil test locations, when in fact, data from only three soil test locations are presented in that document. Regardless of that error, the statistical evaluation of that Treatability Study data by the EPA was valid, given the information available in that document.

Comment 6 on page 7 indicates that the EPA incorrectly evaluated the confidence intervals for the geometric mean. EPA acknowledges that these confidence interval are problematic, particularly with respect to the data sets which EPA has concluded probably represent a lognormally distributed population. However, regardless of the problems with this line of statistical analysis, the nonparametric analysis of the confidence interval on the median indicates that the average Kd values may be as low, or lower than the values used by the EPA contractor in the modeling documented in the Feasibility Study Addendum, Appendix D. EPA believes that a conservative approach is necessary for defining the average Kd value to be used in modeling soil contaminant leaching to ground water. This conclusion is based on the small amount of data available for most Kds (a very small amount of actual site-specific Kd estimates) and the generally extreme variability noted in Kd estimates, whether or not all data are considered together, or only leaching-test specific data are considered. Thus, EPA considers the statistical analysis of the median is more valid than consideration of the geometric mean in definition of the average Kd value for soil contaminant transport modeling.

Comment 7 on page 8 critiques the EPA approach for estimating the beta BHC Kd. There are several points made in this critique. The first point is that site fraction of organic carbon (f_{oc}) data were used in order to estimate the Kd; an approach which was in "...direct contradiction to instruction issued to CGC by EPA." This statement probably reflects the fact that the EPA would prefer where possible to rely on purely site-specific Kd data in order to develop soil remedial goals. The EPA only used the approach of multiplying the f_{oc} data by the contaminant-specific organic carbon partitioning coefficient (K_{oc}) because the site-specific Kd data generated by CGC were insufficient to develop a statistically valid estimate of the average Kd value for beta BHC which could be applied to the entire site.

The EPA considered all of the Kd data presented by CGC in Table 6-6 of their report "Woolfolk Chemical Works Capped Area Investigation" defining Kd values for soil samples collected in the Woolfolk capped area. It is therefore unclear what is meant in the second paragraph of comment 7 by the assertion that beta BHC "...is not highly mobile, as demonstrated by its presence in some soils samples, but not in the corresponding leachate samples..." Data in the referenced document do not include any case where soils contained beta BHC but corresponding leachate samples were clean (Appendix B, "Woolfolk Chemical Works Capped Area Investigation, CH2M Hill, December, 1996). There was one discrete soil sample (WIG002) which contained 11 ug/Kg BHC, but there is no corresponding water sample for comparison. As for the assertion that beta BHC is not highly mobile, it is clear from site ground-water monitoring data that this compound has sufficient mobility in the soil and ground water to have contributed to an aerially, and vertically extensive area of contamination encompassing most of the area below OU3.

Comment 7 criticizes the EPA's selection of the K_{oc} value for beta BHC from the literature. An EPA reference was consulted for the beta BHC K_{oc} value. The reviewer is correct that other references for the K_{oc} value for beta BHC are available and could have been cited by the EPA in their procedure to estimate the Kd of this compound. Two references with several K_{oc} values were consulted in addition to the EPA reference (Groundwater Chemicals Desk Reference, Montgomery and Welkom, 1989; Toxicological Profile for Alpha-, Beta-,Gamma- and Delta-Hexachlorocyclohexane (Update), Agency for Toxic Substances and Disease Registry, Report TP-93/09), and it was determined that the value from the cited EPA reference is the median of seven literature K_{oc} values. Thus, EPA believes the K_{oc} value they used to estimate the Kd for beta BHC is valid.

Comment 7 also criticizes EPA's approach of estimating the beta BHC Kd on the basis of comparing the site-specific Kds for alpha and gamma BHC. This procedure, while inexact, provided two additional estimated Kd values for beta BHC, and is a reasonable approach, given the similar chemical behavior of the various BHC isomers. If these two additional data points were dropped from EPA's analysis, the point estimate median Kd for beta BHC would change from 13.6 to 13.5, and the confidence intervals on the median would increase. There would be no practical effect on EPA's selection of a conservative estimated average Kd value for modeling soil contaminant transport.

On page 8, comment 7 states that EPA rejected arsenic and lead Kd values from a set of SPLP data. EPA did not reject any Kd data developed under any CGC-sponsored investigation, regardless of whether or not that investigation was performed under EPA oversight. However, what EPA did reject was the principle that using a very small amount of data from a limited part of the Woolfolk site would be adequate to characterize the site-wide soil leaching properties of the contaminants of concern.

On page 8, comment 7 notes that EPA's beta BHC data set includes eight "artificial" values which are below the geometric mean of the two actual site-specific Kd values. This conclusion is correct; however, an average of two values is meaningless at this site, given the wide variation in Kd values for many site contaminants which is observed where there are a larger number of actual site-specific Kd measurements. As for the validity of the "artificial" values, EPA believes that while these Kd values represent approximations with a less certain accuracy, relative to the two site-specific Kd values for beta BHC, they are necessary in order to estimate the site-wide average soil mobility of beta BHC.

Concern #22: **The PRP commented that the documentation for development of the proposed stabilization/ solidification (S/S) cleanup concentrations was not provided as part of the Feasibility Study Addendum (FSA).**

EPA Response: The documentation was not specifically in the FSA; however, was provided as part of the Administrative Record (Section 4.9, Item 41).

Concern #23: **The PRP also requested that the ROW soils located along Preston Street be included in the OU #3 activities.**

EPA Response: EPA has decided to include a portion of the ROW soils that are directly adjacent to the site in the OU #3 actions. This would include soils along the ROW from railroad street to the northern end of Jacob Alley. Those soils which are located in the ROW from the southern end of Jacob Alley to just north of Chesnut street will be addressed under OU #4, or under removal authority. These areas are considered to be in residential areas and remedial standards have yet to be established for soils in these areas; therefore, it is not possible to address these as part of the OU #3 soils.

Concern #24: Comments were made by the PRP that no further characterization is required due to the existing data for soils beneath the cap.

EPA Response: Though the PRP's rationale for accepting the existing data is reasonable, EPA has determined that, due to enhanced long-term protectiveness and community and State input, the existing cap will be excavated and disposed of off-site. It will be necessary to characterize the waste for disposal off-site. EPA would prefer that preliminary sampling of the cap be implemented in order to determine the full extent of the material to be removed prior to actual excavation; however, this will be addressed to a greater extent under the remedial design.

Concern #25: The PRP suggested corrections and clarifications to the Proposed Plan and FSA in a letter dated May 1997. Though revisions are not appropriate, certain issues will be addressed and/or clarified through this responsiveness summary. The areas addressed included the history, ownership, inclusion of 1996 Cap Report and 1987 Cleanup Report, and Building E contamination disposal.

EPA Response: The history of the site in the Proposed Plan suggested that the PRP conducted a cleanup of the property prior to transferring it to the current owner. This is incorrect; the cleanup was completed after property transfer. The PRP suggested that the following be added to the history, "In 1945, following the death of a general partner of the Woolfolk Chemical Works, Limited, another partnership, Woolfolk Chemical Works, Ltd. Was formed." EPA believes that the PRP's statement is correct. The 1996 cap report was included in the Administrative Record. The 1987 Cleanup Report has been added to the AR along with other former reports on the site. Finally, Building E contamination was disposed off-site as documented in the approval letter for the FSA.

Concern #26: The PRP suggested that the FSA does not provide the documentation for the development of the proposed S/S cleanup concentrations presented in Table 3.

EPA Response: This documentation was provided in the memorandum entitled "Evaluation of Hypothetical Future Exposures to Treated Soil" (24 April 1997) in Appendix C of the FS Report and provided in the AR.

Concern #27: The PRP requested clarification on the areas required for ecological investigation.

EPA Response: EPA is conducting an ecological investigation in the drainage corridor leading south of the site. No further ecological studies are planned at this point due to the urban nature of the Site and the surrounding areas. The drainage corrider will be addressed in OU #4.

Concern #28: The PRP requested clarification on "non-enforceable" ambient water quality criteria.

EPA Response: The original statement can be traced to the original FS Report by the PRP. The original intent of the statement is not known. The term "non-enforceable" should have been deleted, since even though the water quality criteria may not be applicable, they are considered relevant and appropriate for the stormwater ditch. No further revision of the FSA is required.

Concern #29: The PRP raised concern regarding the wood sampling comment made by EPA which questions the appropriateness of the procedures used during the sampling event. The PRP comment stated that EPA was invited to oversee the sampling event and that documentation is available for review.

EPA Response: The Building W sampling and analysis plan included the sampling of only dust. Wood sampling protocols were not reviewed nor approved by EPA. The depth of the wood sample and the location in the building would have been carefully reviewed by EPA as these are important variables in characterization of the contamination. Since this was not done the appropriateness remains in question and the questions can not be fully resolved by reviewing the data.

Concern #30: The PRP raised a concern that the source of the values for paved soils and capped soils was not presented for review and comparison.

EPA Response: Table 5-3 in the FSA presents all of the action levels applicable to soil to determine which soil areas will require some kind of remedial action. The lowest of these values becomes the unpaved soil goals presented in Table 5-4. The paved soil goals, as stated on page 5-9, are based on the groundwater protection goals for paved soils presented in Appendix D and the risk-based goals for a construction worker, whichever is lower. Based on previous comments, an additional table of information provided in Section 5 in an earlier version of the report was removed, and additional information was moved to Appendix D. The general reader who wants to know the types and values of soil goals that are to be used for particular remedial scenarios can therefore focus on Section 5, while the reader who wants to review the derivation of the goals is referred to Appendices C and D.

Concern #31: The PRP raised concern regarding discrepancies in the areas identified for paving in the FSA Figure 6-2 and Figure H-1.

EPA Response: Based on the PRP comments, the areas around the following sample should be added to the estimated area requiring paving: F6 (Arsenic). The area around the following sample should be deleted: D12. Manganese concentrations were not previously compared to soil goals because they were not included in Appendix B (Contaminant Concentrations) in the original FS Report by the PRP. However, results for this chemical are provided in the RI Report tables. Subsequent risk analysis performed for manganese has eliminated this contaminant as a COC.

Other PRP suggested revisions to the paving areas are not warranted, as follows: Samples AB1 and AB3 are angled borings beneath the cap; therefore, the contamination represented by these samples are addressed in Section 7, Detailed Analysis of Existing Cap Alternatives. Sample F5 is already included in Area 4. No compounds exceeded soil goals in Sample F4. Samples I11 and H12 are already included in Area 17. Sample SS32 is in the Preston Street ROW and therefore is not part of OU3. The results in Appendix B of the FS Report and in the data tables in the RI Report indicate that BHC compounds were not detected in sample M2. The portion of Area 22 south of Area 25 is included due to the concentrations of arsenic, b-BHC, and dieldrin in sample SS13.

Concern #32: The PRP raised concern regarding discrepancies in the areas identified for excavation in the FSA Figure 6-4 and Figure H-1.

EPA Response: PRP suggested revisions to the excavation areas are not warranted, as follows: Sample K5 contained 340 mg/kg of arsenic, which exceeds the paving goal of 317 mg/kg; therefore, this area must be included in the excavation estimate. Samples AB3 and AB4 are angled borings beneath the cap; therefore, the contamination represented by these samples are addressed in Section 7, Detailed Analysis of Existing Cap Alternatives. Excavation of Area 14 to a depth of 20 feet is not warranted, since the concentration at that depth (266 mg/kg) did not exceed the paving goal. As stated on page 5-10, the quantities are based on observed extent of contamination. The vertical extent of contamination most likely extends beyond 4 feet, but the actual depth will not be known until confirmation sampling is performed. The results in Appendix B of the FS Report and in the data tables in the RI Report indicate that BHC compounds were not detected in sample G9.

