



Superfund Record of Decision:

Monsanto, GA



REPORT DOCUMENTATION PAGE	1. REPORT NO. EPA/ROD/R04-91/080	2.	3. Recipient's Accession No.
Title and Subtitle SUPERFUND RECORD OF DECISION Monsanto, GA First Remedial Action - Final		5. Report Date 12/07/90	6.
7. Author(s)	8. Performing Organization Rept. No.		
9. Performing Organization Name and Address	10. Project/Task/Work Unit No.		
	11. Contract(C) or Grant(G) No. (C) (G)		
12. Sponsoring Organization Name and Address U.S. Environmental Protection Agency 401 M Street, S.W. Washington, D.C. 20460	13. Type of Report & Period Covered 800/000		
	14.		
15. Supplementary Notes			
16. Abstract (Limit: 200 words) <p>The 75-acre Monsanto site is a former industrial plant located three miles southeast of Augusta, Georgia. Land use in the area is predominantly industrial, with a wetland area located approximately 4,570 feet from the site. In addition, the site is approximately three miles from the Savannah River, an important source of water for the Augusta area. The plant began operations in 1962. From 1966 to 1974, approximately 1500 pounds of arsenic were placed in two onsite landfills. The landfills were covered with soil, crowned with gravel, seeded with grass, and closed in 1971 and 1977, respectively. Ground water investigations conducted in 1979 and 1980 by Monsanto identified arsenic in the surficial aquifer in excess of the Federal MCL. In 1983, Monsanto, through a State action, excavated the materials in the landfills and disposed of them offsite. Soil samples collected from the bottom of the excavated area did not exceed the EP toxicity standard for arsenic. This final Record of Decision (ROD) addresses ground water contamination. The primary contaminant of concern affecting the ground water is arsenic, a metal.</p> <p>(See Attached Page)</p>			
17. Document Analysis a. Descriptors Record of Decision - Monsanto, GA First Remedial Action - Final Contaminated Medium: gw Key Contaminant: metals (arsenic) b. Identifiers/Open-Ended Terms c. COSATI Field/Group			
18. Availability Statement	19. Security Class (This Report) None	21. No. of Pages 58	
	20. Security Class (This Page) None	22. Price	

EPA/ROD/R04-91/080
Monsanto, GA
First Remedial Action - Final

Abstract (Continued)

The selected remedial action for this site includes monitoring ground water to evaluate compliance with Ground Water Protection Achievement Levels (GPALs); pumping and discharging ground water to an offsite publicly owned treatment works (POTW), in the event that non-compliance with GPALs occurs; monitoring ground water for two years following EPA's acceptance that the MCL has been attained. The estimated present worth cost for this remedial action is \$600,000.

PERFORMANCE STANDARDS OR GOALS: The chemical-specific and GPAL ground water cleanup goal for arsenic is 0.05 mg/l based on SDWA MCLs.



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION IV

345 COURTLAND STREET, N.E.
ATLANTA, GEORGIA 30365

MEMORANDUM

DATE: May 30, 1991

SUBJECT: Monsanto Superfund Site - Augusta, Georgia
Record of Decision Signature Date

FROM: Jim McGuire, RPM
South Superfund Remedial Branch

TO: File

This memorandum serves to document the signature date for the Record of Decision (ROD) for the Monsanto Superfund site in Augusta, Georgia. The signature date on the ROD is December 7, 1991. The actual date the ROD was signed by Mr. Patrick Tobin was December 7, 1990.

DECLARATION FOR THE RECORD OF DECISION

Site Name and Location:

Monsanto Superfund Site - Augusta, Georgia

Statement of Basis and Purpose:

This decision document presents the selected remedial action for the Monsanto Superfund site in Augusta, Georgia, developed in accordance with the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendment and Reauthorization Act of 1986 (SARA), and to the extent practicable, the National Contingency Plan (NCP), March 8, 1990. The selection of the remedial action presented in this document is based on the administrative record for the Monsanto site. The attached index identifies the items that comprise the administrative record (Appendix A).

The State of Georgia has concurred on the selected remedy.

Assessment of the Site:

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

Description of the Selected Remedy:

Upon review of the information contained in the administrative record, it is EPA's judgment that the selected remedy best serves the selection criteria in CERCLA and the NCP in relation to the other options evaluated. A detailed description of this groundwater remedy and an explanation of how it meets statutory requirements is contained in the attached "Summary of Remedial Alternative Selection".

The major components of the selected remedy include:

- * Continue quarterly groundwater monitoring during the design of the selected remedy to determine compliance with the Groundwater Protection Achievement Levels (GPALs);
- * Should the annual average of the levels as determined by the quarterly monitoring exceed the GPALs, extraction of groundwater which exceeds the Primary Drinking Water Standard for arsenic will commence;

- * Discharge extracted groundwater for treatment at a Publicly Owned Treatment Works (POTW);
- * Groundwater monitoring for a minimum of two (2) years following the achievement of the Maximum Contaminant Level (MCL).

Declaration:

The selected remedy is protective of human health and the environment, attains Federal and State requirements that are applicable or relevant and appropriate to the remedial action, and is cost effective. The remedy satisfies the statutory preference for remedies that employ treatment as a principal element to reduce toxicity, mobility, or volume and utilizes permanent solutions and alternative treatment (or resource recovery) technologies to the maximum extent practicable. Because this remedy will not result in hazardous substances remaining onsite above drinking water criteria, the five-year review will not apply to this action.

December 7, 1991

DATE

Patricia M. Burns
for Greer C. Tidwell
Regional Administrator

**RECORD OF DECISION
SUMMARY OF REMEDIAL ALTERNATIVE SELECTION**

**MONSANTO SUPERFUND SITE
AUGUSTA, GEORGIA**

**Prepared by:
U.S. Environmental Protection Agency
Region IV
Atlanta, Georgia**

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Summary of Remedial Alternative Selection
Monsanto Superfund Site

1.0 SITE LOCATION AND DESCRIPTION

The Monsanto Superfund site is located approximately three miles southeast of Augusta, Georgia. The site is bordered on the north by Marvin Griffin Road, on the east by the Norfolk and Southern Railroad, on the south by Butler Creek and on the west by other industrial properties (Figure 1). Phinizy Swamp is located approximately 4,570 feet northeast of the site. The Monsanto plant covers approximately 75 acres. Within the plant's boundary, two landfills covering 0.2 acres that were used to dispose of phosphoric acid sludge. The landfills are located along the eastern boundary of the Monsanto plant property.

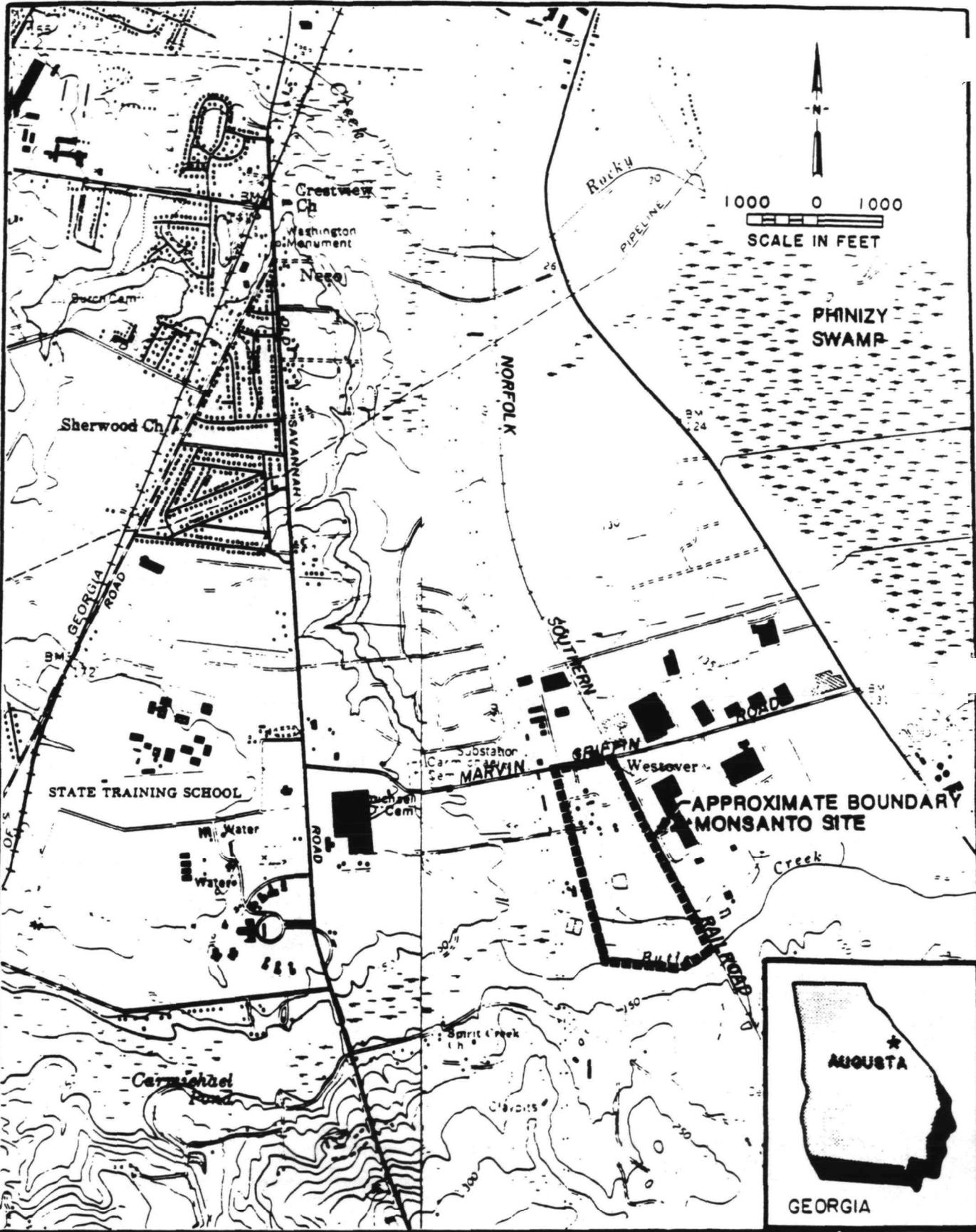
The site is located in an industrial park which is zoned for heavy industrial use. Within a three mile radius of the site, land is zoned commercial, residential and industrial. The nearest residential area is one-half mile northwest of the site. Surface elevations across the site range from 140 to 146 feet above Mean Sea Level (MSL).

2.0 SITE HISTORY AND ENFORCEMENT

The Monsanto-Augusta Plant has been in operation since 1962. From 1966 to 1974, two landfills (0.1 acre each), approximately six feet deep, were used to dispose of solid waste and sludges which contain arsenic trisulfide. Arsenic trisulfide is a waste resulting from the preparation of food grade phosphoric acid. Plant officials estimate approximately 1500 pounds of arsenic were placed in these landfills. In 1971, Landfill #1 was covered with soil, crowned with gravel and seeded with grass. In 1977, Landfill #2 was closed by Monsanto in the same manner as Landfill #1.

The site was first identified by the Georgia Environmental Protection Division (EPD) in August 1975. In June 1979, Monsanto, under the supervision of the EPD, began monitoring the quality of the groundwater south of the site. In February 1980, at the request of EPD, Monsanto installed additional monitoring wells and collected twenty-three soil samples on the site. The groundwater monitoring program revealed arsenic levels in the surficial aquifer exceeding the Federally regulated drinking water standard (i.e. Maximum Contaminant Level or MCL) for arsenic of 0.05 mg/l.

During November 1983, Monsanto, under the supervision of EPD, excavated the waste from both of the landfills. The material excavated from the landfills was transported to a RCRA permitted landfill in Emelle, Alabama. After the contents of the landfills were removed, soil samples were collected from the bottom of the



SITE LOCATION MAP
MONSANTO SITE
AUGUSTA, GEORGIA

FIGURE
 1

excavated area and tested for Extraction Procedure (EP) toxicity for arsenic and other metals. EP toxicity is a test used to identify wastes that are likely to leach hazardous concentrations of toxic substances and to determine if a contaminant is a characteristic hazardous waste. The soil from the bottom of the excavated area did not exceed the EP toxicity standard for arsenic of 5.0 ppm.

In September 1984, the Monsanto site was added to the National Priority List (NPL). The NPL comprises hazardous waste sites which appear to present a significant risk to human health or the environment. Sites are placed on the NPL if they have a ranking score of 28.50 or greater. The Monsanto site was ranked at 35.65.

On January 18, 1989, EPA issued a special notice letter to Monsanto to give Monsanto the opportunity to conduct, with EPA oversight, the Remedial Investigation (RI) and Feasibility Study (FS). Monsanto entered into an Administrative Order on Consent for performance of the RI/FS, with an effective date of April 27, 1989.

Fieldwork for the RI was initiated by Monsanto in October 1989 and completed in January 1990. The final RI report was accepted by EPA on August 20, 1990. The FS report was submitted to EPA by Monsanto on September 16, 1990.

EPA will continue its enforcement activities and will send a Special Notice Letter to Monsanto prior to the initiation of the remedial design for the selected remedial action. Should Monsanto decline to conduct future remedial activities, EPA will either take additional enforcement actions or provide funding for these activities while seeking cost recovery for all EPA-funded response actions at this site.

