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October 1994

EPA Superfund Record of Decision:

Marzone Inc./Chevron Chemical Co. Superfund Site (O.U. 1), Tifton, GA, 9/30/94

RECORD OF DECISION

SUMMARY OF REMEDIAL ALTERNATIVE SELECTION

MARZONE INC. / CHEVRON CHEMICAL COMPANY SUPERFUND SITE

OPERABLE UNIT #1

TIFT COUNTY, GEORGIA

PREPARED BY

U. S. ENVIRONMENTAL PROTECTION AGENCY

REGION IV

ATLANTA, GEORGIA

DECLARATION
of the
RECORD OF DECISION

SITE NAME AND LOCATION

Marzone, Inc./Chevron Chemical Company Site, Tifton, Tift County, Georgia

STATEMENT OF BASIS AND PURPOSE

This decision document (Record of Decision) presents the selected remedial action for the Marzone, Inc./ Chevron Chemical Company Site in Tift County, 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), and to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This decision is based on the Administrative Record for this 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 Marzone, Inc. / Chevron Chemical Company Site. In accordance with 40 Part CFR 300.430, as the support agency, GAEPD has provided input during this process. GaEPD has concurred with the remedy selected in the ROD, but defers concurrence with the performance standards in light of the newly promulgates rules of the Georgia Site Hazardous Response Act.

ASSESSMENT OF THE SITE

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

DESCRIPTION OF SELECTED REMEDY

EPA has organized the work at this Site into two phases or operable units (OUs). Operable Unit #1 involves contamination on the 1.68-acre former Marzone pesticide blending area, part of the Slack Property, and railroad drainage ditch past the southwest corner of the horse pasture, and contaminated groundwater related to the Site. This first operable unit is broken down into two separate remedies; one for groundwater and the other for soil.

For contaminated groundwater the selected remedy is Groundwater Pump and Treat and enhancement through use of an infiltration gallery. The major components of the selected remedy include:

- The implementation of institutional controls.
- The implementation of a pumping test, to aid in determining specific design criteria for the extraction system.
- The design and construction of groundwater extraction wells.
- The installation of a security fence around the on-site treatment unit.
- The design and installation of a groundwater pumping system, a groundwater filtration system, an on-site treatment system, and an infiltration gallery.
- The start-up and operation of this system.
- The transportation, regeneration, recycling, and disposal of the spent filters.
- The operation and maintenance of a long-term groundwater monitoring program. Includes quarterly monitoring of parameters in extraction wells and specified monitoring wells.

The cost of this alternative would be $3.4 million.

For the soil contamination the selected remedy is Low Temperature Thermal Desorption. The major components of the selected remedy include:

- The excavation of all soil contamination above the performance standards.
- The staging and preconditioning of soil for entry into the thermal desorption unit.
- The feeding of soil into the heated chamber for treatment.
- The processing through the thermal desorption unit including the bag house, GAC, or other equivalent system.
- The placement of treated, decontaminated soil back to the Site.
- The periodic soil sampling during treatment to verify effectiveness of the remedy.
- Air monitoring to ensure safety of nearby residents and workers.

The cost of this remedy would be $4.8 million.

The total cost of the groundwater and soil remedy for OUI of the Marzone Site is approximately $8.2 million.

STATUTORY DETERMINATIONS

The selected remedy is protective of human health and the environment, complies with federal and state requirements that are legally applicable or relevant and appropriate to the remedial action, and is cost effective. This remedy satisfies the preference for treatment that reduces toxicity, mobility, or volume as the principal element. Finally, it is determined that this remedy utilizes a permanent solution and alternative treatment technologies to the maximum extent practicable.

Patrick M. Tobin for September 30, 1994

JOHN H. HANKINSON, JR., REGIONAL ADMINISTRATOR DATE

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1.0 SITE NAME, LOCATION, AND DESCRIPTION

The Marzone, Inc./Chevron Chemical Company Site (herein after the Marzone Site or the Site) is located in south-central Georgia in the City of Tifton, at the intersection of Golden Road and Norfolk Southern Railroad (Figure 1). The Site consists of two separate study areas called operable units (OUs). This Record of Decision covers

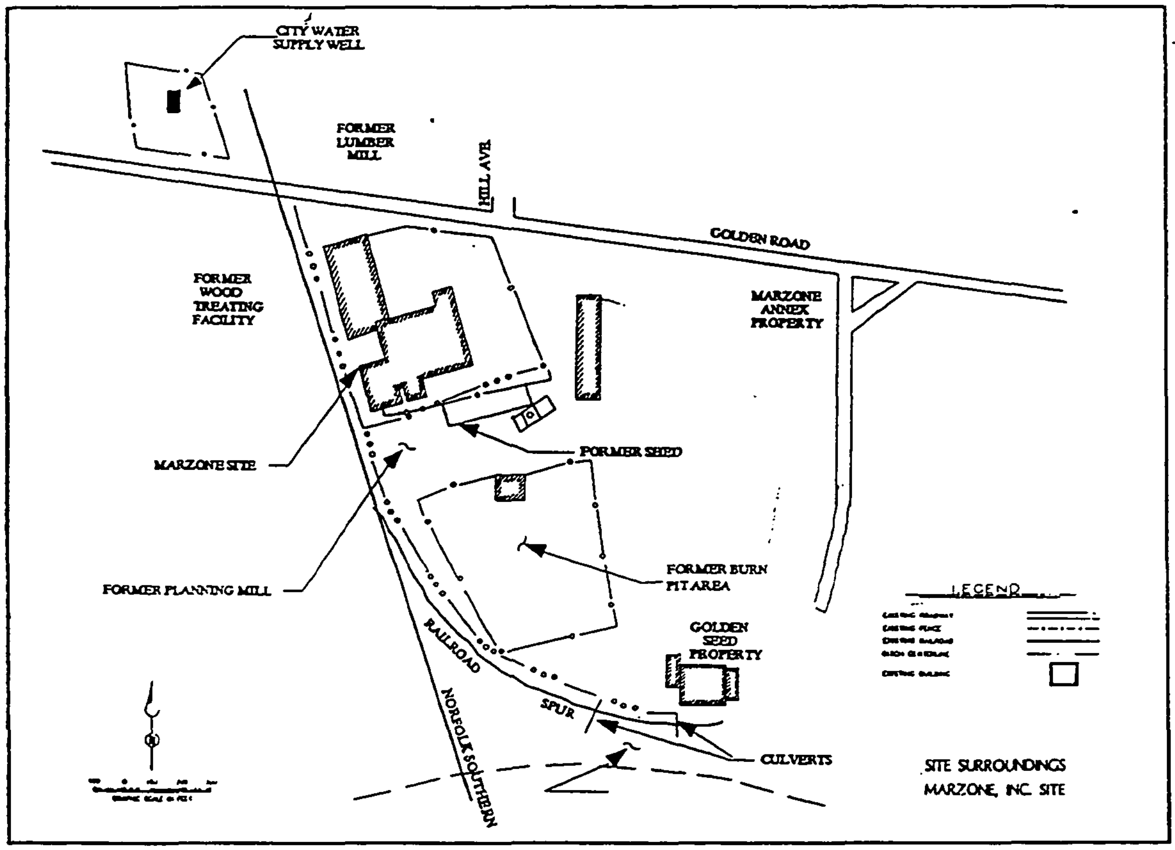


FIGURE 1: Map of Marzone Site

OU1. OU1 consists of the 1.68-acre former pesticide production area, a part of the adjacent Slack property, and part of the adjacent railroad drainage ditch.

Although the property is accessible from all directions, the only roadway access is from Golden Road which borders the property to the north. Across Golden Road to the north is a former lumber mill. To the west of the property is an active railroad and a former wood treating facility. To the east and south is residential property owned by Mr. Grover Slack, which includes an open barn and horse pasture. A live-in trailer is also present on the Slack property. A municipal drinking water supply well is located less than 100 yards to the northwest. Farther to the north and west of this well is a residential area. Also, approximately 500 feet east of OU1 of the Site is a red brick house.

Bordering the southern portion of OU1 of the Marzone Site was a former shed and planing mill, of which only an asphalt area remains. Further south of the Marzone property was a former burn pit area used to burn planing mill wastes. Beyond the former burn pit area to the southeast is the Golden Seed property where a former fertilizer facility was operated. Currently EPA is performing a fund-led removal action on the Golden Seed Property.

Existing features on OU1 of the Marzone Site include the plant building (which formerly consisted of a dry blending area, a warehouse, a drum storage area, and a liquid formulation area), a vertical chemical storage tank, an adjacent tank pad, a loading dock area, and an asphalt parking area and concrete slab (Figure 2). Reportedly, an underground storage tank is located north of the eastern portion of the building. A drainage ditch runs along the southern boundary of the Site and is referred to as the "south drainage ditch." Similarly, another drainage ditch, referred to as the "railroad drainage ditch," runs along portions of the Norfolk Southern Railroad and the railroad spur south and southeast of the Site. Former features on OU1 of the Marzone Site were a rinsate pond (lagoon) in the southeast portion of the Site, and a former truck loading area in the eastern portion of the Site. Additionally, there was an aboveground chemical tank area on the south side of the Site, of which only the tank pad remains.

2.0 SITE HISTORY AND ENFORCEMENT ACTIVITIES

The pesticide formulation facility was developed in 1950 and operated as such until January 1983. After 1983, OU1 of the Site was used primarily for general storage and plant seedling distribution, as well as vegetable washing and repackaging activities. Currently, no operations exist on OU1 of the Marzone Site.

From 1950 to 1970, Chevron Chemical Company operated a pesticide formulating plant at OU1 of the Site. From 1950 to about 1960, Chevron formulated dry pesticide dusts and in 1960 liquid formulation was added. The liquid formulation used xylene and xylene-based mixtures as carrier liquids. Bulk chemical handling facilities operated during these years included unpaved railcar and truck loading areas for base materials and finished products; bulk liquids were unloaded by tanker truck into vertical aboveground storage tanks. Only the western portion of the current building was in existence. The remainder of OU1 was unpaved.

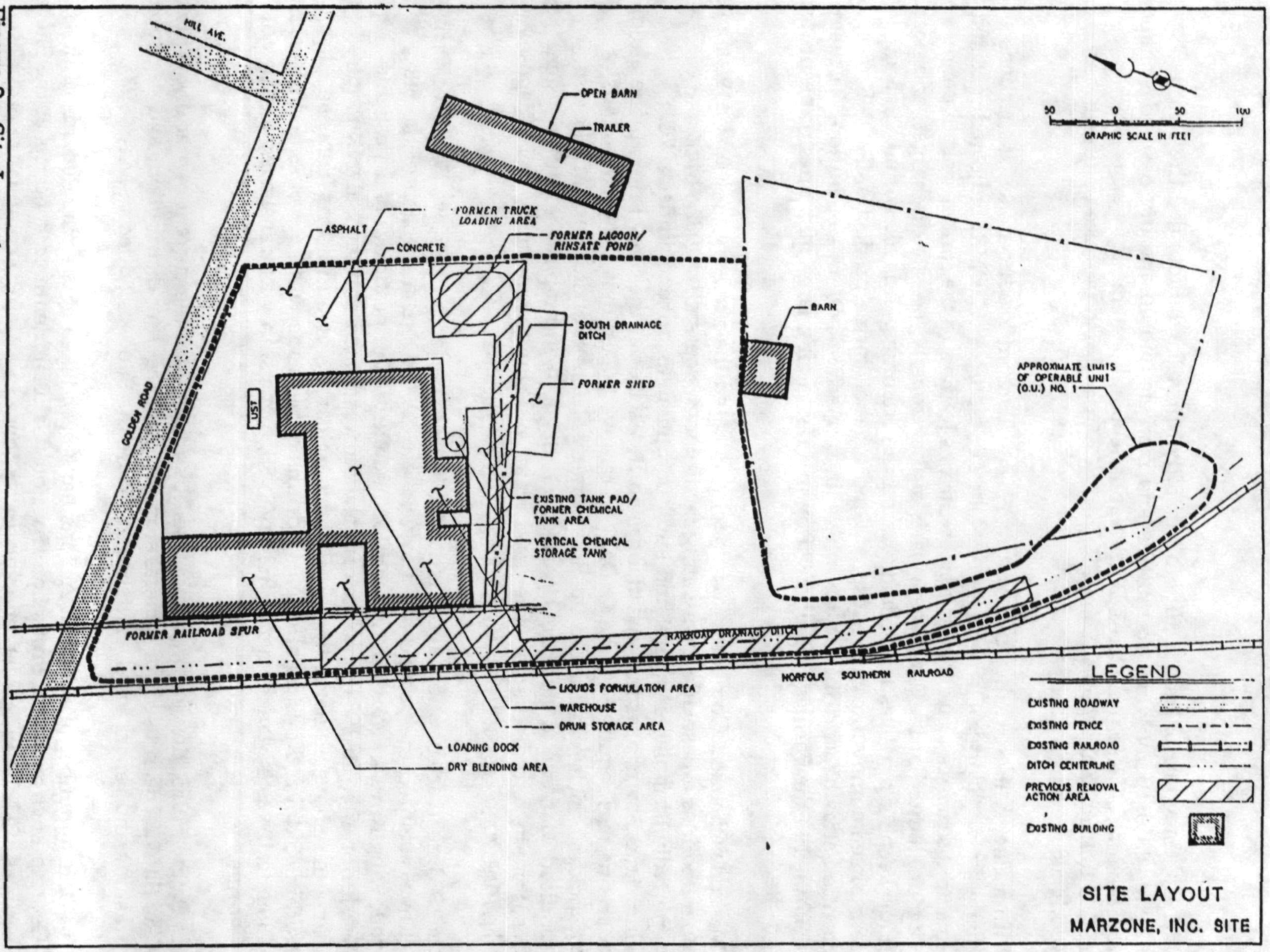


Figure 2 : Site Layout

In 1970, Chevron sold the facility to Mr. Billy Mitchell who founded the Tifton Chemical Company which formulated and marketed liquid and dry pesticides similar to Chevron's. These included DDT, toxaphene, parathion, methyl parathion, malathion, and chlordane; Tifton Chemical Company also produced sulfur-based products.

Tifton Chemicals sold the operation in 1977 to Tifchem Products, Inc. Inspections made by the Georgia Department of Natural Resources (GaDNR) indicated repeated rinsate discharges to unlined drainage ditches leading to the former rinsate pond (lagoon) located at the southeast corner of the property, off-site discharges, and poor housekeeping practices inside and around the buildings. It is likely that Tifchem formulated common organophosphate and organochlorine pesticides. GaDNR records mention atrazine, endrin, and toxaphene in connection with this operation. Tifchem defaulted to the Farmer's Bank of Tifton in 1979 leaving large quantities of pesticides on-site.

Marzone Chemical Company (Marzone) purchased the property in January 1980, and operated it as a pesticide formulating facility until September 1982. Marzone reportedly formulated methyl and ethyl parathion, toxaphene, lindane, DDT, chlordane, Sevin, atrazine, malathion, and heptachlor at the Site. Prior to operation, Marzone was required by the GaDNR to remove the estimated 70,000 pounds of pesticides which remained at the Site from the Tifchem operation. GaDNR also required Marzone to close the rinsate pond (lagoon) and replace it with a system resulting in zero discharge. The pond water and sludge reportedly were disposed at the Pinewood disposal facility in South Carolina.

In 1983, regular commercial operation of the Site ceased when Kova Fertilizer, Inc. (Kova) acquired the property in a foreclosure. A GaDNR inspection of the Site, following Kova's acquisition, identified open drums of pesticides and pesticide wastes on-site. In 1984, a notice of violation was issued and the GaDNR required Kova to remove all hazardous waste, contaminated soil, and debris from the Site within 45 days. Kova manifested 49 drums of pesticide waste for off-site disposal by Chemical Waste Management. In May 1985, ownership was transferred to Kova of Georgia.

In August 1985, the Site was purchased by Milan, Inc., the current owner of the Site. The Site has been used for general storage, plant seedling distribution, and vegetable washing and repackaging. A fence to secure the Site was added in May 1993.

To date a number of Removal Actions have been taken at the Site. Records of the Georgia Environmental Protection Division (GaEPD) identified concerns at the Site as early as 1973. In 1979, Marzone, Inc. in response to a GaEPD compliance order, removed waste from the rinsate pond. Marzone reported that they removed 35 tons of sludge from the rinsate pond area. The rinsate pond was filled with compacted topsoil and clay. Analyses of the sludge samples identified atrazene, lead, and arsenic. An additional 5 tons of pesticide wastes were removed by Kova Fertilizer, Inc., under GaEPD's direction in March 1984. In September 1984, the EPA conducted an investigation at the Marzone Site. Analyses of soil and water samples collected at the Site, indicated that pesticides, including endurin, heptachlor, DDT, chlordane, toxaphene, atrazene, methyl and ethyl parathion, lindane, DDD, and malathion were still present in the soil and/or groundwater. In October 1984, based on the results of the investigation, EPA initiated response actions at the Marzone Site. Approximately 1,700 tons of waste were reportedly removed from the Site and disposed of at a permitted hazardous waste landfill. In May 1985, Chevron contracted with OH Materials Co. for an additional removal of contaminated materials from the rinsate pond and drainage ditches. Approximately 2,200 tons of material was removed during this action. These removal actions were conducted to abate substantial threats to human health and the environment. Residual risk of a lesser degree remained at the Site subsequent to the emergency removal actions.

