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ENGINEERING AND ENVIRONMENTAL SERVICES, INC.

90% REMEDIAL DESIGN REPORT FOR THE GROUND-WATER COLLECTION SYSTEM

FIRESTONE TIRE & RUBBER COMPANY SITE
ALBANY, DOUGHERTY COUNTY, GEORGIA

Submitted to:

U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION IV
ATLANTA, GEORGIA

Prepared for:

BRIDGESTONE/FIRESTONE, INC.

Nashville, Tennessee

August 31, 1995

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ENGINEERING AND ENVIRONMENTAL SERVICES, INC.

August 31, 1995

Mr. Charles King
Region IV
United States Environmental Protection Agency
345 Courtland Street
Atlanta, Georgia 30365

Subject: **Submittal of the Prefinal (90 %) Ground-Water Remedial Design Report**
Firestone Tire & Rubber Company Site
Albany, Dougherty County, Georgia
Law Environmental Project 41-4537

Dear Mr. King:

Law Engineering and Environmental Services, Inc. (LAW), on behalf of Bridgestone/Firestone, Inc. (BFS), is pleased to submit to you six copies of the Prefinal (90 %) Ground-Water Remedial Design Report for the Firestone Tire & Rubber Company Site in Albany, Georgia. As requested by USEPA in a telephone conversation between Mr. Timothy Bent of BFS and you, this document combines the 30 %, 60 %, and 90 % design submittals in an effort to facilitate implementation of the remedial action. The telephone conversation was later documented in a letter from LAW to USEPA on May 4, 1995.

If you have any questions or need additional information, please contact Mr. Timothy Bent at Bridgestone/Firestone, Inc. at 615-872-1426 or us at 404-421-3400.

Sincerely,

LAW ENGINEERING AND ENVIRONMENTAL SERVICES, INC.

Jane A. Moore
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cc: Mary Lou Winn - Georgia Environmental Protection Division (2 copies)
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Kennesaw, Georgia

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Project 41-4537

TABLE OF CONTENTS

	Page
LIST OF TABLES	iv
LIST OF FIGURES	iv
1.0 INTRODUCTION	1-1
1.1 SITE LOCATION	1-1
1.2 SITE DESCRIPTION	1-1
1.3 SITE HISTORY	1-2
1.4 THE SELECTED REMEDY	1-4
1.5 PERFORMANCE STANDARDS	1-5
1.5.1 Ground-Water Collection System	1-5
1.5.2 Ground-Water Compliance Monitoring	1-6
1.5.3 Effluent Monitoring	1-6
2.0 FIELD INVESTIGATION	2-1
2.1 GROUND-WATER EVALUATION	2-1
2.1.1 Sample Collection Activities	2-2
2.1.2 Ground-water Analytical Results	2-3
2.2 COLLECTION SYSTEM	2-3
2.2.1 Field Activities	2-4
2.2.2 Results of System Capacity Test	2-4
2.3 EVALUATION OF THE GROUND-WATER EFFLUENT	2-4
2.3.1 Field Activities	2-5
2.3.2 Analytical Results	2-5
2.4 EVALUATION OF GROUND-WATER FLOW DIRECTION	2-6
2.4.1 Residuum	2-6
2.4.2 Upper Ocala	2-7
2.4.3 Lower Ocala	2-7
3.0 DESIGN ANALYSIS	3-1
4.0 PERFORMANCE STANDARDS VERIFICATION PLAN	4-1
5.0 REMEDIAL DESIGN	5-1
5.1 BASIS OF DESIGN	5-1
5.1.1 Ground-Water Collection System	5-1
5.1.2 Ground-Water Discharge System	5-3
5.2 EQUIPMENT SELECTION	5-3
5.3 SHIPPING AND RECEIVING	5-4
5.4 ELECTRICAL SERVICE CAPACITY	5-4
5.5 SITE SECURITY	5-4
6.0 COST ESTIMATE	6-1
7.0 SCHEDULE	7-1
8.0 REFERENCES	8-1

LIST OF APPENDICES

APPENDIX A: DESIGN SPECIFICATIONS

APPENDIX B: RECORD OF DECISION

APPENDIX C: STATEMENT OF WORK

APPENDIX D: PERFORMANCE STANDARDS VERIFICATION PLAN

APPENDIX E: INDUSTRIAL WASTE WATER PERMIT

APPENDIX F: RESULTS OF CHEMICAL ANALYSIS

APPENDIX G: RESULTS OF SYSTEM CAPACITY TEST

APPENDIX H: LETTER FROM LAW TO CITY OF ALBANY PUBLIC WORKS DIVISION

APPENDIX I: GROUND-WATER VOLUME CALCULATION

LIST OF TABLES

Table

1.1 Constituents of Concern Detected in Residuum Wells

1.2 Constituents of Concern Detected in Transition Zone Wells

1.3 Constituents of Concern Detected in Upper Ocala Wells

1.4 Constituents of Concern Detected in Lower Ocala Wells

1.5 Industrial Wastewater Permit Discharge Limitations

2.1 Summary of System Capacity Test Results

2.2 Ground-Water Collection System Effluent Quality

6.1 Engineer's Cost Opinion

LIST OF FIGURES

Figure

1.1 Site Location Map

1.2 Site Plan

1.3 Detail of Building and Courtyard

1.4 Interim Remediation System Wells

1.5 Constituents of Concern in Residuum/Transition Zone Wells

1.6 Constituents of Concern in Upper Ocala Wells

1.7 Constituents of Concern in Lower Ocala Wells

1.8 Potentiometric Surface of the Upper Ocala Limestone - March 28, 1995

1.9 Potentiometric Surface of the Lower Ocala Limestone - March 28, 1995

2.1 Location Map for Hydrostratigraphic Cross Section A-A'

2.2 Hydrostratigraphic Cross Section A-A'

2.3 Potentiometric Surface of the Ocala Aquifer with Albany Area, November 1979

7.1 Estimated Construction Schedule

EXECUTIVE SUMMARY

This document comprises the prefinal (90%) design for ground-water remediation at the Firestone Tire & Rubber Company Superfund Site, located in Albany, Dougherty County, Georgia. The Remedial Design (RD) was conducted in accordance with requirements set forth in the Consent Decree, dated March 4, 1994, the Record of Decision (ROD), and the Statement of Work (SOW). As specified by the ROD and the SOW, a remediation system was to be designed to collect ground-water in the impacted area for discharge to the City of Albany Publicly Owned Treatment Works. A thorough site description and history are included in Section 1 of the attached Remedial Design Report.

A *Ground-Water Remedial Design Work Plan* (LAW, 1995) was prepared by BFS and approved by the United State Environmental Protection Agency (USEPA), to facilitate the design process. At the request of USEPA, BFS agreed to accelerate voluntarily the design process combining the preliminary and intermediate design submittals into this prefinal design submittal. This prefinal design submittal discusses the design activities and results and includes the specifications and drawings for the proposed remediation system.

The design activities were conducted in 1995 and included the following:

- Monitoring of ground-water quality to facilitate selection of recovery wells for the ground-water collection system (Section 2.1)
- Evaluation of the specific yield of the recovery wells to predict sustainable flow rates from the collection system (Section 2.2)
- Analysis of effluent from the ground-water collection system to evaluate the necessity for treatment (Section 2.3)
- Determination of ground-water flow direction to evaluate the hydraulic gradient at the site (Section 2.4)
- Design of a system to evaluate the performance of remediation system and to demonstrate that applicable and relevant or appropriate regulations (ARARs) are met (Section 4.0 and Appendix D)

Results of design activities indicated the following:

- Wells MW-1-1, MW-1-2, MW-1-3, and PTW-1 will be used as recovery wells in the ground-water collection system (Section 2.1.2)
- Results of the specific capacity test indicate that the specific yield of the ground-water collection system will not exceed POTW permit requirements (Section 2.2.2)
- Analysis of the effluent from the collection system indicates that no treatment of the effluent is needed prior to discharge to the POTW (Section 2.3.2)

- The potentiometric surfaces of the hydrostratigraphic units of interest were mapped to predict ground-water flow direction. Ground-water flow direction in the impacted area in the Upper and Lower Ocala aquifers is generally towards the southwest. Ground water in the Residuum occurs as hydraulically unconnected perched zones (Section 2.4).

- A Performance Standards Verification Plan was prepared outlining a monitoring program to evaluate system effectiveness (Appendix D). The monitoring program will include 1) analysis of samples from recovery wells to evaluate the effectiveness of the selected remediation technique, 2) analysis of samples from monitoring wells bordering the system to verify that constituents of concern have not migrated, and 3) analysis of ground-water collection system effluent to demonstrate compliance with POTW discharge limits.

Based on the results of the design activities, a ground-water collection system was designed to include four recovery wells. Permanent pneumatic pumps, placed in each of the recovery wells, will transport ground-water to the treatment room. Because the effluent from the collection system does not exhibit concentrations of constituents exceeding POTW discharge limits, the effluent will be discharged to the POTW with no further treatment. If, at some later point during the remediation process, treatment should become necessary, the design includes a contingency for installation of two granular activated carbon units. The design, including the contingent activated carbon units, is described in detail in Section 5. The design specifications are included in Appendix A. The design drawings are provided as an attachment.

1.0 INTRODUCTION

This Prefinal (90%) Remedial Design (RD) Report for the Firestone Tire & Rubber Company Superfund Site in Albany, Dougherty County, Georgia has been prepared by Bridgestone/Firestone, Inc. (BFS), formerly known as the Firestone Tire & Rubber Company, to provide the description of the design for ground-water collection and discharge. The purpose of the RD is to provide information to verify that the design presents a constructable and operable Remedial Action (RA). At the request of the United States Environmental Protection Agency (USEPA), the design activities were expedited to accelerate implementation of the Remedial Action (RA). Specifically, the design was expedited by consolidating the 30% and 60% Design submittals in this 90% Prefinal Design submittal. As such, this report includes background information, summarizes the results of field investigations and sampling, presents the design criteria, and discusses the development of the design. Attachments include technical specifications and design drawings, a construction cost estimate, and an RA schedule.

1.1 SITE LOCATION

The Firestone Tire & Rubber Company Superfund Site is located in Dougherty County at 3300 Sylvester Road, approximately 4 miles east of Albany, Georgia. The site is located approximately at longitude 84° 3' 22" West and latitude 31° 34' 6" North. Figure 1.1 shows the location of the site.

1.2 SITE DESCRIPTION

The former Firestone Tire & Rubber Company facility encompasses 329.2 acres, including a 1,840,000 square foot building (Figure 1.2). Access to the area is provided by state highways, railways, and the Albany/Dougherty County Airport. The facility is owned by the Albany-Dougherty Payroll Development Authority and was leased to BFS from 1968 to 1990. The specific and sole use of the facility by BFS was the manufacture of pneumatic tires, which was carried out from 1968 to 1986. The site features applicable to the ground-water RD include the Courtyard area and manufacturing plant (Figure 1.3).

Properties surrounding the facility are listed below:

- mixed commercial, residential and agricultural properties to the east
- Sylvester Road (Route 82) and residential and commercial buildings to the north
- mixed commercial, institutional and agricultural properties to the west
- Seaboard Coastline railroad tracks and U.S. Marine Corps Logistics Base to the south

The facility has been leased and operated by Cooper Tire & Rubber Company since March 1990 for the manufacture of pneumatic tires and is zoned industrial/commercial. The zoning information for a 2-mile radius around the Site, according to the Dougherty County Planning Commission, is presented as follows:

North:	Residential/Commercial
South:	Commercial/Industrial (Restricted use by Marine Corps Logistics Base)
East:	Industrial/Residential/Agricultural
West:	Residential/Commercial/Industrial

1.3 SITE HISTORY

As discussed above, Firestone Tire & Rubber Company operated the facility from 1968 to 1986. In 1985, prior to ceasing operations, Firestone conducted an assessment of potential environmental issues at the facility. From the assessment activities, two areas (the Courtyard and burn pit) were identified for further study. The Courtyard, in the area between the manufacturing buildings, was occupied by underground and above-ground storage tanks, power transformers, road and rail shipping, and material handling operations. The burn pit area, situated near the east drainage ditch and storm-water retention pond, was the site of an anti-oxidant spill in 1980.

Following the initial assessment activities, Firestone conducted several interim remedial activities, including the removal of the underground storage tanks from the Courtyard in 1986, monitoring of ground water, removal of PCB-contaminated soils, and installation and operation of a ground-water collection and treatment interim remediation system (Figure 1.4).

In June 1988, following a Site Inspection, the United States Environmental Protection Agency (USEPA) proposed inclusion of the site on the National Priorities List (NPL) pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). The Site was included on the NPL in October 1989 as a result of USEPA's assumption that the uppermost hydrostratigraphic zone, or residuum, and the next underlying hydrostratigraphic zone, or Upper Ocala, are considered to be the same as the "Principal Artesian Aquifer," from which nearby domestic and irrigation water supplies are obtained. Data subsequently collected during the Remedial Investigation (RI), conducted by Woodward-Clyde Consultants (WCC, 1992), however, indicate that these are three distinct hydrogeologic units. BFS entered into an Administrative Order by Consent (AOC) with EPA in 1990, pursuant to which the company conducted a Remedial Investigation/Feasibility Study (RI/FS). Information regarding previous environmental investigations at the site was first presented to EPA in October 1990, as a preliminary investigation report under the AOC.

During the course of the RI, samples of surface soil, subsurface soil, sediment, surface water and ground water were collected under USEPA oversight and analyzed for the Target Analyte List and Target Compound List in accordance with Contract Laboratory Program (CLP) Statements of Work (SOW).

The results of the RI indicated that organic compounds were present in ground water obtained from the residuum and transition zone in one area of the site known as the Courtyard. PCBs were detected in localized soils in the Courtyard where a transformer was formerly located. The RI also indicated that carbon disulfide and four inorganic analytes (antimony, beryllium, chromium, and lead) were detected in ground-water samples obtained from the site. Because neither the inorganics of concern nor carbon disulfide were used in the manufacturing process and no source area of the analytes could be identified, it was believed that the presence of these constituents could be attributed to background conditions.

On June 24, 1993, a Record of Design (ROD) was issued by the EPA stipulating the selected Remedial Action for ground water and soils in the Courtyard area. In 1994, the AOC was modified to allow BFS to study the occurrence of the four metals and CS_2 in ground water at and in the vicinity of the site. Results of the Inorganics Study indicate that metals and CS_2 are not

present at the site at concentrations exceeding background or ROD-specified clean-up levels. The results will be presented in a Technical Memorandum Report to USEPA.

1.4 THE SELECTED REMEDY

The remedial action (RA) selected and stipulated in the ROD included remediation of soil and ground water at the site. The soil remedial design and action was completed in November 1994. The remedial design contained herein addresses remediation of the volatile organics detected in the ground water in the Courtyard area. One of the purposes of the RA as specified by the ROD is protection of the uncontaminated Lower Ocala (Floridan) Aquifer. As confirmed in the RI report (WCC, 1992), the occurrence of volatile organics above ROD-specified clean-up levels is limited to the residuum. No volatile organics were detected above ROD-specified clean-up levels in the underlying hydrostratigraphic units, specifically in the Upper Ocala and the Lower Ocala. The selected remedy, as outlined in the ROD (Appendix B) and the Statement of Work (SOW) (Appendix C), includes:

- Collection and on-site treatment (if necessary) of the impacted ground water using existing wells
- Discharge of the ground water to the local Publicly Owned Treatment Works (POTW)
- Monitoring ground water and ground-water collection system effluent to evaluate RA progress
- Establishment of institutional controls on the use of ground water from the impacted units (i.e. residuum) at the site.

A summary of site characteristics and calculated site risks, including concentrations of the constituents of concern detected in ground-water samples, is provided in Sections 5 and 6 of the Record of Decision (ROD), located in Appendix B of this document. Tables 1.1 through 1.4 summarize the ground-water analytical results from Remedial Investigation and Remedial Design activities for the constituents of concern. Figure 1.5 depicts the concentration of constituents of concern and the estimated extent of the constituents of concern above the ROD-specified clean-up levels in the Residuum and Transition Zone. Figures 1.6 and 1.7 summarize the concentrations of the constituents of concern in the Upper and Lower Ocala, none of which exceed the ROD-

specified clean-up levels. Figures 1.8 and 1.9 depict the potentiometric surface of ground water of the Upper and Lower Ocala. Potentiometric surface maps were not developed for the Residuum because ground water within the Residuum is present in discrete, hydraulically unconnected, perched zones. Section 2.4 discusses the hydrogeology of the site in greater detail.

1.5 PERFORMANCE STANDARDS

The performance standards established by the ROD for the ground-water remedial action include:

- Ground-water monitoring in the impacted area to determine the effectiveness of the remedial action.
- Ground-water compliance monitoring to determine the effectiveness of the ground-water collection system to eliminate potential migration of the constituents of concern
- Monitoring of the ground-water system effluent to demonstrate compliance with POTW discharge requirements
- Placement of institutional controls

The following sections discuss the applicable or relevant and appropriate requirements (ARARs) and the proposed institutional controls. The Performance Standard Verification Plan included in Appendix D lists activities planned to demonstrate compliance with these Performance Standards.

1.5.1 Ground-Water Collection System

The ground-water collection system will be constructed by installing pumps in wells in which constituents of concern have routinely been detected above ROD-specified clean-up levels. The ground-water collection system will continue to operate until clean-up levels for the constituents of concern are reached throughout the impacted area. The clean-up levels were chosen based on Safe Drinking Water Act (SDWA) Maximum Contamination Levels (MCL) and are listed below.

Constituent of Concern	ROD-Specified Clean-up Level	ARAR
Benzene	5 ug/L	SDWA MCL
1,1-Dichloroethene	7 ug/L	SDWA MCL
1,1,1-Trichloroethane	200 ug/L	SDWA MCL

Notes: SDWA MCL - Safe Drinking Water Act Maximum Contamination Level
ARAR - Applicable or relevant and appropriate requirement
ug/L - micrograms per liter

1.5.2 Ground-Water Compliance Monitoring

Ground-water hydraulically downgradient of and bordering the ground-water collection system will be monitored throughout the duration of the remedial action to demonstrate that migration of the constituents of concern is not occurring. If constituents of concern are detected in the compliance monitoring wells above ARARs in two consecutive sampling events, modifications to the remediation system will be evaluated. The ARARs to be employed are the SDWA MCLs for the constituents of concern as listed in Section 1.5.1.

1.5.3 Effluent Monitoring

Ground water obtained from the collection system will be discharged by pumping through the sewer system to the local Publicly Owned Treatment Works (POTW). The POTW discharge limits, including flow rate limitations, as negotiated with the City of Albany Office of Public Works, for the currently operating interim remediation system are provided in Table 1.5. The POTW discharge limits are not expected to change with the updated system. If permit monitored constituents are detected in the effluent above ARARs discharge limitations in two consecutive sampling events, modifications to the remediation system will be evaluated. Appendix E includes the Industrial Wastewater Permit for 1995.

1.5.4 Institutional Controls

As required by the ROD, institutional controls, including deed restrictions and record notices, will be placed on well construction and ground water use in the impacted area. Under the Consent Decree between the United States, the Albany-Dougherty Payroll Development Authority, and BFS, dated March 4, 1994. The Payroll Development Authority is required to place deed restrictions on the chain of title of the site in accordance with state law. The purpose of the institutional controls is to restrict well operation in the vicinity of the ground-water collection system which could impact the efficiency of the recovery wells. Institutional controls would also restrict the use of ground water containing constituents of concern at concentrations exceeding MCLs. The controls shall remain in effect until the RA is complete.

1.5.5 Duration of the Remedial Action

The ground-water collection system will be operated until such time that the performance standards are met. Ground-water will be obtained from the impacted area as described in Appendix D and analyzed for the constituents of concern. The analytical data will be summarized and submitted to USEPA. The remedial action will be considered complete after three consecutive years of sampling resulting in concentrations which do not exceed ROD-specified clean-up levels. If one year of sampling results in concentrations which do not exceed ROD-specified clean-up levels, all or any subsequent sampling events which yield analytical results exceeding clean-up levels will be verified with a confirmatory round of sampling and analysis. If the confirmatory round of sampling and analysis indicates that the constituents do not exceed clean-up levels, the data from the initial round will be considered anomalous and the data from the confirmatory round of sampling will be used to evaluate the RA.

The analytical results will be evaluated on a well by well basis. As specified in the ROD, operation of recovery wells may be discontinued in areas where clean-up levels are attained. After clean-up levels have been attained in a well, the well will be monitored five years after the completion of the RA. If after 5 years, no ground-water sample contains a constituent of concern exceeding clean-up levels, the well will be abandoned in accordance with state requirements. Appendix D describes the Performance Standards Verification sampling in detail.

2.0 FIELD INVESTIGATION

Field investigations conducted to support the RD include the collection and analysis of ground water from targeted remediation wells, performance of a collection system capacity test in the targeted remediation wells, and the collection and analysis of influent to and effluent from the existing interim remediation system. The following section discusses the data collection activities and resulting data.

2.1 GROUND-WATER EVALUATION

Ground-water samples were collected from selected wells at the site to provide information to facilitate design of the ground-water collection system. Samples were collected from wells MW-1-1, MW-1-2, RW-2, and MW-1-4. Wells MW-1-3 and PTW-1 are presently operating as recovery wells for the interim remediation system. Based on data obtained from the RI, these wells will be included in the ground-water collection system. No ground-water samples were collected from these wells during design activities. The rationale for collection of samples from selected wells is provided below:

- MW-1-1 and MW-1-2 — Ground-water samples obtained during the RI from wells MW-1-1 and MW-1-2 exhibited concentrations of volatiles exceeding ROD-specified clean-up levels. One ground-water sample was obtained from each of these wells in May 1995 to verify concentrations detected in the samples collected during the RI.

- RW-2 — Ground-water samples obtained during the RI from well RW-2 indicated the potential presence of Aroclor-1254 at estimated concentrations below the CLP Contract Required Quantitation Limit. Ground-water samples were obtained during the RD from well RW-2 to evaluate the occurrence of Aroclor-1254 in this well and to determine whether the well would be included in the ground-water collection system.

- MW-1-4 — One ground-water sample obtained prior to the RI from well MW-1-4 indicated the presence of 1,1-dichloroethene and benzene at concentrations exceeding the ROD-specified clean-up levels. Because this data may not be comparable to CLP-generated data, this well was resampled in May 1995 to evaluate the presence of these constituents in the ground water and to determine whether the well would be included in the ground-water collection system.

2.1.1 Sample Collection Activities

Ground-water samples were collected from wells MW-1-1, MW-1-2, MW-1-4 and RW-2 on May 9 and 10, 1995. Prior to sample collection, the ground-water level was measured in each well. Wells MW-1-1 and RW-2 were redeveloped by removing approximately four well volumes of ground water from RW-2 and approximately six well volumes of ground water from MW-1-1. Because wells MW-1-2 and MW-1-4 had been redeveloped in February 1995 during the Inorganics Study, these wells were not redeveloped during the RD field activities.

Once redevelopment activities were completed, each of the wells was purged of approximately three well volumes of ground water. Purging was considered complete when the water quality parameters pH, turbidity, conductivity and temperature stabilized. Wells MW-1-2 and MW-1-4 were purged with a submersible pump in accordance with the low-flow pumping procedures described in the *Inorganics Monitoring Work Plan* (LAW, 1995). Because the static water level in MW-1-2 was above the top of the screen, the ground water in the riser pipe was not purged to below the screened interval. Because the static water level in MW-1-4 was approximately at the top of the screen, the pump was placed within the screened interval. Ground water was purged from the wells at a rate approximately equal to or less than the rate of recovery.

Based on the volume of ground water in RW-2 and MW-1-1 and the depth to ground water, the use of a submersible pump for purging these wells was not feasible. These wells were purged using laboratory-cleaned Teflon® bailers in accordance with USEPA Region IV standard operating procedure.

After the wells were allowed to recover, ground-water samples were obtained from the wells using laboratory-cleaned Teflon® bailers. Samples obtained for volatile analysis were placed in 40-ml glass vials equipped with Teflon®-septa caps. The samples were preserved with hydrochloric acid (HCl) and stored on ice at 4^0C. The sample obtained for PCB analysis was placed in a 1-liter amber glass bottle and stored on ice. The samples were packed in an iced cooler following chain-of-custody procedure and transported via overnight shipper to the laboratory. The samples were analyzed for the following constituents:

Well	Constituent of Concern
MW-1-1	Benzene
MW-1-2	Benzene
MW-1-4	1,1-Dichloroethene, Benzene
RW-2	Aroclor-1254

The results of the analysis are discussed in Section 2.1.2 of this submittal.

Wells MW-1-4 and RW-2 were resampled May 26-28, 1995 to verify the May 9, 1995 results. The wells were purged using a submersible pump for MW-1-4 and a Teflon® bailer for RW-2 and the samples were collected in the same manner described above and were analyzed for the same constituents. The results of this sampling activity are also discussed in the following section.

2.1.2 Ground-water Analytical Results

Results of the analysis of ground-water samples collected in May 1995 in support of the Remedial Design are included in Tables 1.1 and 1.2. Samples obtained from MW-1-1 and MW-1-2 contained benzene at concentrations exceeding the clean-up level of 5 ug/L. Benzene was detected in the sample obtained from well MW-1-1 at 61 ug/L and in the sample obtained from MW-1-2 at 7 ug/L. The two rounds of ground-water samples collected during the RD field activities from wells RW-2 and MW-1-4 did not exhibit detectable concentrations of the targeted compounds. Appendix F presents the data from the analyses conducted during RD activities.

Based on the present remediation system and the results of the RD sampling activities, the wells identified to be part of ground-water collection system are MW-1-1, MW-1-2, MW-1-3 and PTW-1. Wells RW-2 and MW-1-4 have not been included based on the absence of ROD-specified constituents of concern in the samples obtained from these wells.

2.2 COLLECTION SYSTEM CAPACITY TEST

A collection system capacity test was conducted to evaluate the sustainable flow rates from the wells which will comprise the ground-water collection system.

2.2.1 Field Activities

Two days prior to initiating the capacity test, the permanent pumps in wells MW-1-3 and PTW-1 were turned off to allow the aquifer system to equilibrate. Wells MW-1-1 and MW-1-2 were temporarily fitted with submersible bladder pumps for the duration of the capacity test.

The capacity test was performed by pumping continuously and simultaneously from all four wells while measuring ground-water levels in MW-1-1, PTW-1, MW-1-4, RW-4 and MW-1-5A. Ground-water levels could not be monitored in wells MW-1-2 and MW-1-3 due to limited space in the well piping. The flow rate of each pump was periodically adjusted to optimize the volume of ground water recovered from each well. The ground water collected from the system was containerized in a temporary storage tank prior to pumping into the treatment system and discharge to the POTW. The pumping was continued for a total of 72 hours.

2.2.2 Results of System Capacity Test

The results of the system capacity test indicate that the collection system will produce a sustainable flow rate of approximately 0.5 gallons per minute (gpm). Table 2.1 presents the flow rates from each well included in the system. A drawdown of 20.00 feet and 22.96 feet was observed in wells MW-1-1 and PTW-1. The drawdown had stabilized within 25 hours and 50 hours, respectively.

While operating at the optimum continuous flow rate of 0.5 gpm, the collection system was observed to influence one of the wells in the vicinity of the system. After 72 hours of pumping, a drawdown of 0.78 feet was observed in Well MW-1-4, which is located approximately 107 feet from the nearest pumped well (MW-1-1). The drawdown in Well MW-1-4 had not yet stabilized when the system capacity test was terminated indicating that the actual drawdown could be significantly greater. No drawdown was observed in wells MW-1-5A or RW-4 (located 192 and 125 feet, respectively, from well PTW-1) at the time that the test was completed (Appendix G).

2.3 EVALUATION OF THE GROUND-WATER EFFLUENT

Samples of effluent from the ground-water collection system were collected and analyzed to determine if the recovered ground water complies with POTW discharge requirements or will

require pretreatment prior to discharge. Ground water from the collection system was treated by passing through the interim remediation system to evaluate the efficiency of the treatment system. A sample of the treatment system effluent was collected and analyzed to evaluate system efficiency should it be required during implementation of the remedial action.

2.3.1 Field Activities

One effluent sample was obtained from the collection system during the performance of the well capacity test at optimum flow conditions. One water sample was obtained from the effluent stream of the interim remediation system treatment tank prior to initiation of the well capacity test. The effluent stream comprises treated ground water from wells MW-1-3 and PTW-1. Because MW-1-3 and PTW-1 have historically exhibited the highest concentrations of the ROD-specified constituents of concern, this sample exhibits a worst case sample of the treatment effluent. The samples were collected directly into 40-ml Teflon®-septa vials preserved with HCl and stored on ice. The samples were packed in a iced cooler and shipped via overnight carrier to the analytical laboratory. The samples were analyzed for benzene, 1,1-dichloroethene, and 1,1,1-trichloroethane following the CLP SOW.

2.3.2 Analytical Results

The results of the analysis of the effluent from the ground-water collection system indicates that the concentration of constituents of concern do not exceed POTW discharge requirements. Based on these results, it was determined that the effluent from the ground-water collection system will not require pretreatment prior to discharge to the POTW. The effluent from the ground-water collection system contained benzene at a concentration of 13 ug/L (versus a discharge limit of 20 ug/L) and 1,1-dichloroethene at an estimated concentration of 2 ug/L (versus a discharge limit of 20 ug/L). The effluent sample from the treatment system did not contain ROD-specified constituents at detectable concentrations. The results of the analysis are included in Table 2.2

2.4 EVALUATION OF GROUND-WATER FLOW DIRECTION

Depth to ground water was measured on two separate occasions in all wells not fitted with pumps on March 28, 1995 and May 22, 1995 as part of the inorganics study. The ground-water elevations were calculated using surveyed top of casing elevations for the wells. Figure 2.1 provides the location map of a hydrostratigraphic cross-section transversing the site (southwest to northeast). Figure 2.2 provides a hydrostratigraphic cross-section for the site which illustrates the variation of the placement of the well screen from well to well within the same zone. Based on this variation, ground-water elevations across the site were evaluated utilizing wells screened in the same hydrostratigraphic units. The results of this evaluation were similar to the findings presented in the RI and will be discussed in the following sections.

2.4.1 Residuum

Ground-water elevations in the Residuum supported the earlier interpretation that the water bearing units in the Residuum are perched due to the presence of discontinuous clay lenses found throughout the Residuum. Ground-water elevations ranged from 174.40 feet above mean sea level (msl) to 205.76 feet (msl). The highest ground-water elevation (205.76 feet, msl) was observed in the background well BMW-2A. Ground-water elevations for Residuum wells in the courtyard area ranged from 170.5 feet (msl) to 194.3 feet (msl). Ground-water elevations in the undeveloped area in the southern portion of the site ranged from 170.4 feet (msl) to 194.1 feet (msl). Ground-water elevations in wells west of the main building ranged from 170.2 feet (msl) to 172.7 feet (msl). Based on the wide variation in ground-water elevations and the lack of horizontal interconnection between the perched water-bearing zones, no potentiometric surface map was developed for the Residuum.