3.0 HIGHLIGHTS OF COMMUNITY PARTICIPATION

A Community Relations Plan was prepared by EPA in December 1988. In October 1989, EPA printed and distributed a fact sheet describing the activities to be conducted during the RI and FS. An informal meeting was held by EPA on October 20, 1989, to address concerns the public may have had regarding the site investigation.

The Proposed Plan for the Monsanto Superfund site was released to the public on October 30, 1990. The administrative record, which contains documents relating to the remedy selection at the site, including the RI/FS Reports and the Proposed Plan, was made available to the public at the Region IV EPA Office in Atlanta, Georgia and the Augusta-Richmond County Library in Augusta, Georgia. The notice of

availability of the administrative record was published in the Augusta Chronicle and Herald on November 1, 1990. A public comment period was held from November 1, 1990 to November 30, 1990. In addition, a public meeting was held on November 14, 1990 at the Augusta - Richmond County Library. At this meeting, representatives from EPA and the State of Georgia Environmental Protection Division answered questions about the facts surrounding the site. A response to the comments received during this period is included in the Responsiveness Summary, which is part of this Record of Decision (Appendix B). This decision document presents the selected remedy for the Monsanto Superfund site in Augusta, Georgia, chosen in accordance with CERCLA, as amended by SARA, and to the extent practicable, the NCP. The decision for this site is based on the administrative record.

4.0 SCOPE OF REMEDIAL ACTION

This is the first and final planned remedial action for this site. The remedial action selected at this site would protect human health and the environment from potential exposure to the arsenic contaminated groundwater in the surficial aquifer. The objectives for the remedy are to minimize the migration of contamination from the onsite landfills towards Phinizy Swamp and the underlying Cretaceous aquifer (also known as the Tuscaloosa aquifer), as well as to restore the groundwater in the surficial aquifer to drinking water quality for arsenic.

Following the attainment of the drinking water standard, groundwater monitoring will continue for a minimum of two years. Should this monitoring detect elevated contaminant levels from the Monsanto site, EPA will evaluate the need for additional remedial action. In addition, EPA will re-evaluate the effectiveness of this remedy should the drinking water standard for arsenic be revised.

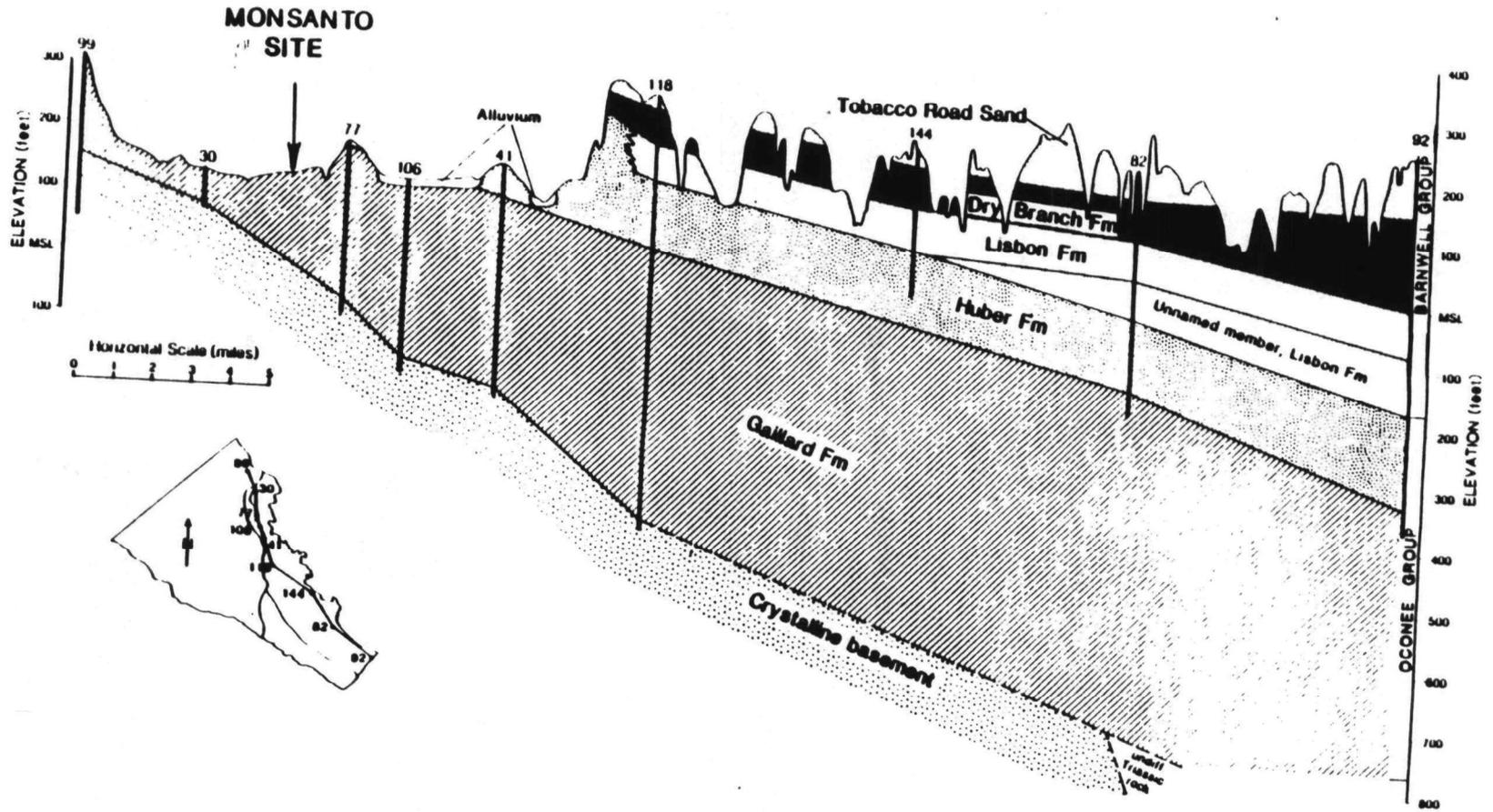
5.0 SITE CHARACTERISTICS

5.1 GEOLOGY

The Monsanto site is located just south of the Fall Line in the Atlantic Plain Major Division, Coastal Plain physiographic province. The site is underlain by recent alluvium and Cretaceous sediments. The alluvium deposits consist of sand and gravel to clay and sandy clay. Underlying the alluvium and outcropping in parts of the site area is the Cretaceous age Gaillard Formation (Figure 2). The Gaillard Formation is composed of interbedded sand, gravel and clay layers.

MONSANTO SITE

GEOLOGIC CROSS SECTION



SOURCE: GORDAY, 1985

FIGURE NO.

2

5.2 HYDROGEOLOGY

Two distinct water bearing zones are present beneath the Monsanto site. A surficial aquifer which occurs in the alluvium deposits and the Cretaceous aquifer which occurs in the Gaillard Formation. The surficial aquifer extends from the surface to a depth of 70 feet. The saturated thickness of this aquifer is approximately 50 feet. The surficial aquifer is separated from the underlying Cretaceous aquifer by a 40 foot layer of clay. The Cretaceous aquifer has an average thickness of 110 feet and extends from beneath the 40 foot thick confining clay layer to bedrock (Figure 3).

Groundwater in the surficial aquifer moves in an easterly direction towards Phinizy Swamp, located one mile from the site, at a rate of 0.9 feet per day. The transmissivity of this shallow water bearing zone is 10,750 gallons per day per foot. In the underlying Cretaceous aquifer, groundwater also flows in an easterly direction. The transmissivity of this zone is significantly greater than the surficial aquifer (17,000 to 130,000 gallons per day per foot); therefore, most wells in the area are developed in this deeper zone. There are no known downgradient wells in the surficial aquifer being used as drinking water sources within a one mile radius from the site.

5.3 SURFACE WATER

The two main bodies of surface water which are proximate to the Monsanto Superfund site are Butler Creek and Phinizy Swamp. Butler Creek, southeast of the site, marks the southern boundary of the Monsanto plant property. The creek is used for fishing; however, it is not a source of drinking water. Butler Creek, after accepting the City of Augusta Publicly Owned Treatment Works (POTW) outfall, flows through the southwest edge of Phinizy Swamp and finally into the Savannah River approximately three miles southeast of the site. The Savannah River is an important source of water and transportation for the Augusta area.

5.4 SAMPLING RESULTS

The primary emphasis for analytical testing during the RI was placed on determining the impact the two onsite landfills may have had on the environment at the site, including the effect on soil, surface water, sediment, air, and groundwater. Specifically, the analytical testing program was developed to detect the presence of arsenic. A summary of the arsenic levels detected for each media sampled in the RI is provided on Table 1. A supplemental sampling effort was conducted by EPA in June 1990 to determine whether other contaminants were present in soils and the groundwater. The results of the June 1990 sampling effort are presented on Table 2.

Eighteen surficial soil samples were collected on the Monsanto property as well as on the adjacent property towards the east during

FIGURE 3

GENERALIZED STRATAGRAPHIC SECTION
Monsanto Superfund Site
Augusta, Georgia

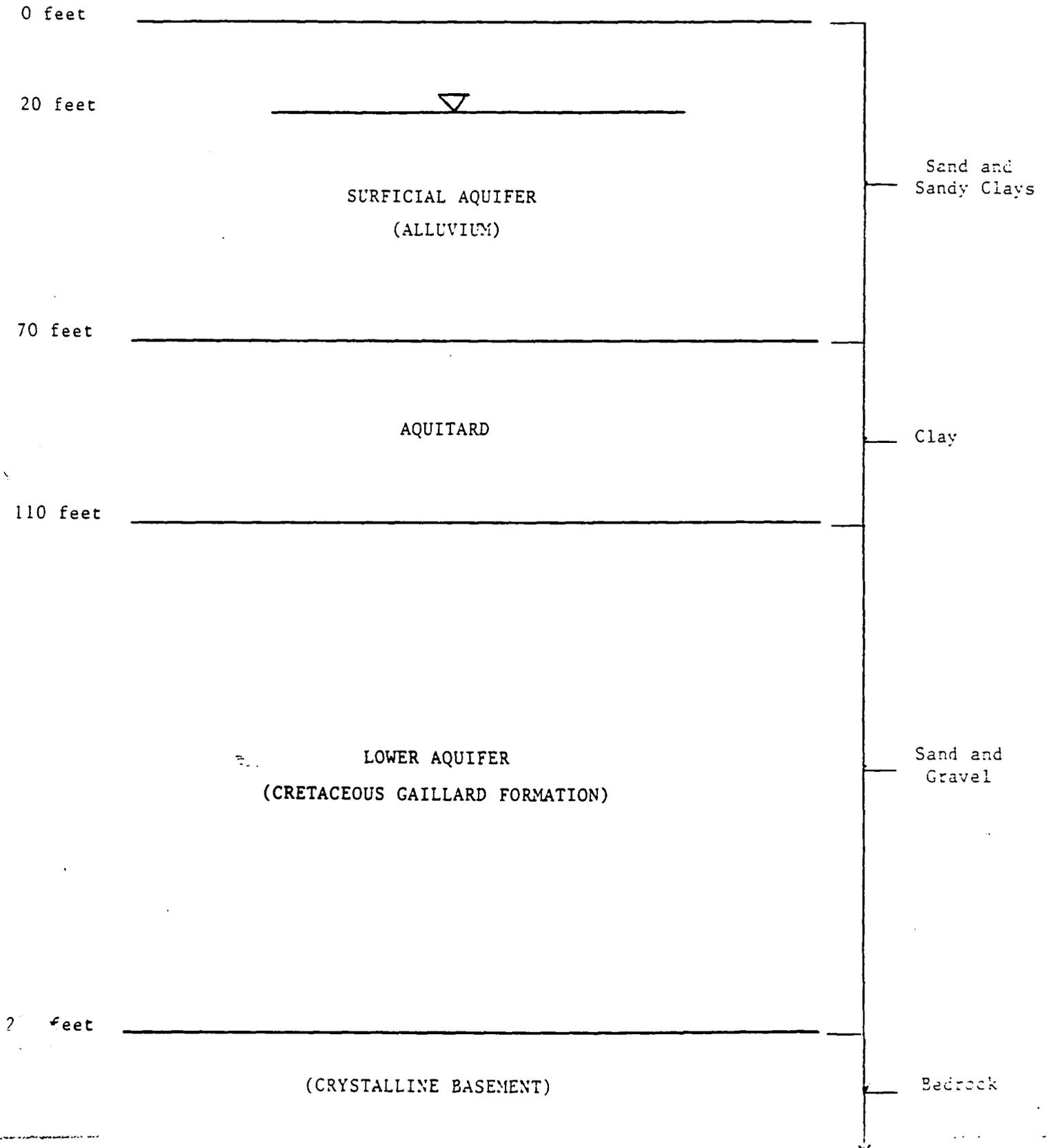


TABLE 1

ARSENIC CONCENTRATIONS IN SAMPLED MEDIA

MEDIA SAMPLED	NUMBER OF SAMPLES	ARSENIC CONCENTRATIONS	BACKGROUND CONCENTRATIONS
SOILS (mg/kg)	43	<0.75 ⁽¹⁾ - 8.9	2.6 (mean) 10.7 (max) ⁽²⁾
SURFACE WATER (ug/l)	8	<10 ⁽¹⁾	<10 ⁽¹⁾
SEDIMENT (mg/kg)	23	<0.99 ⁽¹⁾	5 - 4,000 ⁽³⁾
RUNOFF WATER (ug/l)	4	<10 ⁽¹⁾	<10 ⁽¹⁾
AIR ₃ (ug/m ³)	20	<2.85x10 ⁻⁴ ⁽¹⁾	2x10 ⁻³ (4)
GROUNDWATER (ug/l)	40	5 - 85 ⁽⁵⁾	25 ⁽⁵⁾