The Marzone, Inc./Chevron Chemical Company Site was proposed for the National Priorities List (NPL) in June 1988, and became final in August, 1989. In September 1990, Kova Fertilizer, Inc., Kova of Georgia, Chevron Chemical Company, and Billy G. Mitchell, signed an Administrative Order by Consent (AOC) with EPA for the Site. The AOC directed the PRPs to develop and implement a Remedial Investigation/ Feasibility Study (RI/FS) which identified the nature and extent of contamination and proposed remedial action for the Site. The RI report presents the methods, results, and conclusions of the investigation. The FS report includes development, screening, detailed analysis, conclusions and recommendations for the Remedial Action Alternatives.

3.0 HIGHLIGHTS OF COMMUNITY PARTICIPATION

On June 24, 1991 an availability session was held in the Tifton Neighborhood Services Center, on Golden Road to inform the community of the start of field work for the Remedial Investigation. At that time community interviews were conducted and a repository was set up at the Tifton and Tift County Libraries in Tifton, Georgia. A second availability session took place on January 20, 1994 in the Neighborhood Services Center to inform the public of the results of the Remedial Investigation and the proposed alternatives for remediation.

On April 7, 1994 a third availability session was held to better define the remedial alternatives presented in the Feasibility Study. In addition, on January 5, 1994, EPA held a public meeting in the Tifton Library to announce that Tifton/Tift County, Georgia was selected as Region IV's focus for the Environmental Justice initiative. At that time a summary of the activities at the Marzone Site was presented.

The public comment period on the proposed plan was from July 15, 1994 through September 14, 1994. A public meeting was held on July 26, 1994 where representatives from 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 Tifton and Tift County Libraries 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 Tifton Gazette on July 11, and July 18, 1994. Responses to the significant comments received during the public comment period and at the public meeting are included in the Responsiveness Summary, which is part of this ROD in Appendix A.

4.0 SCOPE AND ROLE OF OPERABLE UNITS

EPA has organized the work at this Site into the following two phases or operable units (OUs). These units are as follows:

OU #1: Contamination on 1.68-acre former Marzone pesticide formulating area, part of the Slack property, and railroad drainage ditch past the southwest corner of the horse pasture, and contaminated groundwater underlying OU1 of the Site.

OU #2: Remaining soil sediment and surface water contamination-- including, but not limited to, contamination in Gum Creek. The Site was broken into operable units when contamination was discovered at Gum Creek and at the Golden Seed removal Site.

The Site was separated into operable units to expedite the cleanup of the major sources of contamination. The 1.68 acre formulating area is the main source of contamination from the Site. This contamination has spread, mostly through surface water runoff, to other nearby area including the drainage ditches and Gum Creek. Additional studies are necessary for OU2 to determine the extend of contamination in Gum Creek. Currently, sufficient information is available only to select a remedy for OU1. The OU2 studies will take some time to complete and a separate ROD will be issued for the remediation of OU2.

5.0 SUMMARY OF SITE CHARACTERISTICS

5.1 General Site Conditions

Tift County consists of uplands, river terraces and floodplains with moderately wide interstream divides separating relatively broad valleys. The surface expression of the divides is generally level, very gently sloping or undulating, while the valley walls have modest slopes and nearly level valley floors. Tift County experiences a humid temperature climate. Winters tend to be short and mild, while the summer season is typically long and hot, occasionally tempered by Gulf and Atlantic winds. The average annual precipitation is reported to be approximately 48 inches; with the greatest sustained rainfall occurring during winter months when evapotranspiration is lowest. The area's winter temperature average 52 degrees Fahrenheit (F) , while summer temperatures average 80 degrees Fahrenheit. The Site is situated within the drainage basin of the southeast-flowing Alapaha River. Local drainage is accomplished by overland flow to Gum Creek which discharges to TyTy Creek, a tributary of the Alapaha. Drainage patterns exhibit dendritic drainage.

5.1.1 Geology/Soil

Tift County is located in the Coastal Plain Physiographic Province of south Georgia, which is composed of a wedge of clastic and carbonate sediments ranging in age from Jurassic/Cretaceous to recent. The sediments represent both nonmarine (land-derived) and marine (oceanic and/or estuarine) sources. The uppermost geologic unit occurring in the Site area is the Miocene age Hawthorne Group which has two major facies: a nonmarine composed of the Coosawhatchiue Formation, the Marks Head Formation and the Parachuchla Formation, and a marginal marine/nonmarine facies composed of the Altamaha Formation. The Hawthorne Group occurs at ground surface in the Site area and extends in some areas to an approximate depth of 300 feet below grade because of depositional features such as the Gulf Trough. The Hawthorne is composed of interbedded clay and clay with limestone, with minor beds of sand, sandy clay, sand-silt and clay, and limestone. The Hawthorne Group is a confining unit in the Site area, overlying a major water producing source at greater depth.

The Hawthorne Group is underlain by the Oligocene Suwannee Formation. In the Site area the Suwannee occurs at a depth of 300 feet below grade or more. It is composed of monolithic limestone, which is locally cavernous. The Suwannee represents the Floridan Aquifer System in this area of Georgia and is a significant source of potable water supplies in the Site area.

Site area geologic units are depicted on Figure 3, a cross section drawn throughout the alignment of three municipal water supply wells illustrated on Figure 4.

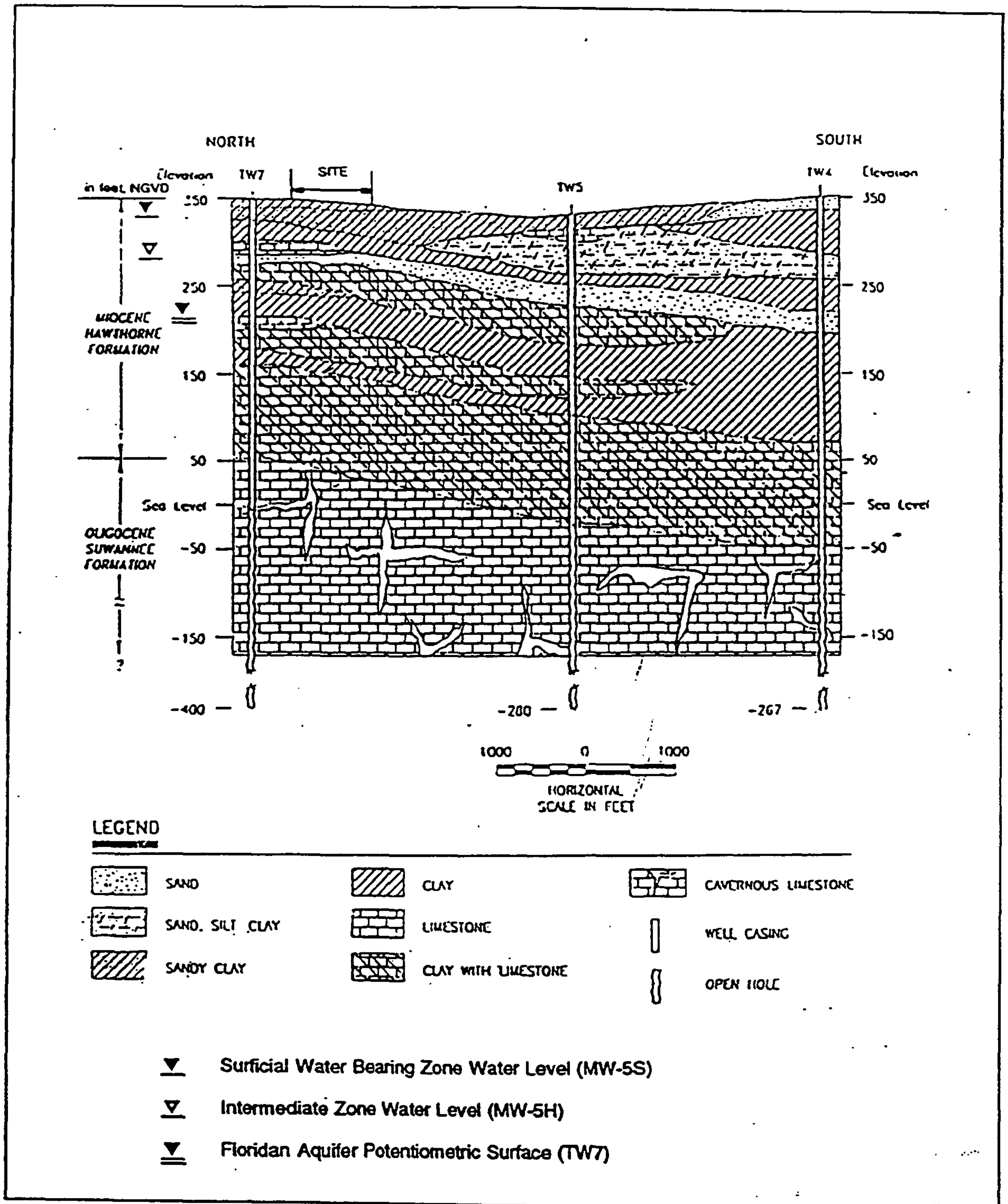


Figure 3 : Site Geology

This cross section illustrates the predominantly clayey nature of the Hawthorne Group as it underlies the Marzone Site. A low-permeability sandy clay overlays a thin sand bed extrapolated to extend through the cross section between the widely spaced wells. The thin sand bed is located more than 50 feet below grade and is the only apparently continuous potentially water-bearing zone within the Hawthorne underlying the Site. All of the remaining Hawthorne strata are interpreted to be fine-grained, low-permeability materials. This was confirmed in the borings conducted during the Remedial Investigation (RI). Immediately underlying the Hawthorne Group is the Suwannee Formation's limestone. It is characterized as a relatively soft, cavernous carbonate rock.

5.1.2 Hydrology

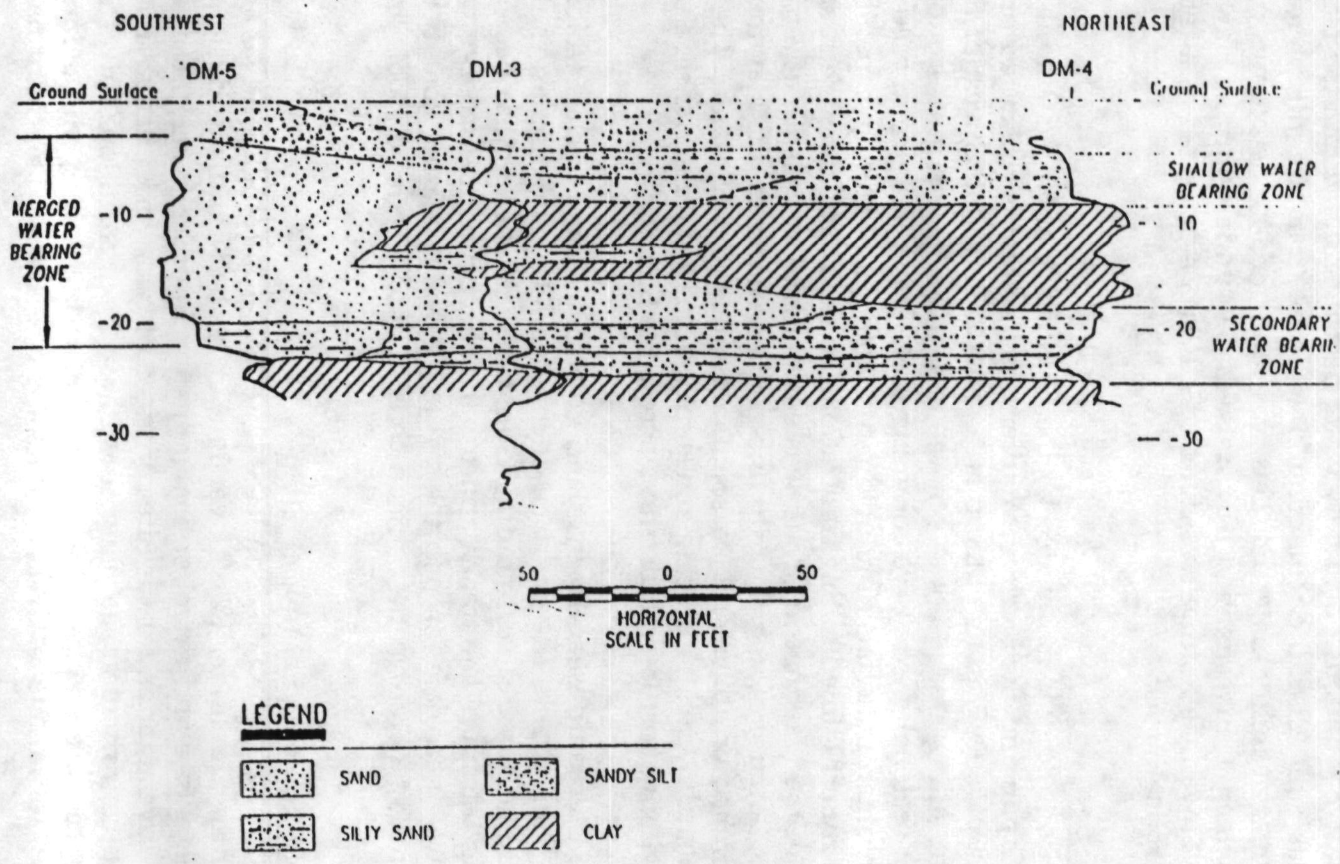
Regional hydrogeology is dominated by the Floridan Aquifer System made up of the Hawthorne Group and the Floridan Aquifer. The system is recharged principally by rainfall and stream flow in its outcrop area some 25 miles northwest of the Site. The Site and surrounding area is not a recharge area. The Hawthorne Group is a 300-foot-thick regionally extensive confining unit. It is chiefly composed of clays and similar fine-grained materials of limited permeability and storage capability. These soil promote runoff while limiting infiltration. In the study area, the first water-bearing unit in the Hawthorne Group was encountered at a depth of 3 to 6 feet below grade. Because of its primarily fine-grained character, the Hawthorne contains numerous perched or ephemeral (seasonal) accumulations of water. The Hawthorne's shallow water-bearing zones may occur separately, merge or pinch out completely within short lateral distances across the Site.

Site drainage is accomplished by overland flow to drainage ditches which directs flow toward Gum Creek. The drainage ditches from the Site discharges through a culvert into a marshy area surrounding Gum Creek. Trenching has been done by the railroad along the spur. The trench appears to collect culvert discharge water which would otherwise percolate through the soil to the water-bearing zone below. Gum Creek is primarily a wet-weather stream consisting of a series of pools and small riffle areas.

5.2 Results of Site Remedial Investigation

The PRPs of the Marzone Site completed a Remedial Investigation (RI) and Feasibility Study (FS) of the Site under EPA's oversight in 1994. The RI was designed to determine the nature and extent of contamination in order to select a cleanup remedy. The investigation for the Site consisted of two work phases: Phase 1—a field screening and confirmation sampling, and Phase 2—an additional investigation phase. The screening included the collection of groundwater, soil, sediment, surface water samples for on-site analysis, and a soil gas analysis. The confirmation stage

Figure 4 : Site Hydrology



scope of work included the installation of monitoring well pairs and the collection of soil, groundwater, sediment, and surface water samples.

During the Phase 1 field investigation, samples were also collected and analyzed for a variety of physical, geochemical, and microbiological data. After EPA's review of the Phase 1 RI Report (March 1992), Phase 2 field sampling was conducted beginning in September 1992. This phase of work focused on the southern drainage ditch and Gum Creek areas downgradient of the Site. Additional upgradient and background data were also collected. The additional tasks performed included monitor well installation and soil, sediment, surface water and groundwater sampling, and analysis. A total of 15 monitor wells (12 in July 1991 and 3 in September 1992) were installed on and adjacent to the Site for groundwater characterization. Soil samples were collected from 15 soil boring and from 8 monitor well locations. Drainage ditch sediment samples were collected from 20 locations to assess the impact of runoff from the Site toward Gum Creek. Seven surface water and ten sediment samples were collected from Gum Creek to assess the nature and extent of contaminants in the creek and marsh area.

The most common chemicals identified in the soil were toxaphene, DDX and BHC isomers. These are pesticide associated chemicals that were detected in more than 50 percent of the samples collected. Toxaphene had the highest concentration in OU1 at 2,300 mg/kg. DDT was detected at a maximum concentration of 1,300 mg/kg. Other common chemicals include xylenes, parathions, and atrazine. These were among the most commonly formulated pesticides or carriers used at the Site. The areas of highest concentrations in the soil and sediments were the liquid formulation area, the south drainage ditch, the "Slack" property south of the formulating area (vicinity of the former planing mill), and the Golden Seed property. These contaminated soil are near the former and current potential source areas and their surface water drainage pathways (Figure 5).

