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June 1996

EPA Superfund Record of Decision:

T H Agricultural and Nutrition Site, Albany, GA 4/26/1996

RECORD OF DECISION

SUMMARY OF REMEDIAL ALTERNATIVE SELECTION

T H AGRICULTURE & NUTRITION SITE

OPERABLE UNIT TWO

ALBANY, DOUGHERTY COUNTY, GEORGIA

PREPARED BY

U. S. ENVIRONMENTAL PROTECTION AGENCY

REGION IV

ATLANTA, GEORGIA

DECLARATION
of the
RECORD OF DECISION
OPERABLE UNIT TWO

SITE NAME AND LOCATION

T H Agriculture & Nutrition Site
Albany, Dougherty County, Georgia

STATEMENT OF BASIS AND PURPOSE

This decision document (Record of Decision), presents the selected Remedial Action for Operable Unit Two for the T H Agriculture & Nutrition (THAN) Site, Albany, Georgia, developed in accordance with the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA) 42 U.S.C. Section 9601 et seq., and to the extent practicable, the National Contingency Plan (NCP) 40 CFR Part 300. This decision is based on the administrative record for the THAN site.

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

ASSESSMENT OF THE SITE

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

DESCRIPTION OF SELECTED REMEDY

This operable unit is the second of two for the Site. This alternative requires the design and implementation of response measures which will protect human health and the environment. The first operable unit addressed the source of the contamination on the western parcel of the Site as well as the principle threat of groundwater contamination across the entire Site. The second operable unit addresses the source of the contamination on the eastern parcel of the Site.

The major components of the selected remedy for operable unit two include:

The excavation of all soil contaminated with organics necessary to meet performance standards.

- The staging and preconditioning of soil for low temperature thermal desorption treatment.
- The treatment of excavated soil by low temperature thermal desorption.
- The placement of treated, decontaminated soil back to the Site.
- Periodic sampling of treated soil during the treatment process to verify the effectiveness of the remedy.
- Air monitoring to ensure safety of nearby residents and workers.
- Groundwater monitoring to ensure that metals contamination remaining in the subsurface soil will not result in contaminated groundwater migrating offsite in concentrations which exceed groundwater protection standards. Institutional controls such as deed restrictions to prevent residential use of groundwater were implemented under the OU 1 remedy.
- Deed restrictions to prevent residential use of the property.

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, and is cost-effective. This remedy satisfies the preference for treatment that reduces toxicity, mobility, or volume as a principal element. Finally, it is determined that this remedy utilizes a permanent solution and alternative treatment technology to the maximum extent practicable.

Because this remedy will result in hazardous substances remaining onsite above health-based levels that would allow for unlimited use and unrestricted exposure, a review will be conducted every five years after commencement of the remedial action to ensure that the remedy continues to provide adequate protection of human health and the environment.

Richard D. Green — 26 APR 96

RICHARD D. GREEN, ACTING DIRECTOR
WASTE MANAGEMENT DIVISION

DATE

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T H Agriculture & Nutrition Site
Albany, Georgia

1.0 SITE LOCATION AND DESCRIPTION

The T H Agriculture & Nutrition (THAN) Site (hereinafter, "the Site") is located at 1401 and 1359 Schley Avenue in Albany, Georgia. For an area location map and general Site map, see Figures 1 and 2, respectively. The Site consists of two former pesticide formulation facilities where various liquid and dry formulations of pesticides and other chemical compounds were handled for approximately thirty years. Current owners of the two properties are T H Agriculture & Nutrition Company, Incorporated ("the western parcel" or "THAN property") and Mr. Larry Jones ("the eastern parcel" or "Jones property"). The Jones property contains an active welding supply store. This parcel (1359 Schley Avenue) consists of approximately five acres, with several structures remaining in the central portion of the property. The Site is bordered on the east by residences and a small U.S. Department of Agriculture laboratory, on the south by Schley Avenue, on the west by a Seaboard Coastline Railway line, and on the north by a construction company and by property owned by Albany Motel Limited. To the west and southwest are lightly populated residential areas. Several motels are within a one mile radius of the Site, with the closest being located northeast of the Site. Located approximately 300 feet south of the Site is an elevated expressway and further south, a large commercial section of Albany.

2.0 SITE HISTORY AND ENFORCEMENT ACTIVITIES

The THAN Property, or western parcel, was used as a formulation and packaging plant for agricultural chemicals from the 1950's until 1982. It appears that the handling of agricultural chemicals commenced at the THAN Property while it was owned by Walker Fertilizer Company, from 1956 to 1958. Pesticide formulation operations were then conducted by a succession of owners until business operations at the THAN Property ceased in 1982.

Pesticides handled at the THAN Property include lindane, DDT, toxaphene, methyl parathion, malathion, and parathion. All of these pesticides are CERCLA hazardous substances. Dry pesticides were formulated on the THAN Property during the 1960s and 1970s (and possibly during the 1950s). Liquid pesticides were formulated on the THAN Property from approximately 1973 until approximately 1978. During liquid formulation operations, the blending tank was rinsed between batches with xylene, which was then discharged into a drainage ditch on the property. Wettable powder began replacing liquid pesticides in approximately 1976. Very little pesticide formulating took place after 1978. Business operations on the THAN Property ceased in 1982.

The eastern parcel, or Jones Property, has a similar history. The Jones Property was used as a formulation and packaging plant for agricultural chemicals from 1964 into the 1970s. It appears that the handling of agricultural chemicals commenced at the Jones Property when it was purchased by Southeastern Liquid Fertilizer Company, Inc., in 1964. Pesticide formulation operations (dry and liquid) were then conducted by a succession of owners. In 1973, the Jones Property was purchased by Gold Kist, Inc., which did not engage in pesticide formulation activities on the property, but continued fertilizer blending and fertilizer and pesticide retail sales until 1981. In 1985, Gold Kist sold the eastern parcel to the current owner, Mr. Larry Jones, who operates a welding supply store on the property.

THAN conducted a removal on the THAN Property in 1984 to remove surficial soils in accordance with a cleanup plan approved by the Environmental Protection Division of the Georgia Department of Natural Resources (EPD). The EPD-approved clean-up plan provided for the removal of identified areas of soil contamination exceeding clean-up criteria established by EPD. Removal activities conducted with EPD oversight included demolition of several buildings, excavation of selected surface soils and subsurface disposal areas, installation of a perimeter fence, and establishment of a vegetative cover. Excavated soils and debris were disposed off-site in a permitted hazardous waste landfill.

The Site was listed on the National Priorities List (NPL) on March 31, 1989. The original listing was based solely on the release of hazardous substances from the THAN Property. THAN agreed to conduct the Remedial Investigation/Feasibility Study (RI/FS) pursuant to an Administrative Order By Consent dated July 6, 1990. In the course of the Remedial Investigation, sampling on the Jones Property established that the groundwater contamination plume extends underneath the Jones Property and that there is significant source contamination on the Jones Property. EPA divided the Site into Operable Units: Operable Unit 1 addresses soil contamination on the THAN Property (western parcel) and groundwater contamination for the entire Site. Operable Unit 2 addresses soil contamination on the Jones Property or eastern parcel of the Site.

A second removal was conducted at the THAN Property pursuant to a Unilateral Administrative Order (UAO) issued to THAN by EPA in March of 1992. The second removal was initially proposed to EPA by THAN while THAN was conducting the RI/FS for Operable Unit 1 at the Site. EPA's Emergency Response Branch evaluated THAN's proposal and determined that a removal was warranted in light of the discovery during the RI/FS of a disposal pit containing pure product and high concentrations of contamination under the former wet mix building on the THAN Property. THAN refused to sign a removal consent order because THAN did not agree with EPA's subsurface soil action levels. Accordingly, EPA issued a UAO for the removal on the THAN Property.

Pursuant to the UAO, THAN demolished and removed several on-site structures, excavated and removed the first foot of soil in areas of contamination, and excavated and removed contaminated subsurface soil and debris to an action level for subsurface soils of 100 ppm for total pesticides. Over 24,700 tons of soil were removed and shipped to a permitted hazardous waste landfill. THAN conducted on-site thermal desorption of approximately 3,000 tons of excavated soil which could not be landfilled because it contained greater than 1,000 ppm of total pesticides. The UAO also required THAN to backfill excavated areas and place a uniform engineered clay cover over the removal area.

Post-removal confirmation samples show that levels of contamination in the soil on the THAN Property have been reduced from greater than 1,000 ppm total pesticides in some locations to levels of less than 25 ppm total pesticides. The top foot of soil was removed at approximately six of the seven acres on the THAN Property, with specific areas being excavated to seven feet below the surface.

EPA issued a ROD for Operable Unit 1 on May 21, 1993, which called for (1) no further action with respect to soils on the THAN property because the removal had adequately addressed contaminated soil on that property, and (2) pumping and treating of contaminated groundwater beneath the entire Site, including the Jones and THAN properties. THAN is conducting the RD/RA pursuant to a UAO; the UAO was also issued to THAN's parent company, North American Phillips Corporation, which refused to comply with the Order. A UAO was also issued to four PRPs connected to the Jones Property, Boise Cascade Corporation, Air Products and Chemicals, Inc., Hercules, Inc., and Gold Kist, Inc., directing them to participate in the Operable Unit 1 clean-up.

Special Notice letters were sent to potentially responsible parties (PRPs) connected with the eastern parcel or Jones Property in July of 1992, to commence negotiations for a consent order providing for PRPs to conduct the Operable Unit 2 RI/FS. None of the PRPs connected to the Jones Property were willing to conduct the Operable Unit 2 RI/FS, so EPA conducted the study.

3.0 HIGHLIGHTS OF COMMUNITY PARTICIPATION

An availability session at a local library and community interviews with local officials were held at the start of field work for the RI for operable unit one on December 12, 1990. The main branch of the Dougherty Public Library at 300 Pine Street was chosen as the local information repository for the Site. On March 12, 1992, THAN held a public meeting to discuss the second removal action at the Site. In addition, a fact sheet concerning the RI for operable unit one was sent to the mailing list in May 1992.

The public comment period on the proposed plan for the operable unit one ROD was September 14, 1992 through November 14, 1992. A public meeting was held on Thursday, September 24, 1992 where representatives for EPA answered questions regarding the Site and the proposed plan under consideration. The administrative record was available to the public at both the information repository maintained at the Dougherty Public Library and at the EPA Region IV Library at 345 Courtland Street in Atlanta, Georgia. The notice of availability of these two documents was published in the Albany News-Herald on September 10, 1992. Responses to the significant comments received during the public comment period and at the public meeting were