(1) Limit of Detection

(2) Carey/Wiersma, 1972

(3) Wilson/Hawkins, 1978

(4) Avg. 24-hr. Ambient Air Arsenic Levels, U.S. National Academy of Sciences (NAS 1977)

(5) Remedial Investigation, 1990

TABLE 2
ANALYTICAL DATA SUMMARY
MONSANTO NPL SITE
AUGUSTA, GEORGIA
JUNE, 1990

INORGANIC ELEMENTS	SB-01 SOIL mg/kg	SB-02 SOIL mg/kg	MW-17 WATER µg/l	MW-35 WATER µg/l
ALUMINUM	11000	12000	8500	21000
ARSENIC	3.4	4.9	69	80
BARIUM	62	46	14	36
BERYLLIUM	--	0.50	--	--
CADMIUM	--	11	--	--
CHROMIUM	36	80	18	38
COBALT	--	1.2	--	--
COPPER	6.0	3.5	--	16
LEAD	3.8	7.4	--	--
MANGANESE	15	73	15	17
MERCURY	--	0.12	--	--
NICKEL	--	5.4	--	--
STRONTIUM	29	20	--	21
TITANIUM	130	1000	68	160
VANADIUM	34	33	180	430
YTRIUM	2.5	9.1	--	17
ZINC	6.4	25	60	18
	mg/kg	mg/kg	mg/l	mg/l
CALCIUM	150	1200	2.0	2.8
IRON	18000	6500	4.8	12
MAGNESIUM	140	710	0.31	0.44
SODIUM	--	3900	190	300
POTASSIUM	--	240	--	--
CYANIDE	--	--	--	--
EXTRACTABLE ORGANICS	µg/kg	µg/kg	µg/l	µg/l
3 UNIDENTIFIED COMPOUNDS	--	7000JN	--	--
PETROLEUM PRODUCTS	--	--	N	N
BUTYLIDENE BIS(4-DIMETHYL- ETHYL)METHYLPHENOL	--	--	--	5JN
VOLATILE ORGANICS	--	--	--	--
PESTICIDES/PCB's	--	--	--	--

Footnote:

- - Material analyzed for but not detected
- N - Presumptive evidence of presence of material
- J - Estimated value

the RI. Subsurface soil borings were also collected to depths of thirty six feet at ten locations. A supplemental sampling effort, conducted by EPA in June 1990, served to collect subsurface soil samples from Landfill #2 at 6 foot and 8.5 foot depths. The RI samples were analyzed for arsenic and were found to be at either near background or nondetectable levels. Samples collected during the June 1990 sampling effort were analyzed for the Target Compound List parameters. The results of the June 1990 sampling effort did not indicate elevated contaminant levels. Based on the soil data collected during the RI and the June 1990 field effort, further soil remediation is not necessary.

Surface water and stream sediment samples were collected from six locations along Butler Creek. In addition, storm water runoff was collected from the site at five locations. None of the samples collected during the RI showed arsenic levels above the detection limit.

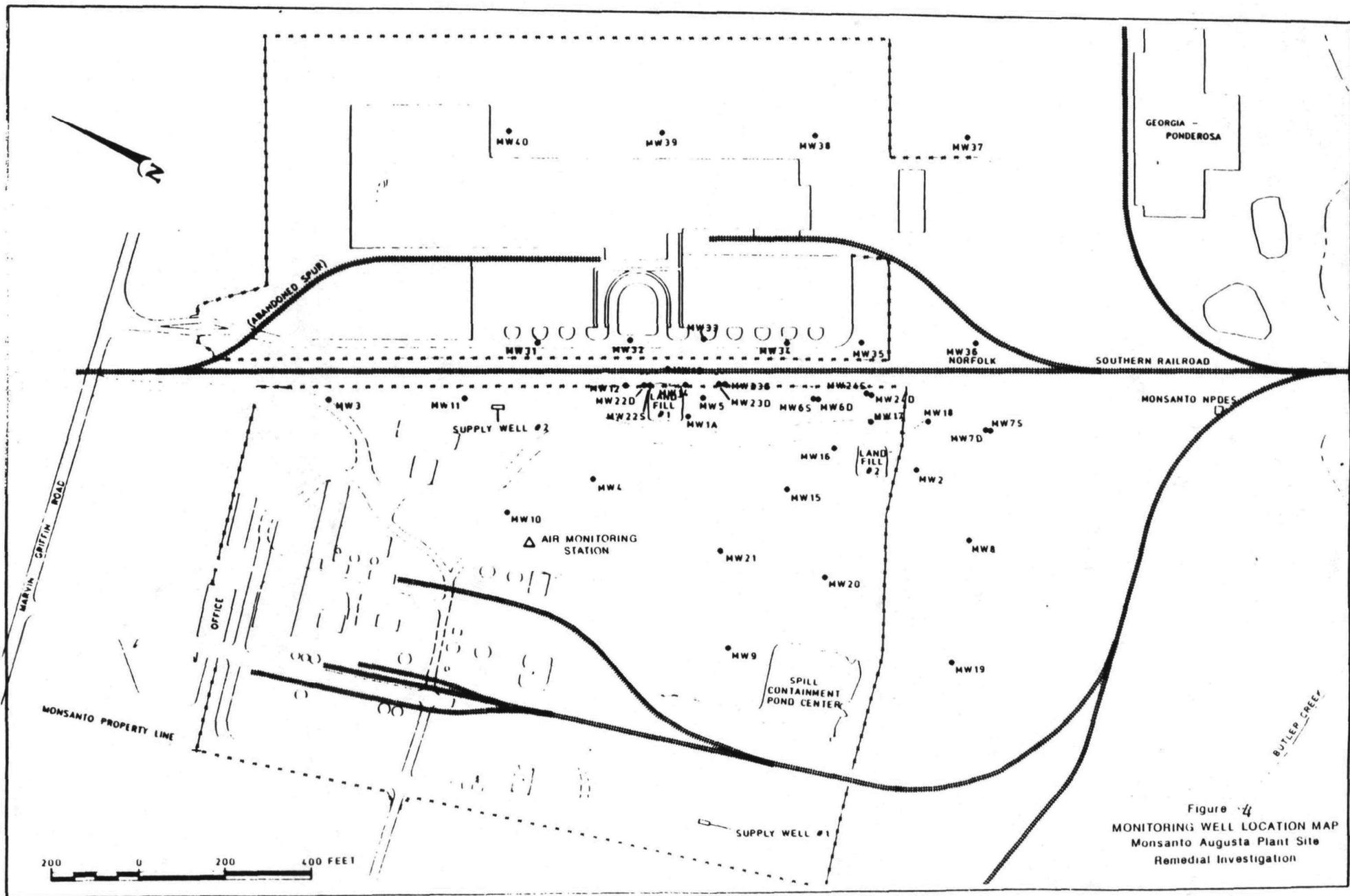
Air monitoring conducted onsite during the installation of several monitoring wells during the RI did not indicate a threat to human health or the environment. Analysis of an air monitoring station sample did not indicate arsenic levels above the analytical detection limit.

Thirty-nine wells have been installed at the site in the surficial aquifer to determine the extent of arsenic contamination. Well locations are shown on Figure 4. Of the wells sampled, only two exceeded the Federally regulated drinking water standard (ie., MCL) for arsenic of 0.05 mg/l during the RI. The arsenic concentrations observed that exceeded the MCL were 0.06 mg/l and 0.085 mg/l in monitoring wells MW-17 and MW-35, respectively, both of which are in the surficial aquifer. Figure 5 depicts the estimated extent of arsenic contamination in the surficial aquifer which exceeds the current drinking water standard. The volume of arsenic contaminated groundwater is estimated to be 7.7 million gallons.

The results of the sampling effort during the RI, along with hydrogeologic parameters developed from pumping tests and slug tests were used to predict future arsenic levels within the surficial aquifer. To project future movement of the arsenic plume, a model was developed. The modeling indicates the arsenic plume is moving downgradient towards Phinizy Swamp at a flow rate of 0.3 feet per day. As shown in Figure 6, the modeled core of the plume is expected to dissipate to below drinking water standards by the year 1995. Within ten years, the model predicts the plume will have diminished to background. Based on the model, there will be no site related discharge of the arsenic contamination into Phinizy Swamp.

6.0 SUMMARY OF SITE RISKS

The assessment of risk posed by the Monsanto site was evaluated in a site specific risk assessment dated September 1990. This assessment



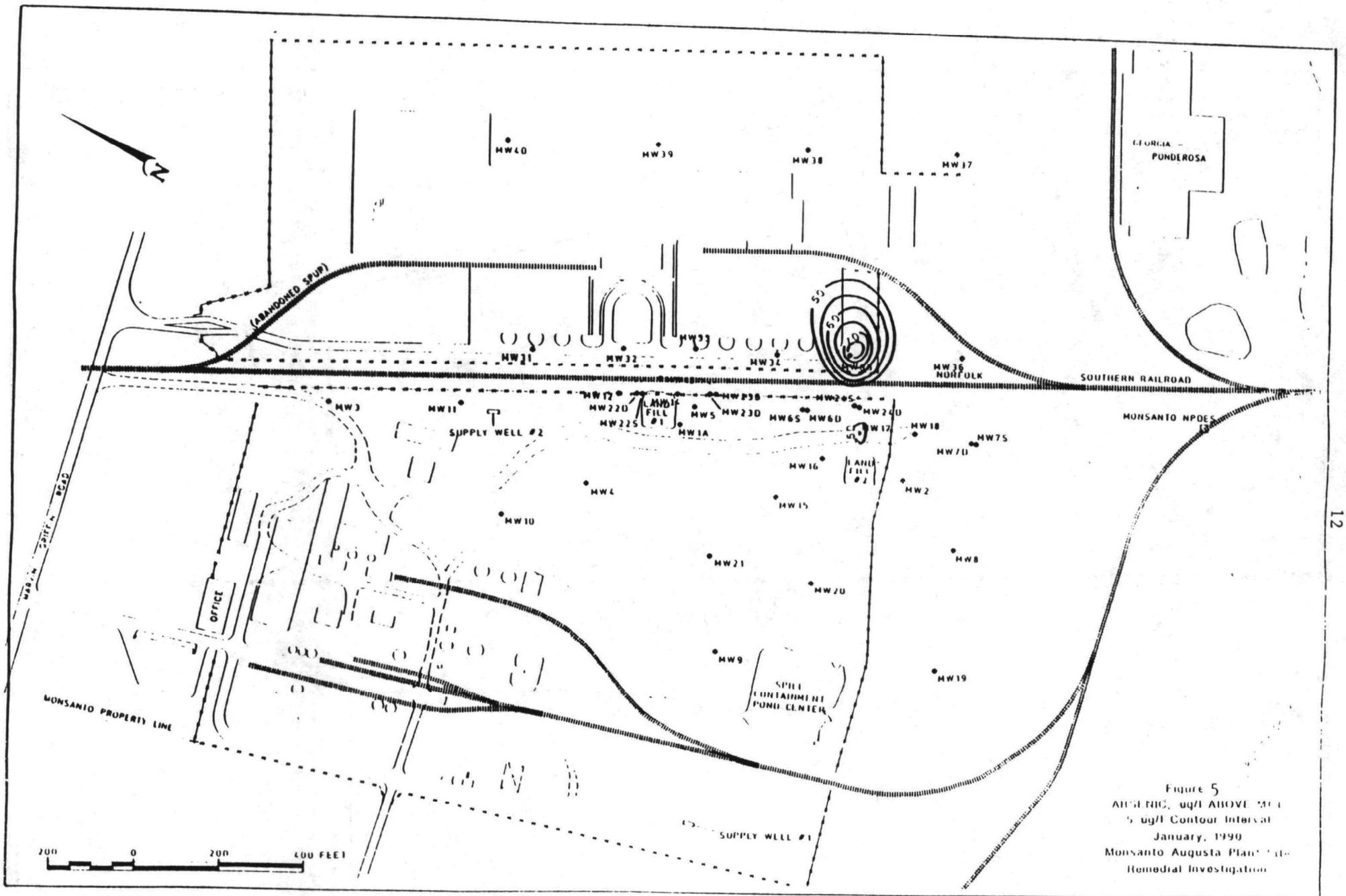
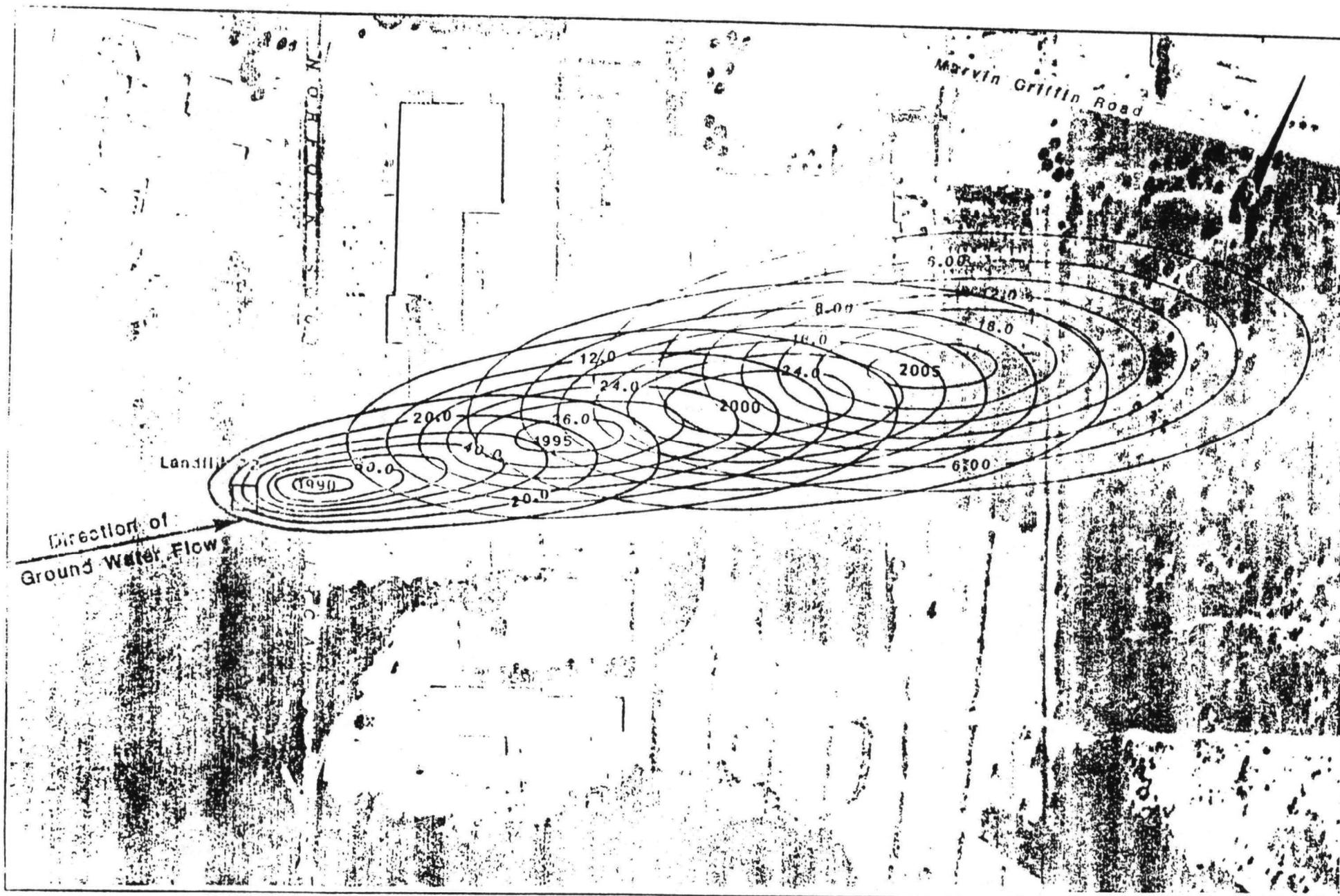