The most prevalent chemicals in groundwater are BHC isomers, xylenes, DDX, and atrazine. Xylenes had the highest concentrations at 94 mg/l. The areas of highest organic concentrations in groundwater are near the railroad loading dock and the "Slack" property south of the formulating area near the planing mill. The contaminants identified in the wells generally correspond to a nearby current/past source or areas of high contaminant concentrations in soil.

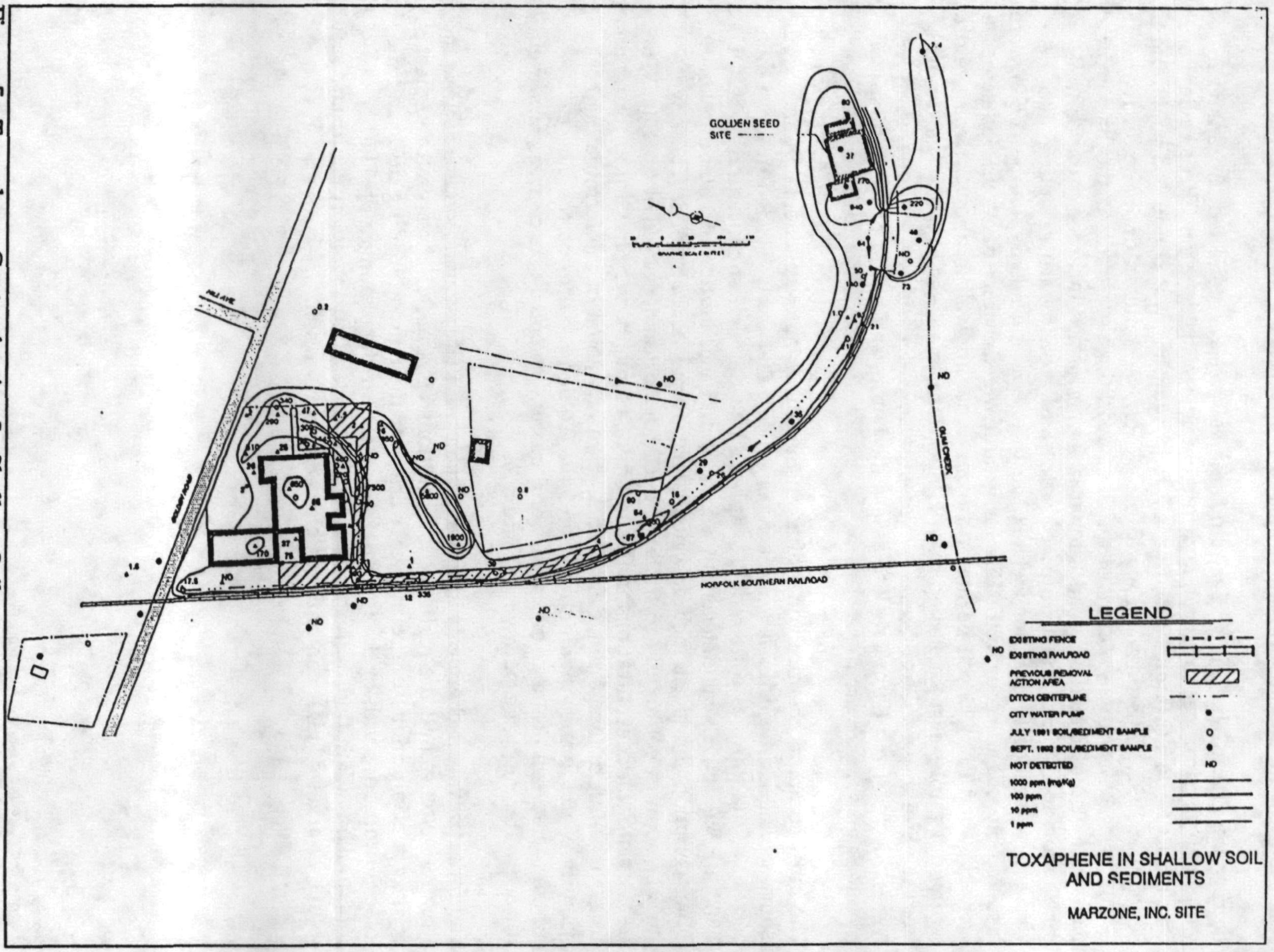


Figure 5 : Toxaphene Contamination In Shallow Soil

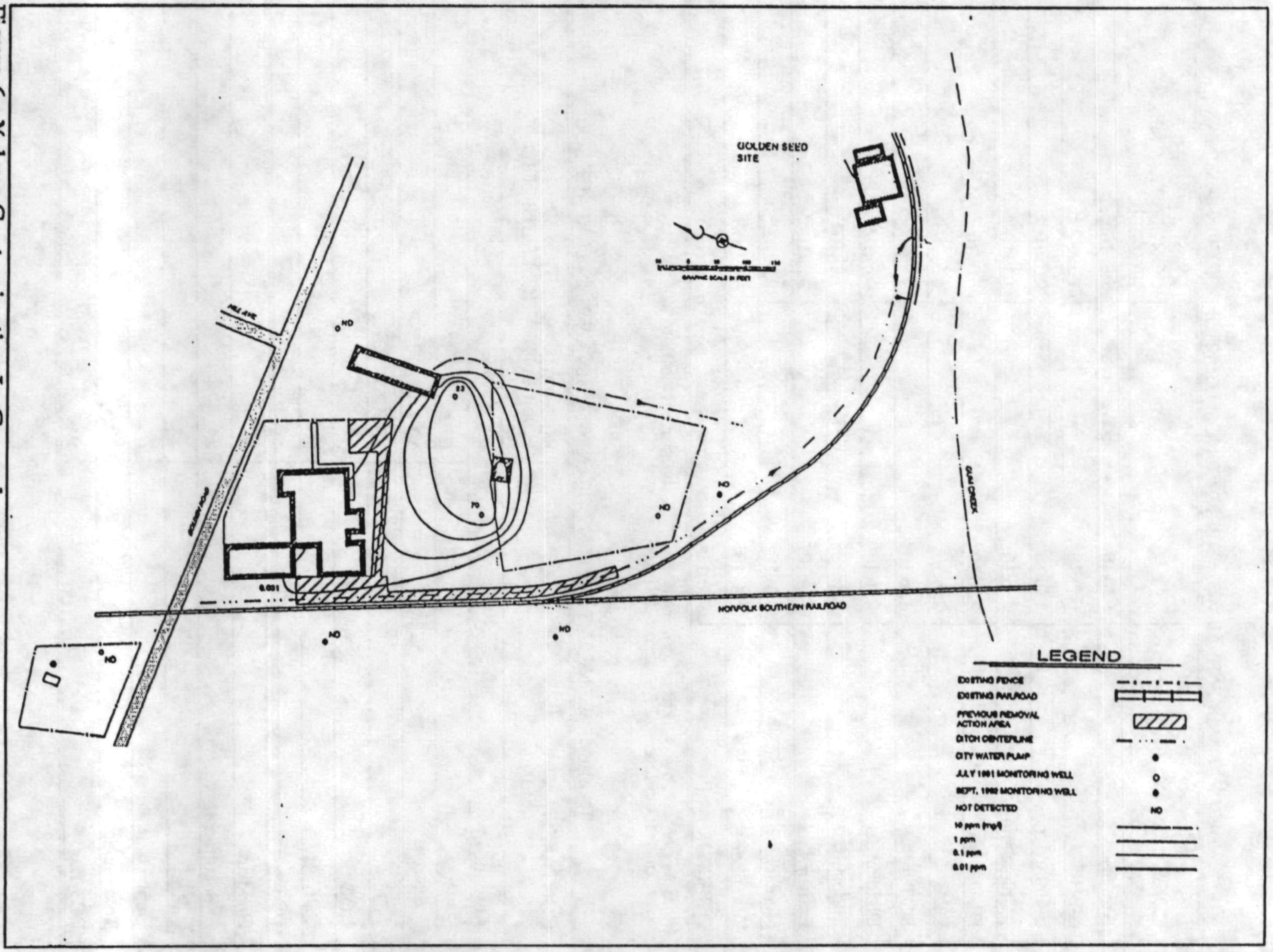


Figure 6 : Xylene Contamination In Groundwater

TABLE 1: AMBIENT ATMOSPHERIC CONCENTRATION OF CONTAMINANTS

CONTAMINANT	C_i [1]	AMBIENT AIR[2] CONCENTRATION (mg/m^3)
Atrazine	$8.3x10^{-5}$	$1.9x10^{-13}$
α-BHC	$5.2x10^{-7}$	$1.2x10^{-15}$
α-Chlordane	$1.0x10^{-5}$	$2.3x10^{-14}$
γ-Chlordane	$4.9x10^{-6}$	$1.1x10^{-14}$
DDD	$2.6x10^{-4}$	$6.0x10^{-13}$
DDE	$2.0x10^{-5}$	$4.6x10^{-14}$
DDT	$1.3x10^{-3}$	$3.0x10^{-12}$
Dieldrin	$2.0x10^{-6}$	$4.6x10^{-15}$
Endosulfan II	$4.8x10^{-5}$	$1.1x10^{-13}$
Endrin	$1.3x10^{-5}$	$3.0x10^{-14}$
Heptachlor Epoxide	$9.0x10^{-7}$	$2.1x10^{-15}$
Toxaphene	$2.3x10^{-3}$	$5.3x10^{-12}$
PCB-1260	$9.7x10^{-7}$	$2.2x10^{-15}$

[1] fraction percent by weight of component "i" in the surface soil
[2] based on particulate soil-to-air modeling

TABLE 2: CONCENTRATIONS OF CONTAMINANTS IN SURFACE SOIL

CONTAMINANT	MAXIMUM CONCENTRATION DETECTED (mg/kg)
Atrazine	83
α-BHC	0.52
α-Chlordane	10
γ-Chlordane	4.9
DDD	260
DDE	20
DDT	1,300
Dieldrin	2
Endosulfan II	48
Endrin	13
Heptachlor Epoxide	0.8
Toxaphene	2,300
PCB-1260	0.97

TABLE 3: CONCENTRATIONS OF CONTAMINANTS IN SEDIMENTS

CONTAMINANT	MAXIMUM CONCENTRATION DETECTED (mg/kg)
α-Chlordane	12
γ-Chlordane	14
DDD	32
DDT	17
Dieldrin	2.4
Endosulfan I	3.4
Endosulfan II	2.0
Endrin	7.3
Heptachlor	19
Heptachlor Epoxide	2.7
Lindane	2.7
Toxaphene	540
Copper	938
Zinc	3050

TABLE 4: CONCENTRATIONS OF CONTAMINANTS IN GROUNDWATER

CONTAMINANT	MAXIMUM CONCENTRATION DETECTED (mg/L)
Benzene	60
α-BHC	60.3
β-BHC	98.5
δ-BHC	23.8
DDD	7.6
DDT	9.3
Endrin	5.8
Ethylbenzene	6100
Lindane	54.6
Methyl Parathion	47.0
Xylene	94000
Arsenic	59.5
Chromium	180
Lead	34.4
Zinc	6390

Three potential routes of chemical migration were identified at OU1 of the Site. These routes are:

1. Surface transport via surface water and sediment runoff from OU1 of the Site,
2. Vertical transport through the soil by desorption of chemicals bound to the surface soil and percolation of chemically enriched water through the soil column, and
3. Vertical and horizontal transport through the groundwater matrix.

5.2.1 Soil Migration

Migration of pesticides is primarily limited to surface migration via storm water runoff. The railroad drainage ditch sediments were found during the RI to contain elevated levels of chemicals associated with pesticides. Storm water runoff which carries the contaminated fine soil particles apparently has deposited these particles into the drainage ditch. The drainage ditch slopes from the formulating area toward Gum Creek, flattening as it approaches the creek (Figure 5). Sediment deposition apparently has occurred in flat areas as the periodic ponding of the water has allowed sediment particles to settle. In general, pesticide concentrations decrease along the ditch away from the Site. However, the concentrations increase near the Golden Seed property.

5.2.2 Groundwater Migration

Former source areas have contributed to the contamination in groundwater. The data indicate toxaphene and DDT as the main soil contaminants. The chemical characteristics of toxaphene and DDT indicate that these chemicals have limited vertical mobility in soil. Contaminants found in the groundwater, for example: parathion, lindane, and atrazine, are more mobile and have therefore, percolated into the shallow groundwater. DDT was detected in only one shallow well, indicating that little vertical migration of DDT into groundwater has occurred. Toxaphene was not present in the groundwater, indicating that migration of toxaphene is sufficiently retarded by sorption to soil and that groundwater has not been impacted. Computations of both toxaphene and DDT migration was calculated; the total horizontal distance traveled in the aquifer is less than 1 foot. However, other chemicals, including xylenes, ethylbenzene, BHC isomers, and methyl parathion were detected in groundwater (Figure 6).

6.0 SUMMARY OF SITE RISKS

CERCLA directs EPA to conduct a baseline risk assessment to determine whether a Superfund Site poses a current or potential 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 soil and groundwater pose a potential risk.

The major risk currently associated with OU1 of the Marzone Site is the ingestion and dermal contact of contaminated soil. In addition, there is a risk posed from the ingestion of the contaminated groundwater underlying the Site. Actual or threatened releases of hazardous substances from this Site, if not addressed by implementing the response action selected in this ROD, may present an imminent and substantial endangerment to public health, welfare, or the environment.

6.1 Chemicals of Concern

The majority of the wastes and residues generated by production operations at the facility have been managed, treated, and disposed of on-site 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: chemical concentrations below background concentrations; measurements below quantification limits; a combination of low toxicity and low concentration or low persistence and low concentration and low frequency of detection.

See tables 1 through 4 for contaminants of concern identified at the Marzone Site OU1.

6.2 Human Health Risk

This Baseline Risk Assessment (BRA) characterized potential current and future risks to human health and the environment from exposure to chemicals found at the Site. The BRA reviewed several potential exposure scenarios for the Site: current industrial or site visitor scenarios, and future hypothetical residential scenario. The BRA showed that under current scenarios, the exposure pathway that exceeded EPA's acceptable cancer risk range of 1×10^{-4} to 1×10^{-6} and/or an acceptable Hazard Index of 1.0 was direct contact with surface soil (i.e., incidental ingestion, dermal contact) for the site visitor and on-site worker. Under the future residential scenario, ingestion of groundwater and direct contact with surface soil were the exposure pathways exceeding this risk range. Hence, based on the results of the BRA, the media of concern for remedial action are surface soil and groundwater. In addition, the subsurface soil is a media of concern because of potential cross-media chemical transport from subsurface soil to groundwater. Surface sediment is not a media of concern at the Site because even the most conservative risk estimates generated in the BRA showed that exposure to chemicals in surface sediment resulted in excess cancer risks well within EPA's acceptable risk range. The BRA showed that assuming industrial use of the Site resulted in the highest estimated carcinogenic risks under current land use conditions. For noncarcinogenic risks the site visitor scenario yielded the highest risk. This is due to the differences in the exposure duration values used in the exposure assessment calculation. Estimated carcinogenic risks for workers exceeded 1×10^{-4} only for surface soil pathways (i.e., incidental ingestion and dermal contact). Surface soil is defined as the top 1 foot of soil. The chemical contributing the most to estimated risks from exposure to chemicals in surface soil was toxaphene (estimated risks were about one order of magnitude greater than for any other chemical).

Under a future residential scenario, the only exposure pathways that resulted in estimated excess cancer risks exceeding 1×10^{-4} were ingestion of and dermal contact with surface soil and hypothetical ingestion of groundwater. For noncarcinogenic endpoints, these pathways resulted in hazard indices greater than 10. As with the industrial scenario, the most important contributor to estimated cancer risks from surface soil was toxaphene. For noncarcinogenic endpoints, the most important contributor to estimated risks from surface soil was DDT. For groundwater, site-related chemicals contributing the most to estimated cancer risks were the α-, ß-, and γ-BHC isomers, while for noncarcinogenic endpoints, the site-related chemicals contributing the most to estimated risks were γ-BHC and methyl parathion.

6.3 Summary of Exposure Assumptions

The Baseline Risk Assessment utilized the following exposure assumptions for the pathways identified at the Site.

Current Worker - The BRA assumed an on-site worker with 8 hours of exposure a day, at 250 days per year, for 25 years. It assumed a 70 kg. adult that would incidentally ingest 50 mg of soil per day. Skin on hands and forearms were also assumed to be exposed to on-site soil.