Concern #33: The PRP raised concern regarding Page 6-18 in the FSA. They suggested that although soils alternative 6 may be the most proactive for the site because contamination is removed, the actual risk is not mitigated, only moved to a different location. Furthermore, under the Superfund law, off-site disposal is the least preferable method.

EPA Response: EPA does not agree that the actual risk is not mitigated and only moved to another site. The site to which these are moved would be better regulated than leaving it on site, is not likely to be placed in an area of recharge for aquifers, and is not likely to be located in the midst of a residential neighborhood. Furthermore, CERCLA provides that remedial actions in which treatment permanently and significantly reduces the volume, toxicity or mobility of the hazardous substances are to be preferred over remedial actions not involving such treatment," and that "the offsite transport and disposal of hazardous substances or contaminated materials without such treatment should be the least favored alternative where practical treatment technologies are available." The selected remedy involves offsite disposal WITH TREATMENT. In EPA's view, the preference for treatment is met by the selected remedy, even though all of the material to be transported will not be treated. The most contaminated material, which poses the most significant risk at the Site, will be treated before it is transported offsite. It is not true that remedies involving offsite disposal are the least favored; only remedies involving offsite disposal WITHOUT TREATMENT are disfavored.

Concern #34: The PRP commented regarding the 500 cu yds of masonry debris will be excavated and transported off site for disposal. It is likely that the original 500 cubic yards of debris, when excavated today, could produce a much larger volume than the 500 cubic yards of material due to mixing with other wastes and soils, if the debris can be identified. The 1996 observations suggested that the debris was disperse through out the material and that it may not be practical to segregate the masonry debris and may unnecessarily increase the risks to workers performing the action.

EPA Response: If the debris is well-mixed within the capped material, it would be more appropriate to perform in situ stabilization on the mass without attempting to excavate the debris first. Since the remedy has changed, this comment becomes an issue only if the material requires treatment prior to being disposed of off-site.

Concern #35: The PRP suggested that normal operating hours for remediation efforts should be implemented rather than the off-hour schedule suggested to alleviate cleanup during the Sureco's normal operations.

EPA Response: These issues can be better addressed during the remedial design once the temporary operating procedures for Sureco are addressed. The FSA offered this as a suggestion to limit worker risk on the site.

Concern #36: The PRP also raised concern regarding the monitoring well proposed.

EPA Response: EPA believes this also to be a design issue and that it should be coordinated with OU 1.

Concern #37: The PRP suggested that the volume of soil under Capping Alternatives 4 and 5 are different and should be the same.

EPA Response: Under Alternative 4, S/S treatment will be performed on excavated material that is hazardous (based on TCLP testing). The conservative assumption is made that one-half of the material would be hazardous and will require treatment prior to off-site disposal. Under Alternative 5, S/S treatment is proposed for all of the material assumed to contain concentrations above paving goals, whether it is hazardous or not. The volume of material that is hazardous is expected to be much less than the volume of soil above paving goals; therefore, the volume of material to be treated should be different under each alternative.

Concern #38: The PRP stated that EPA never indicated whether Building W exceeds the cleanup goals established stated in Chapter 5 of the FSA.

EPA Response: Building W exceeds the building cleanup goals stated in Chapter 5.

Concern #39: The PRP stated that if the buildings are decontaminated, there should be no need for yearly operation and maintenance.

EPA Response: This cost was added to address the concern about recontamination of the dust in the buildings. The table was incorrectly labeled as O&M costs in the FSA and would have been more appropriately labeled as monitoring costs. The actual monitoring program would be established under the remedial design if decontamination is appropriate. The costs in the FSA are considered to be the worst-case scenario.

Concern #40: The PRP raised concern regarding EPA's storm water proposal, which stated that if the potential for release is high from the existing pipe, then repairs will be implemented prior to decontamination through slip-lining or other standard methods. The slip-lining method would require sediment removal to be effective and the PRP suggested that grouting would be more appropriate.

EPA Response: Prior to sediment removal, grouting would be more appropriate for addressing damaged sections of pipe that could allow release of decontamination fluids. If the post jetting video-inspection identifies damaged areas not visible prior to sediment removal, slip-lining could be implemented to prevent further releases.

Concern #41: The PRP suggested that the existing tank farm area near building S would not need to be excavated and that the tank farm could be left in place. Their concern is for Sureco operations and the need to relocate the farm, for areas with no known risk of contacting the contamination underneath a concrete slab.

EPA Response: EPA will require the sampling of soils beneath the tank during the RD. There is the potential that the current owner will vacate the site and under any redevelopment option this area could be excavated. The results of the sampling will determine the need for excavation of this area.

Concern #42: The PRP also provided to EPA a cost estimate for the storm water alternative 2 which was not included in the FSA.

EPA Response: These costs are presented in CGC's comments to EPA on the FSA dated May 1997 in the Administrative Record.

Concern #43: The PRP raised some specific concerns regarding the groundwater protection standards and the modeling input parameters and results.

EPA Response: A more detailed discussion of the processes incorporated into the Multimed model was provided in the Woolfolk RI Report. As stated on page D-3 of the FS Addendum, Multimed runs were made incorporating source and biological decay, while additional runs were made assuming no decay occurred, thus producing a range of results. At least one sample run for each of the infiltration scenarios (existing conditions, paved, and capped) and for each of the decay options (no decay and decay) are included in Attachment D-2. Input for other modeling runs varied only by chemical specific parameters such as distribution coefficient (which are provided on Table D-2) and biological decay coefficient for organic compounds (which are provided in Attachment D-4). Six modeling runs were performed for each of 21 chemicals, resulting in a total of 126 modeling runs. Since the printout of the input data for each modeling run covers five pages, printouts for each run input would cover over 600 pages. Inclusion of that kind of volume of data is not appropriate for this document. References for Multimed input parameters are provided in Table D-1 or in the attached EPA memoranda. See response to second bullet. An output file has been provided for each modeling run. Figures from the EPA memorandum in Attachment D-1 have been provided in the Administrative Record. Source decay rates are calculated in Attachment D-4. The source decay rate is the natural logarithm of 0.5 divided by the source half-life.

On page 2 of the PRP Appendix D comments, comment 1, the eighth "bullet" states "Sources and values for the 'Ratio Average Groundwater Concentration to Protection Standard' are not cited and cannot be recreated." The ninth "bullet" states "Average groundwater concentrations are cited in Attachment D-1, but cannot be duplicated using the reference source cited." William O'Steen memorandum of December 16, 1996 (included in the FS Addendum as part of Attachment D-1) states how the average ground-water concentration values were determined and from where the data were obtained. All values for the average ground-water concentration were obtained from the Woolfolk Remedial Investigation data for the surficial aquifer. The average ground-water concentration is the arithmetic average. Where duplicate samples had detect concentrations, the duplicates were averaged before the arithmetic average of all the samples were calculated. The ground-water protection standards used as a basis for comparison are the values specified in the Record of Decision for Woolfolk Operable Unit 1.

The referenced December 16 memorandum cites two specific examples of calculated average ground-water concentrations observed during the Remedial Investigation. For arsenic, the data used to calculate the averages are as follows:

(All arsenic data from Remedial Investigation Report, Table 4-59)

sample identification	concentration, mg/L
WRIMW12WS, WRIMW12WS2	5.92, 1.42
WRIMW2	0.0325
WRMW13, WRIMW13WS	0.686, 0.807
WRIMW16	0.0203

The average of these data was calculated as follows:
$[(5.92+1.42)/2 + 0.0325 + (0.686+0.807)/2 + 0.0203] \div 4 = 1.117325$ mg/L.

For lead, the data used to calculate the averages are as follows:

(All lead data from Remedial Investigation Report, Table 4-59)

sample identification	concentration, mg/L
WRIMW14	0.0035
WRIMW2	0.0235
WRMW4CWS	0.007
WRIMW13WS	0.0229
WRIMW2KWS	0.0043

(note: a duplicate sample for WRIMW13 was a non-detect concentration and therefore not considered in this analysis)

The average of these lead data was calculated as follows:
[(0.0035 + 0.0235 + 0.007 + 0.0229 + 0.0043] ÷ 5 = 0.01224 mg/L.

The above-calculated arsenic and lead average concentrations are those cited in the December 16 memorandum. For all other contaminants, the same procedure was used. The only difference is that the data were drawn from another table in the Remedial Investigation Report.

Concern #44: The PRP raised concerns regarding the results for lead which are counterintuitive to expected behavior.

EPA Response: EPA agrees that the lead result is counterintuitive, but the result has been verified to be an artifact of the Multimed model. For the most conservative runs that assume no decay, the lower hydraulic gradient (0.012 from the Draft FS Report, March 1996) was used. For the less conservative runs that assume decay, the higher hydraulic gradient (0.017 independently calculated by EPA from Figure D-1 in the Draft FS Report) was used.

The upper limits for chemicals for which dilution factor is "infinite" on Tables D-5 to D-7 are 100% on Table D-8. Since the lower limits are less than this, the proposed goals fall between the two values. In the case of b-BHC, the proposed goal for the unpaved scenario is the range between the maximum and minimum goals divided by 68.9. This latter value is the quotient of the "ratio average groundwater concentration to protection standard" (see EPA memorandum of 12/16/96, page 3) divided by the arsenic factor of 3.166 (same memorandum, page 2). The paved goal is calculated as the unpaved goal times the ratio of the minimum paved goal to the minimum unpaved goal. The capped and leachate goals are calculated in the same manner as the paved goal.

Concern #45: The PRP requested information regarding the source of the leachate concentrations.

EPA Response: Footnote (a) to "Leachate" in Table D-8 of the FSA indicates that these goals apply to material under pavement. Therefore, the range comes from the two Paved Soils tables. Refer to the second-to-last column labeled "Leachate Conc. at Source" in Tables D-3 and D-6. The proposed goal was calculated in the same manner as for the paved and capped soils.

Concern #46: The PRP questioned the consistency of the NG goals in Appendix D.

EPA Response: "NG" goals are not based on whether the upper soil limit is 10^6. Rather, the NG designation was made by EPA for chemicals that, based on groundwater data and migration potential, are not considered a threat to groundwater. For these chemicals, goals based on direct contact risks are more appropriate. See Table 2 in the EPA memorandum of 12/16/96.

Concern #47: The PRP commented that a 113 mg/Kg soil arsenic remedial goal calculated for a residential area should not be applied to locations on the facility where the area of contamination, exposure scenario, and other factors used to calculate the cleanup levels are different.

EPA Response: The arsenic soil remedial goal for ground-water protection is partly based on the chemical-specific maximum contaminant level (MCL) applicable or relevant and appropriate requirement (ARAR) for drinking water. As such, the risk assessment exposure scenario is not a relevant concern. For all ground water determined by the EPA to be a potential source of drinking water, MCLs are the ground-water protection standard, except in areas where waste materials are left in place (such as beneath a closed and capped landfill). As noted elsewhere in the Responsiveness Summary, the EPA considers the threat to ground water from contaminated soils at the OU3 area to be greater than the threat to ground water from contaminated soils in off-site area (i.e. at OU2). Thus, the arsenic soil remedial goal for OU3 should not be higher than the established arsenic soil remedial goal for OU2.