Figure 5
 Arochl. Contour Interval
 5 ug/l Contour Interval
 January, 1990
 Monsanto Augusta Plant
 Remedial Investigation



0 200 400 600 800 1000 Feet
 Contours in micrograms per liter

Figure 6
 PREDICTED PLUME MIGRATION 1990 - 2005
 Monsanto Augusta Plant Site

examined the amount, concentration, properties, environmental fate and transport of the arsenic found at the site, and the populations and environments potentially at risk. The risks associated with the Monsanto site were calculated based on current and future exposure scenarios. The numerical cancer risk values are theoretical quantifications of the excess lifetime cancer risk, that is, the increased probability of contacting cancer as a result of exposure to wastes, compared to the probability if no exposure occurred. For example, a 10^{-6} excess cancer risk represents an exposure that could result in one extra cancer case per million people exposed. The 10^{-6} risk level is considered the goal for remediation at Superfund sites [40 CFR 300.430 (e)(2)(i)(A)(2)].

6.1 IDENTIFICATION OF THE CONTAMINANT OF CONCERN

Based on the historical information relating to the site, sampling results from the RI as well as supplemental sampling conducted in June 1990, arsenic was selected to serve as the contaminant of concern at this site. No other compounds, either organic or inorganic, were detected with either sufficient frequency or concentration during the sampling events.

6.2 EXPOSURE ASSESSMENT SUMMARY

Exposure assessment is the estimation of the magnitude, frequency, duration, and routes of exposure to humans. Exposure to the arsenic contaminated groundwater beneath the Monsanto Superfund site was evaluated based on current and future use scenarios. Based on the RI results, the only source of potential arsenic exposure at the Monsanto site (including the adjacent landowners) is the surficial aquifer beneath the site. Evaluation of all other media (soil, surface water, air) on and near the site, indicated background or non-detectable arsenic levels.

Under current land use conditions, no exposure to humans is occurring due to incomplete exposure pathways. The closest residential area is approximately one half mile northwest of the site and is hydrogeologically upgradient. Downgradient from the site there are no wells which are used to obtain water from the surficial water bearing zone. Water supply wells are completed in the underlying Cretaceous aquifer; however, interconnection between the two water bearing zones has not been demonstrated during previous pumping tests. The point of discharge for the upper zone is Phinizy Swamp. Groundwater modeling projections indicate that the arsenic concentration in the groundwater will be below the limit of detection prior to reaching this discharge point. Groundwater sampling indicates the plume is currently limited to the Monsanto and adjacent properties.

To address future use scenarios, conservative exposure assumptions were developed by EPA. In conducting the exposure assessment, the

focus was on the health effects that could result from ingestion of arsenic contaminated groundwater by adults working within the impacted area. The assessment was limited to exposure via the workplace, rather than long term daily exposure, since the site is located in an industrial setting. Exposure was based upon a worker consuming one liter of water per day, 250 days per year from the well currently containing the maximum contaminant concentration (MW-35). As a result of contaminant dissipation, arsenic levels in MW-35 are expected to decline. Projections of the maximum future exposure point concentrations can be found in Table 3. Exposure duration was developed based on the full length of time arsenic concentrations in MW-35 remain above the MCL (0.05 mg/l) as well as above background concentrations (0.025 mg/l).

6.3 TOXICITY ASSESSMENT SUMMARY

Potential effects of chronic exposure to noncarcinogenic compounds are assessed by comparing the exposure levels with Reference Dose (RFD) levels. The RFD is an estimate of the average daily intake that will result in no adverse health effects. Currently EPA's Integrated Risk Information System does not list any RFDs for arsenic. The primary health effect concern relating to exposure to arsenic is cancer.

Arsenic is classified as a Group A human carcinogen. This means that there is evidence that arsenic is carcinogenic in humans. Ingestion of arsenic is associated with increased incidence of skin cancer. Unlike noncarcinogens, carcinogens do not have threshold exposure levels which will result in no adverse health effects. Rather, cancer potency factors (CPF) are developed for estimating the excess lifetime cancer risks associated with exposure to carcinogens. The excess cancer risk is a function of the CPF and the exposure dose. The CPF proposed for arsenic is $1.75 \text{ (mg/kg/day)}^{-1}$.

6.4 RISK CHARACTERIZATION SUMMARY

Risk characterization involves combining the results of the exposure and toxicity assessments to develop a numerical estimate of health risk. Risk is a probability that is generally expressed in scientific notation (i.e. 1×10^{-6}). An excess cancer risk of 1×10^{-6} indicates that an individual has a one in one million chance of developing cancer as a result of site related exposure to a carcinogen based on the specific exposure conditions at the site. EPA has established a range of 10^{-4} to 10^{-6} for individual cancer risk.

As stated in the exposure assessment, there currently exists no exposure pathways to the contaminated groundwater. However, projected future exposure through ingestion of the contaminated groundwater at the workplace was calculated. Based on intake values from exposure to levels in excess of the MCL, the cumulative risk was 4.15×10^{-5} . The risk associated with exposure to above background

TABLE 3

PROJECTED ARSENIC CONCENTRATIONS MONITORING WELL 35

<u>Year</u>	<u>Concentrations (ppb)</u>
1990	85.0† (71.6)‡
1991	53.0‡
1992	32.0‡
1993	25.0*

† Actual field data January, 1990

‡ Projected concentrations from PLUME model

* Background

concentrations was 4.76×10^{-5} . It should be noted, risk assessments rely on toxicity extrapolation and modeled exposure estimates; therefore, conservative assumptions are used to evaluate the worst reasonable situation. Although, based on the limited exposure scenario considered reasonable at the Monsanto site, consumption of the arsenic contaminated groundwater falls within the risk range; the levels exceed the Federally regulated drinking water standard (i.e. MCL) for arsenic of 0.05 mg/l.

6.5 ENVIRONMENTAL RISK SUMMARY

Since the arsenic contamination is limited to the groundwater, direct contact by environmental receptors does not occur at the present time. Modeling indicates that at the point of discharge to the environment, Phinizy Swamp, arsenic levels will be at background levels.

Based on the industrial exposure scenario, the risk associated with human ingestion of the contaminated groundwater at the workplace should fall within the established risk range. A risk based remediation level was not established for groundwater restoration since there currently exists an applicable or relevant and appropriate requirement for arsenic (i.e. MCL). The MCL, as established by the Safe Drinking Water Act, represents an enforceable standard to regulate the maximum permissible level of a contaminant in public drinking water supplies. Wells with values above drinking water standards are not suitable for use as a lifetime drinking water supply. The MCL of 0.05 mg/l is exceeded in two wells downgradient from Landfill #2 (MW-17 and MW-35). Because these wells exceed the MCL, continued 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.

7.0 DESCRIPTION OF ALTERNATIVES

Four alternatives were considered for remediation of the arsenic contaminated groundwater at the Monsanto Superfund site. The alternatives are evaluated in detail in the Feasibility Study Report. All of the alternatives, except the "No Action" alternative require continued quarterly monitoring of the groundwater to reevaluate the plume boundary and post remediation monitoring to verify the effectiveness of the remedial action.

7.1 ALTERNATIVE 1 - NO ACTION

The Superfund program requires the "No Action" alternative be considered at every site [Section 300.430 (e) of the National Contingency Plan]. The no action alternative serves as a baseline with which the other alternatives can be compared. Under the no action alternative, EPA would take no further action at the site to control or minimize the migration of the arsenic contaminated

groundwater. Since no additional groundwater monitoring will be conducted, wells currently at the site would be decommissioned as part of the no action alternative. The present worth cost associated with this alternative is approximately \$71,000.

7.2 ALTERNATIVE 2 - ESTABLISH AN INTERIM ALTERNATE CONCENTRATION LIMIT

Remedial action alternative 2 involves the establishment of an interim level of remediation, or alternate concentration limit (ACL), which is protective of human health and the environment. An ACL may be developed when there is a known point of entry of the groundwater into a surface water body, there is no increase of site related contaminants at the point of entry, and there are enforceable measures to preclude human exposure to the contaminated groundwater between the site and the point of entry [CERCLA 121 (d)(2)(B)(ii)]. The ACL criteria are met at the Monsanto site. The point of entry of the groundwater is Phinizy Swamp. The RI Report predicts no increase in the level of arsenic in the swamp due to the discharge of the groundwater into the swamp. Groundwater restrictions would be negotiated with downgradient landowners to preclude exposure to the contamination in the surficial aquifer.

The ACL would be an interim action level until the MCL is obtained through natural dissipation. Arsenic levels in MW-35 would be monitored on a quarterly basis to ensure the ACL was not exceeded at any time during the attenuation period. In addition, numerous wells in the area of the current plume of contamination would be monitored for continued compliance with the MCL. These wells would be designated during the design phase prior to site remediation. Exceedances of the MCL in any of these wells for two consecutive quarters would require a re-evaluation of the remedy's protectiveness. Groundwater use restrictions, to be obtained during the design phase, would be necessary for the duration of arsenic levels associated with the Monsanto site that remain above the MCL. Following the attainment of the MCL at the site, monitoring would continue for a minimum of two years to verify the effectiveness of the remedy.

Based on the modeling effort conducted during the RI, the remediation goal of the MCL will be attained at the core of the plume within 5 years (1995). The present worth cost of alternative 2 is approximately \$250,000. This cost includes the two year post remediation monitoring as well as post remediation well plugging.

7.3 ALTERNATIVE 3 - PUMP AND DISCHARGE

Alternative 3 includes the design of an extraction well system to remove the contaminated groundwater from the surficial aquifer. The extracted groundwater would be discharged to the City of Augusta's

POTW to reduce the arsenic concentrations to the MCL. If, during the design of this alternative, a determination is made that the POTW discharge is not feasible, an equivalent discharge method would be developed. The extraction system would operate until the MCL is obtained at the site for two consecutive quarterly sampling events. Groundwater use restrictions on the surficial aquifer and site access would be required during this period.

Following the attainment of the MCL for three consecutive quarters, groundwater sampling would continue for two additional years to monitor the success of the remedial action. Groundwater samples would be collected from monitoring wells designated during the remedial design.

During the design of the extraction well system, quarterly groundwater monitoring would continue. The initiation of the construction activities may be deferred based on the results of the quarterly sampling effort conducted during the remedial design. GPALs have been established by EPA based on the future contaminant levels predicted by the modeling effort in the RI Report. Failure to meet the annual GPAL specified on Table 4 for MW-35, as well as MW-17, would require the immediate initiation of the construction phase for the remedial action. In addition, any verified exceedances of the MCL in the monitoring wells other than MW-17 and MW-35 would require the initiation of construction activities. Exceedances of the MCL during a single quarterly sampling effort would be confirmed by EPA during the subsequent quarter's sampling. However, as long as the GPALs are achieved, the construction phase would be deferred.