Current Visitor - The BRA assumed a 9-18 year old visitor with an average body weight of 50 kg. who is exposed 80 times per years for 4 hours per visit for 10 years. Incidental ingestion was assumed to be 100 mg of soil for each visit to the Site. The skin on the head, hands, forearm, and lower legs, were assumed to be exposed to on-site soil. The exposure dose from sediment was assumed to be one-tenth of soil exposure.

Future Resident - A 70 kg. adult was assumed for an on-site resident for 350 days per year for 24 years. Also a 15 kg. child resident was assumed to be exposed for 350 days per year for 6 years. The adult and child were assumed to ingest 100 mg. and 200 mg., respectively, of on-site soil per day of exposure.

The skin of the head, hands, forearms, and lower legs of the child and adult future residents were assumed to be exposed to on-site soil. The adult and child assumed to be ingest 2 liters of and 1 liter of water per day, respectively, for the exposure frequency and duration stated above. A resident was also assumed to shower daily with Site groundwater. The exposure to sediment was assumed to be one-tenth that of soil exposure.

6.4 Summary of Toxicity Values

The following is a summary of the carcinogenic and noncarcinogenic toxicity values for contaminants of concern at Marzone OU1.

TABLE 5: CARCINOGENIC TOXICITY VALUE FOR CONTAMINANTS OF CONCERN

CONTAMINANT	SLOPE FACTOR INHALATION $(mg/kg\text{-}day)^{-1}$	INGESTION SLOPE FACTOR $(mg/kg\text{-}day)^{-1}$	DERMAL SLOPE FACTOR, $(mg/kg\text{-}day)^{-1}$
Atrazine	NA	$2.22x10^{-1}$	$4.44x10^{-1}$
Arsenic	15.1	1.75	8.75
Benzene	$2.91x10^{-2}$	$2.9x10^{-2}$	$3.6x10^{-2}$
α-BHC	6.3	6.3	12.6
β-BHC	1.8	1.8	3.6
α-Chlordane	1.3	1.3	2.6
γ-Chlordane	1.3	1.3	2.6
Chromium (VI)	$4.2x10^{+1}$	NA	NA
DDD	$3.4x10^{-1}$	$2.4x10^{-1}$	$4.8x10^{-1}$
DDE	$3.4x10^{-1}$	$3.4x10^{-1}$	$6.8x10^{-1}$
DDT	$3.4x10^{-1}$	$3.4x10^{-1}$	$6.8x10^{-1}$
Dieldrin	16	16	32
Heptachlor Epoxide	9.1	9.1	18.9
Heptachlor	4.55	4.5	9.0
Lindane	NA	1.3	2.6
PCB-1260	NA	7.7	15.4
Toxaphene	1.12	1.1	2.2

NA = Not Available

TABLE 6: NONCARCINOGENIC TOXICITY VALUES FOR CONTAMINANTS OF CONCERN

CONTAMINANT	INHALATION RfD (mg/kg-day)	INGESTION RfD (mg/kg-day)	DERMAL RfD (mg/kg-day)
Atrazine	NA	0.005	0.0025
Arsenic	NA	0.003	0.00006
α-Chlordane	NA	6.0×10^{-5}	3.0×10^{-5}
γ-Chlordane	NA	6.0×10^{-5}	3.0×10^{-5}
Chromium (VI)	5.71×10^{-7}	0.005	0.001
Copper	NA	0.037	0.0074
DDD	NA	5.0×10^{-4}	NA
DDE	NA	5.0×10^{-4}	NA
DDT	NA	5.0×10^{-4}	0.00025
Dieldrin	NA	5.0×10^{-5}	2.5×10^{-5}
Endosulfan I	NA	5.0×10^{-5}	2.5×10^{-5}
Endosulfan II	NA	5.0×10^{-5}	2.5×10^{-5}
Endrin	NA	0.0003	0.00015
Ethylbenzene	0.286	0.1	0.08
Heptachlor Epoxide	NA	1.3×10^{-5}	6.50×10^{-6}
Heptachlor	NA	5.00×10^{-4}	2.50×10^{-4}
Lindane	NA	3.00×10^{-4}	1.5×10^{-4}
Methyl Parathion	NA	2.5×10^{-4}	1.25×10^{-4}
Xylene (mixed)	NA	$2.00 \times 10^{+0}$	1.6
Zinc	NA	3.00×10^{-1}	0.06

NA = Not Available
RfD = Reference Dose

6.5 Risk Characterization/Management

EPA considers individual excess cancer risks in the range of 1×10^{-4} to 1×10^{-6} as protective; however the 1×10^{-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 1×10^{-6} expresses EPA's preference for remedial actions that result in risks at the more protective end of the risk range.

Potential concern for noncarcinogenic effects of a single contaminant in a single medium is expressed as the hazard quotient (HQ) (or the ratio of the estimated intake derived from the contaminant concentration in a given medium to the 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.

6.6 Environmental Risks

OU1 of the Marzone Site consists of the major source areas near the main formulating area. Although these source areas are upgradient from Gum Creek, all sediments in OU1 were below levels of concern. Remediation necessary for Gum Creek will be covered under OU2 of the Site. Any environmental risk issues related to Gum Creek will be addressed in a subsequent ROD.

6.7 Cleanup Levels

Cleanup levels were established to ensure that any persons exposed in the future will not be exposed to unsafe levels of site-related chemicals. Cleanup levels are either the Federal Maximum Contaminant Limit (MCL) or the risked-based concentration. EPA is requiring that groundwater be cleaned to a $1x10^{-6}$ risk level and soil be cleaned to a $1x10^{-6}$ or $1x10^{-5}$ risk level for cancer-causing contaminants. A $1x10^{-5}$ cleanup will be required if the bioremediation option is selected and $1x10^{-6}$ will be required for all other alternatives. Both will be cleaned to an HQ of 1 for noncarcinogens. These levels are consistent with EPA requirements for determining cleanup levels within the $1x10^{-4}$ to $1x10^{-6}$ range and are protective of human health and the environment in a residential setting. EPA determines the amount of cleanup necessary at a site by establishing health-based cleanup levels when Federal or state standards have not been set for contaminants in soil or for some groundwater contaminants. To determine these levels, EPA quantifies risk posed by cancer causing contaminants and those known to cause other health effects. This risk range of $1x10^{-4}$ to $1x10^{-6}$ means that exposure to site-specific contaminants as defined in the risk assessment would result in an estimated increase individual chance of developing cancer by one in 10,000 to one in 1,000,000. For non-cancer causing risks, EPA compares the highest dose known to be safe (or not to cause harmful effects) to the estimated dose from exposure to levels found at the Site to determine the cleanup level.

Using MULTIMED, soil cleanup levels were calculated for each contaminant of concern for distances ranging from 0 to 25 meters from the source area. A comparison of results indicated that a distance of 10 meters downgradient from the source allowed attenuation and degradation of the contaminants and resulted in cleanup levels that are protective of ground water. The cleanup levels obtained are feasible to implement. An exception to the 10 meter guideline was made for atrazine. At 10 meters, the soil action level (SAL) for atrazine was below the detection limit. It was appropriate to generate a cleanup goal 25 meters from the source area. The cleanup goal remains protective of ground water and is feasible to implement.

The SALs calculated using MULTIMED for several of the contaminants were extremely high, much higher than any concentration observed on-site. At a 10 meter distance from the source, the SALs generated were:

Constituent	SAL (mg/kg)
α-BHC	1.26×10^{6}
β-BHC	6.16×10^{8}
DDT	3.48×10^{16}
toxaphene	1.59×10^{15}

The values generated indicate that the concentrations present at the Site do not pose a risk for these contaminants to leach from soil to ground water and are therefore protective of ground water. Rather than assigning these high cleanup levels to the contaminants, SALs generated to protect human health are the drivers for cleanup.

For MULTIMED model assumptions and input parameters, see Appendix E of the Feasibility Study Report, May 1994. Cleanup levels for subsurface soil were calculated and are represented in Table 7.

Cleanup levels for chemicals of concern for surface soil and groundwater are also shown on Table 7. Although these are not the only Site contaminants, EPA selected these as chemicals of concern because of their toxicity, mobility, frequency of detection, and the concentrations found on Site. Cleanup levels will be reached for all contaminants of concern if met for these.

TABLE 7: CLEANUP LEVELS FOR CHEMICALS OF CONCERN

CONSTITUENT	SURFACE SOIL[b] (ppm) HI=1 1x10^{-5}	1x10^{-6}	SUB-SURFACE SOIL[c] (ppm)	GROUND WATER (ppm)
Atrazine	35.3	3.5	0.150	
α-BHC	NA	0.12	1.142	0.00003
β-BHC			0.547	0.0001
DDD	32.4	3.2		0.00077
DDE	NA	2.28		
DDT	22.9	2.29		0.00054
Dieldrin	0.49	0.049		
Endosulfan II	2.6	2.6		
Ethylbenzene			57.3	0.7[d]
Heptachlor Epoxide	NA	0.085		
Lindane			0.463	0.0002[d]
Methyl Parathion			4.55	0.0039
Toxaphene	7.1	0.7		
Xylene			213	10[d]

a Blank spaces indicate no cleanup level set because the chemical is not a COC for the medium.

b Surface soil cleanup levels are based on future residential land use. Cleanup levels are based on a cancer risk of 1x10^{-6}, 1x10^{-5} or a hazard index of 1.0. Surface soil refers to the top foot of soil.

c Subsurface soil cleanup levels were calculated using the MULTIMED model.

d groundwater cleanup level based on MCL or safe drinking water level.

7.0 DESCRIPTION OF ALTERNATIVES

Nine alternatives are presented in this Record of Decision (ROD) for the remediation of contaminated groundwater and soil in OU1. These alternatives are discussed in detail in the final Feasibility Study (FS) and caveat dated July 11, 1994.

TABLE 8: SUMMARY OF CLEANUP ALTERNATIVES

Alternative No. 1	For Groundwater	No action for Groundwater
Alternative No. 2		Institutional Controls for Groundwater
Alternative No. 3		Groundwater extraction and carbon adsorption and combinations of the above
Alternative No. 4	For Surface and Subsurface Soil	No Action for Soil
Alternative No. 5		Institutional Action for Soil
Alternative No. 6		Excavation and landfill disposal
Alternative No. 7		Bioremediation by land farming/composting
Alternative No. 8		Low temperature thermal desorption and combinations of the above
Alternative No. 9		Chemical Oxidation

GROUNDWATER

7.1 ALTERNATIVE NO. 1 - No Action for Groundwater

The no action alternative for groundwater provides a baseline for comparing other alternatives. Under this alternative, no further action would be taken at OU1 of the Site to remove or control groundwater contamination. OU1 of the Site would be monitored using existing wells to determine if any migration occurred. This alternative relies on the natural process of dispersion, attenuation, and degradation for reduction of pesticide concentrations.

Although no remedial action is to be taken for the no action alternative, groundwater samples must be collected semiannually. No drilling cost would be expended, since four selected existing monitoring wells would be used to collect the groundwater samples. O&M costs include collecting samples, laboratory analysis, and the an assessment every 5 years. The present worth cost of the no action alternative is $425,000. See table 10 for cost comparison.

7.2 ALTERNATIVE NO. 2 - Institutional Controls and Monitoring for Groundwater

This alternative includes the implementation of institutional controls and the initiation of a long-term groundwater monitoring program. This alternative relies on natural degradation to provide the reduction in pesticide concentrations. Institutional controls will ensure that the shallow groundwater zone will not be used in the future, thereby maintaining the current lack of exposure to, and risks from, chemicals in groundwater.

The institutional controls to restrict access to contaminated groundwater may include deed restrictions for OU1 of the Site. They could include but not be limited to zoning ordinances that prohibit use of groundwater in these areas. In addition, the alternative would include the construction of a security fence to ensure restricted access to the Site.

This alternative also includes a long-term monitoring program to monitor pesticide constituents in the groundwater beneath and downgradient of the Site. Approximately two additional wells will be constructed to act as groundwater monitoring locations downgradient from the Site. The groundwater monitoring program consists of sampling the new wells and four existing wells semiannually for a period of 5 years. If after the period of 5 years data indicate stable or non-detect pesticide concentrations, the monitoring schedule will be changed to a yearly event.

Although no active remediation is to be undertaken during the institutional controls and monitoring alternative, the Site must be secured and groundwater samples collected semiannually. Capital costs include labor/expenses for obtaining a deed restriction, site fencing, and installation of approximately two wells. O&M costs consist of collecting samples, laboratory analysis, and assessment every 5 years. The present worth cost of the institutional controls and monitoring alternative is $775,000. See table 10 for cost comparison.

7.3 ALTERNATIVE NO. 3 - Groundwater Pump and Treat

This alternative consists of extracting the contaminated groundwater in the surficial aquifer within OU1 and treating it on-site through a filtration system and enhancement through the use of an infiltration gallery. The used carbon filters would be taken off-site for recharge and reuse of off-site disposal to an approved incinerator. Approximately 2 groundwater recovery wells would be installed in the area of the loading dock with possibly another 2 installed in the area of the rinsate pond. The contaminated water would be pumped to an on-site water treatment system, treated and passed through an infiltration gallery to enhance the movement of contaminants through the aquifer. This alternative would also includes fencing to prevent Site access to the public and periodic groundwater monitoring to track changes in the level and extent of contamination. The major components of this alternative would consist of:

- The implementation of institutional controls described in Alterative No. 2.
- The design and construction of groundwater extraction wells.
- The installation of a security fence around the on-site treatment unit.
- The design and installation of a groundwater filtration system, a on-site treatment system, and a retention and recycling system including an infiltration gallery.
- The start-up and operation of this system.
- Transportation, regeneration, recycling, and disposal of the spent filters.
- Operation of a long-term groundwater monitoring program.

The approximate volume of groundwater requiring remediation is estimated to be 300,000 gallons. Cleanup levels for groundwater are set out in Table 7 based upon the results of the BRA. It is estimated that it will take 7-41 years to reach cleanup levels. The present worth cost of the alternative would be $3.4 million. See table 10 for cost comparison.

SOIL

7.4 ALTERNATIVE NO. 4 - No Action for Soil

The no action alternative for soil provides a baseline for comparing other alternatives. Surface soil would still pose human health risks from direct exposure to the contaminated soil. The subsurface soil contaminant, would pose a threat to groundwater. This alternative will include some periodic monitoring of the soil to determine if changes in extent or concentration occurs.

Since there is no active remediation, no capital costs will be required for this alternative. It will be necessary to sample these soil annually and prepare an assessment every 5 years. O&M costs consist of collecting approximately eight soil samples yearly plus laboratory analysis and reporting. The present worth cost of the no action alternative is $425,000. See Table 10 for cost comparison.

7.5 ALTERNATIVE NO. 5 - Institutional Controls and Monitoring for Soil

This alternative is similar to Alternative No. 4 except that deed restrictions as well as physical barriers would be used to restrict access to the Site. Deed restrictions could include zoning ordinances that prohibit construction on, or use of, the Site during the time that the soil remains contaminated above cleanup levels. Physical barriers would include fencing, warning signs, etc. to prevent access to and use of the Site.

Securing of the Site and deed restriction costs have been included in the capital costs. It will also be necessary to sample these soil annually and prepare an assessment every 5 years, as with Alternative No. 4. Verification of controls will also be required. The present worth cost of this alternative is $675,000. See Table 10 for cost comparison.

7.6 ALTERNATIVE NO. 6 - Excavation and Landfill Disposal

This alternative is for excavation of contaminated soil, off-site disposal at a permitted landfill, and backfill with clean fill. It is estimated that 12,000 cubic yards of soil will be removed to cleanup levels. This alternative also includes the demolition and removal of some Site structures to provide better access to the contaminated soil. It is a viable alternative for contaminated soil that do not contain a listed hazardous waste or exhibit a hazardous waste characteristic. It would need to be coupled with a treatment alternative for soil that exhibit a hazardous waste characteristic or contain a listed hazardous waste.

The cost has been calculated based on the estimated volume for removal, disposal, and replacement of 12,000 cubic yards with no treatment technology required for the soil (all soil are assumed to be nonhazardous). The excavation, stockpiling, loading, and disposal have a capital cost of $3.0 million which also represents the present net worth. This includes the cost for fencing and initial Site clearance/building demolition. See Table 10 for cost comparison.

7.7 ALTERNATIVE NO. 7 - Bioremediation by Land Farming/Composting

This remedial alternative incorporates two separate biological processes operating concurrently: biofarming through crop cultivation, followed by composting. These processes are preceded by preliminary site preparation consisting of removal of existing structures, and identification, removal, and disposal of biocidal pesticide areas by excavation and landfill disposal. Biocidal pesticide areas are those hot spot areas that have concentrations of pesticides above which bioremediation is unsuccessful. This alternative assumes 3,500 cubic yards of biocidal soil will be excavated.