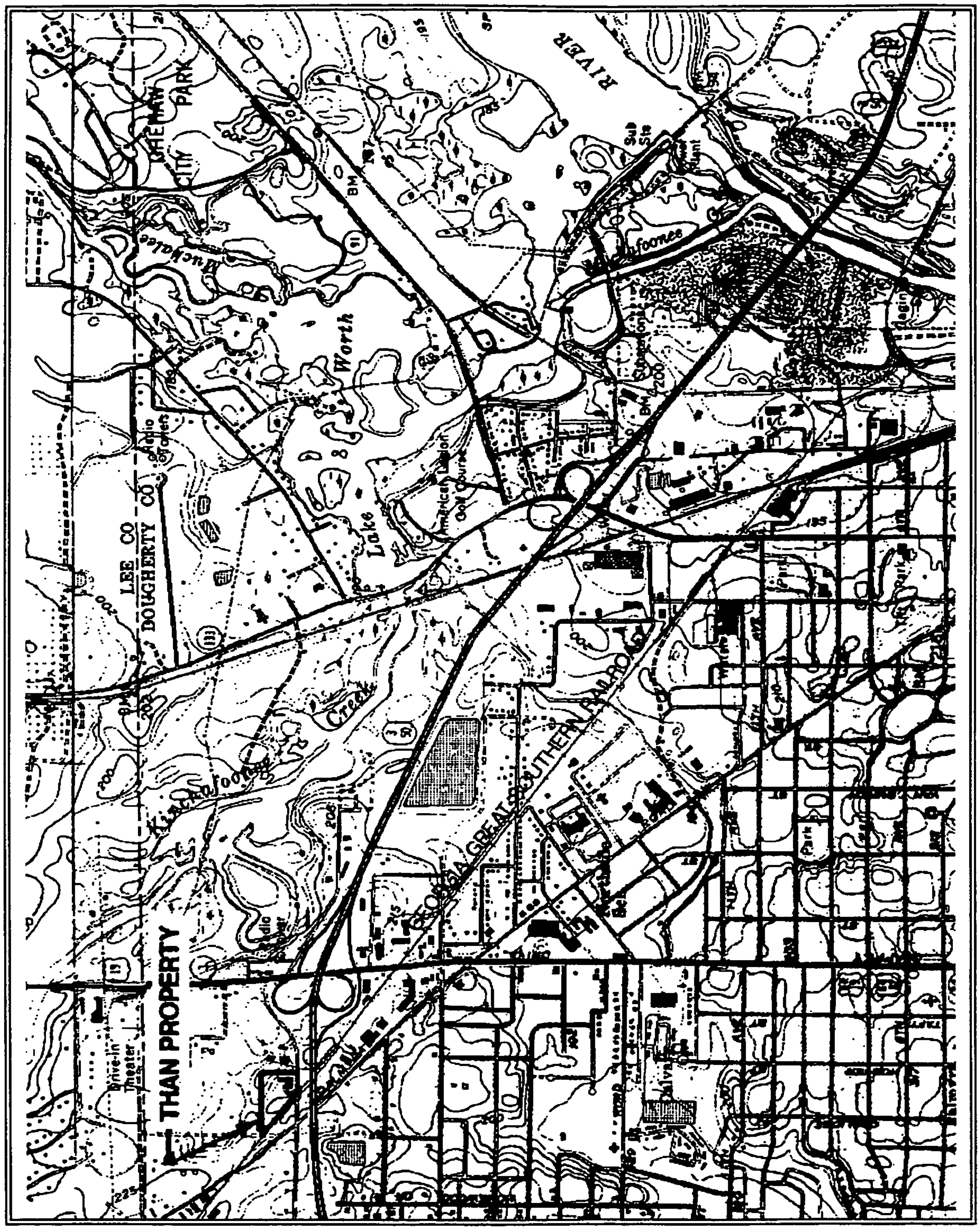

Figure 1
Area Map for Albany, Georgia

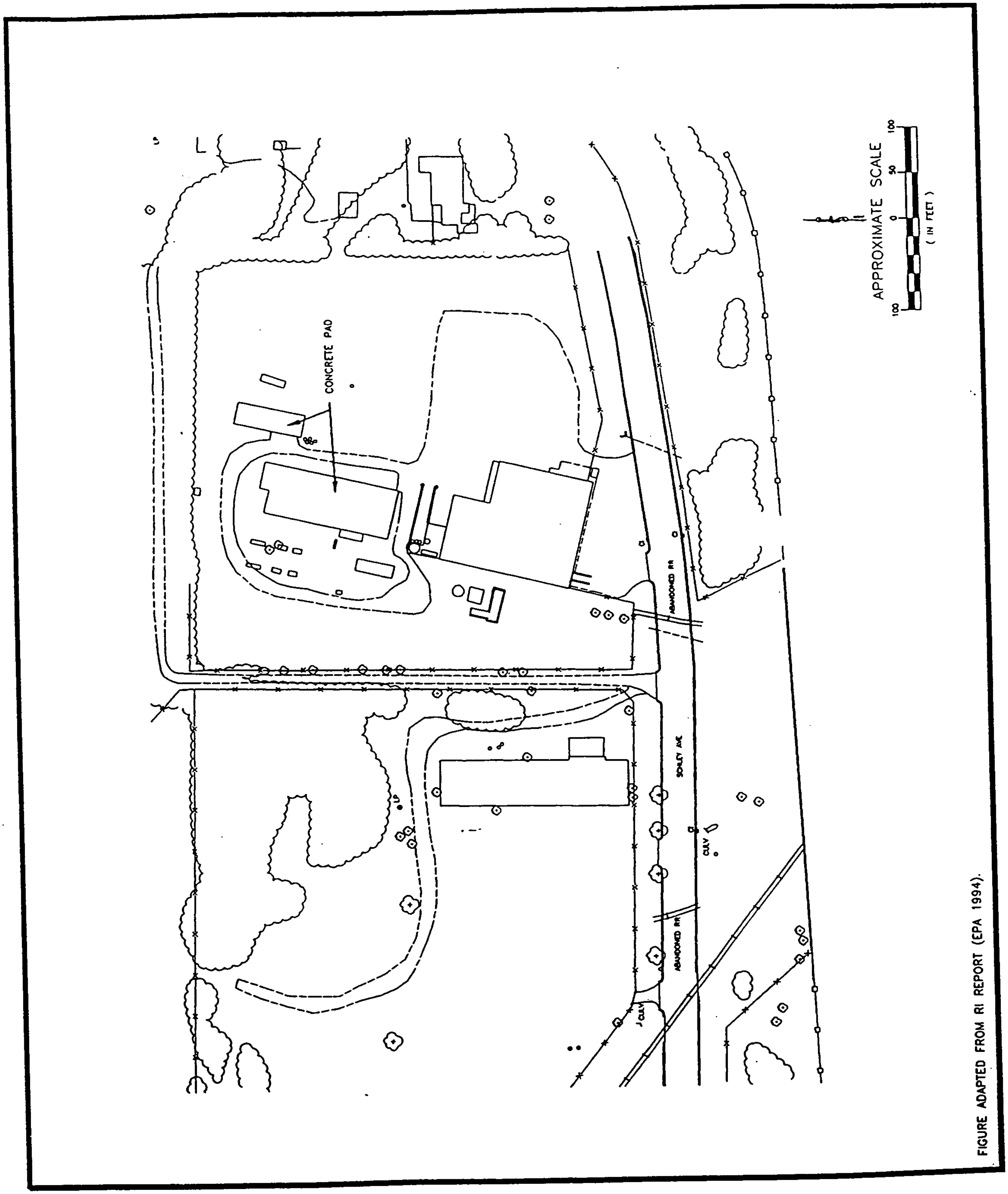

Figure 2
Site Map for the T H Agriculture & Nutrition Site

included in the Responsiveness Summary, which was part of the ROD for operable unit one.

The public comment period on the proposed plan for this ROD (operable unit two) was January 31, 1996 through April 1, 1996. EPA published notice that it would hold a public meeting upon request of the community. However, a public meeting was not requested by the public. The administrative record was available to the public at both the information repository maintained at the Dougherty Public Library and at the EPA Region IV Library at 345 Courtland Street in Atlanta, Georgia. The notice of availability of these documents was published in the Albany News-Herald on January 31, 1996 and February 3, 1996, in the Southwest Georgian on February 1, 1996, and in the Albany Journal on February 9, 1996. Notice of the extension of the comment period was published in the Albany News-Herald on February 29, 1996 and March 4, 1996. Responses to the significant comments received during the public comment period are included in the Responsiveness Summary which is part of this ROD (Appendix A).

This decision document presents the selected remedial action for operable unit two of the THAN site, chosen in accordance with CERCLA, as amended by SARA, and the NCP. The decision for this Site is based on the administrative record. The requirements under Section 117 of CERCLA/SARA for public and state participation have been met for this operable unit.

4.0 SCOPE AND ROLE OF OPERABLE UNIT

EPA has organized the work at this Superfund Site into two operable units (OUs). These units are:

- OU one: Contamination in the residuum and the upper Ocala aquifers underneath the entire Site and contamination of soils on the western portion (THAN property) of the Site.
- OU two: Contamination of the soils on the eastern portion (Jones property) of the Site.

OU #1 addressed both the source of groundwater contamination in the soils on the western parcel as well as the groundwater contamination underneath the entire Site. The non-aqueous phase liquid (NAPL) plume was also addressed in OU #1. The purpose of operable unit one was to initiate groundwater restoration, collect data on aquifer response to remediation, prevent current or future exposure to the contaminated soils, and reduce contaminant migration into the groundwater.

Operable unit two addresses the source of contamination on the eastern parcel of the site. This Site was divided into two operable units after the RI report showed that continuous groundwater contamination is present under both properties, and that source areas exist on the eastern parcel which needed to be investigated further. Additional Potentially Responsible Parties (PRPs) are involved on the eastern parcel since that property was owned and operated separately from the western parcel.

5.0 SUMMARY OF SITE CHARACTERISTICS

5.1 GEOLOGY/SOILS

The sedimentary units outcropping in Dougherty County range from Quaternary to Cretaceous in age. Only the uppermost geologic units consisting of the Residuum, the Ocala Limestone, the Claiborne Group, and the Wilcox Group are pertinent to this study. The Residuum is typically a silty clay with minor varying amounts of sand, limestone fragments, and lignite. It has an average thickness onsite of approximately 26 feet and thickens to the northwest. The lithology and structure of the deposit is influenced primarily by the amount of weathering and the effect of precipitation on the highly soluble limestone. The Residuum overlies the Ocala Limestone. The Ocala consists of medium to fine-grained highly weathered, fossiliferous limestone with some silt and sand. The surface of the limestone gently undulates and contains depressions, typical of karst terrains. The limestone grades from a highly weathered material at the top of the formation to a more brittle rock approximately 30 feet (about 60 feet below ground surface) into the formation. Table 1 provides information concerning the generalized stratigraphy.

5.2 SURFACE WATER AND SEDIMENTS

The area surrounding the Site is drained by the Flint River and Kinchafoonee Creek systems. Kinchafoonee Creek, located approximately 0.4 miles to the east of the THAN site is the nearest natural body of surface water. However, there are no swales, drainage ditches, or intermittent streams that drain from the Site directly to surface waters.

Drainage from the central and eastern portion of the site drains into a culvert which flows beneath Schley Avenue. This culvert drains to a small holding pond immediately south of the Liberty Expressway. An outlet for this pond was not located.

Drainage from the western portion of the Site enters a curb inlet on Schley Avenue and flows into a ditch south of Schley Avenue. From this point the storm water flows west through a culvert beneath the Georgia-Great Southern railroad tracks and into a depression south of the Liberty Expressway. Runoff from the Interstate Truck Leasing facility which is south of the depression also flows into this depression. The depression drains into the storm sewer system beneath Palmyra Road through an inlet at the west end.

The storm system beneath Palmyra Road flows one-half mile southeast, then turns east and flows one-half mile beneath Stuart Avenue, and eventually discharges into a large stormwater holding pond south of the Liberty Expressway (southeast of the Site). The holding pond drains through an outlet which flows beneath Liberty Expressway and discharges into Kinchafoonee Creek one-quarter mile to the northeast.

Table 1
Geologic and Hydrogeologic Equivalents, Albany Area

Approximate Thickness (Feet)	Geologic Sequence		Hydrogeologic Sequence
	Group	Formation	
15-50	Residuum		Upper water-bearing
175	Ocala		Floridan Aquifer
230	Claiborne	Lisbon	
		Tallahatta	
	Wilcox	Hatchetigbee	
120		Tuscahoma	Clayton Aquifer
180	Midway	Clayton	
80	Providence Sand		Providence Sand Aquifer
300	Ripley		Confining Unit

5.3 HYDROGEOLOGY

The shallow groundwater system is contained in the residuum soils and the upper portion of the Ocala Limestone. Infiltration of rainfall runoff through the surface sands and residuum materials is the major source of recharge to the aquifers. Typically, the groundwater reservoirs are recharged most during the winter and spring months when precipitation is high and evapotranspiration is low. Conversely, little recharge is added to the groundwater system during the dry summer months in which heavy agricultural pumpage causes regional drawdowns in the water level elevations. Recharge rates are directly affected by the transmissivity and thickness of the overburden residuum.

Shallow water levels have been observed to rise more than 10 feet within hours of any intense rainfall event. The magnitude of the rise in water levels are unexpected since the Site is overlain by a low permeability clay layer similar to a "cap." The magnitude of the response is also unexpected since the volume of water infiltrating through this layer (cap) is very low. The increase in water levels are due to a hydraulic pressure increase transmitted laterally throughout the residuum and weathered Ocala from runoff infiltrating more permeable sediments in topographically low areas where ponding of surface water temporarily occurs.

This Site has several unique hydrogeologic features. First, it is unusual for a very low permeability clay which effectively inhibits surface recharge to exist at land surface in the Dougherty Plains. Nevertheless, recharge occurs through numerous depressions which transmit water rapidly to a lower more transmissive unit (lower Floridan). Secondly, although the total porosity of the Residuum and upper Floridan Aquifer is high (30-50 percent), very little "drainage" of water (probably less than 5 percent) of these units takes place during drought periods.

A comparison of piezometric maps before and after a heavy rainfall event may suggest that the storage in the aquifer "has been filled," which causes an increase in the gradient and suggests that water is freely flowing. However, this is not the case. Based on the number of laboratory permeability tests and slug tests conducted within the upper 30 feet of Residuum and limestone, the actual physical movement of water (vertically or horizontally) is not significant. Except for the existence of some paths of preferential groundwater flow in the more brittle and permeable sections of the limestone, the volume of water moving laterally through the Site is relatively small.