The total present worth cost for this alternative is approximately \$600,000. This cost includes the design, construction and implementation of the remedial action as well as decommissioning the wells. Assuming construction is initiated immediately following the remedial design, the duration for these activities is estimated to be 4 years. The cost also includes 2 additional years of post remediation monitoring.

7.4 ALTERNATIVE 4 - PUMP AND TREAT ONSITE

This alternative is similar to Alternative 3 except the extracted groundwater would be treated onsite rather than at the POTW. Treatability studies would be required, as part of the design, to evaluate the most effective technology to reduce the arsenic concentration in the contaminated groundwater. Achievement of the GPALs as specified on Table 4 would defer the initiation of the construction phase of the remedial action. Non-compliance with the GPALs may require the initiation of construction activities. Onsite

TABLE 4

GROUNDWATER PROTECTION ACHIEVEMENT LEVELS

Monitoring Wells (MW) 17 and 35

<u>Year</u>	<u>Concentration (ug/l)</u>
1991	71.6
1992	53.0
1993 and thereafter	50.0

Wells other than MW-17 and 35

1991 and thereafter	50.0
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treatment may generate a hazardous treatment sludge. Tests would be conducted to determine the nature of the sludge from a particular treatment unit. Treatment sludge would be collected and stabilized, if necessary. The sludge would then be transported to a permitted, off-site, commercial facility for land disposal. The surficial aquifer would be recharged by the treated groundwater from the effluent from the treatment unit.

Estimated present worth costs for the onsite treatment of the arsenic contaminated groundwater is approximately \$1,500,000. The timeframe for site remediation is similar to Alternative 3.

8.0 SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES

This section of the ROD provides the basis for determining which alternative provides the best balance with respect to the statutory balancing criteria in Section 121 of CERCLA and in Section 300.430 of the NCP. The major objective of the FS was to develop, screen, and evaluate alternatives for remediating the Monsanto Superfund site. Several remedial technologies were identified for groundwater restoration. These technologies were screened based on their feasibility with respect to the contaminants present and the site characteristics.

The technologies that remained after the initial screening were evaluated in detail. EPA has established nine criteria for evaluating potential remedial alternatives. A glossary of these evaluation criteria is provided in Table 5. These evaluation criteria have been divided into three groups based on the function of the criteria in remedy selection. The first two criteria on Table 5 are threshold criteria. These two criteria relate to statutory requirements that each alternative must satisfy in order to be eligible for selection. The next five criteria are balancing criteria. These are technical criteria upon which the detailed analysis is primarily based. The final two criteria on Table 5, known as modifying criteria, assess the public's and state agency's acceptance of the alternative. Based on these final two criteria, EPA may modify aspects of the specific alternative.

A summary of the relative performance of the alternatives with respect to each of the nine criteria is provided in this section. A comparison is made between each of the alternatives for achievement of a specific criterion.

8.1 OVERALL PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT

All of the alternatives, with the exception of the "No Action" alternative, would provide protection of human health and the environment by eliminating or controlling exposure to contaminated

TABLE 5

GLOSSARY OF EVALUATION CRITERIA

Overall Protection of Human Health and the Environment - addresses whether or not a remedy provides adequate protection and describes how exposure to the contaminated groundwater would be eliminated or controlled through treatment or institutional controls.

Compliance with ARARs - addresses whether or not a remedy will meet all of the applicable or relevant and appropriate requirements of other Federal and State environmental statutes and/or provides grounds for invoking a waiver.

Short Term Effectiveness - refers to the level of protection the remedy would achieve during the construction and implementation period as well as the remedy's potential to create adverse impacts on human health and the environment during this same period.

Long Term Effectiveness - refers to the ability of a remedy to maintain reliable protection of human health and the environment over time once the drinking water standard has been met.

Reduction of Toxicity, Mobility, or Volume Through Treatment - is the anticipated performance of the treatment technologies that may be employed in a remedy.

Implementability - is the technical and administrative feasibility of a remedy.

Cost - includes capital and operation and maintenance costs. The costs are reported as present worth cost.

Community Acceptance - is assessed in the Responsiveness Summary in Appendix C of this Record of Decision. The Responsiveness Summary was developed based on comments received during the comment period for this remedial action.

State Acceptance - indicates whether the State of Georgia concurs with, opposes, or has no comment on the preferred alternative.

groundwater through treatment or institutional controls. The No Action alternative fails to provide any controls to restrict exposure to the contaminated groundwater. Alternative 2 relies on institutional controls for protection until contaminant levels naturally dissipate to levels below the MCL. Alternatives 3 and 4 rely on treatment to eliminate exposure by actively remediating the groundwater if deemed necessary based on non-compliance with GPALs.

8.2 COMPLIANCE WITH APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARs)

Although based on modeling conducted during the RI arsenic levels are projected to naturally attenuate to below the ARAR for potential drinking water sources (i.e. MCL), alternative 1 provides no measures to verify the potential reduction nor would there be any contingency plans. Alternatives 2, 3, and 4 would all comply with potential Federal and State ARARs.

8.3 SHORT TERM EFFECTIVENESS

The No Action alternative would not be effective as unrestricted usage of impacted surficial aquifer could occur since no groundwater controls would be implemented. The interim ACL alternative (#2) would provide short term effectiveness to human health through restricting usage of the contaminated groundwater. As with the interim ACL alternative, the active restoration alternatives (#3 and 4) would require controls be placed on groundwater usage during site remediation. Should the GPALs not be complied with during the design period, Alternatives 3 and 4 would rely on an extraction well system to intercept the arsenic plume; thus minimizing the migration of the plume.

8.4 LONG TERM EFFECTIVENESS AND PERMANENCE

The long term objective for remediating the arsenic contaminated groundwater is the attainment of the MCL. All of the alternatives are projected to achieve the MCL through either treatment or natural dissipation. However, since monitoring would not be conducted as part of the No Action alternative, verification of the potential attainment of the MCL would not be possible.

8.5 REDUCTION OF MOBILITY, TOXICITY OR VOLUME THROUGH TREATMENT

Although contaminant levels at the core of the plume are projected to dissipate over a 5 year period, the No Action alternative would not provide any verification of this reduction. Alternative 2 also relies on natural dissipation to reduce mobility, toxicity or volume; however, reductions would be monitored. While treatment is not incorporated into Alternative 2, a reduction of arsenic, through natural dissipation, is expected to occur with this alternative.

Although the reduction would be verified, this alternative does not provide for the immediate active restoration should natural dissipation not occur. The extraction well system required with Alternatives 3 and 4, should attainment of the GPALs not be achieved during the design phase of the project, would minimize the migration of the plume. The treatment process would remove the arsenic contamination from the surficial aquifer.

8.6 IMPLEMENTABILITY

The No Action alternative is relatively easy to implement since it simply involves plugging the existing wells. The interim ACL remedy requires continued quarterly monitoring during the estimated duration of the project. Although Alternative 3 (groundwater extraction and POTW discharge) requires the design of the extraction well system, the extraction well system would not be innovative and construction activities would not be difficult. Onsite treatment of the arsenic contaminated groundwater would be more difficult to implement in comparison with the other alternatives. Although the extraction well system would not be innovative, the construction and operation of an onsite treatment unit would be more difficult than Alternative 3.

8.7 COST

The present worth cost of each alternative includes the capital cost, annual remediation operation and maintenance, and annual post remediation operation and maintenance. All estimated costs assume 10% interest per year for the entire duration of the project. The cost associated with the No Action alternative (\$71,000) is for the decommissioning of the existing monitoring wells. Alternative 2 has a higher cost compared to alternative 1 since quarterly monitoring will continue for an extended period of time. The total present worth cost for the interim ACL action is \$250,000. The present worth cost of alternative 3 (POTW discharge) is \$600,000. Alternative 4 (onsite treatment) has a present worth cost of \$1,500,000. Alternatives 3 and 4 both require the design and construction of the extraction well system; however, Alternative 4 also includes costs associated with the construction and operation of the treatment unit.

8.8 COMMUNITY ACCEPTANCE

Based on comments received during the public comment period, the community was opposed to the No Action alternative and the establishment of an ACL (Alternative 2). The community favors active restoration to reduce the arsenic levels in the groundwater to the drinking water standard and supports the selection of Alternative 3.

8.9 STATE ACCEPTANCE

The State of Georgia (Environmental Protection Division) has also stated a preference for active restoration at the Monsanto site. The State has concurred with the selection of alternative 3 as the preferred alternative for the remediation of the arsenic contaminated groundwater associated with the Monsanto site (Appendix C).

9.0 SELECTED REMEDY

EPA's preferred alternative for the protection of human health and the environment at the Monsanto site is alternative 3, which consists of the continued monitoring of arsenic levels in the surficial aquifer to evaluate compliance with GPALs, extraction of contaminated groundwater and discharge the groundwater to the POTW should non-compliance with GPALs occur. The remediation level will be the MCL enforced by EPA prior to the completion of the remedial design (MCL is currently 0.05 mg/l). In addition, the alternative involves post remediation monitoring for a minimum of two years following EPA's acceptance the MCL has been attained.

Arsenic contamination of the surficial aquifer is currently limited to two monitoring wells directly downgradient of Landfill #2. During the design phase of the project, monitoring on a quarterly basis (January, April, July and October) will continue such that EPA will continue to re-evaluate the boundary of the plume. The data obtained from MW-35 and MW-17 during each monitoring event will be averaged annually and compared with the annual GPAL on Table 4. Should the arithmetic annual average arsenic level in either MW-35 or MW-17 exceed the GPAL for that year, the initiation of construction activities will be required following the completion of the remedial design. In addition, should EPA verify the detection of arsenic concentrations in excess of the MCL in any of the remaining wells, construction of the remedy will be required. Compliance with the GPALs may defer or eliminate the need for the initiation of construction activities.

During the remedial design, access will be obtained from downgradient landowners impacted by the expanding plume. Access will be necessary to install extraction wells and distribution lines, to conduct quarterly groundwater monitoring and to service the extraction well system during site remediation. Design activities will also include obtaining permission to discharge the wastewater to the POTW. Since the maximum arsenic levels are over ten times less than the level currently accepted by the POTW, this discharge method is preferred. However, should difficulties arise during the design in obtaining POTW acceptance, an equivalent discharge method will be incorporated into the remedial design.

Based on current information, the selected remedy provides the best

balance of the nine criteria that EPA uses to evaluate each remedial alternative for this site. The rationale for selecting Alternative 3 includes:

- * Alternative 3 provides short and long term protection of human health and the environment from potential threats associated with direct contact (ingestion) of the contaminated groundwater, and
- * Alternative 3 provides for immediate initiation of active restoration should the GPALS not be achieved at the site.

10.0 STATUTORY DETERMINATIONS

The USEPA has determined that this remedy will satisfy the statutory requirements of Section 121 of CERCLA by providing protection of human health and the environment, attaining ARARs, providing cost effectiveness, and utilizing permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable.

10.1 PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT

The selected remedy adequately protects human health by reducing the arsenic levels in the surficial aquifer currently in excess of the drinking water standard (MCL) of 0.05 mg/l. The remedy also relies on groundwater use restrictions to prohibit the usage of the contaminated groundwater until the MCL is attained. Should construction activities be required, protection of human health and the environment will be accomplished through the minimization of the migration of the plume via the extraction well system and arsenic reduction.

10.2 ATTAINMENT OF APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

Remedial actions performed under CERCLA, as amended by SARA, must comply with all ARARs or provide a justifiable waiver. The selected remedy for the Monsanto site was found to attain the ARARs.

This remedy assures that, following site remediation, the surficial aquifer beneath the Monsanto site boundary (which includes adjacent property impacted by the groundwater contamination) will meet the MCL which is being enforced by EPA at the completion of the remedial design. The MCL is an ARAR under the Federal Safe Drinking Water Act as well as the Georgia Safe Drinking Water Act. In addition to the MCL, the remedial action will be designed consistent with the requirements of an existing permit [HW-074(S)] issued by the State of Georgia under the Resource Conservation and Recovery Act (RCRA) as well as the City of Augusta's pretreatment standards for wastewater discharges to the POTW (Ordinance 5148). The intent of the State of

Georgia's Groundwater Use Rules will be complied with under this action since groundwater extraction is anticipated; however, permits are not required for onsite Superfund actions [40 CFR 300.400(e)]. All activities conducted under this remedial action will be performed in accordance with the Federal Occupational Safety and Health Administration Act (OSHA).

10.3 COST EFFECTIVENESS

The present estimated cost of EPA's selected remedy is \$600,000. Cost effectiveness is determined by comparing the costs of all alternatives being considered with their overall effectiveness to determine whether the costs are proportional to the effectiveness achieved. The selected remedy, Alternative 3, although more costly than Alternatives 1 and 2, provides a higher degree of protectiveness. EPA has determined that the costs of the selected remedy are proportionate to the overall effectiveness; therefore, the remedy is considered cost effective.