The considerably higher ground-water elevations observed during the initial activities confirm the use of BMW-2A as the background well for the Residuum. Ground-water elevations observed in the other portions of the site consistently range from approximately 170 feet (msl) to 195 feet (msl) compared to over 205 feet MSL for background well BMW-2A.

2.4.2 Upper Ocala

Ground-water elevations in the Upper Ocala ranged from 169.4 feet (msl) to 174.3 feet (msl). Because the Upper Ocala wells are not screened in a single hydrostratigraphic unit, a potentiometric surface map of the Upper Ocala was prepared based on the ground-water elevations from wells screened approximately 20 feet within the Ocala Limestone. The resulting potentiometric surface map (Figure 1.8) is similar to the map presented in the RI.

The regional ground-water gradient (hence ground-water flow) in the Ocala is generally toward the southwest in the Albany area and beneath the site, as illustrated by Figure 2.3, obtained from a 1981 USGS report entitled *Geohydrology of the Albany Area, Georgia* (Hicks, 1981). The USGS report states that local variations in the southwestern regional trend are common, caused by local recharge areas (surface water bodies) and geologic boundaries. Figure 2.3 illustrates variations in ground-water flow direction in the Albany area due to the effects of recharge from several surface water bodies in the area, including the Flint River, Muckalee Creek, Kinchatoonie Creek and Coolewahee Creek.

The ground-water elevations and general flow direction measured at the site are consistent with the USGS findings in 1979 (i.e., elevations between 170 and 180 feet, msl, and flow generally to the southwest). Recharge from the wetlands area and the stormwater detention pond located on the southern portion of the site create a local mounding of the potentiometric surface. Ground water flows radially off of this mound, causing a minor local deflection of the regional southwestern flow trend, locally diverting to the west around the recharge mound.

The ground-water elevations observed during the initial activities confirm the use of RW-10A as the background well for the Upper Ocala based on the regional and local direction of ground-water flow and the observed ground-water elevation and location of well RW-10A.

2.4.3 Lower Ocala

Ground-water elevations in the Lower Ocala ranged from 167.1 feet (msl) to 169.3 feet (msl). A potentiometric surface map (Figure 1.9) of the Lower Ocala indicates that ground-water flow direction is toward the south-west. The much higher hydraulic conductivity of the Lower Ocala

compared to that of the Upper Ocala results in a more consistent and gently sloping potentiometric surface. This is also consistent with USGS findings.

The ground-water elevations observed during the initial activities confirm the use of RW-11 as the background well for the Lower Ocala based on the regional and local ground-water flow direction and the observed ground-water elevation and location of well DRW-11.

3.0 DESIGN ANALYSIS

This section defines the technical criteria for an effective remedial action and presents the RD plan satisfying the criteria. The criteria supporting the technical aspects of the remedial action include waste characterization, pretreatment requirements and treatment schemes (if necessary), volume of ground water requiring discharge, system input/output rates, system influent/effluent qualities, materials and equipment, performance standards, and long-term monitoring requirements. Each criterion will be discussed in this section.

Waste Characterization — Ground-water data collected during the RI/FS indicate that only benzene, 1,1-dichloroethene, and 1,1,1-trichloroethane were detected in ground-water samples at concentrations exceeding ROD-specified clean-up levels (Table 1.1). The samples exceeding clean-up levels were collected from wells located in the south-western portion of the Courtyard, near the location of the interim remediation system as indicated on Figure 1.4.

Treatment Schemes and Pretreatment Requirements — Based on analytical results obtained from ground-water samples collected from the pilot ground-water collection system, additional pretreatment, prior to discharge to the POTW, will not be required (Section 2.3). As indicated by Table 2.2, the samples obtained from the ground-water collection system did not contain any constituents of concern at concentrations exceeding POTW discharge limits.

On July 24, 1995, Mr. Hank Garner of the Albany Public Works Division (PWD) was contacted by LAW to discuss permit requirements for discharge to the POTW and whether pretreatment of effluent from the ground-water collection system will be required. As confirmed in a letter from LAW to the POTW (Appendix H), pretreatment of the ground-water collection effluent is not required prior to discharge to the POTW if the concentration of constituents of concern in the effluent are below permit discharge limitations. During a follow-up call between USEPA, BFS, LAW, and PWD on August 30, 1995, Mr. Hank Garner of PWD agreed that the PWD would accept ground-water collection system effluent discharged directly to the POTW if the concentrations of volatile organic compounds in the effluent did not exceed permit discharge limitations. In that same conversation, Mr. King of USEPA indicated that, given the approval of the PWD, USEPA would also approve direct discharge of the effluent to the POTW with the inclusion of contingency granular activated carbon units in the design.

If, during the course of the RA, effluent concentrations exceed POTW permit limitations, the design includes a contingency for installation of two granular activated carbon units.

Volume of Ground Water Exceeding Clean-Up Levels — Figure 1.5 illustrates the areal extent of ground water impacted at the facility. Based on hydrostratigraphic data obtained during the RI, the impact to ground water is limited to the residuum/transition zone due to the low permeability of the Upper Ocala hydrostratigraphic unit. The volume of ground water impacted by constituents of concern above ROD-specified clean-up levels was estimated at 149,000 gallons. This volume of was calculated using the areal extent depicted in Figure 1.5, the average depth of the Residuum/Transition Zone and the effective porosity of the type of soil comprising the residuum. Calculation sheets are provided in Appendix I.

System Input/Output Rates — The wells which have been designated a part of the ground-water collection system produce ground water at an estimated sustainable pump rate of 0.5 gallons per minute (30 gallons per hour), as determined by the system capacity test discussed in Section 2.3. The ground-water collection system effluent rate will be equal to the sustainable pumping rate. This rate is within the POTW discharge limitations.

Ground-Water Collection System Effluent Quality — The ground-water collection system effluent quality was determined from samples obtained from the pilot pumping system during implementation of the system capacity test. The effluent sample was collected once the optimum pumping rates from each well were stabilized. The effluent quality is presented in Table 2.2.

Materials and Equipment — The remediation system will consist of recovery wells, permanent pneumatic pumps and associated controllers/compressors, and piping to the POTW. The system will be fitted with sampling ports for each well and at the outfall to the POTW. Section 5.0 provides a detailed description of the remediation system.

Performance Standards — Performance standards are discussed in Section 1.5.

Long-Term Monitoring Requirements — Long-term monitoring requirements include monitoring of the ground water in the impacted area and monitoring the ground-water hydraulically

downgradient of and bordering the impacted area, and monitoring the effluent concentration at the POTW outfall. The monitoring requirements during the Remedial Action are discussed in Sections 1.5, 4.0, and the Performance Standards Verification Plan (Appendix D).

4.0 PERFORMANCE STANDARDS VERIFICATION PLAN

The purpose of the Performance Standards Verification Plan is to provide a mechanism to ensure that both short-term and long-term Performance Standards for the Ground-Water Remedial Action are met. Specifically, the Performance Standards Verification Plan addresses remediation system monitoring and ground-water compliance monitoring. Activities conducted pursuant to the Performance Standards Verification Plan will be in substantial accordance with Region IV standard operating procedure (USEPA, 1991). The plan is provided in Appendix D.

5.0 REMEDIAL DESIGN

The system designed to remediate the impacted ground water at the Firestone Tire & Rubber Company Superfund Site is described in Section 5. The components of the system will include a ground-water collection system and a discharge system. Appendix A includes the design specifications. The design drawings are provided as an attachment.

5.1 BASIS OF DESIGN

The ground-water collection system is required to collect the impacted ground water beneath the Courtyard area and transport the collected ground water to the discharge system. Ground water will be obtained from four existing wells (MW-1-1, MW-1-2, MW-1-3, and PTW-1), which will be fitted with permanent pumps. As determined by the system capacity test described in Section 2.2, the four recovery wells will yield 0.5 gallons of ground water per minute (30 gallons per hour). PTW-1 will be fitted with a sampling port from which ground water will be sampled. Based on the limited annular space, wells MW-1-1, MW-1-2, and MW-1-3 will not be fitted with sampling ports to collect ground-water samples. Ground-water samples will be obtained from the wells by removing the pumps prior to sampling. The collected ground-water effluent will be transported via underground lines to a treatment room, where each effluent line will be fitted with a sampling port and a valve to enable each recovery well to operate and be sampled independently. The effluent streams will be combined and then will be transported to the POTW outfall. A sampling port will be located at the POTW outfall to facilitate sampling of the discharge. Should treatment of the ground-water become necessary, the ground-water lines in the treatment room have been designed to allow installation of two contingency granular activated carbon units with no impact to the system. Section 11346 of the attached specifications (Appendix A) discusses the carbon units in detail.

5.1.1 Ground-Water Collection System

The ground-water collection system will be composed of existing wells, pneumatic pumps, pump controllers, air compressors, valves and associated piping.

Existing Wells

Ground-water will be collected from the impacted areas by placing permanent pumps in wells MW-1-1, MW-1-2, MW-1-3, and PTW-1. The following table provides information concerning the construction of these wells.

Well	Total Depth (feet bgs)	Screened Interval (feet bgs)	Construction Details
MW-1-1	60.5	49 to 59	2" PVC single cased
MW-1-2	35.5	25 to 35	2" PVC single cased
MW-1-3	65.5	55 to 65	2" PVC single cased
PTW-1	84.3	16 to 84	6" PVC single cased

Notes: bgs - below ground surface
PVC - polyvinylchloride

Ground-water Collection Pumps and Controllers

Wells MW-1-1, MW-1-2, MW-1-3, and PTW-1 will be permanently fitted with a QED Pulse Pump Model LP1301. Each pump will be controlled by a QED Well Master L380. A QED Pulse Sender L360 will control the four Well Masters. This pump and controller are capable of flow rates ranging from zero to two gallons per minute. The controllers require seven cubic feet per minute (CFM) free air at 100 pounds per square inch (gauge) (psig). Section 11214 discusses the pump and controller specifications.

Air Compressor

The pneumatic ground-water pumps will be driven with a Speedaire Model 5Z401 air compressor, which delivers 34.2 CFM free at 100 psig with ambient inlet conditions as required by the pumps and controllers. The air compressor will be equipped with an after cooler, coalescing air line filter, air line oil removal filter, refrigerated air dryer, and particulate filters, as discussed in Section 11370 specifications.

Process Piping and Appurtenances

The ground-water piping from the wells to the treatment room will be constructed of PVC with standard fittings. Within the treatment room, ground-water piping will be constructed of carbon steel with standard fittings.

Air piping from the well vaults to the treatment room will be constructed of high density polypropylene (HDPE) rated for a pressure of 150 psi. The HDPE piping will be oil and chemical resistant with standard fittings. Within the treatment room, air piping will be stainless steel with standard fittings.

A totalizing water meter will be installed to measure discharge flow to the POTW. Hose connectors will be constructed of stainless steel dry disconnect with Viton® gaskets. An oil-filled pressure gauge with a range of 0 to 150 psi will be placed in-line. Section 15060 of the attached specifications describes the piping and appurtenances specifications

Valves

Valves will be specified rising stem or rising outside screw and yoke stems. Each valve will be as scheduled and required to suit anticipated system pressures and temperatures. Section 15100 of the attached specifications describes the valve specifications.

5.1.2 Ground-Water Discharge System

The ground-water discharge system consists of piping and appurtenances and valves. These design components were discussed in Section 5.1.1.

5.2 EQUIPMENT SELECTION

Material selection for the ground-water collection system was based on corrosion resistance, durability, operability, availability of spare parts, cost and ease of installation and repair. Pump selection was based on the same requirements.

5.3 SHIPPING AND RECEIVING

Materials and supplies will be shipped or received by the individual/firm responsible for operation and maintenance of the remediation system. Currently, BFS has an on-site coordinator who performs these functions. The operation and maintenance will be discuss during the remedial action.

5.4 ELECTRICAL SERVICE CAPACITY

The only part of the ground-water collection system requiring electrical service is the treatment room. This room is currently serviced to operate the interim remedial system. No additional service is required for this design.

5.5 SITE SECURITY

The former Firestone Tire & Rubber facility is completely fenced. Cooper Tire & Rubber Company limits access to the facility with a 24-hour guard. The site is inaccessible to unauthorized personnel.

6.0 COST ESTIMATE

Table 6.1 provides a good faith cost estimate for construction of the remediation system described in this design submittal.

7.0 SCHEDULE

Figure 7.1 provides an estimated schedule for construction of the remediation system described in this submittal.

8.0 REFERENCES

Hicks, D.W., R.E. Krause, and J.S. Clarke, 1981. *Geohydrology of the Albany Area, Georgia*, Information Circular 57, Georgia Geologic Survey, Atlanta, Georgia.

Law Environmental, Inc., 1995. *Ground-Water Remedial Design Work Plan, Former Firestone Rubber & Tire Facility, Albany, Georgia*, Kennesaw, Georgia.

Law Environmental, Inc., 1995. *Inorganics Monitoring Work Plan, Former Firestone Rubber & Tire Facility, Albany, Georgia*, Kennesaw, Georgia.

Woodward-Clyde Consultants, 1992. *Remedial Investigation Report, Former Firestone Rubber & Tire Facility, Albany, Georgia*, Chicago, Illinois.

United States Environmental Protection Agency, 1991. *Engineering Support Branch Standard Operating Procedures and Quality Assurance Manual*, Region IV, Athens, Georgia.

TABLES

Table 1.1. Constituents of Concern Detected in Residuum Wells

Sample Location / Date Collected	1,1,1-TCA ug/L	1,1-DCE ug/L	Benzene ug/L	Aroclor-1254 ug/L
BMW-2				
8/17/91	5 U	5 U	5 U	–
BMW-3				
8/20/91	5 U	3 J	5 U	2 U
BMW-4				
8/22/91	5 U	5 U	5 U	2 U
EMG-5A				
8/21/91	0.7 J	0.4 J	5 U	2 U
8/21/91	1 J	5 U	5 U	–
MW-1-2				
8/14/91	5 U	5 U	31	1 U
5/9/95	–	–	7	–
MW-1-4				
1/24/91	0.5 U	24	86	
8/15/91	–	–	–	1 U
5/9/95	–	7 U	5 U	–
5/23/95	–	7 U	5 U	–
MW-12-1				
8/17/91	24	6	5 U	–
9/30/91	19	7	5 U	1 U
MW-12-1B				
9/30/91	5 J	2 J	5 U	1 U
MW-14				
10/1/91	5 U	5 U	5 U	1 U
MW-7-8				
8/15/91	4 J	8 U	8 U	1 U

Notes:

U - Analyte was not detected above reported detection limit.

J - Reported concentration is estimated.

* - Data were obtained form a study conducted prior to the RI. The reported data may not be comparable to RI-generated data.

1,1,1-TCA - 1,1,1-Trichloroethane

1,1-DCE - 1,1-Dichloroethene

Source:

Feasibility Study,
Woodward-Clyde Consultants, 1992

Table 1.2. Constituents of Concern Detected in Transition Zone Wells

Sample Location	Date Collected	1,1,1-TCA ug/L	1,1-DCE ug/L	Benzene ug/L	Aroclor-1254 ug/L
EMG-1					
	8/20/91	5 U	5 U	5 U	2 U
EMG-2					
	8/22/91	5 U	5 U	5 U	1 U
EMG-6					
	8/20/91	5 U	5 U	5 U	2 U
EMG-7					
	8/20/91	5 U	5 U	5 U	2 U
MW-1-1					
	8/14/91	15 B	6	71	1 U
	5/10/95	–	–	61	–
MW-1-3					
	8/23/91	560 D	1400 D	50 U	1 U
MW-1-5					
	8/21/91	3 J	5 J	5 U	2 U
MW-1-6					
	9/5/91	5 U	5 U	5 U	1 U
MW-7-5					
	8/15/91	2 J	6 J	8 U	1 U
	8/15/91	28 B	7	5 U	1 U
PTW-1					
	8/23/91	220	130	10 U	1 U
RW-1					
	8/16/91	40 B	5 U	5 U	1 U
RW-2					
	12/11/91	10 U	10 U	10 U	0.58 J
	5/10/95	–	–	–	0.38 U
	5/25/95	–	–	–	0.38 U
RW-3					
	8/21/91	–	–	–	2 U
	8/21/91	0.9 J	5 U	5 U	2 U

Notes:

U - Analyte was not detected above reported detection limit.

J - Reported concentration is estimated.

* - The reported concentration is below the Contract Required Quantitation Limit and, therefore, likely within a nonliner portion of the calibration curve.

1,1,1-TCA - 1,1,1-Trichloroethane

1,1-DCE - 1,1-Dichloroethene

Source:

Feasibility Study,
Woodward-Clyde Consultants, 1992

Table 1.3. Constituents of Concern Detected in Upper Ocala Wells

Sample Location	Date Collected	1,1,1-TCA ug/L	1,1-DCE ug/L	Benzene ug/L	Aroclor-1254 ug/L
DRW-2					
	8/29/91	5 U	5 U	5 U	1 U
DRW-3					
	8/29/91	5 U	5 U	5 U	1 U
DRW-4					
	8/28/91	5 U	5 U	5 U	–
DRW-8					
	10/1/91	5 U	5 U	5 U	1 U
EMG-3					
	8/22/91	5 U	5 U	5 U	1 U
EMG-5					
	8/21/91	0.7 J	5 U	5 U	2 U
MW-13					
	10/1/91	5 U	5 U	5 U	1 U
RW-10					
	10/3/91	5 U	5 U	5 U	1 U
RW-4					
	9/17/91	5 U	5 U	5 U	1 U
RW-5					
	9/23/91	0.5 J	0.3 J	5 U	1 U
RW-6					
	9/30/91	5 U	5 U	5 U	1 U
RW-7					
	9/26/91	5 U	5 U	5 U	1 U
	9/26/91	5 U	5 U	5 U	1 U
RW-8					
	9/20/91	5 U	1 J	5 U	1 U
RW-9					
	9/16/91	5 U	5 U	5 U	1 U

Notes:
U - Analyte was not detected above reported detection limit.
J - Reported concentration is estimated.
1,1,1-TCA - 1,1,1-Trichloroethan
1,1-DCE - 1,1-Dichloroethene

Source:
Feasibility Study,
Woodward-Clyde Consultants, 1992

Table 1.4. Constituents of Concern Detected in Lower Ocala Wells

Sample Location	Date Collected	1,1,1-TCA ug/L	1,1-DCE ug/L	Benzene ug/L	Aroclor-1254 ug/L
DRW-10					
	9/18/91	0.5 U	0.5 U	0.5 U	1 U
DRW-11					
	9/24/91	0.5 U	0.5 U	0.5 U	1 U
	9/27/91	5 U	5 U	5 U	1 U
DRW-5					
	9/19/91	0.5 U	1.2	0.5 U	1 U
DRW-6A					
	9/19/91	0.5 U	0.5 U	0.5 U	1 U
DRW-7A					
	9/18/91	0.5 U	0.5 U	0.5 U	1 U
	9/18/91	0.5 UJ	0.5 UJ	0.5 UJ	1 U
DRW-9					
	9/20/91	0.5 U	0.5 U	0.5 U	1 U
OW-1					
	8/26/91	10 U	10 U	10 U	1 U
OW-2					
	9/4/91	8 U	8 U	8 U	1 U
	9/4/91	6 U	6 U	6 U	1 U
PW-1					
	10/1/91	0.5 U	0.5 U	0.5 U	1 U
PW-2					
	9/27/91	5 U	5 U	5 U	1 U

Notes:
U - Analyte was not detected above reported detection limit.
J - Reported concentration is estimated.
1,1,1-TCA - 1,1,1-Trichloroethan
1,1-DCE - 1,1-Dichloroethene

Source:
Feasibility Study,
Woodward-Clyde Consultants, 1992

Table 1.5. Industrial Wastewater Permit Discharge Limitations

Parameter	Maximum Daily Concentration ug/L	Average Daily Concentration ug/L
Benzene	20	20
Carbon Tetrachloride	100	100
Chloroform	4	4
Chlorinated Ethanes	700	700
Dichlorobenzenes (total)	4000	4000
Dichloroethenes (total)	20	20
Dichloromethane	180	180
1,1,2,2-Tetrachloroethane	10	10
1,1,1-Trichloroethane	20	20
Toluene	2000	2000
Xylenes (total)	10000	10000

Note: Two consecutive monitoring monthly monitoring events shall not exceed the listed concentration.
Source: Industrial Wastewater Contribution Permit Number T-1, User Code CO P11

Entered by: JAM 7/18/95
Checked by MPL 7/18/95

Table 2.1. Summary of System Capacity Test Results

Well	Average Pump Rates[1] (gpm)	Observed Drawdown[2] (feet)	Specific Capacity (gpm/ft)	Nearest Pumped Well (feet)
Pumped Wells				
MW-1-1	0.12	NA	NA	NA
MW-1-2	0.23	NA	NA	NA
MW-1-3	0.05	20.00	0.0025	NA
PTW-1	0.11	22.96	0.0048	NA
Monitoring Wells				
MW-1-4	NA	0.78[3]	NA	107 (MW-1-1)
MW-1-5A	NA	**	NA	125 (PTW-1)
RW-4	NA	**	NA	192 (PTW-1)

Notes:

Entered by: JAM 7/18/9
Checked by RM 7/18/95

NA - Not Applicable
gpm - gallons per minute
gpm/ft - gallons per minute/foot
** - No drawdown was observed in these wells during the system capacity test.
1 - Average pump rates were obtained from pump cycle data. The total average pump rate at the holding tank was 0.5 gpm.
2 - Drawdown could not be observed in wells MW-1-1 and MW-1-2 due to the small well diameter and ground-water level.
3 - Reported drawdown was observed at 72 hours after the start of pumping. Drawdown in MW-1-4 was still increasing at the end of the system capacity test.

Table 2.2. Ground-Water Collection System Effluent Quality

Parameter	Effluent Concentrations (ug/L)	Maximum Daily Concentration (ug/L)
Benzene	13	20
Carbon Tetrachloride	ND	100
Chloroform	ND	4
Chlorinated Ethanes	1 J	700
Dichlorobenzenes (total)	--	4000
Dichloroethenes (total)	2 J	20
Dichloromethane	ND	180
1,1,2,2-Tetrachloroethane	ND	10
1,1,1-Trichloroethane	ND	20
Toluene	ND	2000
Xylenes (total)	3 J	10000

Notes: ND - Not detected

-- - Effluent samples were analyzed following Contract Laboratory Program Statement of Work for Volatile Organic Compounds. Dichlorobenzenes are not analyzed as part of this methodology. Samples collected during the RI and analyzed for semivolatile organic compounds did not exhibit the presence of dichlorobenzenes at detectable concentrations.

J - Reported concentration is estimated.

Entered by: JAM 8/30/95
Checked by: RM 8/30/95

Source: Industrial Wastewater Contribution Permit Number T-1, User Code CO P11

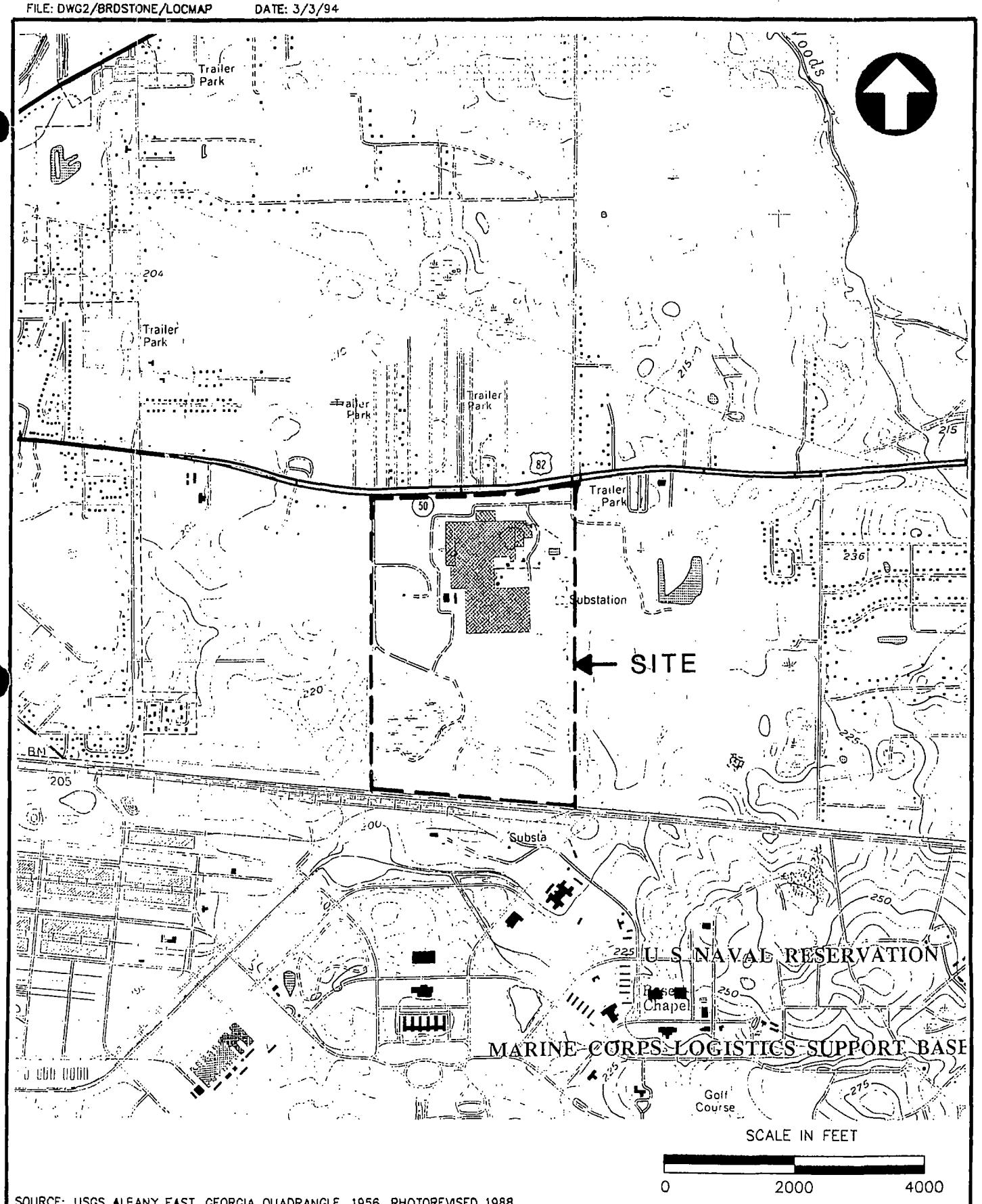
Table 6.1
ENGINEER'S COST OPINION
UNIT PRICE SCHEDULE

ITEM NO.	DESCRIPTION	SPECIFIED ITEMS ESTIMATED QUANTITY	UNIT PRICE	TOTAL PRICE
1.	Mobilization	Lump Sum	$ 5,000	$ 5,000
2.	Demobilization	Lump Sum	$ 5,000	$ 5,000
3.	Demolition and Removal	Lump Sum	$ 7,000	$ 7,000
4.	Compressed Air System Modifications	Lump Sum	$ 6,000	$ 6,000
5.	Ground-Water Recovery System Modifications	Lump Sum	$26,450	$26,450
		TOTAL:	$49,450	$49,450

Entered by: CSS
Checked By: JWK

FIGURES

FILE: DWG2/BRDSTONE/LOCMAP DATE: 3/3/94



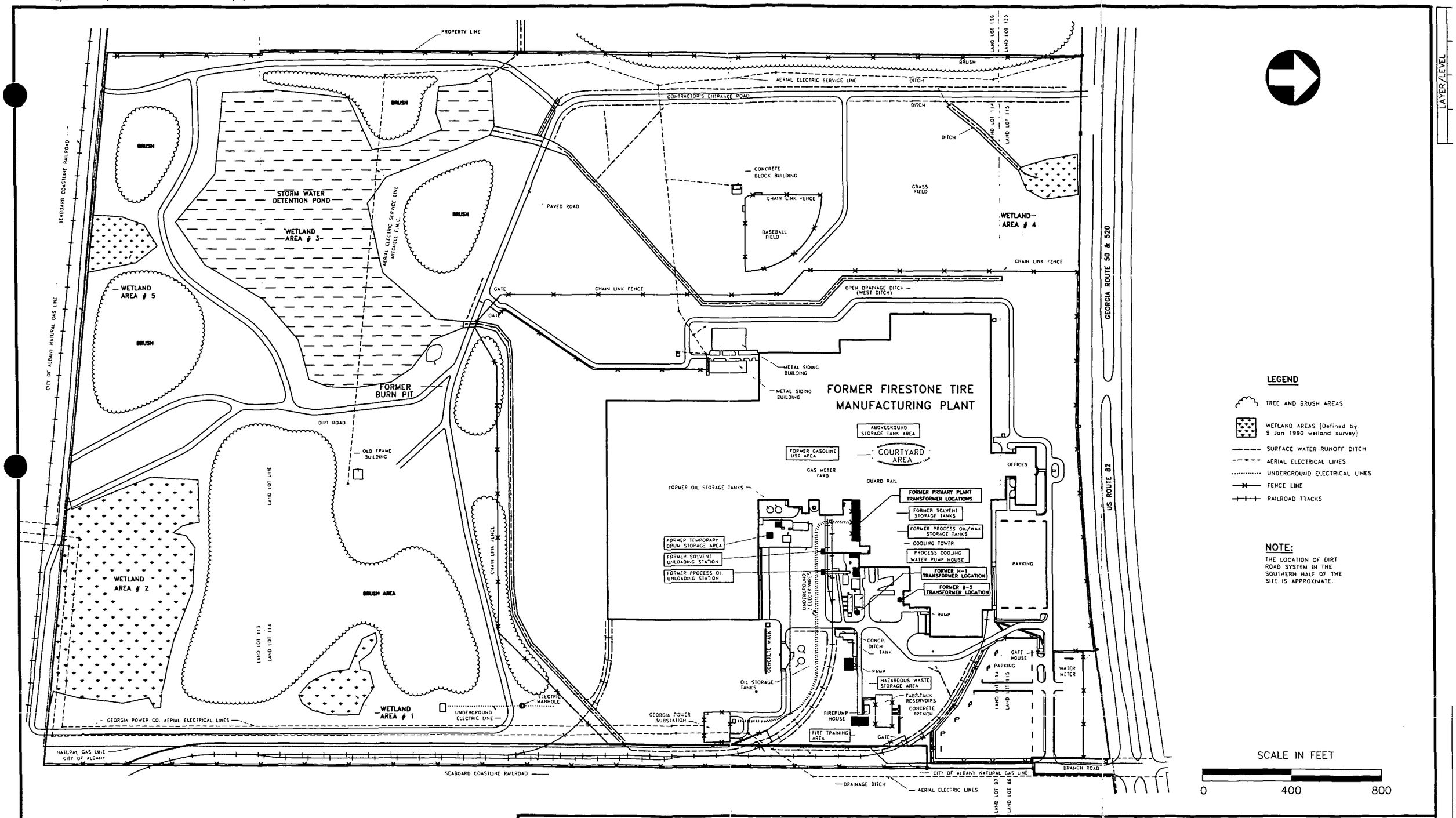
SOURCE: USGS ALBANY EAST, GEORGIA QUADRANGLE, 1956, PHOTOREVISED 1988

LAYER/LEVEL

BRIDGESTONE/ FIRESTONE, INC. ALBANY, GEORGIA	LAW ENGINEERING AND ENVIRONMENTAL SERVICES	SITE LOCATION MAP FIRESTONE TIRE AND RUBBER COMPANY SITE PROJECT NO. 41-4537 FIGURE 1.1