Solution features such as joints, fractures, and solution channels are generally not present in the shallow aquifer. Based on the slug tests and aquifer pumping tests conducted onsite, there appears to be "channels" of preferred groundwater flow in the weathered upper Floridan aquifer. These channels are formed by unequal weathering of the limestone. Most of the upper Floridan is very fine grained and appears in large "islands" of low permeability separated by the more permeable channels. Most wells are screened into the islands; however, wells located near or in the channels will often have a much greater ability to produce water.

5.4 NATURE AND EXTENT OF CONTAMINATION

The primary organochlorine (OC) pesticides detected in soil on the eastern parcel include: toxaphene, 4,4'-DDT and its metabolites, and endrin. The analytical results for the surface and subsurface soil samples indicated that generally the surface soils have the highest concentrations of the OC pesticides and that the concentrations decrease significantly with depth. However, the highest concentration of toxaphene was found at a depth of five feet. The physical/chemical nature of the OC pesticides suggests that they are not readily biodegraded in the surface environment. The OC pesticides are generally not soluble in water. However, they are significantly more soluble in organic solvents, such as xylene. The OC pesticides also have more affinity for organic matter in soils, which is generally highest in concentration in the upper limits of the vadose zone. The presence of the OC pesticides and their relatively high concentrations in the surface soils attest to their relative immobility and non-biodegradability.

Organophosphorus (OP) pesticides are essentially absent from surface and subsurface soil samples. The OP pesticides were detected in only three subsurface soil samples.

The major herbicide detected on the eastern parcel was 2,4-D. The highest concentration of this compound was detected in a subsurface soil sample. Like the OC pesticides, the concentrations generally decreased with depth.

The frequency of detection of these compounds was low and somewhat localized. The herbicides are also similar to the OC pesticides in their stability and immobility in soil. They are, however, more mobile in the presence of organic solvents.

Volatile and semivolatile organic compounds were generally found in subsurface soil samples on the eastern property, albeit infrequently and at low concentrations. Volatile organic compounds were not detected in most of the surface soil samples since these contaminants are readily volatilized or biodegraded.

Elevated levels of metals were found throughout the eastern property. Levels of aluminum, arsenic, chromium VI, iron, and vanadium were detected in surface soils at levels significantly above background levels. In subsurface soils, beryllium, cadmium, lead and manganese were detected at elevated levels. In previous investigations, these metals also were detected in groundwater samples below the eastern property at levels above Maximum Contaminant Levels or health-based concentrations.

OC pesticides such as DDT and toxaphene were detected in the sediment samples both on- and off-site. However, the concentrations of the pesticides generally dropped significantly in the off-site collection locations as compared to the onsite collections. As expected, the pesticides are bound to the sediments rather than to the surface water, since the water samples collected in the depression and holding pond south of the Liberty Expressway did not detect any contamination by pesticides. Surface water samples were contaminated with 2,4-D and atrazine.

6.0 SUMMARY OF OPERABLE UNIT TWO RISKS

CERCLA directs EPA to conduct a baseline risk assessment to determine whether a Superfund Site poses a current or potential threat to human health and the environment in the absence of any remedial action. The baseline risk assessment provides the basis for determining whether or not remedial action is necessary and the justification for performing remedial action. Based upon this analysis it was determined that the surface and subsurface soil pose a potential risk.

The major risk currently associated with OU2 of the THAN Site is the ingestion and dermal contact of contaminated soil. In addition, the migration of subsurface contaminants into the groundwater would pose a risk for potential users of the groundwater. Surface water and sediment contamination did not pose a significant risk. Actual or threatened releases of hazardous substances from this Site, if not addressed by implementing the response action selected in this ROD, may present an imminent and substantial endangerment to public health, welfare, or the environment.

6.1 CONTAMINANTS OF CONCERN

The majority of the wastes and residues generated by production operations at the facility have been managed, treated, and disposed of onsite throughout the Site's history. The chemicals measured in the various environmental media during the RI were evaluated for inclusion as chemicals of potential concern in the risk assessment by application of screening criteria. The criteria which resulted in elimination of chemicals included: inorganics whose maximum concentration did not exceed two times the average background concentration and inorganics that are essential nutrients or are normal components of human diets. Table 2 lists the chemicals of potential concern for the Site.

6.2 EXPOSURE ASSESSMENT

Whether a chemical is actually a concern to human health and the environment depends upon the likelihood of exposure, i.e. whether the exposure pathway is currently complete or could be complete in the future. A complete exposure pathway (a sequence of events leading to contact with a chemical) is defined by the following four elements:

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

If all four elements are present, the pathway is considered complete.

An evaluation was undertaken of all potential exposure pathways which could connect chemical sources at the Site with potential receptors. All possible pathways were first hypothesized and evaluated for completeness using EPA's criteria. The current pathways represent exposure pathways which could exist under current Site conditions while the future pathways represent exposure pathways which could exist, in the future, if the current exposure conditions change. Exposure by each of these pathways was mathematically modeled using generally conservative assumptions.

The current pathways are:

- potential oral exposure by on-site workers to on-site surface soils,
- potential oral exposure by visitors to on-site surface soils and off-site drainage ditch soils and pond/depression sediments,
- potential oral exposure by visitors to off-site surface water,
- potential dermal exposure by on-site workers to on-site surface soils,

Table 2
Contaminants of Potential Concern

	Surface Soil Maximum (mg/kg)	Surface Soil RME * (mg/kg)	Subsurface Soil (mg/kg)	Sediment (mg/kg)	Surface Water (ug/L)
Aluminum	23,000	10,148	121,000		
Arsenic	8.9	4.6	53		
Beryllium	0.91	0.5	40	2.3	
Cadmium	6.7	1.8	23		
Chromium VI	110	28.4	64		
Iron	48,000	27,052	110,000	35,000	
Lead	200	22.9	620	31	
Manganese	4,600	452	9,200	380	310
Vanadium	78	53.6	270		
Atrazine					8.9
Benzo(a)pyrene	1.30	0.3		190	
Benzo(b) fluoranthene	1.30	0.03			
Indeno(1,2,3) pyrene	0.92	0.03			
Dieldrin	0.44	0.4	0.44		
4,4'-DDT	390	390	210		
4,4'-DDE	26	11	4.1		
4,4'-DDD	13	13	19		
Endrin	40	12.5	13		
Ethylene dibromide (EDB)			0.87		
Methyl parathion			69		
Toxaphene	1,500	1,500	1,800		

* = Reasonable maximum exposure (Upper Confidence Limit or maximum when UCL is greater than maximum

- potential dermal exposure by visitors to on-site and off-site drainage ditch soils and pond/depression sediments ,

- potential dermal exposure by visitors to off-site surface water, and

- potential inhalation exposure by workers and visitors to dust.

The future pathways are:

- potential dermal exposure by residents to surface soil,

- potential oral exposure by residents to surface soil,

- potential inhalation exposure by residents to dust, and

- potential ingestion of groundwater from a future drinking water well.

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

The major assumptions about exposure frequency and duration that were included in the exposure assessment were:

- Future onsite residents were assumed to have an exposure frequency of 350 days per year. The industrial worker is assumed to spend 250 days per year onsite for 25 years, based on a 5 day working week for 50 weeks per year. A 7-16 year-old juvenile visitor who would enter the Site is assumed to have an exposure frequency of 24 days per year for 10 years. The juvenile visitor is assumed to visit the depression and surge pond 36 times per year for 10 years.

- Soil ingestion rates for future onsite residents include a rate of 200 mg/day for children and 100 mg/day for adults. Soil ingestion rates for current use are 50 mg/day for an industrial worker and 100 mg/visit for a juvenile visitor. The surface water ingestion rate is 20 ml/day for a visitor wading in the depression or surge pond. The sediment ingestion rate is 100 mg per visit.

- Dermal contact exposure parameters for surface water for a juvenile visitor include contact 4 times/month for 9 months/year or 36 visits/year for 10 years.

- In all scenarios a standard body weight of 70 kg was used for adults and 45 kg was used for juveniles.

6.3 TOXICITY ASSESSMENT

Toxicity assessment is a two-step process whereby the potential hazards associated with route-specific exposure to a given chemical are (1) identified by reviewing relevant human and animal studies; and (2) quantified through analysis of dose-response relationships. EPA has conducted numerous toxicity assessments that have undergone extensive review within the scientific community. EPA toxicity assessments and the resultant toxicity values were used in the baseline risk assessment to determine both carcinogenic and non-carcinogenic risks associated with each chemical of concern and route of exposure. EPA toxicity values that are used in this assessment include:

- cancer slope factors (CSFs) for carcinogenic effects, and
- reference dose values (RfDs) for non-carcinogenic effects.

Cancer slope factors are route-specific values derived only for compounds that have been shown to cause an increased incidence of tumors in either human or animal studies. The slope factor is an upper bound estimate of the probability of a response per unit intake of a chemical over a lifetime and is determined by low-dose extrapolation from human or animal studies. When an animal study is used, the final slope factor has been adjusted to account for extrapolation of animal data to humans. If the studies used to derive the slope factor were conducted for less than the life span of the test organism, the final slope factor has been adjusted to reflect risk associated with lifetime exposure. Table 3 presents cancer slope factors for the potential chemicals of concern.

Reference doses (RfDs) have been developed by EPA for indicating the potential for adverse health effects from exposure to chemicals exhibiting noncarcinogenic effects. Reference doses are ideally based on studies where either animal or human populations were exposed to a given compound by a given route of exposure for the major portion of the life span (referred to as a chronic study). The RfD is derived by determining dose-specific effect levels from all the available quantitative studies, and applying uncertainty factors to the most appropriate effect level to determine a RfD for humans. The RfD represents a threshold for toxicity. RfDs are derived such that human lifetime exposure to a given chemical via a given route at a dose at or below the RfD should not result in adverse health effects, even for the most sensitive members of the population. Table 4 presents reference doses for the potential chemicals of concern.

6.4 RISK CHARACTERIZATION

Human health risks are characterized for potential carcinogenic and non-carcinogenic effects by combining exposure and toxicity information. Excessive lifetime cancer risks are determined by multiplying the estimated daily intake level with the cancer potency factor. 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 boundary , an individual has a one in one million additional (above their normal risk) chance of developing cancer as a

TABLE 3

CRITICAL TOXICITY VALUES[1]
SLOPE FACTORS (SFs)

Compound	Cancer Slope Factor		
	CSFo	CSFi	CSFd
Aluminum	NA	NA	NA
Arsenic	1.75E+00	1.5E+01	8.8E+00
Beryllium	4.3E+00	8.4E+00	2.2E+01
Cadmium	NA	6.3E+00	NA
Chromium VI	NA	4.2E+01	NA
Iron	NA	NA	NA
Lead	NA	NA	NA
Manganese	NA	NA	NA
Vanadium	NA	NA	NA
Atrazine	2.2E-01	NA	4.4E-01
Benzo(a)pyrene	7.3E+00	3.1E+00	1.5E+01
Benzo(b)fluoranthene	7.3E+00	NA	1.5E+01
Indeno(1,2,3)pyrene	7.3E+00	NA	1.5E+01
Dieldrin	1.6E+01	1.6E+01	3.2E+01
4,4'-DDT	3.4E-01	3.4E-01	6.8E-01
4,4'-DDE	3.4E-01	NA	6.8E-01
4,4'-DDD	2.4E-01	NA	4.8E-01
Endrin	NA	NA	NA
Toxaphene	1.1E+00	1.1E+00	2.2E+00

Notes:

[1] Critical toxicity values obtained from Integrated Risk Information System (IRIS) or Health Effects Assessment Summary Tables (HEAST) (USEPA, Fiscal Year 1991).

CSFo - Cancer Slope Factor (Oral), $(mg/kg/day)^{-1}$
CSFi - Cancer Slope Factor (Inhalation), $(mg/kg/day)^{-1}$
CSFd - Cancer Slope Factor (Dermal), $(mg/kg/day)^{-1}$; derived by converting the oral CSF to an absorbed dose value
NA - Not Applicable (No data)

TABLE 4

CRITICAL TOXICITY VALUES[1]
REFERENCE DOSES (RfDs)

Compound	Reference Doses	
	RfDo	RfDd
Aluminum	1E+00	2E-01
Arsenic	3E-04	6E-05
Beryllium	5E-03	1E-03
Cadmium (water)	5E-04	1E-04
Cadmium (food)	1E-03	2E-04
Chromium VI	5E-03	1E-03
Iron	3E-01	6E-02
Lead	NA	NA
Manganese (water)	5E-03	1E-03
Manganese (food)	1.4E-01	3E-02
Vanadium	7E-03	1E-03
Atrazine	3.5E-02	2E-02
Benzo(a)pyrene	NA	NA
Benzo(b)fluoranthene	NA	NA
Indeno(1,2,3)pyrene	NA	NA
Dieldrin	5E-05	3E-05
4,4'-DDT	5E-04	3E-04
4,4'-DDE	5E-04	3E-04
4,4'-DDD	5E-04	3E-04
Endrin	3E-04	2E-04
Toxaphene	NA	NA

Notes:

[1] Critical toxicity values obtained from Integrated Risk Information System (IRIS) or Health Effects Assessment Summary Tables (HEAST) (USEPA, Fiscal Year 1991).

