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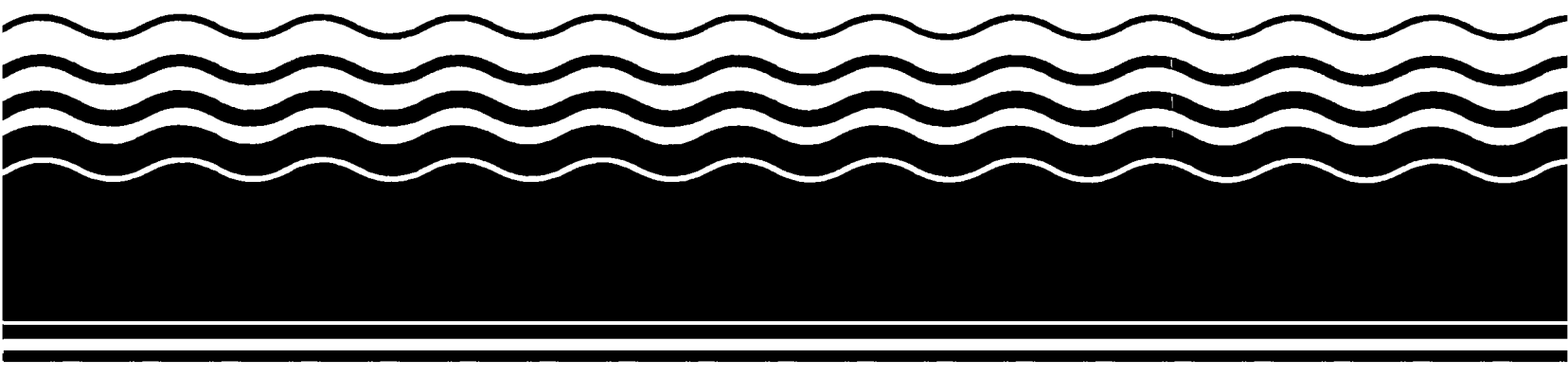
EPA/ROD/R07-93/064
May 1993

EPA

Superfund Record of Decision:

Chemplex II, IA



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Second Remedial Action - Final

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16. Abstract (Limit: 200 words)

The 700-acre Chemplex II site consists of a manufacturing plant and agricultural fields located in Clinton, Iowa. The plant, located on approximately 230-acres of land, is owned by the City of Clinton and enclosed by a fence. Land use in the area is predominantly industrial, with agricultural fields surrounding the plant. Eleven potential areas of concern were identified from historical waste handling practices and previous studies, which are identified as the Landfill, Debutanized Aromatic Compound (DAC) Storage and Truck Loading Area, Polishing Basin, Previous Basin, Former Waste Pile F, Surface Impoundment B, Surface Impoundment C, Surface Impoundment D, DAC Spill Area, Former Container Storage Area H, and Unnamed Tributary to Rock Creek. From 1968 to 1978, the 7-acre landfill was used for disposal of various plant wastes generated at the polyethylene manufacturing facility, including sludge, debris, scrap polyethylene, and spent solvents. These wastes appear, in part, to have contaminated the soil and ground water below the landfill. Much of the highly contaminated soil and debris in the landfill will continue to leach into the ground water and potentially could be a future contamination source for ground water. Currently, the contaminated soil and debris in the Landfill Area pose the principal threat because they contain high concentrations of contaminants that are highly mobile due to landfill subsurface

(See Attached Page)

17. Document Analysis a. Descriptors
Record of Decision - Chemplex II, IA
Second Remedial Action - Final
Contaminated Media: soil, debris
Key Contaminants: VOCs (benzene, PCE), other organics (PAHs)

b. Identifiers/Open-Ended Terms

c. COSATI Field/Group

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Second Remedial Action - Final

Abstract (Continued)

conditions. The proposed remedy includes treating vapors from the Soil Vapor Extraction (SVE) system using a technology such as catalytic oxidation or carbon adsorption, as determined during the remedial design phase. The contaminated soil, debris, and ground water at the rest of the site present a relatively low long-term threat. A 1989 ROD addressed ground water extraction and treatment throughout the site, as OU1. The design of the system is currently ongoing and the system is expected to be operational in 1994. This ROD addresses a final remedy for the contaminated soil and debris, as OU2. The primary contaminants of concern affecting the soil and debris are VOCs, including benzene and PCE; and other organics, including PAHs.

The selected remedial action for this site includes treating onsite 350,000 yd^3 of contaminated soil and debris using in-situ soil vapor extraction to remove VOCs; treating the vapors onsite using catalytic oxidation or carbon adsorption; installing a multi-layer cap over this area; capping the H-2 area of the DAC Storage and Truck Loading Area; disposing of treatment residuals from SVE either onsite or offsite; establishing and maintaining a vegetative cover in the Polishing Basin Area, Previous Basin Area, and Former Waste Pile F to prevent exposure to damaged soil; placing warning signs and fences in these areas and in Surface Impoundments B and D; suppressing ground water in the Landfill Area to facilitate operation of the SVE system; and implementing institutional controls, including deed restrictions. The estimated present worth cost for this remedial action is $11,409,000, which includes an estimated annual O&M cost of $32,702 for 2.5 years.

PERFORMANCE STANDARDS OR GOALS:

Chemical-specific soil cleanup goals will be based on MCLs from chemical data collected during the Supplemental Endangerment Assessment (SEA), and include benzene 4,672.29 mg/kg; CPAH 1,051.14 mg/kg; PAH 51,093.6 mg/kg; and PCE 118.85 mg/kg. The SVE process will attain a 90-99% cleanup of VOCs as measured by in-situ gas concentrations. Detailed performance criteria will be developed as part of the design process.

RECORD OF DECISION

DECLARATION

SITE NAME AND LOCATION

Chemplex Site
Clinton, Iowa

STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected remedial action for the soils and wastes at the Chemplex Site located in Clinton, Iowa. This decision was chosen in accordance with the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act (SARA), and, to the extent practicable, the National Contingency Plan (NCP). This decision is based on the administrative record for this Site.

The State of Iowa concurs on the selected remedy.

ASSESSMENT OF THE SITE

Actual or threatened releases of hazardous substances from this Site, if not addressed by implementing the response action selected in this Record of Decision (ROD), may present a current or potential threat to public health, welfare, or the environment.

DESCRIPTION OF THE SELECTED REMEDY

Remedial action at the Chemplex Site is to be implemented through a series of operable units. The first operable unit consists of extraction and treatment of contaminated groundwater. The Record of Decision for the first operable unit was signed on September 27, 1989. That remedial action is being implemented by a number of potentially responsible parties (PRPs) pursuant to a judicial consent decree entered by the Federal District Court for the Southern District of Iowa on November 7, 1991.

The second and final operable unit, which is the subject of this Record of Decision, addresses threats posed by contaminated soils and wastes at the Site. The contaminated soils and wastes act as a source of groundwater contamination and also act as a source for direct exposure to hazardous substances. The remedy addresses principal threat wastes, which are the contaminated materials in the Landfill Area of the Site, as well as the low-level threat wastes at the rest of the Site.

The major components of the selected remedy are:

- groundwater suppression, soil vapor extraction (SVE), and capping in the Landfill Area;
- capping of the H-2 area of the DAC Storage and Truck Loading Area;
- establishment and maintenance of a vegetative cover in the Previous Basin Area, Former Waste Pile F, and Surface Impoundments B and D; and
- institutional controls in all areas.

STATUTORY DETERMINATIONS

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

Because this remedy will result in hazardous substances remaining on the Site above health-based levels, a review will be conducted within five years after commencement of remedial action to ensure that the remedy continues to provide adequate protection of human health and the environment.

William W. Rice
Acting Regional Administrator
U.S. EPA, Region VII

5/12/93
Date

RECORD OF DECISION

DECISION SUMMARY

CHEMPLEX SITE

CLINTON, IOWA

SOILS AND WASTES OPERABLE UNIT

Prepared by:

U.S. ENVIRONMENTAL PROTECTION AGENCY

REGION VII

KANSAS CITY, KANSAS

MAY, 1993

RECORD OF DECISION
CHEMPLEX SITE

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RESPONSIVENESS SUMMARY

GLOSSARY 50-51

DECISION SUMMARY

1.0 Site Name, Location and Description

The Chemplex Site is located approximately five miles west of Clinton, Iowa, south of U.S. 30 and west of Route 67. The 700-acre Site includes the high-density and low-density polyethylene manufacturing plant operated by Quantum Chemical Corporation and the agricultural fields that surround the plant. The plant itself is located on approximately 230 acres of land enclosed by a fence. The plant has been in operation since approximately 1967. The plant and the land on which it is located are owned by the City of Clinton. Initially the City leased the land to ACC Chemical Company and Getty Chemical Company (ACC/GCC), who operated the plant until 1984. Quantum currently leases the plant and the property, excluding a seven-acre Landfill on the western portion of the Site, from the City of Clinton. ACC/GCC retain their leasehold interest in the Landfill.

As indicated on Figure 1, eleven potential areas of concern (AOCs) at the Site were identified from historical waste handling practices and/or previous investigations. These eleven areas (study areas) were investigated during the Second Operable Unit Remedial Investigation (SOURI) and are discussed in detail in the Remedial Investigation (RI) and Feasibility Study (FS) Reports. These areas are the Landfill, Debutanized Aromatic Compound (DAC) Storage and Truck Loading Area, Polishing Basin, Previous Basin, Former Waste Pile F, Surface Impoundment B, Surface Impoundment C, Surface Impoundment D, DAC Spill Area, Former Container Storage Area H, and Unnamed Tributary to Rock Creek.

2.0 Site History and Enforcement Activities

The Site has been the subject of a number of investigations over the past several years. Initially, the investigations were concerned with the Polishing Basin and the Landfill. The scope of subsequent investigations was expanded to include the eleven study areas. A brief description and history of each of these eleven study areas is presented below.

2.1 The Landfill

The Landfill is located near the west-central boundary of the fenced portion of the Site and covers approximately seven acres. From 1968 to 1978, the Landfill was used for disposal of various plant wastes generated at the polyethylene manufacturing facility including black oily sludge, scrap polyethylene, construction debris, carbonate sludge, and spent solvents. The

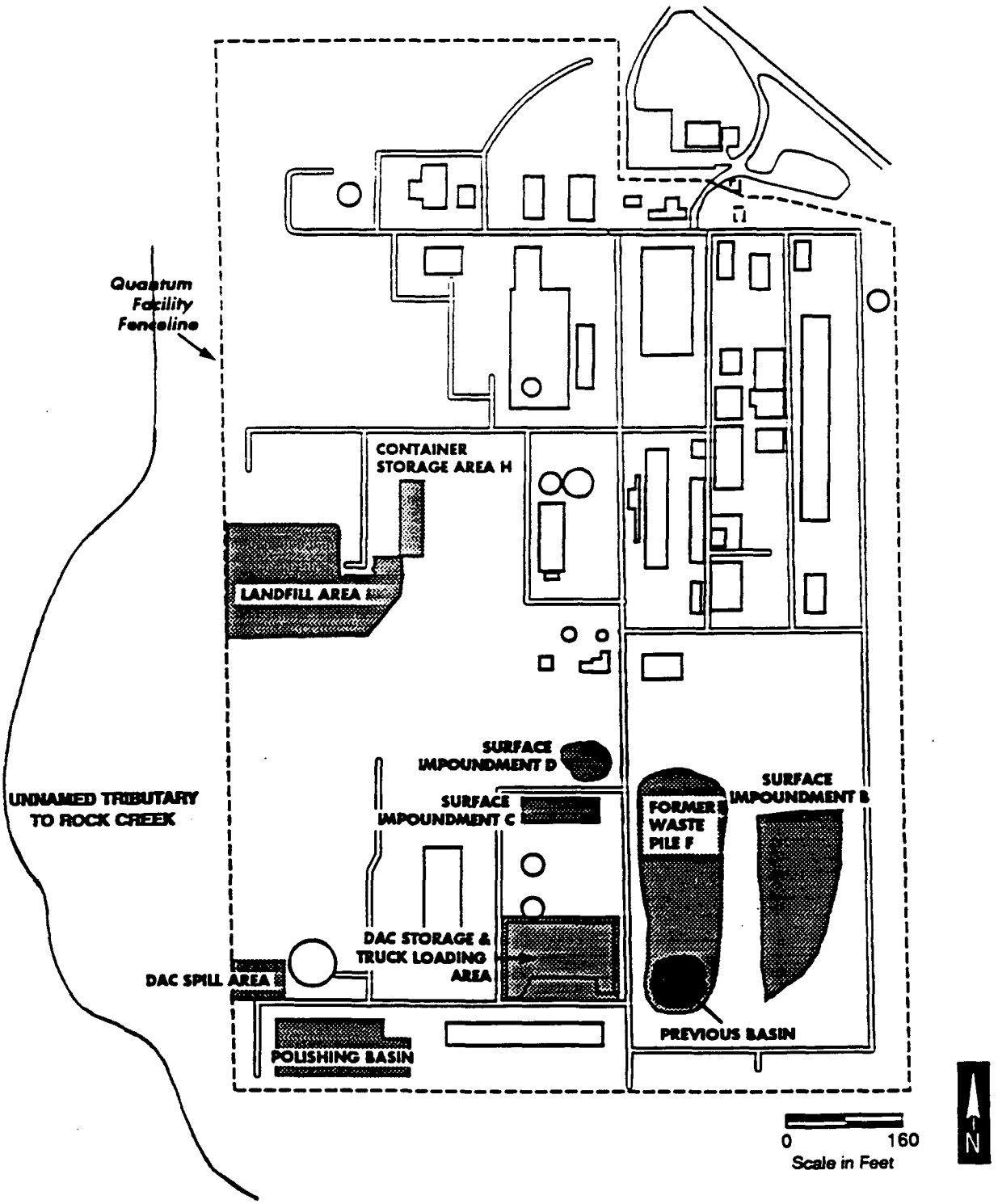


FIGURE 1

On-Site Areas of Potential Concern- Chemplex Site: Clinton, Iowa

plant wastes have contaminated the soil and groundwater underneath the Landfill.