PREPARED BY/DATE

FILE: DWG2/BRDSTONE/FIGT-2 DATE: 8/8/95



SOURCE: WOODWARD-CLYDE CONSULTANTS, REMEDIAL INVESTIGATION REPORT, 1992

FIRESTONE TIRE & RUBBER COMPANY
SUPERFUND SITE
BRIDGESTONE/FIRESTONE, INC.
ALBANY, GEORGIA

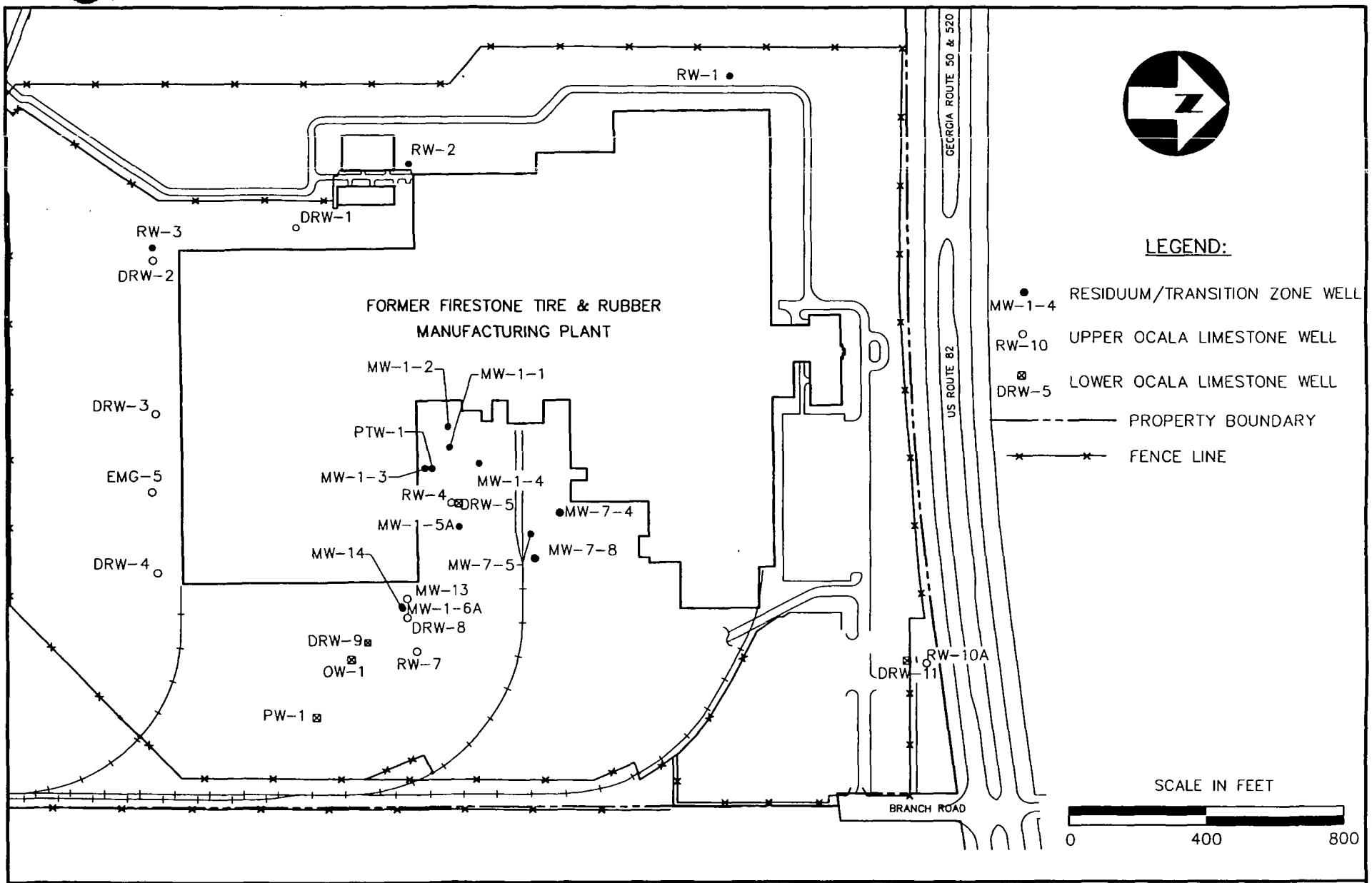
LAW
ENGINEERING AND ENVIRONMENTAL SERVICES

SITE PLAN
FIRESTONE TIRE & RUBBER COMPANY SITE

PROJECT NO. 41-4537 FIGURE 1.2

LAYER/LEVEL

PREPARED BY/DATE



BRIDGESTONE/FIRESTONE, INC.
ALBANY, GEORGIA

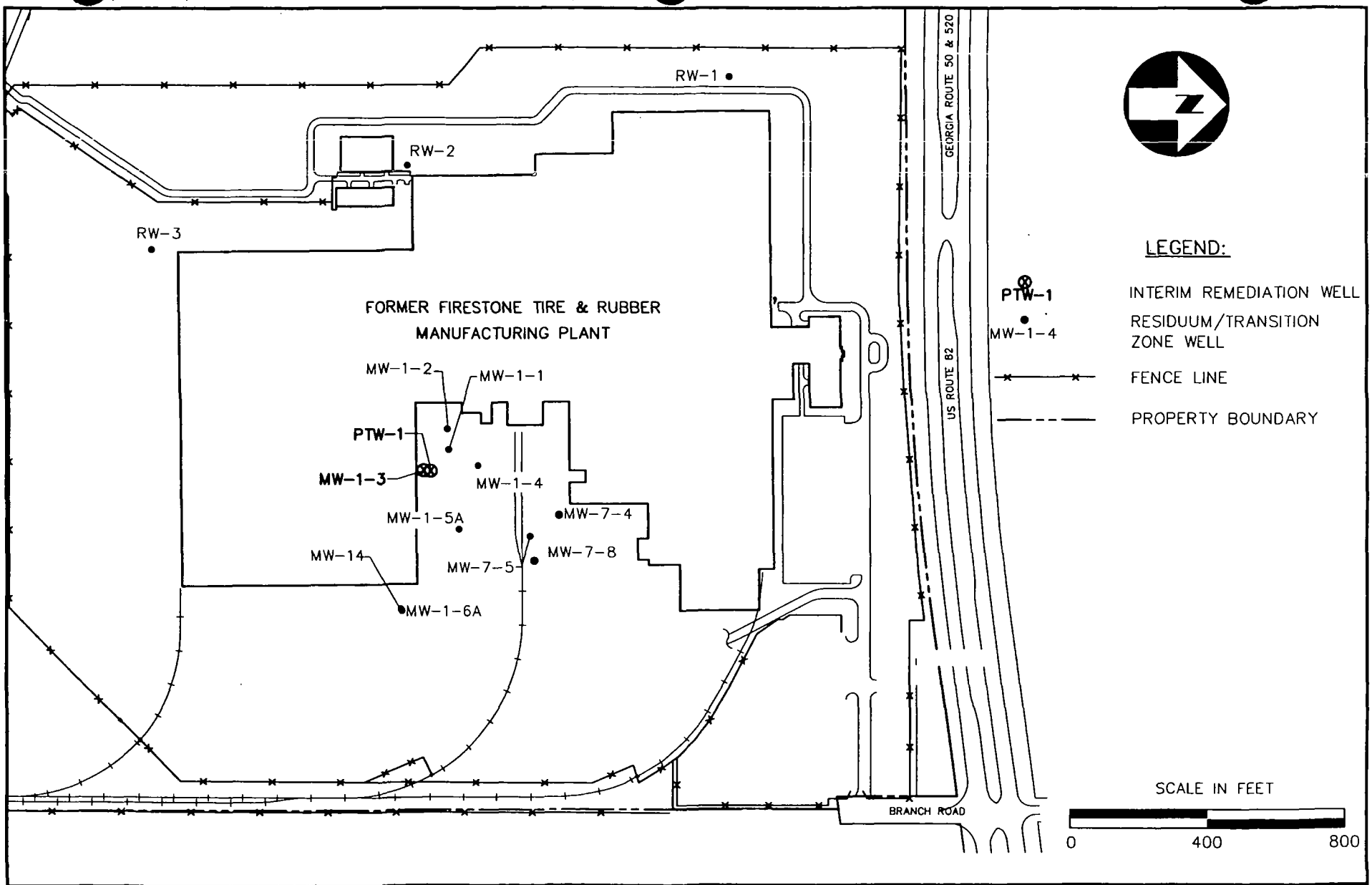
LAW
ENGINEERING AND ENVIRONMENTAL SERVICES

DETAIL OF BUILDING
AND COURTYARD

FIRESTONE TIRE & RUBBER COMPANY SITE

PROJECT NO. 41-4537 FIGURE 1.3

/BRDSTONE/FIG1-3 DATE: 8/31/95



BRIDGESTONE/FIRESTONE, INC.
ALBANY, GEORGIA

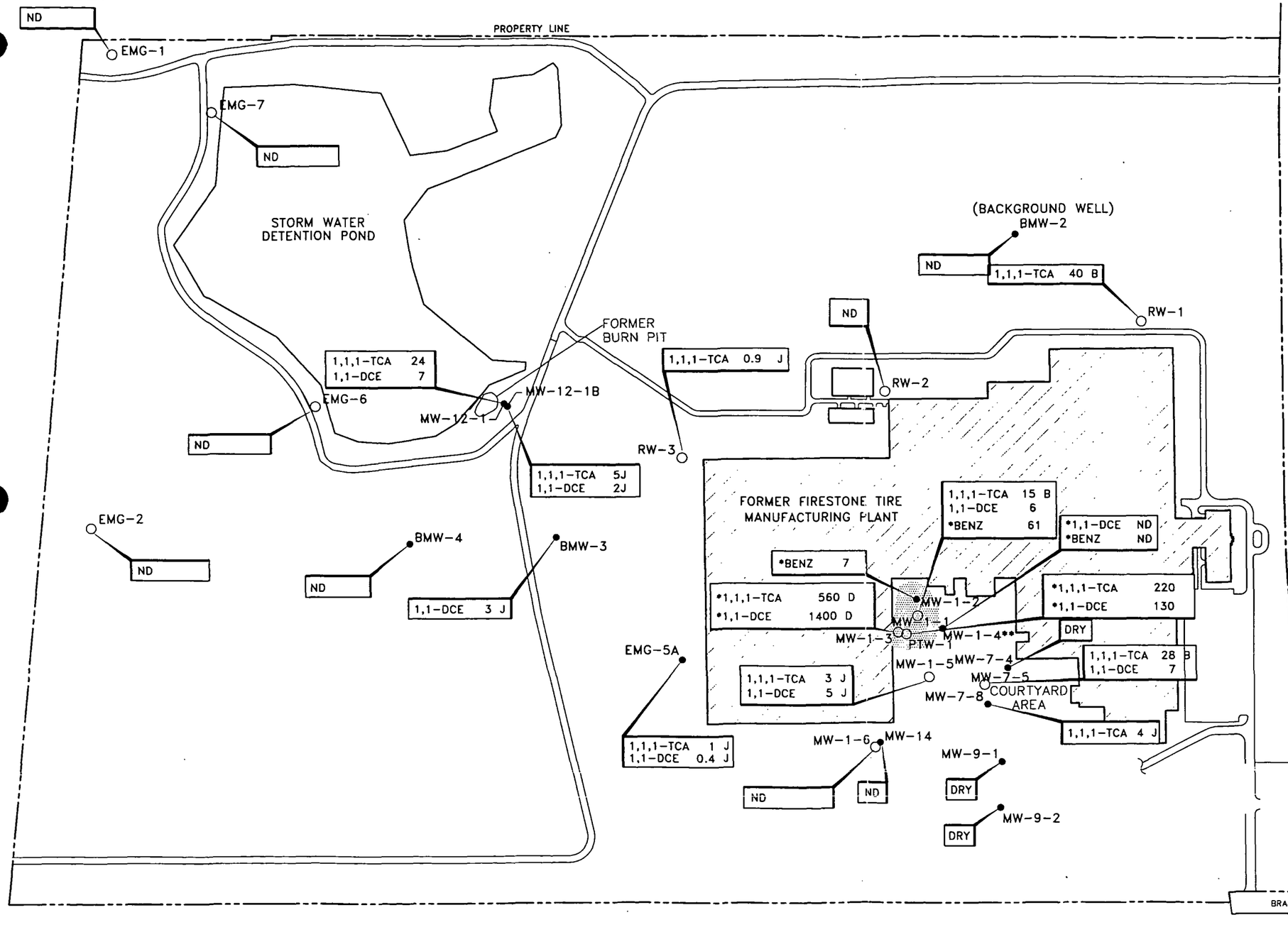
LAW
ENGINEERING AND ENVIRONMENTAL SERVICES

INTERIM REMEDIATION SYSTEM WELLS

FIRESTONE TIRE & RUBBER COMPANY SITE

PROJECT NO. 41-4537 FIGURE 1.4

FILE: /DWG2/BRDSTONE/FIG1-4 DATE: 8/31/95



GEORGIA ROUTE 50 & 520

U.S. ROUTE 82

LAYER/LEVEL

LEGEND:

- ○ RW-1 TRANSITION ZONE WELL (SCREEN/SAND PACK IN RESIDUUM/ UPPER OCALA)
- ● BMW-2 RESIDUUM WELL
- [*BENZ 6] REPORTED CONCENTRATION IN ug/l EXCEEDS ROD SPECIFIED CLEAN-UP LEVEL
- [1,1-DCE 6] REPORTED CONCENTRATION IN ug/l IS LESS THAN OR EQUAL TO ROD SPECIFIED CLEAN-UP LEVEL
- ND CONSTITUENTS OF CONCERN NOT DETECTED
- ESTIMATED EXTENT OF COCs DETECTED ABOVE ROD SPECIFIED CLEAN-UP LEVELS

J = REPORTED CONCENTRATION IS ESTIMATED

D = ANALYSIS OF THE SAMPLE WAS BASED UPON A SECONDARY DILUTION OF THE SAMPLE

B = THE CONSTITUENT WAS DETECTED IN AN ASSOCIATED BLANK SAMPLE

NOTE: FIGURE DENOTES SITE LAYOUT AS OF AUGUST THROUGH SEPTEMBER, 1991. CONCENTRATIONS ARE REPORTED FROM THE MOST CURRENT AVAILABLE DATA.

CONSTITUENTS OF CONCERN:

1,1,1-TCA	1,1,1-TRICHLOROETHANE
1,1-DCE	1,1-DICHLOROETHENE
BENZ	BENZENE

SCALE IN FEET

0 400 800

SOURCE: WOODWARD-CLYDE CONSULTANTS, REMEDIAL INVESTIGATION REPORT, 1992

BRIDGESTONE/FIRESTONE, INC.
ALBANY, GEORGIA

LAW
ENGINEERING AND ENVIRONMENTAL SERVICES

CONSTITUENTS OF CONCERN IN RESIDUUM/TRANSITION ZONE WELLS

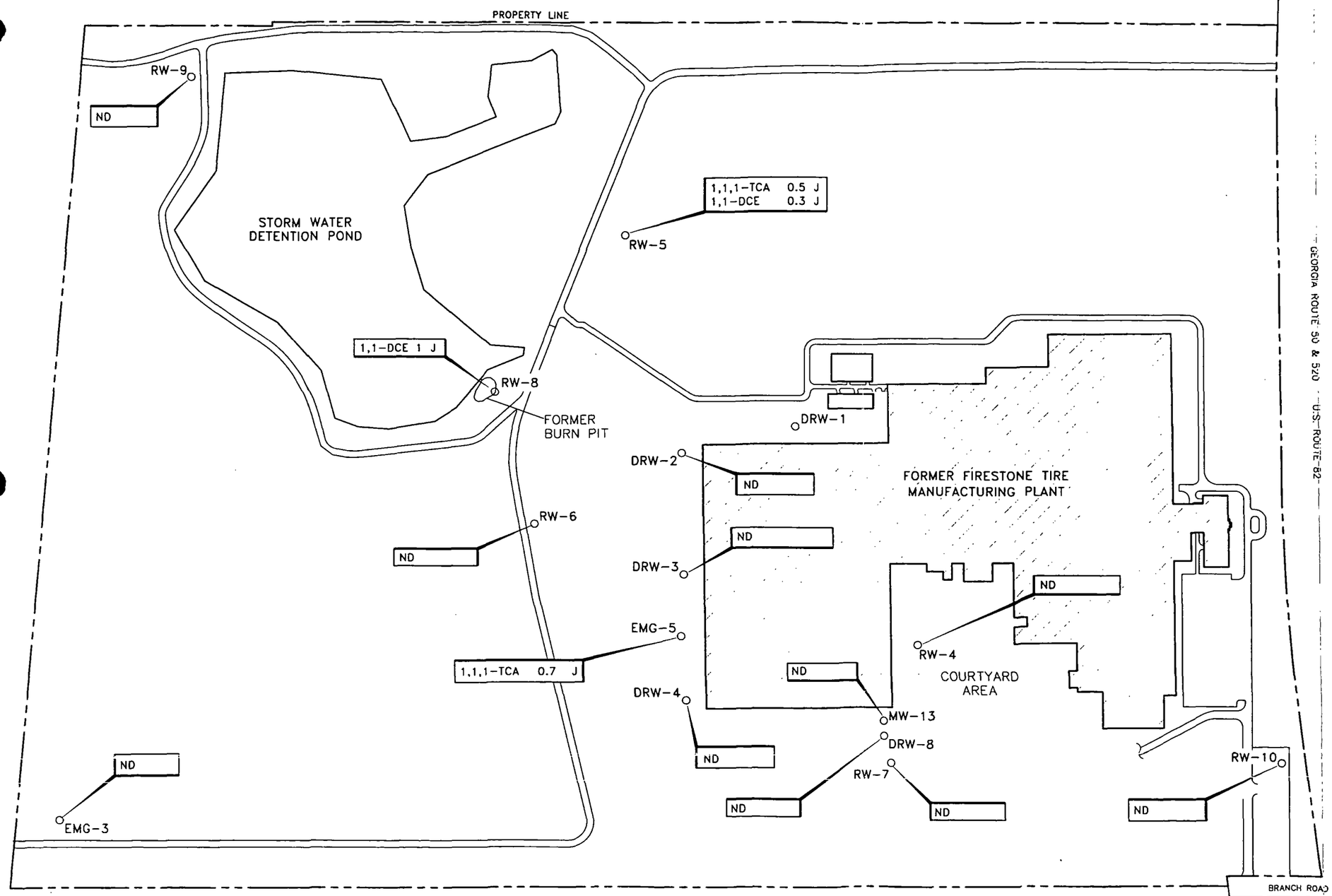
FIRESTONE TIRE & RUBBER COMPANY SITE

PROJECT NO. 41-4537 FIGURE 1.5

PREPARED BY/DATE

CHECKED BY/DATE

FILE: /DWG2/BRDSTONE/FIG2-5A DATE: 8/31/95



LEGEND:

O RW-5	UPPER OCALA LIMESTONE WELL
1,1-DCE 1J	REPORTED CONCENTRATION IN ug/l IS LESS THAN ROD SPECIFIED CLEAN-UP LEVEL
ND	CONSTITUENTS OF CONCERN NOT DETECTED

J = REPORTED CONCENTRATION IS ESTIMATED

FIGURE DENOTES SITE LAYOUT AS OF AUGUST THROUGH SEPTEMBER, 1991

CONSTITUENTS OF CONCERN:*

1,1,1-TCA	1,1,1-TRICHLOROETHANE
1,1-DCE	1,1-DICHLOROETHENE

* NO COCs WERE DETECTED ABOVE ROD SPECIFIED CLEAN-UP LEVELS IN UPPER OCALA

SCALE IN FEET

0 400 800

SOURCE: WOODWARD-CLYDE CONSULTANTS, REMEDIAL INVESTIGATION REPORT, 1992

BRIDGESTONE/FIRESTONE, INC.
ALBANY, GEORGIA

LAW
ENGINEERING AND ENVIRONMENTAL SERVICES

CONSTITUENTS OF CONCERN IN UPPER OCALA WELLS

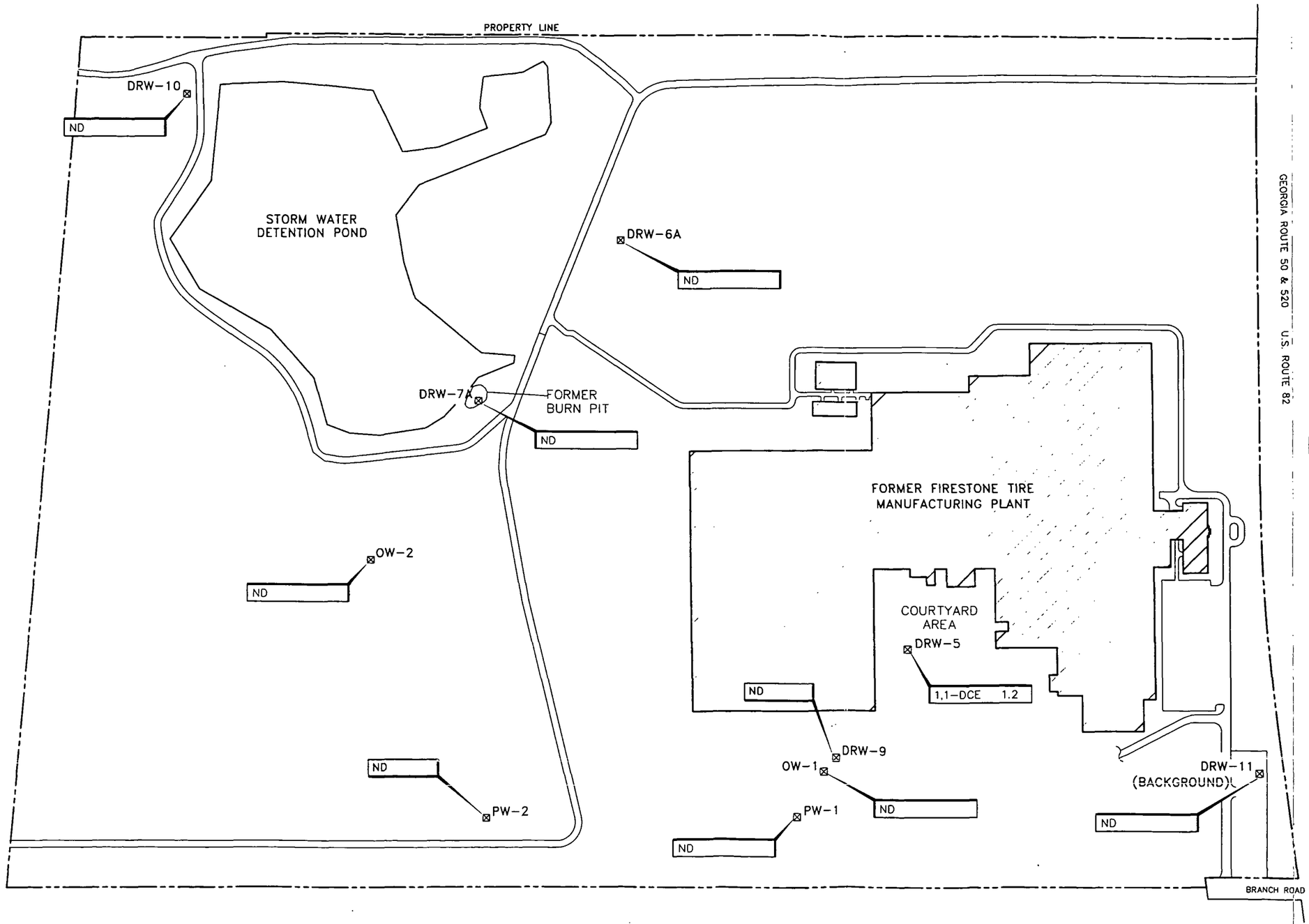
FIRESTONE TIRE & RUBBER COMPANY SITE

PROJECT NO. 41-4537 FIGURE 1.6

PREPARED BY/DATE

CHECKED BY/DATE

FILE: /DWG2/BRDSTONE/FIG2-6 DATE: 8/31/95



LEGEND:

⊠ DRW-11	LOWER OCALA LIMESTONE WELL
1,1-DCE 1.2	REPORTED CONCENTRATION IN ug/l IS LESS THAN THE ROD SPECIFIED CLEAN-UP LEVEL
ND	CONSTITUENT OF CONCERN NOT DETECTED

J = REPORTED CONCENTRATION IS ESTIMATED

FIGURE DENOTES SITE LAYOUT AS OF AUGUST THROUGH SEPTEMBER, 1991

CONSTITUENTS OF CONCERN: *

1,1-DCE 1,1-DICHLOROETHENE

* NO COCs WERE DETECTED ABOVE ROD-SPECIFIED CLEAN-UP LEVELS IN THE LOWER OCALA

SCALE IN FEET

0 400 800

SOURCE: WOODWARD-CLYDE CONSULTANTS, REMEDIAL INVESTIGATION REPORT, 1992

BRIDGESTONE/FIRESTONE, INC.
ALBANY, GEORGIA

LAW
ENGINEERING AND ENVIRONMENTAL SERVICES

CONSTITUENTS OF CONCERN
IN LOWER OCALA WELLS

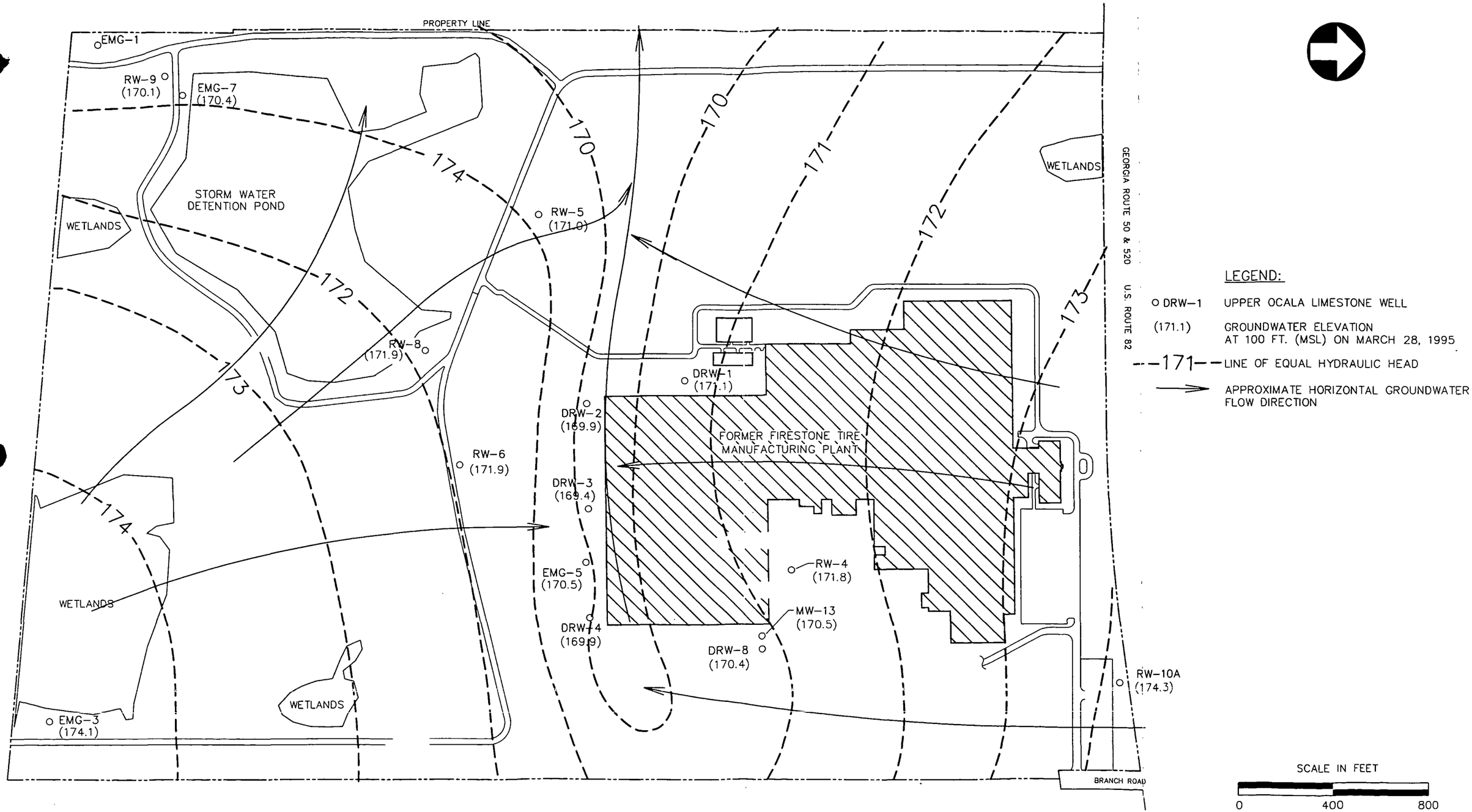
FIRESTONE TIRE & RUBBER COMPANY SITE

PROJECT NO. 41-4537 FIGURE 1.7

PREPARED BY/DATE

CHECKED BY/DATE

FILE: DWG2/BRDSTONE/POT-395 DATE: 8/9/95 LAYER: POT-395U



SOURCE: WOODWARD-CLYDE CONSULTANTS, REMEDIAL INVESTIGATION REPORT, 1992

BRIDGESTONE/FIRESTONE, INC.
ALBANY, GEORGIA

LAW
ENGINEERING AND ENVIRONMENTAL SERVICES, INC.