RfDo - Reference Dose (Oral), mg/kg/day

RfDd - Reference Dose (Dermal), mg/kg/day; derived by converting the oral RfD to an absorbed dose value

NA - Not Applicable (No data)

result of site-related exposure to a carcinogen over a 70-year lifetime under the assumed specific exposure conditions at a site.

Throughout the risk assessment process, uncertainties associated with evaluation of chemical toxicity and potential exposures arise. For example uncertainties arise in derivation of toxicity values for reference doses (RfDs) and carcinogenic slope factors (CSFs), estimation of exposure point concentrations, fate and transport modeling, exposure assumptions and ecological toxicity data. Because of the conservative nature of the risk assessment process, risk estimated in this assessment are likely to be overestimates of the true risk associated with potential exposure at OU #2 of the THAN Site.

EPA considers individual excess cancer risks in the range of $1x10^{-4}$ to $1x10^{-6}$ as protective; however the $1x10^{-6}$ risk level is generally used as the point of departure for setting cleanup levels at Superfund sites. The point of departure risk level of $1x10^{-6}$ expresses EPA's preference for remedial actions that result in risks at the more protective end of the risk range. The estimated health risks for OU #2 are shown in Tables 5, 6, and 7.

Potential concern for noncarcinogenic effects of a single contaminant in a single medium is expressed as the hazard quotient (HQ) (or the ratio of the estimated intake derived from the contaminant concentration in a given medium to the contaminant's reference dose). A HQ which exceeds one (1) indicates that the daily intake from a scenario exceeds the chemical's reference dose. By adding the HQs for all contaminants within a medium or across all media to which a given population may reasonably be exposed, the Hazard Index (HI) can be generated. The HI provides a useful reference point for gauging the potential significance of multiple contaminant exposures within a single medium or across media. An HI which exceeds unity indicates that there may be a concern for potential health effects resulting from the cumulative exposure to multiple contaminants within a single medium or across media. The HIs for OU #2 are shown in Tables 5, 6 and 7.

Neither a cancer slope factor nor reference dose value is available for lead. Instead, blood lead concentrations have been accepted as the best measure of exposure. EPA has developed an integrated exposure uptake biokinetic model to assess chronic exposures of children to lead. This model was used to evaluate exposures of future child residents to lead. EPA uses a blood lead level of 10 ug/dl as the benchmark to evaluate lead exposure. The projected blood lead levels for this site are below 10 ug/dl for all age groups.

6.5 ENVIRONMENTAL RISK

The Site is located in a light industrial area in the city limits of Albany, Georgia, primarily surrounded by industrial facilities. Natural, vegetative covers, such as pine woods, have been fragmented due to industrial and highway development. Surface water bodies near the site consist of two areas (a depression and a surge pond) which receive surface

TABLE 5
SUMMARY OF CANCER RISKS
AND NON-CANCER RISKS BY EXPOSURE ROUTE
CURRENT USE SCENARIO

Location	Exposure Route	On-Site Worker		Site Visitor	
		Cancer	HI	Cancer	HI
Site Surface Soil	Inadvertent Ingestion	3E-04	0.5	4E-05	0.1
	Dermal Contact	2E-04	0.4	2E-05	0.1
	Inhalation of Dust	5E-08	NA	2E-09	NA
Drainage Ditch Soil	Inadvertent Ingestion	NA	NA	2E-05	0.1
	Dermal Contact	NA	NA	1E-05	0.03
	Inhalation of Dust	NA	NA	2E-11	NA
DOT Surge Pond Water	Inadvertent Ingestion	NA	NA	NA	0.0002
	Dermal Contact	NA	NA	NA	0.0002
DOT Surge Pond Sediment	Inadvertent Ingestion	NA	NA	NA	0.01
	Dermal Contact	NA	NA	NA	0.002
Depression Area Water	Inadvertent Ingestion	NA	NA	NA	0.003
	Dermal Contact	NA	NA	NA	0.004
Depression Area Sediment	Inadvertent Ingestion	NA	NA	NA	0.03
	Dermal Contact	NA	NA	NA	0.004
TOTAL CURRENT RISK		6E-04	0.9	9E-05	0.4

NA = Not applicable

TABLE 6
SUMMARY OF CANCER RISKS
AND NON-CANCER RISKS BY EXPOSURE ROUTE
FUTURE USE SCENARIO

Location	Exposure Route	Child Resident		Adult Resident		Lifetime Resident		On-site Worker		Site Visitor	
		Cancer	HI	Cancer	HI	Cancer	HI	Cancer	HI	Cancer	HI
Site Surface Soil	Inadvertent Ingestion	2E-03	12.9	8E-04	1.4	3E-03	3.7	3E-04	0.5	4E-05	0.1
	Dermal Contact	4E-04	2.1	8E-04	1.2	1E-03	1.4	2E-04	0.4	2E-05	0.1
	Inhalation of Dust	6E-08	NA	6E-08	NA	1E-07	NA	5E-08	NA	2E-09	NA
Drainage Ditch Soil	Inadvertent Ingestion	NA	NA	NA	NA	NA	NA	NA	NA	2E-05	0.1
	Dermal Contact	NA	NA	NA	NA	NA	NA	NA	NA	1E-05	0.03
	Inhalation of Dust	NA	NA	NA	NA	NA	NA	NA	NA	2E-11	NA
DOT Surge Pond Water	Inadvertent Ingestion	NA	NA	NA	NA	NA	NA	NA	NA	NA	.0002
	Dermal Contact	NA	NA	NA	NA	NA	NA	NA	NA	NA	.0002
DOT Surge Pond Sediment	Inadvertent Ingestion	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.01
	Dermal Contact	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.002
Depression Area Water	Inadvertent Ingestion	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.003
	Dermal Contact	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.004
Depression Area Sediment	Inadvertent Ingestion	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.03
	Dermal Contact	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.004
TOTAL FUTURE RISK		**2E-03**	**15.1**	**2E-03**	**2.6**	**4E-03**	**5.1**	**6E-04**	**0.8**	**9E-05**	**0.4**

NA = Not applicable

Table 7
Summary of Potential Cancer Risks and Non-Carcinogenic Hazard Quotients for Individual Chemicals

Chemicals of Concern	Inadvertant Ingestion		Dermal Contact		Inhalation of Dust	
	Cancer Risk	Hazard Quotient	Cancer Risk	Hazard Quotient	Cancer Risk	Hazard Quotient
On-Site Worker Scenario						
Arsenic	1E-06	0.01	3E-07	0.001	1E-09	NA
Dieldrin	1E-06	0.004	1E-06	0.003	1E-10	NA
4,4'-DDT	2E-05	0.4	2E-05	0.3	2E-09	NA
Toxaphene	3E-04	NA	2E-04	NA	3E-08	NA
Child Resident Scenario						
Arsenic	9E-06	0.2	4E-07	0.01	1E-09	NA
Chromium VI	NA	0.1	NA	0.003	2E-08	NA
Iron	NA	1.2	NA	0.05	NA	NA
Lead	NA	NA	NA	NA	NA	NA
Vanadium	NA	0.1	NA	0.00	NA	NA
Aluminum	NA	0.1	NA	0.01	NA	NA
Beryllium	2E-06	0.0001	1E-07	0.002	8E-11	NA
Benzo(a)-pyrene	3E-06	NA	5E-07	NA	2E-11	NA
Dieldrin	8E-06	0.1	1E-06	0.02	1E-10	NA
4,4'-DDT	1E-04	10.0	3E-05	1.8	3E-09	NA
4,4'-DDE	4E-06	0.3	7E-07	0.1	NA	NA
4,4'-DDD	3E-06	0.3	6E-07	0.1	NA	NA
Endrin	NA	0.5	NA	0.1	NA	NA
Toxaphene	2E-03	NA	3E-04	NA	3E-08	NA
Adult Resident Scenario						
Arsenic	4E-06	0.02	9E-07	0.01	1E-09	NA
Iron	NA	0.1	NA	0.03	NA	NA
Beryllium	1E-06	0.0001	3E-07	0.001	9E-11	NA
Benzo(a)-pyrene	1E-06	NA	1E-06	NA	2E-11	NA
Dieldrin	3E-06	0.01	3E-06	0.01	1E-10	NA
4,4'-DDT	6E-05	1.1	6E-05	1.0	3E-09	NA
4,4'-DDE	2E-06	0.03	2E-06	0.03	NA	NA
4,4'-DDD	1E-06	0.04	1E-06	0.03	NA	NA
Endrin	NA	0.1	NA	0.1	NA	NA
Toxaphene	8E-04	NA	8E-04	NA	3E-08	NA

NA = Not applicable

water drainage from the Site, other nearby facilities, and the highway. The area has no wetlands identified by EPA's Advance Identification wetlands project considered of high ecological value.

Although onsite, terrestrial vegetation, soil invertebrates, and animals may have experienced adverse effects due to their exposures to chemicals of potential concern (COPCs) in surface soil and sediment, these areas are considered of limited habitat value because of their small size and lack of ample surrounding habitat. Plants, soil invertebrates, herbivorous small animals, and insectivorous birds exposed to COPCs in the depression southwest of the Site may be adversely effected. However, this area cannot offer an ample food supply to support animal populations, nor does it serve as an important corridor for animals roaming between habitats. Aquatic biota exposed to COPCs in the surge pond south of the Site may be adversely effected, but wading piscivorous birds and waterfowl should not be affected by exposure to COPCs. The surge pond does not offer a unique or valuable aquatic habitat, since more desirable habitats exist in the vicinity of the Site.

6.6 CLEANUP GOALS

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

The soils at the THAN site currently contain concentrations of Site-related contaminants at levels which would pose an unacceptable risk (cumulative risk in excess of $1x10^{-4}$ for cancer risks and/or hazard indices in excess of 1 for non-cancer risks) to human health for current on-site workers exposed to the soil. Actual or threatened releases of hazardous substances from this Site, if not addressed by implementing the response action selected in this ROD, may present an imminent and substantial endangerment to public health, welfare, or the environment.

The cleanup levels for soil are contained in Table 8. The soil cleanup levels have been generated to ensure treatment of contaminated soil which exceeds the health-based cleanup levels established at the $1x10^{-5}$ risk level for carcinogenic contaminants and a hazard quotient level of 1 for non-carcinogenic contaminants. A $1x10^{-5}$ risk level was chosen because it falls within EPA's risk range of $1x10^{-4}$ and $1x10^{-6}$ and it results in a significantly more cost effective remedy than the $1x10^{-6}$ risk level. This cleanup level provides an acceptable exposure level that is protective of human health and the environment in an industrial setting. Cleanup levels for contaminated surface soil are based on an on-site worker exposure scenario and assume an industrial land use. Cleanup levels for contaminated subsurface soil are based on protection of groundwater.

TABLE 8
Summary of Remedial Action Objectives

Compound	Medium	
	Surface Soil (mg/kg)	Subsurface Soil (mg/kg)
Manganese	NA	337
4,4'-DDT	94	NA
Ethylene dibromide	NA	0.006
Methyl parathion	NA	17
Toxaphene	29	NA

NA = Not applicable

The soil cleanup levels will be applied at the Site to ensure that current on-site workers will not be exposed to unacceptable concentrations of site-related chemicals and that groundwater will be protected. At the $1x10^{-5}$ risk level and hazard quotient level of 1, cleanup levels are necessary for 4,4'-DDT and toxaphene for surface soil. Metals were not found in the surface soil at concentrations which exceeded health-based levels. For subsurface soil, cleanup levels are necessary for manganese, ethylene dibromide, and methyl parathion.

Transport modeling was used to evaluate the contribution of contaminated subsurface soil to groundwater contamination. The PESTAN computer transport model was used for organics to determine the levels of contamination which can exist in the subsurface soil and not create a condition in the groundwater whereby groundwater protection standards are exceeded.