Concern #48: The PRP commented that it should be made clear that the modeling output concentration is actually the fraction of the original leachate concentration, and is not the actual concentration in the groundwater. An additional step would be required to correlate the MULTIMED model output results to the source concentration in order to calculate the final groundwater concentration.

EPA Response: EPA concurs.

Concern #49: The PRP also was concerned that the source does not appear to be constant over the time frame of the simulation.

EPA Response: In effect the commenter is saying that the source duration must be as long or longer than the duration over which the model is run. EPA sees no reason that this must be so. A source duration of 100,000 years is already conservative.

Concern #50: There were a number of comments regarding redevelopment of the Site, operating business near and on the Site, and providing a safe level of protection for the citizens of Fort Valley.

EPA Response: EPA believes that the redevelopment of the property could benefit both the businesses surrounding the Site, the existing operations, and the citizens surrounding the Site. The selected remedy will protect the human health and the environment and leave the Site available for commercial redevelopment. EPA does not believe that the relocation of the current operator is required for implementation of the selected remedy.

Concern #51: There were a number of comments from the public meeting which questioned the efficacy of the preferred options in the proposed plan other than those related to the cap. These comments included EPA's ability to oversee the PRP work, the permanence of the paving, the reduction in toxicity provided by the proposal, objection to leaving the material at concentration between target action levels for soils that are paved and unpaved, and the speed with which the site is progressing.

EPA Response: EPA makes every effort to carefully oversee the actions implemented by the PRP. When errors are discovered, as in the case of the material left behind at the library site after the removal, EPA ensures that these errors are corrected in an expedient manner. The permanence of paving is determined by the efficacy and completeness of the maintenance plan and activities. These will be addressed under the remedial design. However, EPA believes that pavement can reduce contact with contaminated material and limits the migration of this material to the groundwater on a permanent basis, if properly maintained. Toxicity of the material is not reduced at the site through treatment, nor can it be. The main contaminant, arsenic, can not have its toxicity reduced through treatment because it is inorganic. It is not possible to reduce toxicity. Cleanup levels for all of the contaminants are presented in the ROD. The residual levels left on the site will be at or below these levels and will be protective of human health and the environment.

EPA believes that there is not sufficient justification to reduce the levels of contamination from target action levels for paved soils to the target action levels for unpaved soils. The planned future use of the property as a commercial property, with institutional controls in place to prevent removal of the pavement and institutionalize the commercial use of the property, has been taken into consideration in determining the protectiveness of the action levels. The pavement prevents the contact of the material by commercial users and the action levels are protective of temporary workers who may need to access the soils on a short-term basis (to repair utilities or place a foundation). The action levels are also protective of groundwater. It is therefore not necessary to excavate material that would be underneath pavement to levels established for soils that are not under pavement.

Finally, EPA understands the frustration of all parties with respect to the slowness of the process. The site is complex, the issues difficult to address and the process arduous. EPA is making every effort to expedite progress at the site.

Concern #52: A number of comments were also received requesting investigation of the Vienna Street City Landfill.

EPA Response: EPA conducted a site investigation of the Vienna Street City Landfill. The Agency found that there would be no further need for Federal Action on this site. Though contamination levels were found at the Site, the study found that no one was being exposed to the areas where this contamination exists. With little potential for exposure, EPA can not rank the site on the National Priorities List for action under CERCLA authority, and use of CERCLA authority at the site is not warranted.

Concern #53: The current operator objected to the range of residual contamination left in place under the Agency's preferred option in the Proposed Plan. The comment also promoted the future use of the property for more than industrial purposes.

EPA Response: EPA has chosen to remove the contamination from the site for all contaminants above the paved action level as opposed to leaving them on-site. The residual contamination left in place will allow for productive non-residential use of the property once the cleanup is complete. Only residential development is to be restricted on the property. Review of the former use of the property, discussion with local leaders, and the current zoning requirements on the site were all supportive of the decision to restrict residential use and promote non-residential use in this area.

Concern #54: The current owner also requested that EPA provide evidence that the proposed in-situ solidification/stabilization remedy is feasible.

EPA Response: EPA has change the proposed remedy to require off-site disposal and hence the S/S process will only be used to meet off-site land disposal requirements. The effectiveness of this process will be verified during the RD and RA.

Concern #55: The current owner is also concerned about the potential effects on public health.

EPA Response: EPA believes that safety measures can be implemented in concert with the current operations to minimize the risks to public health. The most significant potential risk to on-site persons during the remedial action would be from exposure to air-borne particulate matter created during the soil handling. These can be controlled through dust suppression methods. EPA believes that the short-term risks to public health are outweighed by the improved overall long-term protectiveness and community and State preferences achieved by the selected remedy.

Concern #56: The current operator is also concerned about the effect that the remedial action will have on its business.

<u>EPA Response:</u> EPA independently evaluated the operation of the existing facility and determined that the remedial actions could be implemented by using a number of options (e.g. temporary access roads) which would allow the current operator to continue to function concurrently with the remediation. EPA will encourage the current operator to participate in the planning activities in order to minimize effects to its operations.

<u>Concern #57:</u> Comments were received regarding dioxin cleanup goals as to whether these are to be applied across the site or under the soils of Building E alone.

<u>EPA Response:</u> The cleanup goals are for soils in general. EPA has data which shows that the dioxin contamination is limited to the soils beneath the former building E. Therefore, while these apply to all soils on the site, only soils beneath former building E will be removed or paved due to the dioxin levels. Confirmatory samples are only expected to be taken from the areas around building E.

<u>Concern #58:</u> The PRP commented on apparent changes which were made over the course of modeling performed by EPA's contractor (Weston), under direction from EPA, during the development of soil remedial goals for ground-water protection. The PRP states that files provided by the EPA "...may not be complete in that no documentation was identified that established the initial approach that EPA directed its contractor, Roy F. Weston, Inc. (Weston), to follow in developing groundwater protection goals."

<u>EPA Response:</u> The PRP was provided with an extensive amount of material which, in effect, constituted a lengthy record of a series of "brainstorming sessions" between the EPA and Weston concerning the most appropriate approach and input for modeling soil contaminant transport to ground water, using the Multimed model. After EPA's contractor was tasked with completion of the OU3 FS addendum, EPA's conceptual model of soil contamination at the Woolfolk site was refined, such that adjustments were necessary in order to bring the Multimed model setup closer to the conceptual model. The Multimed model was also run for some contaminants of concern using several different model input assumptions, all of which are potentially valid, in a sensitivity analysis evaluation. In other words, the model produced different output, depending on varying the model input within the range of potentially valid average values and observations. The model input was varied due to uncertainties concerning the exact nature of certain site characteristics which influence the soil remedial goal for ground-water protection.

The final approach and input for the Multimed modeling is fully documented and justified in the FS Addendum and supporting documentation in the Administrative Record. What is not and need not be fully documented is the entirety of non-written and internal deliberative communications between EPA and Weston concerning the most appropriate and defensible modeling approach and input for consideration of the Woolfolk Operable Unit 3 soil contamination.

In contrast to the PRP's conclusion that input was "arbitrarily adjusted" by EPA's contractor, a prolonged series of deliberations and consultations by and between EPA and its contractor were involved in the calculation of the soil remedial goals for ground-water protection. These communications and variation in modeling scenarios were necessary because of the complexities of the Woolfolk site. An arbitrary and inappropriate approach for modeling soil remedial goals for ground-water protection for the Woolfolk OU3 would have been for EPA to have not thoroughly considered the range of potentially applicable values for input into the Multimed model, and to have ignored the uncertainties with regard to modeling soil contaminant transport to ground water at this complex site. This sort of oversimplification of the soil contaminant transport modeling was an EPA concern during the period when the PRP's contractor had involvement with the FS Addendum for OU3. In a September 26, 1995 EPA memorandum from William N. O'Steen to Tim Woolheater, Woolfolk Remedial Project Manager, EPA requested that the PRP's contractor consider a range of possible scenarios for their modeling evaluation of soil remediation for ground-water protection (memorandum page 2, first full paragraph):

> In the Remedial Investigation Report for the Woolfolk site, the modeling considered a range of possible scenarios for soil contaminant leaching to ground water. This approach should be used in the FS Addendum for OU 3. The addendum should acknowledge the uncertainties in modeling transport of arsenic and other contaminants through the soil to ground water, present a range of input values that may apply to the modeling, and present the resultant range in model output. EPA can then use the model results to make a reasonable risk-management decision about the soil remedial goals for OU 3. For arsenic, because of the potential risks associated with exposure to this metal, I recommend using a conservative risk-management approach for setting soil remedial goals for ground water protection.

Once the EPA contractor was tasked with completion of the FS Addendum, the approach outlined in that memorandum was adequately followed.

Concern #59: The PRP agreed with the stormwater remedy and requested that these activities be implemented after the soils cleanup.

EPA Response: These issues will be addressed in the Work Plan for the Remedial Design.

Concern #60: One commenter suggested that the public did not understand the solidification/stabilization (S/S) process. In fact, during the public meeting a number of comments were received requesting clarification of this process.

EPA Response: The S/S process would be accomplished by mixing the contaminated soils with a reagent to stabilize and/or solidify the contamination with the soils. The process can be compared to adding cement to concrete, though in this case testing is performed to determine a reagent which effectively treats the particular contaminants. The process requires significant quality assurance to ensure adequate and uniform mixing. The S/S process, implemented with a rotary tilling or augering device, is tested to ensure that the treatment is effective using standards for the amount of contaminant which will leach from the treated material, strength of the S/S material when compressed, permeability of the material, and durability. Though EPA proposed using this technology in-situ (on the soils in place), the community and the State acceptance for this technology is limited and therefore, EPA has changed its remedy to require treatment of the soils with off-site disposal. In this case, material which is considered a hazardous waste will be treated using an ex-situ (completed after excavation of the soil) S/S process in order to meet disposal requirements.

Concern #61: Issues were raised with respect to the contaminants in the drainage corrider.

EPA Response: These issues are being evaluated as Part of OU4 for both human health and ecological effects.

Concern #62: There was concerned raised regarding the contamination of the City wells.

EPA Response: Though this is not a specific issue related to OU3, EPA would like to clarify certain issues. EPA is not certain of the source of the contamination in the City wells. The contaminant detected is typically used as a dry-cleaning fluid and an industrial cleaning agent. There are numerous other potential sources around the City wells which may have led to this contamination. EPA and EPD are currently evaluating the potential sources.

Concern #63: One commentor requested the following information: Where did the dioxin contaminated soil from Building E cleanup go? Has the soil gone to final disposal? May we see the data showing "clean" samples from all sides of Building E? Has the data been displayed on a standard map? Is the map available for the community?

EPA Response: The dioxin contaminated soil beneath Building E has been left in place and was paved over during the Removal Action in 1993. This is not the "final disposal" for all of the material, since many of the levels are above the target action levels for soils under pavement. These soils will be excavated, treated, and disposed at an appropriate off-site disposal facility as part of the OU#3 remedial action. Dioxin was studied in 1985 in and around Building E under the National Dioxin Study. EPA took additional samples for dioxin in June 1996 and updated the Administrative Record as a result of this comment. A map of the location for the samples are presented in a letter from Steve Hall, EPA's Science and Ecosystem Support Division, to Tim Woolheater, RPM, dated June 17, 1997 which has been added to the Administrative Record.

Concern #64: One commentor requested information regarding the proposed sampling for the contamination beneath the cap.