POTENTIOMETRIC SURFACE
UPPER OCALA LIMESTONE
MARCH 28, 1995

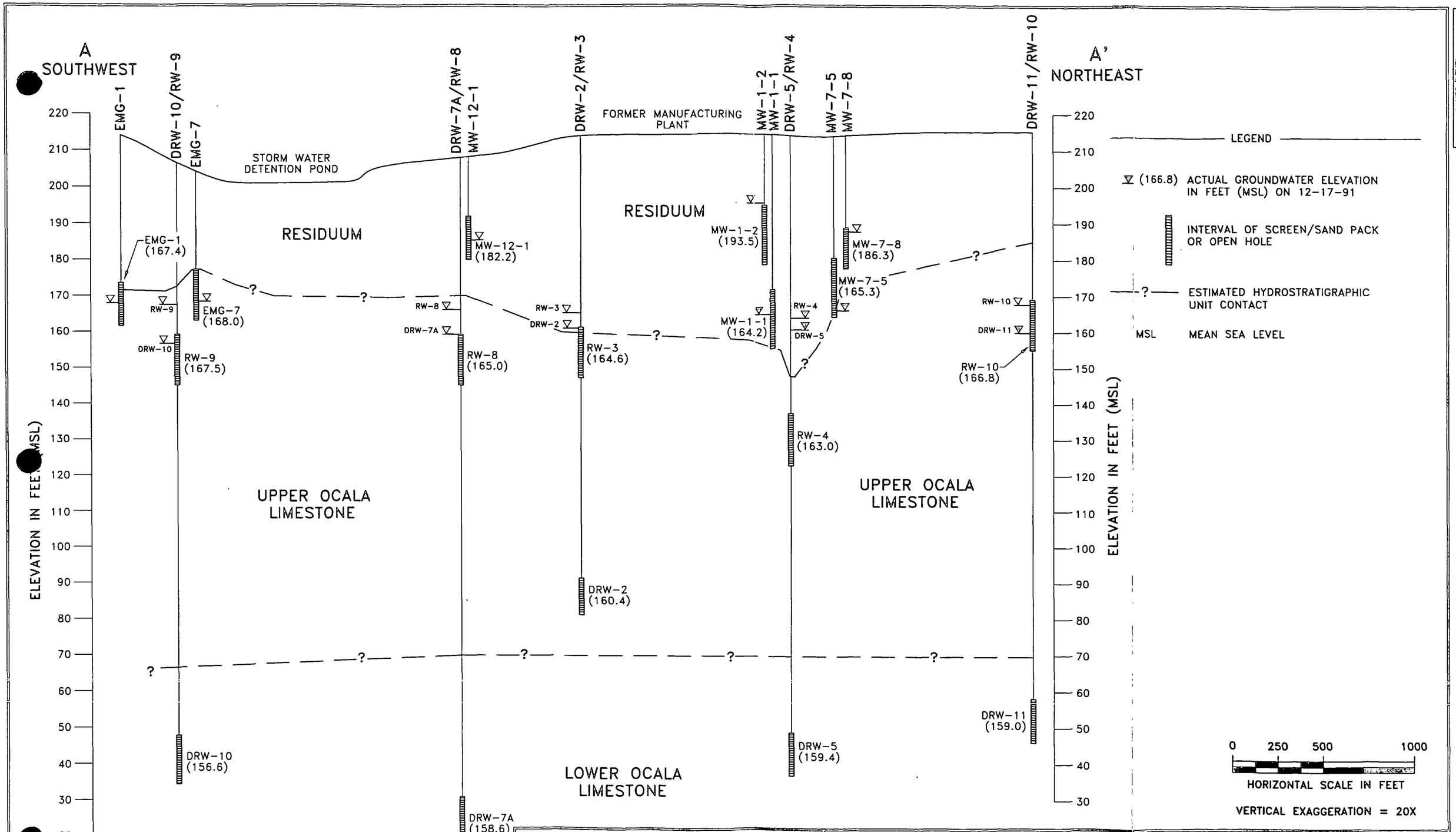
FORMER FIRESTONE TIRE & RUBBER COMPANY SITE

PROJECT NO. 41-4575 FIGURE 1.8

PREPARED BY/DATE

CHECKED BY/DATE

FILE: DWG2/BRDSTONE/6116-14 DATE: 8/31/95



SOURCE: WOODWARD-CLYDE CONSULTANTS, REMEDIAL INVESTIGATION REPORT 1992

BRIDGESTONE/FIRESTONE, INC.
ALBANY, GEORGIA

LAW
ENGINEERING AND ENVIRONMENTAL SERVICES

HYDROSTRATIGRAPHIC CROSS SECTION A-A'

FIRESTONE TIRE & RUBBER COMPANY SITE

JOB NO. 41-4537

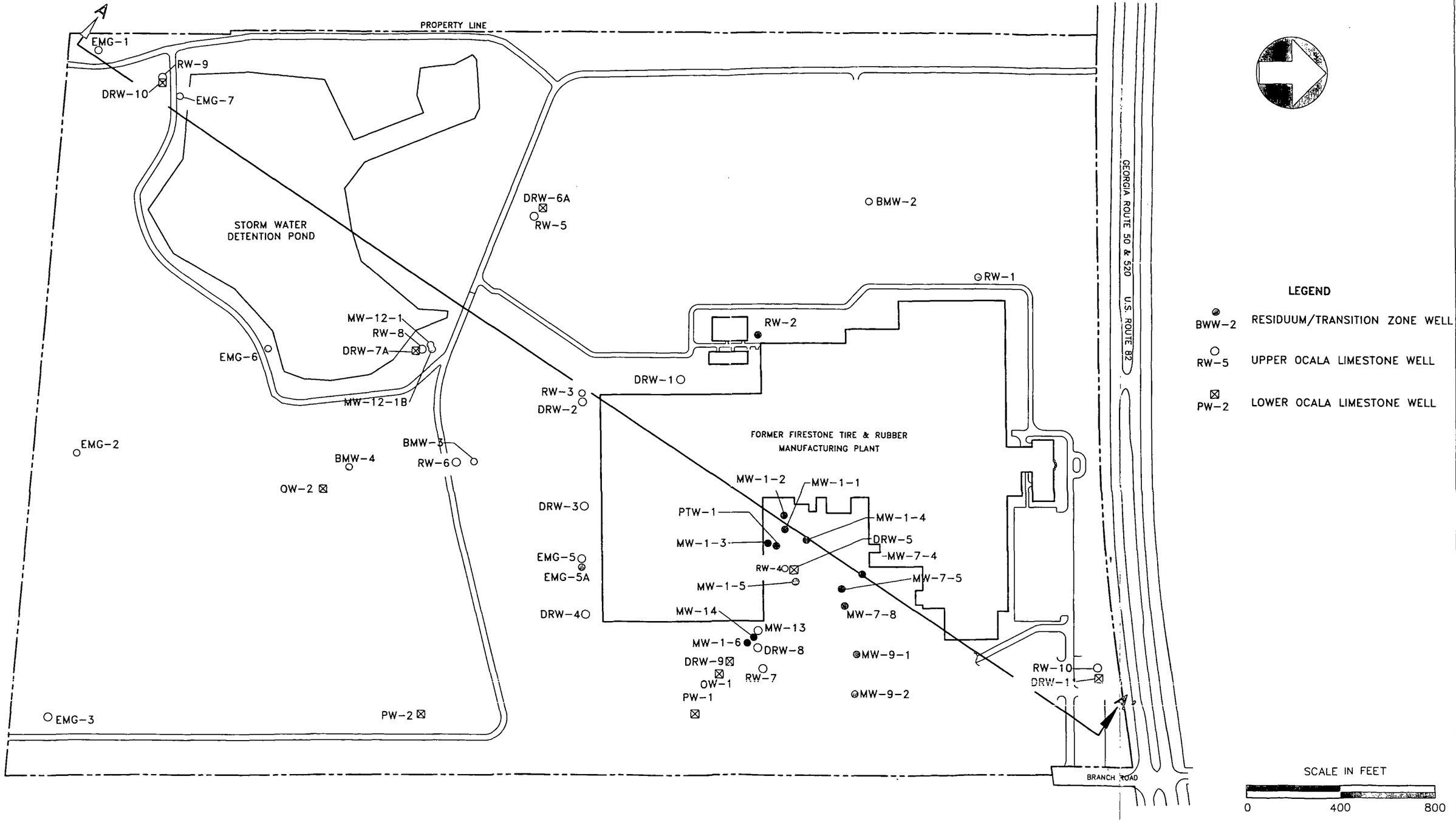
FIGURE 2.2

LAYER/LEVEL

PREPARED BY/DATE

CHECKED BY/DATE

FILE: DWG2/BTDSTONE/6116-17 DATE: 8/31/95



SOURCE: WOODWARD-CLYDE CONSULTANTS, REMEDIAL INVESTIGATION REPORT, 1992

BRIDGESTONE/FIRESTONE, INC.
ALBANY, GEORGIA

LAW
ENGINEERING AND ENVIRONMENTAL SERVICES

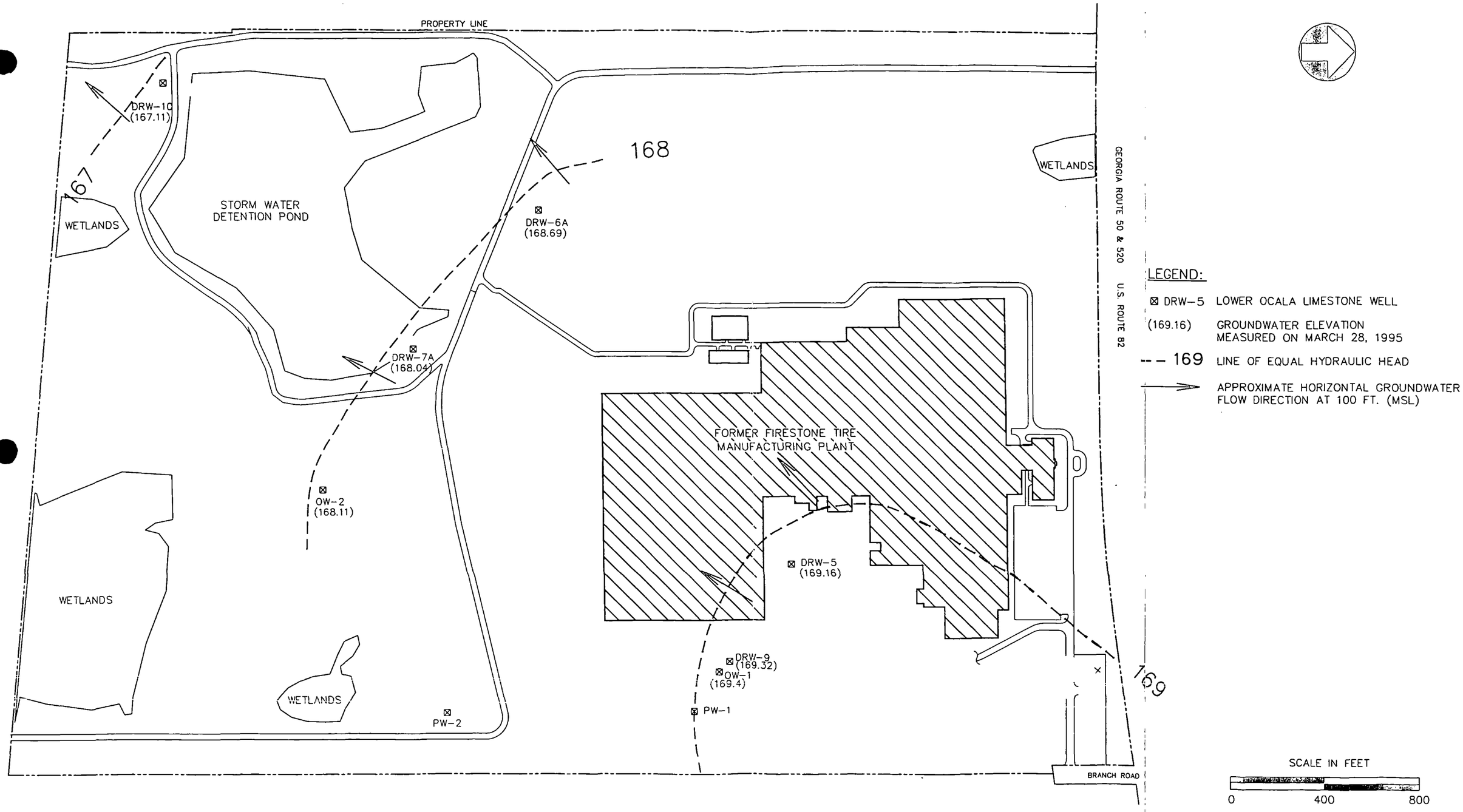
LOCATION MAP FOR HYDROSTRATIGRAPHIC CROSS SECTION A-A'
FIRESTONE TIRE & RUBBER COMPANY SITE

JOB NO. 41-4537 FIGURE 2.1

LAYER/LEVEL

PREPARED BY/DATE

FILE: DWG2/BRDSTONE/POT-BASE DATE: 8/9/95



SOURCE: WOODWARD-CLYDE CONSULTANTS, REMEDIAL INVESTIGATION REPORT, 1992

BRIDGESTONE/FIRESTONE, INC.
ALBANY, GEORGIA

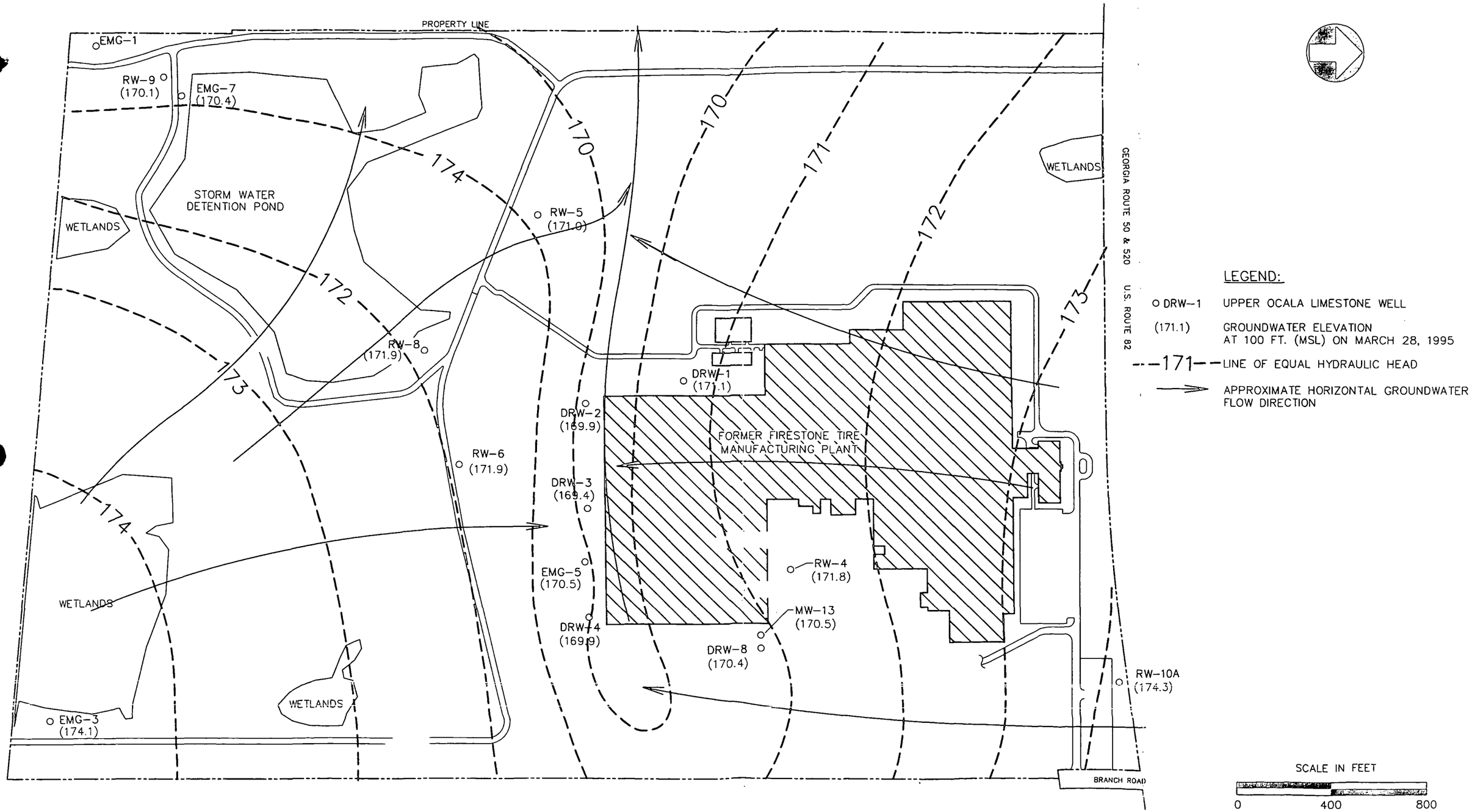
LAW
ENGINEERING AND ENVIRONMENTAL SERVICES, INC.

POTENTIOMETRIC SURFACE
LOWER OCALA LIMESTONE
MARCH 28, 1995
FIRESTONE TIRE & RUBBER COMPANY SITE

PROJECT NO. 41-4537 FIGURE 1.9

PREPARED BY/DATE
CHECKED BY/DATE

FILE: DWG2/BRDSTONE/POT-395 DATE: 8/9/95 LAYER: POT-395U



SOURCE: WOODWARD-CLYDE CONSULTANTS, REMEDIAL INVESTIGATION REPORT, 1992

BRIDGESTONE/FIRESTONE, INC.
ALBANY, GEORGIA

LAW
ENGINEERING AND ENVIRONMENTAL SERVICES, INC.

POTENTIOMETRIC SURFACE
UPPER OCALA LIMESTONE
MARCH 28, 1995

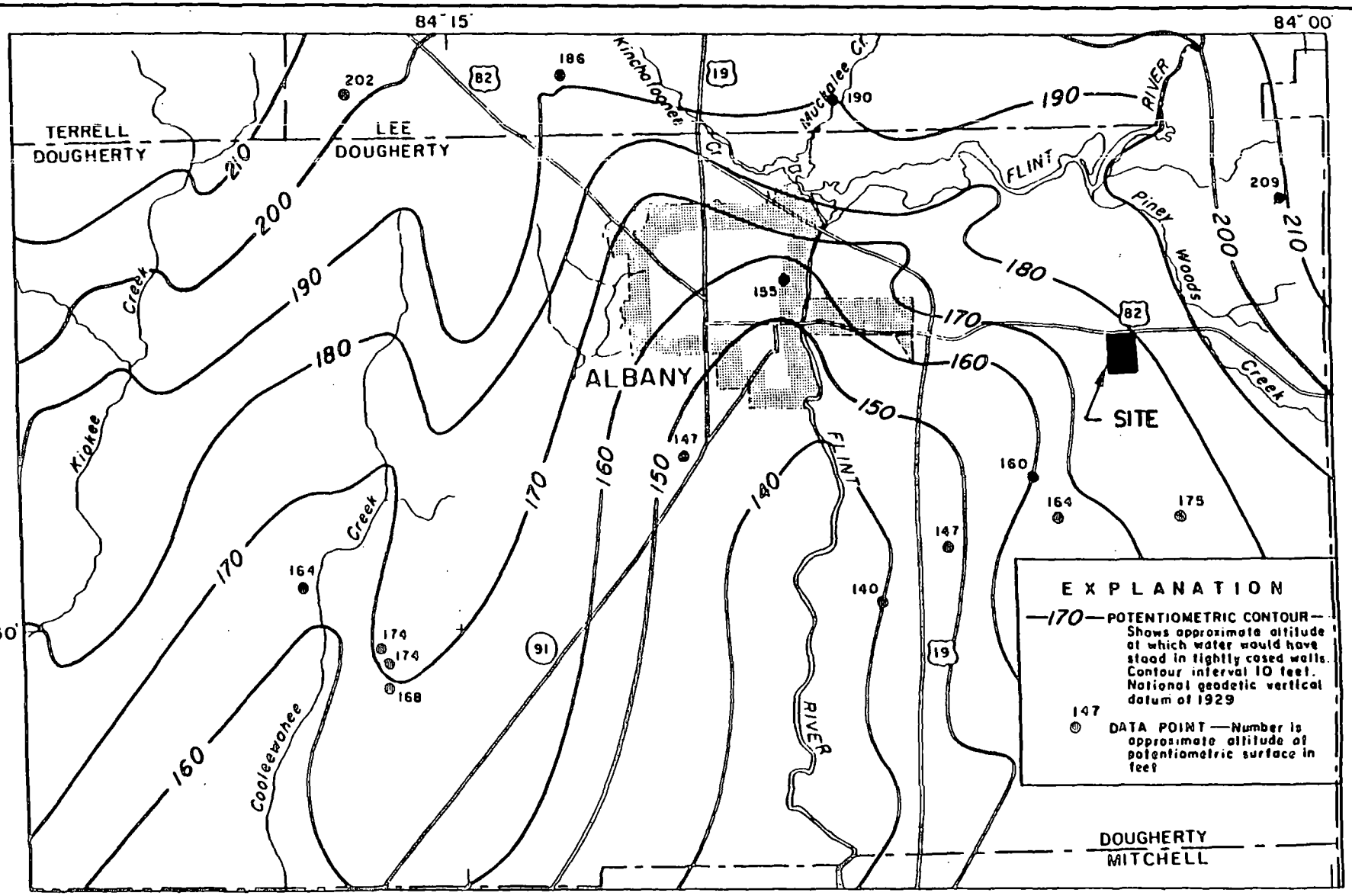
FORMER FIRESTONE TIRE & RUBBER COMPANY SITE

PROJECT NO. 41-4575 FIGURE 1.8

PREPARED BY/DATE

CHECKED BY/DATE

FILE: dwg/[redacted]dstone/pot1179tb DATE: 8/9/95



SOURCE: GEOHYDROLOGY OF THE ALBANY AREA, GEORGIA, D.W. HICKS, et.al, 1981

5 10 MILES

Hydrology from G.D. Mitchell, 1979

BRIDGESTONE/FIRESTONE, INC.
ALBANY, GEORGIA

LAW
ENGINEERING AND ENVIRONMENTAL SERVICES

POTENTIOMETRIC SURFACE OF THE OCALA AQUIFER IN THE ALBANY AREA, NOVEMBER 1979

FORMER FIRESTONE TIRE & RUBBER COMPANY SITE

JOB NO. 41-4537

FIGURE 2.3

LAYER/LEVEL

PREPARED BY/DATE

FILE: DWG2/ ONE/6616-17 DATE: 8/31/95

Task	Duration	Week 1	Week 2	Week 3
Demolition of Existing Piping, Well Vaults, Treatment Tanks	3 days			
Trenching for Piping	2 days			
Reconfiguration of (4) Well Vaults	3 days			
Pipe Installation	3 days			
Collection System Configuration	3 days			
System Startup	5 days			

BRIDGESTONE/FIRESTONE, INC.
ALBANY, GEORGIA

LAW
ENGINEERING AND ENVIRONMENTAL SERVICES

ESTIMATED-CONSTRUCTION SCHEDULE

JOB NO. 41-4537 FIGURE 7.1

PREPARED BY/DATE
CHECKED BY/DATE

APPENDICES

APPENDIX A

DESIGN SPECIFICATIONS

SPECIFICATIONS

GROUND-WATER RECOVERY SYSTEM

FIRESTONE TIRE AND RUBBER COMPANY SITE
ALBANY, GEORGIA

Prepared by:

LAW ENGINEERING AND ENVIRONMENTAL SERVICES, INC.
(formerly Law Environmental, Inc.)
Kennesaw, Georgia

August 31, 1995

BID FORM

PROJECT IDENTIFICATION: **GROUND-WATER RECOVERY SYSTEM**
FIRESTONE TIRE AND RUBBER COMPANY SITE
Albany, Georgia

THIS BID IS SUBMITTED TO: Earl H. Scott, P.G.
Law Engineering and Environmental Services, Inc.
(formerly Law Environmental, Inc.)
112 TownPark Drive
Kennesaw, Georgia 30144

1. The undersigned BIDDER proposes and agrees, if this Bid is accepted, to sign the Contract Documents as written, except as specifically modified, and to perform and furnish all Work as specified or indicated in the Contract Documents for the Bid Price and within the Bid Times indicated in this Bid Form and in accordance with the other terms and conditions of the Contract Documents.

2. BIDDER accepts all of the terms and conditions of the Invitation to Bid and Instructions to Bidders. This Bid will remain subject to acceptance for thirty-five calendar days after the day of Bid opening. BIDDER will sign and deliver the required number of counterparts of the Agreement with the Bonds, and other documents required by the Bidding Requirements within five days after the date of Owner's Notice of Award.

3. In submitting this Bid, BIDDER represents, as more fully set forth in the Agreement, that:

   (a) BIDDER has examined and carefully studied the Bidding Documents and the following Addenda (receipt of all which is hereby acknowledged):

No._____	Dated_____	No._____	Dated_____
No._____	Dated_____	No._____	Dated_____
No._____	Dated_____	No._____	Dated_____

   (b) BIDDER has visited the site and become familiar with and is satisfied as to the general, local and site conditions that may affect cost, progress, performance and furnishing of the Work;

   (c) BIDDER is familiar with and is satisfied as to all federal, state and local Laws and Regulations that may affect cost, progress, performance and furnishing of the Work.

   (d) BIDDER has given Engineer written notice of all conflicts, ambiguities or discrepancies that BIDDER has discovered in the Contract Documents and the written resolution thereof by Engineer is acceptable to the Bidder, and the Contract Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performing and furnishing the Work for which this Bid is submitted.

   (e) This Bid is genuine and not made in the interest of or on behalf of any undisclosed person, firm or corporation and is not submitted in conformity with any agreement or

rules of any group, association, organization or corporation; BIDDER has not directly or indirectly induced or solicited any other BIDDER to submit a false or sham Bid; BIDDER has not solicited or induced any person, firm or corporation to refrain from bidding; and BIDDER has not sought by collusion to obtain for itself any advantage over any other BIDDER or over Owner.

4. BIDDER agrees to complete the Work for the unit prices listed on the Unit Price Schedule. BIDDER acknowledges that quantities are not guaranteed and final payment will be based on actual quantities determined as provided in the Contract Documents.

5. BIDDER agrees that the Work will be substantially completed on or before _____ _____ (to be completed by Bidder) and completed and ready for final payment in accordance with paragraph 14.13 of the General Conditions on or before _____(to be completed by Bidder).

6. BIDDER accepts the provisions of the Agreement as to liquidated damages in the event of failure to complete the Work on time.

7. The terms used in this Bid which are defined in the General Conditions of the Construction Contract or Instructions to Bidders will have the meanings indicated in the General Conditions or Instructions.

(Signatures on Pages BF-3 and BF-4)

Submitted on _____, 1995

State Contractor License No. _____N/A_____

If BIDDER is:

An Individual

By _____

(SEAL) (Individual's Name)

doing business as _____

Business address: _____

_____

Phone No.: _____

A Partnership

By _____

(SEAL) (Firm Name)

_____

(general partner)

Business address: _____

_____

Phone No.: _____

A Corporation

By _____

(SEAL) (Corporation Name)

_____

(state of incorporation)

By _____

(SEAL) (name of person authorized to sign)

_____

(title)

(Corporate Seal)

Attest _____

(Secretary)

Business address: _____

_____

Phone No.: _____

Date of Qualification to do business is _____

A Joint Venture

By _____ (SEAL)

(Name)

_____

(Address)

By _____ (SEAL)

(Name)

_____

(Address)

Phone Number and Address for receipt of official communications

_____

_____

(Each joint venturer must sign. The manner of signing for each individual, partnership and corporation that is a party to the joint venture should be in the manner indicated above).

BID FORM
UNIT PRICE SCHEDULE
GROUND-WATER RECOVERY SYSTEM
FIRESTONE TIRE AND RUBBER COMPANY SITE
ALBANY, GEORGIA

ITEM NO.	DESCRIPTION	SPECIFIED ITEMS ESTIMATED QUANTITY	UNIT PRICE	TOTAL PRICE
1.	Mobilization	Lump Sum	$ _____	$ _____
2.	Demobilization	Lump Sum	$ _____	$ _____
3.	Demolition and Removal	Lump Sum	$ _____	$ _____
4.	Compressed Air System Modifications	Lump Sum	$ _____	$ _____
5.	Ground-Water Recovery Sytem Modifications	Lump Sum	$ _____	$ _____

TOTAL BID PRICE $_____ $_____
Written Out

Bid Submitted By: _____ Date _____, 1995 Phone No. _____

TABLE OF CONTENTS
SPECIFICATIONS
GROUND-WATER RECOVERY SYSTEM
FIRESTONE TIRE AND RUBBER COMPANY SITE
ALBANY, GEORGIA

DIVISION 1 - GENERAL REQUIREMENTS

Section Number	Title
01010	Summary of Work
01019	Contract Considerations
01025	Measurement and Payment
01035	Modification Procedures
01100	Special Project Procedures
01200	Project Meetings
01300	Submittals
01400	Quality Control
01410	Contractor's Quality Control Inspection and Laboratory Services
01500	Construction Facilities and Temporary Controls
01600	Material and Equipment
01650	Starting of Systems
01700	Contract Closeout

DIVISION 2 - SITE WORK

Section Number	Title
02225	Trenching, Backfilling, and Compacting
02673	Ground-Water Recovery Wells
02930	Seeding and Mulching

DIVISION 3 - CONCRETE

Section Number	Title
03300	Cast-in-Place Concrete

TABLE OF CONTENTS (Cont.)

DIVISION 11 - EQUIPMENT

Section Number	Title
11214	Ground Water Collection Pumps
11346	Contingency Granular Activated Carbon System
11370	Air Compressors and Appurtenances

DIVISION 15 - MECHANICAL

Section Number	Title
15060	Process Piping and Appurtenances
15100	Valves
15190	Mechanical Identification
15250	Mechanical Insulation

SECTION 01010
SUMMARY OF WORK

1.01 SUMMARY

A. Section Includes:

1. Work Covered by Contract Documents

2. Work by Others

3. Work Sequence

4. Contractor's Use of Premises

1.02 WORK COVERED BY CONTRACT DOCUMENTS

A. The Work consists of mobilization, equipment procurement, construction and start-up of a ground water recovery and treatment system at the Firestone Tire and Rubber Company Site located in Albany, Georgia.