2.2 The DAC Storage and Truck Loading Area

The DAC Storage and Truck Loading Area is an active operation area that has been in use since the inception of facility operations in 1968. The area measures approximately 500 feet by 800 feet and is used primarily for the storage and transfer of debutanized aromatic compound (DAC), a by-product of the polyethylene production process. DAC contains approximately 40% benzene, which is a hazardous substance, as well as other volatile organic compounds. The area contains eleven above-ground storage tanks, a transfer pump station, a truck loading area and a rail tank car loading area, including a railroad track that bisects the study area. Historically, this area was not paved or otherwise protected from surface water infiltration, and contamination of soils and groundwater occurred as a result of spills of DAC product. However, subsequent paving and compaction activities have reduced the potential for surface water infiltration.

The area south of the railroad tracks is unpaved and is bordered on its southern end by a french drain. The french drain was installed voluntarily by ACC/GCC in approximately 1988 as an interim groundwater recovery system to intercept Light Non-Aqueous Phase Liquids (LNAPL) present as free product floating on the water table. The french drain appears to be at least somewhat effective in controlling LNAPL.

2.3 The Polishing Basin

This area is currently used by Quantum as a tertiary process water treatment unit that receives process water from a biological treatment unit. The Polishing Basin was originally constructed with a bentonite-treated clay liner in 1968 and used as a process water settling pond. In 1974, in conjunction with construction of the wastewater treatment plant, the Polishing Basin was dredged. During dredging, a backhoe apparently removed a section of the clay liner. As a result of this damage to the clay liner, contaminants leached into the soil beneath the Polishing Basin.

In 1982, the Polishing Basin was drained. It was at this time that the damage to the clay liner from the 1974 dredging was discovered. The Polishing Basin was rebuilt with a new liner consisting of compacted clay, bentonite, and a high density polyethylene liner. A leachate collection system was also installed that included a system of horizontal piping that underlies the Polishing Basin. A french drain is located in the ditch between the Polishing Basin and Hawkeye Road. An additional groundwater recovery system is located downgradient of

the Polishing Basin that consists of three french drains and two collection wells.

2.4 The Previous Basin

The Previous Basin is a 1.1-acre area of the Site on which was located a basin containing approximately 28,000 tons of oily sludges. These sludges were dredged from the Polishing Basin in 1974 and placed in the Previous Basin. The sludges consisted of the sediment from the settling of plant wastewater prior to the construction of the wastewater treatment plant in 1974.

In 1987, the sludges in the Previous Basin were excavated and removed from the Site. However, some residual contamination remains in the soil.

2.5 Surface Impoundment B

This area is approximately 700 feet by 350 feet. The impoundment was an engineered structure with a clayey silt liner constructed in September 1982 to provide a drying basin for sludges removed from the Polishing Basin. The Polishing Basin sludges placed in Surface Impoundment B were tilled, allowed to dry, and kept in place until 1985. In June 1985, the area was excavated and the soils and sludges were transported to Former Waste Pile F (described below).

2.6 Surface Impoundment C

This area is approximately 300 feet by 100 feet. The impoundment was placed in service in 1980 for storage of non-hazardous sludges generated by the process water treatment plant thickener. In 1985, Surface Impoundment C was excavated and the sludges and soil were transferred to Former Waste Pile F (described below).

2.7 Former Waste Pile F

This area is approximately 800 feet by 300 feet. The area was first used in 1977 for the storage of non-hazardous calcium carbonate- and magnesium carbonate-rich sludges from the facility's water treatment and wastewater treatment plants. In 1985-1986, sludges from Surface Impoundments B and C were excavated and placed in Former Waste Pile F. In 1987, all sludges in Former Waste Pile F were removed to an off-site landfill and the area was backfilled.

2.8 Surface Impoundment D

The boundaries of this area are somewhat ill-defined. It is approximately 300 feet by 150 feet. Surface Impoundment D was placed in service in the Fall of 1979 to store non-hazardous

thickener sludges from the process water treatment plant. This impoundment was abandoned in 1983. The dried sludge was landfarmed in place by plowing into the soil and has not been excavated.

2.9 The DAC Spill Area

This area includes a DAC storage tank, a bermed area for the tank, and the drainage ditch adjacent to the bermed area. In March, 1982, a line from the DAC storage tank ruptured, spilling approximately 37,000 gallons of DAC into the bermed area. Although most of the spilled material was contained in the bermed area and recovered, approximately 1,500 gallons escaped through the drainage pipe. Approximately 1,000 of the 1,500 gallons that escaped were recovered with a suction truck. The remaining 500 gallons flowed south in a drainage ditch that eventually drains into the Unnamed Tributary to Rock Creek, located on the western portion of the Site.

2.10 Former Container Storage Area H

This area is approximately 25 feet by 100 feet. From 1968 to 1981, this area was used to store drums of chromium-bearing catalyst after its use in the polyethylene manufacturing process. Other materials stored in this area may have contained 1,1,1-trichloroethane, tetrachloroethylene (PCE), cyclohexane, and mono- and di-glycerides. The drums were reportedly removed from the area in 1981.

2.11 Unnamed Tributary to Rock Creek

The Unnamed Tributary to Rock Creek drains the western portion of the Site and flows south, draining into Rock Creek approximately 2,200 feet south of the plant. Below the confluence with the Unnamed Tributary, Rock Creek flows to the east and then to the south. Approximately one and a half miles southeast of the Site, Rock Creek flows adjacent to Hazel's Lake. During high water conditions, the creek and lake are hydraulically connected through a culvert. Rock Creek eventually discharges to the Mississippi River approximately two miles south of the Site.

2.12 Enforcement History

On September 18, 1987, EPA entered into an Administrative Order on Consent with certain Potentially Responsible Parties (PRPs), USI (now Quantum) and ACC/GCC, to investigate the Landfill and DAC Storage and Truck Loading Area. The Consent Order was issued pursuant to Section 106(a) of CERCLA, 42 U.S.C. §9606(a), and Section 3013 of the Resources Conservation and Recovery Act, as amended (RCRA),

42 U.S.C. §6934. A summary of the results of this investigation and other previous investigations is included in the RI/FS Report that was completed by the PRPs in June 1989. With this information and other documents available in the Administrative Record file, EPA issued the first ROD for this Site in September, 1989, which selected groundwater extraction and treatment for the Landfill and the DAC Storage and Truck Loading Areas. This ROD was later modified by an Explanation of Significant Differences (ESD) to include groundwater extraction and treatment for the entire Site. The groundwater extraction and treatment remedy is considered Operable Unit Number One (OU#1) for the Site and is discussed in more detail in Section 4.0 of this document. These documents are all available in the Administrative Record file for OU#1.

At the time the first ROD for the Site was issued, EPA determined that there was not sufficient information concerning the nature and extent of soil contamination at the Site to select a remedy. Therefore, on December 28, 1989, EPA entered into an Administrative Order on Consent with the PRPs to conduct a Second Operable Unit (OU#2) RI/FS. This Order was issued pursuant to Sections 104(b) and 122(d) of CERCLA, 42 U.S.C. §§9604(b) and 9622(d). The RI was completed in June of 1992 and the FS was completed in December of 1992. A Supplemental Endangerment Assessment (SEA) and Treatability Study were also completed by the PRPs. The results of all of the investigations to date are summarized in these reports.

3.0 Highlights of Community Involvement

The RI/FS Report and the Proposed Plan for the Chemplex Site were released to the public for comment on January 23, 1993. These two reports and the Administrative Record file were made available for review in the Clinton and Camanche Public Libraries and at the EPA Region VII offices at 726 Minnesota Avenue, Kansas City, Kansas. The notice of availability for these documents was published in the Clinton Herald on January 23, 1993. A public comment period on the documents was held from January 23, 1993 through February 21, 1993. In addition, a public meeting was held in Clinton on February 2, 1993. At this meeting, representatives from EPA and the Iowa Department of Natural Resources answered questions about the Site and the remedial alternatives under consideration. Responses to the comments received during the public comment period are included in the Responsiveness Summary, which is part of this ROD. The decision for this Site is based on the information contained in the Administrative Record file.

4.0 Scope and Role of Response Action Within Site Strategy

Remedial action at the Chemplex Site is being implemented through a series of operable units, or discrete actions. The

soils and wastes at the Site is driven by carcinogenic PAHs (CPAHs). Therefore, the discussions of the nature and extent of contamination at the study areas focus on the occurrence of the following SOCs: benzene, PCE, PAHs and CPAHs.

Table 5 summarizes the maximum concentrations of SOCs found at the Site for each study area in parts per million (ppm). As the table indicates, maximum contaminant concentrations in the Landfill area are one to two orders of magnitude higher than maximum concentrations at any other area at the Site. The maximum concentrations of either benzene or PCE in any of these other areas is 12 ppm, which is minimal when compared to the Landfill. The maximum concentration of PAHs found in any of the other areas except the Landfill is 3,821 ppm, and occurred in the subsurface at Surface Impoundment B. Although this concentration may seem high, PAHs are relatively immobile in the subsurface and groundwater contamination is much more widespread for benzene and PCE than it is for PAHs.

As discussed in the RI Report, the Landfill contains a total of approximately 350,000 cubic yards of contaminated soils and wastes including 104,000 cubic yards of contaminated plant by-products and construction debris. This is in sharp contrast to the ten other areas, where the total volume of contaminated soils is approximately 20,000 cubic yards.

The contaminated soils and wastes in the Landfill Area pose the principal threat to be addressed by this operable unit, because they contain high concentrations of contaminants that are highly mobile due to Landfill subsurface conditions. Much of the highly contaminated soils and wastes in the Landfill are in contact with bedrock and the groundwater. As a result, contaminants from soils and wastes in the Landfill will continue to leach into the groundwater and will act as long-term sources of damage to groundwater unless they are addressed.

The contaminated soils and wastes at the rest of the Site present a relatively low long-term threat. In the DAC Truck Storage and Loading Area and the Polishing Basin Area, considerable groundwater contamination exists. However, the groundwater contamination appears to be primarily from historic releases. Given the relatively low levels of contamination and the low permeability of the soils in these areas, it appears that significant leaching of contaminants into the groundwater is not occurring and will not be expected to occur in the future.

In regard to all of the other areas of the Site, low permeability soils have apparently restricted the movement of SOCs and there is little or no groundwater damage in these areas.

phasing of cleanup actions provides the opportunity to achieve significant risk reduction more quickly than addressing the entire Site at one time. The Chemplex Site cleanup consists of two operable units.

The first operable unit remedial action addresses groundwater at the Site. As mentioned earlier, the September 1989 ROD calls for groundwater extraction and treatment throughout the Site. On November 7, 1991, EPA and certain PRPs entered into a Consent Decree which requires the PRPs to design, construct and operate the groundwater extraction and treatment system. The design of the system is currently ongoing and the system is expected to be operational sometime in 1994.

The purpose of OU#2 is to address contaminated soils and wastes at the Site that present a threat to human health and the environment from direct exposure or from indirect exposure through migration of contaminants into groundwater. In concert, OU#1 and OU#2 should address all human health and environmental risks at the Site. The specific remedial action objectives for OU#2 are:

1. Reduction of carcinogenic risk to on-site workers and construction workers from direct dermal and inhalation exposure to soils to a risk level of approximately 1×10^{-6} or less.

2. Reduction of migration of contaminants into groundwater to the maximum extent practicable, consistent with the OU#1 groundwater remedy.