EPA Response: EPA will no longer require the characterization of the contaminants beneath the cap prior to excavation due to the change in the remedy. EPA will require that the contamination be characterized for disposal requirements only. EPA believes that sufficient information is available regarding the material beneath the cap to plan for safety measures during this excavation to protect nearby residents and workers.

Concern #65: One commenter requested an explanation as to why scientific notation was used in the proposed plan regarding the cleanup level for arsenic under the cap.

EPA Response: This was a typographical error which was corrected in a handout given to the public at a meeting on June 12, 1997.

Concern #66: One commenter suggested that the vertical and horizontal extent of contamination by COPCs in the groundwater is unresolved.

EPA Response: The EPA has required the PRP to conduct additional ground-water investigations as a part of Woolfolk Operable Unit 1 Remedial Design activities. These additional investigations have identified the approximate vertical and horizontal extent of ground-water contamination by COPCs.

Concern #67: A number of comments were made regarding the dust in the attic found in nearby residences.

EPA Response: EPA will evaluate the house dust attic issues at the Site as part of Operable Unit #4. EPA is concerned that information distributed through letter by EPA has been misinterpreted by individuals in the community. EPA will issue a clarification of the letters regarding the attic dust in the near future.

Concern #68: Concerns were also raised with regard to expanding the sampling around the Site to include more residences.

EPA Response: EPA will evaluate the need for further sampling of residential areas as part of OU #4.

Concern #69: A number of issues were raised which relate to the health of residents which live and work in and around the Woolfolk Site.

EPA Response: The Agency for Toxic Substances and Disease Registry (ATSDR) is tasked with addressing issues that relate to health of residents and workers at all Superfund sites. The ATSDR is currently assessing the concerns raised by a number of citizens in and around the Site. EPA will continue to support their effort by forwarding those concern of which EPA is aware to the ATSDR for response. EPA will forward a copy of the proceedings recorded during the public meeting of June 12 in order that these concerns can be addressed by them. EPA will continue to ensure that action taken on the Site will be protective of human health and the environment both during and after the implementation of the selected remedy.

Concern #70: Residents near the site are also concerned about the potential for contamination moving onto their property from stormwater transport.

EPA Response: After reviewing the site data, EPA found that the lowest levels of contamination were generally at the site boundaries. One exception to this is at the northeastern portion of the Site near the former building E were the highest levels of contamination on the site were found. The levels near the boundary of the Site are significant because these would be the soils expected to migrate from the Site during stormwater runoff. Soils on the former Duke Packing shed property had a maximum arsenic concentrations of 41 ppm. Though above the residential level set under the Removal action, this is a commercial property. The adjacent residential property, which was cleaned under the removal action, would require a significant volume of eroded Site soils to increase contamination of the cleaned property to a level above the residential action level. With the grasses currently on the property, this type of erosion is not expected. Another area of concern would be the residential properties adjacent to the pecan orchard on the southern property boundary. The maximum arsenic concentration found at the surface of the site boundary was 58 ppm. The nature of the property would prevent erosion due to the high grass and drainage swales. EPA does not expect that high volumes of sediment would be able to migrate off-site in a rain event. During remediation activities EPA will ensure that preventative measures are implemented to control sediment transport onto these properties. EPA will also evaluate the Removal actions as part of OU#4 to determine whether any final cleanup activities are necessary in the residential neighborhoods surrounding the Site.

Concern #71: A question was raised regarding the capital costs of implementing the preferred remedy.

EPA Response: The present worth cost of all four components of the preferred remedy identified in the Proposed Plan was approximately $5,686,000. The present worth is different from the capital costs in that the capital costs do not consider the operation and maintenance of the remedy once completed, while these costs are factored into the present worth value. The selected remedy has an approximate present worth value of $9,570,000.

Concern #72: There was also a question regarding the meaning of Table 1 in the Proposed Plan.

EPA Response: Table 1 presented the cleanup goals for the remedial action which is to take place at the Site. The goals presented in Table 1 were for unpaved soils, paved soils, and capped soils. The basis for the calculation of each level was listed beside the value (i.e., whether the level was based on human health *risk* or protection of *groundwater (GW)).* Once the work on-site begins, the contaminated soils above the unpaved action levels will either be paved (if not above the paved action level) or they will be excavated (if above the paved action level). The capped soils action level was presented for those soils which would have remained under the cap in the preferred remedy presented in the proposed plan. These values will not be needed in the selected remedy since the cap will not remain on-site.

As an example, soils samples taken during the RI showed that the toxaphene levels in the surface soils near the cap (Sample G4) had a level of 23 mg/kg which is below the unpaved action level for toxaphene (37 mg/kg). This area is unpaved and would not require paving unless another contaminant (i.e. arsenic) exceeded the unpaved action levels in this same area. However, near the tank farm the toxaphene concentration was 2,700 mg/kg which exceeds the paved action level for toxaphene (356 mg/kg) and these soils will require excavation with off-site disposal. If a soil were found between the unpaved and paved action levels (for toxaphene between 37 and 356 mg/kg) then these soils would only require paving and not excavation with off-site disposal.

The "NG" notation was also questioned. This notation means that "no goal" was calculated for this particular contaminant for this scenario. No goals were calculated for certain contaminants below the cap due to the unlikelihood of these contaminants being a threat to groundwater at any level since they are under a cap.

Concern #73: An explanation of Table 2 in the Proposed Plan was also requested.

EPA Response: EPA had proposed cleanup goals for the buildings in Table 2 in the Proposed Plan for the contaminants of concern in the buildings. Two different exposure scenarios were used to calculate the goals, one for the industrial worker and one for the child trespasser. The lower value presented in the table is the cleanup goal proposed. For example, for chlordane a building will require an action if it exceeds 2.54 mg/m^2.

Concern #74: There were a number of comments at the meeting requesting that EPA close the plant and clean the entire site.

EPA Response: EPA has determined that if it is not necessary to close the plant in order to conduct a protective cleanup at the Site.

Concern #75: An issue was raised during the meeting regarding the leaking Peach County landfill.

EPA Response: This issue is not related to the site and will not be addressed in this responsiveness summary. It is EPA's understanding that this is a State issue.

Concern #76: Concern was raised regarding air contamination from the Site.

EPA Response: Contamination coming from the site through the air is considered to be minimal. The RI and the Baseline Risk Assessment showed that contaminant levels emanating from the Site were below, within or near EPA's risk range. EPA believes that the remedial actions required in the ROD for the site will reduce or eliminate the risk from the air contamination pathway at the Site. Data collected by EPA indicates that the air pathway is not currently significant. For example, the facility has been operating since the 1910's and using arsenic since the 1920's. The maximum arsenic concentration found in the lead-arsenate building was 372,000 mg/kg and yet, directly across the street, the maximum concentration was only 353 mg/kg. The building has now been demolished and soil concentrations on the site now do not approach the levels which existed prior to the PRP cleanup. This, along with the data we have collected, would suggest that the air pathway is not currently significant. Construction activities during implementation of the remedial action have the potential for generating dust and EPA will ensure that proper dust suppression techniques are used during these activities. In order to verify these assumptions, EPA will conduct air monitoring during construction and after the remedy is implemented.

Concern #77: One individual at the public meeting requested information with regard to the risk assessment process and guidelines.

EPA Response: EPA has documented the risk process in Appendix C of the Feasibility Study Addendum dated April 1997. This appendix along with the Baseline Risk Assessment, indicate the references used in performing this task. For an understanding of the overall process, EPA's *Risk Assessment Guidance for Superfund, Human Health Evaluation Manual* is a good reference. The risk assessment process is generally described in Section 6 of the ROD.

Comment 78: A commenter questioned whether EPA can give more weight to the PRP comments than the community. The commenter suggested that EPA can not implement a remedy which the community does not support.

EPA Response: EPA is required to evaluate every possible cleanup remedy by nine evaluation criteria. The first two criteria (protection of people and the environment and ability to comply with federal and state requirements) are essential, and no cleanup alternative can be considered further if it does not meet both of these. The next five (short-term effect; permanence; implementability; treatment to reduce amount, toxicity, or movement; and cost) are considered to be balancing criteria to determine which is most appropriate for the specific site. Although EPA does seek state concurrence, the final two criteria, state and community acceptance, are currently modifying criteria. These are used to differentiate between two relatively equal or comparable remedies or, in some cases, justify modifications to the remedy to make it meet state and community concerns.

PRPs are considered part of the public for remedy evaluation purposes, and EPA uses their comments on the proposed plan in the same manner that community comments are considered. PRP comments are not given more weight that any other public comments. EPA must consider and respond to all public comments.

Neither the Superfund law nor the National Contingency Plan (NCP) requires that EPA implement the remedy that the community chooses. EPA cannot choose a remedy that does not adequately meet the other seven evaluation criteria just because a community likes it. However, if two or more cleanup alternatives meet the other criteria equally well (or are higher and lower on specific criteria making them comparable), community input may carry more weight and be the deciding factor.

Comment 79: One commenter asked why we are not using the Council on Environmental Quality (CEQ) threshold level to establish our cleanup levels. He said that our levels exceed these and that EPA needs to use these values instead.

EPA Response: CEQ is an environmental policy body that answers directly to the President. It does not, however, prescribe cleanup levels for Superfund cleanups. Superfund regulations and guidance define the process for deriving risk and clean up values. EPA has followed these regulations and guidance in setting the performance standards for this Site.

Comment 80: One commenter asked if EPA had separated dioxin out of our chlorinated organics sampling in order to get a total dioxin level on the site. He then asked why we are not using the Dioxin Reassessment to base our decisions.

EPA Response: EPA develops chemical-specific risk and cleanup values. Dioxin risk levels are not usually added to the risk values for other carcinogens that a given receptor is exposed to since EPA evaluates dioxin differently. EPA is not at odds with the Dioxin Reassessment effort to this point. However, the Reassessment is only in draft form, and has yet to be finalized. Once the final version is issued the effects of the assessment will be evaluated as it relates to Superfund regulatory decisions concerning dioxin risk and clean up levels. Until the reassessment becomes final, EPA has issued an OSWER (Office of Solid Waste and Emergency Response) Directive which determines the dioxin levels to be used for Superfund cleanups.

Comment #81: Objection was raised to wording in the Proposed Plan that "EPA's target risk range for cancer -causing substances under Superfund cleanups is from $1x10^{-4}$ to $1x10^{-6}$. This range is equivalent to an increased chance of one additional case of cancer in 10,000 to 1,000,000."

EPA Response: The Superfund regulation (NCP, 3/90) states that for known or suspected carcinogens, acceptable exposure levels are generally concentration levels that represent an excess upper bound lifetime cancer risk to an individual of between 10-4 and 10-6. This bases the acceptability of a contaminant level on the probability of an individual getting cancer at a given daily dosage level. These risk values could also be used to determine a population risk, i.e. what dosage level would yield on average one additional calculated cancer occurrence in a given population size, e.g. 1,000.000, of exposed individuals.

Comment #82: The PRP objected to the inclusion of aluminum, chromium, iron, and vanadium as Chemicals of Potential Concern (COPCs) in OU3. They argue that these are naturally occurring elements and are within the naturally occurring ranges for soils in the eastern U.S., and should be deleted from the list of contaminants.

EPA Response: Aluminum, chromium, iron and vanadium were included as chemicals of potential concern because each one met the retention criteria base on site-specific background level comparisons and toxicity associated with the maximum level found. The COPC criteria does not include a consideration of whether a direct association of these inorganic chemicals with pesticide formulation is known. Clean up levels were derived for chromium and vanadium. These were later eliminated from further consideration because their maximum concentration on-site was below the clean-up levels.