B. In general, the Work includes the following:

1. Demolition and removal of existing recovery well piping currently installed from MW-1-1 and PTW-1 to the existing air sparging tank.

2. Demolition and removal of existing discharge piping connecting the air sparging tank to the discharge manhole.

3. Demolition and removal of existing air sparging system including the fiberglass storage tank, blower, and associated electrical systems and controls.

4. Inspection and preventative maintenance to be performed on the existing air compressor, air dryer, air filters, and appurtenances.

5. Installation of new recovery well piping, carbon adsorption units (if required), and discharge piping. The discharge piping shall be reconnected to the existing discharge manhole.

6. Inspection and maintenance on the two existing recovery pumps, pulse sending units, and controller, and installation of two new recovery pumps and pulse sending units.

1.03 WORK BY OTHERS

A. Related work by others under separate contracts with the Owner consists of:

1. Engineering Certification.

2. Construction Quality Assurance.

1.04 WORK SEQUENCE

A. The sequence of activities shall be the responsibility of the Contractor as long as the requirements of these specifications are met, the Contractor's progress is according to the schedule approved by the Engineer, and Contract Times stated in the Agreement are complied with.

1.05 CONTRACTOR'S USE OF PREMISES

A. All of the Contractor's operations on the Owner's premises, including the storage of materials, shall be confined to areas approved by the Owner or Engineer.

B. Contractor's personnel shall abide by the Owner's regulations concerning site entry and exit.

C. Neither the Owner nor the Engineer will assume responsibility for damages to facilities on the site due to negligence or carelessness on the part of the Contractor. The Owner and Engineer will not be liable for loss or damage of Contractor's tools, equipment or materials due to theft, vandalism or any other cause whatsoever.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01019
CONTRACT CONSIDERATIONS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Schedule of Values

2. Applications for Payment

1.02 SCHEDULE OF VALUES

A. Within the time limit indicated in Section 01300, submit to Owner for review a preliminary Schedule of Values for all of the Work which will include quantities and prices of items aggregating the Contract Price and will subdivide the Work into component parts in sufficient detail to serve as the basis for progress payments during construction. Such prices shall include as appropriate amount of overhead and profit applicable to each item of Work.

B. Format: Utilize Bid Schedule as a guide.

C. Revise schedule to list approved Change Orders with each Application for Payment.

D. Upon request of the Engineer, support the values with data which will substantiate their correctness.

E. The approved Schedule of Values shall be used only as the basis for the Contractor's Applications for Payment, and is not necessarily appropriate for determination of costs for Contract Modifications.

F. Schedule shall list the installed value of the component parts of the Work in sufficient detail to serve as a basis for computing values for progress payments during construction.

G. For each major line item list sub-values of major products or operations under the item.

H. For items on which progress payments will be requested for stored materials, break down the value into:

1. The cost of the materials, delivered and unloaded, with taxes paid. Paid invoices are required for materials.

2. The total installed value.

I. The Schedule of Values shall include unit cost and quantities for all items noted as Unit Price Items on the Bid Schedule.

J. The sum of all values listed in the Schedule of Values shall equal the total Contract Price.

1.03 APPLICATIONS FOR PAYMENT

A. Submit Applications for Payment as described in the Agreement, on forms provided in the Contract Documents or otherwise approved by the Owner.

B. Preparation of Application for Each Progress Payment

1. Application Form:

a. Fill in required information, including that for Change Orders executed prior to date of submittal of application.

b. Execute each copy of Application with original signature of a responsible officer of Contractor, and corporate seal of Contractor.

2. Continuation Sheets:

a. Fill in total list of all scheduled component items of work, with item number and scheduled dollar value for each item.

b. Fill in dollar value in each column for each scheduled line item when work has been performed or products stored. Round off values to nearest dollar, or as specified for Schedule of Values.

c. List each Change Order executed prior to date of submission, at the end of the continuation sheets. List by Change Order number, and description, as for an original component item of work.

d. To receive approval for a payment on component material stored on site, submit copies of the original paid invoices with the Application for Payment. Payment for items stored on site but not incorporated into the work will be made up to but not exceeding the amount indicated on invoices, less any deduction deemed necessary by the Engineer for defective or damaged goods.

C. Substantiating Data for Progress Payments

1. When the Owner or the Engineer requires substantiating data, submit suitable information, with a cover letter identifying:

   a. Project

   b. Application number and date

   c. Detailed list of enclosures

   d. For stored products: Item number and identification as shown on application, and description of specific material.

2. Submit one copy of data and cover letter for each copy of Application.

3. As a prerequisite for payment, Contractor is required to have available for Engineer's review the updated Project Record Documents, maintained in accordance with section 01700.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01025
MEASUREMENT AND PAYMENT

PART 1 GENERAL

1.01 SUMMARY

A. Section includes measurement and payment criteria applicable to the Work.

1.02 UNIT QUANTITIES SPECIFIED

A. Quantities and measurements indicated on the Bid Schedule are for bidding and contract purposes only. Progress payments on account of Unit Price Work will be based on the number of units completed and documented, with required survey information and passing results of specified quality control testing, and as approved by the Engineer.

B. If the actual Work requires more or fewer quantities than those quantities indicated, provide the required quantities at the unit prices contracted, or as otherwise required in accordance with the Supplementary Conditions.

1.03 PAYMENT

A. Payment Includes: Full compensation for all required labor, products, tools, equipment, transportation, services and incidentals; performance of surveys to locate and lay out the Work; erection, application or installation; quality control inspection and testing of earthwork and geosynthetics; measurements of installed items for payment; and overhead and profit.

B. Final payment for Work governed by unit prices will be made on the basis of the actual measurements and quantities accepted by the Engineer multiplied by the unit price for Work which is incorporated in or made necessary by the Work, unless otherwise indicated in the Supplementary Conditions.

C. Measurement and calculations of volumes and areas for pay quantities shall be made by the Contractor. It is the Contractor's responsibility to keep proper records of Contractor's on-site personnel, materials and equipment. Support calculations and drawings shall be provided to Engineer with Applications for Payment to document all pay quantities. The Engineer may verify measurements and quantities.

D. Copies of invoices and shipping receipts for all materials shall be submitted to the Engineer with each Applications for Payment.

1.04 PAY ITEMS

A. Pay Item 1: Mobilization

1. Shall be paid for at the Contract lump sum price. Price shall include all costs for project start-up, including: transportation of personnel, supplies and equipment to job site; and installation and erection of temporary utilities, equipment and facilities of every kind.

B. Pay Item 2: Demobilization

1. Shall be paid for at the Contract lump sum price. Price shall include all costs for removing all supplies, equipment and temporary facilities of every kind from the site, and site cleanup to the satisfaction of the Engineer and Owner. Payment for this item will only be considered in the Final Application for Payment during the life of the project.

C. Pay Item 3: Demolition and Removal

1. Shall be paid for at the Contract lump sum price. Price shall include:

a. Demolition and removal of existing recovery well piping currently installed from MW-1-3 and PTW-1 to the existing air sparging tank.

b. Demolition and removal of existing discharge piping connecting the air sparging tank to the discharge manhole.

c. Demolition and removal of existing air sparging system including the fiberglass storage tank, blower, and associated electrical systems and controls.

D. Pay Item 4: Compressed Air System Modifications

1. Shall be paid for at the Contract lump sum price. Price shall include all costs associated with the inspection and preventative maintenance to be performed on the existing air compressor, air dryer, air filters, and appurtenances. Price shall also include the new oil/water separator, piping and valves associated with the compressed air system.

E. Pay Item 5: Ground-Water Recovery System Modifications

1. Shall be paid for at the Contract lump sum price. Price shall include the installation of new recovery well vaults and piping, carbon adsorption units (if required), and related piping. The discharge piping shall be reconnected to the existing discharge manhole.

2. Shall be paid for at the Contract lump sum price. Price shall include the inspection and maintenance on the two existing recovery pumps, pump controllers, and pulse sending unit, and installation of two new recovery pumps and pump controllers. Price shall also include new well tubing and support cable for each of the recovery pumps.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01035
MODIFICATION PROCEDURES

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Submittals.

2. Change procedures.

3. Work Change Directive.

4. Documentation of proposals and claims.

5. Preparation of change orders and field orders.

6. Lump sum/fixed price change order.

7. Unit price change order.

8. Time and material/force account change order.

9. Correlation of Contractor submittals.

1.02 SUBMITTALS

A. Within seven days after Effective Date of the Agreement, submit name of the individual authorized to receive change documents, and be responsible for informing others in Contractor's or Subcontractor's employ of changes to the Work.

1.03 CHANGE PROCEDURES (PRELIMINARY FORMS)

A. Owner or Engineer may initiate changes by submitting a Request for Change Order (RCO) to Contractor.

1. RCO will include:

a. Detailed description of the Change.

b. Supplementary or revised Drawings and Specifications.

c. The projected time span for making the change, and a specific statement as to whether overtime work is, or is not, authorized.

2. Such request is for information only, and is not an instruction to execute the changes, nor to stop work in progress.

3. Contractor shall prepare and submit an estimate within seven days.

B. Contractor may initiate changes by submitting a written Change Order Request (COR) to Engineer.

1. COR shall contain:

a. Description of the proposed changes, and reference to appropriate contractual condition allowing such change.

b. Statement of the reason for making the changes.

c. Statement of the effect on the Contract Price and the Contract Time.

d. Statement of the effect on the work of separate contractors.

e. Documentation supporting any change in Contract Price or Contract Time, as appropriate.

1.04 WORK CHANGE DIRECTIVE

A. In lieu of a Request for Change Order, Engineer may issue a Work Change Directive authorizing Contractor to proceed with a change for subsequent inclusion in a Change Order.

B. The document will describe changes in the Work with attachments of revised Contract Documents to define details of the change, and will designate the method of determining any change in the Contract Price and any change in Contract Time.

C. Engineer will sign and date the Work Change Directive as authorization for the Contractor to proceed with the changes.

D. Contractor may sign and date the Work Change Directive to indicate agreement with the terms therein.

1.05 DOCUMENTATION OF PROPOSALS AND CLAIMS

A. Support each quotation for a lump-sum proposal, and for each unit price which has not previously been established, with sufficient substantiating data to allow Engineer to evaluate the quotation.

B. On request, provide additional data to support time and cost computations:

1. Labor and equipment required.

2. Products required.

   a. Recommended source of purchase and unit cost.

   b. Quantities required.

3. Taxes, insurance and bonds.

4. Credit for work deleted from Contract, similarly documented.

5. Overhead and profit.

6. Justification for any change in Contract Time.

C. Support each claim for additional costs, and for work done on a time-and-material/force account basis, with documentation as required for a lump-sum proposal, plus additional information:

1. Name of the Owner's or Engineer's authorized agent who ordered the work, and date of the order.

2. Dates and times work was performed, and by whom.

3. Time record, summary of hours worked, and hourly rates paid.

4. Receipts and invoices for:

   a. Equipment used, listing dates and times of use.

   b. Products used, listing of quantities.

   c. Subcontracts.

D. Document requests for substitutions for products as specified in the General Conditions and Section 01300 of the Specifications.

1.06 PREPARATION OF CHANGE ORDERS AND FIELD ORDERS

A. Engineer will prepare each Change Order and Field Order.

B. Forms: Field Order form and Change Order form included in Project Manual.

C. Change Orders will describe changes in the Work (additions, deletions, and modification, etc.) with attachments of revised Contract Documents to define details of the change.

D. Change Orders will provide an accounting of the adjustment in the Contract Price and in the Contract Time.

E. Field Orders will describe interpretations or clarifications of Contract Documents, order minor changes in the Work, or document trade-off agreements.

F. Field Order work will be accomplished without change in the Contract Price or Contract Time.

1.07 LUMP-SUM/FIXED PRICE CHANGE ORDER

A. Content of Change Orders will be based on, either:

1. Engineer's RCO and Contractor's responsive estimate as mutually agreed between Owner and Contractor.

2. Contractor's initiated COR, recommended by Engineer.

B. Engineer and Owner will sign and date the Change Order as authorization for the Contractor to proceed with the changes.

C. Contractor shall sign and date the Change Order to indicate agreement with the terms therein.

1.08 UNIT PRICE CHANGE ORDER

A. Content of Change Orders will be based on, either:

1. Engineer's definition of the scope of the required changes.

2. Contractor's COR for a change, as recommended by Engineer.

3. Survey of completed work.

B. The amounts of the unit prices shall be either:

1. Those stated in the Agreement.

2. Those mutually agreed upon between Owner and Contractor.

C. When quantities of each of the items affected by the Change Order can be determined prior to start of the work:

1. Engineer and Owner will sign and date the Change Order as authorization for Contractor to proceed with the changes.

2. Contractor shall sign and date the Change Order to indicate agreement with the terms therein.

D. When quantities of the items cannot be determined prior to start of the work:

1. Engineer and Owner will issue a Work Change Directive directing Contractor to proceed with the change on the basis of unit prices, and will cite the applicable unit prices.

2. At completion of the change, Engineer will determine the cost of such work based on the unit prices and quantities used. Contractor shall submit documentation to establish the number of units of each item and any claims for a change in Contract Time.

3. Engineer and Owner will sign and date the Change Order to establish a change in Contract Price and in Contract Time.

4. Contractor shall sign and date the Change Order to indicate Contractor's agreement with the terms therein.

1.09 TIME AND MATERIAL/FORCE ACCOUNT CHANGE ORDER

A. Engineer and Owner will issue a Work Change Directive directing Contractor to proceed with the changes.

B. At completion of the change, Contractor shall submit itemized accounting and supporting data as provided in the Article "Documentation of Proposals and Claims" of this Section.

C. Engineer will determine the allowable cost of such work, as provided in General Conditions and Supplementary Conditions.

D. Engineer and Owner will sign and date the Change Order to establish the change in Contract Price and in Contract Time.

E. Contractor shall sign and date the Change Order to indicate Contractor's agreement therewith.

1.10 CORRELATION WITH CONTRACTOR'S SUBMITTALS

A. Contractor shall periodically revise Schedule of Values and Application for Payment forms to record each change as a separate item of Work, and to record the adjusted Contract Price.

B. Contractor shall periodically revise the Construction Progress Schedule to reflect each change in Contract Time, and its impact on other items of work.

C. Upon completion of work under a Change Order, enter pertinent changes in Project Record Documents.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01100
SPECIAL PROJECT PROCEDURES

PART 1 GENERAL

1.01 SUMMARY

A. Section includes:

1. Coordination with on-site activities

2. Construction Work Plan

3. Health and Safety

4. Decontamination

1.02 COORDINATION WITH ON-SITE ACTIVITIES

A. Coordinate the Work with the Owner's personnel in order to limit hindrance to routine daily activities.

B. Plant personnel shall be informed of any schedule changes of Work.

1.03 CONSTRUCTION WORK PLAN

A. Prepare and submit a Construction Work Plan within 14 days after award of Contract.

B. The Work Plan shall indicate construction procedures, major equipment, staging of operations, materials and methods to be used for the Work.

1.04 HEALTH AND SAFETY

A. The Project will involve working on the site of a currently operating manufacturing facility. The Contractor may potentially contact substances harmful to the health and safety of workers on the site.

B. All work shall be performed in accordance with applicable safety and health regulations, codes and standards set forth by the proper authorities.

C. Known potential substances of concern which have been identified through environmental assessment of the site are identified in separately bound documents, including a remedial design report for ground-water collection system prepared by the Engineer. Such documents can be obtained by submitting a written request to Owner or Engineer.

D. The Contractor is advised that he should be familiar with the hazards associated with those chemical compounds listed in the aforementioned document(s) and that he must take appropriate measures as required when working on the construction site.

E. Within 14 days after award of Contract, submit to the Engineer and Owner for review, a Health and Safety Plan (HSP) for the Project.

F. The HSP shall include the following as a minimum: 1) a Hazard Communication Program, specifying requirements for safety procedures and notification regarding hazardous substances brought to the site by the Contractor; 2) type of equipment to be used to detect flammables, toxic gases and other hazardous materials; 3) type of equipment and methods to be used to work with these materials; and 4) safety precautions to be taken to protect all site personnel and the public from hazards associated with Work.

1.05 DECONTAMINATION

A. Decontaminate all equipment and materials which may have been in contact with regulated waste or hazardous materials.

B. Decontamination shall be performed on all personnel and nondisposable work materials and equipment each time such personnel, material or equipment exit the construction site.

C. Handling and disposition of decontamination water at an Owner-approved facility and by Owner-approved transportation shall be at the Contractor's expense.

D. Provide to Owner a written decontamination plan, which shall be incorporated into the Health and Safety Plan, describing procedures prior to commencement of the Work.

E. The facilities for decontamination activities shall be located where approved by the Owner.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01200
PROJECT MEETINGS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Preconstruction meeting

2. Progress meetings

1.02 PRECONSTRUCTION MEETING

A. Owner or Owner's Representative will schedule a pre-construction meeting within ten days after the Notice to Proceed.

B. The location of the pre-construction meeting will be at the site.

C. Parties responsible for attending the pre-construction meeting are:

1. Owners' representatives.

2. Engineer's representatives.

3. Contractor's representatives.

4. Major subcontractors and suppliers.

5. Other parties as appropriate.

D. Agenda:

1. Distribution of Contract Documents.

2. Review of Contractor's Work Plan and Schedule.

3. Discussion of construction quality assurance procedures.

4. Designation of personnel representing the parties in Contract, the Engineer, and other personnel.

5. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, Change Orders and Contract closeout procedures.

6. Use of premises.

7. Construction facilities, controls and construction aids.

8. Site security.

9. Work hours.

10. Other items as required.

1.03 PROGRESS MEETINGS

A. The Owner or Engineer will schedule progress meetings, if deemed necessary. The progress meetings will be held on an as-required basis.

B. Location of the meetings will be at the project site.

C. Attendance: Representatives of Engineer, Contractor, Owner, and other parties as appropriate.

D. Agenda:

1. Field observations, problems, conflicts.

2. Problems which impede schedule.

3. Corrective measures and procedures to regain projected schedule.

4. Revisions to Schedule.

5. Progress, schedule, during succeeding work period.

6. Maintenance of quality standards.

7. Work hours.

8. Other business, as appropriate.

PART 2 (NOT USED)

PART 3 (NOT USED)

END OF SECTION

SECTION 01300
SUBMITTALS

PART 1 GENERAL

1.01 SUMMARY

A. Section includes submittal procedures and types of submittals required prior to incorporation of products in the Work, and during the progress of the Work.

1.02 INITIAL SUBMITTALS

A. Submit the following to the Engineer for review not more than fourteen calendar days after the Effective Date of the Agreement.

1. Preliminary Schedule of Values (specified in Section 01025 and in General Conditions, paragraph 2.6.2).

2. Initial Construction Schedule (specified in this Section and in General Conditions, paragraph 2.6.1).

3. Proposed Products List (specified in this Section).

4. Health and Safety Plan (specified in Section 01100).

1.03 PROGRESS SUBMITTALS

A. Submit the following to the Engineer for review during the progress of the Work:

1. Applications for Payment (specified in Section 01019).

2. Product information and certifications.

3. Equipment manufacturer's instructions and certificates.

4. Independent quality control inspection and testing information (specified in Sections 01400 and 01410).

5. Project Record Documents (specified in Section 01700).

6. All other miscellaneous submittals not mentioned herein and as specified in other individual specification sections.

1.04 SUBMITTAL PROCEDURES

A. Timing of Submittals

1. Make submittals in advance of scheduled dates for installation, as specified in individual specification sections, to allow for reviews, for securing necessary approvals, for possible revisions and resubmittals, and for placing orders and securing deliveries. Preferred timing for the submittals will be discussed during the Preconstruction Meeting.

2. Contractor shall be responsible for delays occasioned by incomplete submittals.

B. Sequentially number the transmittal forms.

C. Identify Project, Contractor, Subcontractor or supplier; pertinent Drawing sheet and detail number(s), and specification section number, as appropriate.

D. Apply Contractor's stamp, signed or initialled certifying that review, verification of products required, field dimensions, adjacent construction work, and coordination of information, is in accordance with the requirements of the Work and Contract Documents.

E. Schedule submittals to expedite the project, and deliver to Engineer. Coordinate submission of related items.

F. Identify variations from Contract Documents and product or system limitations which may be detrimental to successful performance of the completed Work.

G. Provide a four-inch by four-inch square blank space for Engineer's review stamp.

H. Revise and resubmit submittals in the same quantity as required for the original submittal. Identify all changes made since previous submittal.

I. Distribute copies of reviewed submittals to concerned parties. Instruct parties to promptly report any inability to comply with provisions.

J. Maintain one copy of each submittal in Project Record Documents (specified in Section 01700).

1.05 CONSTRUCTION SCHEDULE

A. Submit initial Construction Schedule (first revision of schedule submitted with the Bid) in duplicate within the time specified in subsection 1.02 of this Section.

B. Submit revised Schedule with each Application for Payment, identifying changes since previous version.

C. Show complete sequence of construction by activity, identifying Work of separate stages and other logically grouped activities. Indicate the early and late start, early and late finish, float dates, and duration. Schedule shall be in accordance with the required work sequence and completion dates specified in the Contract Documents.

D. Indicate estimated percentage of completion for each item of Work at each submission.

E. Indicate submittal dates required for shop drawings, product data, samples, product delivery, and quality control test reports.

F. The Schedule shall be revised as required throughout the project to indicate anticipated and actual durations and sequence of activities. Copies of revised Schedules shall be provided promptly to the Engineer for review and comment.

1.06 PROPOSED PRODUCTS LIST

A. Within the time specified in subsection 1.02 of this Section, submit complete list of major products proposed for use, with name of manufacturer, trade name, and model number of each product.

B. For products specified only by reference standards, give manufacturer, trade name, model or catalog designation, and reference standards.

C. Indicate on the list the product delivery dates, including those furnished by the Owner.

1.07 SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

A. Shop Drawings and Product Data Submittals

1. Submit the number of copies which Contractor requires, plus four copies which will be retained by Engineer.

2. Mark each copy of product data submittals to identify applicable products, models, options, and other data. Supplement manufacturer's standard data to provide information unique to this Project.

B. Sample Submittals

1. Submit samples to illustrate functional and aesthetic characteristics of the product, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.

2. Include identification on each sample, with full project information.

3. Submit the number of samples specified in the individual specification Sections. One sample will be retained by the Engineer.

1.08 MANUFACTURERS' INSTRUCTIONS

A. When specified in individual specification Sections, submit manufacturers' printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing in quantities specified for Product Data in subsection 1.07 above.

B. Identify conflicts between manufacturers' instructions and Contract Documents.

1.09 MANUFACTURERS' CERTIFICATES

A. When specified in individual specification sections, submit manufacturers' certificates to Engineer for review, in quantities specified for Product Data in subsection 1.07 above.

B. Indicate material or product conforms to or exceeds specified requirements Submit supporting reference data, affidavits, and certificates as appropriate.

C. Certificates shall be based on test results acceptable to the Engineer.

1.10 INSPECTION AND TEST CERTIFICATES

A. Inspection and test certificates required for demonstrating proof or compliance of materials with specification requirements shall be submitted to Engineer for review.

B. Each certificate shall be signed by an official authorized to certify on behalf of the manufacturing company and shall indicate the name and address of the Contractor, the project name and location, and the quantity and date or dates of shipment or delivery to which the certificates apply.

C. Copies of laboratory test reports submitted with certificates shall contain the name and address of the testing laboratory and the date or dates of the test to which the report applies.

D. Certification will not be construed as relieving the Contractor from furnishing satisfactory material, if, after tests are performed on selected samples, the material is found not to meet the specified requirements.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01400
QUALITY CONTROL

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Regulatory requirements

2. References

3. Source quality control testing

4. Quality control of installation

5. Manufacturers' field services and reports

6. Inspection and testing services

1.02 REGULATORY REQUIREMENTS

A. Comply with all applicable local, state and federal regulations.

1.03 REFERENCES

A. Conform to latest edition of reference standards as of date of Contract Documents or date otherwise specified in specification sections.

B. Should specified reference standards conflict with Contract Documents, request clarification from Engineer before proceeding.

C. The contractual relationship of the parties to the Contract shall not be altered from the Contract Documents by mention or inference otherwise in any reference document.

1.04 SOURCE QUALITY CONTROL TESTING

A. Materials and equipment forming the Work under this Contract are subject to inspection and testing at the point of manufacture or fabrication. Standard specifications for quality and workmanship are indicated in the Contract Documents.

B. Provide statements or certificates from the manufacturers and fabricators that the materials and equipment provided by them are manufactured or fabricated in full accordance with the standard specifications for quality and workmanship indicated in the Contract Documents.

C. All costs of this testing and providing statements and certificates shall be a subsidiary obligation of the Contractor, and no extra charge to the Owner shall be allowed on account of such testing and certification.

1.05 QUALITY CONTROL OF INSTALLATION

A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce Work of specified quality.

B. Comply fully with manufacturers' instructions, including each step in sequence.

C. Should manufacturers' instructions conflict with Contract Documents, request clarification from Owner's Representative before proceeding.

D. Comply with specified standards as a minimum quality for the Work except when more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.

E. Perform work by persons qualified to produce workmanship of specified quality.

1.06 MANUFACTURERS' FIELD SERVICES AND REPORTS

A. When specified in individual specification Sections, require material or Product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, test, adjust, and balance of equipment as applicable, and to initiate instructions when necessary.

B. The suppliers' or manufacturers' personnel shall report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.

1.07 INSPECTION AND TESTING SERVICES

A. Contractor shall employ and pay for the services of approved independent quality control firms (QC Firms) to perform specified testing services. Qualifications, duties and responsibilities of the QC Firms are specified in Section 01410.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01410
CONTRACTOR'S QUALITY CONTROL INSPECTION
AND LABORATORY SERVICES

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Selection and payment.

2. Qualifications.

3. Contractor submittals.

4. Responsibilities of Quality Control Firm(s) and Laboratory(ies).

5. Laboratory reports.

6. Limits on authority of Quality Control Firm(s) and Laboratory(ies).

7. Contractor's responsibilities.

1.02 SELECTION AND PAYMENT

A. Contractor shall employ and pay for the services of approved independent Quality Control (QC) Firm(s) and Laboratory(ies) to perform specified inspection and testing services.

B. Employment of QC Firm(s) and Laboratory(ies) shall in no way relieve Contractor of obligation to perform work in accordance with requirements of Contract Documents.

1.03 QUALIFICATIONS

A. Maintain a full time registered Engineer or other specialist on staff to review services.

B. Testing Equipment: Calibrated at reasonable intervals with devices of an accuracy traceable to either National Bureau of Standards (NBS) Standards or accepted values of natural physical constants.

C. Obtain approval of the Owner and Engineer before employing QC Firm(s) and Laboratory(ies).

D. Laboratories shall comply with the recommendations for quality assurance presented in the "Quality Assurance Manual", prepared by the American Council of Independent Laboratories, and other applicable qualifications and standards.

E. Comply with all quality control requirements of these Specifications.

1.04 CONTRACTOR SUBMITTALS

A. Prior to start of Work, within the time limit agreed to in the Preconstruction Meeting, submit the following for each quality control firm and laboratory: name, address, and telephone number, and names of full time registered Engineer or specialist and responsible officer.

B. For quality control laboratory, submit copy of report of laboratory facilities inspection made by Materials Reference Laboratory of National Bureau of Standards (NBS) during most recent tour of inspection, with memorandum of remedies of any deficiencies reported by the inspection.

1.05 RESPONSIBILITIES OF QUALITY CONTROL FIRM(S) AND LABORATORY(IES)

A. Provide qualified personnel at site. Cooperate with Engineer and Contractor in performance of services.

B. Perform specified inspection, sampling, and testing of Products in accordance with specified standards.

C. Promptly notify Engineer and Contractor of observed irregularities or non-conformance of Work or Products.

D. Attend Preconstruction Meeting and progress meetings if required by Engineer.

1.06 LABORATORY REPORTS

A. The laboratory shall submit two copies of laboratory reports to Engineer within three working days after completion of each inspection and test.

B. Reports shall include:

1. Date issued

2. Project title and number

3. Name of inspector

4. Date and time of sampling or inspection

5. Identification of product and specifications section

6. Location in the Project

7. Type of inspection or test

8. Date of test

9. Results of tests

10. Signature of appropriate specialist on laboratory report certifying accuracy of data

C. When requested by Engineer, provide interpretation of test results.

1.07 LIMITS ON AUTHORITY OF QUALITY CONTROL FIRM(S) AND LABORATORY(IES)

A. QC Firm(s) and Laboratory(ies) shall not release, revoke, alter, or enlarge on requirements of Contract Documents.

B. QC Firm(s) and Laboratory(ies) shall not approve or accept any portion of the Work, and shall not assume any duties of the Contractor.

C. QC Firm(s) and Laboratory(ies) shall have no authority to stop the Work.

1.08 CONTRACTOR'S RESPONSIBILITIES

A. Cooperate with QC Firm(s) and Laboratory(ies) personnel and provide access to Work.

B. Furnish incidental labor and facilities:

1. To provide access to work to be tested.

2. To obtain and handle samples at the Project site or at the source of the product to be tested.

3. To facilitate inspections and tests.

4. For storage and curing of test samples.

C. Notify QC Firm(s) and Laboratory(ies) sufficiently in advance of operations to allow for assignment of personnel and scheduling of tests and inspections.

D. Pay costs of services of QC Firm(s) and Laboratory(ies).

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01500
CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Mobilization

2. Temporary utilities

3. Barriers and enclosures

4. Protection of existing utilities and installed Work

5. Site security

6. Access roads and parking

7. Temporary Controls: construction cleaning; noise; water; soil erosion and sediment; pollution; and dust

8. Traffic control; Haul routes.

9. Removal of temporary utilities, facilities and controls.

1.02 MOBILIZATION

A. Mobilize to the site and be prepared to initiate the construction activities within 30 days after receiving Notice to Proceed from the Owner.

B. Mobilization shall not be attempted unless the Contractor has:

1. Obtained all permits, licenses and OSHA training certificates necessary to perform the Work, where required.

2. Received approval from the Owner for the location of temporary structures and storage areas.

3. Submitted initial documents to the Engineer as listed in subsection 1.02.A of Section 01300.

1.03 TEMPORARY UTILITIES

A. Provide and pay for required temporary power service, and temporary lighting. Temporary electrical utilities, if needed, shall be installed by a licensed electrical contractor.

B. Provide and pay for water required for construction as described in these specifications. Water supplies from the existing service shall be arranged by the Contractor with the Owner.

C. Supply and maintain temporary sanitary facilities at the site.

D. Provide adequate fire protection at the site as required by local fire codes and standards.

1.04 BARRIERS AND ENCLOSURES

A. Provide barriers to prevent unauthorized entry to construction areas and to protect existing facilities from damage from construction operations.