10.4 UTILIZATION OF PERMANENT SOLUTIONS AND ALTERNATIVE TREATMENT TECHNOLOGIES TO THE MAXIMUM EXTENT PRACTICABLE

EPA has determined that the selected remedy provides the best balance among the nine evaluation criteria for the four alternatives evaluated. The selected remedy provides protection of human health and the environment, reduces the mobility of the plume, and is cost effective. The remedy, when complete, will be permanent. The remedy represents the maximum extent to which permanent solutions and treatment can be practicably utilized to remediate the Monsanto site.

10.5 PREFERENCE FOR TREATMENT AS A PRINCIPAL ELEMENT

The statutory preference for treatment will be met by the selected remedy. The remedy relies on active groundwater restoration rather than natural attenuation. The surficial aquifer contaminated with arsenic will be treated, as required by pretreatment standards, or treated at the POTW.

11.0 DOCUMENTATION OF SIGNIFICANT CHANGES

EPA issued a Proposed Plan (preferred alternative) for remediation of the site on October 30, 1990. The selected remedy does not differ from the Proposed Plan.

APPENDIX A

ADMINISTRATIVE RECORD INDEX

**Monsanto Superfund Site
Augusta, Georgia**

ADMINISTRATIVE RECORD INDEX

for the

MONSANTO CO NPL Site

1.0 PRE-REMEDIAL

1.8 Preliminary Assessment Documents

1. "Potential Hazardous Waste Site - Identification and Preliminary Assessment" Form, EPA Region IV (December 6, 1979).

1.9 Site Inspection Documents

1. "Inventory and Evaluation - Tract Located Between Georgia Highway 56 and Central Georgia Railroad," Philip S. Hadarits, USDA-Soil Conservation Service (March 25, 1980).
2. "Potential Hazardous Waste Site - Site Inspection Report" Form, EPA Region IV (June 20, 1980).
3. "Potential Hazardous Waste - Tentative Disposition" Form, EPA Region IV (October 1, 1980).
4. "Potential Hazardous Waste Site - Final Strategy Determination" Form, EPA Region IV (November 2, 1980).

1.10 Expanded Site Inspection Documents

1. Memorandum from Dan Thoman, EPA Region IV to David Melgaard, EPA Region IV (April 26, 1988). Concerning QA/QC overview of Dames and Moore personnel at the Monsanto Company Site in Augusta, Georgia.
2. Memorandum from Roger E. Carlton, EPA Region IV Environmental Services Division, Athens, Georgia to David Melgaard, EPA Region IV (August 31, 1988). Concerning attached Monsanto Company Field Investigation Report.
3. "Field Investigation Report - Monsanto NPL Site - Augusta, Richmond County, Georgia," EPA Region IV (August 7, 1990).

2.0 REMOVAL RESPONSE

2.2 Sampling and Analysis Data

The Sampling and Analysis Data for the Removal Response may be reviewed, by appointment only, at EPA Region IV, Atlanta Georgia, and at EPA Region IV Environmental Services Division, Athens Georgia.

1. Letter from George D. Rozelle, Monsanto Company to Jennifer Kaduck, Georgia Environmental Protection Division (December 27, 1979). Concerning attached interim geological/hydrological report on the two on-site landfills at Monsanto's Augusta Plant.

2.8 Removal Response Reports

1. "Report - Soil Sampling and Testing of Existing Landfills - Augusta, Georgia Facility for Monsanto Chemical Company," Dames & Moore (December 22, 1983).
2. Letter from George D. Rozelle, Monsanto Company to J. Leonard Ledbetter, Georgia Environmental Protection Division (December 28, 1983). Concerning completion of the excavation, transportation and disposal at the Monsanto Company Site in Augusta, Georgia.
3. "Draft - Monsanto Chemical Company - August, Georgia - Landfill Removal Project," Monsanto Chemical Company (October 1986).
4. "Report - Hydrologic Slug - Testing of Monitoring Wells Two Former Landfill Areas, Augusta, Georgia for Monsanto Chemical Company," Dames & Moore (March 5, 1987).
5. Letter from George D. Rozelle, Monsanto Chemical Company to Brian A. Donaldson, EPA Region IV (December 14, 1987). Concerning meeting to discuss status of the fate and transport modeling work and progress on the landfill cleanup evaluation project.
6. "Monsanto - Augusta, GA - Landfill Cleanup Project Conclusions," Georgia Department of Natural Resources (February 22, 1988).
7. "Augusta Arsenic Fate and Transport Study," Monsanto Company (August 1, 1988).

2.8 Removal Response Reports (cont'd.)

8. Memorandum from David Melgaard, EPA Region IV to File, EPA Region IV (August 27, 1988). Concerning attached memo from Camp, Dresser and McKee, Inc.

3.0 REMEDIAL INVESTIGATION (RI)

3.1 Correspondence

1. Letter from Meredith Clarke Anderson, EPA Region IV to G.F. Benjamin, Monsanto Chemical Company (August 8, 1986). Concerning the listing of the Monsanto Company Site on the Environmental Protection Agency's (EPA) National Priorities List (NPL).
2. Letter from Meredith Clarke Anderson, EPA Region IV to George D. Rozelle, Monsanto Chemical Company (October 20, 1986). Concerning results of the initial review of background information and data on the Monsanto Company Site.
3. Letter from Meredith Clarke Anderson, EPA Region IV to George D. Rozelle, Monsanto Chemical Company (November 28, 1986). Concerning results of the November 12, 1986 meeting between EPA Region IV and Monsanto Chemical Company.
4. Letter from George D. Rozelle, Monsanto Chemical Company to Meredith Clarke Anderson, EPA Region IV (December 8, 1986). Concerning the delisting of Monsanto Company Site in Augusta, Georgia.
5. Memorandum from G. Behrens, Camp, Dresser and McKee, Inc. to D. Lawton, Camp, Dresser and McKee, Inc. (March 25, 1987). Concerning Monsanto Sampling Trip Report.
6. Letter from James E. McGuire, EPA Region IV to Addressees, EPA Region IV (May 29, 1990). Concerning request for peer review of the Monsanto Company Site draft Remedial Investigation Report.
7. Letter from James E. McGuire, EPA Region IV to James Lee, United States Department of the Interior (May 29, 1990). Concerning request for review of the Monsanto Company Site draft Remedial Investigation Report.
8. Letter from James E. McGuire, EPA Region IV to Jennifer Kaduck, Georgia Environmental Protection Division (July 26, 1990). Concerning transmittal of the draft Remedial Investigation Report for the Monsanto Company Site.

3.2 Sampling and Analysis Data

The Sampling and Analysis Data for the Remedial Investigation may be reviewed, by appointment only, at EPA Region IV, Atlanta Georgia, and at the EPA Region IV Environmental Services Division, Athens, Georgia.

1. Letter from David Melgaard, EPA Region IV to George D. Rozelle, Monsanto Chemical Company (April 26, 1988). Concerning verification of the sampling and analytical methods used at the Monsanto Company Site in Augusta, Georgia.
2. Memorandum from David Melgaard, EPA Region IV to Doug Lair, EPA Region IV (June 23, 1988). Concerning probable cross contamination of samples from the Monsanto Company Site in Augusta, Georgia.
3. Letter from David Melgaard, EPA Region IV to George D. Rozelle, Monsanto Chemical Company (June 23, 1988). Concerning EPA's comments on sampling collection procedures at the Monsanto Company Site in Augusta, Georgia.
4. Cross-Reference: "Monsanto - Augusta Plant Site - RI/FS Final Work Plan," Dames & Moore (July 26, 1989). [Filed and cited as entry number 10 in 3.4 REMEDIAL INVESTIGATION (RI) - Work Plans and Progress Reports]
5. "Arsenic, Sodium, Total Phosphorus CLP Protocol," Savannah Laboratories and Environmental Services, Inc. for Dames & Moore (January 1990).
6. Analytical Report from Savannah Laboratories and Environmental Services, Inc. to Dale P. Voykin, Dames & Moore (January 9, 1990). Concerning analytical results of liquid samples from the Monsanto Company Site in Augusta, Georgia.
7. Memorandum from Wade Knight, EPA Region IV to David B. Abbott, EPA Region IV (March 12, 1990). Concerning data package from the Potentially Responsible Parties' (PRP) laboratory, Savannah Laboratories and Environmental Services, Inc.
8. Memorandum from David W. Hill, EPA Region IV to David B. Abbott, EPA Region IV (March 14, 1990). Concerning Arsenic Equilibrium Modeling for Well MW-35 at the Monsanto Company Site in Augusta, Georgia.

3.4 Work Plans and Progress Reports

1. Memorandum from David W. Hill, EPA Region IV to David B. Abbott, EPA Region IV (June 14, 1989). Concerning review of the RI/FS Work Plan for the Monsanto Company Site in Augusta, Georgia.
2. Letter from David B. Abbott, EPA Region IV to Betsy A. Briggs, Dynamac Corporation (June 14, 1989). Concerning review of the RI/FS Work Plan for the Monsanto Company Site in Augusta, Georgia.
3. Memorandum from Rebecca Fox, EPA Region IV to David B. Abbott, EPA Region IV (June 16, 1989). Concerning review of the RI/FS Work Plan for the Monsanto Company Site in Augusta, Georgia.
4. Letter from David B. Abbott, EPA Region IV to George D. Rozelle, Monsanto Company (June 23, 1989). Concerning review of the RI/FS Work Plan for the Monsanto Company Site in Augusta, Georgia.
5. Letter from Roger E. Carlton, EPA Region IV Environmental Services Division, Athens, Georgia to Douglas Mundrick, EPA Region IV (June 26, 1989). Concerning review of the RI/FS Work Plan for the Monsanto Company Site in Augusta, Georgia.
6. Memorandum from Lee Page, EPA Region IV to Douglas Mundrick, EPA Region IV (July 5, 1989). Concerning review of the RI/FS Work Plan for the Monsanto Company Site in Augusta, Georgia.
7. Letter from Joe Hughart, Agency for Toxic Substances and Disease Registry (ATSDR) to David B. Abbott, EPA Region IV (July 6, 1989). Concerning review of the RI/FS Work Plan for the Monsanto Company Site in Augusta, Georgia.
8. Memorandum from Winston A. Smith, EPA Region IV to Patrick M. Tobin, EPA Region IV (July 10, 1989). Concerning review of the RI/FS Work Plan for the Monsanto Company Site in Augusta, Georgia.
9. Letter from Charles T. Allen, Dames & Moore to David B. Abbott, EPA Region IV (July 21, 1989). Concerning response to comments on the RI/FS Work Plan for the Monsanto Company Site in Augusta, Georgia.
10. "Monsanto - Augusta Plant Site - RI/FS Final Work Plan," Dames & Moore (July 26, 1989).

3.4 Work Plans and Progress Reports (cont'd.)

11. Letter from David B. Abbott, EPA Region IV to George D. Rozelle, Monsanto Company (August 29, 1989).
Concerning review of the Final RI/FS Work Plan for the Monsanto Company Site in Augusta, Georgia.
12. Letter from George D. Rozelle, Monsanto Company to David B. Abbott, EPA Region IV (September 6, 1989).
Concerning monthly progress report for August 1989.
13. Letter from George D. Rozelle, Monsanto Company to David B. Abbott, EPA Region IV (October 5, 1989).
Concerning monthly progress report for September 1989.
14. Letter from George D. Rozelle, Monsanto Company to David B. Abbott, EPA Region IV (November 9, 1989).
Concerning monthly progress report for October 1989.
15. Letter from George D. Rozelle, Monsanto Company to David B. Abbott, EPA Region IV (December 7, 1989).
Concerning monthly progress report for November 1989.
16. Letter from George D. Rozelle, Monsanto Chemical Company to David B. Abbott, EPA Region IV (December 18, 1989). Concerning Landfill Delisting Project and Work Plan Interpretation.
17. Letter from George D. Rozelle, Monsanto Company to David B. Abbott, EPA Region IV (January 8, 1990).
Concerning monthly progress report for December 1989.
18. Letter from George D. Rozelle, Monsanto Company to David B. Abbott, EPA Region IV (February 5, 1990).
Concerning monthly progress report for January 1990.
19. Letter from George D. Rozelle, Monsanto Company to David B. Abbott, EPA Region IV (March 9, 1990).
Concerning monthly progress report for February 1990.
20. Letter from George D. Rozelle, Monsanto Company to David B. Abbott, EPA Region IV (April 5, 1990).
Concerning monthly progress report for March 1990.
21. Letter from George D. Rozelle, Monsanto Company to James E. McGuire, EPA Region IV (May 7, 1990).
Concerning monthly progress report for April 1990.
22. Letter from George D. Rozelle, Monsanto Company to James E. McGuire, EPA Region IV (June 7, 1990).
Concerning monthly progress report for May 1990.

3.4 Work Plans and Progress Reports (cont'd.)

23. Letter from George D. Rozelle, Monsanto Company to James E. McGuire, EPA Region IV (July 2, 1990). Concerning monthly progress report for June 1990.
24. Letter from George D. Rozelle, Monsanto Company to James E. McGuire, EPA Region IV (August 8, 1990). Concerning monthly progress report for July 1990.

3.7 Applicable or Relevant and Appropriate Requirements (ARARs)

1. Letter from James E. McGuire, EPA Region IV to George D. Rozelle, Monsanto Company (June 26, 1990). Concerning summary of June 22, 1990 meeting.