Comment #83: The PRPs also argued that the COPCs developed by EPA appeared to be independent of the affected media and suggested that EPA separate the COPCs into multiple lists.

EPA Response: EPA did not develop the COPCs independantly of the media. Twenty eight (28) COPCs were developed for surface soil, eight (8) for sub-surface soil and twenty five (25)chemicals were evaluated for building cleanup levels. These evaluations led to a various cleanup levels for different media and are presented in Chapter 6 of the Record of Decision.

Comment #84: The PRP suggested that EPA use a site -wide average or upper 95% confidence limit of site data as the basis for establishing a achievement of the cleanup goal.

EPA Response: EPA has used average concentrations of a contaminant in an environmental medium in determining the need for cleanup if it can be shown that this approach is protective for all receptors being considered. For the average value to be considered in this regard, the average value must be derived from a sufficiently large number of samples per exposure unit and evidence must be conclusive that movement of the receptor over the exposure unit is random. This criteria is difficult to meet and typically all contamination "hot spots" above the clean up value will require remedial action. Based on the limited consideration of exposure unit factors in the site assessment and in consideration of community concerns, clean up levels were considered to be not-to-exceed levels for remediation of this site.

Comment #85: The PRP also suggested that since the Site was to be used for industrial purposes that the standards should be set at $1x10^{-4}$ instead of the selected $1x10^{-5}$. They added that this would be more consistent with EPA's arsenic drinking water standard which is set at $2.5x10^{-3}$ risk level.

EPA Response: The risk level set at the site is consistent with that established under the OU #2 ROD. It is also seen as appropriately conservative, in that the Site may be used for commercial purposes instead of industrial purposes in the future and that these properties border residential properties. The soil clean up level for arsenic was based on its potential effects as a systemic toxicant, not its carcinogenic potential. However, the clean up levels do provide a carcinogenic protective level within EPA's acceptable risk range.

Comment #86: The PRP suggested that there is no reason for EPA to sample for dioxin in any area other than the former Building E location.

EPA Response: EPA has determined that the soils surrounding the former Building E are not contaminated with dioxin and, therefore, will probably not require the PRP to sample for dioxin in areas other than the area of Building E soils. There has not been a similar determination for the capped area and sampling for dioxin may be required for disposal purposes.

Comment #87: The PRP believes that this site is a reasonable candidate for a probablistic risk assessment.

EPA Response: EPA accepts the concept of probabilistic analysis in Superfund risk assessments in order to further characterize uncertainty. However, the lack of data and information on the distribution of values among the various exposure parameters limits the value of these analyses. Often the "value added" appears insignificant relative to the use of a deterministic approach in the risk determination. The use of probabilistic methods in the risk assessment for this site would be an after-the-fact analysis and would not appear to add value to the site remedial action.

Comment #88: The PRP questioned EPA's justification for the exposed skin surface areas, soil adherence, and ingestion assumptions used in the BRAA.

EPA Response: The values used are upper-end standard EPA default values used for the relevant receptor. A larger portion of body exposed was used for the construction worker.

Comment #89: The PRP commented that the default assumption that all chromium detected at the site is the hexavalent form is insupportable and needlessly conservative.

EPA Response: Speciation of chromium in soil is difficult. Since chromium VI is much more toxic than chromium III and valence states can change in the environment, the toxicity values for chromium VI were used as a conservative approach.

Comment #90: The PRP suggested that Table 5-4 be modified to eliminate 10 contaminants due to the fact that their calculated cleanup values are greater than the maximum detected onsite.

EPA Response: EPA concurs that the maximum detected value for the 10 chemicals are below the calculated cleanup goal and has eliminated 8 of the 10 contaminants. The maximum values for DDD and benzo(a)pyrene were sufficiently close to the calculated cleanup value to merit sampling for these contaminants during confirmation sampling under the remedial action.

Comment #91: The PRP questioned the cleanup goal for manganese.

EPA Response: EPA has reevaluated the manganese soil cleanup level of 494 mg/kg and believes it to be in error on the low side. The prime contribution to this relatively low clean up level was an erroneous assumption relative to exposure from the inhalation route. The calculated cleanup level based on more realistic airborne dust concentrations and inhalation levels of small particles yielded a cleanup level greater than the highest level detected in onsite surface soil samples, i.e. 1120 mg/kg. Therefore, manganese is no longer considered to be a Chemical of Concern for this remedial action.

Comment #92: The PRP also questioned the cleanup goals for building surfaces.

EPA Response: Building surface cleanup levels were developed to be protective of direct contact and contribution to air borne exposure (i.e. ingestion, dermal and inhalation).

Comment #93: The PRP requested that the bioavailability of arsenic be revised to more realistic values.

EPA Response: An 80% bioavailability value was used in deriving the arsenic cleanup value. EPA's default value is 100%. Eighty percent was appropriately conservative considering the published literature.

Comment #94: The State of Georgia requested clarification as to why their Hazardous Site Response Act remediation levels are "to-be-considered" guidelines and not ARARs.

EPA Response: Section 121(d)(2) requires that on-site remedial actions must attain (or waive) Federal and more stringent State applicable or relevant and appropriate requirements (ARARs) of environmental laws upon completion of the remedial action. "Applicable requirements means those cleanup standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under Federal environmental or State environmental or facility siting law that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site. Only those state standards that are identified by a state in a timely manner and that are more stringent than federal requirements may be applicable." 40 CFR §300.5 (emphasis added).

"Relevant and appropriate requirements means those cleanup standards, standards of control, ... that, while not applicable ..., address problems or situations sufficiently similar to those encountered at the CERCLA site that their use is well suited to the particular site. Only those state standards that are identified by a state in a timely manner and that are more stringent than federal requirements may be applicable." 40 CFR §300.5 (emphasis added).

Georgia's HSRA statute is not an ARAR because it does not provide a specific mandated standard that would be applicable in a particular case. Instead, HSRA sets forth a number of alternative approaches for setting a remediation level. HSRA establishes a process for selecting a cleanup level that is inherently flexible and involves the exercise of discretion and a fact specific analysis. Therefore, the statute does not constitute a cleanup standard, standard of control or other substantive environmental protection requirement, and thus is not an ARAR. Further, because one of the alternative approaches for selecting a cleanup level under HSRA is to perform a site specific risk assessment, and CERCLA has its own risk assessment requirement, HSRA does not include any standard that is more stringent than federal requirements, and cannot be considered an ARAR.

Comment #95: The State also requested that EPA determine if tetrachloroethylene detected in the surficial aquifer at MW-52 needs to be added to the list of the 10 COPCs for which groundwater protection goals were developed.

EPA Response: EPA has determined that tetrachloroethylene (PCE) was only detected in one surface soil sample and one subsurface soil sample during the Remedial Investigation. A screening level analysis of soil contaminant leaching potential indicates that the only soil sample collected during the Remedial Investigation that may be a concern with respect to the potential for contaminant leaching to ground water (sample identification WRIF800SS) is associated with significant levels of soil contamination by the BHC compounds and arsenic (a concern with respect to potential leaching to ground water; reference FS Addendum, Table 5-4) and significant levels of toxaphene (a concern with respect to potential direct contact exposure). Therefore, the tetrachloroethylene contamination at that location will be addressed in the soil remedial action and there is no need to include PCE as a COPC.

Comment #96: The PRP believes that Alternative 2 for soils is appropriate since the average arsenic concentration for the site presented in Appendix I of the FSA is 300 mg/kg, below the cleanup level of 317 mg/kg.

EPA Response: EPA has used average concentrations of a contaminant in an environmental medium in determining the need for cleanup if it can be shown that this approach is protective for all receptors being considered. For the average value to be considered in this regard, the average value must be derived from a sufficiently large number of samples per exposure unit and evidence must be conclusive that movement of the receptor over the exposure unit is random. This criteria is difficult to meet and typically all contamination "hot spots" above the clean up value will require remedial action. Based on the limited consideration of exposure unit factors in the site assessment and in consideration of community concerns, clean up levels were considered to be not-to-exceed levels for remediation of this site.

Comment #97: One commenter expressed concern regarding EPA's use of Emergency Response Memorandums for setting cleanup goals and supported the consideration of arsenic as a carcinogen.

EPA Response: The Emergency Response Memorandum was used in the historical section of the report and was not the basis for setting cleanup levels. The cleanup values were determined through the risk evaluation process documented in the ROD. Arsenic is a natural element that has been classified by EPA as a human carcinogen and a toxic substance. In the southeastern United States, arsenic is typically found (background) in soil at a mean concentration of about 5 mg/kg. A long history of human exposure to arsenic in its natural form and more recently in man-made products containing inorganic arsenic has show that it can be harmful in relatively high doses. At very low does, it appears that the body can neutralize any harmful or toxic effect even after prolonged exposure. Therefore, a "no-threshold" assumption (i.e. no level without harm) for its carcinogenic or toxic effect does not appear warranted. The Environmental Protection Agency has evaluated the scientific literature on arsenic toxicity in humans and laboratory animal models and has developed a daily exposure level (0.3 ug/kg body weight) that is believed to be without significant risk of toxic effects, i.e. a reference dose. This reference dose combined with an assumed soil exposure level for each type of receptor and an assumption that 80% of the arsenic in soil could be taken up by the body was used to derive the soil clean up levels for arsenic based on land use. An arsenic "dose" derived in this way will also fall within EPA's protective risk range for carcinogenic environmental chemicals.

Comment #98: One commenter stated that EPA has wrongly tried to extrapolate the IEUBK model's defaults to cover the lead dispersed at the site and questioned how a child trespasser can be at risk from 16 mg/m³ lead on building surfaces. The commenter compared the soil cleanup values to those buildings and found the lead and arsenic values for buildings and soils to be counter-intuitive. For soils, the lead value was higher than the arsenic value while for building surfaces this was not the case.

EPA Response: Lead is believed to manifest its primary adverse effect as a developmental toxicant in children six years of age and younger. Currently, blood lead levels are considered the best predictor of lead exposure and toxic potential. EPA utilizes a computer model (the IEUBK model) to predict blood lead levels in children from exposure to contaminated soil in consideration of total lead exposure from other major sources, i.e. food, water and air. In calculating a clean up level for surface areas in buildings on-site, EPA used a process that has not been standardized and proposed cleanup values in the Proposed Plan that were too conservative for lead. EPA has reevaluated the proposed cleanup values based on the comment above, and determined more appropriate cleanup values for lead in building surfaces.

Comment #99: There were many concerns raised at the Public Meeting regarding the Executive Order 12898: a] Some asked for an explanation of the Order and whether it applied to Fort Valley; b] Others wondered if it was being enforced in Fort Valley. One individual suggested that the site be raised to a higher level (i.e. the White House); c] One commenter wondered if EPA has a policy regarding the strategies to address Environmental Justice (EJ) issues and wondered whether the States were required to follow the Executive Order; d] A commenter asked if EPA's strategy would impact the cleanup of Fort Valley.

EPA Response: a] Environmental Justice is the principle that seeks to ensure the equitable distribution of environmental protection benefits. The goal of environmental justice is to provide environmental and public protection so that no segment of the population, regardless of race, ethnicity, culture or income, bears an undue burden of environmental pollution and to ensure that everyone shares the benefits of environmental protection.