PESTAN was developed by the EPA Robert S. Kerr Environmental Research Laboratory in Ada, Oklahoma for estimating the vertical migration of pesticides through soil to groundwater. The model presents an analytical solution to a solute transport equation, considering sorption, dispersion, and degradation. The model output consists of chemical concentrations at varying depths in the unsaturated soil profile for specified times. The model presents one-dimensional concentration profiles, assuming steady state flow conditions in a single layer soil with constant sorption and mass sink parameters. PESTAN is most applicable in the portions of vadose zone located between the bottom of the root zone and the water table.

The PESTAN model was found to be most appropriate for the evaluation of organics in the subsurface soils at the Site since it considers many fate/transport properties, such as dispersion, sorption, and degradation. The model also allows for evaluation of a contaminant "front" as it passes through previously uncontaminated soil.

The PESTAN modeling results indicate that the low infiltration rate and relatively low solubilities of the compounds found in operable unit 2 allow contaminants to exist in the subsurface soils at high concentrations and not cause the groundwater to exceed the groundwater protection standards. Because of the low solubility, more contaminant mass in the subsurface soil does not result in higher concentrations in the resulting leachate, but rather results in an increased amount of time for the slug to pass through a particular depth in the soil profile.

The PESTAN modeling, coupled with the results of the subsurface soil investigation performed during the RI, indicate that the subsurface soils on the Site would contribute to groundwater contamination at concentrations exceeding the groundwater protection standards for ethylene dibromide and methyl parathion.

The Summers model was used to evaluate the fate of inorganic contaminant transport in the subsurface soil at the Site. Summers was used due to the lack of site specific distribution coefficients (Kd) for metals. The Summers modeling, coupled with the results of the subsurface soil investigation, indicate that the subsurface soils would contribute to groundwater contamination at concentrations exceeding the groundwater protection standards for cadmium, lead, and manganese.

The Summers model was used to determine subsurface soil cleanup levels based on their detection in both subsurface soils and earlier groundwater samples. In the latest sampling efforts, low flow techniques have been used in order to reduce turbidity effects on the samples and consequently obtain a representative groundwater sample. The subsequent analysis has detected only manganese. This manganese contamination is localized in the area to the west of the main building above levels which could pose a threat to groundwater. The result of this latest groundwater sampling indicates that a subsurface soil cleanup level is only necessary for manganese. Future groundwater monitoring for manganese, cadmium, and lead will verify this conclusion.

7.0 DESCRIPTION OF ALTERNATIVES

Two alternatives for the remediation of contaminated soil at OU#2 of the THAN site were evaluated in depth in the Feasibility Study Report and listed in the Proposed Plan for the Site, along with the No Action alternative. These alternatives are complete and address the remediation of all the media. Table 9 summarizes the alternatives and their costs.

The site-specific alternatives analyzed in the Feasibility Study represented a range of distinct waste-management strategies addressing the human health and environmental concerns. Eight remedial technologies for containment or treatment were analyzed. Two technologies were retained as the most effective for this site. Although the selected remedial alternative will be further refined as necessary during the predesign phase, the analysis presented below reflects the fundamental components of the various alternatives considered feasible for this Site.

7.1 ALTERNATIVE NO. 1 - NO ACTION

The no action alternative is carried through the screening process as required by the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This alternative is used as a baseline for comparison with other alternatives that are developed. Under this alternative, EPA would take no further action to minimize the impact soil contamination has on the area. Soil contamination would remain and possibly migrate due to surface runoff. The cost for this alternative is for continued monitoring of the soil and groundwater quality at the Site. The cost for this alternative is $157,000.

Table 9
Operable Unit #2 Alternatives

Alternative Number	Remedial Action	Present Worth
1	No Action	$157,000
2 A/B	Excavation & Onsite Treatment with Thermal Desorption; Onsite Disposal	$5,400,000 or $2,500,000
3 A/B	Excavation & Offsite Disposal	$4,500,000 or $1,000,000 (Non-hazardous) $8,000,000 or $1,600,000 (Hazardous)

7.2 <u>ALTERNATIVE NO. 2 A/B - EXCAVATION AND THERMAL DESORPTION WITH ONSITE DISPOSAL</u>

This alternative involves excavating contaminated surface and subsurface soil necessary to meet the RA objectives. Onsite treatment would be low temperature thermal desorption. The treated soil would be backfilled onsite. The final treatment system would depend on the outcome of treatability testing and would be determined during the remedial design phase. Alternative 2 has been divided into two sub-alternatives which vary in scope. Alternative 2A would consist of excavating all contaminated soil necessary to meet the remedial action objectives, which involves an estimated 19,174 cubic yards. Under Alternative 2B, organic-contaminated soil would be excavated, but metals contaminated soils would remain in place. This sub-alternative is included because the groundwater contamination by metals appears to be isolated (located immediately west of the main building) and does not appear to be migrating. The estimated volume of soil for Alternative 2B is 3,060 cubic yards. The cost of this alternative is estimated to be $5,400,000 if all contaminated soil is excavated and treated and $2,500,000 if only soil contaminated with organics is excavated and treated.

7.3 <u>ALTERNATIVE NO. 3 A/B - EXCAVATION AND OFFSITE DISPOSAL</u>

This alternative involves excavating contaminated surface and subsurface soil necessary to meet the remedial action objectives and transporting it offsite for disposal. The excavated area would be backfilled with clean topsoil. If the soil is characterized as a RCRA hazardous waste, it would be transported to a RCRA Subtitle C disposal facility and pretreated at the facility before disposal. Alternative 3 has been divided into two alternatives which vary in scope. Alternative 3A would involve excavating all contaminated soil. Alternative 3B would consist of excavating only soil contaminated with organics. Metals contaminated soils would remain place. This sub-alternative is included because the groundwater contamination by metals appears to be isolated (located immediately west of the main building) and does not appear to be migrating. Assuming that the soil is a RCRA hazardous waste, the estimated cost is $8,000,000 for all contaminated soil (3A) and $1,600,000 for soil only contaminated with organics (3B). If the soil is not characterized as a RCRA hazardous waste, it would be transported to a Subtitle D landfill. The estimated cost of this alternative would then be $4,500,000 for all contaminated soil and $1,000,000 for only soil contaminated with organics.

8.0 SUMMARY OF THE COMPARATIVE ANALYSIS OF ALTERNATIVES

This section of the ROD provides the basis for determining which alternative provides the best balance with respect to the statutory balancing criteria in Section 121 of CERCLA and in Section 300.430 of the NCP. The major objective of the FS was to develop, screen, and evaluate alternatives for the remediation of Operable Unit Two at the THAN site. The remedial alternatives selected from the screening process were evaluated using the following nine evaluation criteria:

- Overall protection of human health and the environment.
- Compliance with applicable and/or relevant and appropriate Federal or State public health or environmental standards.
- Long-term effectiveness and permanence.
- Reduction of toxicity, mobility, or volume of hazardous substances or contaminants.
- Short-term effectiveness, or the impacts a remedy might have on the community, workers, or the environment during the course of implementing it.
- Implementability, that is, the administrative or technical capacity to carry out the alternative.
- Cost-effectiveness considering costs for construction, operation, and maintenance of the alternative over the life of the project.
- Acceptance by the State.
- Acceptance by the Community.

The NCP categorizes the nine criteria into three groups:

(1) Threshold Criteria - overall protection of human health and the environment and compliance with ARARs (or invoking a waiver) are threshold criteria that must be satisfied in order for an alternative to be eligible for selection;

(2) Primary Balancing Criteria - long-term effectiveness and permanence; reduction of toxicity, mobility, or volume; short-term effectiveness; implementability, and cost are primary balancing factors used to weigh major trade-offs among alternative hazardous waste management strategies; and

(3) Modifying Criteria - state and community acceptance are modifying criteria that are formally taken into account after public

comment is received on the proposed plan and incorporated in the ROD.

The selected alternative must meet the requirement for overall protection of human health and the environment and comply with all ARARs or be grant a waiver for compliance with ARARs. Any alternative that does not satisf both of these requirements is not eligible for selection. The Primary Balancing Criteria are the technical criteria upon which the detailed analysis is primarily based. The final two criteria, known as Modifying Criteria, assess the public's and the state agency's acceptance of the alternative. Based on these final two criteria, EPA may modify aspects of a specific alternative.

The following analysis is a summary of the evaluation of alternatives for remediating the THAN Superfund Site under each of the criteria. A comparison is made between each of the alternatives for achievement of a specific criterion.

Threshold Criteria

8.1 OVERALL PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT

Alternative 1 would not contain or remediate the soil contamination. Cleanup levels for soil would not be achieved with Alternative 1, and Alternative 1 therefore would not provide adequate protection of human health and the environment. Since Alternative 1 does not meet a threshold criteria, it will not be discussed further in the document. Alternative 2 would remediate contaminated soil with onsite treatment to reduced risk levels. Alternative 3 would remove the contaminated soil from the site to reduce risks. Sub-alternative B for both alternatives would be less effective, since metal-contaminated soil would remain in place, but these sub-alternatives are still protective of human health and the environment For Alternatives 2 and 3, cleanup would reduce risks to a 10^{-5} additional risk for direct contact with soils by on-site workers, which is within EPA's acceptable risk range.

8.2 COMPLIANCE WITH ARARS

The potential ARARs for this Site are listed in Table 10, 11, and 12. Alternatives 2 and 3 would comply with all Federal or State ARARs. Contaminant-specific ARARs would be met through excavation and treatment or disposal of contaminated soil. All excavation, storage, handling, treatment and disposal of contaminated soil would be conducted in accordance with applicable RCRA requirements. Off-site disposal of contaminated soil under Alternative 3 would be at a permitted RCRA Subtitle C, or Subtitle D landfill, as appropriate. During treatment, air emissions from the site would be monitored to ensure compliance with the Clean Air Act. Air monitoring would be conducted to ensure that contaminant concentrations do not exceed levels considered to be safe for human health. If levels are exceeded, mitigative procedures would be employed to prevent harmful levels of air emissions from impacting on-site workers or from leaving the Site. RCRA design standards would be incorporated into the remedial design of all remedial activities.

TABLE 10
POTENTIAL CONTAMINANT-SPECIFIC ARARS

Standard, Requirement, Criteria, or Limitation	**Citation**	**Description**
Federal		
Safe Drinking Water Act	40 USC Section 300	
National Primary Drinking Water Standards	40 CFR Part 141	Establishes maximum contaminant levels (MCLs) which are health-based standards for public water systems.
National Secondary Drinking Water Standards	40 CFR Part 143	Establishes secondary maximum contaminant levels (SMCLs) which are non-enforceable guidelines for public water systems to ensure the aesthetic quality of the water.
Maximum Contaminant Level Goals (MCLGs)	40 CFR Part 141	Establishes drinking water quality goals set at levels of no known or anticipated adverse health effects with an adequate margin of safety.
Clean Water Act	33 USC Section 1251-1376	
Ambient Water Quality Criteria	40 CFR Part 131 Quality Criteria for Water, 1976, 1980, 1986	Requires the states to set ambient water quality criteria (AWQC) for water quality based on use classifications and the criteria developed under Section 304(a) of the Clean Water Act.
Resource Conservation and Recovery Act (RCRA), as amended	42 USC Section 6905, 6912, 6924, 6925	
RCRA Groundwater Protection	40 CFR Part 264	Provides for groundwater protection standards, general monitoring requirements, and technical requirements.
Clean Air Act	42 USC Section 7401-7642	
National Primary and Secondary Ambient Air Quality Standards	40 CFR Part 50	Establishes standards for ambient air quality to protect public health and welfare.
National Emissions Standards for Hazardous Air Pollutants (NESHAPs)	40 CFR Part 61	Provides emissions standards for hazardous air pollutants for which no ambient air quality standards exist.
Solid Waste Disposal Act (SWDA)	42 USC Section 6901-6987	
Land Disposal Restrictions	40 CFR Part 268.10-12; 40 CFR Part 268 (Subpart D)	Disposal of contaminated soil and debris resulting from CERCLA response actions are subject to Federal land disposal restrictions.
State		
Georgia Department of Natural Resources Environmental Protection Division; Water Quality Control	Chapter 391-3-6	Establishes groundwater classifications and water quality standards.
Georgia Drinking Water Regulations	Chapter 391-3-5	Regulates water systems within the state that supply drinking water that may affect the public health.
Georgia Department of Natural Resources Environmental Protection Division; Air Quality Control	Chapter 391-3-1 Section 02	Establishes air quality standards.