5.0 Summary of Site Characteristics

The nature and extent of soil contamination for the eleven study areas are summarized below. This summary is based primarily on data generated from the investigation performed by ACC/GCC for the OU#2 RI. More detailed information regarding the nature and extent of contamination can be found in the June, 1992 OU#2 RI Report, which is part of the Administrative Record file and is available at the Clinton and Camanche Public Libraries.

Based on chemical data collected for soil and groundwater at the Site and the analysis of soil data in the Supplemental Endangerment Assessment (SEA), particular substances of concern (SOCs) have been identified for the Site. Data indicate that benzene and tetrachloroethylene (PCE) are SOCs because they occur in the groundwater and soils at elevated levels. Within the Site boundary, Polynuclear Aromatic Hydrocarbons (PAHs) occur at high concentrations, particularly in association with separate-phase Light Non-Aqueous Phase Liquids (LNAPLs). The SEA concludes that risk to human health by direct dermal exposure to contaminated

In the Unnamed Tributary to Rock Creek, PCE was detected at the highest concentrations west of the Landfill at 232 parts per billion (ppb) and west of the Polishing Basin at 56 ppb. Even at its highest concentration in the tributary, PCE occurs at levels below the EPA ambient water quality standard for PCE which is considered safe for aquatic life.

TABLE 5

Study Area	----Maximum Concentrations of SOCs (ppm)---- Benzene	PCE	Total CPAH	Total PAH
Landfill	4,650.0	105.0	900.0	40,690.0
DAC Storage and Truck Loading Area	5.2	.04	26.0	428.0
Polishing Basin	4.0	.2	19.0	1,083.0
Previous Basin	9.5	12.0	9.2	3,683.0
Former Waste Pile F	.09	.14	38.3	322.0
Surface Impound. B	1.2	.26	32.8	3,821.0
Surface Impound. C	1.2	1.2	22.2	921.0
Surface Impound. D	ND	.004	2.86	136.0
DAC Spill Area	1.1	ND	ND	5.4
Former Container Storage Area H	ND	.002	.78	4.2

PCE = tetrachloroethylene

PAH = Polynuclear Aromatic Hydrocarbons

CPAH = Carcinogenic PAH

ND=Non-detected

6.0 Summary of Site Risks

6.1 Overview of Baseline Risk Assessment

A baseline risk assessment was conducted to evaluate the potential impacts to human health from exposure to hazardous substances at the Site in the absence of remedial action. Risks based on exposures resulting from both current and future land use scenarios were evaluated. An ecological assessment was also performed. This section summarizes EPA's findings regarding risks to human health and the environment from exposure to contamination in the soil at the study areas. The complete risk assessment is presented in the Supplemental Endangerment Assessment (SEA), dated May, 1992. This document is available in the Administrative Record file. The assessment consisted of an identification of chemicals of potential concern, toxicity assessment, exposure assessment, and risk characterization.

6.2 Contaminants of Concern

The SEA compiled a list of contaminants of concern for each study area from the results of the various sampling activities at the Site. These indicator contaminants of concern were selected based on concentrations at the Site, toxicity, physical/chemical properties that affect transport/movement in air, soil and groundwater, and prevalence/persistence in these media. These contaminants of concern (as listed in Tables 2-4 through 2-14 of the SEA) were used to evaluate potential health risks at the Site. In general the contaminants of concern consist of volatile organic compounds and base-neutral acids, including PAHs.

6.3 Toxicity Assessment

The toxicity assessment characterized available human health and environmental criteria for the contaminants of concern, and qualitatively related potential chemical exposure (dose) to expected adverse health effects (response). Included in this assessment are the pertinent standards, criteria, advisories and guidelines developed for the protection of human health and the environment. An explanation of how these values were derived and how they are applied is presented below.

Cancer slope factors (CSFs or potency factors), have been developed by EPA's Carcinogenic Assessment Group for estimating excess lifetime cancer risks associated with exposure to potentially carcinogenic chemicals. 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 an upper-bound estimate of the excess lifetime cancer risk associated with exposure at that intake level. The term "upper bound" reflects the conservative estimate of the risks calculated from the CSF.

Use of this approach makes underestimation of the actual cancer risk highly unlikely. CSFs 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.

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, that are likely to be without an appreciable risk of adverse health effects. Estimated intakes of chemicals from environmental media (e.g., the amount of a chemical ingested from contaminated soil) 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 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 Exposure Assessment

Exposure pathways by which humans could be exposed to chemicals of potential concern were based on reasonable assumptions about current and future uses of the Site. Exposures of four potential receptors were evaluated in the SEA: an on-site worker, a trespasser, an off-site receptor, and an on-site construction worker. In accordance with the NCP and Risk Assessment Guidance for Superfund (RAGS), exposure scenarios should be based on reasonable and not unlikely current and future land use. A reasonable maximum exposure (RME) represents a situation which is more conservative than an average case but is not a worst case scenario. As explained in guidance published by EPA in October 1988 for conducting an RI/FS, the RME scenario is developed to reflect the types and extent of exposures that could occur based on the likely or expected use of the site in the future. A residential scenario was therefore not evaluated because the Quantum facility is still in operation and the property is likely to continue to be used for industrial use for the foreseeable future. A summary of these receptor groups along with the potential exposure pathways and current and future uses is presented in Table 6.4.

6.5 Risk Characterization

The risk characterization quantifies present and/or potential future risk to human health that may result from exposure to the contaminants of concern found at the Site. The site-specific risk values are estimated by incorporating information from the toxicity and exposure assessments.

TABLE 6.4

POTENTIAL EXPOSURE SCENARIOS EVALUATED AT THE CHEMPLEX SITE
OU-2 FEASIBILITY STUDY
CHEMPLEX SUPERFUND SITE
CLINTON, IOWA

POTENTIAL EXPOSURE PATHWAYS (PEPs)	RECEPTOR GROUPS			
	On-Site Worker C/F	Trespasser (C/F)	Off-Site Receptor (C/F)	On-Site Construction Worker (F)
Surface Soil:				
Inhalation	X	X		
Ingestion	X	X		
Dermal Contact	X	X		
Subsurface Soil:				
Inhalation				X
Ingestion				X
Dermal Contact				X
Sediment:				
Ingestion			X	
Dermal Contact			X	
Surface Water:				
Ingestion			X	
Dermal Contact			X	

C - Current
F - Future

When sufficient data are available, two quantitative evaluations are made: the incremental risk to the individual resulting from exposure to a carcinogen; or, for noncarcinogens, a numerical index or ratio of the exposure dose level to an acceptable reference dose.

6.5.1 Risks From Noncarcinogenic Compounds

The EPA has developed standards, guidelines, and criteria that provide levels of intakes considered to protect human populations from possible adverse effects resulting from chemical exposures. A ratio of the estimated chemical chronic average daily dose (CADD, sometimes referred to as the chronic daily intake or CDI) to the RfD provides a numerical measure of the potential that adverse health effects may result. This ratio is referred to as the chronic hazard quotient (HQ).

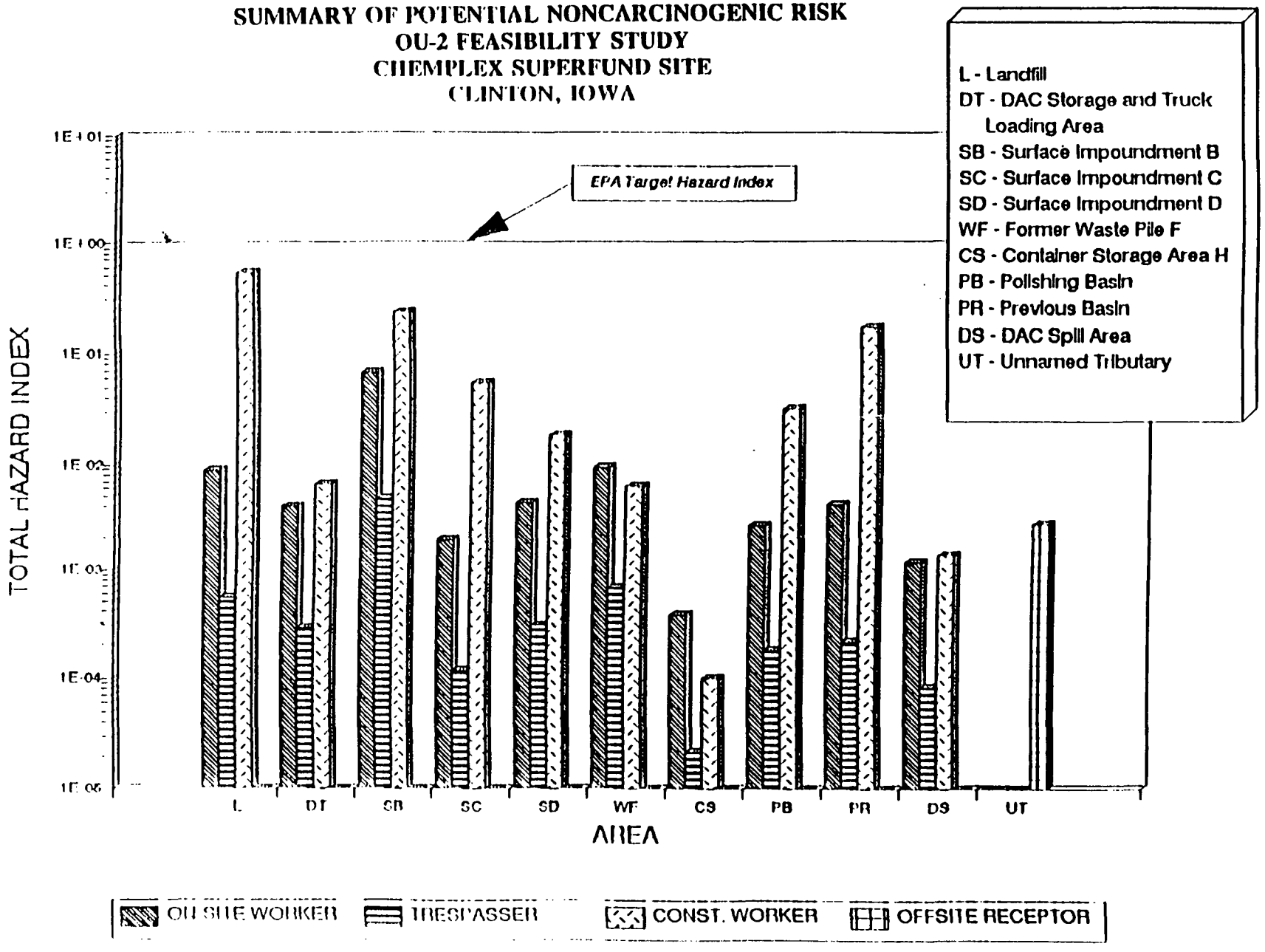
The CADD equations were derived from actual Site data and exposure assumptions based on EPA guidance documents. The RfD values for a contaminant represent a level of intake which is unlikely to result in adverse non-carcinogen health effects in individuals exposed for a chronic period of time. The equations and exposure assumptions for the CADD are presented in Appendix D of the SEA. Sources of the RfD values include EPA's Integrated Risk Information System (IRIS) (U.S.EPA, 1992), and the Health Effects Assessment Summary Tables (HEAST) (U.S.EPA, 1991). These values are listed in Tables 4-1 and 4-2 of the SEA.

By adding the HQs for all contaminants within a medium or across all media 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. In general, hazard indices greater than one are associated with potentially unacceptable health risk. As shown on Figure 6.5.1, the baseline risk assessment indicates that there are no waste-related compounds at any of the eleven study areas that represent a potentially unacceptable non-carcinogenic risk level.

6.5.2 Risks From Carcinogenic Compounds

For carcinogens or suspected carcinogens, a quantitative risk assessment involves calculating risk levels considered to represent the probability or range of probabilities of prescribed exposure conditions. Carcinogenic risk estimates, expressed as additional incidences of cancer, are determined by multiplying the cancer slope factor (CSF) of the contaminant of concern by the estimate lifetime average daily dose (LADD). The CSF values for the contaminants of concern are based on information from IRIS and HEAST and are presented in Table 4-3 of the SEA. The LADD values are based on site-specific data and are calculated in

FIGURE 6.5.1
SUMMARY OF POTENTIAL NONCARCINOGENIC RISK
OU-2 FEASIBILITY STUDY
CHEMPLEX SUPERFUND SITE
CLINTON, IOWA



Appendix D of the SEA. It is the CSF, expressed in $(mg/kg/day)^{-1}$ which converts the estimated LADD, expressed in (mg/kg/day), to incremental risk. These risks are probabilities that are generally expressed in scientific notation (e.g., $1x10^{-6}$). An excess lifetime cancer risk of $1x10^{-6}$ indicates that, as a plausible upper bound, an individual has a one in one million chance of developing cancer as a result of site-related exposure to a carcinogen over a 70-year lifetime under the specific exposure conditions at a site. The EPA generally considers as being acceptable those concentration levels representing an excess lifetime cancer risk of between 10^{-4} and 10^{-6} (or lower). Figure 6.5.2 presents the potential carcinogenic risk for the various receptors in each of the eleven study areas. As this figure indicates, all of the potential carcinogenic risks are within the 10^{-4} to 10^{-6} risk range.