President Clinton signed Executive Order 12898 [Order] in 1994. The Order directed all federal agencies to identify and address, as appropriate, any disproportionately high and adverse human health and environmental effects on minority and low income populations occurring as a result of their policies, programs, and activities. The Order further directs that each federal agency ensures that no person or population, as a result of their race, color, or national origin, suffers discrimination, or be excluded from participation or is denied benefits from the manner in which it conducts its programs, policies and activities. The Order is not law. It is to facilitate internal management processes. It does not create any right to judicial

review to contest the compliance or noncompliance of the United States, its agencies, its officers or any other person.

The directives of the Order are applicable to all communities including Fort Valley.

b] To the best of its ability, EPA is addressing the issues raised by the Fort Valley community within the tenets of the Order. EPA's Office of Environmental Justice developed a strategy to assist the Agency in integrating the Order's principles into its programs, policies and activities. The guiding principles of the strategy are as follows:

1] Environmental justice begins and ends in our communities. EPA will work with communities through communication, partnership, research and the public participation processes.

2] EPA will help affected communities have access to information which will enable them to meaningfully participate in activities.

3] EPA will take a leadership and coordination role with other Federal agencies as an advocate of environmental justice.

EPA's willingness to work with the Fort Valley is reflected in the financial assistance it has awarded to the community totaling thus far, $120,000. The community has access to EPA's information services. Currently, EPA is working with the Agency for Toxic Substances and Disease Registry (ATSDR) to address health concerns and has assisted in acquiring a grant to study the future prospects at the Site from the Department of Commerce Economic Development Administration.

Although the community may elevate its request for assistance to the White House, it is EPA's opinion that to do so will not cause a significant change in the actions taken at this site.

c] No, the States are not required to adhere to Federal Environmental Justice policies. However, EPA does have a Memorandum of Agreement with the State of Georgia. EPA has worked with the State of Georgia to ensure that environmental justice issues are considered in its decision-making process regarding the community. The State of Georgia does have an environmental justice representative assigned to the Woolfolk site.

EPA is working in partnership with the community. Public participation is encouraged. Community input is valued and did contribute to revisions of EPA's plan to address community issues. The preferred alternative as the remedy proposed for the site has been reconsidered.

d] The impact of EPA's Environmental Justice Strategy on EPA's cleanup cannot be measured. Possibly, the implementation of the strategy facilitated community participation to an extent that impacted EPA's cleanup decision. However, the strategy will ensure that no person or population will suffer disproportionately high and adverse human health and environmental effects or discrimination as a result EPA's implementation of its programs, policies or activities.

<u>Cmt #100:</u> One commenter requested an explanation of the EJ office's involvement at the site to date. The commenter believes that the community deserved EPA assistance since EPA considers the site as an EJ site. The comments suggested that EPA was not being environmentally sensitive to these neighborhoods and that people should be moved as in Pascagoula, MS and Times Beach, MO.

<u>EPA Response:</u> EPA's Office of Environmental Justice (OEJ) has been involved in this site. The Office of Environmental Justice has participated in numerous meetings with community members, internal EPA offices, and other federal agencies to ensure that environmental justice strategies were considered in EPA's actions at the site. At this site, in particular, EPA has encouraged the support of the Agency for Toxic Substances and Disease Registry (ATSDR) to address health concerns, encouraged the Department of Housing and Urban Development (HUD) assistance for the community, and assisted in acquiring a grant to study future prospects at the site from the Department of Commerce Economic Development Administration.

Any remedy or corrective action is taken only after careful consideration of the risk or threat of harm that may affect an impacted community. The circumstances and the needs of the communities at the Times Beach and Pascagoula sites differ greatly from the circumstances and needs of the Fort Valley community. Circumstances and the facts surrounding the issues raised at Woolfolk site have been evaluated and careful consideration has been given to any threat or risk of harm to the residents of Fort Valley prior to any decision concerning remedy or corrective action, including relocation. At this time, based on the studies made and a review of the circumstances, relocation is not warranted for the community residents. EPA's Environmental Justice Office (EJO) has been involved in this site. The Office of Environmental Justice has participated in numerous meetings with community members, internal EPA offices, and other federal agencies to ensure that environmental justice strategies were considered in EPA's actions at the site. At this site in particular, EPA has encouraged the support of the Agency for Toxic Substances and Disease Registry (ATSDR) to address health concerns and facilitated the Department of Commerce Economic Development Administration grant to study the future prospects at the Site. These activities have gone far beyond the "normal" Superfund site activities, partly in response to the environmental justice concerns at the site. EPA does not, however, believe at this time that this site merits any further relocation efforts.

IV. Concerns to be Addressed in the Future

EPA will address house-dust, ecological, and expansion of sampling concerns as part of Operable Units 4. EPA will continue to work with the Fort Valley community to get input on future remediation decisions.

APPENDIX B:

ARARs

WOOLFOLK CHEMICAL WORKS SITE

RECORD OF DECISION, OPERABLE UNIT #3:

FORT VALLEY, PEACH COUNTY, GEORGIA

Table B-1
Identification of Action Specific ARARs for Woolfolk Chemical Works

Actions*	Requirement	Prerequisites	Citation	ARAR	Comments
Institutional Controls	Record disposal of hazardous waste with local zoning authority and Regional Administrator, and annotate deed to restrict future use.		40 CFR 264.119(a), (b)	Relevant and Appropriate	
Cover	Placement of a cap (cover) over waste (e.g., closing a landfill, or closing a surface impoundment or waste pile as a landfill, or similar action) requires a cover designed and constructed to: Provide long-term minimization of migration of liquids through the capped area Function with minimum maintenance Promote drainage and minimize erosion or abrasion of the cover • Accommodate settling and subsidence so that the cover's integrity is maintained; and	Covering with asphalt cap makes the technical requirements relevant and appropriate.	40 CFR 264.258(b) (Waste Piles) and 40 CFR 264.310(a) (Landfills)	Relevant and Appropriate	Implementation of capping in-place is an alternative for at least a portion of the site. The RCRA capping requirements would be relevant and appropriate to capping hazardous wastes in place, and could be relevant to capping non-hazardous wastes in place. A RCRA cap would serve to isolate and contain contaminated soils, and limit infiltration of precipitation if a groundwater contaminant problem exists. If the wastes are excavated and reconsolidated in their current location, the capping requirements are applicable.
	Restrict post-closure use of property as necessary to prevent damage to the cover.		40 CFR 264.117(c)	Relevant and Appropriate	
	Post-closure care length		40 CFR 264.117(a)	Relevant and Appropriate	
	Continuation of security requirements		40 CFR 264.117 (b)	Relevant and Appropriate	
	Post-closure plan (O&M and monitoring)		40 CFR 264.118(a), (b)	Relevant and Appropriate	
	Certification of completion of post-closure care		40 CFR 264.120	Relevant and Appropriate	
	Contingency plan to minimize hazards from potential release	Site use continues after capping.	40 CFR 264 Subpart D	To be Considered	
	Corrective Action following release		40 CFR 264.100 to 101	Relevant and Appropriate	
	Prevent run-on and run-off from damaging cover.		40 CFR 264.310(b)(4)	Relevant and Appropriate	
	Protect and maintain surveyed benchmarks used to locate waste cells (landfills, waste piles).		40 CFR 264.310(b)(6)	Relevant and Appropriate	

Table B-1 Identification of Action Specific ARARs for Woolfolk Chemical Works (Continued)					
Actions*	**Requirement**	**Prerequisites**	**Citation**	**ARAR**	**Comments**
Clean Closure (Removal)	General performance standard requires minimization of need for further maintenance and control; minimization or elimination of post-closure escape of hazardous waste, hazardous constituents, leachate, contaminated runoff, or hazardous waste decomposition products.	Disturbance of RCRA hazardous waste (listed or characteristic) and movement outside the unit or area of contamination. May apply to contaminated soil, including soil disturbed in the course of drilling or excavation and returned to land.	40 CFR 264.111	Relevant and Appropriate	Clean closure removal is being considered for the site.
	Disposal or decontamination of equipment, structures, and soils.	May apply to structures, containers piping and equipment used during excavation.	40 CFR 264.111 and 268 and 40 CFR 264.178 and 40 CFR 264.197	Relevant and Appropriate	The RCRA Land Disposal Restrictions require treatment of RCRA wastes to specified levels or by specified technologies. The RCRA requirements would be considered relevant and appropriate to wastes that are not RCRA hazardous wastes, but which are similar (same constituents) as RCRA wastes. If treatment to the specified level or by the specified technology is not achievable or appropriate, a variance must be obtained from the EPA. If the wastes are determined to be RCRA wastes, these requirements would be applicable.
	Removal or decontamination of all waste residues, contaminated containment system components (e.g., liners, dikes), contaminated subsoils, and structures and equipment contaminated with waste and leachate, and management of them as hazardous waste.	Disposal of RCRA hazardous waste (listed or characteristic) after disturbance and movement outside the unit or area of contamination.	40 CFR 264.258	Applicable	In the event that the wastes being removed are determined to be hazardous wastes, the requirements of this section would be applicable.
	Meet health-based levels at unit.		40 CFR 264.111	Applicable	In the event that the wastes being removed are determined to be hazardous wastes, the requirements of this section would be applicable.
Closure with Waste in Place (Capping)					See discussion under Capping.
	Stabilization of remaining waste and waste residues to support cover.		40 CFR 264.258	Relevant and Appropriate	
	Installation of final cover to provide long-term minimization of infiltration.		40 CFR 264.310(a)(1)	Applicable	
	Post-closure care and groundwater monitoring.		40 CFR 264.310(b)	Applicable	

Table B-1 Identification of Action Specific ARARs for Woolfolk Chemical Works (Continued)					
Actions*	**Requirement**	**Prerequisites**	**Citation**	**ARAR**	**Comments**
Closure with Waste in Place (Capping) (Continued)	RCRA hazardous wastes are subject to land disposal restrictions. Land disposal restrictions set performance requirements on treatment of the wastes before land disposal.		40 CFR 268	Applicable	If the wastes found on the Woolfolk site are found to be RCRA wastes and are disposed or otherwise managed in a land-based unit, the Land Disposal Restrictions will be applicable.
			40 CFR 268	Relevant and Appropriate	If the wastes are not RCRA wastes but contain the same or similar constituents to those in RCRA wastes, then the Land Disposal Restrictions will be relevant and appropriate.
Consolidation	With respect to the waste that is moved, see requirements in the following sections: Capping, Closure with Waste in Place, Construction of a New Landfill On Site, Operation and Maintenance, Tank Storage, and Treatment	Movement of hazardous waste and placement in another unit.	See Capping, Closure with Waste in Place, Construction of a New Landfill On-site, Operation and Maintenance, Tank Storage, and Treatment in this exhibit.		
	Consolidation of waste in corrective action management units (CAMUs)		40 CFR 264.552	Applicable	This requirement would be applicable to actions involving consolidation of waste prior to treatment and disposal in on-site or off-site landfills.
Excavation	Area from which materials are excavated may require cleanup to levels established by closure requirements.	Disposal by disturbance of hazardous waste and moving it outside the unit or area of contamination.	40 CFR 264 Disposal and Closure Requirements	Relevant and Appropriate	See discussions under Capping, Clean Closure, Closure with Waste In-Place, etc.
			40 CFR 264 Disposal and Closure Requirements	Applicable	If the excavated materials can be classified as hazardous wastes, the disposal and closure requirements would be applicable.
Stormwater Sewer work and excavations	Areas which require excavation of sediment and soils may require meeting effluent standards to prevent discharge to surface waters. Best Mangement Practices program to prevent release of toxic constituents to surface waters. Establishment of specific procedures for the control of toxic and hazardous constituent spills.		40 CFR 122.26 Industrial activities requirements 40 CFR 122, 125.100, 104	Relevant and Appropriate	CERCLA site rediation is not required to obtain an NPDES permit; however, substansive requirements must be met by the action.
Operation and Maintenance (O&M)	Devise fugitive dust and odor emission control plan for this action if existing site plan is inadequate.		CAA Section 101[b] and 40 CFR 52[b].07 to .29	Applicable	See discussions under Construction of new landfill.