The cropping operation would use local crops (e.g.,peanuts), which have a high lipid content and so will accumulate higher pesticide residues. The harvested peanuts would be composted to enhance further degradation of residual pesticides. Initially, the harvested agricultural materials from OU1 of the Marzone Site would be milled with the crop residue to reduce the particle size for compost processing. The composting operation would be seeded with materials from an existing cellulose compost operation, thus introducing material with an established microbial population. Milled material would be mixed with this established composted material, and any contaminated solid associated with the cropping operation would be added to the mixture. The mixture would be composted in static piles over a manifold of forced aerators, and a leachate collection/recycling system would be installed. Aeration will allow for control of aerobic conditions and will prevent odor problems in the process. Once the compost has matured, it will be re-applied to the cropping area to provide nutrient to the soil, which will enhance the growth of crops and microorganisms. The biofarming/compost cycle will be repeated until pesticide concentrations reach target levels. The cleanup levels for this alternative are based upon a $1x10^{-5}$ risk-based level (Table 7).

In developing this remediation scheme, treatability testing and pilot-scale studies would initially be conducted to assess full-scale application and identify basic operating conditions. These studies would take approximately 1 year to complete.

Based on an assumption of three cropping/composting cycles per year, initial cost plus O&M costs for a 5-year treatment period are estimated at $2.7 million present worth. This estimate includes $1.2 million for removal of biocidal areas and periodic soil sampling to monitor the alternative effectiveness. See Table 10 for cost comparison.

7.8 ALTERNATIVE NO. 8 - Low Temperature Thermal Desorption

On-site low temperature thermal desorption is a relatively recent technology which has gained acceptance as an alterative to incineration. Mobile thermal treatment units have been shown to remove pesticides and other contaminants from soil similar to those at OU1 of the Marzone Site.

The process consists of a heated chamber with temperatures of 700 to 900 degrees Fahrenheit. Approximately 12,000 cubic yards of contaminated soil are excavated from the Site, broken up, preconditioned, and then fed into the chamber in a continuous operation. The pesticide contaminants are driven off the soil by the heat and are captured in the next stage bag house, granular activated carbon (GAC), or other equivalent system. GAC has been the most effective method of capturing the off-gas from pesticide-contaminated soil. The treated, uncontaminated soil is placed back at the Site and the GAC is sent off-site to an authorized incinerator for disposal or for regeneration, if appropriate.

It is estimated that the total capital cost for the low temperature thermal desorption alternative, which is also the present net worth, is $4.8 million. These costs include planning and design fees, as well as mobilization and implementation of the alternative. See Table 10 for cost comparison.

7.9 ALTERNATIVE NO. 9 - Chemical Oxidation

Chemical oxidation is a technology that has its roots in sewage treatment. It has been adapted for the treatment of pesticide contaminated soil, often using chemicals that are in ready supply for the sewage treatment industry. The treatment system comprises a batch process and involves mixing the contaminated soil with sodium hypochlorite and water and stabilizing the mixture with lime. When the batch is proved, by testing, to be below the required level of contaminants, it is landfilled.

The major sequences of this alternative consist of:

1. Excavation of contaminated soil, with loading and transporting to a

permitted Treatment, Storage, or Disposal (TSD) facility.

2. Treatment of the contaminated soil at the TSD facility treatment plant in batches.
3. 200 cubic yards of contaminated soil is placed in a waste holding tank.
4. Sodium hypochlorite in a liquid mixture with water is introduced into the tank and is mixed with the soil to start the oxidation process.
5. Lime is made into a slurry mixture with water in a pugmill and conveyed to the holding tank.
6. The lime slurry and soil are mixed in the holding tank until the reaction is complete.
7. The treated soil is tested by the toxic characteristic leaching procedure (TCLP) and transported to an appropriate landfill, contingent on their Land Disposal Restriction (LDR) status.
8. The batch process is repeated until all the soil have been treated.

The estimated costs, including engineering, testing, supervision, and contingency, are $540 a cubic yard for excavation, chemical oxidation, and landfilling. It is estimated that one-third of the total soil (4,000 cubic yards) will require treatment. The remaining soil will be directly landfilled at $160 per ton. Therefore, the capital and present worth costs would be $4.1 million. There is no annual or maintenance cost. See Table 10 for cost comparison.

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. See Table 13-15 for a list of potential ARARs and TBCs. The NCP categorizes the nine evaluation 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 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 threshold criteria and comply with all ARARs or be granted a waiver for compliance with ARARs. Any alternative that does not satisfy both of these requirements is not eligible for selection. The Primary Balancing Criteria are the technical criteria upon which the detailed analysis is primarily based. The final two criteria known as Modifying Criteria, assesses the public's and the state agency's acceptance of the criteria. EPA may modify aspects of a specific alternative based upon this criteria.

The following analysis is a summary of the evaluation of alternatives for remediating OU1 of the Marzone, Inc./Chevron Chemical Site under each of the criteria. A comparison is made between each of the alternatives for achievement of a specific criterion.

TABLE 9: COMPARISON OF THRESHOLD AND BALANCING CRITERIA

Alternate No.	1	2	3	4	5	6	7	8	9
Overall Protection of Human Health and the Environment	N	Y	Y	N	Y	Y	Y	Y	Y
Compliance With ARARs	N	N	Y	N	N	Y	Y	Y	Y
Long-Term Effectiveness and Permanence	N	N	Y	N	N	N	Y	Y	N
Reduction in Toxicity, Mobility, and Volume Through Treatment	N	N	Y	N	N	Y	Y	Y	Y
Short-Term Effectiveness	N	N	N	N	N	Y	N	Y	Y
Implementability	Y	Y	Y	Y	Y	Y	Y	Y	Y
Cost Effectiveness	Y	Y	Y	Y	Y	Y	Y	Y	Y

THRESHOLD CRITERIA

GROUNDWATER

8.1 Overall Protection of Human Health and the Environment

The no action alternative does not provide adequate protection of human health or the environment if the groundwater were to be used as drinking water in the future. The institutional controls alternative provides protection by restricting future use. Only the pump and treat option provides adequate protection, and would use active measures to reduce contamination and reduce the future threat to human health and the environment and more quickly remediate to cleanup levels.

8.2 Compliance with ARARs

Key ARARs:

40 CFR Part 141, National Primary Drinking Water Regulations
40 CFR Part 143, National Secondary Drinking Water Regulations.
Georgia Drinking Water Regulations, Chapter 391-3-5.

GaEPD has classified the surficial aquifer as a potential drinking water source. Based upon this the no action and institutional controls alternatives do not meet the Federal and state ARARs for drinking water standards. These standards are MCLs , non-zero MCL goals, or risk-based concentrations safe for drinking water. The pump and treat alternative is the only alternative that will meet these standards.

PRIMARY BALANCING CRITERIA

8.3 Long-Term Effectiveness and Permanence

Unsaturated and saturated zone models were used to estimate how long it would take to reach risk-based concentrations or MCLs at the point of compliance if the no action or institutional alternatives were selected. The results indicate that it would take much longer than 30 years for α-BHC, β-BHC, lindane, methyl parathion, xylene, ethylbenzene, toxaphene, DDT, and atrazine to reach their cleanup levels in groundwater. Alternative 3 will meet cleanup levels by providing a capture zone that will reduce migration of contaminants, extract and treat contaminated groundwater and be enhanced by natural attenuation; resulting in less than 30 year timeframe to meet cleanup levels.

8.4 Reduction in Toxicity, Mobility, and Volume Through Treatment

The no action and institutional controls alternatives would not provide for a reduction in toxicity, mobility and volume through treatment since they are not treatment options. Only the pump and treat alternative would provide reduction in toxicity, mobility, and volume of contaminated groundwater to cleanup levels through treatment.

8.5 Short-Term Effectiveness

All systems would be ineffective in meeting cleanup levels in the near future. The no action and institutional control alternatives would have the least immediate harmful effect on human health or the environment, but they would also provide less protection in the short term. The pump and treat alternative would slightly increase the risk of exposure by pumping and handling of contaminated groundwater. Those risks would be reduced to safe levels by using proper safety measures.

8.6 Implementability

The no action alternative is the easiest to implement because there is little to implement. Imposing institutional controls will require legal actions. The groundwater pump and treat system will require adjustments, maintenance, sampling, and periodic replacement. The groundwater pump and treat system will require testing to determine the best design to remediate the groundwater.

8.7 Cost Effectiveness

The groundwater pump and treat system costs more than both the no action and institutional controls alternatives (Table 10), but is the only groundwater remedy that meets the threshold criteria for protection for protection of human health and the environment and compliance with ARARs. Therefore the higher cost is justifiable and cost effective.

MODIFYING CRITERIA

8.8 State Acceptance
EPA has consulted with the Georgia Environmental Protection Division (GaEPD) and received a letter dated September 30, 1994, indicating State concurrence on the remedy selection in this ROD, but deferring concurrence on the performance standards in light of the newly promulgated rules of the Georgia Hazardous Site Response Act. The letter is attached as Appendix B of this ROD.

8.9 Community Acceptance
EPA has determined community acceptance of the preferred alternative after considering comments received during the public comment process associated with the Proposed Plan. A Responsiveness Summary has been included as an attachment to this Record of Decision (ROD) in Appendix A explaining how the comments were addressed.

SOIL

THRESHOLD CRITERIA

8.10 Overall Protection of Human Health and the Environment
Contamination which could pose a threat to human health and the environment is present in the surface and subsurface soil at OU1 of the Site. Surface soil pose a risk from direct exposure. Subsurface soil pose a risk to the groundwater. The no action alternative does not provide adequate protection from these risks. The institutional controls alternative limits direct exposure risk by limiting access and land use but does not remediate the soil. The chemical oxidation landfill disposal, bioremediation and thermal desorption alternatives provide adequate protection through remediation. The chemical oxidation, landfill disposal and thermal desorption alternatives meet a $1x10^{-6}$ risk cleanup level for surface soil, while bioremediation provides a $1x10^{-5}$ risk level for surface soil.

8.11 Compliance with ARARs
Key ARARs:

40 CFR Part 261, Identification and Listing of Hazardous Waste.
40 CFR Part 264, Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities.
40 CFR Part 268, Land Disposal Restrictions.

The landfilling, low temperature thermal desorption, chemical oxidation, and bioremediation alternatives will comply with the ARARs for soil, but the no action and institutional controls alternatives will not. The biofarming alternative will reduce the chemical concentrations to a $1x10^{-5}$ risk level in about 5 to 7 years. The excavation and disposal, and chemical oxidation alternatives will meet a $1x10^{-6}$ level for surface soil remediation within the shortest time period (within 4 to 6 months). Thermal desorption will take about 1 year.

PRIMARY BALANCING CRITERIA

8.12 Long-Term Effectiveness and Permanence

Landfilling, thermal desorption, and chemical oxidation reduce the residual risk to $1x10^{-6}$ for residential property use and will reduce levels to eliminate leaching to groundwater. Bioremediation achieves a $1x10^{-5}$ risk level for industrial use. Thermal desorption and bioremediation are the only alternatives presented that lead to a permanent solution at the Site.

8.13 Reduction in Toxicity, Mobility, and Volume Through Treatment

The bioremediation and low temperature thermal desorption alternatives will reduce the toxicity, mobility, and volume by on-site treatment. The excavation and landfill disposal alternatives do not provide treatment of soil. Chemical oxidation is a treatment option that will reduce the toxicity and mobility of chemicals in approximately one-third of the soil but not down to the cleanup levels. The no action and institutional controls alternatives do not reduce toxicity and volume and are not treatment technologies.

8.14 Short-Term Effectiveness

The no action and institutional controls alternatives do not provide short-term effectiveness. Of the four action alternatives, the excavation, chemical oxidation, and disposal process is a 4 to 6 month operation after beginning on-site remediation work, and threat to workers and the community can be readily controlled by using appropriate construction techniques. The thermal desorption alternative takes over 1 year after mobilization, permitting, and start-up, and the protection of workers and the community is a slightly greater risk. Biofarming will require 5 to 7 years to achieve cleanup levels and will require dust and run-off controls.

8.15 Implementability

The no action alternative is easily implemented since no action is necessary. The institutional controls, excavation and disposal, and chemical oxidation alternatives are more difficult but still somewhat easy to implement. The latter two use standard equipment and well proven technology. Institutional controls will require some administrative and legal actions. Low temperature thermal desorption and bioremediation are potentially more difficult to implement because they are more sensitive technologies and are subject to of the variation in the soil quality.

8.16 Cost Effectiveness

The action remedies for soil are more costly than both the no action and institutional controls, but they meet the threshold criteria, while no action and institutional controls do not. Bioremediation is less costly than excavation and landfill disposal, low temperature desorption, and chemical oxidation; thus making it cost effective. Bioremediation is also a treatment technology and will attain a permanent remedy. Low temperature thermal desorption is the most expensive remedy but is a proven technology that will result in a permanent remedy and therefore is cost effective.

MODIFYING CRITERIA

8.17 State Acceptance

EPA has consulted with the Georgia Environmental Protection Division (GaEPD) and received a letter dated September 30, 1994, indicating State concurrence on the remedy selection in this ROD, but deferring concurrence on the performance standards in light of the newly promulgated rules of the Georgia Hazardous Site Response Act. The letter is attached as Appendix B of this ROD.

8.18 Community Acceptance

After considering comments received during the public comment process associated with the Proposed Plan, EPA has refined the soil remedy to low temperature thermal desorption. The community did not prefer EPA's proposed bioremediation remedy for soil cleanup. In general, the commentors felt the bioremediation remedy was too experimental, would not remediate the soil, and they preferred a remedy that was known to effectively treat the contaminated contamination. They also preferred a remedy that would be implemented in a relatively short time frame and one that would expose the community to the least risk. During the public meeting the impression was that the commentors preferred the contingent remedy of low temperature thermal desorption over bioremediation. A Responsiveness Summary has been included as an attachment to this Record of Decision (ROD) in Appendix A explaining how public comments were addressed.

TABLE 10: COST ANALYSIS OF ALTERNATIVES

No.	Action	Cost, $
1	No Action for Groundwater	Capitol = 0 O&M = 37,500 PW = 425,000
2	Institutional Controls for Groundwater	Capitol = 37,000 O&M = 65,000 PW = 775,000
3	Groundwater Extraction	Capitol = 540,000 O&M = 285,500 PW = 3,400,000
4	No Action for Soil	Capitol = 0 O&M = 37,500 PW = 425,000
5	Institutional Control for Soil	Capitol = 73,000 O&M = 52,500 PW = 675,000
6	Excavation and Landfill Disposal	Capitol = 3,000,000 O&M = 0 PW = 3,000,000
7	Bioremediation	Capitol = 2,000,000 O&M = 700,000 PW = 2,700,000
8	Low Temperature Thermal Desorption	Capitol = 4,800,000 O&M = 0 PW = 4,800,000
9	Chemical Oxidation	Capitol= 4,100,000 O&M = 0 PW = 4,100,000

9.0 SUMMARY OF SELECTED REMEDY

Based upon the requirements of CERCLA, the NCP, EPA Policy, and the detailed analysis of alternatives presented in the Feasibility Study, EPA has selected a remedy for Operable Unit 1 at the Marzone Site. The remedy addresses remediation of contaminated groundwater and soil.

9.1 Groundwater Remedy

For the contaminated groundwater on-site, the selected remedy is Groundwater Pump and Treat with enhancement through use of an infiltration gallery. This remedy will consist of extracting the contaminated groundwater from the surficial aquifer, treating it on-site through a carbon filtration system and passing it back into the aquifer through an infiltration gallery. The used carbon filters will be taken off-site for recharge and reuse. It is anticipated that approximately 2 groundwater recovery wells will be installed in the area of the loading dock with possibly about another two installed within the contaminated aquifer near the area of the rinsate pond. The number of wells and their specific location will be optimized to extract all contaminants of concern for treatment down to the performance standard. Location, sizing, and pumping rates for wells will be determined by evaluating the results of a pumping test that will be conducted as part of the remedial design phase. Contaminated groundwater will be pumped to the water treatment system, treated, and passed through an infiltration gallery. Since the underlying aquifer is relatively slow moving, an infiltration gallery will be utilized to help enhance movement of contaminated groundwater toward the extraction wells. Pumping and treating the groundwater will continue until the performance standards on Table 11 of this ROD are achieved this is estimated to take 7-41 years to cleanup the contaminated groundwater at OU1.

This remedy also includes fencing to prevent Site access to the public, and periodic groundwater monitoring to track changes in the level and extent of contamination. The major components consist of:

- The implementation of institutional controls.
- The implementation of a pumping test, to aid in determining specific design criteria for the extraction and monitoring system.
- The design and construction of groundwater extraction and monitoring wells.
- The installation of a security fence around the on-site treatment unit.
- The design and installation of a groundwater pumping and monitoring system, a groundwater filtration system, a treatment system, and an infiltration gallery.
- The start-up and operation of this system.
- The transportation, regeneration, recycling, and/or disposal of the spent filters.
- The operation and maintenance of a long-term groundwater monitoring

program. Includes quarterly monitoring of parameters in extraction wells and specified monitoring wells.