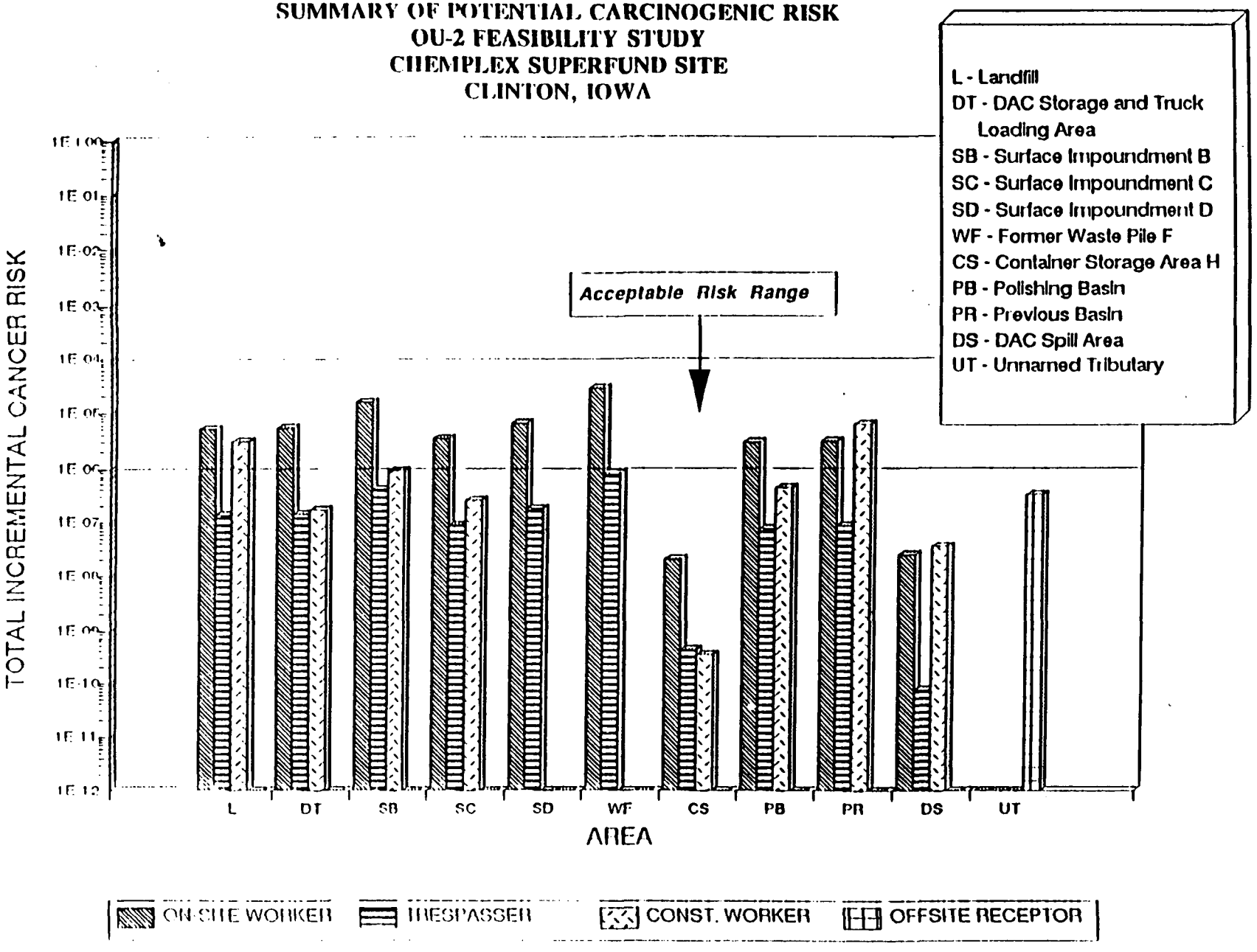
6.5.3 Environmental Evaluation

The SEA considered risk to aquatic receptors from exposure to contaminants of potential concern in surface water, to terrestrial receptors from surface soils, surface waters and sediment, and to downstream ecosystems. The SEA also evaluated the potential for critical habitats or endangered species to be adversely affected by contaminants from the Site.

After considering, in accordance with EPA guidelines, potential acute and chronic adverse effects to aquatic receptors from exposure to the contaminants of potential concern, the SEA found that there are no ecological risks of concern to aquatic receptors. The hazard indices for two potential terrestrial receptors evaluated indicated that there is a "possible concern" related to noncarcinogenic exposure for moles ingesting earthworms in Surface Impoundment B and for house sparrows ingesting seeds coated with surface soil from Surface Impoundment B. The SEA concluded, however, that due to the very conservative exposure assumptions used and the resulting relatively low levels of risk, neither of these receptors are expected to be adversely affected by Site-related contaminants of concern.

The SEA further concluded that it is unlikely that there is any risk from Site-related contaminants of concern to downstream ecosystems since there is no unacceptable risk to aquatic receptors in surface waters near the Site, and dilution of contaminants is anticipated in both Rock Creek and the Mississippi River. In summation, the SEA found that existing conditions at the Site are protective of all potential ecological receptors. Aquatic toxicity tests, stream evaluations and terrestrial surveys were not performed because the evaluation that was conducted addressed protection of all potential ecological receptors.

FIGURE 6.5.2
SUMMARY OF POTENTIAL CARCINOGENIC RISK
OU-2 FEASIBILITY STUDY
CHEMPLEX SUPERFUND SITE
CLINTON, IOWA



6.6 Uncertainties

Regardless of the type of risk estimate developed, it should be emphasized that all estimates of risk are based upon numerous assumptions and uncertainties. For example, in the Landfill Area, where materials are extremely heterogeneous, uncertainty in chemical data is heightened. There may be hot spots that were not sampled, and thus exposure point contaminant concentrations used in risk assessment may be low. Everything was done to collect the best possible data (i.e. 95% confidence interval, etc.), to reduce the likelihood of underestimating exposure levels. Nonetheless, in areas such as the Landfill, potential exposures may be higher than estimated in the risk assessment. In addition to limitations associated with site-specific chemical data, other assumptions and uncertainties that affect the accuracy of the site-specific risk characterization result from the extrapolation of potential adverse human effects from animal studies, the extrapolation of effects observed at high dose to low dose effects, the modeling of dose response effects, and route-to-route extrapolation.

The use of acceptable levels (established standards, criteria, and guidelines) and unit cancer risks which are derived from animal studies introduces uncertainty into the risk estimates. In addition, the exposure parameters used in estimating chemical intakes are often associated with uncertainties. As such, these estimates should not stand alone from the various assumptions and uncertainties upon which they are based. In developing numerical indices of risk, an attempt is made to evaluate the effect of the assumptions and limitations on numerical estimates. When the assumptions and uncertainties outweigh the meaningfulness of a risk assessment, a qualitative assessment of risk is performed.

Regardless of the uncertainties in the risk assessment, there are high levels of contamination in the subsurface of the Landfill that will act as a continuing source of groundwater contamination if not remediated.

6.7 Conclusion

In conclusion, based on the results of the risk assessment, EPA has determined that actual or threatened releases of hazardous substances from this Site, if not remediated by the selected alternative or one of the other active measures considered, present a current or potential threat to public health, welfare, or the environment.

In order to reduce all carcinogenic risks based on direct exposure to a risk level of 10^{-6} or less, remedial action is necessary in the Landfill Area, DAC Storage and Truck Loading

Area, Previous Basin, Former Waste Pile F, and Surface Impoundments B and D.

With regard to indirect exposure, the area of principal threat is the Landfill area, where PCE-damaged soils will act as a long-term source of groundwater damage unless they are addressed.

7.0 Description of Alternatives

The alternatives evaluated in detail in the FS Report are described below. This discussion identifies engineering and treatment components, institutional controls, implementation requirements, estimated costs, and major applicable or relevant and appropriate regulations (ARARs) associated with each option.

7.1 Site-Wide Alternative 1 - No Action

Under this alternative, the Site would remain in its present condition and no further action would be taken to reduce exposure to Site contaminants or reduce migration of contaminants. Although the no action alternative is not adequately protective of human health and the environment, it is presented, as required by the NCP, as a baseline for comparison.

The estimated total present worth cost for this alternative is approximately $308,000 because of continued maintenance and 5-year reviews that would be required.

7.2 Site-Wide Alternative 2 - Containment/Limited Action

This alternative includes containment for the Landfill Area, the DAC Storage and Truck Loading Area, and the Polishing Basin, and institutional controls in all areas.

The containment component consists of capping to eliminate direct dermal exposure and cut-off surface water infiltration. The cap in the Landfill would meet the State of Iowa's requirements for closure of existing solid waste landfills (I.A.C. Chapter 567-103, Subrule 103.2(13)), which are applicable to the Landfill. This cap will also comply with certain relevant and appropriate RCRA Subtitle C landfill closure requirements set forth at 40 CFR §264.310. Specifically, relevant and appropriate requirements are that the cap provide long-term minimization of migration of liquids through the Landfill, function with minimum maintenance, promote drainage and minimize erosion, and have a permeability less than the natural soils present.

In the Polishing Basin and DAC Storage and Truck Loading Areas, a cap would be installed in certain areas to reduce direct contact threats and contaminant migration to groundwater. The State of Iowa landfill closure requirements are not applicable in

these areas, and the RCRA closure requirements are not relevant and appropriate. However, these are operating areas at the plant, and the cap would need to be constructed in a manner that would ensure its long-term effectiveness.

A vegetative cover would be established and maintained at the Previous Basin, Former Waste Pile F, and Surface Impoundments B, C, and D. Groundwater suppression for all of these areas would be included to inhibit migration of SOCs via groundwater.

Institutional controls would be used to supplement the containment in order to further reduce exposure to contaminated soils. Access controls, including a fence and warning signs, would be put in place. Also, the Site is currently on the State of Iowa Registry of Hazardous Waste or Hazardous Substance Disposal Sites. Property on the Registry cannot be sold, transferred, or conveyed, nor can its use be changed, without written authorization from the Director of IDNR. Finally, deed restrictions would be recorded with the local registry of deeds which would prohibit activities at the Site which would disturb the caps and vegetative covers.

Implementation time for this remedy is approximately six months. The estimated capital cost for this alternative is $5,226,000, the estimated annual O&M cost is $32,702, and the total present worth cost for this alternative is approximately $5,534,000.

7.3 Site-Wide Alternative 3 - Landfill SVE/Limited Action

This alternative utilizes soil vapor extraction (SVE) to remove volatile organic compounds, including benzene and PCE, from the Landfill. Use of SVE will also enhance the biodegradation of PAHs by increasing the availability of oxygen to subsurface soils. Based on the results of treatability tests, SVE in the Landfill is expected to remove significant quantities of volatile organic compounds (VOCs) and enhance biodegradation of PAHs. The goal of the SVE treatment will be to remove greater than 90% of the VOCs in the Landfill area. Contaminants extracted from the Landfill would be captured and treated in order to avoid cross-media impacts and short-term exposures to nearby residents and workers. Catalytic oxidation and carbon adsorption are types of treatment which could be used.

The soils and wastes in the Landfill are contaminated in part as a result of disposal of spent solvents, which are listed RCRA wastes. However, the spent solvent disposal occurred prior to the 1980 effective date of RCRA, and thus RCRA regulations are only potential ARARs for remedial activities which involve treatment, storage, or disposal of these contaminated materials. Since the SVE treatment would be performed in-situ, there are no

applicable or relevant and appropriate RCRA requirements for the SVE treatment.

This alternative also includes installation of a multimedia cap in the Landfill. The cap would comply with the State of Iowa requirements for closure of solid waste landfills and the relevant and appropriate RCRA Subtitle C landfill closure requirements described for Alternative 2.

In study areas other than the Landfill, Alternative 3 is the same as Alternative 2, including capping, groundwater suppression, and institutional controls.

Implementation time for this remedy is approximately thirty months. The estimated capital cost for this alternative is $11,101,000, the estimated annual O&M cost is $32,702, and the total present worth cost for Alternative 3 is approximately $11,409,000.

7.4 Site-Wide Alternative 4 - SVE/Limited Action

Alternative 4 is identical to Alternative 3 with the exception of an SVE component being added in the DAC Storage and Truck Loading Area and in the Polishing Basin.