Actions[a]	Requirement	Prerequisites	Citation	ARAR	Comments
Operation and Maintenance (O&M) (continued)	Post-closure care to ensure that site is maintained and monitored.		40 CFR 264.110	Relevant and Appropriate	Post-closure requirements for operation and maintenance of the Woolfolk site are relevant and appropriate to new disposal units with non-hazardous waste, or existing units capped in-place.
			40 CFR 264.110[b]	Applicable	In cases where the wastes are determined to be hazardous wastes, and new disposal units are created, the post-closure requirements will be applicable.
Tank Storage or Treatment (On Site)	Tanks must have sufficient structural strength to ensure that they do not collapse, rupture, or fail.	Storage of RCRA hazardous waste (listed or characteristic) not meeting small quantity generator criteria held for a temporary period greater than 90 days before treatment, disposal, or storage elsewhere (40 CFR 264.10), in a tank (i.e., any portable device in which a material is stored, transported, disposed of, or handled). A generator who accumulates or stores hazardous waste on site for 90 days or less in compliance with 40 CFR 262.34(a)(1-4) is not subject to full RCRA storage requirements. Small quantity generators are not subject to the 90-day limit [40 CFR 262.34(c), (d), and (e)].	40 CFR 264.191	Applicable	These requirements would be applicable to the construction and use of tank storage at Woolfolk to store hazardous waste on site prior to treatment or disposal.
	Waste must not be incompatible with the tank material unless the tank is protected by a liner or by other means.				
	Design and operating standards for unit in which hazardous waste is treated	Treatment of hazardous waste in a unit.	40 CFR 264.190-264.192 (Tanks)	Applicable	These regulations are applicable to the treatment of hazardous waste.
	Tanks must be provided with secondary containment and controls to prevent overfilling, and sufficient freeboard maintained in open tanks to prevent overtopping by wave action or precipitation.		40 CFR 264.193-194	Applicable	
	Inspect the following: overfilling control, control equipment, monitoring data, waste level (for uncovered tanks), tank condition, aboveground portions of tanks (to assess their structural integrity), and the area surrounding the tank (to identify signs of leakage).		40 CFR 264.195	Applicable	
	Repair any corrosion, crack, and leak.		40 CFR 264.196	Applicable	

Actions*	Requirement	Prerequisites	Citation	ARAR	Comments
	At closure, remove all hazardous waste and hazardous waste residues from tanks, discharge control equipment, and discharge confinement structures.		40 CFR 264.197	Applicable	
Tank Storage or Treatment (On Site) (Continued)	Store ignitable and reactive waste so as to prevent the waste from igniting or reacting. Ignitable or reactive wastes in covered tanks must comply with buffer zone requirements in "Flammable and Combustible Liquids Code." Tables 2-1 through 2-6 (National Fire Protection Association, 1976 or 1981).		40 CFR 264.198		This requirement is applicable to any ignitable or reactive hazardous waste at the site.
	Incompatible wastes must not be placed in same tank system.		40 CFR 264.199	Applicable	
	Storage Prohibitions: Storage of banned wastes must be in accordance with 40 CFR 268. When such storage occurs beyond one year, the owner/operator bears the burden of providing that such storage is solely for the purpose of accumulating sufficient quantities to allow for proper recovery, treatment, and disposal.		40 CFR 268.50	Applicable	This requirement is applicable to any listed or characteristic hazardous waste that does not meet treatment standards prescribed in 40 CFR 268 (Land Disposal Restrictions).

Actions[a]	Requirement	Prerequisites	Citation	ARAR	Comments
Treatment	Standards for miscellaneous units (...land treatment units) require new miscellaneous units to satisfy environmental performance standards by protection of groundwater, surface water, and air quality, and by limiting surface and subsurface migration	Use of other units for treatment of hazardous wastes.	40 CFR 264 (Subpart X)	Relevant and Appropriate Applicable	R&A to the construction, operation and closure of misc. units constructed on the site for treatment and/or disposal of non-hazardous wastes Appicable to the construction, operation and closure of misc. units constructed on the site for treatment and/or disposal of non-hazardous wastes
	Treatement of wastes subject to a banon land disposal must atain levels achievable by best demonstrated available treatment technologies (BDAT) for each hazardous constituent in each listed waste.	Effective date for CERCLA actions is Nov. 8, 1988, for F001-F005 hazardous wastes, dioxin wastes, and certain "California Listed".	40 CFR 268 (Subpart D)	Applicable Relevant & Appropriate	Applicable to the disposal of any wastes that can be defined as restricted. R&A to the treatment prior to land disposal of any wastes that contain components of restricted wastes in concentrations that make the site wastes sufficiently similar to the regulated wastes. The requirements specify levels of treatment that must be attained prior to land disposal.
			40 CFR 264.601 (Misc Treat Units)	Relevant and Appropriate Relevant and Appropriate	These requirement are R&A for design and operation of treatment units which treat non-RCRA hazardous wastes similar to hazardous wastes.
	Monitoring, analysis, response, reporting, and corrective action for miscellaneous treatment units.		40 CFR 264.602	Relevant and Appropriate	
	Post-closure care for mics. Units		40 CFR 264.603	Applicable	
	Fugitive and odor emissions control plan for this action.		CAA Sect 101 and 40 CFR 52.04	Applicable	
	Filing an Air Pollution Emission Notice (APEN) with state to include estimation of emission rates for each pollutant expected.				
Land Disposal	RCRA hazardous wastes are subject to land disposal restrictions. If universal treatment standards are exceeded, material must be treated prior to land disposal.	Applicable to land disposal of hazardous waste.	40 CFR 268	Applicable	

NOTES:

[a]Action alternatives from ROD keyword index.
[b]All of the Clean Air Act ARARs that have been established by the Federal Government are covered by matching state regulations. The state has the authority to manage these programs through the approval of its implementation plans (40 CFR 52, Subpart G).

Table B-2
Identification of Location-Specific ARARs at Woolfolk Chemical Works

Location	Requirement	Prerequisite(s)	Citation	ARAR	Comments
Within area where action may cause irreparable harm, loss, or destruction of significant artifacts	Action to recover and preserve artifacts	Alteration of terrain that threatens significant scientific, prehistorical, historical, or archaeological data	National Archaeological and Historical Preservation Act (16 USC Section 469); 36 CFR Part 65	Unknown	Should scientific, pre-historical, or historical artifacts be found at the site, this will become applicable.

Table B-3
Identification of Chemical-Specific ARARs for Woolfolk Chemical Works

Requirement	Prerequisites	Citation	ARAR
Solid wastes with extracts that contain chemical species in excess of threshold limit are classified as RCRA hazardous wastes because of toxicity.	Applicable to all solid wastes at the site.	40 CFR 261.24	Applicable
RCRA hazardous wastes are subject to land disposal restrictions. Land disposal restrictions set performance requirements on treatment of the wastes before land disposal.	Applicable to land disposal of hazardous waste. Applicable to RCRA hazardous waste (listed or characteristic) placed at the site or into another land-based unit. Not applicable to material treated in-situ or consolidated within area of contamination.	40 CFR 268	Applicable
Emissions from contamination being addressed during corrective action must not cause ambient atmospheric concentrations to exceed the 8-hour time-weighted average threshold concentration.	Applicable to all work activities at site in which employees may become exposed to chemical of concern.	29 CFR 1910.1000, 29 CFR 1910.1018, 29 CFR 1910.1025	Applicable
Action levels established by the Georgia Hazardous Site Response Act	Applicable to sites listed on the Hazardous Site Response Act.	GA 391-3-19-.07	TBC
Risk-based cleanup goals established in the risk assessment.	Applicable to sites subject to corrective action.	Woolfolk Chemical Works Site Risk Assessment for Operable Unit #3	TBC
Target cleanup levels based on groundwater protection.	Applicable to sites subject to corrective action.	Woolfolk Chemical Site Operable Unit No. 3 Action levels for Groundwater Protection	TBC
Discharge to surface water needs to meet water quality criteria or other standards established under a site-specific NPDES permit	Discharge of stormwater or water from treatment system, stormwater remedy, or decontamination	40 CFR 131	Relevant and Appropriate

APPENDIX C:

STATE CONCURRENCE LETTER

WOOLFOLK CHEMICAL WORKS SITE

RECORD OF DECISION, OPERABLE UNIT #3:

FORT VALLEY, PEACH COUNTY, GEORGIA

Georgia Department of Natural Resources

205 Butler Street, Suite 1154 East Tower, Atlanta, Georgia 30334-4910

Lonice C. Barrett, Commissioner
Environmental Protection Division
Harold F. Reheis, Director
Hazardous Waste Management Branch
Phone 404-656-7802 FAX 404-651-9425

Site: OLB
Break: 5.7
Other: HZ

November 25, 1997

DEC 1 12 05 PM '97

SOUTH

Mr. John Hankinson
Regional Administrator
USEPA Region 4
Atlanta Federal Center
61 Forsyth Street
Atlanta, Georgia 30303-3104

SUBJECT: Record of Decision for Operable Unit No. 3: On-Facility Contamination, Woolfolk Chemical Works Site, Fort Valley, Peach County, Georgia

Dear Mr. Hankinson:

The Environmental Protection Division (EPD) has completed its review of the subject document and supporting information. Based on our review and information provided to my staff by your staff in a telephone conversation yesterday, EPD concurs with the Record of Decision (ROD) for Operable Unit No. 3: On-Facility Contamination. EPD appreciates the consideration you have extended to the citizens of Fort Valley in response to their concerns, as evidenced by your willingness to make changes to the ROD so that the citizens will be better served by this process and EPD can provide our concurrence on this important decision.

There are a number of points I want to state to ensure that there was no misunderstanding or miscommunication regarding yesterday's EPD - EPA telephone conversation:

1. The volumes of waste in the ROD to be removed and treated at the site are only estimates. The ROD states that 8,000 cubic yards of waste will be removed from beneath the existing cap area; however, EPD has a document which estimates that there are 10,000 cubic yards of waste which would be classified as hazardous due to the characteristic test for arsenic beneath the cap. The EPA representatives stated that the 8,000 cubic yards, after a 25% increase in volume due to on-site treatment, would increase the volume to 9,000 cubic yards. Upon inquiring into how this calculation was made, we were informed that the 25% increase would only apply to 4,000 cubic yards or half the 8,000 cubic yards estimate, because only 4,000 cubic yards are considered to be hazardous waste.

2. The footnote at the bottom of Table 6-6 and the basis for the soil cleanup goal for 2,3,7,8-TCDD TEQ specified in Table 6-6 are confusing. In Table 6-6, "risk" is the basis for the 0.005 mg/kg soil cleanup goal for both the unpaved soils and the paved soils for 2,3,7,8-TCDD TEQ (dioxins). According to the footnote at the bottom of Table 6-6, the standard is based on "current EPA policy." EPD realizes that "current EPA policy" is probably based on "risk;" regardless, this discrepancy needs to be resolved to avoid the reader having to rely on deductive reasoning to understand the basis for the calculated value.