B. Provide barricades, covered walkways and other temporary construction required by Owner for access to existing building(s).

C. All temporary construction shall be in accordance with applicable federal, state and local laws and building codes.

D. Protect non-owned vehicular traffic, stored materials, site and structures from damage.

1.05 PROTECTION OF EXISTING UTILITIES AND MONITORING WELLS

A. Contact and cooperate with the Owner and utility companies to locate all utilities (including pipelines, cables, power poles and other structures) on the construction site prior to beginning the Work.

B. All utilities shall be protected from damage during construction, unless otherwise indicated to be removed or abandoned.

C. Comply with requirements of the utility owners for clearances and access for all construction within and adjacent to the utility right-of-way.

D. If damaged, the utilities shall be repaired as required by the Owner at the Contractor's expense.

E. If a utility is encountered which is not shown on the Drawings or otherwise made known to the Contractor prior to beginning the Work, promptly take necessary steps to assure that the utility is not damaged, and give written notice to the Owner or Engineer and to the owner of the utility. The Owner or Engineer will then review the conditions and determine the extent, if any, to which a change is required in the Contract Documents to reflect and document the consequences of the existence of the utility.

F. No existing or newly installed monitoring wells shall be damaged by the Contractor. Damage shall be defined as disturbance to the well, causing it to be no longer plumb, or damaging of the surface seal (unless otherwise indicated to be reconstructed). Repairs or replacement of damaged wells shall be paid by the Contractor.

1.06 PROTECTION OF INSTALLED WORK

A. Protect installed Work and provide special protection where required in individual specification sections.

B. Provide temporary and removable protection for installed Products. Control activity in immediate work area to minimize damage.

1.07 SECURITY

A. Provide security and facilities to protect Work and existing facilities from unauthorized entry, vandalism or theft.

B. Coordinate with Owner's security program.

1.08 ACCESS ROADS AND PARKING

A. Designated existing on-site roads and areas shall be used for construction traffic and parking, unless otherwise directed by the Owner or Engineer.

1.09 CONSTRUCTION CLEANING

A. Maintain areas free of trash and rubbish. Maintain site in a clean and orderly condition.

B. No trash or rubbish containers will be supplied by Owner. Supply all containers required for storage and removal of trash, rubbish, and debris resulting from the work included in this project.

C. Remove trash and rubbish from site at least weekly and dispose on site where designated by the Owner.

1.10 NOISE CONTROL

A. Contractor's vehicles and equipment shall be such as to minimize noise to the greatest degree practicable. Noise levels shall conform to the latest OSHA standards and state, county and local ordinance requirements, and in no case will noise levels be permitted which interfere with the work of the Owner or others.

1.11 WATER CONTROL

A. Provide methods to control surface water and ground water to prevent damage to the Work, the site, or adjoining properties.

B. Control fill, grading and ditching to direct water away from excavations, and other construction areas, and to direct drainage to proper runoff courses so as to prevent any erosion, damage or nuisance. Contractor shall be responsible for damages caused by his water disposal operations.

C. Provide, operate and maintain equipment and facilities of adequate size to control water.

1.12 SOIL EROSION AND SEDIMENT CONTROL

A. Construct all temporary measures necessary to control soil erosion and sediment transport within the construction limits in compliance with the requirements of governmental authorities having jurisdiction.

B. The use of temporary control measures shall be coordinated with the permanent erosion control features specified elsewhere to the extent practical, to assure effective and continuous erosion and sediment control.

1.13 POLLUTION CONTROL

A. Provide methods, means and facilities required to prevent contamination of soil, water or atmosphere by the discharge of noxious substances from construction operations.

B. All oil, fuel, and other fluids discharged or spilled during vehicle maintenance operations or other site operations shall be collected, stored and disposed of in compliance with all applicable local, state, and federal regulations. All spills shall be cleaned up to the satisfaction of the Owner, including excavation of soil contaminated by spills.

C. Take special measures to prevent harmful substances from entering public waters. Prevent disposal of wastes, effluents, chemicals, or other such substances adjacent to streams, or in sanitary or storm sewers.

D. Provide systems for control of atmospheric pollutants. Prevent toxic concentrations of chemicals, and prevent harmful dispersal of pollutants into the atmosphere.

E. All Contractor's equipment used during construction shall conform to all current federal, state and local laws and regulations.

1.14 DUST CONTROL

A. Maintain all excavations, roads, and all other work areas within the project boundaries free from visible airborne dust which would cause a hazard or nuisance to others.

B. Approved temporary methods of stabilization, consisting of sprinkling with clean water, or similar methods, will be required to control dust. Sprinkling must be repeated at such intervals as to keep all parts of the disturbed area at least damp at all times.

1.15 TRAFFIC CONTROL

A. Coordinate movement of construction equipment and hauling vehicles with Owner to prevent interference with public traffic and parking, access by emergency vehicles, and Owner's operations.

1.16 HAUL ROUTES

A. Consult with authority having jurisdiction in establishing public thoroughfares to be used for haul routes and site access.

B. Confine construction traffic to designated haul routes.

1.17 REMOVAL OF TEMPORARY UTILITIES, FACILITIES AND CONTROLS

A. Remove temporary above-grade and buried utilities, equipment, facilities, materials prior to final inspection.

B. Clean and repair damage caused by installation or use of temporary work.

C. Restore existing facilities used during construction to original condition.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01600
MATERIAL AND EQUIPMENT

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Products

2. Transportation and handling

3. Storage and protection

4. Product options

5. Substitutions

1.02 PRODUCTS

A. Products: Means new material, machinery, components, equipment, fixtures, and systems forming the Work. Does not include machinery and equipment used for preparation, fabrication, conveying and erection of the Work. Products may also include existing materials or components required for reuse.

1.03 TRANSPORTATION AND HANDLING

A. Transport and handle products in accordance with manufacturer's instructions.

B. Promptly inspect shipments to assure that products comply with requirements, quantities are correct, and products are undamaged.

C. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, and damage.

1.04 STORAGE AND PROTECTION

A. Store and protect products in accordance with manufacturer's instructions, with seals and labels intact and legible. Store sensitive products in weather-tight, climate controlled enclosures.

B. For exterior storage of fabricated products, place on sloped supports, above ground.

C. Provide off-site storage and protection when site does not permit on-site storage or protection.

D. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to avoid condensation.

E. Store loose granular materials on solid flat surfaces in a well-drained area. Prevent mixing with foreign matter.

F. Provide equipment and personnel to store products by methods to prevent damage.

G. Arrange storage of products to permit access for inspection. Periodically inspect to assure products are undamaged and are maintained under specified conditions.

1.05 PRODUCT OPTIONS

A. Products Specified by Reference Standards or by Description Only: Any product meeting those standards or description.

B. Products Specified by Naming One or More Manufacturers: Products of manufacturers named and meeting specifications; no options or substitutions allowed.

C. Products Specified by Naming One or More Manufacturers with a Provision for Substitutions: Submit a request for substitution for any manufacturer not named.

1.06 SUBSTITUTIONS

A. Engineer will consider requests for Substitutions only within 60 days after Effective Date of Agreement.

B. Subsequent Substitutions will be considered only when a product becomes unavailable through no fault of the Contractor. Improper planning will not be considered as a reason to increase Contract Price as a result of product substitution.

C. A request constitutes a representation that the Contractor:

1. Will provide the same warranty for the Substitution as for the specified product.

2. Will coordinate installation and make changes to other Work which may be required for the Work to be complete with no additional cost to the Owner.

3. Waives claims for additional costs or time extension which may subsequently become apparent.

4. Will reimburse Owner for review or redesign services associated with re-approval by Engineer and Engineer's consultants and regulatory agencies.

D. Substitutions will not be considered when they are indicated or implied on shop drawing or product data submittals, without separate written request, or when acceptance will require revision to the Contract Documents.

E. Substitution Submittal Procedure:

1. Submit copies of request for Substitution for consideration. Limit each request to one proposed Substitution.

2. Submit the number of copies required for all submittals, as specified in Section 01300.

3. Submit shop drawings, product data, and certified test results attesting to the proposed product equivalence.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01650
STARTING OF SYSTEMS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Starting systems

2. Demonstration and instructions

3. Testing, adjusting, and balancing

1.02 STARTING SYSTEMS

A. Coordinate schedule for start-up of various equipment and systems.

B. Notify Engineer seven days prior to start-up of each item.

C. Verify that each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, or other conditions which may cause damage.

D. Verify that tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.

E. Verify wiring and support components for equipment are complete and tested.

F. Execute start-up under supervision of responsible manufacturers' representatives in accordance with manufacturers' instructions.

G. When specified in individual specification sections, require manufacturers to provide authorized representatives to be present at site to inspect, check and approve equipment or system installation prior to start-up, and to supervise placing equipment or system in operation.

H. Submit a written report in accordance with Section 01400 that equipment or system has been properly installed and is functioning correctly.

1.03 DEMONSTRATION AND INSTRUCTIONS

A. Demonstrate operation and maintenance of Products to Owner's personnel at date of final inspection.

B. Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, maintenance, and shutdown of each item of equipment at agreed-upon times, at equipment location.

C. Utilize operation and maintenance manuals as basis for instruction. Review contents of manuals with Owners' personnel in detail to explain all aspects of operation and maintenance.

D. Prepare and insert additional data in operations and maintenance manuals when need for additional data becomes apparent during instruction.

1.04 TESTING, ADJUSTING, AND BALANCING

A. Contractor shall appoint, employ, and pay for services of manufacturers' representatives or an independent firm to perform testing, adjusting and balancing.

B. The manufacturers' representatives or independent firm shall perform services specified in Divisions 11 and 15.

C. Reports shall be submitted by manufacturers' representatives or independent firm to the Engineer indicating observations and results of tests and indicating compliance or non-compliance with specified requirements and with the requirements of the Contract Documents.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01700
CONTRACT CLOSEOUT

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Closeout procedures

2. Final cleanup and demobilization

3. Reinspection fees

4. Contractor's closeout submittals

5. Final Application for Payment

6. Project Record Documents

7. Operation and maintenance data

8. Warranties

9. Spare parts and maintenance materials

1.02 CLOSEOUT PROCEDURES

A. Comply with applicable paragraphs of the General Conditions, as modified by the Supplementary Conditions (if applicable), for substantial completion procedures, final inspection, final application for payment, final payment and acceptance, and related topics.

1.03 FINAL CLEANUP AND DEMOBILIZATION

A. The Contractor is responsible for final cleanup of the site and demobilization, prior to final acceptance of the Work.

B. Remove all equipment, vehicles, excess materials and debris created by or brought on-site for the purpose of completing the Work described in the Contract Documents.

C. Remove all temporary utilities and structures constructed specifically to carry out tasks for this project, as specified in subsection 1.17 of Section 01500.

D. Relocate removed items or materials owned by Owner as directed by Owner's representative.

1.04 REINSPECTION FEES

A. Should the Engineer perform more than one reinspection due to failure of the Work to comply with the claims of status of each level of completion made by the Contractor, Owner will deduct the amount of compensation for subsequent inspections, including travel expenses, from the final payment to the Contractor.

1.05 CONTRACTOR'S CLOSEOUT SUBMITTALS

A. Provide submittals that are required by all governing authorities.

B. Submit all documents referenced in Paragraph 14.12 of the General Conditions, including, but not necessarily limited to:

1. Final Application for Payment (refer to subsection 1.06 below).

2. Project Record Documents (refer to subsection 1.07).

3. Operation and Maintenance Data (refer to subsection 1.08).

4. Warranties (refer to subsection 1.09).

1.06 FINAL APPLICATION FOR PAYMENT

A. Submit the final Application for Payment, accompanied by all required documentation, in accordance with procedures and requirements stated in the General and Supplementary Conditions.

1.07 PROJECT RECORD DOCUMENTS

A. Maintain at the site one set of the following documents:

1. Contract Drawings.

2. Specifications.

3. Addenda.

4. Change Orders and other modifications to the Contract.

5. Engineer's Field Orders or written instructions.

6. Approved submittals (refer to Section 01300).

7. Field test records and laboratory analyses.

B. Store Project Record Documents separate from documents used for construction.

C. Record information concurrent with construction progress.

D. Make Project Record Documents available at all times for review by the Engineer.

E. Contract Drawings shall be legibly marked to record as-built information for all construction. Deliver marked-up Contract Drawings to Engineer at the conclusion of the Work. Engineer will use the drawings submitted by the Contractor to prepare final "As-built" Drawings prepared by the Engineer. Information shall include, as applicable:

1. Measured locations and depths of structures.

2. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.

3. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.

4. Field changes of dimension and detail.

5. Changes made by Field Order or by Change Order.

6. Details not on original Contract Drawings.

F. Submit all Project Record Documents to Engineer with claim for final Application for Payment.

1.08 OPERATION AND MAINTENANCE DATA

A. Submit two bound copies of document 15 days prior to final inspection. One copy will be returned after final inspection with Engineer's and Owner's comments. Revise content of document as required prior to final submittal.

B. Submit final revised document within ten days after receipt of Engineer's and Owner's comments.

C. Contents of document:

1. Listing of Engineer, Contractor, subcontractors, and major equipment suppliers.

2. Operation and maintenance instructions, identifying the following:

a. List of equipment.

b. Parts list for each component.

c. Operating instructions.

d. Maintenance instructions for equipment and systems.

1.09 WARRANTIES

A. Provide notarized copies

B. Execute and assemble documents from subcontractors, suppliers, and manufacturers.

C. Submit with final Application for Payment.

1.10 SPARE PARTS AND MAINTENANCE MATERIALS

A. Provide products, spare parts, maintenance and extra materials in quantities specified in individual specification sections.

B. Deliver to project site and place in location directed by Owner; obtain receipt prior to final payment.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 02225
TRENCHING, BACKFILLING AND COMPACTING

PART 1 GENERAL

1.01 SUMMARY

A. Section includes excavation, backfill and compaction for the removal of existing pipelines and the installation of new pipelines.

1.02 REFERENCES

A. American Society for Testing and Materials (ASTM):

1. ASTM D 698, Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort.

2. ASTM D 1556, Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method.

3. ASTM D 2167, Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method.

4. ASTM D 2487, Standard Test Method for Classification of Soils for Engineering Purposes.

5. ASTM D 2937, Standard Test Method for Density of Soil in Place by the Drive-Cylinder Method.

1.03 SUBMITTALS

A. Submit certificates, signed by the material producer and the Contractor, stating that the following materials meet or exceed the specified requirements.

1. Pipe Bedding Material and Initial Trench Backfill (same material)

B. Submit test results showing conformance of the constructed work with the specifications.

1.04 QUALITY CONTROL

A. Contractor shall retain the services of an approved independent testing firm to determine conformance of the materials and constructed work with the specifications, in accordance with Sections 01400 and 01410.

1.05 PROJECT CONDITIONS

A. Locate and protect existing utilities not indicated to be removed, as specified in Section 01500.

B. Notify the Engineer of any unexpected subsurface conditions.

C. Protection of Persons and Property:

1. Barricade open holes and depressions occurring as part of the Work.

2. Protect structures, pavements, and other facilities not designated to be removed, from damage caused by settlement, lateral movement, washout, and other hazards created by operations under this Section.

D. The Contractor is solely responsible for excavation slope stability. Excavation work shall be in compliance with applicable OSHA regulations, and in accordance with the Contractor's Health and Safety Plan, prepared as specified in Section 01100.

E. Provide temporary controls for erosion and siltation, surface water, noise, dust and other environmental factors related to construction work as specified in Section 01500.

PART 2 PRODUCTS

2.01 SOURCE QUALITY CONTROL

A. Proposed materials shall be approved for use on this project by the Engineer as specified, prior to use of the material in the construction.

2.02 PIPE BEDDING MATERIAL AND INITIAL TRENCH BACKFILL

A. Shall be sand or fine gravel, having characteristics consistent with SW, SP, GW or GP soils as defined by the Unified Soil Classification System.

B. Shall be substantially free of sharp edges or corners, and debris. Maximum particle size shall be 3/8-inch or less.

2.03 FINAL TRENCH BACKFILL

A. The soil shall be substantially free of organic matter or other perishable matter, rocks larger than two inches in greatest dimension, pavement material, litter and topsoil.

B. Soil excavated from the trench will be considered suitable for use as Final Trench Backfill if it meets the criteria specified above.

C. Testing of Soil

1. Proctor Moisture - Density Curve (ASTM D 698): Minimum of one test for each visible change in material.

2.04 CONCRETE FOR PAVEMENT PATCHING

A. Specified in Section 03300.

PART 3 EXECUTION

3.01 FIELD QUALITY CONTROL

A. Field quality control testing shall be performed by the independent testing firm.

B. Testing of Final Trench Backfill at Pavement Crossing

1. Compaction/Density tests, using ASTM D 1556, D 2167 or D 2937: Minimum of one test for every eight inches of backfill placed.

C. The Engineer may require additional tests to establish gradation, maximum density, and in-place density as required by working conditions.

3.02 PREPARATION

A. Establish required lines and levels.

B. Maintain benchmarks and other survey control points, and re-establish if disturbed or destroyed at no additional cost to the Owner.

3.03 TRENCH EXCAVATION

A. Excavate trenches to the minimum width necessary for proper installation of pipes, and in compliance with OSHA regulations regarding trench excavation.

B. Trenches shall be excavated to the depths shown on the Drawings. Accurately grade the bottom to provide uniform bearing for the piping.

C. Edges of pavement shall be saw cut in a uniform straight alignment, as shown on the Drawings. Use an adequately powered, water-cooled, mechanical saw with a diamond-edge blade or abrasive wheel, unless otherwise approved by the Engineer.

D. Maintain pavement cuts in good order until pipe installation and pavement patching operations are completed.

E. If existing material below the pipe trench bottom grade is unsuitable for properly laying pipe, as determined by the Engineer, excavate and remove the unsuitable material to a depth of approximately four inches and replace the same with Pipe Bedding Material properly tamped and compacted to produce a firm and even bearing surface.

F. Removal of materials beyond the indicated subgrade elevations, without authorization by the Engineer, shall be classified as unauthorized excavation and shall be backfilled with Pipe Bedding Material and compacted as specified above, at no additional cost to the Owner.

G. Remove water from the excavation properly and continuously throughout the progress of the work, and keep the excavation dry until the pipe installation and backfilling are completed.

3.04 PIPE INSTALLATION

A. Installation of all pipe and appurtenances shall be subject to the review of the Engineer before being covered.

B. Install piping as shown on the Drawings and as specified in Section 15060.

3.05 TRENCH BACKFILLING AND COMPACTING

A. Do not completely backfill trenches for new piping until the required pressure and leakage tests have been performed, and the piping system as installed conforms to the Specifications and Drawings.

B. Place Initial Trench Backfill around and over the pipes, in layers not exceeding six inch thickness, up to approximately six inches above the top of the pipes. Each layer shall be thoroughly compacted by hand-tamping or approved manually-guided compaction equipment.

C. Final Trench Backfill over piping shall be placed in layers not exceeding eight inches loose thickness up to existing grade. Final Trench Backfill shall be compacted to achieve at least 92 percent of the material's maximum dry density as determined by ASTM D 698.

D. Compaction of trench backfill shall be performed in a manner that does not damage the pipe. Any pipe that is damaged shall be replaced at the Contractor's expense.

E. Trenches excavated for pipe removals shall be backfilled to ground surface using excavated material. Compact as specified for Final Trench Backfill.

F. Surface of trench backfill in grassed areas shall be graded smooth, and seeded and mulched as specified in Section 02930.

3.06 PAVEMENT PATCHING

A. Grade surface of compacted Final Trench Backfill to elevation required for concrete placement.

B. Comply with Section 03300 for concrete placement.

3.07 DISPOSAL OF MATERIAL

A. Excess material from pipe trenches not used as Final Trench Backfill shall be disposed on-site where designated by the Owner.

END OF SECTION

SECTION 02673
GROUND-WATER RECOVERY WELLS

PART 1 GENERAL

1.01 SUMMARY

A. Section includes: removal of existing recovered ground-water lines; protection of existing monitoring and recovery wells; reconstruction of the tops of designated wells (PTW-1, MW-1-1, MW-1-2, and MW-1-3); and installation of well vaults.

1.02 REFERENCES

A. "Standard Specifications for Road and Bridge Construction", 1993 edition, Georgia Department of Transportation (Georgia DOT Specifications).

1.03 SUBMITTALS

A. Submit manufacturer's information on well vaults, showing conformance with the Specifications.

B. Submit description of materials and methods for sealing of pipe penetrations through well vaults.

C. Submit certificate, signed by the material producer and the Contractor, stating that the crushed stone base material meet or exceed the specified requirements.

1.04 QUALITY ASSURANCE

A. Reconstruction of wellheads shall comply with all applicable state and local requirements for well construction. Work shall be performed by a qualified water well contractor, licensed in the State of Georgia.

PART 2 PRODUCTS

2.01 WELL VAULTS

A. Shall be pre-fabricated underground enclosures, constructed to the dimensions shown on the Drawings with the required penetrations for pipe installation, and designed for an AASHTO H-20 traffic loading.

B. Shall be Composolite as manufactured by Quazite Corporation, "PG" Style Service Box Assemblies: 30-inch depth standard box with no base (part number PG2436BA30), and heavy-duty locking cover (part number PG2436HA00) with gasket. Cover shall be white and imprinted with the following logo in black: "RECOVERY WELL".

C. Holes for pipeline penetrations shall be pre-drilled by the manufacturer at the required locations shown on the Drawings, unless otherwise approved by the Engineer.

2.02 CONCRETE FOR WELL VAULTS

A. Specified in Section 03300.

2.03 CRUSHED STONE BASE FOR VAULTS

A. Material shall consist of crushed stone, crushed or uncrushed gravel, crusher run stone, or other similar material having hard durable particle free of adherent coatings. Gradation and quality requirements shall comply with Type I or Type II Stabilizer Aggregate, listed in Section 803 of the Georgia DOT Specifications.

PART 3 EXECUTION

3.01 PROTECTION OF WELLS

A. No existing monitoring or recovery well shall be damaged by the Contractor. Damage shall be defined as disturbance of the well, causing it to be no longer plumb, or damaging of the cement grout seal, except as required for reconstruction of designated wellheads. Repairs or replacement of damaged wells shall be paid by the Contractor.

3.02 PIPE REMOVAL

A. Excavate and remove existing recovered ground-water pipelines from wells PTW-1 and MW-1-3 as shown on the Drawings.

B. Cut the pipe as required and place in approved containers for disposal.

C. Backfill, regrade and seed the excavated areas as specified in Sections 02225 and 02930.

3.03 RECONSTRUCTION OF WELL RISERS

A. The tops of monitoring wells identified on the Drawings where vaults are to be installed shall be reconstructed as described below.

B. All work shall be accomplished so as not to disturb and damage the well risers, and the cement grout seal surrounding the risers below the base elevation for the well vaults.

C. Excavate soil around well risers to the dimensions and depth required for installation of well vaults as shown on the Drawings.

D. Break up and remove concrete pads and cement grout seal around wells.

E. Remove existing protective casings and well covers. Cut and remove existing recovery well piping above grade at wells PTW-1 and MW-1-3, as shown on the Drawings and as specified in Section 15060.

F. Cut and remove top portion of existing riser pipe at each well to the depth required for vault and piping installation. Use equipment and methods to prevent debris from falling into well.

3.04 INSTALLATION OF WELL VAULTS

A. Prepare bottom and sides of excavation at each well as required for installation of well vaults. Place six-inch depth of crushed stone base in excavations as shown on the Drawings. Compact the crushed stone as required for a stable base.

B. If not pre-drilled by the manufacturer, cut holes at required locations on sides of vaults for installation of piping. Holes shall be cut using materials and methods recommended by the vault manufacturer.

C. Install brackets, pipe supports and other accessories as shown on the Drawings.

D. Install well vaults as shown on the Drawings and according to the manufacturer's recommendations. Vaults shall be seated on the crushed stone base, properly aligned, leveled and adjusted so that the cover is slightly above ground surface to provide drainage away from cover as shown.

E. Place and compact backfill around vaults up to elevation required for concrete collar. Backfill material shall be soil excavated for installation of vaults if it meets the same criteria as specified for Final Trench Backfill in Section 02225, subsection 2.03.A. Compact as specified in Section 02225, subsection 3.05.C.

F. Place concrete around the vaults as shown on the Drawings and as specified in Section 03300.

3.05 DISPOSAL OF MATERIAL

A. Existing piping, protective well casings and other materials removed during the Work shall be disposed off-site where approved by the Engineer and Owner.

END OF SECTION

SECTION 02930
SEEDING AND MULCHING

PART 1 GENERAL

1.01 SUMMARY

A. Section includes establishing a stand of grass on all areas disturbed by construction.

1.02 REFERENCES

A. "Standard Specifications for Road and Bridge Construction", 1993 edition, Georgia Department of Transportation (Georgia DOT Specifications).

1.03 SUBMITTALS

A. Submit manufacturer's certification that seed, lime and fertilizer meet specification requirements.

B. Submit actual proposed rates of application of lime, fertilizer, and seed. Seed submittal shall include a listing of all seed types and proportions in seed blends.

C. Submit seed bag tags, receipts, truck weight tickets, and other information necessary to confirm application rates and types for all seed, fertilizer, lime, and mulch.

1.04 QUALITY CONTROL

A. Seeding shall be accomplished according to standard local practice and in compliance with requirements of applicable state and federal regulations.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver packaged materials in containers showing weight, analysis and name of manufacturer.

B. Protect materials from deterioration during delivery, and while stored at site.

1.06 PROJECT CONDITIONS

A. Perform seeding upon completion of trench backfilling, compaction and grading.

PART 2 PRODUCTS

2.01 FERTILIZER

A. Shall be a commercial fertilizer, in dry or liquid form.

B. Mix shall be within the following limits:

Nitrogen	5 to 10 percent
Phosphorus	10 to 15 percent
Potassium	10 to 15 percent

2.02 LIME

A. Shall be dolomitic limestone, designated for agricultural use, meeting the requirements of the Georgia DOT Specifications, Section 882.01.

2.03 SEED

A. Seed shall be fresh, clean, new-crop seed mixed in the proportions specified for species and variety, conforming to Section 890.01 of the Georgia DOT Specifications.

B. Permanent seed shall consist of the following mixture: 50 percent Common Bermudagrass (hulled); and 50 percent Common Bermudagrass (unhulled).

C. Temporary seed: Annual ryegrass, cereal grasses, or other quick-growing species suitable to the area and as a temporary cover, which will not compete with the grasses specified for permanent cover.

D. The variety and blends of seed may be added, deleted or substituted as appropriate to take advantage of proven varieties and mixtures and to account for changes of season and weather, based on recommendations by local agricultural extension agent, and as approved by the Engineer and Owner.

E. Seed which has become wet, moldy or otherwise damaged will not be acceptable.

2.04 WATER

A. Clean, potable water supplied by Owner.

2.05 MULCH

A. Provide and install a mulch adequate to protect the seeding during its growing period.

B. Clean long-fibered hay or straw for gentle slopes, consisting of stalks of oats, wheat, barley, rye, or excelsior wood fibers, free of noxious weed seeds.

PART 3 EXECUTION

3.01 PREPARATION

A. Surface shall be graded and free of litter, large clods, roots, sharp protrusions, and large stones.

3.02 APPLICATION METHODS

A. Spread lime (if required) uniformly on soil surface at rate specified in subsection 3.03. Incorporate lime into top four inches of soil with a heavy-duty disk. Lime is not required for temporary seeding.

B. Seed, fertilizer, and mulch materials shall be placed by one of the methods described below. Application of fertilizer is not required for temporary seeding.

C. Hydraulic Method

1. The seed, fertilizer and mulch shall be mixed in the specified amount of water to produce a slurry.

2. The slurry shall then be applied under pressure to the areas and at the rates indicated below.

3. Areas inadequately covered shall be re-treated.

D. Dry Method

1. Seed and fertilizer shall be applied uniformly at the specified rate, using power drawn seeders, seed drills, or other mechanical methods approved by the Engineer. Hand-operated seeding devices may be used on areas which are inaccessible to mechanical seeders.

2. Seed and fertilizer shall be applied separately. Fertilizer shall be incorporated into the upper portion of the soil prior to the seeding operation.

3.03 APPLICATION RATES

A. Lime: Apply at the rate of approximately 20 pounds per 1,000 square feet.

B. Fertilizer: Apply at the rate of approximately 30 pounds per 1,000 square feet.

C. Permanent seed: Apply at the rate of approximately four pounds per 1,000 square feet.

D. Other rates of application for lime, fertilizer and seed may be allowed by the Engineer based on recommendations by a local agricultural extension agent.

3.04 MULCHING

A. Spread mulch uniformly over seeded area in a continuous blanket at a rate of approximately two tons per acre.

B. Mulch may be spread by hand or by machinery. Mulch shall be spread not later than 48 hours after seeding.

3.05 ESTABLISHMENT OF GRASS

A. Begin maintenance immediately after seed placement.

B. Carry out watering as needed during the establishment period to maintain moisture in upper four inches of soil.

C. Fill, level, and repair washed or eroded areas as necessary.

D. Re-seed and mulch areas larger than one square foot not having a uniform stand of grass.

E. Maintain and protect all seeded areas until final acceptance of the Contract. Final acceptance of seeding will not be made until an acceptable uniform stand of permanent grass is obtained in areas disturbed by construction outside the limits of the cover.

END OF SECTION

SECTION 03300
CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.01 SUMMARY

A. Section includes cast-in-place concrete construction for pipe trench across pavement and for collars around recovery well vaults.

1.02 REFERENCES

A. American Concrete Institute

1. ACI 304, Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete.

2. ACI 308, Standard Practice for Curing Concrete.

3. ACI 309, Practice for Consolidation of Concrete.

B. American Society for Testing and Materials

1. ASTM A 185, Welded Steel Wire Fabric for Concrete Reinforcement.

2. ASTM C 31, Methods of Making and Curing Concrete Test Specimens in the Field.

3. ASTM C 33, Concrete Aggregates.

4. ASTM C 39, Test Method for Compressive Strength of Cylindrical Concrete Specimens.

5. ASTM C 94, Ready-Mixed Concrete.

6. ASTM C 143, Test Method for Slump of Portland Cement Concrete.

7. ASTM C 150, Portland Cement.

8. ASTM C 172, Method of Sampling Freshly Mixed Concrete.

9. ASTM C 260, Air Entraining Admixtures for Concrete.

C. Wire Reinforcement Institute (WRI), "Manual of Standard Practice".

1.03 SUBMITTALS

A. Submit under provision of Section 01300.

B. Manufacturer's certification that reinforcement and concrete meet specification requirements.

1.04 QUALITY CONTROL

A. Contractor shall retain the services of an independent testing firm to perform material evaluation tests to determine conformance of the materials and constructed work with the specifications.