SVE would be utilized in select areas in the DAC and Polishing Basin Areas to remove contaminants from LNAPL-smeared soils. Treatability tests indicate that SVE in these areas would remove and destroy some contaminants. However, the extent to which SVE can be used in the DAC and Polishing Basin Areas is limited because existing facility operations make some of the contaminated soils inaccessible. In addition, the effectiveness of SVE in the DAC and Polishing Basin Areas, as opposed to the Landfill, is uncertain due to the low permeability of soils in these areas.

Implementation time for this remedy is approximately thirty months. The estimated capital cost for this alternative is $14,115,000, the estimated annual O&M cost is $32,702, and total present worth cost for Alternative 4 is approximately $14,424,000.

7.5 Site-Wide Alternative 5 - SVE/Excavation/Limited Action

This alternative incorporates SVE in the Landfill, DAC Storage and Truck Loading Area, and Polishing Basin. It also includes excavation of certain contaminated unsaturated soils in the DAC Storage and Truck Loading Area which are in areas not amenable to SVE. Approximately 4300 cubic yards of contaminated soil would be excavated. Excavation would be done manually due to the presence of pipelines, pumps, and utilities in the area.

The excavated soils would be consolidated in the Landfill for subsequent SVE treatment.

The contaminated soils in the DAC area, unlike the Landfill, are not contaminated with RCRA listed wastes. Therefore, RCRA requirements would only be applicable to the handling of excavated DAC Storage and Truck Loading Area soils if the soils exhibit a characteristic of hazardous waste pursuant to 40 CFR Part 261. Based on the RI data, some of the contaminated soils may contain benzene at high enough concentrations that the soils might exhibit the characteristic of toxicity for benzene. Excavated soils would undergo Toxicity Characteristic Leaching Procedure (TCLP) analysis, and if the analysis indicates that they are a characteristic hazardous waste, RCRA regulations would be applicable to handling of such waste.

The other components of Alternative 5 are identical to those included in Alternative 3, including capping in the Landfill, DAC Storage and Truck Loading Area, and Polishing Basin Areas following SVE treatment, vegetative cover in the Previous Basin, Former Waste Pile F and the Surface Impoundments, institutional controls in all areas, and groundwater suppression in all areas other than the surface impoundments.

Implementation time for this remedy is approximately thirty months. The estimated capital cost for this alternative is $14,846,000, the estimated annual O&M cost is $32,702, and the total present worth cost for Alternative 5 is approximately $15,154,000.

7.6 Site-Wide Alternative 6 - Landfill Bioremediation/SVE or Excavation/Limited Action

This alternative incorporates SVE, excavation and ex situ bioremediation in the Landfill. It also includes partial SVE, partial excavation and containment in the DAC Storage and Truck Loading Area, SVE and containment in the Polishing Basin, containment, including capping, in the Previous Basin, and a vegetative cover and access controls in Former Waste Pile F and the Surface Impoundments. Groundwater suppression is also part of this alternative.

All Landfill materials would undergo SVE treatment, followed by excavation and on-site bioremediation in a prepared bed reactor. Approximately 350,000 cubic yards of material would be excavated and treated. The treated materials would then be replaced in the excavated area and a vegetative cover would be established.

The SVE system would be designed and operated as described for Alternative 3. Upon completion of SVE, the SVE system would be dismantled and contaminated Landfill materials excavated and

prepared for bioremediation. Materials handling treatability tests indicate that excavation and preparation of the materials can be accomplished using commercially available equipment, but considerable technical difficulties are likely to be encountered due to the heterogeneity of the materials and the high concentrations of contaminants in the materials. Rigid controls would be necessary to protect workers and nearby residents from exposure to contaminants during excavation and material preparation activities.

The soils and wastes in the Landfill are contaminated with PCE as a result of the disposal of spent solvents. The RCRA status of these contaminated soils and wastes is governed by EPA's "contained-in" policy, which states that any mixture of a soil and a RCRA listed waste must be managed as a hazardous waste as long as the soil "contains" hazardous constituents above health-based levels. The health-based level for PCE for purposes of this remedial action is 5.6 ppm. Thus, if after SVE treatment the excavated Landfill materials contain PCE at concentrations above health-based levels, they must be managed as RCRA wastes. This means that the RCRA requirements for design and operation of treatment units would be applicable to the bioremediation treatment unit, and that any storage of excavated materials prior to bioremediation would have to comply with RCRA storage requirements.

In addition, the RCRA land disposal restrictions of Part 268 would be applicable if the concentrations of PCE in bioremediated soil are greater than 5.6 ppm. The land disposal restrictions require that the bioremediated soil cannot be redeposited in the Landfill area until either TCLP analysis of the soils shows that PCE concentrations are reduced to less than .05 ppm, or a treatability variance is obtained.

Bench-scale treatability test data indicate that bioremediation would likely be effective in destroying residual VOCs and PAHs remaining in the soils after the SVE treatment to levels below health-based concentrations. However, bioremediation is a relatively innovative technology, and pilot-scale testing would probably be necessary in order to accurately determine its feasibility and effectiveness. If the residual levels of PCE in bioremediated soil are below 5.6 ppm, the soil can be redeposited in the Landfill with only a vegetative cover. However, if they are not below 5.6 ppm, RCRA Subtitle C landfill closure requirements would be applicable.

Monitoring of air emissions during bioremediation would be performed, and emission controls would be put into place as necessary to avoid cross-media impacts and protect human health and the environment. The need for such controls would be evaluated during the pilot-scale testing.

In the DAC Storage and Truck Loading Area, limited SVE would be performed, as in Alternative 5. Limited excavation of contaminated materials would also be done, with the excavated materials being treated in the bioremediation unit. At other areas of the Site, Alternative 6 is identical to Alternative 5.

Implementation time for this remedy is approximately seventy-two months. The estimated capital cost of this alternative is $94,423,000, the estimated annual O&M cost is $25,116, and the total present worth cost for Alternative 6 is approximately $94,660,000.

7.7 Site-Wide Alternative 7 - Landfill Incineration/Bioremediation

This alternative incorporates treatment for all areas at the Site. It includes SVE followed by excavation and on-site incineration of 350,000 cubic yards of material from the Landfill, relocation of Quantum operations at the DAC Storage and Truck Loading Area and Polishing Basin followed by excavation and bioremediation of all contaminated soils in these areas, and excavation and bioremediation of contaminated soils in the Previous Basin, Former Waste Pile F and the Surface Impoundments.

In the Landfill Area, SVE treatment would be followed by excavation and preparation of the Landfill materials for incineration. RCRA regulations for treatment and storage would be applicable to such activities if the excavated materials contain PCE at concentrations above the health-based level of 5.6 ppm.

RCRA Subpart O requirements for design and operation of thermal treatment units would be ARARs for this alternative. The specific type of thermal treatment unit would be selected during the remedial design. Trial burns would be performed, and air emissions from the incinerator would be controlled as necessary to protect human health and the environment and comply with federal, state, and local air emission regulations.

Following incineration, the treatment residuals would be placed in the Landfill. RCRA land disposal regulations would be applicable to these residuals if PCE concentrations are greater than the health-based level of 5.6 ppm. However, incineration is expected to be extremely effective in destroying VOCs, so that treatment residuals could be placed in the Landfill with only a vegetative cover.

In the DAC Storage and Truck Loading Area and Polishing Basin Area, existing Quantum operations would be relocated so that all contaminated soils can be excavated and bioremediated. Contaminated soils at all other areas of the Site would also be bioremediated. Approximately 500,000 cubic yards of material

would be bioremediated. The excavation, materials preparation, and bioremediation of these soils would be performed as described in Alternative 6. After treatment, the treated materials would be backfilled in the treated areas and a vegetative cover would be installed.

Implementation time for this remedy is approximately seventy-two months. The estimated capital cost for this alternative is $269,500,000, and there would be no O&M cost.

8.0 Summary of Comparative Analysis of Alternatives

Nine evaluation criteria have been developed by EPA to address CERCLA statutory requirements and technical, cost, and institutional considerations which the Agency has determined to be appropriate. The evaluation criteria serve as the basis for conducting a detailed analysis of alternatives during the FS and for subsequently selecting an appropriate remedial action. Attachment A provides a glossary of the evaluation criteria.

8.1 Overall Protection of Human Health and Environment

Alternative 3 would adequately protect human health and the environment because it would address the principal threat of OU#2 by using SVE to treat PCE, benzene and other volatile organic compounds and enhance biodegradation of PAHs in the Landfill Area. This will reduce direct contact exposure in the Landfill as well as minimize indirect exposure through contaminant leaching to groundwater. This alternative will also address direct contact exposure to contaminants in the surface soils in the DAC Storage and Truck Loading Area, Polishing Basin, Previous Basin, Former Waste Pile F, and Surface Impoundments B, C, and D through capping in the DAC Storage and Truck Loading and Polishing Basin Areas and establishment and maintenance of a vegetative cover in the other areas. Institutional controls in all areas will supplement the containment measures and help to ensure that exposures in these areas will not increase to the extent that the carcinogenic and noncarcinogenic risks will be unacceptable.

With the exception of the no action alternative, all the other alternatives provide protection of human health and the environment by removing, reducing, or controlling risk through treatment, engineering controls, or institutional controls. The no action alternative will not be evaluated further because it is not protective of human health and the environment.

8.2 Compliance with ARARs

Section 121(d) of CERCLA requires that remedial actions at CERCLA sites at least attain legally applicable or relevant and

appropriate federal and State standards, requirements, criteria, and limitations which are collectively referred to as "ARARs," unless such ARARs are waived under CERCLA Section 121(d)(4). Applicable requirements are those substantive environmental protection requirements, criteria, or limitations promulgated under federal or State law that specifically address hazardous substances found at the site, the remedial action to be implemented at the site, the location of the site, or other circumstances present at the site. Relevant and appropriate requirements are those substantive environment protection requirements, criteria, or limitations promulgated under federal or State law which while not applicable to the hazardous materials found at the site, the remedial action itself, the site location or other circumstances at the site, nevertheless address problems or situations sufficiently similar to those encountered at the site that their use is well-suited to the site. ARARs may relate to the substances addressed by the remedial action (chemical-specific), to the location of the site (location-specific), or the manner in which the remedial action is implemented (action-specific).

The State of Iowa has promulgated regulations pursuant to Iowa Code Section 455E.5 which apply to cleanup actions at sites where significant amounts of soil contamination are present and groundwater contamination is occurring. These regulations, set forth in 567 IAC 133, are applicable to the Landfill Area due to the high levels of groundwater and soil contamination in the Landfill Area. The regulations require "active cleanup of the contaminated soils . .. to the extent reasonable or necessary to prevent or minimize release to the groundwater; passive cleanup may be allowed in extraordinary circumstances". There are no extraordinary circumstances at this Site, and thus active cleanup is required. Active cleanup is defined by the regulation as the removal, treatment, or isolation of contamination through directed human efforts.

Alternatives 3 through 7 all involve treatment of the Landfill materials and thus comply with this requirement. Alternative 2, which provides for capping of the Landfill and groundwater suppression, would comply with this requirement by isolating the contaminated Landfill materials.

The substantive provisions of the State of Iowa's requirements for closure of existing solid waste landfills (I.A.C. Chapter 567-103, Subrule 103.2(13)) are also applicable in the Landfill Area for Alternatives 2 through 5. These alternatives, as opposed to Alternatives 6 and 7 (bioremediation and incineration), would leave contaminated soils and wastes in place in the Landfill, and thus closure in accordance with state landfill closure requirements is required. The caps constructed for Alternatives 2 through 5 would be constructed and maintained as required by this regulation.

Regulations have been promulgated under RCRA Subtitle C for closure of hazardous waste landfills. These requirements are not applicable to alternatives involving capping of the Landfill materials in place, because the wastes were disposed of prior to the effective date of the RCRA regulations.

However, some of these closure requirements are relevant and appropriate. In particular, the hazardous waste landfill closure requirements set forth at 40 CFR § 264.310 are relevant and appropriate. These requirements mandate that the cap provide long-term minimization of migration of liquids through the Landfill, function with minimum maintenance, promote drainage and minimize erosion, and have a permeability less than the natural soils present. The requirements are relevant because wastes disposed of in the Landfill prior to the effective date of RCRA, in particular spent solvents, are now classified as RCRA hazardous wastes. They are appropriate because the purposes of the requirements - limiting infiltration and erosion in order to prevent contaminant leaching to groundwater - are identical to the remedial objectives for the Landfill cap. The Landfill cap for Alternatives 2 through 5 would be constructed and maintained in compliance with these RCRA requirements.