3. On Table 6-7, on the line for lead, there is an entry of "(a)" under the column entitled loading. We understand that EPA has calculated the lead loading value to be 849 mg/m^3. Regardless, there is no reference to what "(a)" refers to in this document.

4. The version of the ROD that EPD reviewed was missing the verification goal for air monitoring for arsenic in Table 6-8. We were told that this value has been calculated and the entry in the table should be $1.6x10^{-2} mg/m^3$, although the table does not specify any units.

5. We were assured that our questions and concerns about verification sampling, monitoring, and other measures that are necessary to document that the ROD has been executed correctly are addressed during the design phase of this process. We will work closely with EPA during each step of the design process to ensure that once the ROD has been implemented, the results we expect to achieve will be confirmed by an appropriate number and proper location of all confirmation or verification samples.

6. The value in Table 6-6, for lead for paved soil is listed as 1,000,000 mg/kg or parts per million. This is an unrealistic number, the calculations that support it are not available, and according to the yesterday's telephone conversation, it will be changed in the final document. We trust that the value entered into this column for lead under paved soil will be clearly understood and supported by either calculations or EPA policy. Moreover, we expect it will be much less than 1,000,000.

7. It is unclear how releases from the stormwater system will be either cleaned up, as specified in the ROD, or evaluated to determine the concentration of the constituents that were released. We were assured that this would be an element of the design of the stormwater remediation process. As we had committed to you above, EPD will work closely with EPA during the design phase for the stormwater remediation to ensure that the releases from it are cleaned up to levels that are protective of human health and the environment.

With respect to a related matter, prior to EPA determining that protection of human health and the environmental can best be achieved by removal of the existing cap and the waste beneath it, there was a continual debate regarding the regulatory status of the capped area. EPD provided EPA with letters, EPD comments, and discussions during meetings to support our perspective. To that end, we want to provide you with further information so that EPA can better understand the position EPD has maintained on this point for many years. Attached are excerpts out of two reports submitted to EPD by Applied Engineering and Science on behalf of Reichhold Chemicals and Canadyne-Georgia Corporation. While we are certain that EPA has these documents, your staff may not have had sufficient time to evaluate these. To facilitate your understanding, we are providing a brief outline of the logic we used, based on the attached excerpts, which supports EPD's position.

The Remedial Action Management Plan (RAMP), dated April 1986 contained figures, charts, tables, and other information to support the remedial activities contemplated at that time. Figure 3, December 1985, found in the RAMP illustrates the relationship between EP Toxicity concentrations for Arsenic and Total concentrations for Arsenic. For a waste stream to be hazardous due to the characteristic for arsenic, the EP Toxicity concentration would have to be 5 parts per million or greater. Examing Figure 3, which was constructed from the results of samples collected at the Woolfolk Chemical Works, it appears that an EP Toxicity concentration of 5 parts per million occurs when the concentration of total arsenic is around 700 parts per million. While the exactness of this relationship is not important, it does in a general sense help understand the waste classification system used throughout the RAMP: total arsenic 0-700 is defined as mildly contaminated; total arsenic 700-10,000 parts per million is defined as moderately contaminated; and total arsenic of greater than 10,000 parts per million is defined as heavily contaminated. This classification system is important because it dictated how waste that was generated during the implementation of the RAMP would be handled.

In August 1987, Applied Engineering and Science, on behalf of Reichhold Chemicals and Canadyne-Georgia Corporation, submitted a document entitled: "Cleanup Report for Former Woolfolk Chemical Works Plant Site, Fort Valley, Georgia" to EPD. This report summarized the work that was done pursuant to the RAMP submitted in April 1986. On Page V-7, first complete paragraph says: "A section of soil along Pine Street, where the cap maintenance road would later be constructed, was excavated to remove soil moderately high in arsenic. The section. . . . and 7 feet deep. The excavated soil was placed in Area 1 where the cap was later constructed over it." The questions that we had to ask about these actions are, as follows: Is soil containing moderately high levels of arsenic hazardous waste? If a person generates hazardous waste, are there any requirements that govern the subsequent handling of that hazardous waste? And finally, is placement of soil moderately high in arsenic the same thing as disposal of hazardous waste? The answer to each of those questions is "yes," and the ROD, as written, adequately addresses the concerns regarding these questions that EPD had previously expressed.

Finally, EPD, along with the Law Department, is studying the September 17, 1997 letter from Paul Schwartz, Assistant Regional Counsel, regarding EPA's position that remediation levels established under the Georgia Hazardous Site Response Act are not Applicable, and Relevant and Appropriate Requirements (ARARs) under CERCLA. EPA's position, in principle, is unacceptable to EPD, but we want to fully evaluate the letter, its implications, and potential consequences to EPD before we provide you with a written response. We expect to provide you with our written response early in 1998.

We look forward to working closely with you and you staff until the environmental problems associated with the Woolfolk Chemical Works NPL Site are permanently resolved. If we can be of further assistance, please contact Bill Mundy at (404) 656-7802 or me at (404) 656-4713.

Sincerely,

Harold F. Reheis
Director

cc: Jennifer Kaduck
Richard Green

R:\JIMS\RODACC97.LTR

FIGURE 3

COMPARSION OF EP TOXICITY VS. TOTAL EXTRACTABLE ARSENIC

CANADYNE - GEORGIA CORP.

FORT VALLEY, GEORGIA

APPLIED ENGINEERING AND SCIENCE

SCALE

DWN. BY GH

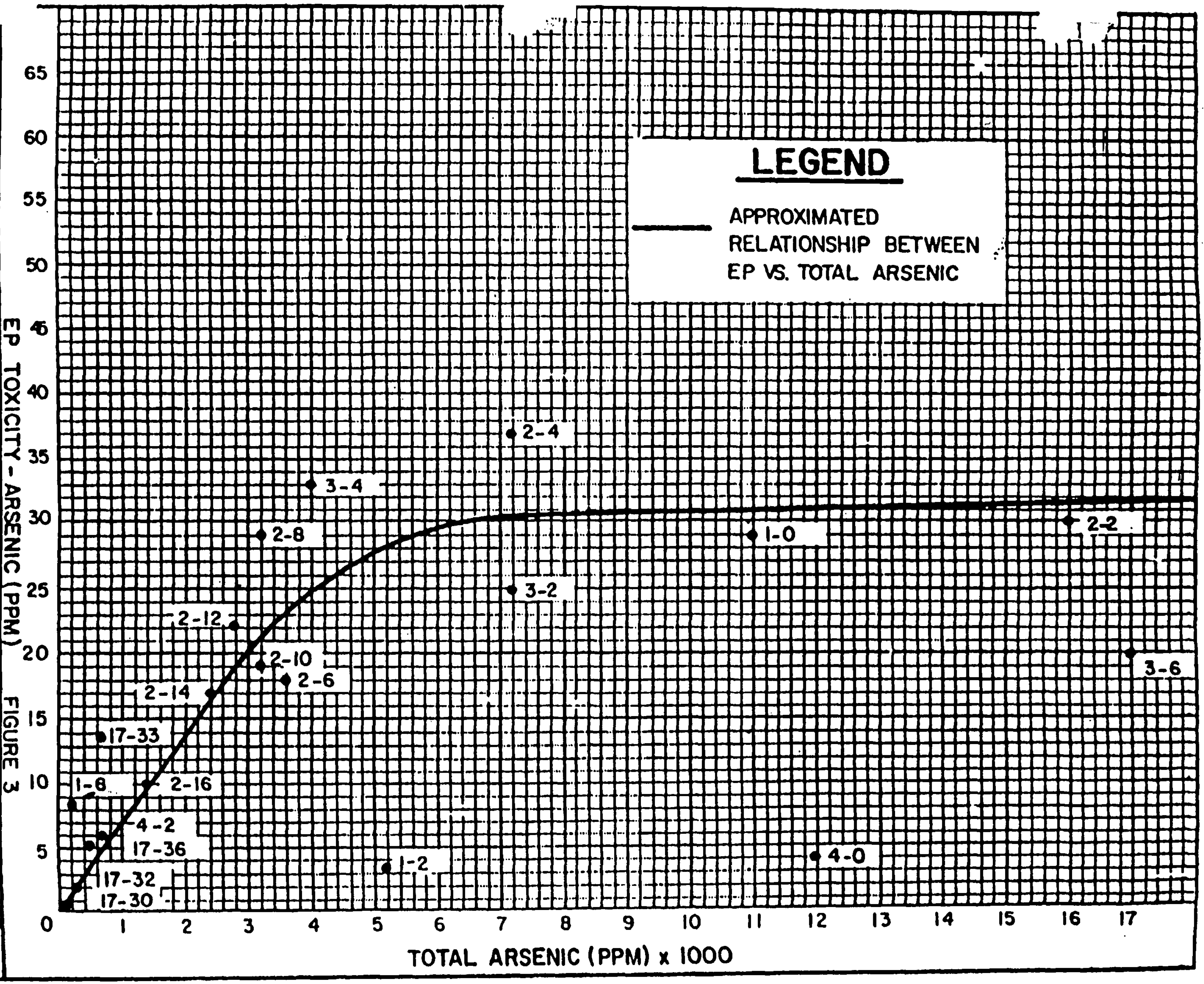
CHK'D. BY GW

APPR. BY TH

DATE DEC 1985

DWG. NO. 40628

SHEET NO.



I. INTRODUCTION

Canadyne-Georgia Corporation (the Company) operated the former Woolfolk Chemical Works (the Plant) facilities in Fort Valley, Georgia from 1977 to 1984. A variety of pesticides and herbicides were formulated and packaged at the plant. Contamination of soils, groundwater, production and storage areas have resulted from its normal operations over a period of many years.

Remedial investigations of the site were undertaken by AES in 1985. AES prepared a Remedial Action Management Plan (RAMP) which was submitted to the Georgia Environmental Protection Division (EPD) in April, 1986. The plan which was approved by the EPD involves the demolition and disposal of buildings, excavation and disposal of some of the contaminated soils, onsite relocation of mildly contaminated soil and construction of an impermeable cap.

This work plan will address the the construction ... site layout, the remedial work for buildings ... along with cap construction. The hauling and disposal of building debris and soil, runoff control and wastewater treatment and the cleanup schedule is also presented.

top of the lime sulfur sludge and compacted. Also, a substantial amount of concrete remained from the demolition of the buildings. This concrete was buried in the burial cells along with the lime sulfur sludge. This was performed consistent with recommendations from the geotechnical engineer regarding soil stability and differential settling beneath the cap.

A section of soil along Pine Street, where the cap maintenance road would later be constructed, was excavated to remove soil moderately high in arsenic. The section was excavated in a series of sampling/excavation steps. Dimensions of the final excavation were 37 feet long, 14 feet wide and 7 feet deep. The excavated soil was placed in Area 1 where the cap was later constructed over it. The excavation was backfilled with soil brought from off the site.

Two existing vertical, deep, narrow holes were uncovered in the south corner of Area 1 during excavation operations. These were believed to be abandoned water wells. They were about 4 feet square, 18 to 20 feet deep and located as shown on Sheet 4. Both holes were sealed with 6 feet of neat cement grout at the bottom. The work was performed under the direction of a licensed water well contractor as required by the Water Well Standards Act of 1985, as amended. The