1.05 DELIVERY, STORAGE AND HANDLING

A. Reinforcement materials shall be handled and stored to prevent contamination, damage and accumulation of dirt or excessive rust.

PART 2 PRODUCTS

2.01 REINFORCEMENT

A. Welded Steel Wire Fabric: Comply with ASTM A 185, 65,000 psi yield strength; Plain type in flat sheets or rolls, unfinished.

B. Tie Wire: Minimum 16 gage annealed type.

C. Reinforcement Supports: Sized and shaped for strength and support of reinforcement during concrete placement conditions, and complying with WRI Manual of Standard Practice, unless otherwise approved by the Engineer.

2.02 CONCRETE MATERIALS

A. Cement: Comply with ASTM C 150, Portland Cement, Type I or II.

B. Fine and Coarse Aggregates: Comply with ASTM C 33. Maximum coarse aggregate size shall be one inch.

C. Water: Clean and not detrimental to concrete.

2.03 CONCRETE ADMIXTURES

A. Air Entrainment: Comply with ASTM C 260.

B. Chemical: The written approval of the Engineer shall be obtained prior to using any chemical admixture.

2.04 CONCRETE MIX

A. Mix and deliver concrete in accordance with ASTM C 94.

B. Mix Design

1. Concrete mixes shall be proportioned such that the 28 day compressive strength of moist cured laboratory samples achieve not less than the following:

a. Concrete for pipe trench across pavement: 4,000 pounds per square inch (psi).

b. Concrete for well vault collars: 3,000 psi.

2. Slump range shall be four inches maximum for concrete placed in pipe trench across pavement, and six inches maximum for concrete at all other locations.

3. Entrained air content for concrete placed in pipe trench across pavement: 6 percent, plus or minus one percent.

4. Maximum Water/Cement Ratio: 0.45.

PART 3 EXECUTION

3.01 PREPARATION OF SUBGRADE

A. For pavement crossing, place and compact trench backfill as specified in Section 02225.

B. Place and compact backfill around well vaults as specified in Section 02673 and as shown on the Drawings.

3.02 FIELD QUALITY CONTROL

A. If required by the Engineer, the following tests shall be performed by the independent testing firm during placement of concrete:

1. Sampling Fresh Concrete: Comply with ASTM C 172, except modified for slump to comply with ASTM C 94.

2. Slump: ASTM C 143. One test for each concrete load at point of discharge; and one for each set of compressive strength test specimens.

3. Concrete Temperature: Tested hourly when air temperature is 40 degrees F. and below, and when 80 degrees F. and above; and each time a set of compression test specimens is made.

4. Compression Test Specimens: ASTM C 31. One set of four standard cylinders for each compressive strength test.

5. Compressive Strength Test: ASTM C 39. One set for every class of concrete placed. One specimen of each set tested at seven days, two at 28 days, and one other specimen retained for later testing if required.

B. Concrete testing will be waived by the Engineer if the required certifications for concrete mix design and concrete delivery are submitted.

3.03 REINFORCEMENT

A. Comply with the specified codes and standards, for details and methods of reinforcement placement and supports, and as herein specified.

B. At the time of concrete placement, all reinforcement shall be free from loose rust, scale (except tight mill scale), mud, oil, grease and other materials which might reduce or destroy bond with concrete.

C. Accurately position and support reinforcement against displacement using metal chairs, runners, bolsters, spacers and hangers, and other supports as required.

D. Place reinforcement to obtain at least the minimum coverages for concrete protection.

E. Tolerance for cover over reinforcement shall be plus or minus one-half inch.

F. Install welded wire fabric in as long lengths as practicable. Lap adjoining pieces at least one full mesh and lace splices with 16 gage wire.

3.04 CONCRETE PLACEMENT

A. General: Place concrete in compliance with the practice and recommendations of applicable sections of ACI 304, and as herein specified.

B. Do not use concrete which becomes non-plastic and unworkable, or does not meet the required quality control limits, or which has been contaminated by foreign materials.

C. Consolidate concrete using equipment and procedures in accordance with the recommended practices of ACI 309 to suit the type of concrete and project conditions.

D. Maintain reinforcing steel in the proper position continuously during concrete placement operations.

3.04 CONCRETE FINISHING

A. Provide a broomed finish to all concrete surfaces exposed to view and which will receive traffic.

3.05 CURING AND PROTECTION

A. Conform to ACI 308 for curing of concrete. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.

B. Protect freshly placed concrete from premature drying, excessive cold or hot temperatures and mechanical injury.

3.06 DEFECTIVE WORK

A. Concrete work which does not conform to the specified requirements, including strength, dimensions and finish, shall be corrected at the Contractor's expense, as determined by the Engineer.

END OF SECTION

SECTION 11214
GROUNDWATER COLLECTION PUMPS

PART 1 GENERAL

1.01 SUMMARY

This section includes furnishing and installing the Groundwater Collection Pumps (P-1-1, P-1-2, P-1-3, P-1-4) with accessories.

1.02 SUBMITTALS

A. All necessary information shall be submitted under the provisions of Section 01300.

B. Manufacturer's specifications and engineering data, including certified pump curves showing pump performance characteristics with pump and system operating point plotted.

C. Shop drawings:

1. Assembly

2. Installation

D. Operation and maintenance instructions:

1. Installation instructions.

2. A control sequence describing start-up, operation, and shutdown.

3. Operation and maintenance instructions, including lubrication instructions and trouble shooting.

4. Manufacturer's bulletins, cuts and descriptive data, parts list and predicted life of parts subject to wear.

5. Test data and pump characteristic curves.

1.03 GUARANTEE

Contractor's guarantee for items furnished covers and includes:

A. Labor and materials, guaranteed for a minimum period of 12 months after installation.

B. Improper assembly or erection.

C. Defective workmanship and materials.

D. Leakage, breakage, or other failure.

1.04 DELIVERY AND STORAGE

All equipment delivered and placed in storage shall be stored with protection from the weather, humidity, and temperature variations, dirt and dust, or other contaminants.

1.05 NAMEPLATES

Each pump shall have the manufacturer's name or trademark in a conspicuous place. The manufacturer's name or trademark may be cast integrally with, stamped, or otherwise permanently marked upon the item of equipment. Such other information as the manufacturer may consider necessary to complete identification shall be shown on the nameplate.

1.06 VERIFICATION OF DIMENSIONS

The Contractor shall become familiar with all details of the work, verify all dimensions in the field, and shall advise the Engineer of any discrepancy before permitting the work to be performed.

1.07 SPARE PARTS DATA

The Contractor shall furnish recommended spare parts data for each different item of materials and equipment specified. The data shall include a complete list of parts and supplies, with current unit prices and source of supply.

PART 2 PRODUCTS

2.01 GROUNDWATER COLLECTION PUMPS AND CONTROLS

A. The current system consists of two QED LP1301 pulse pumps controlled by two QED L380 controllers and a QED L360 controller. The Contractor shall use existing pumps and controllers unless found defective.

B. Groundwater collection pumps shall be QED Pulse Pump® Model LP1301 with a 2" cap size or engineer approved equal.

C. Each pump shall be controlled by a QED Well Master L380 controller (LC 1-1, LC 1-2, LC 1-3, LC 1-4) and pump exhaust valve or engineer approved equal.

D. The four QED Well Master L380 controllers shall be controlled by a single Pulse Sender L360 (KS 1-1) and L358 controller exhaust valve or engineer approved equal.

E. The existing L380 and L360 controllers and corresponding exhaust valves shall be inspected to assure proper operation of the pumps.

F. Each pulse pump shall come equipped with 1/2" discharge tubing, 3/8" air supply tubing, 1/4" bubbler tubing, bottom inlet screen, and stainless steel support cable attached to the pump. The minimum length of the tubing and support cable shall be in accordance with Table I.

TABLE I - TUBING/SUPPORT CABLE LENGTHS		
Recovery well	**Well depth**	**Minimum tubing/support cable length**
PTW-1	84.3 ft	90 ft
MW-1-1	60.5 ft	66 ft
MW-1-2	35.5 ft	41 ft
MW-1-3	65.5 ft	71 ft

PART 3 EXECUTION

3.01 INSTALLATION

A. Pump installation: Pumping equipment and appurtenances shall be installed in the position indicated and in accordance with the manufacturer's written instructions. All appurtenances required for a complete and operating pumping system shall be provided.

B. Valves, piping and controls associated with the air operated pumps which are to be installed by the Contractor shall be installed at points shown on drawings and in accordance with manufacturer's instructions to give complete and regulating control. Valves shall be the same size as the line in which they are installed. If there is any conflict between the contract documents and manufacturer's instructions, the Contractor shall notify the Engineer before proceeding with the installation of the equipment in conflict.

3.02 ADJUST AND TEST

A. Operational test: Prior to acceptance, an operational test of all pumps and control systems shall be performed to determine if the installed equipment meets the purpose and intent of the specifications. Tests shall demonstrate that the equipment is not mechanically, structurally, or otherwise defective; is in safe and satisfactory operating condition; and conforms with the specified operating characteristics. Tests shall include checks for excessive vibrations, leaks in all piping and seals, correct operation of pump controls and equipment, proper alignment, and excessive noise levels.

B. Retesting: If any deficiencies are revealed during any test, such deficiencies shall be corrected and the tests shall be conducted again.

C. Damage: If any damage occurs to the pumps and control system components prior to or during installation, the Contractor shall be responsible for replacement of the pump.

END OF SECTION

SECTION 11346
CONTINGENCY GRANULAR ACTIVATED CARBON SYSTEM

PART 1 GENERAL

1.01 SUMMARY

This section includes furnishing and installing a granular activated carbon system (if required). The system shall include all equipment (carbon vessels, header piping, carbon, gauges, etc.), necessary for the installation of the system.

1.02 QUALITY ASSURANCE

All equipment provided shall be manufactured in accordance with accepted industry standards and shall meet the requirements of all regulatory agencies and local codes.

1.03 SUBMITTALS

Submit under the provisions of Section 01300 the following items:

A. System layout showing piping and valves.

B. Shop drawings of carbon vessels detailing vessel size, shell thickness and nozzle locations.

C. Design calculations detailing estimated carbon usage and vessel changeout frequency, pressure drop through the system at the design flowrate, and maximum pressure rating of the carbon vessels.

D. Manufacturer's product sheets.

E. Materials of construction.

F. Operation and Maintenance Instructions:

1. Installation instructions.

2. Piping layout and control diagram.

3. A control sequence describing start-up, operation and shutdown procedures, including carbon loading and unloading procedures.

4. Quantity of carbon to be utilized per vessel.

5. Operation and maintenance instructions including trouble shooting and carbon replacement conditions and procedures.

G. Sampling and Analysis Plan.

1.04 SPACE REQUIREMENTS

The granular activated carbon system shall fit into the space provided in the building along with other equipment specified to be placed inside the building. Equipment requiring normal servicing or maintenance shall be installed such that access is easily accomplished.

1.05 GUARANTEE

Manufacturer shall guarantee in writing that the granular activated carbon system will meet the effluent requirements specified in subsection 2.02 of this specification.

PART 2 PRODUCTS

2.01 GENERAL DESCRIPTION

The following specification describes all equipment, materials and services necessary to provide a completely installed granular activated carbon adsorption system. The adsorption system shall consist of two units and all related appurtenances required for a completely installed and operational system. The total system shall be designed for economical carbon usage and ease and completeness of granular activated carbon transfers.

A. The carbon adsorption system supplier must take unit responsibility for the completely installed system. The supplier will be responsible for design, fabrication, installation and start-up of all mechanical components including, but not limited to, vessels and piping. The carbon adsorption system supplier will also be responsible for supply, delivery, hydraulic loading and unloading and environmentally approved disposal of the spent carbon. Removal and disposal of spent carbon must be in accordance with all applicable local, state, and federal regulations regarding solid waste materials.

B. The carbon adsorption system supplier shall be able to guarantee supply of virgin grade granular activated carbon and verify the quality of such material with lot analyses of all shipments. This quality shall be in full compliance with the specification herein for granular activated carbon. The carbon adsorption system supplier shall also be able to remove and transport spent granular activated carbon classified as hazardous under RCRA regulations, so that it can be transported to a disposal site or reactivation facility as required.

C. Battery limits for the adsorption system will be defined as beginning at the influent connection for the system and ending with the effluent connection for the system. All equipment between these two points will be provided as part of the complete design by the system supplier.

D. Work included: The work covered by this specification includes the furnishing and installation of all equipment, materials, carbon and services to comprise a complete adsorption system.

2.02 PERFORMANCE REQUIREMENTS

The manufacturer and/or Contractor of the granular activated carbon system shall be responsible for the proper design and installation of the system. All equipment shall be designed to meet the effluent criteria listed.

Compound	Inlet Concentration (ppb)	Effluent Concentration (ppb)
1,1-Dichloroethane	580	ND*
1,1-Dichloroethene	1400	ND*
1,1,1-Trichloroethane	560	ND*
Acetone	9	ND*
Benzene	71	ND*
Ethylbenzene	270	ND*
Methylene Chloride	52	ND*
Toluene	16	ND*
Xylenes	800	ND*

* Non Detect as determined by EPA method 8260.

2.03 CARBON FILTER VESSELS

The manufacturer's design of the carbon filter system shall at a minimum include:

A. Two pressure carbon filter vessels capable of operating interchangeably in series shall be provided. Acceptable carbon filters are Carbonair PC 3 Liquid Phase Carbon Adsorbers or engineer approved equal.

B. The filter system shall also include flow instrumentation, including meters, gauges, sample ports and valves as well as interconnecting piping.

C. Influent and effluent quick connects shall also be provided in the manufacturer's design.

D. The specification on the pressure carbon filter vessel shall be:

1. 22 inches in diameter by 54 inches high, fiberglass construction.

2. The bed area shall be approximately 2.4 square feet with a variable flow range of 1 to 20 gallons per minute.

3. At a minimum four fittings shall be provided with the filter vessels:

   (2) influent-effluent full couplings
   (1) drain
   (1) aeration port

3. The design pressure at a maximum shall be 125 psi.

E. The vessels shall be provided filled with carbon. Each vessel shall have a carbon capacity of approximately 250 pounds.

2.04 SPECIAL TOOLS

The contractor shall supply all special tools needed for the repair and maintenance of the granular activated carbon system.

2.05 MATERIALS OF CONSTRUCTION

Materials of construction shall be suitable for the service intended and shall be compatible with the material being handled. Materials of construction shall also offer adequate strength and structural integrity for the specified design and operating conditions. Materials and equipment shall be new and unused.

2.06 TRAINING

Upon completion of the work, and at a time designated by the Engineer, the services of a manufacturer's representative shall be provided by the Contractor for a period of not less than four hours. The manufacturer's representative shall instruct a representative of the Owner in the operation and maintenance of the granular activated carbon system. These field instructions shall cover all the items contained in the "Operation and Maintenance Manual" (subsection 1.03, F).

PART 3 EXECUTION

3.01 DELIVERY AND STORAGE

A. All parts shall be preassembled to the largest extent practical, compatible with transportation limitation and equipment protection considerations.

B. All equipment shall be crated and/or packed to protect against damage during shipping.

C. All parts shall be properly protected so that no damage or deterioration will occur during a prolonged delay from the time of shipment until installation is completed and the treatment system is ready for operation. Finished iron or steel surfaces shall be properly protected to prevent rust and corrosion.

D. Flange faces shall be protected from damage. All openings shall be covered to prevent entrance of dirt, water and debris.

E. All equipment delivered and placed in storage shall be stored with proper protection from the weather, humidity, temperature variation, dirt and dust, or other contaminants.

F. The carbon supplied for the filter vessels shall be transported to the site outside of the vessels. The carbon shall be placed in the vessels once they are installed.

3.02 INSTALLATION

A. Carbon system equipment and appurtenances shall be installed in the position indicated and in accordance with the manufacturer's written instructions. All appurtenances required for a complete and operating system shall be provided, including such items as piping, conduit, valves, gauges, concrete foundations, anchors, grouting and controls.

B. Valves, piping and controls associated with the carbon system which are to be installed by the Contractor shall be installed at points shown on drawings or in accordance with manufacturer's instruction to give complete and regulating control. Valves shall be the same size as the line in which they are installed.

C. Operation of carbon system requires periodic replacement of carbon. Contractor shall verify that ample room is provided for service company to replace carbon.

3.03 ADJUST AND TEST

A. Operational test: Prior to acceptance, an operation test of the carbon system shall be performed to determine if the installed equipment meets the purpose and intent of the specifications. Tests shall demonstrate that the equipment is not mechanically, structurally or otherwise defective; is in safe and satisfactory operating condition; and conforms with the specified operating characteristics. Tests shall include checks for excessive vibration, leaks in all piping and seals, correct operation of control systems and equipment, proper alignment, excessive noise levels and power consumption.

B. The Contractor shall employ and pay for the services of an approved independent testing laboratory to perform the sampling and analysis of groundwater entering and leaving the system to verify proper operation. The Contractor shall prepare and submit to the Engineer for approval a sampling and analysis plan including, but not limited to, frequency of sampling, sampling procedures, required tests to be performed, and criteria for determining carbon breakthrough. Employment of testing laboratory shall in no way relieve Contractor of obligation to perform work in accordance with requirements of Contract Documents.

C. Retesting: If an deficiencies are revealed during any test, such deficiencies shall be corrected and the tests shall be conducted again.

END OF SECTION

SECTION 11370
AIR COMPRESSOR AND APPURTENANCES

PART 1 GENERAL

1.01 SUMMARY

This section includes inspection and maintenance of existing air compressor and appurtenances that provide process and control air to the groundwater collection pumps and their associated controls.

1.02 SUBMITTALS (of new equipment if necessary)

A. Submit under the provisions of Section 01300 the following:

1. Shop drawings.

2. Manufacturer's product sheets.

3. Materials of construction.

4. Electrical control drawings and motor nameplate data.

5. Operation and maintenance manuals.

B. If equipment maintenance only is required, the Contractor shall submit to the Engineer, a written report of those maintenance activities performed by him or his subcontractor.

PART 2 PRODUCTS

2.01 GENERAL DESCRIPTION

The Contractor shall inspect all compressed air system components for safe and proper operation. The system includes the air compressor, after-cooler, air dryer, all filters, valves and gauges.

A. Existing air compressor is a Speedaire model 5Z401, 10 hp, 2-stage, 3 phase power.

B. Contractor shall verify that the after-cooler and air dryer are adequately sized for the air compressor. After-cooler shall be factory-interlocked to the air compressor so as to run when the compressor is operating. If necessary, the air dryer shall be recharged to perform in accordance with manufacturer's standards.

C. Compressor receiver shall be equipped with an automatic blow down drain valve and oil/water separator. Oil/water separator shall be ECOSEP Model WT5 or Engineer approved equivalent.

D. All filters shall be cleaned (and replaced if necessary) and all cartridges replaced.

E. Contractor shall compare existing piping arrangement to the Process and Instrumentation Diagram (Dwg PI-003) and install any valves, gauges, and filters that do not exist as part of the current installation. New equipment shall be submitted in accordance with Section 01300 (Submittals) and subsection 1.02 of this specification.

F. If for any reason, it is determined that the air compressor, air dryer or aftercooler need to be replaced, the Contractor shall submit in writing to the Owner and Engineer reasons for the replacement. The Contractor shall submit in accordance with Section 01300 (Submittals) and subsection 1.02 of this specification, data on the replacement equipment for approval by the Engineer.

G. All piping and valves shall be installed in accordance with Section 15060 (Process Piping and Appurtenances).

PART 3 EXECUTION

3.01 DELIVERY AND STORAGE

A. All parts shall be preassembled to the largest extent practical, compatible with transportation limitations and equipment protection considerations.

B. All equipment shall be crated and/or packed to protect against damage during shipping.

C. All parts shall be properly protected so that no damage or deterioration will occur during a prolonged delay from the time of shipment until installation is completed and the treatment system is ready for operation. Finished iron or steel surfaces shall be properly protected to prevent rust and corrosion.

D. Flange faces shall be protected from damage. All openings shall be covered to prevent entrance of dirt, water and debris.

E. All equipment delivered and placed in storage shall be stored with proper protection from the weather, humidity, temperature variations, dirt and dust or other contaminants.

3.02 INSTALLATION

Install air compressor system and components in accordance with manufacturer's instructions and in accordance with the specification in related sections.

3.03 TESTING AND ADJUSTMENT

A. An operational test shall be performed to demonstrate that the air compressor system and components are not electrically, mechanically, structurally or otherwise defective. Tests shall include but not be limited to checks for excessive vibration, leaks, correct operation of control systems and equipment, correct operation of alarms and interlocks and correct power consumptions.

B. If deficiencies are revealed during any test, such deficiencies shall be corrected and the tests shall be reconducted.

END OF SECTION

SECTION 15060
PROCESS PIPING AND APPURTENANCES

PART 1 GENERAL

1.01 SUMMARY

A. Section includes furnishing and installing all piping and tubing with the necessary fittings for the groundwater treatment operation including air supply and control piping, and ground-water piping.

1.02 QUALITY ASSURANCE

A. Install pipe, hose, tubing and fittings to meet requirements of regulatory agencies and local standard practice.

B. Qualifications of Manufacturer: Pipes shall be manufactured by firms regularly engaged in manufacture of pipe, tube and fittings of types and sizes required, whose products have been in satisfactory use in similar service for not less than two years.

1.03 SUBMITTALS

A. Submit under the provisions of Section 01300 manufacturer's data and product cut sheets of the following:

1. Steel Pipe and Fittings

2. HDPE Pipe and Fittings

3. Flanges and Gaskets

4. Tubing and Hose

1.04 DELIVERY, STORAGE AND HANDLING

A. Provide factory-applied plastic end-caps on each length of pipe and tube. Maintain end-caps through shipping, storage and handling to prevent pipe-end damage and prevent entrance of dirt, debris and moisture. Flange faces shall be protected from damage.

B. Exercise care in transporting and handling to avoid damage to pipe and fittings.

C. Keep materials clean, dry and free from deleterious conditions.

D. Do not store materials directly on the ground.

PART 2 PRODUCTS

2.01 GENERAL

A. Provide pipe and tube of type, joint type, grade, size and weight (wall thickness or class) indicated for each service. Where type, grade or class is not indicated, provide proper selection as determined by installer for installation requirements, and comply with governing regulations and industry standards.

2.02 PIPING AND TUBING

A. Piping, tubing, fittings, gaskets and other wetted parts shall be compatible with the materials being handled. The following materials of construction shall be used in the treatment system.

B. HDPE Piping

1. All air and ground-water piping from the well vaults to the treatment room shall be 3/4-inch HDPE pipe rated for a working pressure of 160 psi and be oil and chemical resistant with standard fittings unless otherwise noted.

2. Acceptable manufacturer: Phillips Driscopipe.

C. Stainless Steel Pipe

1. All air and ground-water piping within the well vaults and treatment room shall be Schedule 40 Stainless Steel, with standard fittings in accordance with ASTM A790 and A774 unless otherwise noted.

a. Ground-water piping located inside the plant shall be 1-inch.

b. Air and bubbler piping from HDPE transition fittings to the control panel shall be 3/4-inch.

c. Compressed air header shall be 1 1/2-inch.

D. Well Vault Tubing

1. All well vault tubing shall be of the appropriate size and material for the materials being handled. Tubing shall be supplied by the pump manufacturer in accordance with Section 11214, subsection 2.01.

D. Pump Controller Tubing

1. Pump controller tubing shall be supplied by the pump manufacturer as follows:

a. 1/2-inch air tubing from the compressed air header to the L360 controller and L380 level controllers.

b. 1/4-inch air tubing from the L360 controller to the L380 level controllers.

c. 1/4-inch air bubbler tubing from each of the L380 level controllers to the HDPE pipe, as shown on the drawings.

d. 3/8-inch air supply tubing from each of the L380 level controllers to the HDPE pipe, as shown on the drawings.

2.03 HOSE CONNECTORS

A. Ground-water piping at carbon vessels: Shall be Dover Corporation, OPW Division, Twin-Kam Kamlok Couplers, unless otherwise noted.

B. Tubing connectors at control panel and inside well vault: acceptable manufacturer, Imperial Eastman or engineer approved equivalent.

2.04 PRESSURE GAUGES

A. Shall be oil-filled as manufactured by Ashcroft with a range of 0-150 psi.

PART 3 EXECUTION

3.01 GENERAL

A. Install pipe and tubing in accordance with manufacturer's instructions.

B. Install pipe groups parallel to surface and so as not to interfere with other trades such as electrical wiring.

C. Plug all ends of piping and equipment, except when work is being performed, to minimize entrance of dirt and debris.

D. Pipe shall not be supported by adjoining equipment. Piping shall not exert strain on or cause misalignment of equipment.

E. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

F. Remove scale, slag, dirt and debris for both inside and outside of piping and fittings before assembly.

3.02 INSTALLATION

A. Install all outdoor HDPE piping underground in accordance with manufacturer's recommendations and as noted on drawings.

B. In treatment room and well vaults, install piping and tubing, so as not to interfere with equipment.

C. Tubing to and from the L360 and L380 pump controllers shall be kept to a minimum and fastened to the control panel. Where extra tubing is necessary or desired, the excessive tubing shall be wound and fastened together, and attached to the control panel away from the pump controllers.

D. Extra tubing located in the well vaults shall wound and fastened together and attached to the side of the well vault away from the riser pipe and hand valves.

3.03 JOINTS

A. HDPE Pipe Joints: Complete joints in accordance with manufacturer's instructions. HDPE pipe shall be joined using the heat fusion technique in accordance with ASTM D 2657 and the manufacturer's recommendations.

B. HDPE to Metal Pipe: Make joints between HDPE and metal pipe with flanges.

C. Screwed Joints: Do not mar or damage threaded surfaces of pipe and fittings. Apply thread sealant suitable for the service to male threads only.

3.04 PIPE FITTINGS

A. Make all changes in size and direction of steel and HDPE piping with standard fittings.

B. Where branch piping is the same size as the main piping, tees shall be used.

C. Use eccentric reducing couplings where required to bring tops or bottoms of pipe in line to prevent water or air pockets.

D. Thoroughly purge existing pipe of all hazardous material prior to cutting.

3.05 CONNECTIONS

A. Install unions in piping 2-inch and smaller at the final connection to each piece of equipment and plumbing fixture, and where otherwise indicated on the drawings.

B. Install flanges in piping 2 1/2-inch and larger, at the final connection to each piece of equipment and plumbing fixture, and where otherwise indicated on the drawings.

C. Provide flanges or unions to equipment and control valves to facilitate dismantling. Arrange connections so that the equipment being served may be removed without disconnecting other piping.

D. Install all piping at design line size with any change in size being made at the equipment being serviced.

E. Balancing valves shall be marked and locked in position after balancing.

3.06 PIPE SLEEVES AND ESCUTCHEONS

A. Sleeves

1. All new pipe openings through walls and slabs shall have sleeves with internal diameter at least 2-inches larger than the outside diameter of uninsulated lines, or of the insulation. Sleeve shall not be used to support pipe.

2. Install sleeves through interior walls and partitions flush with finished surfaces; sleeves through outside walls shall project 1/2" on outside of walls and be flush with inside finished surface; and floor sleeves shall project 2" above finished floors.

3. Set sleeves securely in place before pouring concrete.

4. Fill the space between outside of pipe or insulation and the inside of the sleeve with fiberglass.

B. Escutcheons: Install escutcheons on both sides of the penetration for all pipes exposed to view passing through walls, floors, ceilings and partitions whether or not insulated. Escutcheons shall fit over the sleeve tight to the pipe.

3.07 CLEANING AND TESTING

A. Flushing and Cleaning: Prior to operations all piping systems shall be flushed clean.

B. Pressure Tests

1. Pressure testing shall be performed prior to installation of heat tracing and insulation and covering pipes with soil.

2. Contractor shall notify Engineer of date and time of pressure tests at least 48 hours prior to executing tests. Engineer may observe tests to verify tightness.

3. In general, pressure tests shall be applied to piping only before connection of fixtures, equipment and appliances. In no case shall any piping, fixtures, equipment or appliances be subjected to pressures exceeding their rating.

4. Blank off or remove diaphragm valves, relief valves, pumps, traps, instruments and automatic valves, which may be damaged by test pressure. Open, but do not back-seat all valves.

5. All defective work shall be repaired or replaced, and the tests shall be repeated.

6. Pressure testing shall be performed by maintaining an internal water pressure of 125 psi for a period of three hours. Before applying the specified test pressure, all piping shall be flushed and all air expelled from pipe. While piping system is pressurized all joints shall be inspected with an acceptable leak detection fluid. Any leaks that occur shall be repaired to the satisfaction of the Engineer and pressure testing repeated until pipe is accepted by Engineer.

7. The use of caulking or other temporary fixers, etc., to stop leaks is not permitted.

END OF SECTION

SECTION 15100
VALVES

PART 1 GENERAL

1.01 SUMMARY

Section includes furnishing and installing all valves and accessories required in pipeline work.

1.02 RELATED SECTIONS

Section 15060.

1.03 QUALITY ASSURANCE

A. Comply with ASME B31.9 for building services piping and ASME B31.3 for process piping.

B. Comply with the various MSS (Manufacturers Standardization Society of the Valves and Fittings Industry) standard practices referenced.

1.04 SUBMITTALS

Product data, including body material, valve design, pressure and temperature classification, end connection details, sealing materials, trim material and arrangement, dimensions and required clearances, and installation instructions.

1.05 DELIVERY, STORAGE AND HANDLING

A. During loading, transporting and unloading, exercise care to prevent damage to materials.

B. Do not drop valves or fittings.

C. Store valves on-site in enclosures or under protective coverings.

D. Keep valves clean and dry.

E. Do not store valve directly on the ground.

PART 2 PRODUCTS

2.01 GENERAL VALVE FEATURES

A. Pressure and temperature ratings: As scheduled and required to suit system pressures and temperatures.

B. Sizes: Same size as upstream pipe, unless otherwise indicated.

C. Operators

1. Hand-wheels, fastened to valve stem, for valves other than quarter-turn.

2. Lever handles, on quarter-turn valves 6-inch and smaller.

D. Extended stems: Where insulation is indicated or specified, provide extended stems arranged to receive insulation.

E. End connections: As indicated in the valve specifications.

1. Threads: Comply with ANSI B1.20.1.

2. Flanges: Comply with ANSI B16.1 for cast iron, ANSI B16.5 for steel and ANSI B16.24 for bronze.

F. Equivalent products may be substituted for products listed after review and approval by Engineer.

2.02 BALL VALVES

A. Ground-water and Air Piping

1. Neles-Jamesbury, Type 3000, 316 stainless steel, screwed-end ball valves or engineer approved equal.

2.03 PRESSURE RELIEF VALVE (PSV 1-2)

A. Farris, series 1850, stainless steel construction, or engineer approved equal. Valve shall be set at an initial pressure of 105 psi.