The groundwater remedy for Operable Unit #1 of the Marzone Site is consistent with the requirements of Section 121 of CERCLA and the National Contingency Plan. The remedy will reduce the mobility, toxicity, and volume of contaminated groundwater at the Site. In addition, the remedy is protective of human health and the environment, will attain all Federal and State applicable or relevant and appropriate requirements, is cost-effective, and utilizes permanent solutions to the maximum extent practicable. The remedy for OU1 is consistent with previous and projected remedial actions at the Site. Based on the information available at this time, the selected remedy represents the best balance among the criteria used to evaluate remedies.

9.1.1 Performance Standards for Groundwater

Groundwater shall be extracted from the surficial aquifer at a rate to be determined through the results of an EPA established or approved pumping test and shall be treated until the following performance standards set out in Table 11 are achieved at wells that were located and/or designated by EPA in the RD phase.

TABLE 11: PERFORMANCE STANDARDS FOR GROUNDWATER

Constituent	Concentration (ppm)
α-BHC	0.00003
β-BHC	0.0001
DDD	0.00077
DDT	0.00054
Ethylbenzene	0.7
Lindane	0.0002
Methyl Parathion	0.0039
Xylene	10.0

9.1.2 Infiltration Standards

Treated groundwater that will be passed through the infiltration gallery shall comply with all ARARs and TBCs. GaEPD's classification of this aquifer as a potential drinking water source yields a requirement for all groundwater that passes through the infiltration gallery to meet MCLs or the risk-based cleanup levels for those chemicals without MCLs. Periodic sampling of such groundwater is required prior to passage through the infiltration gallery to verify that the groundwater infiltration standards are being met. A schedule of compliance appropriate for the purpose of this monitoring shall be included as part of the remedial design phase. All treated water that will be passed through the infiltration gallery must meet the performance standards set out in Table 11.

9.1.3 Design Criteria for Groundwater

The design, construction, and operation of the groundwater treatment system shall be conducted in accordance with all ARARs, including but not limited to the RCRA requirements set forth in 40 C.F.R. Part 264 (Subpart F). All design specifications will be developed through the remedial design process so as to achieve the performance standards set out in Table 11.

9.1.4 Compliance Monitoring for Groundwater

Groundwater monitoring shall be conducted at this Site. After demonstration of compliance with the performance standards set out above, the Site groundwater shall be monitored for no less than five years. If monitoring indicates that the performance standards set forth in Table 11 are being exceeded at any time after pumping has been discontinued, extraction and treatment of the groundwater will recommence until the performance standards are once again achieved and compliance monitoring thereafter re-established. At that time, the effectiveness of the source control component may be re-evaluated by EPA. A schedule of compliance for a groundwater monitoring plan that verifies compliance with the performance standards shall be included as part of the remedial design phase.

9.1.5 Cost

Capitol cost for the groundwater remedy is $540,000 which includes emplacement of institutional controls, installation of extraction wells, treatment plant, and the infiltration gallery with an O&M of $285,500 for monitoring continued operation. The estimated present worth of the remedy is $3.4 million.

9.2 Soil Remedy

For the soil medium, the selected remedy is Low Temperature Thermal Desorption. This remedy includes the utilization of a mobile thermal treatment unit to remove Site contaminants from soil at OU1 of the Marzone Site.

The remedy will entail the use of a mobile low temperature thermal desorption unit that consists of a heated chamber with temperatures of 700 to 900 degrees Fahrenheit. Approximately 12,000 cubic yards of surface and subsurface contaminated soil will be excavated from the Site, broken up, preconditioned, and then fed into the chamber in a continuous operation. The thermal desorption unit will drive off pesticide contaminants from the soil that will be captured in the next stage bag house, GAC, or other equivalent system. Both surface and subsurface soil will be treated to the performance standards set out on Table 12 of this ROD. The treated, decontaminated soil, will be placed back at the Site. In order to facilitate this remedy expediously and effectively, OU1 of the Marzone Site is designated as a Corrective Action Management Unit (CAMU) and an Area of Contamination (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. OU1, and the designated CAMU/AOC, consists of the contamination on the 1.68-acre former Marzone pesticide formulating area, part of the Slack property, railroad drainage ditch area past the southwest corner of the horse pasture, contaminated groundwater related to the Site (see Figure 2) and all suitable areas in close proximity to the contamination necessary for implementation of the remedy selected in this ROD. Since soil contamination at OU1 will be cleaned down to the risk-based performance standards, no closure standards apply for this CAMU/AOC.

Major components of the soil remedy include:

- The excavation of all soil contamination at OU1 above the performance standards.
- The staging and preconditioning 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 bag house, GAC, or other equivalent system.
- The placement of treated, decontaminated soil back to the Site.
- The periodic soil sampling during treatment to verify effectiveness of the remedy.
- Air monitoring to ensure safety of nearby residents and workers.
- Demobilization and removal of the thermal desorption unit after completion of the remedy.

The soil remedy for Operable Unit #1 of the Marzone Site is consistent with the requirements of Section 121 of CERCLA and the National Contingency Plan. The remedy will reduce the mobility, toxicity, and volume of contaminated soil at the Site. In addition, the remedy is protective of human health and the environment, will attain all Federal and State applicable or relevant and appropriate requirements, is cost-effective, and utilizes permanent solutions to the maximum extent practicable. The remedy for OU1 is consistent with previous and projected remedial actions at the Site. Based on the information available at this time, the selected alternative represent the best balance among the criteria used to evaluate remedies.

9.2.1 Performance Standards for Soil

For the low temperature thermal desorption remedy, the performance standards for surficial soil is based upon a $1x10^{-6}$ risk level for a cleanup associated with future residential land use. For subsurface soil the cleanup level was calculated using the MULTIMED groundwater model. Performance standards are set out in Table 12.

Excavation of soils within the confines of OU1 and which are contaminated above the performance standard shall continue until the remaining soil achieves the performance standards set out in Table 12. All excavation shall comply with ARARs, OSHA, and state standards. Pertinent testing methods will be selected or approved by EPA and used to determine whether the 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 set out in Table 12. 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 again treated by the thermal desorption unit until performance standards are achieved.

TABLE 12: PERFORMANCE STANDARDS FOR SOIL

CONSTITUENT	SURFACE SOIL[b] (ppm) HI=1, $1x10^{-6}$	SUBSURFACE SOIL[c] (ppm)
Atrazine	3.5	0.150
α-BHC	0.12	1.142
β-BHC		0.547
DDD	3.2	
DDE	2.28	
DDT	2.29	
Dieldrin	0.049	
Endosulfan II	2.6	
Ethylbenzene		57.3
Heptachlor Epoxide	0.085	
Lindane		0.463
Methyl Parathion		4.55
Toxaphene	0.7	
Xylene		213

a Blank spaces indicate no cleanup level set because the chemical is not a COC for the medium.

b Surface soil cleanup levels are based on future residential land use. Cleanup levels are based on a cancer risk of 1 x 10^{-6}, or a hazard index of 1.0. Surface soil refers to the top foot of soil.

c Subsurface soil cleanup levels were calculated using the MULTIMED model.

9.2.2 Design Criteria for Soil

The design, construction, and operation of the low temperature thermal desorption system shall be conducted in accordance with all ARARs, including but not limited to the RCRA requirements set forth in 40 C.F.R. Part 264 (Subpart F). The thermal desorption unit shall consist of a heated chamber, a bag house, GAC, afterburner, or equivalent system. All design specifications will be developed through the remedial design process to meet the performance standards set out in Table 12.

9.2.3 Soil Testing

Soil testing shall be conducted on Site to determine the effectiveness of meeting the soil performance standards set out in Table 12. Performance will be met when the confirmatory sampling effort shows all samples have been remediated to a level at or below the performance standard. Confirmatory sampling will include testing of both the decontaminated soil exiting the thermal desorption unit and any soil left in place. All such soil shall meet the performance standard.

9.2.4 Cost

For low temperature thermal desorption, it is estimated that the cost and present worth of the remedy is $4.8 million. These costs include planning and design fees, as well as mobilization and implementation. The capital cost is $4.8 million; there are no O&M costs associated with this remedy.

The total cost of the groundwater and soil remedy for OU1 of the Marzone Site is $8.2 million. This includes groundwater pump and treat and soil remediation through low temperature thermal desorption.

10.0 STATUTORY DETERMINATIONS

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 as established under Federal and State environmental laws unless a statutory waiver is justified. The selected remedy also must be cost effective and utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. Finally, the statute includes a preference for remedies that employ treatment that permanently and significantly reduce the volume, toxicity, or mobility of hazardous wastes as their principal element. The following sections discuss how the selected remedy meets these statutory requirements.

10.1 Protection Of Human Health And The Environment

The selected remedy protects human health and the environment through isolating and treating threats at Operable Unit #1 of the Site in contaminated groundwater and soil. The selected remedy provides protection of human health and the environment by eliminating, reducing, and controlling risk through treatment, engineering and/or institutional controls. The contaminated groundwater underlying OU1 of the Marzone Site will be pumped and treated to cleanup levels. In addition institutional controls will be employed throughout the treatment process to protect human heath and the environment. Contaminated soil will be treated through low temperature thermal desorption. For surface soil the cleanup level will meet a $1X10^{-6}$ risk-based level. The subsurface soil will be cleaned up to levels that are protective of groundwater.

10.2 Compliance With ARARs

Remedial actions performed under CERCLA must comply with all applicable or relevant and appropriate requirements (ARARs). All alternatives considered for OU1 of the Marzone 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 the following ARARs.

TABLE 13: FEDERAL ARARs FOR MARZONE SITE OU1			
CLEAN WATER ACT - 33 U.S.C. §§ 1251-1376			
	CITATIONS		**COMMENTS**
R & A	40 CFR Part 131 Ambient Water Quality Criteria Requirements	Chemical Specific for groundwater	Provides for the establishment of water quality based on toxicity to aquatic organisms and human health.
R & A	40 CFR Part 141 National Primary Drinking Water Regulations	Chemical Specific for groundwater	Establishes primary drinking water regulations pursuant to Section 1412 of the Public Health Service Act, as amended by the Safe Drinking Water Act; and related regulations applicable to public water systems.
R & A	40 CFR Part 142 National Primary Drinking Water Regulations Implementation	Chemical Specific for groundwater	Sets forth Sections 1413-1416, 1445, and 1450 of the Public Health Service Act, as amended.
R & A	40 CFR Part 143 National Secondary Drinking Water Regulations	Chemical Specific for groundwater	Establishes National Secondary Drinking Water Regulations pursuant to Section 1412 of the Safe Drinking Water Act, as amended (42 U.S.C. 300g-1); and control contaminants in drinking water that primarily affect the aesthetic qualities relating to the public acceptance of drinking water.
A	40 CFR Part 144 Underground Injection Control	Action Specific for groundwater	Set forth requirements for the Underground Injection Control (UIC) program promulgated under Part C of the Safe Drinking Water Act.

TABLE 13: FEDERAL ARARs FOR MARZONE SITE OU1			
	RESOURCE CONSERVATION AND RECOVERY ACT - 42 U.S.C. §§ 6901-6987		
	CITATIONS		**COMMENTS**
A	40 CFR Part 261 Identification and Listing of Hazardous Waste	Action Specific for Soil	Identifies those solid wastes which are subject to regulation as hazardous wastes. Defines the term "solid waste" and "hazardous waste".
R & A	40 CFR Part 262 Standards Applicable to Generators of Hazardous Waste	Action Specific for Soil	Establishes standards for generators of hazardous waste.
A	40 CFR Part 263 Standards Applicable to Transporters of Hazardous Waste	Action Specific for Soil	Establishes the responsibilities of generators and transporters of hazardous waste in the handling, transportation, and management of that waste.
R & A	40 CFR Part 264 Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal (TSD) Facilities.	Action Specific for Soil	Establishes minimum national standards which define the acceptable management of hazardous waste for owners and operators of facilities which treat, store, or dispose of hazardous waste.
R & A	40 CFR Part 268 Land Disposal Restrictions	Chemical Specific for Soil	Identifies hazardous wastes that are restricted from land disposal and describes those circumstances under which an otherwise prohibited waste may be land disposed.
A	Federal Register/Vol. 58 February 16, 1993 40 CFR Part 260 et al Corrective Action Management Units and Temporary Units; Corrective Action Provisions; Final Rule	Action Specific for soil and groundwater	Finalizes provisions for corrective action management units (CAMUs) and temporary units under Subpart S of 40 CFR Part 264. Defines the term "remediation waste".
R & A	40 CFR Part 270 EPA Administered Permit Programs: Hazardous Waste Permit Program	Action Specific for Soil	Establishes provisions for the Hazardous Waste Permit Program under Subtitle C of the Solid Waste Disposal Act.

A —— APPLICABLE REQUIREMENTS WHICH WERE PROMULGATED UNDER FEDERAL LAW TO SPECIFICALLY ADDRESS A HAZARDOUS SUBSTANCE, POLLUTANT, CONTAMINANT, REMEDIAL ACTION LOCATION OR OTHER CIRCUMSTANCE AT OU1 OF THE MARZONE SITE.

R & A—RELEVANT AND APPROPRIATE REQUIREMENTS WHICH WHILE THEY ARE NOT "APPLICABLE" TO A HAZARDOUS SUBSTANCE, POLLUTANT, CONTAMINANT, REMEDIAL ACTION, LOCATION, OR OTHER CIRCUMSTANCE AT OU1 OF THE MARZONE SITE, ADDRESS PROBLEMS OR SITUATIONS SUFFICIENTLY SIMILAR TO THOSE ENCOUNTERED AT OU1 OF THE MARZONE SITE THAT THEIR USE IS WELL SUITED TO THE SITE.

TABLE 14: STATE ARARs FOR MARZONE SITE OU1			
	CITATIONS		COMMENTS
A	Georgia Drinking Water Regulations, Chapter 391-3-5	Chemical and Location Specific for groundwater	Establishes rules and regulations for Georgia drinking water standards and addresses wellhead protection zones.
A	Rules of the Georgia Department of Natural Resources Environmental Protection Division, Chapter 391-3-15	Action Specific for Soil	Provides rules for the Underground Storage Tank Program. GaEPD has not set soil action levels for contaminants other than petroleum hydrocarbons.
A	Georgia Water Quality Control Regulations and Standards	Action and Chemical Specific for runoff	Establishes Georgia surface water quality criteria.

A ——APPLICABLE REQUIREMENTS WHICH WERE PROMULGATED UNDER FEDERAL LAW TO SPECIFICALLY ADDRESS A HAZARDOUS SUBSTANCE, POLLUTANT, CONTAMINANT, REMEDIAL ACTION LOCATION OR OTHER CIRCUMSTANCE AT OU1 OF THE MARZONE SITE.

R & A —RELEVANT AND APPROPRIATE REQUIREMENTS WHICH WHILE THEY ARE NOT "APPLICABLE" TO A HAZARDOUS SUBSTANCE, POLLUTANT, CONTAMINANT, REMEDIAL ACTION, LOCATION, OR OTHER CIRCUMSTANCE AT OU1 OF THE MARZONE SITE, ADDRESS PROBLEMS OR SITUATIONS SUFFICIENTLY SIMILAR TO THOSE ENCOUNTERED AT OU1 OF THE MARZONE SITE THAT THEIR USE IS WELL SUITED TO THE SITE.

TABLE 15: TO-BE-CONSIDERED (TBCs) DOCUMENTS FOR MARZONE SITE OU1	
DOCUMENT TYPE	DESCRIPTION
USEPA, Office of Drinking Water, Drinking Water Regulations and Health Advisories, Washington, D.C., December 1993	Issues health advisories based on exposure to various concentrations of chemicals of concern.

TBCs — TO-BE-CONSIDERED CRITERIA ARE NON-PROMULGATED ADVISORIES AND GUIDANCE THAT ARE NOT LEGALLY BINDING, BUT SHOULD BE CONSIDERED IN DETERMINING THE NECESSARY LEVEL OF CLEANUP FOR PROTECTION OF HEALTH OR THE ENVIRONMENT.

10.3 Cost Effectiveness

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 for groundwater is pump and treat. This remedy is more costly than both the no action and institutional controls alternatives but is the only groundwater remedy that meets the threshold criteria for protection of human health and the environment and compliance with ARARs. Therefore, the higher cost is justified and cost effective. The selected remedy for soil is low temperature thermal desorption. This alternative is more costly than both the no action and institutional controls alternatives but meets the threshold criteria, while no action and institutional controls do not. The low temperature thermal desorption remedy is also more costly than excavation and landfill disposal, bioremediation, and chemical oxidation. Low temperature thermal desorption along with bioremediation are the only two remedies that involve treatment to achieve a permanent remedy for the Site. Bioremediation will only achieve a cleanup standard based upon a $1x10^{-5}$ risk which is not appropriate for future residential land use. Low temperature thermal desorption is the only remedy that fulfills the threshold criteria, is a permanent remedy, and will remediate to a risk based level of $1x10^{-6}$ for future residential land use, therefore, making it a reasonable value.