TABLE 11
POTENTIAL LOCATION-SPECIFIC ARARS

Standard, Requirement, Criteria, or Limitation	Citation	Description
Federal		
RCRA, as amended	42 USC Section 6901	
RCRA Location Standards	40 CFR Part 264.18(b)	Establishes design, construction, operation and maintenance standards for treatment/storage/disposal (TCD) facilities constructed in a 100-year floodplain.
Fish and Wildlife Conservation Act	16 USC Part 2901 et seq.	Requires states to identify significant habitats and develop conservation plans for these areas.
Floodplain Management Executive Order	Executive Order 11988; 40 CFR Part 6.302	Actions that are to occur in floodplain should avoid adverse effects, minimize potential harm, restore and preserve natural and beneficial value.
Endangered Species Act	16 USC Section 1531	Requires action to conserve endangered species or threatened species, including consultation with the Department of Interior.

TABLE 12

POTENTIAL ACTION-SPECIFIC ARARS

Standard, Requirement, Criteria, or Limitation	Citation	Description
Federal		
Solid Waste Disposal Act (SWDA)	42 USC Section 6901-6987	
Criteria for Classification of Solid Waste Disposal Facilities and Practices	40 CFR Part 257	Establishes criteria for use in determining which solid waste disposal facilities and practices pose a reasonable probability of adverse effects on health, and thereby constitute prohibited open dumps.
Hazardous Waste Management Systems General	40 CFR Part 260	Establishes procedure and criteria for modification or revocation of any provision in 40 CFR Parts 260-265.
Identification and Listing of Hazardous Wastes	40 CFR Part 261	Defines those solid wastes which are subject to regulation as hazardous wastes under 40 CFR Parts 263-265 and Parts 124, 270, and 271.
Standards Applicable to Generators of Hazardous Waste	40 CFR Part 262	Establishes standards for generators of hazardous waste.
Standards Applicable to Transporters of Hazardous Waste	40 CFR Part 263	Establishes standards which apply to persons transporting hazardous waste within the U.S. if the transportation requires a manifest under 40 CFR part 262.
Standards Applicable to Hazardous Waste Generation, Storage, Transportation, and Disposal Facilities	40 CFR 264	Established standards for hazardous waste treatment, storage, and disposal facilities.
Land Disposal Restrictions	40 CFR Part 268.10-12; 40 CFR 268 (Subpart D)	Disposal of contaminated soil and debris resulting from CERCLA response actions are subject to Federal land disposal restrictions.
Hazardous Waste Permit Program	40 CFR 270	Establishes provisions covering basic EPA permitting requirements.
Hazardous Materials Transportation Regulations	49 CFR 107, 171-177	Regulates transportation of hazardous materials.

Standard, Requirement, Criteria, or Limitation	Citation	Description
Occupational Safety and Health Act	20 USC Section 651-678	Regulates worker health and safety.
Clean Air Act	42 USC Section 7401-7642	
National Ambient Air Quality Standards	40 CFR Part 50	Treatment technology standard for emissions to air •incinerators •surface impoundments •waste piles •landfills •fugitive emissions
Air Use Approval	40 CFR 60 (Subpart A)	Requires notification and performance testing by owner or operator.
Particulate Discharge Limitations and Performance Testing	40 CFR 60 (Subpart B)	Defines limitations for particulate emissions, test methods, and monitoring requirements for incinerators.
Hazardous Materials Transportation Act	49 USC Section 1801-1813	
Hazardous Materials Transportation Regulations	49 CFR Parts 107, 171-177	Regulates transportation of hazardous materials.
State		
Georgia Hazardous Waste Management Act	Code of Georgia, Title 12, Article 3, Chapter 8	Institution and maintenance of a state-wide program for the management of hazardous wastes through the regulation of the generation, transportation, storage, treatment, and disposal of hazardous wastes.
Georgia Solid Waste Management Rules	Chapter 391-3-4	Siting and design requirements for disposal sites.
Georgia Air Quality Control Law	Title 12, Chapter 9	Air pollution control, air quality, and emissions control standards.
Georgia Hazardous Waste Management Rules	Rules and Regulations of the State of Georgia, Chapter 391-3-11	Establishes the policies, procedures, requirements, and standards to implement the Georgia Hazardous Waste Management Act.

TABLE 13
TO-BE-CONSIDERED (TBCs) DOCUMENTS[1]

Document	Citation	Description
Georgia Hazardous Site Response Act (HSRA)	Chapter 391-3-19	Establishes State hazardous substance cleanup activities and requirements

[1] TBCs - To-be-considered criteria are documents which are not legally binding, but should be considered in determining the necessary level of cleanup for protection of human health or the environment.

Primary Balancing Criteria

8.3 LONG-TERM EFFECTIVENESS AND PERMANENCE

Alternatives 2 and 3 would provide long-term effectiveness through removal and treatment or disposal of contaminated soils. If contaminated soil remains on site above levels which allow for unrestricted use, a review at least every five years would be required to ensure that the remediation continued to protect human health and the environment. Sub-alternative B for both alternatives would be less effective, since metals-contaminated soil would remain on site, but these sub-alternatives are still protective of human health and the environment.

8.4 REDUCTION OF TOXICITY, MOBILITY OR VOLUME THROUGH TREATMENT

Alternative 2 would reduce mobility and toxicity through treatment. Alternative 3 would reduce mobility of contamination by removing contaminated soil off-site and placing the soil in a landfill which would contain the contamination. Toxicity and volume would remain the same if pretreatment was not required. Toxicity would be reduced if pretreatment was required before disposal at a RCRA Subtitle C facility. Sub-alternative B for alternatives 2 and 3 would reduce toxicity and mobility less, since metals-contaminated soil would remain on site.

8.5 SHORT-TERM EFFECTIVENESS

Alternative 2 would require approximately 2 years and Alternative 3 would require approximately 1 year to implement. Appropriate monitoring and engineering controls would be applied to reduce fugitive dust, noise and risks to on-site remedial workers for Alternatives 2 or 3.

8.6 IMPLEMENTABILITY

Technological expertise, services, equipment and materials are adequately available for the implementation of Alternatives 2 and 3. Alternative 2 would require a longer period to implement due to the on-site treatment of the contaminated soil.

8.7 COST

The total present worth cost of Alternative 2 is approximately $5,400,000 if all contaminated soil is excavated and treated and $2,500,000 if only organic-contaminated soil is excavated and treated. For disposal at a non hazardous waste landfill, the total present worth cost for Alternative 3 is approximately $4,500,000 if all contaminated soil is removed and approximately $1,000,000 if only organic-contaminated soil is removed. For disposal at a hazardous waste facility, the total present worth cost for Alternative 3 is approximately $8,000,000 if all contaminated soil is removed and approximately $1,400,000 if only organic-contaminated soil is removed.

Modifying Criteria

8.8 STATE ACCEPTANCE

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

8.9 COMMUNITY ACCEPTANCE

During the public comment period, comments were received on the proposed plan from three commenters. See Appendix A - Responsiveness Summary for EPA's responses to the comments.

9.0 SUMMARY OF SELECTED REMEDY

Based upon consideration of the requirements of CERCLA, the NCP, the detailed analysis of alternatives and public and state comments, EPA has selected a remedy for Operable Unit 2 of the Site. The selected remedy is Alternative 2B, which provides for the following:

1. Excavation of all soil contaminated with organics necessary to meet performance standards for organics (See Table 14).

2. The staging and preconditioning of soil for low temperature thermal desorption treatment.

3. Treatment of excavated soil by low temperature thermal desorption.

4. Placement of treated, decontaminated soil back to the site.

5. Periodic sampling of treated soil during the treatment process to verify the effectiveness of the remedy.

6. Air monitoring to ensure the safety of nearby residents and workers.

7. Monitoring of groundwater on an annual basis for five years to ensure that metals contamination of groundwater is not migrating offsite in concentrations which exceed groundwater

protection standards. Monitoring may be suspended with EPA approval after two years if groundwater protection standards are met.

8. Deed restrictions to prevent residential use of the property.

At the completion of this remedy, the risk associated with this Site has been calculated at $1x10^{-5}$ which is determined to be protective of human health and the environment. The total present worth cost of the selected remedy, Alternative 2B, is estimated at $2,500,000.

9.1 SOIL REMEDY

The selected remedy for contaminated soils is low temperature thermal desorption. This remedy includes the utilization of a mobile thermal treatment unit to remove contaminants from soil at OU2 of the THAN site.

The low temperature thermal desorption unit consist of a heated chamber with temperatures ranging from 300 - 1,200 degrees Fahrenheit, depending on the specific type of unit. Approximately 3,000 cubic yards of organic-contaminated soil would be excavated, broken up, preconditioned (if necessary), and fed into the chamber of the desorption unit. The thermal unit will drive off organic contaminants from the soil. The contaminants in the vapor would be treated onsite by activated carbon, baghouses or an equivalent system. The soil will be treated to meet the performance standards outlined in Table 14. The treated soil will be placed back at the site.

In order to facilitate this remedy, OU2 of the THAN site is designated as a Corrective Action Management Unit (CAMU) and an Area of Containment (AOC) for purposes of this ROD. All waste managed within the CAMU/AOC must comply with the requirements set out in this ROD for soil remediation. OU2 and the designated CAMU/AOC consists of the Jones property and is bordered by the THAN property on the west, Schley Boulevard on the south, residences and a U.S. Department of Agriculture laboratory on the east, and the Albany Motel Limited property on the north. The CAMU/AOC also includes suitable areas in close proximity to the contamination necessary for implementation of the remedy selected in this ROD. Since soil contamination at OU2 will be cleaned to the risk-based performance standards, no closure standards apply for this CAMU/AOC.

Major components of the soil remedy include:

* The excavation of organic-contaminated surface and subsurface soils (approximately 3,000 cubic yards) which exceed action levels.

* The staging and preconditioning (if necessary) of soil for entry into the thermal desorption unit.

* The feeding of contaminated soil into the heated chamber for treatment.

* The processing of contaminated soil through the thermal desorption unit including the activated carbon, baghouse, or equivalent system.

* The placement of treated soil back to the site.

* The periodic sampling of soil during treatment to verify effectiveness of the remedy.

* Air monitoring to ensure safety of nearby residents and workers.

* Demobilization and restoration of the site property after completion of the remedy.

* Monitoring of groundwater for metals on an annual basis for five years.

* Institutional controls to prevent residential use of the site.

9.2 PERFORMANCE STANDARDS FOR SOIL

For the low temperature thermal desorption remedy, the performance standards for surface soil are based upon a $1x10^{-5}$ risk level for a cleanup associated with current and future industrial land use. Because an operating welding supply company exists on the eastern parcel and the property is zoned for commercial use through the year 2010, an industrial scenario was selected for operable unit two. A $1x10^{-5}$ risk level was chosen because it falls within EPA's risk range of $1x10^{-4}$ and $1x10^{-6}$ and it results in a significantly more cost effective remedy than the $1x10^{-6}$ risk level. This risk level remains protective of human health and the environment. For the subsurface soil the cleanup level was calculated using the PESTAN and Summers groundwater models. Performance standards are outlined in Table 14. Excavation of organic-contaminated soils within OU2 shall continue until the remaining soil achieves the performance standards. All excavation shall comply with ARARs, OSHA, and state standards. Pertinent testing methods will be selected or approved by EPA and used to determine that performance standards have been achieved.

All excavated soil shall be treated by means of a mobile low temperature thermal desorption unit to the performance standards outlined in Table 14. All treatment shall comply with ARARs, OSHA, and state standards. Treated soil will be used to backfill the site if it achieves the performance standards, otherwise it will be treated again by the thermal desorption unit until performance standards are achieved.

EPA has determined that excavation of metals-contaminated soil is not necessary. Metals concentrations in surface soil are below the $1x10^{-5}$ risk level or hazard quotient of 1. Metals in subsurface soil were examined to determine if the migration of metals to groundwater was possible. The metals selected for examination were beryllium, cadmium, lead, and manganese. This selection was based on the presence of these metals in groundwater at levels above drinking water or other health based standards in early sampling events. Computer modeling using the Summers model concluded that concentrations of cadmium, lead, and manganese in the subsurface soil were at levels which could result in migration of the contaminants into the groundwater. Beryllium concentrations were below levels which could result in migration into the groundwater.

Subsequent sampling of the groundwater at OU2 using low-flow techniques found that manganese is the only metal of concern in the groundwater. Manganese contamination in the groundwater at OU2 appears to be restricted to the area west of the main building. This is also the area of the highest subsurface soil contamination. Manganese contamination was not found in the monitoring wells to the east of the building (which is downgradient of the contamination). The result of these sampling events indicates that a subsurface soil cleanup level is only necessary for manganese. The groundwater will be monitored for cadmium, lead, and manganese on an annual basis for five years to ensure that metals contamination of groundwater is not migrating offsite in concentrations that exceed groundwater protection standards. If monitoring indicates that metals contamination is migrating offsite, EPA would then consider additional cleanup, such as excavating and treating metals-contaminated soil. The public would be notified if additional activities were being considered.