As explained earlier, materials excavated from the Landfill for bioremediation or incineration would have to be handled in accordance with RCRA requirements so long as the PCE concentrations in such materials are above the health-based concentration level of 5.6 ppm. Substantive RCRA storage regulations would apply to storage of excavated materials prior to treatment, and substantive RCRA design and operating requirements for treatment units would also be applicable. RCRA land disposal restrictions would govern disposal of treatment residuals from the bioremediation and incineration of Landfill materials.

The alternatives which involve capping include drainage and runoff control. Any alternative which involves channeling of site runoff directly to an on-site surface water body, via a ditch, pipeline, storm sewer or otherwise, would have to comply with substantive requirements of the National Permit Discharge Elimination System program. Substantive requirements include ambient water quality standards, effluent limitations, and monitoring requirements.

The alternatives which involve SVE include collection and treatment of vapors using technologies such as catalytic oxidation or carbon adsorption. Any such equipment must be operated in compliance with substantive requirements of the National Emission Standards for Equipment Leaks of Benzene, 40 CFR Part 61, the RCRA Air Emission Standards for Process Vents, 40 CFR Part 265 Subpart AA, and the RCRA Air Emission Standards for Equipment Leaks, 40 CFR Part 265 Subpart BB. Any treatment

residuals from collection and treatment of vapors must be managed in accordance with RCRA treatment, storage and disposal regulations, since the PCE in such residuals would result from treatment of listed waste (spent solvents disposed of in the Landfill).

8.3 Long-Term Effectiveness and Permanence

Alternative 3 includes implementation of SVE in the Landfill Area, which would effectively minimize the long-term risks associated with direct contact and contaminant migration to the groundwater for the Landfill Area of the Site. Results of the site-specific treatability tests indicate that SVE is likely to be highly effective in reducing contaminant levels in the Landfill Area. Capping and vegetative covers in the other areas at the Site would reduce the potential direct contact exposures to a carcinogenic risk level of less than 1×10^{-6}. Long-term controls would be required to ensure the integrity of the caps and vegetative covers.

Alternative 2, which includes a cap but no treatment in the Landfill, would effectively minimize direct contact risk but would not be as effective as the Alternative 3 in reducing contaminant migration to the groundwater. Alternatives 4 and 5, which call for SVE and limited excavation in the DAC Storage and Truck Loading and Polishing Basin Areas, would not be expected to accomplish significantly greater long-term reduction of risk than Alternative 3 because of the relatively low risk in the DAC Storage and Truck Loading and Polishing Basin Areas compared to the Landfill, inaccessibility of soils in these areas, and limited effectiveness of SVE in these areas due to the low permeability of the soils. Alternatives 6 and 7, which call for excavation and treatment by bioremediation or incineration, would provide the greatest degree of long-term effectiveness and permanence by destroying the contaminants in the soils at the Site through bioremediation or incineration.

EPA believes that groundwater suppression for areas other than the Landfill, which is a common component of Alternatives 2 through 7 would not be advisable as it would not assist in providing long-term reduction of risk at the Site and would in fact inhibit long-term reduction of contaminants through biodegradation.

8.4 Reduction of Toxicity, Mobility, or Volume

Alternative 3 would employ SVE treatment in the Landfill to reduce the toxicity, mobility, and volume of the contaminants in the soil. Alternative 2 would reduce the mobility of the contaminants in the Landfill Area through installation of a cap and groundwater suppression, but would not reduce the toxicity or the volume of the contaminants.

Alternatives 4 and 5 would provide the same reduction in toxicity, mobility, and volume for the Landfill Area as Alternative 3, and would provide slightly greater reduction in the DAC Storage and Truck Loading Area and Polishing Basin Areas. The SVE and limited excavation called for in Alternatives 4 and 5 for the DAC Storage and Truck Loading Area and Polishing Basin Areas would not accomplish significant reduction in toxicity, mobility, and volume due to inaccessibility of the soils, limited effectiveness of SVE in these areas and the relatively low toxicity, mobility, and volume of contaminants in these areas compared to the Landfill. There would, however, be some reduction in contaminant levels in these soils.

Alternative 6 would provide significantly greater reduction in toxicity, mobility, and volume than Alternatives 2 through 5, through use of bioremediation to destroy the VOC and PAH contaminants in the Landfill and DAC Storage and Truck Loading Area soils. Alternative 7, which includes treatment of all contaminated soils by either incineration or bioremediation, would provide the greatest reduction by destroying contaminants in all areas.

8.5 Short-Term Effectiveness

The short-term risks associated with the Alternative 3 include worker exposure to contaminants during SVE treatment and cap construction, as well as possible exposure to fugitive dust and surface runoff. These potential exposures can be effectively minimized and controlled by compliance with worker safety regulations, ARARs and implementation of engineering controls such as dust suppression.

Alternative 2 would involve less short-term risks than Alternative 3 because there would be less handling of contaminated soils and waste. Alternatives 4 and 5 would involve more short-term risks than Alternative 3, because of the expanded SVE. Alternatives 6 and 7 would involve significantly greater short-term risks to the community as well as construction workers because of the excavation and handling of contaminated soils.

8.6 Implementability

Implementation of Alternative 3 would involve use of conventional SVE technologies in the Landfill Area that are proven and reliable. Treatability testing results indicate that SVE is easily implementable in the Landfill Area. There are no anticipated significant administrative issues, such as permitting, that could affect the implementability of this alternative.

Alternative 2, capping, would also be readily implementable. Implementation of SVE and excavation in the DAC Storage and Truck

Loading and Polishing Basin Areas as called for in Alternatives 4 through 6 would be difficult because of the on-going production activities. Bioremediation, as called for in Alternative 6, was proven effective for the contaminants of concern in the Treatability Study. However, it would require special equipment and materials and has not been done extensively on sites of this magnitude. Use of on-site incineration, as called for in Alternative 7, could be difficult to implement due to potential community resistance to on-site incinerator operation. Although incineration is a proven technology for destruction of the contaminants of concern, excavation and handling of greater than 500,000 cubic yards of contaminated soils would involve significant risk and uncertainty as well as the potential for significant volatile organic emissions.

8.7 Cost

The cost of Alternative 3 would be approximately $11.4 million. The cost of Alternative 2, the remedy which incorporates capping, would be approximately $5.5 million. The cost of the other SVE/containment remedies ranges from $14.4 million to $15.1 million. The cost of excavation and treatment by bioremediation or incineration as called for in Alternatives 6 and 7 ranges from $94.6 to $269.5 million.

8.8 State Acceptance

The State of Iowa concurs on EPA's selected remedy, which is a modification of Alternative 3 (the selected remedy is discussed in more detail in Section 9.0).

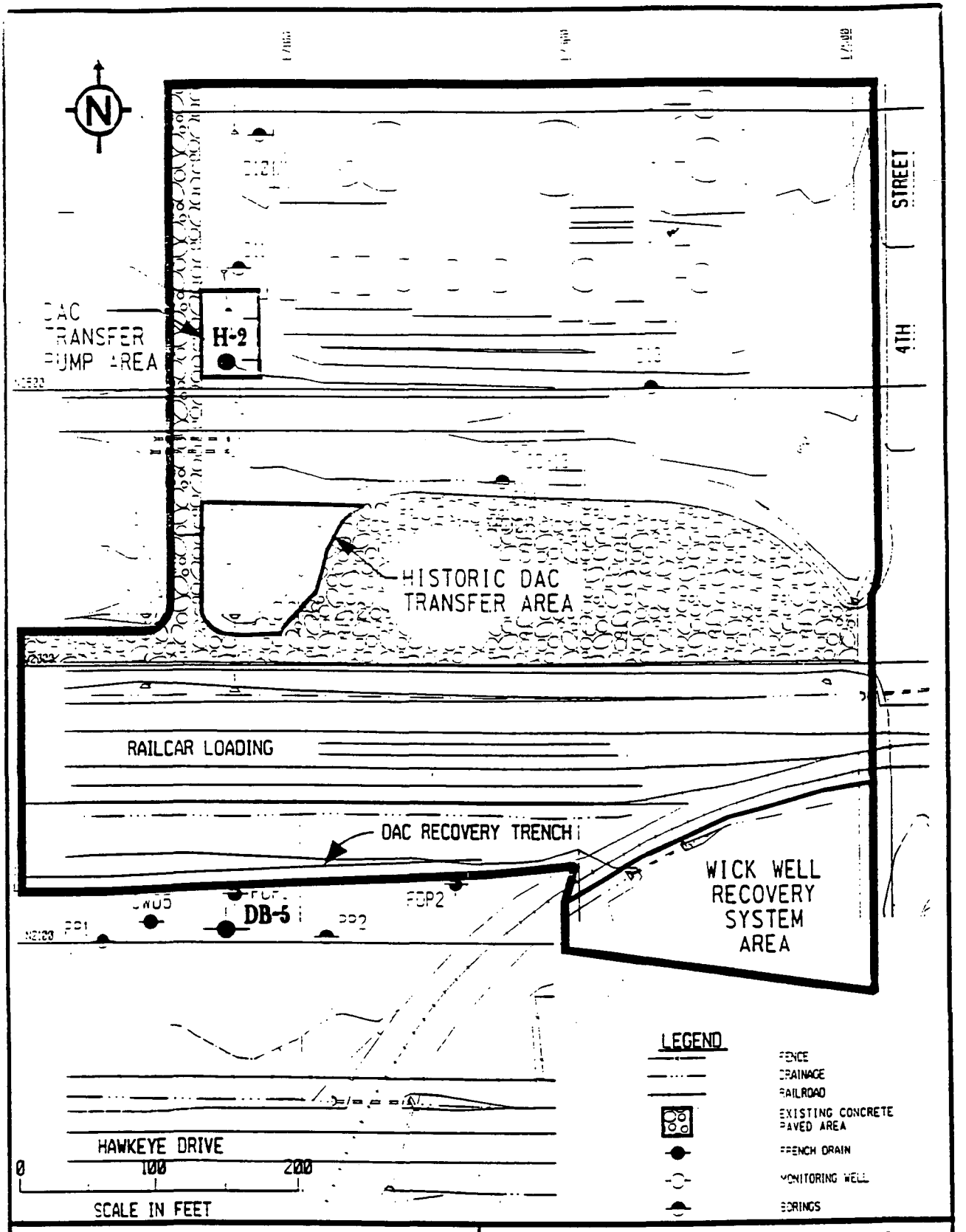
8.9 Community Acceptance

Community acceptance of the selected remedy has been evaluated following the Public Meeting held on February 2, 1993, and at the conclusion of the public comment period on February 21, 1993. The results of the evaluation are presented in the attached Responsiveness Summary.

9.0 Selected Remedy

EPA has selected a remedy that is a modified version of Alternative 3 as described above. The selected remedy is:

- groundwater suppression, SVE, and capping in the Landfill Area;
- capping of the H-2 area (as indicated on Figure 9) of the DAC Storage and Truck Loading Area;



DAC STORAGE AND TRUCK LOADING AREA

CHEMPLEX SUPERFUND SITE
CLINTON, IOWA

BECHTEL ENVIRONMENTAL, INC.
HOUSTON, TEXAS

JOB NO.	DRAWING NO.	REV. / DATE
21073-005		0

- establishment and maintenance of a vegetative cover in the Polishing Basin Area, Previous Basin Area, Former Waste Pile F, and Surface Impoundments B and D;

- institutional controls in all areas; and

- 5-year reviews

The difference between the selected alternative and Alternative 3 is that groundwater suppression would not be incorporated in areas other than the Landfill, and most of the areas in the DAC Storage and Truck Loading and Polishing Basin Areas would not be capped. Groundwater suppression is a common component of site-wide Alternatives 2 through 7 in the FS. Although groundwater suppression would inhibit migration of contaminants to some degree, it would also inhibit natural biological degradation and attenuation of contaminants in the study areas. Since OU#1 requires groundwater extraction and treatment for the entire Site, any contaminated groundwater would be collected and treated before it migrates off-site. Therefore, EPA believes that it would be better not to suppress the groundwater and isolate the contaminants. However, groundwater suppression will still be incorporated in the Landfill to facilitate SVE. Once SVE and any required monitoring is complete, groundwater suppression will cease.

The highly contaminated soils and wastes in the Landfill Area pose the principal threat being addressed by this remedial action, and they will be addressed by SVE treatment. The remaining low-level threats, and the contaminated soils in other areas at the Site will be addressed through use of containment and institutional controls.

Based on an evaluation of the relative performance of each alternative with respect to the evaluation criteria, EPA has determined that this alternative presents the best balance of trade-offs among the alternatives considered for remediation of the study areas. Each component of the remedy is described in detail below.

9.1 Groundwater Suppression, SVE and Capping of the Landfill Fence and Warning Signs

Groundwater suppression will be conducted in the Landfill Area to facilitate operation of the SVE system and will be implemented prior to SVE. It is important that the groundwater suppression be coordinated with OU#1 groundwater extraction. In particular, any Light Non-Aqueous Phase Liquid (LNAPL) recovery activities will have to be undertaken prior to commencing groundwater suppression to avoid creating an LNAPL smear across Landfill soil and debris as the water table is lowered.