10.4 Utilization Of Permanent Solutions To The Maximum Extent Practicable

EPA and GaEPD believe that the selected remedy is the most appropriate cleanup solution for OU1 of the Marzone Site and provides the best balance among the evaluation criteria for the remedial alternatives considered. The pump and treat remedy for groundwater is a permanent remedy. The low temperature thermal desorption remedy is also a permanent remedy. In all cases treated media can be returned to the Site. The selected remedy meets the statutory requirement to utilize permanent solutions and treatment technologies to the maximum extent practicable.

10.5 Preference For Treatment As A Principal Element

The statutory preference for treatment will be met through treatment of contaminated groundwater and through the low temperature thermal desorption treatment remedy for the soil.

11.0 DOCUMENTATION OF SIGNIFICANT CHANGES

The final remedy for OU1 of the Marzone Site was refined somewhat from the proposed plan fact sheet, in that, the remedy for soil remediation will be low temperature thermal desorption. The proposed plan presented a remedy for soil of bioremediation by landfarming/composting with a contingency for low temperature thermal desorption. The biofarming alternative was proposed because EPA believed that the community would be more receptive of a bioremediation (e.g peanut farming) remedy over low temperature thermal desorption. Biofarming would be consistent with the agricultural land use in the Tifton, GA area. EPA weighed heavily its criteria for community acceptance when proposing the biofarming alternative.

It was evident from the comments received, both verbally and in writing, that the biofarming alternative was not the communities preferred remedy. The community expressed concern over the success of the highly innovative technology and over the longer time frame for bioremediation. There were also some concerns over the degree of remediation ($1x10^{-5}$ versus $1x10^{-6}$) from the biofarming alternative. Based upon these factors, EPA reevaluated the 9 criteria for remedy selection and determine that the low temperature thermal desorption remedy was, in fact, the best remedy for remediating the soil at OU1 of the Marzone Site. Low temperature thermal desorption is a proven technology that results in a permanent remedy for OU1. The time frame for remediation is approximately 1 year and it will remediate surface soil to a $1x10^{-6}$ risk based level for a future residential land use.

RECORD OF DECISION

APPENDIX A
RESPONSIVENESS SUMMARY

Marzone, Inc./Chevron Chemical Company Site
Tift County, Georgia

Responsiveness Summary
Marzone, Inc./Chevron Chemical Company Site
Tift County, Georgia

The U.S. Environmental Protection Agency (EPA) held a public comment period from July 15, 1994 through August 15, 1994 for interested parties to give input on EPA's Proposed Plan for Remedial Action at Operable Unit 1 (OU1) of the Marzone Inc./Chevron Chemical Company Superfund Site in Tifton, Tift County, Georgia. EPA conducted a public meeting on July 26, 1994, at the Neighborhood Services Center in Tifton, Georgia. The meeting presented the results of the Remedial Investigation and Feasibility Study (RI/FS) for OU1 of the Marzone Inc./Chevron Chemical Company Site and the Proposed Plan of action for remediation. The public comment period was extended an additional 30 days, i.e., until September 14, 1994 after EPA received two requests 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 OU1 of the Marzone Inc./Chevron Chemical Site.

This responsiveness summary for the Marzone Inc./Chevron Chemical Company 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 Marzone 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. <u>Overview</u>

The remedial alternatives were presented to the public in a Proposed Plan released on July 14, 1994, and in a public notice in the Tifton Gazette on July 11, and July 18, 1994. A public meeting was held July 26, 1994 with over 200 people attending.

EPA has organized the work at this Site into two phases or operable units (OUs). OU1 involves contamination on the 1.68-acre former Marzone pesticide blending area, part of the Slack Property, and railroad drainage ditch past the southwest corner of the horse pasture, and contaminated groundwater related to the Site. This first operable unit is broken down into two separate remedies; one for groundwater and the other for soil.

For contaminated groundwater, the selected remedy is Alternative No. 3, Groundwater Pump and Treat and reinjection through an infiltration gallery.

The major components of the selected remedy include:

* The implementation of institutional controls.
* The design and construction of groundwater extraction wells.
* The installation of a security fence around the on-site treatment unit.
* The design and installation of a groundwater pumping system, a groundwater filtration system, a on-site treatment system, and an infiltration gallery.
* The start-up and operation of this system
* Transportation, regeneration, recycling, and disposal of the spent filters.
* Operation of a long-term groundwater monitoring program. Which will include periodic monitoring of parameters in extraction wells and specific monitoring wells.

The cost of this alternative would be $3.4 million.

For soil contamination, the preferred alternative as presented to the public in the proposed plan fact sheet was NO. 7, Bioremediation by landfarming/composting with a contingency remedy of alternative NO. 8, Low Temperature Thermal Desorption.

The final selected remedy for the soil at OU1 of the Marzone Site is NO. 8, Low Temperature Thermal Desorption. This remedy will include the use of a mobile thermal treatment units to remove Site contaminants from OU1 soil at the Marzone Site. The low temperature thermal desorption unit will consist of a heated chamber with temperatures of 700 to 900 degrees Fahrenheit. Approximately 12,000 cubic yards of contaminated soils will be excavated from the Site, broken up, preconditioned, and then fed into the chamber in a continuous operation. The thermal desorption unit will drive off pesticide contaminants from the soil that will be captured in the next stage bag house, GAC, or other equivalent system. Both surface and subsurface soils will be treated to the performance standards set out in this ROD. The treated, decontaminated soil, will be placed back at the Site. The estimated cost of this remedy is $4.8 million.

The total estimated cost of the groundwater and soil remedy for OU1 of the Marzone Site is $8.2 million. This includes groundwater pump and treat and soil remediation through low temperature thermal desorption.

Most of the community's concerns were related to health issues either from exposure to the Marzone Site or other toxic waste sites in Tifton. Of the comments that were related to EPA's proposed remedy, there was a favorable response to EPA's proposed groundwater pump and treat remedy but disfavor for EPA's proposed bioremediation remedy for soil cleanup. The commentors felt the bioremediation remedy was too experimental, would not cleanup the soil adequately, and that they preferred a remedy that was known to effectively treat the contaminated contamination. They also preferred a remedy that would be implemented in a relatively short time frame and one that would expose the community to the least risk. During the public meeting the impression was that the commentors preferred the contingent remedy of low temperature thermal desorption over bioremediation. Many written comments re-emphasized the major concerns but did not designate a specific remedy preference.

II. Background on Community Involvement and Concerns

EPA has taken the following actions to insure that interested parties have been kept informed and given an opportunity to provide input on activities at the Marzone Inc./Chevron Chemical Company Superfund Site.

On June 24, 1991 an availability session was held in the Tifton Neighborhood Services Center, on Golden Road to inform the community of the start of field work for the Remedial Investigation. At that time community interviews were conducted and a repository was set up at the Tifton and Tift County Libraries in Tifton, Georgia. A second availability session took place on January 20, 1994 in the Neighborhood Services Center to inform the public of the results of the Remedial Investigation and the proposed alternatives for remediation.

On April 7, 1994 a third availability session was held to better define the remedial alternatives presented in the Feasibility Study. In addition, on January 5, 1994 EPA held a public meeting in the Tifton Library to announce that Tifton/Tift County, Georgia was selected as Region IV's focus for the Environmental Justice initiative. At that time a summary of the activities at the Marzone Site was presented.

The public comment period on this ROD was July 15, 1994 through August 15, 1994. The comment period was extended 30 days until September 14, 1994 upon two requests received by EPA. A public meeting was held on July 26, 1994 where representatives from 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 Tifton and Tift County Libraries and at the EPA Region IV Library at 345 Courtland Street in Atlanta, Georgia. The notice of availability of the proposed plan and the administrative record was published in the Tifton Gazette on July 11, and July 18, 1994.

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

Comment 1: Two commentors suggested that alternative #6, Excavation and Landfilling, be selected as the final remedy for the Site. They stated that #6 would be the fastest way to cleanup the Site.

EPA Response 1: EPA is required to use the nine criteria which are listed on page of this ROD to determine the best remedy for NPL sites. Also it is a congressional preference that EPA select remedies that use treatment technologies that result in permanent solutions. The excavation and landfilling alternative does not meet the preference for a treatment option nor is it a permanent remedy. Excavation and landfilling would entail digging up contamination from on-site and transferring it to a landfill in another neighborhood, and is just the situation that Congress was trying to avoid by directing the Agency to consider on-site treatment option that result in a permanent remedy creating the potential for accidents, spillage and community concerns in other states.

Comment 2: One commentor suggested that alternative #9, Chemical Oxidation, be selected as the final remedy for soils of OU1 of the Site.

Response 2: Although chemical oxidation is a treatment alternative, it does not result in a permanent solution for OU1 of the Site. After the contaminated soil is treated it will still have to be disposed of in an appropriate landfill. This will entail transferring a waste, treated or untreated, from one neighborhood to another. Since the state of Georgia does not have a operating hazardous waste landfill, this waste may have to be shipped over state lines.

Comment 3: A PRP suggested that the remedy for OU1 of the Site entail building a box that is of reinforced concrete on the sides and bottom and lined on the top with waterproof material. The contaminated soil should be placed in this box and mixed with lime. On top of this structure a building could be constructed for industrial usage.

Response 3: This suggested unit of a "concrete box" would be defined as a landfill under the Resource Conservation and Recovery Act (RCRA) and would have to meet the minimum technology requirements (MTRs) and Land Disposal Restrictions (LDRs) of 40 CFR 264 and 270. The design as described by the commentor does not fulfill any of these requirements. The alternative of an on-site landfill was explored in the FS and rejected because of the difficulties associated with the regulatory restrictions; some of which are set out above. The FS contains a detailed explanation of the inadequacies and feasibility of an on-site landfill.

Comment 4: One commentor supported the proposed plan's preference for bioremediation of soils at OU1 of the Site. He stated that the bioremediation option appears to have more positive elements than other options, and is more environmentally friendly. He also stated that the option would provide critically needed revenue or research not available from public funds, and that the option would have a positive economic impact on the local community.

Response 4: EPA does not disagree with these statements. These are a few of the reasons that EPA's original proposed plan for soils at OU1 of the Site was bioremediation. On the other hand, the biofarming/cropping option has not yet been proven in reducing pesticide residues in soil. In addition, if successful, the bioremediation alternative would not be able to remediate the soils down to the cleanup levels based upon a $1x10^{-6}$ risk as would other alternatives including the low temperature thermal desorption alternative.

Comment 5: Another commentor was also in favor of the bioremediation alternative, saying that it would be the least offensive to surrounding neighbors and bring the least adverse economic impact on the City. This commentor also had a concern over the thermal desorption alternative stating that it would result in problems if used. People would be concerned about dust, noise, and emissions.

Response 5: The low temperature thermal desorption alternative is one that has been proven for use for pesticide residues in soils similar to those at OU1 of the Site. This remedy was used at an NPL site in Albany, Georgia less than 100 miles from Tifton. In Albany residents were concerned at first about the use of the thermal desorption unit, but after start-up and completion of the project, most of those residents fears dissipated as they became more familiar and comfortable with the technology. The mobile unit, although occupying a large space, is designed to control dust, noise, and emission very effectively. The system is designed with a safety in that it shuts down automatically when it doesn't function properly. However, the unit is constantly monitored by a technician.

Comment 6: One commentor asked how many toxic substances affect residents at this Site. This commentor stated that the proposed plan fact sheet was not clear on who was at risk.

Response 6: A detailed analysis of the risks presented by OU1 of the Marzone Site is presented in the Baseline Risk assessment (BRA) which is part of the Administrative Record (AR) for the Site. The BRA identified 28 potential chemicals of concern at OU1 of the Marzone Site. In addition, it identified a current risk to individuals from direct contact, inhalation, and ingestion of contaminated soils at the Site. Those individuals that would be most at risk would be on-site workers, since the Site is fenced and posted "no trespassing." Any trespassers may also be at risk from contaminated soils. There is a future risk for ingestion of contaminated groundwater. Currently, the groundwater contaminant plume is localized under the Site and has not migrated to private or public drinking water. If this plume were not cleaned up, it would present a risk in the future by potential migration to drinking water wells. In addition, there is a risk to the groundwater from contamination of subsurface soils. If subsurface soils are not remediated they would continue to release contaminants to the underlying aquifer. For a thorough explanation of the contaminants of concern and Site risks, the commentor may wish to read the Baseline Risk Assessment available in the repository.

Comment 7: A commentor asked why toxaphene and DDT increase as a result of remediation.

Response 7: Toxaphene and DDT do not increase as a result of remediation. The toxaphene and DDT in surface soils will be remediated to 0.7 ppm and 2.29 ppm respectively. Unlike the other 7 contaminants identified in the proposed plans for subsurface soil contamination, toxaphene and DDT are not considered to be a threat for leaching to the underlying aquifer because they tend to adhere to the soil particle. This conclusion was determined by use of a mathematical model that calculates the potential for a chemical to leach out of soil. The modelling generated a cleanup value of 2,700 ppm for toxaphene and 1,300 ppm for DDT in the subsurface soils which are higher than any values of these chemicals detected at subsurface soil during the RI.

Comment 8: A commentor asked how water can remove an immiscible liquid. This commentor postulates that the xylenes found in the aquifer underlying OU1 of the Site is not dissolved in the groundwater but is instead present in a layer on top of the groundwater, and therefore, cannot be remediated by EPA's remedy of pump and treat.

Response 8: It is the opinion of EPA's experts in hydrogeology that the xylenes found at OU1 of the Marzone Site is mixed with groundwater. This opinion is based upon current site conditions, extensive reviews of the remedial investigation and other groundwater investigations conducted at the Site. In addition it is EPA's opinion that a well designed groundwater pump and treat system will, in fact, cleanup all contaminants found in the groundwater including the xylenes. This remedy has been employed many times for aquifers contaminated with organic constituents such as xylene and has proven to be effective.

Comment 9: A commentor asked why there were no backup alternatives proposed for water treatment?

Response 9: There were three alternatives in the feasibility study that were evaluated for cleanup at the Site. The only alternative that met all nine criteria of evaluation was the pump and treat remedy. This remedy is well proven and effective. It has been used innumerable times in the past on aquifers contaminated with xylenes and other organic constituents that are found at this Site. EPA believes this remedy will adequately address groundwater contamination at this Site.

Comment 10: A commentor asked why there is no treatment proposed for subsurface contamination.

Response 10: Both the proposed plan and the final selected remedy contain a remedy for subsurface soils. The proposed plan presented the remedy of bioremediation through biofarming/composting for both surface and subsurface soils with a contingent remedy of low temperature thermal desorption. The final remedy for OU1 of the Marzone Site is for low temperature thermal desorption of both contaminated surface and subsurface soil. Cleanup levels for surface and subsurface soil are set out in Table 1 of the proposed plan and Table 12 of the ROD.

Comment 11: A commentor asked why use peanut farming to remove contaminants. This commentor stated that he does not believe that peanuts will uptake pesticide residues and that the proposed alternative of peanut farming would not work.

Response 11: It is the opinion of EPA experts that reviewed the information regarding peanut farming that the alternative should be strongly considered as a viable option to remediating pesticide contaminated soils at the Site. EPA realizes that the peanut farming option is innovative and would require treatability testing to determine if the remedy would be successful. EPA never envisioned following through with the biofarming remedy if it failed to prove successful during the testing. Due to the great deal of concern from many individuals over this highly innovative option, EPA has defaulted to the low temperature thermal desorption alternative for remediation of contaminated soils at OU1. Low temperature thermal desorption is a well proven technology. It is permanent and can be implemented in a shorter time frame.

Comment 12: A commentor asked what is a "hot spot?" This phrase is used in the proposed plan to describe areas where soil will be excavated before bioremediation.

Response 12: With regard to bioremediation of soils at OU1, the phrase "hot spot" is clearly defined in the FS, which is part of the AR for the Site. It is defined as biocidal soils or that soil who's concentration of pesticide residues are so high that the bioremediation option would be unsuccessful. In other words the concentrations of contaminants in the soils would kill the biological organism that could be used in the bioremediation remedy. EPA apologizes for not clearly defining the term in the proposed plan.

Comment 13: A commentor asked how the offer of local jobs would benefit the community.

Response 13: EPA was not offering local jobs. Rather, a component of the bioremediation option was the use of labor from the local work force to implement the biofarming/composting option. If the bioremediation remedy was selected this information would have been developed as part of the remedial design during which time the detailed plans would be developed for the remedy and the costs would be properly evaluated.

Comment 14: A commentor asked, "Have all of the chemicals at this Site been found?" The commentor believes that EPA should require a thorough grid search of the Site and employ geophysical techniques to determine if there are any buried drums at the Site.