TABLE 14
Summary of Remedial Action Objectives

Compound	**Medium**	
	Surface Soil (mg/kg)	**Subsurface Soil (mg/kg)**
4,4'-DDT	94	NA
Ethylene dibromide	NA	0.006
Methyl parathion	NA	17
Toxaphene	29	NA

NA = Not applicable

9.3 SOIL TESTING

Soil testing shall be conducted on the site to determine the effectiveness of meeting the soil performance standards outlined in Table 14. Performance will be met when the confirmatory sampling effort shows all surface soil samples have been remediated to a level at or below the performance standards and subsurface soils meet the performance standards on a site-wide basis. Confirmatory sampling will include testing of both the decontaminated soil exiting the thermal desorption unit and any soil left in place.

9.4 COST

For low temperature thermal desorption, the estimated present worth cost of the remedy is approximately $2,500,000. These costs include planning and design fees, as well as mobilization and implementation. The capital cost is approximately $2,000,000; the operation and maintenance cost is approximately $500,000.

10.0 STATUTORY DETERMINATION

Under its legal authorities, EPA's primary responsibility at Superfund sites is to undertake remedial actions that achieve adequate protection of human health and the environment. In addition, Section 121 of CERCLA establishes several other statutory requirements and preferences. These specify that, when complete, the selected remedial action for this Site must comply with applicable or relevant and appropriate environmental standards established under Federal and State environmental laws. The selected remedy also must be cost-effective and utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. Finally, the statute includes a preference for remedies that employ treatment 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 isolating and treating threats at Operable Unit 2 of the Site in the contaminated soil. The selected remedy provides protection of human health and the environment by eliminating, reducing, and controlling risk through treatment and institutional controls. The surface and subsurface soils at Operable Unit 2 of the Site will be treated through low temperature thermal desorption. For surface soil the cleanup will meet a $1x10^{-5}$ risk-based level. The subsurface soils will be cleaned up to levels that are protective of groundwater for organic contamination. Although metals contaminated soil will be left in place at a level that could impact groundwater, groundwater monitoring will be implemented to ensure that metals contamination of groundwater does not migrate offsite in concentrations which exceed groundwater protection standards.

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

Remedial actions performed under CERCLA must comply with all applicable or relevant and appropriate requirements (ARARs). All alternatives considered for the THAN OU2 site were evaluated on the basis of the degree to which they complied with these requirements. The selected remedy was found to meet or exceed all ARARs, including those listed in Tables 10, 11, and 12.

Waivers

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

Other Guidance To Be Considered

Other Guidance To Be Considered (TBCs) include health based advisories and guidance. TBCs have been utilized in estimating incremental cancer risk numbers for remedial activities at the sites. The risk numbers are evaluated relative to the normally accepted point of departure risk range of $1x10^{-4}$ to $1x10^{-6}$.

10.3 COST EFFECTIVENESS

The estimated cost of EPA's selected remedy is $2,500,000. Cost effectiveness is determined by comparing the cost of all alternatives being considered with their overall effectiveness to determine whether the costs are proportional to the effectiveness achieved. EPA evaluates the incremental cost of each alternative as compared to the increased effectiveness of the remedy. The selected remedy, Alternative 2B, does cost more than the no action alternative; however, effectiveness achieved by Alternative 2B justifies the higher cost. The selected remedy also costs more than Alternative 3B. However, the reduction in mobility and toxicity achieved by Alternative 2B justifies the additional cost. The selected remedy is less costly that Alternatives 2A and 3A, which would address subsurface soil contamination with metals. However, the incremental increase in effectiveness under 2A or 3A would not justify the substantial increase in cost. The remedy is considered cost effective.

10.4 UTILIZATION OF PERMANENT SOLUTIONS TO THE MAXIMUM EXTENT PRACTICABLE

The selected remedy utilizes permanent solutions to the maximum extent practicable by using treatment to permanently reduce contaminant levels.

10.5 PREFERENCE FOR TREATMENT AS A PRINCIPAL ELEMENT

The statutory preference for treatment will be met because the selected remedy treats the contaminated soil which is the principal threat posed by Operable Unit 2 at the Site.

11.0 DOCUMENTATION OF SIGNIFICANT CHANGES

This selected remedy differs from the preferred remedy in the proposed plan in removing cadmium, lead and manganese as contaminants of concern. As discussed above, subsequent groundwater monitoring has found that cadmium and lead are not migrating into the groundwater and that manganese is isolated to the area on the west side of the main building. The period of groundwater monitoring for metals also has been changed to five years to ensure protection of groundwater resources. In addition, deed restrictions to prevent residential use of the property were added to the remedy.

In order to facilitate this remedy, OU2 of the THAN Site is designated as a Corrective Action Management Unit (CAMU) and an Area of Containment (AOC) for purposes of this ROD. All waste managed with the CAMU\AOC must comply with the requirements set out in the ROD for soil remediation. OU2 and the designated CAMU/AOC consist of the Jones property and is bordered by the THAN property on the west, Schley Boulevard on the south, residences and a U.S. Department of Agriculture laboratory on the east, and the Albany Motel Limited property on the north. The CAMU/AOC also includes suitable areas in close proximity to the contamination necessary for implementation of the selected remedy. Since soil contamination at OU2 will be cleaned to the risk-based performance standards, no closure standards apply for this CAMU/AOC.

APPENDIX A

Responsiveness Summary
T H Agriculture & Nutrition Site
Operable Unit 2
Albany, Georgia

The U.S Environmental Protection Agency (EPA) held a public comment period from January 31, 1996 through March 1, 1996 for interested parties to give input on EPA's Proposed Plan for Remedial Action at Operable Unit 2 (OU2) of the T H Agriculture & Nutrition (THAN) Superfund Site in Albany, Dougherty County, Georgia. The public comment period was extended an additional thirty days, until April 1, 1996, after EPA received a request for an extension.

A responsiveness summary is required to document how EPA addressed citizen comments and concerns about the Site, as raised during the public comment period. All comments summarized in this document have been factored into the final decision of the remedial action for OU2 of the T H Agriculture & Nutrition Site.

This responsiveness summary for the T H Agriculture & Nutrition Site is divided into the following sections.

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

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

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

IV. Concerns to be Addressed in the Future - This section discusses community concerns of which EPA should be aware during remedial design.

I. Overview

The remedial alternatives were presented to the public in a Proposed Plan released in January 1996. The public comment period was January 31, 1996 through April 1, 1996. Public notices in the Albany News-Herald were published on January 31, 1996 and February 3, 1996. A public notice was published in the Southwest Georgian on February 1, 1996 and in the Albany Journal on February 9, 1996. The public notice indicated the EPA wold hold a public meeting if requested by the public. Notice of the extension to the public comment period was published in the Albany News-Herald on February 19, 1996 and March 4, 1996. A public meeting was not requested by the public.

EPA has organized the work at this Site into two phases or operable units (OUs). OU1 involves the eastern parcel currently owned by T H Agriculture

& Nutrition Company, Incorporated. A removal action on OU1 was performed in 1992 to excavate and treat contaminated soils. Current remedial actions on OU1 are addressing groundwater contamination underneath the entire Site and soil on the western parcel. Operable unit two addresses the source of contamination on the eastern parcel currently owned by Mr. Larry Jones who operates the Jones Welding Supply Company.

For the contaminated soils on OU2, the selected remedy is Alternative 2B, Excavation and Onsite Treatment with Thermal Desorption and Onsite Disposal. The major components of the selected remedy include:

* Excavation of organic-contaminated surface and subsurface soils necessary to meet action levels for organics,

* Treatment of contaminated soils by low temperature thermal desorption,

* Backfilling of treated soils on the site, and

* Monitoring of groundwater for metals on an annual basis for five years. (Monitoring may be suspended with EPA approval after two years if groundwater protection standards are met.)

* Deed restrictions to prevent residential use of the property.

The estimated cost of this alternative is $2,500,000.

This selected remedy differs from the preferred remedy in the period of groundwater monitoring which has been changed from two years to five years to ensure protection of groundwater resources. In addition, deed restrictions to prevent residential use of the property were added to the remedy.

In order to facilitate this remedy, OU2 of the THAN Site is designated as a Corrective Action Management Unit (CAMU) and an Area of Containment (AOC) for purposes of this ROD. All waste managed within the CAMU/AOC must comply with the requirements set out in the ROD for soil remediation. OU2 and the designated CAMU/ AOC consist of the Jones property and is bordered by the THAN property on the west, Schley Boulevard on the south, residences and a U.S Department of Agriculture laboratory on the east, and the Albany Motel Limited property on the north. The CAMU/AOC also includes suitable areas in close proximity to the contamination necessary for implementation of the selected remedy. Since soil contamination at OU2 will be cleaned to the risk-based performance standards, no closure standards apply for this CAMU/AOC.

II. Background on Community Involvement and Concerns

EPA has taken the following actions to ensure that interested parties have been kept informed and given an opportunity to provide input on activities at the THAN OU2 Site.

An availability session at a local library and community interviews with local officials were held at the start of field work for the RI for operable unit one on December 12, 1990. The main branch of the Dougherty Public Library at 300 Pine Street was chosen as the local information repository for the Site. On March 12, 1992, THAN held a public meeting to discuss the second removal action at the Site. In addition, a fact sheet concerning the RI for operable unit one was sent to the mailing list in May 1992.

The public comment period on the proposed plan for the operable unit one ROD was September 14, 1992 through November 14, 1992. A public meeting was held on Thursday, September 24, 1992 where representatives for EPA answered questions regarding the Site and the proposed plan under consideration. The administrative record was available to the public at both the information repository maintained at the Dougherty Public Library and at the EPA Region IV Library at 345 Courtland Street in Atlanta, Georgia. The notice of availability of these two documents was published in the Albany News-Herald on September 10, 1992. Responses to the significant comments received during the public comment period and at the public meeting were included in the Responsiveness Summary, which was part of the ROD for operable unit one.

The public comment period on the proposed plan for this ROD was January 31, 1996 through April 1, 1996. EPA published notice that it would hold a public meeting upon request of the community.. However, a public meeting was not requested by the public. The administrative record was available to the public at both the information repository maintained at the Dougherty Public Library and at the EPA Region IV Library at 345 Courtland Street in Atlanta, Georgia. The notice of availability of these documents was published in the Albany News-Herald on January 31, 1996 and February 3, 1996, in the Southwest Georgian on February 1, 1996, and in the Albany Journal on February 9, 1996. Notice of the extension of the comment period was published in the Albany News-Herald on February 29, 1996 and March 4, 1996.

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

Comment 1: The property owner requested additional information regarding risk to on-site workers.

Response 1: The risk to on-site workers is a long-term risk caused by direct exposure to the soils. Because the area of highest contamination is not an area with day-to-day operations, the exposure of on-site workers is limited and would only be of concern after many years. The site will be cleaned before the on-site workers have significant exposure.

Comment 2: The property owner requested additional information regarding the impact of the clean-up to property and business operations.

Response 2: The area of highest contamination is located on the west side of the existing building. EPA will attempt to conduct the clean-up with minimal or no disruptions to the building or the operations.

Comment 3: One commenter suggested that bioremediation should have been carried through to the final stage of remedial alternative screening.

Response 3: The bioremediation alternative was screened out because it was not a viable alternative. This commenter presented data that demonstrated toxaphene was degraded from 40 mg/kg to less that 2 mg/kg. However, in the same data when starting concentrations of toxaphene were higher (577 mg/kg and 1050 mg/kg), the final concentrations were 270 mg/kg and 244 mg/kg respectively, which does not meet the cleanup standards for this site.

Comment 4: One Potentially Responsible Party (PRP) commented that they agree with EPA's conclusion regarding the need to remediate only organic-contaminated soil.

Response 4: No response needed.

Comment 5: One PRP commented that risk assessment scenarios that are more representative of actual current conditions need to be evaluated. A more realistic current exposure would be for an occasional trespasser or grounds maintenance personnel or possibly a guard at the site. Scenarios for future conditions need to consider potential institutional controls such as deed restrictions that may limit future use of the property to industrial applications only.

Response 5: The current use of the site is an operating welding supply company. Although the facility does not use the west side of the building (which is most highly contaminated) on a day-to-day basis at this time, this area could be used at any time in the future resulting in unacceptable risk to on-site workers. Deed restrictions have been included in the remedy to limit future use of the property to industrial applications.

Comment 6: One PRP commented that cleanup standards for soils should be reevaluated after the risk assessment has been updated. Cleanup standards for surface soil should consider exposure to on-site workers and protection of surface water runoff. Cleanup standards for subsurface soil should consider potential exposure to construction workers.