3.8 Interim Deliverables

1. Letter Report from Jack T. Camp, Camp, Dresser and McKee, Inc. to Meredith Clarke Anderson (June 17, 1986). Concerning Monsanto Interim Letter Report.
2. Letter from Meredith Clarke Anderson, EPA Region IV to Jack T. Camp, Camp Dresser & McKee, Inc. (July 14, 1986). Concerning review of the Interim Letter Report prepared as part of the Forward Planning Study for the Monsanto Company Site in Augusta, Georgia.
3. Letter from Meredith Clarke Anderson, EPA Region IV to George D. Rozelle, Monsanto Company (November 25, 1986). Concerning results of the November 12, 1986 meeting between EPA and Monsanto Company.
4. Letter from Meredith Clarke Anderson, EPA Region IV to George D. Rozelle, Monsanto Company (February 9, 1987). Concerning request to review the draft Forward Planning Study (FPS) for the Monsanto Company Site.
5. Memorandum from Cody Jackson, Agency for Toxic Substances and Disease Registry (ATSDR) to Meredith Clarke Anderson, EPA Region IV (February 23, 1987). Concerning review of the draft Forward Planning Study (FPS) for the Monsanto Company Site.
6. Memorandum from Nick Ceto, EPA Region IV to Leonard Nowak, EPA Region IV (February 24, 1987). Concerning review of the draft Forward Planning Study (FPS) for the Monsanto Company Site.

3.8 Interim Deliverables (cont'd.)

7. Letter from George D. Rozelle, Monsanto Company to Meredith Clarke Anderson, EPA Region IV (February 25, 1987). Concerning review of the draft Forward Planning Study (FPS) for the Monsanto Company Site.
8. Memorandum from Tex Ann Reid, EPA Region IV to Meredith Clarke Anderson, EPA Region IV (February 27, 1987). Concerning review of the draft Forward Planning Study (FPS) for the Monsanto Company Site.
9. Letter from George D. Rozelle, Monsanto Company to Meredith Clarke Anderson, EPA Region IV (March 10, 1987). Concerning review of the draft Forward Planning Study (FPS) for the Monsanto Company Site.
10. Memorandum from John H. Mann, EPA Region IV to Meredith Clarke Anderson, EPA Region IV (April 7, 1987). Concerning review of the draft Forward Planning Study (FPS) for the Monsanto Company Site.
11. Letter from Meredith Clarke Anderson, EPA Region IV to Jack T. Camp, Camp, Dresser and McKee, Inc. (May 15, 1987). Concerning completed peer review and revision of the draft Forward Planning Study (FPS).
12. Memorandum from Fred Sloan, EPA Region IV Environmental Services Division, Athens, Georgia to Meredith Clarke Anderson, EPA Region IV (June 1, 1987). Concerning review of the draft Forward Planning Study (FPS) for the Monsanto Company Site.
13. Letter from David Melgaard, EPA Region IV to George D. Rozelle, Monsanto Company (October 12, 1988). Concerning request for review of the draft Forward Planning Study (FPS) for the Monsanto Company.
14. Memorandum from Joe Hughart, EPA Region IV to David Melgaard, EPA Region IV (October 21, 1988). Concerning review of the draft Forward Planning Study (FPS) for the Monsanto Company Site.
15. Letter from George D. Rozelle, Monsanto Company to David Melgaard, EPA Region IV (October 27, 1988). Concerning Monsanto's comments on the draft Forward Planning Study (FPS) for the Monsanto Company Site.
16. Memorandum from Roger E. Carlton, EPA Region IV Environmental Services Division, Athens, Georgia to David Melgaard, EPA Region IV (October 27, 1988). Concerning review of the draft Forward Planning Study (FPS) for the Monsanto Company Site.

3.8 Interim Deliverables (cont'd.)

17. "Final Forward Planning Study Report - Revision I - Monsanto Site - Augusta, Georgia," EPA Region IV (December 13, 1988).
18. Letter from David B. Abbott, EPA Region IV to Jan Simmons, Georgia Environmental Protection Division (January 20, 1989). Concerning agreement of EPA to assume lead for the Monsanto Company Site in Augusta, Georgia.
19. Cross-Reference: "Monsanto - Augusta Plant Site - RI/FS Final Work Plan," Dames & Moore (July 26, 1989). [Filed and cited as entry number 10 in 3.4 REMEDIAL INVESTIGATION (RI) - Work Plans and Progress Reports]

3.10 Remedial Investigation (RI) Reports

1. Memorandum from Roger E. Carlton, EPA Region IV Environmental Services Division, Athens, Georgia to Dick Dubose, EPA Region IV (October 27, 1989). Concerning overview of the Remedial Investigation of the Monsanto Company Site.
2. Memorandum from Kevin Koporec, EPA Region IV to James E. McGuire, EPA Region IV (June 13, 1990). Concerning comments on the draft Remedial Investigation (RI) Report for the Monsanto Company Site.
3. Memorandum from Robert E. Safay, Agency for Toxic Substances and Disease Registry (ATSDR) to James E. McGuire, EPA Region IV (June 15, 1990). Concerning review of the draft Remedial Investigation (RI) Report for the Monsanto Company Site.
4. Memorandum from Roger E. Carlton, EPA Region IV Environmental Services Division, Athens, Georgia to James E. McGuire, EPA Region IV (June 18, 1990). Concerning comments on the draft Remedial Investigation (RI) Report for the Monsanto Company Site.
5. Letter from James E. McGuire, EPA Region IV to George D. Rozelle, Monsanto Company (June 20, 1990). Concerning transmittal of EPA's comments on the draft Remedial Investigation (RI) Report for the Monsanto Company Site.
6. Memorandum from David W. Hill, EPA Region IV to James E. McGuire, EPA Region IV (June 26, 1990). Concerning review of the draft Remedial Investigation (RI) Report for the Monsanto Company Site.

3.10 Remedial Investigation (RI) Reports (cont'd.)

7. Letter from George D. Rozelle, Monsanto Company to James E. McGuire, EPA Region IV (July 23, 1990). Concerning transmittal of the Final Remedial Investigation (RI) Report for the Monsanto Company Site.
8. "Monsanto - Augusta Plant Site - Remedial Investigation - Final Report - Volume I," Dames & Moore (July 23, 1990).
9. "Monsanto - Augusta Plant Site - Remedial Investigation - Final Report - Volume II," Dames & Moore (July 23, 1990).
10. Letter from Cynthia F. Zauner, Dames & Moore to James E. McGuire, EPA Region IV (August 1, 1990). Concerning transmittal of the tabulation report, "Response to EPA Remedial Investigation Report Comments, dated June 20, 1990."
11. Letter from James E. McGuire, EPA Region IV to George D. Rozelle, Monsanto Company (August 20, 1990). Concerning EPA's acceptance of the Final Remedial Investigation (RI) Report for the Monsanto Company Site in Augusta, Georgia.
12. Letter from James E. McGuire, EPA Region IV to Lael Butler, Georgia Environmental Protection Division (September 5, 1990). Concerning request for comments on the Final Remedial Investigation (RI) Report for the Monsanto Company Site in Augusta, Georgia.

3.11 Health Assessments

1. Letter from David B. Abbott, EPA Region IV to Chuck Pietrosewicz, Agency for Toxic Substances and Disease Registry (ATSDR) (December 12, 1988). Concerning review of the draft Preliminary Health Assessment for the Monsanto Company Site.
2. "Preliminary Health Assessment for Monsanto Corporation," Agency for Toxic Substances and Disease Registry (ATSDR) (January 19, 1989).

3.12 Endangerment Assessments

1. Memorandum from Kevin Koporec, EPA Region IV to James E. McGuire, EPA Region IV (August 27, 1990). Concerning comments regarding the draft Risk Assessment Report (RA) for the Monsanto Company Site.
2. Cross-Reference: Memorandum from Robert E. Safay, Agency for Toxic Substances and Disease Registry (ATSDR) to James E. McGuire, EPA Region IV (August 28, 1990). Concerning review of the draft Feasibility Study Report and the draft Risk Assessment. [Filed and cited as entry number 3 in 4.9 FEASIBILITY STUDY (FS) - Feasibility Study (FS) Reports]
3. Letter from James E. McGuire, EPA Region IV to George D. Rozelle, Monsanto Company (September 7, 1990). Concerning peer review comments on the Risk Assessment and Feasibility Study for the Monsanto Company Site in Augusta, Georgia.
4. "Monsanto - Augusta Plant Site - Risk Assessment - Final Report," Dames & Moore (September 14, 1990).
5. Cross-Reference: Letter from George D. Rozelle, Monsanto Chemical Company to James E. McGuire, EPA Region IV (September 14, 1990). Concerning transmittal of the Final Feasibility Study Report (FS) and the Final Risk Assessment (RA) for the Monsanto Company Site in Augusta, Georgia. [Filed and cited as entry number 7 in 4.9 FEASIBILITY STUDY (FS) - Feasibility Study (FS) Reports]

4.0 FEASIBILITY STUDY (FS)

4.1 Correspondence

1. Memorandum from James E. McGuire, EPA Region IV to Addressees, EPA Region IV (August 16, 1990). Concerning request for peer review of draft Feasibility Study Report for the Monsanto Company Site.
2. Letter from James E. McGuire, EPA Region IV to Jennifer Kaduck, Georgia Environmental Protection Division (August 16, 1990). Concerning transmittal of the draft Feasibility Study Report and draft Risk Assessment for the Monsanto Company Site.

4.1 Correspondence (cont'd.)

3. Letter from James E. McGuire, EPA Region IV to James Lee, Department of the Interior (August 16, 1990). Concerning transmittal of the draft Feasibility Study Report and draft Risk Assessment for the Monsanto Company Site.

4.9 Feasibility Study (FS) Reports

1. Memorandum from James E. McGuire, EPA Region IV to File, EPA Region IV (June 7, 1990). A summary of the June 6, 1990 meeting with Monsanto Corporation concerning the Monsanto Company Site.
2. Letter from Charles T. Allen, Dames & Moore to William H. McLemore, Georgia State Geologist (June 29, 1990). Concerning Underground Injection as an remediation alternative at the Monsanto Company Site.
3. Memorandum from Robert E. Safay, Agency for Toxic Substances and Disease Registry (ATSDR) to James E. McGuire, EPA Region IV (August 28, 1990). Concerning review of the draft Feasibility Study Report and the draft Risk Assessment.
4. Memorandum from Roger E. Carlton, EPA Region IV Environmental Services Division, Athens, Georgia to James E. McGuire, EPA Region IV (August 28, 1990). Concerning review of the draft Feasibility Study Report for the Monsanto Company Site.
5. Memorandum from Kevin P. Koporec, EPA Region IV to James E. McGuire, EPA Region IV (August 31, 1990). Concerning review and comments on the draft Feasibility Study Report for the Monsanto Company Site.
6. Memorandum from David W. Hill, EPA Region IV to James E. McGuire, EPA Region IV (September 4, 1990). Concerning review of the draft Feasibility Study Report for the Monsanto Company Site.
7. Letter from George D. Rozelle, Monsanto Chemical Company to James E. McGuire, EPA Region IV (September 14, 1990). Concerning transmittal of the Final Feasibility Study Report (FS) and the Final Risk Assessment (RA) for the Monsanto Company Site in Augusta, Georgia.
8. "Monsanto - Augusta Plant Site - Feasibility Study - Final Report," Dames & Moore (September 16, 1990).

9.0 STATE COORDINATION

9.1 Correspondence

1. Letter from James E. McGuire, EPA Region IV to Jennifer Kaduck, Georgia Environmental Protection Division (July 20, 1990). Concerning request for the assistance of the State of Georgia in identifying environmental standards applicable for the Monsanto Company Site in Augusta, Georgia.

9.6 Cooperative Agreements, Special Conditions, and Amendments

1. Letter from J. Leonard Ledbetter, Georgia Environmental Protection Division to Fred Hiller, Monsanto Chemical Company (June 8, 1984). Concerning attached copy of Consent Agreement between the Georgia Environmental Protection Division and Monsanto Chemical Company.

10.0 ENFORCEMENT

10.6 State and Local Enforcement Records

1. Letter from George D. Rozelle, Monsanto Chemical Company to J. Leonard Ledbetter, Georgia Environmental Protection Division (December 28, 1983). Concerning activities associated with the closure of the Monsanto Company Site in Augusta, Georgia.
2. Letter from Bill Mundy, Georgia Environmental Protection Division to George D. Rozelle, Monsanto Chemical Company (January 26, 1984). Concerning response to December 28, 1983 letter describing the closure of Monsanto Company Site.

10.10 PRP-Specific Negotiations

1. **Cross-Reference:** Letter from Stephen P. Krchma, Monsanto Company to Gail S. Baylor, EPA Region IV (February 7, 1989). Response to notice letter and desire to participate in negotiations with EPA regarding the Monsanto Company Site. [Filed and cited as entry number 2 in 11.9 POTENTIALLY RESPONSIBLE PARTIES (PRP) - PRP-Specific Correspondence]
2. Letter from Stephen P. Krchma, Monsanto Chemical Company to Gail S. Baylor, EPA Region IV (March 24, 1989). Concerning negotiations between EPA Region IV and Monsanto Chemical Company.

10.10 PRP-Specific Negotiations (cont'd.)

3. Letter from Gail S. Baylor, EPA Region IV to Stephen P. Krchma, Monsanto Chemical Company (April 12, 1989). Concerning Good Faith Proposal and Draft Administrative Order by Consent.