Response 14: EPA believes a thorough investigation was undertaken for OU1 of the Marzone Site. A 2 year remedial investigation was completed which included extensive sampling of groundwater, soil, surface water, and sediment at the Site. This investigation yielded enough information for EPA to select a remedy for contamination found at OU1. Geophysical techniques were not employed during the RI because they were not deemed necessary or appropriate for the nature of the investigation at the Site. A magnetometer survey would have been unsuccessful due to interference by metal buildings and objects on-site along with a nearby railroad track and overhead power lines. Ground penetrating radar is a technique that would not have, in EPA's opinion, generated useful information about buried drums or contaminated media. A seismic survey would not have been useful since it is not an appropriate techniques for determining the location of buried drums. The appropriateness of geophysical techniques at Superfund sites is detailed in an EPA document entitled, "Geophysical Techniques for Sensing Buried Wastes and Waste Migration," Environmental Monitoring Systems Laboratory , Office of Research and Development, U.S. EPA, Las Vegas, NV, 1982.

Comment 15: A commentor asked how long the Site would remain toxic after remediation?

Response 15: OU1 of the Marzone Site will not remain toxic after cleanup. The selected remedy of low temperature thermal desorption will remediate Site soil to a risk level of $1x10^{-6}$ which is appropriate for residential use. The original proposed alternative of bioremediation would have remediated the Site to a $1x10^{-5}$ risk level appropriate for industrial use.

Comment 16: A PRP commented that the proposed plan was too specific and may conflict with the optimal design of the remedial design .

Response 16: EPA believes that the level of specificity is appropriate to achieve the purpose and goals of the proposed plan. The proposed plan must have sufficient information for the public to understand the options being explored and EPA's preferred alternative. In turn, the ROD must determine the scope of the remedy and provide the basis for the design.

Comment 17: A PRP commented that it is generally supportive of the proposed plan and favors the bioremediation alternative. It states that EPA did not justify the selection of thermal desorption, and it prefers that excavation and landfilling or chemical oxidation be selected over thermal desorption.

Response 17: As stated in responses above, both landfilling and chemical oxidation do not meet the preference for selection of treatment remedies that yield permanent remedies. In evaluating the nine criteria for remedy selection both the bioremediation and thermal desorption alternatives are highly preferred because they result in permanent remedies.

Comment 18: A PRP commented that the total cost of the cleanup proposed in the fact sheet could be in excess of the $8.6 million stated since some fraction of the $2.7 million bioremediation option would be expended if the bioremediation option failed the treatability test.

Response 18: EPA agrees that undertaking the contingent remedy could have entailed expenditure of some fraction of the $2.7 million bioremediation remedy, but the cost of the study is subject to a multiple cost variable in a manner similar to the outcome of the study itself. EPA believes that $8.6 million presented in the proposed plan was a reasonable estimate.

Comment 19: A PRP commented that the decision to use an infiltration gallery in the groundwater pump and treat alternative should be delayed until after further testing (e.g. column leach test) of the aquifer. It further commented that it is technically impracticable to pump and treat the groundwater and that use of an infiltration gallery may enhance contaminant migration in undesired directions.

Response 19: EPA believes that in order to fully remediate the contaminated aquifer an infiltration gallery should be installed. From the information compiled in the RI it is evident that the aquifer is a slow moving one. The use of an infiltration gallery on slow moving aquifers to enhance contaminant migration to extraction wells is an often used technique and was included in a draft of the FS prepared for the Site which is part of the AR. Delaying the remediation of the contaminated groundwater by further testing this aquifer is not justified by the existing data. It is a well proven technology and has been used in the past on aquifers and hydrogeology very similar to that at OU1 of the Marzone Site. A well designed groundwater pump and treat system and a well designed infiltration gallery will enhance migration of contaminants to the desired location of the extraction wells. The groundwater pump and treat remedy at OU1 of the Marzone Site will be carefully designed so that contaminants do not migrate in undesirable directions.

Comment 20: A PRP commented that the proposed plan is misleading because it implies that a no action groundwater remedy will not improve the groundwater quality. However, source remediation conducted on-site will improve the groundwater quality.

Response 20: The no action remedy for groundwater will not improve the current conditions of the contaminated groundwater. Source remediation will only remove any future or further contamination of the aquifer; it will not improve the current groundwater quality.

Comment 21: A PRP commented that the proposed plan states that pump and treat will meet ARARs in less time than no action; but that this is unsupported by the FS, which states that there is no significant differences between groundwater alternatives.

Response 21: EPA believes that it is clear that the active pump and treat alternative for the contaminated aquifer, enhanced with an infiltration gallery, would remediate a contaminated aquifer in less time than a no action alternative or natural attenuation alternative. The pump and treat remedy will be made more effective by inducing a capture zone for the contaminants. This capture zone is enhanced by forces of the infiltration gallery and any naturally attenuative properties of the contaminants present. Moreover, the pump and treat remedy is the only alternative that meets the ARARs for the groundwater at OU1.

Comment 22: A PRP commented that there is a radical difference between EPA's soil cleanup levels for the Marzone Site and the levels for the EPA removal activities at the Golden Seed Site.

Response 22: The goal of EPA's removal activities at the Golden Seed Site was to abate an imminent and substantial endangerment to human health and the environment, not to cleanup the Site to risk-based levels; removal activities at Golden Seed eliminated the emergency. The goal of the cleanup at OU1 of the Marzone Site is to remediate the soils and groundwater to levels that are within EPA's risk range of $1x10^{-4}$ to $1x10^{-6}$ which yields different standards than those developed for the Golden Seed removal activity.

Comment 23: A PRP asked why filtration was chosen over an afterburner on the thermal desorption unit?

Response 23: EPA has not chosen filtration over an afterburner for the thermal desorption unit. This determination will be made through the remedial design process.

Comment 24: A PRP commented that EPA should mention the economic development of each option on the community. The commentor estimated that over 50% of the bioremediation expenditures would be made locally versus less than 5% for the other soil remediation options.

Response 24: Economic development is not one of the nine criteria in selecting a remedy or cleaning up a Superfund site and was not taken into consideration in the FS or in selecting the final remedy for OU1 of the Marzone Site. Moreover, percentages provided by the commentor are broad estimates since there is very little known with respect to economic development arising from Superfund sites.

Comment 25: A PRP disagreed that the Site should be cleaned up to a level suitable for future residential use. The Site is adjacent to the main line of a railroad and is currently zoned for industrial usage.

Response 25: It is EPA policy to use a $1x10^{-6}$ risk levels as a point of departure for determining site-specific cleanup levels. Deviation from the $1x10^{-6}$ risk level is determined based upon justifiable evidence. EPA does not agree that because property is currently zoned as commercial it will continue to be zoned commercial; EPA has commented extensively on this issue. The facts are: There is a trailer on the Slack property within yards of the area designated as OU1, in the past someone lived in this trailer; there is a red brick house within 500 feet east of the Site that is residential; there are a half dozen houses within 500 feet west of the Site, and just beyond these houses is a heavily populated residential area in and around Golden Road. An examination of the areal photographs from the Site from 1948 to 1988 shows an enormous encroachment of residential communities into the area of the Site. There is a high potential that this residential encroachment will not discontinue. Therefore, EPA does not agree that the future use of this property must remain commercial even though it is currently zoned commercial and it is adjacent to a railroad line.

Comment 26: A PRP disagreed that the contaminated aquifer requires pumping and treating by stating that there is no evidence of the need in the FS. It was further stated that although state and community acceptance may modify EPA's evaluation criteria, the "limited informed public involvement" in the remedy selection process at the Site does not warrant the selection of any remedy other than institutional controls.

Response 26: Since the groundwater underlying OU1 of the site is contaminated, the pump and treat is the only remedy that meets the threshold criteria of protection of human health and the environment and compliance with ARARs. GaEPD has classified the aquifer underlying the Marzone Site as a potential drinking water aquifer. Drinking water must meet certain standards which are either established Maximum Contaminant Levels (MCLs), non-zero MCL goals or an appropriate risk-based level for those chemicals without MCLs. Contaminated groundwater must be treated to these standards at this Site.

Comment 27: A PRP claimed that the bioremediation option for soil cleanup is warranted but that the selection of a more expensive soil and subsurface soil remedy at the Site would add nothing to the Site remedy other than targeting cleanup levels to residential use, a use that is "clearly prohibitive."

Response 27: EPA disagrees with the commentors statement. The low temperature thermal desorption remedy outweighs the bioremediation remedy in more that just its ability to remediate soils to a level appropriate for residential land use. Low temperature thermal desorption can be implemented in approximately one year while bioremediation may take 3 to 7 years. Low temperature thermal desorption is a proven technology; it has been used in the past to break down pesticide contaminated soil. The biofarming/composting alternative is innovative and has never been used. Thermal desorption is a proven technology, and it will be easier to implement. These criteria outweigh the cost factor when evaluating remedies.

Comment 28: A commentor requested that the groundwater remedy include language which would require the remedy to be changed if a new, more effective alternative would become available in the future.

Response 28: Under the NCP, EPA is required to complete a review of the remedy after a 5 year period. At that time if EPA determines that the remedy is ineffective or needs modification, a ROD amendment can be issued. Also, if new information becomes available at any time that may affect the selected remedy, EPA can, if appropriate, issue a ROD amendment to modify the remedy.

Comment 29: A commentor requested that if biofarming didn't work EPA should consider chemical treatment rather than thermal desorption; chemical treatment would yield less risk to the community than thermal desorption. The concern was that nearby residents should not be unfairly impacted by the cleanup.

Response 29: EPA agrees that nearby residents should not be unfairly impacted by the cleanup, however, chemical treatment is not a permanent remedy and hence not preferred over low temperature thermal desorption. Moreover, the chemical treatment remedy would entail transport of either treated or untreated material through the community and therefore would also impact the community. If soil treatment were to occur on-site, the risks posed would be similar to thermal desorption.

Comment 30: A commentor stated that the composting/landfarming plan was too vague in some respects and requested additional information on the bioremediation parameters be included in the ROD.

Response 30: The ROD has been refined and low temperature thermal desorption was determined to be is the final remedy selected for soil remediation at Marzone OU1. Therefore the detailed information about bioremediation is not necessary.

Comment 31: A commentor stated that one of the ARARs for the remedy is the Georgia Hazardous Site Response Act, O.C.G.A. §12-8-93(b), Chapter 391-3-19, that identifies soil cleanup standards for corrective action.

Response 31: Cleanup standards contained in the regulations promulgated pursuant to the Georgia Hazardous Site Response Act are not ARARs for the remedy at OU1 of the Marzone Site because CERCLA stipulates that a State's cleanup standards must be "timely identified" to be ARARs. The NCP contemplates that this need for timeliness requires ARAR-identification to occur during the early stages of the comparative analysis of alternatives; the purpose of the requirement is to avoid a duplication of efforts and inordinate delays in the cleanup. The State's regulatory requirements for corrective action under the Hazardous Site Response Act were not adopted until well after EPA's Baseline Risk Assessment was finalized, became effective only after the Feasibility Study Report was issued, and were identified to EPA subsequent to publication of the proposed plan and the public meeting.

The selected remedy remains protective of human health and the environment even though the ROD does not contemplate or require a cleanup of each contaminant at OU1 of the Marzone Site to levels that might be required under the State's new corrective action regulations. In addition, exclusion of the State's corrective action requirements as an ARAR for this ROD due to "timeliness" should not necessarily exempt any person otherwise subject to the Hazardous Site Response Act from the requirements contained in the State's new regulations.

Comment 32: A PRP commented that the acceptability of the selected remedy to the community is extremely important to its successful implementation. It stated that "[b]y all accounts, the public meeting held in July was less than successful in communicating the pros and cons of the various remedies. Many of the people present were more interested in cash settlements than site cleanup. The hysterical nature of the meeting inhibited more thoughtful, moderate feedback. Many other interested elements of the Tifton community were not represented. Given the small size of Tifton (14,000 residents), we strongly urge EPA to seek out input from a wider cross section of the community, including nearby residents, business, academia, city and county government, and the farm community. We believe that it is imperative that the community provide "informed consent" to EPA's selected remedy. Otherwise, we run a tremendous risk of opposition and litigation which may stall the implementation of the selected remedy. Especially if the selected remedy is Thermal desorption. We believe that because this technology is a variant of incineration, an informed community will oppose it."

Response 32: The comments received by EPA, both verbally and in writing, on the proposed remedy for OU1 of the Marzone Site, were from a broad cross section of the interested public. This is a result of the extensive community outreach EPA has conducted in the Tifton and Tift County area of Georgia. A summary of this community outreach is presented in the overview section of this responsiveness summary. In essence, EPA has conducted four public meetings in the past eight months to inform and update the community on the activities of the Marzone Site including discussions of cleanup alternatives. Two distinct meetings were set up just for the purpose of discussing the cleanup alternatives for the Marzone Site. In addition, EPA has met with the local government of Tifton on two separate occasions to inform and update them on the activities of the Marzone Site. One of those two meetings was specifically for the purpose of informing them of EPA's proposed remedy at OU1. EPA has had numerous telephone and personal conversations with interested persons regarding the cleanup. These interested persons have ranged from current nearby residents, to scientists, to member of environmental organizations, to member of Tifton neighborhood organizations; all of which have submitted comments on EPA's proposed plan. Over twenty comment letters were submitted by the interested public and over 200 people attended the public meeting held on July 26, 1994. Previous meeting have also yielded over 100 attendees. This is more than the usual participation for an NPL Site in Region IV.

Also, EPA placed two full page advertisements in the Tifton Gazette announcing the public comment period and public meeting. Another two full page advertisements were run when EPA extended the comment period for the proposed plan. EPA sent four videos addressing the suite of remedies evaluated for OU1, including low temperature thermal desorption, to the Neighborhood Services Center in Tifton. It is our understanding that interested parties have viewed these videos. EPA has provided the community with various handouts addressing the suite of alternatives evaluated for the OU1 cleanup. Hundreds of these handout have been distributed and received by the community. EPA has gone above and beyond requirements to reach all segments of the community and interested parties with regards to the activities at the Marzone Site. A repository has been set up in the Tifton Library which contains important documentation about the remedy at the Site. The librarian indicated that the repository was being used by the community.

One commentor could not endorse the thermal desorption plan, yet another commentor, a nearby resident, stated that the low temperature thermal desorption remedy sound fine as long as there is no risk of explosion or any form of radiation. Of course all measures will be taken to ensure that an explosion never occurs, and radiation is not a threat at this site. Therefore, EPA believes the comments and concerns regarding the cleanup at OU1 of the Site were from a broad cross section of a well informed public.

RECORD OF DECISION

APPENDIX B
STATE CONCURRENCE LETTER

Marzone, Inc./Chevron Chemical Company Site
Tift County, Georgia

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
404/656-7802

September 30, 1994

Ms. Joanne Benante
Remedial Project Manager
South Superfund Remedial Branch
U.S. Environmental Protection Agency
Region IV
345 Courtland Street, N.E.
Atlanta, Georgia 30365

RE: Interim Record of Decision (ROD)
Marzone NPL Site

Dear Ms. Benante:

This correspondence shall confirm receipt of the July 25, 1994 "Draft Record of Decision for Operable Unit 1 of the Marzone/Chevron Superfund Site in Tifton, Georgia," received by the Environmental Protection Division (EPD) on July 27, 1994. Based on the review of the latest modification to the draft Interim ROD, the EPD concurs with those selected remedies set forth in the Interim ROD but must defer concurrence of the specific performance standards identified in the selected remedies.

Remedies acceptable to the EPD for contaminated soil and groundwater within that area specified as Operable Unit 1 of the Marzone/Chevron Superfund Site are as follows:

- Extraction of contaminated groundwater with subsequent treatment prior to infiltration through an infiltration gallery. Spent carbon filters generated by the treatment process shall be transported off-site. Infiltration of treated groundwater shall further facilitate the extraction of contaminated groundwater. Groundwater monitoring shall be implemented to determine the effectiveness of the remedy as well as to assure effective groundwater treatment prior to infiltration.

- Excavation of contaminated soil with subsequent treatment using Low Temperature Thermal Desorption. Treated uncontaminated soil will remain on-site. Contaminated residues generated by the treatment process shall be transported off-site to an authorized incinerator.

Under the terms and conditions of CERCLA Section 121(d)(2)(ii) and the NCP, "timely identification" of pertinent provisions of the Georgia Rules for Hazardous Site Response, Chapter 391-3-19 et. seq. ("the Rules") as Applicable or Relevant and Appropriate Requirements (ARARs) was not possible given that during the formative stages of the Feasibility Study, the Rules had yet to become formally adopted or officially effective. In this instance, in an effort to expedite source removal, prevent further migration of contaminants from this site, prevent inordinate delays in the clean-up and avoid duplication of effort, the EPD does not intend to identify specific performance standards set forth in the Georgia Rules for Hazardous Site Response as ARARs for those selected remedies at Operable Unit 1 of the Marzone/Chevron Superfund Site.

Ms. Joanne Benante
September 30, 1994
Page Two

Should you require further clarification, please contact Andrew Taft at (404) 656-7802.

Sincerely,

Harold F. Reheis
Director

HFR/at

File: Marzone (B)
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