The cleanup goal of SVE will be to remove 90-99% of volatile organic compounds as measured by in situ gas concentrations. This is consistent with expected performance of the SVE system, based on results of the treatability tests. It is also consistent with the NCP's stated Superfund program goal of employing treatment technologies that reduce contaminant levels by greater than 90%. Detailed performance criteria will be developed as part of the design process. It is expected that operation of the SVE system will be for a period of two to ten years. Vapors from the SVE system will be treated using a technology such as catalytic oxidation or carbon adsorption. The appropriate treatment system will be selected during the remedial design. Any residuals from the treatment system (i.e. carbon filters) will be handled in compliance with RCRA Subtitle C requirements for treatment, storage, and disposal of hazardous waste.

The timing of installation of the cap over the Landfill will need to be coordinated with operation of the SVE system to maximize the efficiency of the SVE operation. Therefore, the exact timing of placement of the cap in conjunction with the SVE system will be determined during the design phase.

As discussed in Sections 7 and 8, the State of Iowa's requirements for closure of solid waste landfills are applicable to the Landfill Area, and certain RCRA Subtitle C landfill closure requirements are relevant and appropriate to the Landfill Area. The exact details of the Landfill Area cap construction will be finalized during the design phase; however, it will be a multimedia cap with several feet of clay, geotextile, geomembrane, and a vegetative cover. The cap will incorporate appropriate stormwater drainage and diversion structures to minimize erosion and limit future maintenance requirements. Gas vents will be provided to remove any gases that may be trapped under the liner.

After completion of the SVE operation and construction of the cap, a fence will be installed around the Landfill Area and warning signs will be posted.

Operation and maintenance (O&M), including but not limited to periodic inspections, mowing, fertilizing, weeding, replacement of any eroded cap material, sign and fence maintenance, and maintenance of surface water diversion structures will be required. The O&M requirements will be finalized during the design phase.

9.2 Cap in the H-2 Area of the DAC Truck Storage and Loading Area

The H-2 Area of the DAC Truck Storage and Loading Area will be capped in order to eliminate direct contact from the surficial

soils in this area. Unlike the cap in the Landfill Area, this cap will not need to meet the State of Iowa solid waste or RCRA hazardous waste landfill closure requirements. However, the cap must be of sufficient thickness and durability that the ongoing plant operations in the area will not reduce the cap's long-term effectiveness. Examples of potentially appropriate cover material for this cap are concrete and asphalt. Maintenance of the cap will be required to ensure and maintain its integrity. Details of cover material and thickness, as well as O&M requirements, will be determined during the design phase.

9.3 Vegetative Cover, Warning Signs in the Other Areas

Vegetative covers will be established and maintained in the Polishing Basin Area, Previous Basin Area, Former Waste Pile F, and in Surface Impoundments B and D to prevent exposure to damaged soils in these areas. Most of these areas have existing vegetative cover that can be left in place and supplemented with additional seeding so that there is a complete cover. Warning signs will also be placed in these areas. O&M activities for these areas include maintenance of the vegetative covers (mowing, fertilizing, weed control, etc.). Details on the vegetative covers, and O&M will be finalized during the design phase.

9.4 Institutional Controls

Institutional controls in the form of deed restrictions will be required in all of the eleven study areas. These controls will restrict future use of the areas and will prohibit any excavation, drilling, or other intrusive activity in these areas that would disturb a cap or vegetative cover and potentially expose workers to contaminants. The deed restrictions will be structured to allow future changes in use, if it can be demonstrated to EPA that the proposed use will not have an adverse impact on human health or the environment.

9.5 5-Year Reviews

The EPA required 5-year reviews will be required for all eleven study areas because hazardous substances will remain on-site.

10.0 Statutory Determinations

Under its legal authority, 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,

unless a statutory waiver is justified. 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 that 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 through SVE treatment of the contaminated soil in the Landfill. SVE treatment will extract and treat most of the contaminants in the Landfill soils and thereby reduce the potential to contaminate groundwater. The selected remedy also requires a cap over the Landfill Area. The Landfill cap will provide a physical barrier limiting the potential for direct contact with any contaminants remaining after completion of the SVE. It will also limit the amount of surface water infiltration that passes through Landfill material, thus reducing the potential for contaminant leaching to groundwater.

The selected remedy also includes a cap over the area H-2 of the DAC Truck Storage and Loading Area, as well as vegetative covers in the other areas and institutional controls for the Site. This will ensure that there will never be direct contact threats to contaminated surficial soil above the $1x10^{-6}$ level. Compliance with site-specific worker health and safety plan and control of SVE vapors will ensure that there are no unacceptable short-term risks or cross-media impacts.

10.2 Compliance with Applicable or Relevant and Appropriate Requirements

The selected remedy will comply with all federal and state ARARs. The cap in the Landfill area will be constructed to comply with the State of Iowa requirements for closure of solid waste landfills. The cap will also comply with the RCRA landfill closure requirements contained at 40 CFR § 264.310, which are relevant and appropriate requirements for the Landfill cap.

The remedy employs SVE treatment in the Landfill Area, and thus complies with the "active cleanup" requirement of 567 IAC 133. The SVE system, including the treatment unit(s) used to treat vapors, will comply with the substantive requirements of air emission standards contained in RCRA Part 264 Subparts AA and BB, as well the Clean Air Act standards contained at 40 CFR Part 61. Treatment residuals from the SVE vapor treatment system will be managed in accordance with RCRA treatment, storage, and disposal regulations.

Any drainage system or runoff collection system which is constructed as part of the remedy and which discharges to an on-site surface water body will comply with substantive provisions of the NPDES program. Any off-site discharge will comply with the substantive and administrative requirements of the NPDES program.

10.3 Cost-Effectiveness

The selected remedy is cost effective because it will provide overall effectiveness proportional to its cost, with the net present value being approximately $11 million. The selected remedy provides protectiveness essentially equivalent to that provided by Alternatives 4 and 5, at significantly less cost. It is nearly an order of magnitude less costly than either Alternative 6 or 7. It is significantly more costly than Alternative 2, but it is more protective than Alternative 2 and complies with all ARARS.

10.4 Utilization of Permanent Solutions and Alternative Treatment (or resource recovery) Technologies to the Maximum Extent Practicable (MEP)

The selected remedy represents the maximum extent to which permanent solutions and treatment technologies can be utilized in a cost-effective manner for the Chemplex Site. Specifically, the selected remedy will permanently deal with the problems at the Site by incorporating SVE treatment to remove contaminants from the Landfill (with a goal of 90% removal of volatile organic compounds), which pose the principal threat being addressed by this action. It will also reduce lesser threats by construction of permanent caps and covers over other areas of the Site that will be maintained over the long-term. Of those alternatives that are protective of human health and the environment and comply with ARARs, the selected remedy provides the best balance in terms of long-term effectiveness and permanence, reduction in toxicity, mobility or volume achieved through treatment, short-term effectiveness, implementability, and cost. Also, the State and EPA considered the statutory preference for treatment as a principal element, as well as input from the community.

This alternative reduces the mobility of contaminants by treatment, complies with ARARS, provides short-term effectiveness and protects human health and the environment equally as well as Alternatives 3 through 7. Alternatives 1 and 2 do not meet the preference for treatment and do not comply with all ARARs. In terms of long-term effectiveness, the selected alternative provides protection equal to or exceeding all other alternatives. The selected alternative also will be technically and administratively easier to implement than Alternatives 6 and 7 (which incorporate bioremediation and incineration). The selected remedy is reliable and can be implemented quickly with

less difficulty and at less cost than other treatment alternatives. It is therefore the most appropriate solution for the contaminated soils and wastes at the Chemplex Site.

10.5 Preference for Treatment as a Principal Element

By treating the contaminated soil in the Landfill Area by SVE, the selected remedy addresses the principal threat of contaminant migration to groundwater as well as potential direct contact and ingestion/inhalation of contaminated soil. Although the Landfill Area is the only area which will undergo treatment, it has concentrations of contaminants that are orders of magnitude higher than the other areas. Also, there are approximately 350,000 cubic yards of contaminated material in the Landfill, a significant amount of which is below the water table, as opposed to approximately 20,000 cubic yards of moderately contaminated soil in the other areas combined. EPA does not believe that it is practicable to apply treatment to the other areas given that the DAC Truck Storage and Loading and Polishing Basin Areas are in operation and that contamination in all areas (with the exception of the Landfill) is not significant, will attenuate, and will be captured by the OU#1 groundwater pump and treat system. Therefore, the statutory preference for remedies that employ treatment as a principal element is satisfied.

11.0 Document of Significant Changes

The Proposed Plan for the soils and wastes for the Chemplex Site was released for public comment on January 23, 1993. In the Proposed Plan, the preferred alternative identified was: groundwater suppression, SVE, and capping in the Landfill Area; capping of the H-2 area of the DAC Truck Storage and Loading Area; establishment and maintenance of a vegetative cover in the Previous Basin Area, Former Waste Pile F, and Surface Impoundments B, C, and D; and institutional controls in all areas. The EPA reviewed all comments received during the public comment period. Upon review of these comments, it was determined that the only significant change to the remedy identified in the Proposed Plan is that Surface Impoundment C will not need a vegetative cover. Based on other comments, some minor changes were made to this ROD. These changes are discussed in the Responsiveness Summary.

RESPONSIVENESS SUMMARY FOR THE RECORD OF DECISION

This responsiveness summary is divided into the following sections:

Overview:	This section discusses the public comment period, public meeting and the public's view of EPA's preferred alternative.
Background:	This section provides a brief history of community interest and concerns raised during remedial planning at the Chemplex Site.
Part I:	This section provides a summary of commentors' major issues and concerns, and expressly acknowledges and responds to those raised by the local community. "Local community" may include local homeowners, businesses, the municipality and not infrequently, potentially responsible parties (PRPs).
Part II:	This section provides a comprehensive response to all written comments received and is comprised primarily of the specific legal and technical questions raised during the public comment period. If necessary, this section will elaborate with technical detail on answers covered in Part I.

OVERVIEW

The Proposed Plan, RI/FS Reports and Administrative Record were available for public comment from January 23 through February 21, 1993. A public meeting was also held on February 2 at the Clinton County Community College. Comments received from the local community, both in writing and during the public meeting, were directed toward issues involving the effect of the Site on human health and the environment in general. The transcript from the public meeting is available with the Administrative Record file. The local community did not express a preference for, nor indicate any adversity to, EPA's preferred alternative. ACC/GCC, who are PRPs at the Site, sent a letter to EPA during the public comment period which indicated their position that Alternative 2 was as protective as the preferred alternative.

BACKGROUND

As part of the community relations process, which included interviews of the local community and preparation of a Community

Relations Plan during the planning stages of this project, several community concerns were identified.

The Chemplex Site is located in a rural area, approximately 5 miles west of the cities of Clinton and Camanche, Iowa. Another NPL site, the DuPont/Todtz Landfill Site, is located approximately one mile from Chemplex. The Arcadian Fertilizer Company is also located in close proximity to Chemplex. Therefore, citizens who live in the surrounding area have expressed concern that the proximity of these facilities to their property may have had an adverse impact on their health and property values.

PART I: SUMMARY OF COMMENTORS' MAJOR ISSUES AND CONCERNS

This section provides a summary of commentors' major issues and concerns, and acknowledges and responds to comments made by the local community during the public meeting on February 2. The questions, comments, and responses are summarized below.

1. Question: A letter received by EPA prior to the public meeting and that was signed by 24 Iowa state legislators requested that a health study be conducted. The request was due to concerns of potential adverse health impacts of residents who live in close proximity to the Site. EPA's response at the public meeting was that since the letter was received only a few hours before the meeting, a commitment to conduct the study could not be made at that time. However, the EPA personnel in attendance at the meeting committed to discuss the request with management.

Response: EPA forwarded the request for a health study to the Agency for Toxic Substances and Disease Registry (ATSDR). According to ATSDR, the Iowa Department of Public Health and the University of Iowa Hygienics Laboratory are in the process of conducting a health study. Therefore, ATSDR is not planning to do a health study but is continuing to review the environmental data and evaluate the need for other types of health activities.

2. Comment: Concern was expressed by citizens at the public meeting about arsenic originating from the Chemplex Site contaminating private drinking water wells. EPA agreed to review the arsenic data for the Site and respond in writing.