Response 6: EPA does not agree that the risk assessment should be updated The risk assessment should be updated only if new issues of protectivenes arise. Cleanup standards for surface soil have been set to protect on-site workers. Cleanup standards for subsurface soil have been set to protect groundwater from contamination. These subsurface standards will be protective of short-term exposure by construction workers.

Comment 7: One PRP suggested that additional remedial alternatives should be considered in light of more realistic risk assessment alternatives and revised cleanup standards. Remediation of surface soil only, institutional controls, in-situ soil stabilization and solidification, and containment technologies such as capping should be considered.

Response 7: EPA does not agree that the cleanup standards should be revised. EPA considered stabilization/solidification and containment technologies. However, these alternatives are not as effective at reducing toxicity and volume of waste and are considered less protective. EPA has included institutional controls (deed restrictions) in the remedy.

Comment 8: One PRP states that while the preferred alternative presented in the Proposed Plan is protective of human health and the environment, there are several less costly alternatives (institutional controls, deed restrictions, in-situ treatment, and containment by capping) that would achieve an acceptable reduction of risk, thus meeting the objectives of the National Oil and Hazardous Pollution Contingency Plan (NCP). In light of the comments above, these alternatives should be evaluated and the proposed plan revised accordingly.

Response 8: See response 7.

Comment 9: One PRP commented that the Feasibility Study for OU2 is questionable in that it appears to have relied upon the results of computer modeling to conclude that there are inorganic compounds at the Jones property that should be remedied. The modeling is poorly documented and appears to depend on general rules of thumb or estimates for many of the input parameters.

Response 9: The Feasibility Study utilized computer modeling to determine that subsurface metal contamination could continue to contaminate groundwater resources. Metals concentrations of beryllium, cadmium, lead, and manganese in the soil were significantly above background levels for the site and these same metals were found in earlier groundwater samples from the site.

In the latest sampling efforts, low flow techniques have been used in order to reduce turbidity effects on the samples and consequently obtain a representative groundwater sample. The subsequent analyses have detected only manganese. This contamination is localized in the area to the west of the main building. Therefore, cadmium and lead were removed from the list of contaminants of concern and manganese will continue to be sampled and monitored.

Comment 10: One PRP stated that analytical data does not support the Feasibility Study (FS) statement that inorganic contamination extends from 1 to 22.5 feet; the comparison of maximum detected concentrations of the metals to a cleanup standard is inappropriate; that maximum detected lead concentrations did not exceed the industrial worker exposure limit of 1000 parts per million; and that the manganese occurrence is not as extensive as implied by the FS.

Response 10: The Remedial Investigation for this site found levels of inorganic contamination from 1 to 22.5 feet below surface which exceeded the background levels for this site. Maximum concentrations were compared to cleanup standards as a conservative approach for protection of groundwater. The maximum detected lead concentrations did not exceed the industrial worker limit, but did result in groundwater contamination when used in the groundwater model. Lead has subsequently been removed as a contaminant of concern for subsurface soil. Manganese occurrence in excess of the maximum subsurface soil background concentration of 269 mg/kg is frequent; manganese concentrations in groundwater in excess of the national maximum of 3000 mg/kg occur in multiple wells.

Comment 11: One PRP stated that the maximum detected lead and manganese are in subsurface samples which should be compared with leachability values calculated using site-specific Kd values.

Response 11: EPA is aware of the value of site specific soil/water distribution coefficients (Kd). Because site specific data was not available, EPA decided to develop soil clean-up levels for inorganics using literature derived values. In order to account for natural variation in the Kd, the Summer's model and conservative input values were chosen for the purpose. In addition, the protective measure of monitoring of groundwater for inorganic contamination has been provided in the ROD. This monitoring will provide verification of leachability of inorganics and protection of human health and the environment at the site.

Comment 12: One PRP stated that if a localized source of metals exists, then a localized action may be recommended.

Response 12: EPA agrees with this comment, but has no knowledge of any localized source of metals. The subsurface manganese contamination appears to be concentrated on the west side of the main building, but the source of this contamination is unknown.

Comment 13: One PRP stated that Figure 2-3 of the FS shows the extent of metals contamination including samples JP-25, JP-33 and JP-47, but the analytical data does not support the figure.

Response 13: Samples JP-25, JP-33, and JP-47 had concentrations of one or more metal which significantly exceeded the background concentrations for the site.

Comment 14: One PRP stated that the site-specific Risk Assessment and Remedial Investigation (RI) data do not support remediation of soils for inorganic contamination for the protection of human health and the environment.

Response 14: The data from the RI/FS for OU1, the RI for OU2, and subsequent groundwater sampling events indicate that manganese is present in elevated levels which are causing contamination of groundwater in a local area to the west of the main building. The selected remedy includes continued groundwater sampling and monitoring to determine if remediation of subsurface soils is necessary.

Comment 15: One PRP stated surface and subsurface soils have levels of pesticides, toxaphene, and DDT and its degradation products, DDD and DDE, that require remediation. The other co-occurring pesticides (dieldrin, endosulphan, dinoseb, and so forth) will be removed if toxaphene and DDT are addressed in remediation, but because of their low detected concentrations, they do not require remediation. None of the other volatile organic compounds (VOCs), semivolatile organic compounds (VOCs) or metals require remediation.

Response 15: EPA agrees with the statement regarding toxaphene and DDT for the surface soil remediation. However, groundwater modeling indicates that methyl parathion and ethylene dibromide are contaminants of concern for subsurface soil due to the likelihood of leaching into the groundwater.

Comment 16: One PRP stated that the executive summary of the Remedial Investigation (RI) report wrongly presents xylene as a potential problem at the site.

Response 16: The RI states that "soils in the southwestern portion of the site are contaminated with toxaphene and xylene." The OU1 RI and OU2 RI found xylene contamination in several samples which was consistent with previous operations at the site.

Comment 17: One PRP stated that none of the metals detected appeared to be at elevated concentrations (above naturally occurring levels).

Response 17: Many of the samples from both the OU1 and OU2 RI had levels of metals which significantly exceeded the background level for the site.

In the latest sampling efforts, low flow techniques have been used in order to reduce turbidity effects on the samples and consequently obtain a representative groundwater sample. The subsequent analyses have detected only manganese. This contamination is localized in the area to the west of the main building. Therefore, cadmium and lead were removed from the list of contaminants of concern and manganese will continue to be sampled and monitored.

Comment 18: One PRP stated that all of the reported semivolatile organic compounds were estimated concentrations and appear to be within the detection limit ranges. None of them appear to be in significant concentrations to be of exposure concern.

Response 18: EPA agrees that the semivolatiles do not appear to be contaminants of concern.

Comment 19: One PRP stated that Table 2-1 in the Risk Assessment (RA) reported mean values higher than the maximum values, that cancer risks in the RA were estimated using a dose averaging time of 75 years, instead of the standard of 70, and that a conversion factor was omitted from the equation for the soil intake estimates.

Response 19: EPA found no occurrences in Table 2-1 of the RA document where the reported mean value was higher than the maximum. The cancer risks were estimated using the standard of 70 years. The conversion factor was included in the equation for the soil intake estimates.

Comment 20: One PRP stated that the RA addressed only surface soil contamination.

Response 20: Since no direct routes of exposure are anticipated for current and future use of the property, direct subsurface exposure was not addressed in the RA. Subsurface contamination was addressed in the Feasibility Study for protection of groundwater.

Comment 21: One PRP stated that a fate and transport discussion is lacking in the RA.

Response 21: Although a fate and transport discussion is not provided, the report satisfies the requirements established by EPA. In addition, a fate and transport discussion is provided in the RI/FS for Operable Unit 1.

Comment 22: One PRP stated that analytical data used in the RA should be included in the report or referenced in the report.

Response 22: The data were obtained from the EPA RI report cited in Section 2-2.

Comment 23: One PRP stated that the exposure point concentration estimates in the RA assumed that all data are lognormally distributed for the Reasonable Maximum Exposure (RME) calculation. However, the DDT concentrations used were the maximum detected concentrations which could mean that the data distribution assumptions may not be accurate.

Response 23: The RME calculation was performed according to EPA guidance. When the calculated upper confidence limit is greater that the maximum detected concentration, the RME defaults to the maximum detection as was done for DDT.

Comment 24: One PRP stated that the Feasibility Study report presented Remedial Action Objectives (RAOs) based on the protection of groundwater for methyl parathion and EDB which were not even reported in the RA.

Response 24: Subsurface soil was not an issue for the risk assessment as explained in response 20. However, subsurface soil contamination is an issue for the protection of groundwater and RAOs were appropriately determined using leachate model results.

Comment 25: One PRP stated that for oral and inhalation exposure pathways in the RA, the EPA cancer slope factor (CSF) and reference dose (RfD) values were used. For dermal intake estimations, modified CSF and RfD values were used, which is technically incorrect.

Response 25: Toxicity factors were adjusted from administered to adsorbed toxicity factors as noted in Section 4.1 of the RA. The method is consistent with Appendix A to the Risk Assessment Guidance for Superfund (RAGS). Further, the absorption percentages that were used are consistent with the EPA policy cited in Section 4.1.

Comment 26: One PRP stated that the exposure pathway evaluations in the RA are not realistic. The exposure pathways included on-site workers and youth trespassers for current land use and on-site residents for future land use.

Response 26: The exposure setting of the Jones property is described in Section 3. Currently, the site is used for commercial purposes and residential areas are located in close proximity; thus, on-site workers and site visitors are potential receptors. Residential use of the property is an unlikely, but possible, future use scenario. The western parcel of the site already has stopped commercial operations, so residential use is not impossible.

Comment 27: One PRP stated that exposure factors used in the RA are, for the most part, the default exposure factors from EPA. The assumptions us are not realistic for the current land use at the site.

Response 27: The exposure factors that were used were a combination of standard default exposure factors and professional judgement. This approach is typically used when site-specific data is lacking.

Comment 28: One PRP stated that a site land use map is needed to properly evaluate the future land use.

Response 28: EPA used the Albany-Dougherty Planning Commission's "Comprehensive Development Plan", June 1989, for projected land use in the area. Commercial zoning of the property through year 2010 was confirmed by telephone conversation with a staff person on the Albany-Dougherty Planning Commission.

Comment 29: One PRP stated that the on-site worker scenario appears to drive the risk assessment. The narrative seems to imply that the worker is in the contaminated area for the full time at work. A more realistic scenario could be a worker trespassing the area or mowing the grass or an off-site youth visiting the site occasionally.

Response 29: The current use of the site is an operating welding supply company. Although the facility does not use the west side of the building (which is most highly contaminated) on a day-to-day basis at this time, this area could be used at any time in the future resulting in unacceptable risk to on-site workers.

Comment 30: One PRP stated that the juvenile site visitor scenario seems excessive, because site access is controlled.

Response 30: See response 27. In addition, site access is not controlled during non-business hours.

IV. Concerns to be Addressed in the Future

No concerns to be addressed in the future were identified.

APPENDIX B

CONCURRENCE LETTER

Georgia Department of Natural Resources

205 Butler Street, S.E., Suite 1154 Atlanta, Georgia 30334
Joe D. Tanner, Commissioner
Environmental Protection Division
Harold F. Reheis, Director
404/656-2833 404/656-7802

April 29, 1996

Mr. Richard Green
Acting Division Director
Waste Management Division
U.S. EPA, Region IV
345 Courtland Street, N.E.
Atlanta, Georgia 30365

RE: Record of Decision
T H Agriculture & Nutrition
NPL Site
Operable Unit Two (OU #2)

Dear Mr. Green:

The Georgia Environmental Protection Division (EPD) has reviewed the Record of Decision, Summary of Remedial Alternative Selection for the T H Agriculture & Nutrition Site (Operable Unit Two) in Albany, Georgia. EPD concurs with the selected remedy in which the major components include:

- excavation of all soil contaminated with organics necessary to meet performance standards;
- staging and preconditioning of soil for low temperature thermal desorption;
- treatment of excavated soil by low temperature thermal desorption;
- placement of treated, decontaminated soil back to the Site;
- periodic sampling of treated soil during the treatment process to verify the effectiveness of the remedy;
- air monitoring to ensure safety of nearby residents and workers;
- groundwater monitoring to ensure that metals contamination of groundwater is not migrating off-site in concentrations which exceed groundwater protection standards; and
- institutional controls such as deed restrictions to prevent residential use of the property and/or groundwater where implemented under the Operable Unit 1 (OU#1) remedy.

If you have any questions, please contact Ned Emrick at (404) 656-7802.

Sincerely,

Harold F. Reheis
Director

HFR/nce
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