10.11 EPA Administrative Orders

1. Cross-Reference: Letter from Gail S. Baylor, EPA Region IV to Stephen P. Krchma, Monsanto Chemical Company (April 12, 1989). Concerning Good Faith Proposal and Draft Administrative Order by Consent. [Filed and cited as entry number 3 in 10.10 ENFORCEMENT - PRP-Specific Negotiations]
2. Consent Order, IN THE MATTER OF MONSANTO COMPANY, AUGUSTA PLANT, P.O. BOX 1473, AUGUSTA, GEORGIA, Docket No. 89-24-C (April 24, 1989).

11.0 POTENTIALLY RESPONSIBLE PARTIES (PRP)

11.9 PRP-Specific Correspondence

1. Letter from Patrick M. Tobin, EPA Region IV to George D. Rozelle, Monsanto Company (January 18, 1989). Concerning notice of potential responsibility for the release or threaten release of hazardous substances and contaminants at the Monsanto Company Site in Augusta, Georgia.
2. Letter from Stephen P. Krchma, Monsanto Company to Gail S. Baylor, EPA Region IV (February 7, 1989). Response to notice letter and desire to participate in negotiations with EPA regarding the Monsanto Company Site.

13.0 COMMUNITY RELATIONS

13.6 Community Relations Plans

1. "Revised Community Relations Plan - Monsanto Corporation," Booz, Allen & Hamilton, Inc. for EPA Headquarters (August 18, 1989).

13.9 Fact Sheets

1. "Superfund Remedial Investigation/Feasibility Study - Fact Sheet - Monsanto Site - Augusta, Georgia," (October 1989).

APPENDIX B

RESPONSIVENESS SUMMARY

Monsanto Superfund Site
Augusta, Georgia

MONSANTO SUPERFUND SITE
RESPONSIVENESS SUMMARY

The U.S. Environmental Protection Agency (EPA) established a public comment period from November 1, 1990 through November 30, 1990 for interested parties to comment on EPA's Proposed Plan for remediation of the Monsanto Superfund site. The Proposed Plan was released to the public on October 30, 1990. A public meeting was held on November 14, 1990, at the Augusta-Richmond County Library in Augusta, Georgia. During the meeting the results of the studies undertaken at the site as well as EPA's preferred alternative was presented.

A responsiveness summary is required by Superfund policy [40 CFR 300.430 (f)(3)(i)(F)] to provide a summary of citizen comments and concerns about the site raised during the comment period, and the response by EPA to those concerns. All comments summarized in this document have been factored into the final decision of the preferred alternative for remediation of the Monsanto Superfund site in Augusta, Georgia.

This responsiveness summary 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 Monsanto Superfund site.
- III. Summary of Major Questions and Comments Received During the Public Comment Period and EPA's Responses - This section presents both oral and written comments submitted during the public comment period and provides EPA's response to these comments.
- IV. Remaining Concerns - This section discusses community concerns of which EPA should be aware in design and implementation of the remedial alternative for the site.

I. Overview

The preferred remedial alternative was presented to the public in a Proposed Plan released on October 30, 1990, a public notice in the Augusta Chronicle and Herald on November 1 and 12, 1990 as well as at a public meeting held on November 14, 1990. This alternative includes extraction and discharge of the contaminated groundwater to

the Augusta Wastewater Treatment Plant until the arsenic levels in the groundwater attain the Maximum Contaminant Level (MCL). During the design of the extraction well system, groundwater quality will be monitored on a quarterly basis. The initiation of the construction phase may be deferred based on the results of the quarterly monitoring. The major components of the alternative include:

- * Continue quarterly groundwater monitoring during the design of the selected remedy to determine compliance with the Groundwater Protection Achievement Levels (GPALs);
- * Should the annual average of the levels as determined by the quarterly monitoring exceed the GPALs, extraction of groundwater which exceeds the Primary Drinking Water Standard (ie., Maximum Contaminant Level or MCL) for arsenic will commence;
- * Discharge extracted groundwater for treatment at a Publicly Owned Treatment Works (POTW);
- * Groundwater monitoring for a minimum of two years following the attainment of the MCL.

II. Background on Community Involvement and Concern

A Community Relations Plan was prepared by EPA in December 1988. In October 1989, EPA printed and distributed a fact sheet describing the activities to be conducted during the Remedial Investigation and Feasibility Study for the Monsanto site. An informal meeting was held by EPA on October 20, 1989, at the Augusta-Richmond County Library to address concerns the public may have had regarding the site investigation.

An EPA prepared Proposed Plan which described alternative remediation plans, along with EPA's preferred remedy, was mailed to the public which had previously expressed an interest in the site on October 30, 1990. The Proposed Plan gave a brief site history, described the Superfund process and the remedial alternatives, provided details about the public comment period and the public meeting to be held on November 14, 1990. In addition to the Proposed Plan, a public notice was published in the Augusta Chronicle and Herald on November 1, 1990 and November 12, 1990, to notify the public of the availability of the Proposed Plan and the upcoming public meeting.

Environmental concerns are receiving increasing attention in the Augusta area. A citizen group (Citizens Against Pollution or "CAP") has been formed to monitor the activities of local industry and to report potential problems to the proper authorities. Representatives of CAP met with the EPA's Remedial Project Manager for the Monsanto site on November 13, 1990, to discuss the Superfund process and EPA's

activities at the Monsanto site. CAP representatives were given a tour of the Monsanto Superfund site on November 14, 1990.

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

Comment 1: Several people were concerned with the potential interconnection between contamination at the Monsanto site and a property located approximately one-half mile east of Monsanto.

EPA's Response: A comparison of the data collected at the Monsanto site with data collected at the downgradient property does not appear to provide a sufficient chemical "fingerprint" to support the potential interconnection between these two areas. Specifically, numerous inorganics as well as xylene, present at elevated levels at the downgradient property, have not been detected at the Monsanto site. Also, chromium levels at the downgradient property exceeded the concentrations of arsenic present in the groundwater at this property. At the Monsanto site, the concentrations of the contaminant of concern, arsenic, far exceeds the chromium levels. This differential in concentration indicates separate potential sources of the contamination.

In addition to the lack of a chemical fingerprint, the results from the Remedial Investigation (RI) indicates the entire plume relating to the Monsanto site has been defined. Data collected during the RI shows increasing to decreasing arsenic levels as the distance from the source (landfill #2) becomes greater. Based on this data, the core of the plume is currently located approximately 250 feet downgradient of the landfill. Samples from a line of monitoring wells located 400 feet downgradient from the core were all below the Federally regulated drinking water standard for arsenic of 50 ug/l.

Comment #2: There was concern that a model, rather than actual data from sampling done during the site investigation, was being relied on by EPA to select a remedial alternative at the Monsanto site.

EPA's Response: EPA has not relied solely on the model in selecting a remedy at this site, but instead the model was used to supplement the results from numerous sampling events. Since the model was calculated using assumptions, it is used only to indicate or project the potential movement and concentration of the arsenic plume. The model was calibrated by comparing the existing data collected during the 1989 site investigation with the results of the model for the year 1990 (year ten from the model). Based on this comparison, the model over estimated the extent of the plume. The predicted arsenic concentrations will be verified as part of the selected alternative through quarterly groundwater monitoring.

Comment #3: One person was concerned the modeling technique used during the site investigation would not provide an accurate representation of the potential migration of arsenic present in the groundwater.

EPA's Response: During the study of the site, the Plume modeling technique was used to project future transport of the arsenic plume. This technique was used since the site is underlain by unconsolidated sediments and only one contaminant, arsenic, was present at elevated levels at the site. A detail discussion on the modeling effort is provided in Section 5 of the Remedial Investigation Report. Prior to the site investigation, a more complex modeling effort using the Random-Walk technique was conducted. It should be noted that complex models require more input data or assumptions, than models such as Plume. However, both the Random-Walk and Plume models indicate decreasing concentrations of arsenic to background levels as distance from the source becomes greater. Groundwater samples obtained during the site investigation support the model predictions.

Comment #4: A citizen asked why sampling results collected between 1987 through 1989 show an increase in arsenic levels.

EPA's Response: Groundwater sampling at the Monsanto site has been conducted since 1979. Although the overall trend of the annual average arsenic concentrations show a decrease, fluctuations of the contaminant levels have been observed. Specifically, arsenic levels increased during the period of time between 1987 through 1989. While the exact cause for this increase is not known, the increase may have been due to a drought Augusta was experiencing during this period. With less rainfall to produce infiltration, there would be less groundwater available to carry the dissolved arsenic, thus an increase in concentration would be observed. The sampling results from 1990 confirm the overall trend of decreasing arsenic concentrations has continued to occur. Sampling results from the last quarterly monitoring conducted in 1990 show all wells at the site either at or near background levels.

Comment #5: A commenter requested EPA account for the variability of the arsenic levels when selecting the Groundwater Protection Achievement Levels (GPALs).

EPA's Response: The GPALs have been established based on the modeled projection of arsenic concentrations in MW-35. The GPALs also will be monitored in the other contaminated well at the site (MW-17) since this well is upgradient of MW-35. The fluctuation of contaminant concentration has been considered in establishing the GPALs for these wells. The GPAL for a specific year will be compared with the annual average of the level from the quarterly groundwater monitoring program. Averaging the concentrations on an annual basis would

minimize the potential for noncompliance with the GPALs should contaminant fluctuation occur during a single sampling event.

Comment #6: One commenter proposed the selection of a modified version of Alternative II which would establish "Interim Arsenic Levels" rather than the "Interim Alternate Concentration Limit".

EPA's Response: When compared to the modified version of Alternative II, Alternative III appears to provide the best balance among the nine criteria used to evaluate alternatives. The Interim Arsenic Levels proposed by the commenter allows much greater fluctuations in arsenic concentrations as well as time to achieve the drinking water standard as does the selected remedy. In addition, the selected remedy requires the initiation of the design of the extraction well system concurrent with monitoring the compliance with the GPALs. Noncompliance with the GPALs would require the immediate initiation of the construction phase of the remedy, thus minimizing the time period migration of the plume could occur. Alternative II requires additional time to select and design an active method of remediation should the proposed interim levels not be complied with.

EPA's selected alternative provides a greater degree of protection of human health and the environment since treatment is relied upon to eliminate potential exposure by actively remediating the groundwater should noncompliance with the GPALs occur. Implementability of the selected alternative could potentially be more difficult than commenter's proposed alternative due to the potential construction of the extraction well system should GPALs not be achieved. However, the inconveniences relating to the construction is no trade off for protection of human health and the environment.

Comment #7: A representative of a local citizen's environmental group supported the proposal of Alternative III; however, the representative was concerned with the additional burden on the POTW from the Monsanto site.

EPA's Response: The additional flow of wastewater to the POTW is not anticipated to impact its operation. The current mass of arsenic being accepted by the POTW was calculated at 357 grams/day. The discharge from the Monsanto site to the POTW would increase the current mass by approximately 8 grams/day. The POTW treats the wastewater through an activated sludge treatment process. The sludge is recycled via land application. At the current loading rate (2.46 metric tons/ha), this sludge may contain over four times greater arsenic than currently present. The arsenic levels from the Monsanto site will not significantly increase the current concentration.

IV. Remaining Concerns

The community's concerns surrounding the Monsanto site will be addressed through community relations support throughout the Remedial Design/Remedial Action.

Community relations will consist of making available final documents (ie., Remedial Design Workplan, Remedial Design Reports, etc.) in a timely manner through the local repository. Also, issuance of fact sheets, during the Remedial Design/Remedial Action process, to those on the mailing list will further provide the community with project progress and a schedule of events. The community will be made aware of any principal design changes made during the project design as well as the results of the quarterly groundwater monitoring.

Community relations activities will remain an active aspect of the Remedial Design/Remedial Action phase of this project.

APPENDIX C

STATE CONCURRENCE LETTER

Monsanto Superfund Site
Augusta, Georgia

Georgia Department of Natural Resources

205 Butler Street, S.E., Floyd Towers East, Atlanta, Georgia 30334

J. Leonard Ledbetter, Commissioner
Harold F. Reheis, Assistant Director
Environmental Protection Division

December 3, 1990

Mr. Jim McGuire
Remedial Project Manager
Superfund Branch
US EPA Region IV
345 Courtland Street, N.E.
Atlanta, Georgia 30365

FILE COPY

RE: Monsanto Chemical Company
Draft ROD

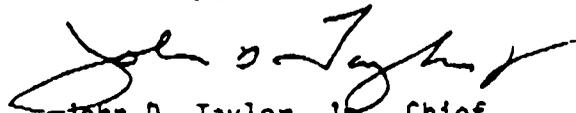
Dear Mr. McGuire:

We have reviewed the draft Record of Decision (ROD) for the Monsanto Superfund site located in Augusta, Georgia. Since you indicated that references to the decommissioning of groundwater monitoring wells have been removed, we have no objections to Alternative 3 (pump and discharge) as Monsanto's corrective action for the groundwater contamination from the two landfills. However, when drafting Monsanto's pending hazardous waste permit modification, the Division is not limiting itself to certain time frames set forth in the draft ROD, therefore the requirements in the permit modification may be more stringent.

Additionally, the Division is continuing to investigate the contamination of the nearby property owned by Norfolk Southern Corporation to determine if there is a link to the Monsanto NPL site.

Thank you for the opportunity to review the draft ROD. If you have any questions, please contact Jan Simmons at 404/656-2833.

Sincerely,



John D. Taylor, Jr., Chief
Land Protection Branch

JDT:js:3395M

file: Monsanto (R)