Response: Background arsenic levels in soils upgradient of Chemplex ranged from 0.6 parts per million (ppm) to 7.1 ppm and averaged 3.6 ppm. Arsenic levels in soil on the Chemplex Site ranged from zero to 54 ppm with most of the elevated samples coming from the Landfill. Arsenic levels in the groundwater in the vicinity of the Landfill range from 2 parts per billion (ppb) to 31 ppb, indicating that the Landfill may have contaminated the groundwater. There is no evidence of significant arsenic

concentrations in groundwater at areas on the Site other than the Landfill. Arsenic has not been detected in groundwater monitoring wells located immediately downgradient of the Site which indicates that arsenic is not migrating off-site. Groundwater extraction and treatment will be implemented in 1994 and this will ensure that off-site migration of arsenic does not occur. The cleanup standard for arsenic is 0.03 ppb for off-site groundwater. The long-term groundwater monitoring plan at Chemplex includes regular analysis for arsenic and it will be analyzed for indefinitely.

3. Question: A citizen stated in the public meeting that information received from the University of Iowa Hygienics Laboratory indicated the presence of trichloroethylene (TCE) in her private well. A representative of the laboratory indicated that it was total organic carbon (TOC) that was present in this particular well, not TCE. The citizen continued to be concerned. EPA agreed to follow up on this.

Response: EPA reviewed the correspondence from the University of Iowa Hygienics Laboratory and has confirmed that TOC was detected in this citizen's drinking water well. TOC is not a contaminant of concern at the site. TCE was not detected in this citizen's drinking water well.

PART II: RESPONSE TO WRITTEN COMMENTS

This section provides technical detail in responding to written comments or questions on the Chemplex Site. One of the written comments received was a request by 24 Iowa state representatives for a health study. This letter was read at the public meeting and EPA's response to this letter is stated in Part I. Two other comment letters were submitted by the local community and two letters were submitted by the law firm representing the Potentially Responsible Parties (PRPs), ACC and Getty Chemical Companies (ACC/GCC).

Following are questions or comments and responses to the letters received by the local community:

1. Question: When the Chemplex SVE material is discharged, will the total amount of effluent (SVE and Quantum) discharged to the Mississippi River still be within the discharge permit?

Response: The SVE system is a vacuum extraction system applied to the vapors in the soils in the unsaturated zone (above the zone where groundwater is found). The extracted vapors will contain contaminants from the soils and will be treated (i.e. carbon adsorption, catalytic oxidizer, etc.) prior to discharge into the air.

Regarding the discharge of wastewater to the Mississippi River, the Quantum facility currently has a National Pollutant Discharge Elimination System (NPDES) permit from the Iowa Department of Natural Resources (IDNR) to discharge a certain amount of water at certain levels from their treatment process to the River. The levels and quantity of water have been established by IDNR based on the Clean Water Act (CWA) to be protective of a surface water body such as the Mississippi River. The contaminated groundwater from the Site that will be extracted and treated as part of the First Operable Unit will either need to be discharged as part of Quantum's permit or will need a separate NPDES permit. EPA will require the quantity and levels established to be protective of the water quality of the Mississippi River.

2. Question: A letter from another citizen expressed concern regarding the number of cancer cases in the vicinity of the Site and requested if a health study would be conducted. The citizen also wanted to know what EPA was going to do about the Arcadian Fertilizer facility.

Response: The health study issue has been addressed in Question 1 of Part I. Regarding the Arcadian facility, this is currently being handled by IDNR.

The remaining questions and/or comments were submitted by the law firm representing ACC/GCC. The questions and/or comments and responses are as follows:

1. Comment: The Proposed Plan calls for SVE and groundwater suppression in the Landfill followed by installation of a multimedia cap. The comment was made that the SVE component of the proposed alternative will not appreciably increase the protectiveness of this remedial option over a cap in conjunction with OU#1 groundwater extraction and treatment. The comment further states that the cap would meet both remedial action objectives for the Site by cutting off the possibility of direct contact with and surface water infiltration through the contaminated soil and debris in the Landfill.

Response: Gross contamination in the soils and wastes in the Landfill is migrating into the groundwater and would continue to do so even after installation of a cap since much of the waste material is below the water table. This contamination will continue to act as a source of groundwater contamination for many years. The groundwater contamination will be controlled and prevented from migrating off-site by the OU#1 groundwater extraction and treatment system. However, it is also important to reduce or eliminate the source of groundwater contamination wherever it is practicable to do so. It is possible with present technologies, as demonstrated by treatability studies at the Site, to effectively and efficiently remove large amounts of

contaminants from the Landfill, thus greatly reducing contaminant migration to the groundwater. This can be done in a reliable and cost-effective manner, using SVE treatment that is expected to remove greater than 90% of the VOC contaminants from the Landfill. This can be done in situ, without excavating the Landfill and putting numerous workers and local residents at risk.

Also, CERCLA mandates the use of permanent solutions to the maximum extent practicable and expresses a preference for treatment as a principle element of remedial actions. Capping the Landfill Area would not satisfy these statutory requirements, while use of SVE treatment would.

EPA has determined that the benefits in source reduction realized by using SVE in the Landfill will be substantial and should remain as part of the remedy. This determination is consistent with the remedial action objective for the Site of reducing the migration of chemicals into the groundwater to the maximum extent practicable.

2. Comment: The appropriate protective risk level at a secured industrial facility like the Chemplex Site is 1×10^{-4} instead of the remediation goal as stated in the Proposed Plan of approximately 1×10^{-6}.

Response: The baseline risk assessment for the Site assumed only industrial exposures; residential risk scenarios were not considered due to the fact that the facility is now and is likely to remain as a industrial facility. In accordance with EPA's guidance on risk assessments, the baseline industrial exposures were calculated using less frequent exposure time and less sensitive populations (i.e. healthy adults as opposed to children) than if baseline residential exposures had been calculated. Similarly, the appropriate protective risk level for this Site is 1×10^{-6} risk, for industrial exposures. Increasing the acceptable risk level in addition to assuming an industrial exposure would result in unacceptable exposures.

3. Comment: SVE performance standards in the Landfill should be flexible to reflect the innovative application of this technology and the heterogeneity of the Landfill.

Response: This comment is valid. EPA has established a cleanup goal of removing 90-99% of volatile organic compounds, as measured by in situ gas concentrations. This is consistent with expected performance of the SVE system. It is also consistent with the NCP's stated Superfund program goal of employing treatment technologies that reduce contaminant levels by greater than 90%. Detailed performance criteria will be developed as part of the design process.

4. Comment: The final remedy should provide flexibility in the timing and coordination of SVE and capping in the Landfill to maximize the efficiency of the SVE system. The Proposed Plan indicates that installation of the cap will follow SVE.

Response: EPA agrees that flexibility should be allowed in coordinating the timing of SVE and the cap. The exact timing will be determined during the design phase.

5. Comment: The Proposed Plan should reflect that groundwater suppression in the Landfill should be coordinated with First Operable Unit groundwater extraction and treatment. In particular, any Light Non-Aqueous Phase Liquid (LNAPL) recovery activities will have to be undertaken prior to commencing groundwater suppression to avoid creating an LNAPL smear across Landfill soil and debris as the water table is lowered.

Response: EPA agrees with this comment. This has been included in the ROD.

6. Comment: Given the current restrictions on access and the existing vegetative covers on the various impoundments, posting of appropriate signs should be sufficient to reduce worker exposure. Also, deed restrictions should not necessarily prevent any future change in land uses. Any institutional controls implemented should allow future changes in accordance with an activity-specific health and safety plan to address possible exposure and a design that recognizes and addresses the presence of chemicals of concern.

Response: EPA agrees that there is vegetative cover on most of the impoundments. However, there are also bare spots in some of the areas that need to be addressed. Warning signs without fences are appropriate as long as there are sufficient restrictions to ensure that more frequent exposures to these areas does not occur. In regard to allowing institutional controls that include future changes in accordance with an activity, EPA would need to review and approve that action prior to its implementation.

7. Comment: The description of the DAC Truck Storage and Loading Area on page 4 of the Proposed Plan should include reference to an existing french drain.

Response: The following information has been added to the ROD: The area south of the railroad tracks is unpaved and is bordered on its southern end by a french drain. The french drain was installed voluntarily by ACC/GCC in approximately 1988 as an interim groundwater recovery system to intercept Light Non-Aqueous Phase Liquid (LNAPL) present as free product floating on the water table. The french drain appears to be at least somewhat effective in controlling LNAPL.

8. Comment: Section 3.2 on page 10 of the Proposed Plan should clearly discuss the relationship of the First and Second Operable Units. This section should indicate that the Second Operable Unit remedy presented in the Proposed Plan was developed in conjunction with the First Operable Unit remedy, and that together, the First and Second Operable Unit remedies are intended to provide a complete remedy for the Chemplex Site.

Response: EPA agrees with this comment. This section presently states that "In concert, OU#1 and OU#2 will address all human health and environmental risks at the Site." This clarifies that the two Operable Units are intended to provide a complete remedy for the Site.

9. Comment: Section 3.2 on page 10 of the Proposed Plan incorrectly refers to June 1994 as the date the First Operable Unit groundwater extraction and treatment system is expected to be operational. Due to the difficulty of projecting such a date in light of certain remedial design obstacles, it is suggested the reference to such date be deleted.

Response: EPA agrees that the June 1994 date is incorrect. The ROD will refer to the operational date as being sometime in 1994.

10. Comment: The risk levels calculated as part of the Supplemental Endangerment Assessment for the various areas of the Site were overstated because of an artifact of the methodology. More accurate risk levels were calculated using the instrument detection limits. Using these limits, the risk to on-site workers in the DAC Truck Storage and Loading Area, the Polishing Basin and Surface Impoundment C do not exceed 1×10^{-6}. The risks from soils in other areas were less than those estimated in the Supplemental Endangerment Assessment, although they still exceeded 1×10^{-6}.

Response: EPA agrees with this methodology in this case, given that the sample quantitation limits (SQLs) are much higher than either the instrument detection limits and the levels that were detected. Therefore, Surface Impoundment C will not need establishment and maintenance of a vegetative cover as discussed in the Proposed Plan. This will be changed in the ROD. However, given the relatively high concentrations of total PAHs (CPAHs were not analyzed for) Area H-2 of the DAC Truck Storage and Loading Area will still need to be capped.

11. Comment: ACC/GCC's consultant also evaluated using the instrument detection limit instead of the SQL for the exposure scenario of the construction worker in the Previous Basin and Landfill Areas. In doing this they discovered that the concentrations reported for carcinogenic Polynuclear Aromatic Hydrocarbons (CPAHs) for the Previous Basin in the Supplemental Endangerment Assessment were incorrect and were actually two

orders of magnitude higher than the actual concentrations. This resulted in the risk to construction workers in the Previous Basin being below 1 x 10^{-6}. They also discovered that using the instrument detection limits instead of the SQLs for the Previous Basin further reduced this risk. For the Landfill, the resulting risk of using the instrument detection limit as opposed to the SQL reduced the risk but did not lower it to below 1 x 10^{-6}.

Response: EPA agrees with this comment. However, the preferred alternative for the Landfill Area is SVE and capping. With regard to the Previous Basin Area, the preferred alternative is establishment and maintenance of a vegetative cover as well as institutional controls. Changing the risk of the construction worker's exposure would not affect either of these preferred alternatives.

ATTACHMENT A

GLOSSARY OF EVALUATION CRITERIA

The following criteria were developed by EPA to address CERCLA statutory requirements and technical, cost, and institutional considerations. The evaluation criteria serve as the basis for conducting detailed analyses during the Feasibility Study and for subsequently selecting an appropriate remedial action.

OVERALL PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT

Alternatives are assessed as to whether they can provide adequate protection from risks above health-based levels posed by contamination present at the site by eliminating, reducing, or controlling exposures.

COMPLIANCE WITH ARARs

The alternatives are assessed as to whether they attain applicable or relevant and appropriate requirements or other Federal and State environmental and public health laws or provide grounds for invoking a waiver.

LONG-TERM EFFECTIVENESS AND PERMANENCE

The magnitude of risk remaining after implementation of the alternatives is evaluated. The adequacy and reliability of controls used to manage treatment residuals or untreated wastes that remain at the site are also assessed.

REDUCTION OF TOXICITY, MOBILITY AND VOLUME

The degree to which the alternatives employ treatment that reduces toxicity, mobility, or volume is assessed.

SHORT-TERM EFFECTIVENESS

The alternatives are evaluated with respect to their effects on human health and the environment during implementation of the alternative. Also assessed is the amount of time until protectiveness is achieved.

IMPLEMENTABILITY

The technical and administrative feasibility of implementing an alternative and the availability of services and materials required to implement an alternative are evaluated.

COST

Direct and indirect capital costs and operation and maintenance costs incurred over the life of the project are identified.

STATE ACCEPTANCE

Technical and administrative issues and concerns the State may have regarding the alternative are assessed.

COMMUNITY ACCEPTANCE

The issues and concerns of the public regarding the alternatives are assessed.