2.04 PRESSURE REDUCING VALVE (PCV-1-1)

A. Parker Fluidpower air line regulator 08R713A equipped with pressure gauge P781642 or engineer approved equal.

2.05 CHECK VALVES

A. Keystone 3/4-inch swing check valves, all stainless steel construction or engineer approved equal.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine valve interior through the end ports for cleanliness, freedom from foreign matter and corrosion. Remove special packing material, such as blocks to prevent disk movement during shipping and handling.

B. Actuate valve through an open-close and close-open cycle. Examine functionally significant features, such as guides and seats made accessible by such actuation. Following examination, return valve closure member to shipping position.

C. Examine threads on both the valve and the mating pipe for form (i.e., out-of-round or local indentation) and cleanliness.

D. Examine mating flange faces for conditions which might cause leakage. Check bolting for proper size, length and material. Check gasket material for proper size material composition suitable for service, and freedom from defects and damage.

E. Prior to valve installation, examine the piping for cleanliness, freedom from foreign materials and proper alignment.

F. Replace defective valves with new valves.

3.02 VALVE END SELECTION

Select valves with the following ends or types of pipe/tube connections unless otherwise indicated:

A. Stainless Steel Pipe: N.P.T. threaded ends.

3.03 VALVE INSTALLATION

A. Valves shall be installed at points shown and specified. Valves shall be installed with neat appearance and grouping, so all parts are easily accessible and maintained. Provide separate support where necessary.

B. Install valves in horizontal piping with stem at or above the center of the pipe.

C. Install valves in a position to allow for full stem movement.

D. Installation of check valves:

1. Swing Check valves: Horizontal position with hinge pin level.

3.04 THREADED CONNECTIONS

A. Align threads at point of assembly.

B. Apply appropriate tape or thread compound to the external pipe threads (except where dry seal threading is specified).

C. Assemble joint, wrench tight. Wrench on valve shall be on the valve end joint into which pipe is being threaded.

3.05 FLANGED CONNECTIONS

A. Align flanged surfaces parallel.

B. Assemble joints by sequencing bolt tightening to make initial contact of flanges and gaskets as flat and parallel as possible. Use suitable lubricants on bolt threads. Tighten bolts gradually and uniformly using a torque wrench.

3.06 FIELD QUALITY CONTROL

Tests: After piping systems have been tested and put into service, but before final adjusting and balancing, inspect each valve for leaks. Adjust or replace packing to stop leaks. Replace valve if leak persists.

3.07 ADJUSTING AND CLEANING

A. Check and adjust valves for smooth operation.

B. Clean mill scale, grease and protective coating from exterior of valves and prepare valves to receive finish painting or insulation.

END OF SECTION

SECTION 15190
MECHANICAL IDENTIFICATION

PART 1 GENERAL

1.01 APPLICABLE PUBLICATION

A. The following reference standards of the issue listed below, but referred to thereafter by basic designation only, forms a part of this specification to the extent indicated by the reference thereto:

1. Federal Standard (Fed. Std.):
No. 595a and Change Notices 2, 3, 4, 5, 6, 7, 8 & Errata

2. ANSI A13.1-1981 Scheme for the Identification of Piping Systems

PART 2 PRODUCTS

2.01 BANDS AND LEGENDS

A. Band and legend dimensions for the various pipe sizes shall be in accordance with Table I. Legends and colors of band and legend letters shall be in accordance with Table II. Upper case letters and arabic numerals shall be used for the legends. The maximum system supply pressures and temperatures shall be inserted in the legends where indicated. Legends shall be placed so as to be easily read from operating positions. Arrows shall be provided adjacent to legends to indicate the direction of flow of materials under normal operating conditions.

2.02 COLORS

A. The colors referred to in Table II shall match the color chips in Fed. Std. 595, as identified by number in the color schedule below. If the base paints do not match the color chips, they shall be mixed with the proper colors in oil to obtain matching required. All color matching shall be subject to approval.

Color Schedule

Color	No. of Fed. Std. 595
Red	11105
Yellow	13655
Black	17038
White	17875
Green	14260
Blue	15102

2.03 PIPE MARKERS

A. Pipe markers of pressure sensitive tape material designed for permanent adhesion to covered and uncovered pipe surfaces may be furnished in lieu of the painted bands and legends herein before specified. Sizes, colors and legends for tape markers shall be the same as specified for painted bands and legends. Any cleaning or precovering materials that may be necessary to ensure permanent adhesion of markers to piping shall be provided. Pipe markers shall be the standard product of a manufacturer regularly engaged in the manufacture of such products and shall essentially duplicate markers that have been satisfactorily used for at least two years in comparable installations.

2.04 IDENTIFICATION TAGS

A. Identification tags for valves, equipment and pipes which are too small for application of bands and legends shall be provided. Tags shall be made of 18 gauge brass, not less than 1-1/2 inch in diameter with depressed black figures 1/2-inch high. Tag lettering for valves and equipment shall be according to identification numbers shown on the Process and Instrumentation Diagram (P&ID). Tag lettering for pipes shall be as specified for bands and legends.

PART 3 EXECUTION

3.01 ITEMS TO BE IDENTIFIED

A. All piping valves and equipment in mechanical equipment areas, except that which is installed in inaccessible locations such as partitions, walls and floors, and that which is buried underground, shall be identified with bands, legends and tags as hereinafter specified. Bands and legends shall be applied to piping at the following locations:

1. Adjacent to each valve.

2. Each branch and riser at take-off.

3. At each pipe passage through wall or floor.

4. At not more than 40 feet spacing on straight pipe runs.

5. At each change in direction.

6. Inside each well vault.

7. At each outside, aboveground pipe.

8. Each valve and piece of equipment shall be tagged or labeled according to its identification number shown on the P&ID.

9. Where pipes are too small for application of bands and legends, identification tags, as hereinafter specified, shall be used.

3.02 BANDS AND LEGENDS

A. Bands and legends shall be painted on the pipe or pipe covering (or may be pressure sensitive tape pipe markers at the option of the Contractor). Band painting shall be a minimum of two coats of paint. Where piping is not required to receive general painting, a band prime coat followed by a finish coat shall be applied. Piping which has been coated with asphalt varnish shall have the coat removed with solvents or other means for the extent of the required band dimensions. Legends and arrows shall be applied over bands with one or two coats of finish paint as required to obtain complete hiding.

TABLE I - BAND SIZING

Outside Diameter of Pipe or Pipe Covering	Minimum Width of Color Band	Size and Legend Letters and Numerals
3/4 to 1-1/4 inch	8 inch	1/2 inch
1-1/2 to 2 inch	8 inch	3/4 inch
2-1/2 to 6 inch	12 inch	1-1/4 inch

TABLE II - PIPE LABELS

Material	Band Colors	Letter (Colors)	Legend
Compressed Air Header	Yellow	Black	Compressed Air
Ground-water Discharge	Yellow	Black	Ground-water
PTW-1 Compressed Air Supply	Yellow	Black	PTW-1 Air
PTW-1 Bubbler Air	Yellow	Black	PTW-1 Level
MW-1-1 Compressed Air Supply	Yellow	Black	MW-1-1 Air
MW-1-1 Bubbler Air	Yellow	Black	MW-1-1 Level
MW-1-2 Compressed Air Supply	Yellow	Black	MW-1-2 Air
MW-1-2 Bubbler Air	Yellow	Black	MW-1-2 Level
MW-1-3 Compressed Air Supply	Yellow	Black	MW-1-3 Air
MW-1-3 Bubbler Air	Yellow	Black	MW-1-3 Level

END OF SECTION

SECTION 15250
MECHANICAL INSULATION

PART 1 GENERAL

1.01 SUMMARY

A. This section includes furnishing and installing mechanical insulation for exposed outdoor aboveground piping and equipment and as indicated on the drawings.

1.02 QUALITY ASSURANCE

A. Manufacturer's qualifications: Firms regularly engaged in manufacture of mechanical insulation products, of types and sizes required.

1.03 SUBMITTALS

A. Submit under the provisions of Section 01300 the following product data:

1. Manufacturer's technical product data and installation instructions for each type of mechanical insulation.

2. Schedule showing manufacturer's product number, k-value, thickness and furnished accessories for each mechanical system requiring insulation.

1.04 DELIVERY, STORAGE AND HANDLING

A. Deliver insulation, coverings, cements, adhesives and coating to site in containers with manufacturer's stamp or label, affixed showing fire hazard indexes of products.

B. Protect insulation against dirt, water and chemical and mechanical damage. Do not install damaged or wet insulation; remove from project site.

PART 2 PRODUCTS

2.01 OUTDOOR PIPING INSULATION MATERIALS

A. Outdoor aboveground piping insulation materials shall be 1-inch thick Foamglass insulation covered with aluminum jacketing. Acceptable manufacturer and product description: Pittsburgh Corning Foamglass insulation with aluminum jacket, or approval equivalent.

PART 3 EXECUTION

3.01 INSPECTION

A. Notify engineer to inspect installation of the pipe prior to installing insulation. Engineer will also inspect proper installation after insulation and aluminum jacketing is installed.

B. Pipes shall be identified in accordance with Section 15190 before being insulated.

3.02 INSTALLATION OF PIPING INSULATION

A. The following sections of pipe, including valves, fittings and appurtenances, require insulation as noted:

1. All outdoor aboveground piping.

B. Install all insulation in accordance with manufacturer's instructions and recognized industry practices to ensure that insulation serves intended purpose.

C. Apply insulation to clean, dry pipe or tubing. Cover valves, fittings and similar items with equivalent thickness of insulation applied to adjoining pipe run. Maintain integrity of jackets on pipe insulation.

END OF SECTION

APPENDIX B

RECORD OF DECISION

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION IV

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

JUN 24 1993

4WD-SSRB

RECEIVED

JUN 28 1993

ENVIRONMENTAL AFFAIRS

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Mr E. H. Hurst
Bridgestone/Firestone, Inc.
Akron, Ohio 44317

RE: Transmitting a signed Copy of the Record of Decision addressing contamination at the Firestone Tire and Rubber Superfund Site located in Albany, Georgia.

Dear Mr. Hurst:

Per your request, enclosed is a signed copy of the Record of Decision addressing contamination at the Firestone Tire and Rubber Superfund Site located in Albany, Georgia. As discussed in previous telephone conversations, within the next few days, EPA will be issuing Remedial Design/Remedial Action Special Notice Letters to provide the Potentially Responsible Parties an opportunity to participate in the negotiations for the implementation of the Record of Decision.

If you have any questions, please do not hesitate to call me at (404) 347-2643.

Sincerely,

Charles L. King Jr

Charles L. King Jr.
Remedial Project Manager
South Superfund Remedial Branch

Enclosure

CC: Bill Mundy, GEPD w/encl
Don McHugh, GEPD w/encl
Tom Thomas, Woodward-Clyde w/encl
Richard Jeng, HQ/OWPE w/encl

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APR 28 1993
ENVIRONMENTAL AFFAIRS

DECLARATION of the RECORD OF DECISION

SITE NAME AND LOCATION

Firestone Tire & Rubber Company Site
Albany, Dougherty County, Georgia

STATEMENT OF BASIS AND PURPOSE

This decision document(Record of Decision), represents the selected remedial action for the Firestone Tire & Rubber Company "Site", Albany, Dougherty County, Georgia, developed in accordance with the requirements of the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization act of 1986 (SARA) 42 U.S.C. Section 9601 et seq., and to the extent practicable, the National Contingency Plan (NCP) 40 CFR Part 300.

This decision is based on the administrative record for the Site.

The State of Georgia concurs with the selected remedy.

ASSESSMENT OF THE SITE

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

DESCRIPTION OF SELECTED REMEDY

This final remedy addresses remediation of soils and groundwater contamination by eliminating or reducing the risks posed by the Site, through treatment, engineering and institutional controls.

The major components of the selected remedy include:

Excavation of PCB-contaminated soils until established cleanup levels are reached with disposal in an off-site permitted landfill.

Backfilling the excavated areas with clean fill material.

Extraction and treatment of contaminated groundwater using existing wells and supplemental wells if necessary. The contaminated groundwater will be remediated using on-site air stripping.

Discharge of extracted groundwater after treatment to the Local Waste Water Treatment System (Publicly Owned Treatment Works - POTW).

Periodic groundwater monitoring will be conducted to assess the effectiveness of the remedy.

Institutional controls will be placed on well construction and water use on the Site.

STATUTORY DETERMINATIONS

The selected remedy is protective of human health and the environment, complies with federal and state requirements that are legally applicable or relevant and appropriate, and is cost-effective. This remedy utilizes permanent solutions and alternative treatment (or resource recovery) technologies to the maximum extent practicable and satisfies the statutory preference for remedies that employ treatment that reduces toxicity, mobility, or volume as a principal element. Because this remedy will result in hazardous substances remaining on-site above health-based levels, a review will be conducted at least every five years beginning no later than five years from commencement of remedial action to ensure that the remedy continues to provide adequate protection of human health and the environment. Reviews may be conducted on a more frequent basis as EPA deems necessary.

Patrick M Tobin 6-24-93

Patrick M. Tobin,
Acting Regional Administrator DATE

RECORD OF DECISION
SUMMARY OF REMEDIAL ALTERNATIVE SELECTION

FIRESTONE TIRE & RUBBER COMPANY SITE
ALBANY, GEORGIA

PREPARED BY:
U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION IV
ATLANTA, GEORGIA

TABLE OF CONTENTS

1.0 SITE LOCATION AND DESCRIPTION 1
1.2 SURFACE FEATURES..... 1
1.3 CLIMATE AND METEOROLOGY 4
1.4 SURFACE WATER HYDROLOGY 4
1.5 GEOLOGY 5
1.6 HYDROGEOLOGY 6
1.7 DEMOGRAPHY 9
1.8 ECOLOGY 10

2.0 SITE HISTORY AND ENFORCEMENT ACTIVITIES 10

3.0 HIGHLIGHTS OF COMMUNITY PARTICIPATION 12

4.0 SCOPE AND ROLE OF RESPONSE ACTION 13

5.0 SUMMARY OF SITE CHARACTERISTICS 13
5.1 NATURE AND EXTENT OF CONTAMINATION 13
5.1.1 CONFIRMATORY SAMPLING OF THE FORMER INTERIOR PCB TRANSFORMER LOCATIONS 14
5.1.2 GROUNDWATER SAMPLING 14
5.1.3 SURFACE WATER SAMPLING 23
5.1.4 SURFACE SOIL SAMPLING 23
5.1.5 SUBSURFACE SOIL SAMPLING 23
5.1.6 SEDIMENT SAMPLING 33
5.1.7 CONFIRMATORY SAMPLING OF FORMER COURTYARD PCB TRANSFORMERS..... 33

6.0 SUMMARY OF SITE RISKS 33
6.1 CONTAMINANTS OF CONCERN 35
6.2 EXPOSURE ASSESSMENT 47
6.3 TOXICITY ASSESSMENT 55
6.4 RISK CHARACTERIZATION 59
6.5 ENVIRONMENTAL RISK 60

7.0 DESCRIPTION OF CLEANUP ALTERNATIVES 62
7.1 ALTERNATIVES FOR GROUNDWATER REMEDIATION 62
7.2 ALTERNATIVES FOR SOIL REMEDIATION 64

8.0 SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES 65
8.1 OVERALL PROTECTION OF HUMAN HEALTH & THE ENVIRONMENT 66
8.2 COMPLIANCE WITH ARARs 67
8.3 LONG-TERM EFFECTIVENESS & PERMANENCE 68
8.4 REDUCTION OF TOXICITY, MOBILITY OR VOLUME 68
8.5 SHORT-TERM EFFECTIVENESS 69
8.6 IMPLEMENTABILITY 69
8.7 COST 69
8.8 STATE ACCEPTANCE 70
8.9 COMMUNITY ACCEPTANCE 70

9.0 THE SELECTED REMEDY 70
9.1 PERFORMANCE STANDARDS 70

10.0 STATUTORY DETERMINATIONS 73
10.1 PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT 73
10.2 COMPLIANCE WITH ARARs 74
10.3 COST EFFECTIVENESS 76
10.4 UTILIZATION OF PERMANENT SOLUTIONS 76
10.5 PREFERENCE FOR TREATMENT AS A PRINCIPAL ELEMENT 76

APPENDIX A - RESPONSIVENESS SUMMARY 77

LIST OF TABLES

TABLE 5-1 SUMMARY OF CONTAMINANTS FOUND IN GROUNDWATER 19

TABLE 5-2 CONTAMINANTS FOUND IN SURFACE AND SUBSURFACE SOILS 24

TABLE 5-3 CONTAMINANTS FOUND IN SEDIMENTS 28

TABLE 5-4 CONTAMINANTS FOUND IN SURFACE WATER 31

TABLE 6-1 CONCENTRATIONS OF CONTAMINANTS FOUND IN GROUNDWATER RESIDUUM WELLS 36

TABLE 6-2 CONCENTRATIONS OF CONTAMINANTS FOUND IN GROUNDWATER UPPER OCALA 37

TABLE 6-3 CONCENTRATIONS OF CONTAMINANTS FOUND IN GROUNDWATER LOWER OCALA 38

TABLE 6-4 CONCENTRATIONS OF CONTAMINANTS FOUND IN SOILS SURFACE SOILS (0-1 FT) 40

TABLE 6-5 CONCENTRATIONS OF CONTAMINANTS FOUND IN SOILS SUBSURFACE SOILS (3-30 FT) 41

TABLE 6-6 CONCENTRATIONS OF CONTAMINANTS FOUND IN SEDIMENTS SHALLOW SEDIMENTS (0-1 FT)..... 43

TABLE 6-7 CONCENTRATIONS OF CONTAMINANTS FOUND IN SEDIMENTS SUB-SURFACE SEDIMENTS (2-3 FT) 44

TABLE 6-8 CONCENTRATIONS OF CONTAMINANTS FOUND IN SURFACE WATER 45

TABLE 6-9 EXPOSURE & INTAKE PARAMETERS ASSESSING INGESTION AND DERMAL EXPOSURE TO SOIL BY WORKERS 49

TABLE 6-10 EXPOSURE & INTAKE PARAMETERS ASSESSING INGESTION AND DERMAL EXPOSURE TO SEDIMENT AND SURFACE WATER BY WORKERS 50

TABLE 6-11 EXPOSURE & INTAKE PARAMETERS ASSESSING INHALATION EXPOSURE TO PARTICLE AND VAPOR PHASE CHEMICALS BY WORKERS 51

TABLE 6-12 EXPOSURE & INTAKE PARAMETERS ASSESSING INGESTION OF GROUNDWATER, INHALATION OF VOCs IN THE GROUNDWATER AND DERMAL CONTACT WITH GROUNDWATER BY POTENTIAL FUTURE ON-SITE RESIDENTS 52

TABLE 6-13 EXPOSURE & INTAKE PARAMETERS ASSESSING INGESTION DERMAL EXPOSURE TO SURFACE SOIL FOR POTENTIAL FUTURE ON-SITE RESIDENTS 53

TABLE 6-14 EXPOSURE & INTAKE PARAMETERW ASSESSING INHALATION EXPOSURE TO VOLATIZED SOIL CHEMICALS AND ENTRAINED SOIL PARTICLES FOR POTENTIAL FUTURE ON-SITE RESIDENTS 54

TABLE 6-15 CHRONIC REFERENCE DOSES AND CANCER SLOPE FACTORS FOR CONTAMINANTS OF CONCERN 56

TABLE 6-16 SUMMARY OF CANCER RISK AND NON-CARCINOGENIC HEALTH HAZARD ESTIMATES AND MEDIA FOR WHICH REMEDIATION GOALS ARE DERIVED 61

LIST OF FIGURES

FIGURE 1-1 LOCATION MAP 2

FIGURE 1-2 FACILITY MAP (SITE FEATURES) 3

FIGURE 1-3 GEOHYDROGEOLOGY OF THE ALBANY, GEORGIA AREA 7

FIGURE 5-1 RI SAMPLING LOCATIONS 15

FIGURE 5-2 CONTAMINANTS IDENTIFIED IN THE RESIDUUM ... 16

FIGURE 5-3 CONTAMINANTS IDENTIFIED IN THE TRANSITION ZONE 17

FIGURE 5-4 CONTAMINANTS IDENTIFIED IN THE UPPER OCALA 18

Decision Summary
Record of Decision

Firestone Tire & Rubber Company Site
Albany, Georgia

1.0 SITE LOCATION AND DESCRIPTION

The Firestone Tire & Rubber Company Site("Site") is located at 3300 Sylvester Road in Albany, Dougherty County, Georgia. The City of Albany is located in Dougherty County in the southwest portion of Georgia. The Site is located approximately one mile east of Albany city limits (Figure 1-1). The Firestone facility was used for manufacturing tires from 1968 to 1986 within a 1,840,000 ft^2 on-site building. In October 1989, the facility was placed on the National Priorities List ("NPL") as a result of environmental investigations conducted at the Site. Except for cleanup activities, the Site remained inactive between 1986 and March 1990, at which time Cooper Tire purchased the facility and began renovations for future operations.

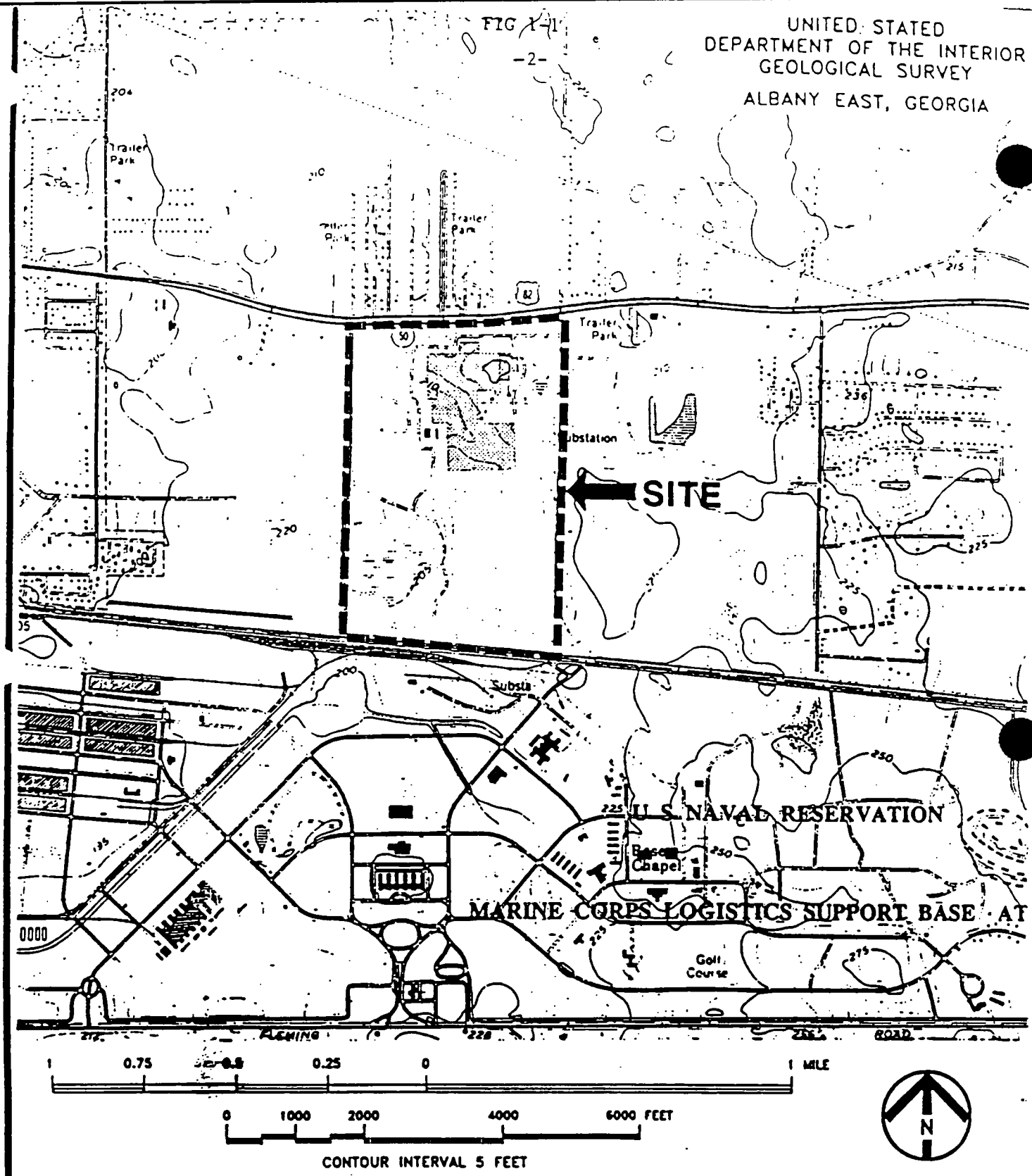
Along the eastern property line of the Site lies vacant land, which was formerly used for agricultural purposes. Immediately to the north of the Site is Sylvester Road, a four-lane highway (U.S. Route 82). North of Sylvester Road are eight mobile home parks and three commercial retail sites, including a flea market and a gas station. Along the western property line are a church, a tree farm and vacant land. The southern property line lies along the Seaboard Coastline railroad tracks. A railroad spur along the east side of the Site, which served the facility's shipping and receiving operations, is connected to the Seaboard Coastline railroad at the southeast corner of the Site. To the south of the Site, beyond the railroad right-of-way, lies the U.S. Marine Corps Logistics Base which has also been identified as a Superfund Site.

The facility is currently zoned as an industrial/commercial area, according to the Dougherty County Planning Commission. The primary source Area of Contamination addressed in this Record of Decision ("ROD") is located in the courtyard area (Figure 1-2). However, certain chemicals have been dispersed throughout the Site.

1.2 SURFACE FEATURES

The Firestone Site is located in the Dougherty Plain district of the Coastal Plain physiographic province. The land displays level or gently undulating topography, with measurements at the Site indicating ground surface elevations ranging from approximately 200 to 220 ft above mean sea level (MSL). The composition of the soils range from well-drained sands to poorly

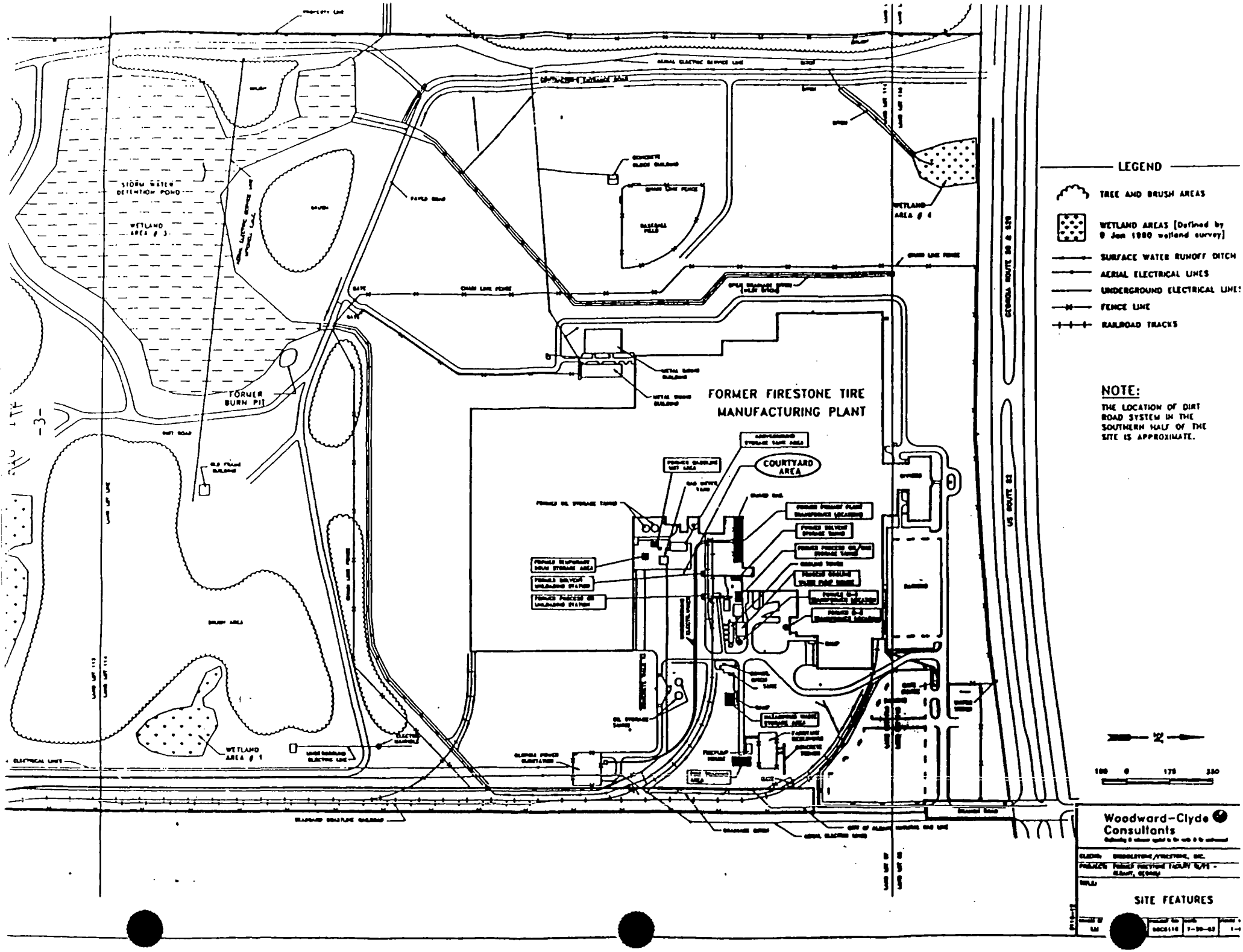
UNITED STATED
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
ALBANY EAST, GEORGIA



GENERAL LOCATION MAP
FORMER FIRESTONE FACILITY - ALBANY, GEORGIA

DRAWN BY: REM	CHECKED BY: MJM	PROJECT NUMBER: 90C6116	DATE: 7-29-92	FIGURE NO: 1-1

Woodward-Clyde
Consultants


LEGEND
TREE AND BRUSH AREAS
WETLAND AREAS (Defined by 9 Jan 1980 wetland survey)
SURFACE WATER RUNOFF DITCH
AERIAL ELECTRICAL LINES
UNDERGROUND ELECTRICAL LINES
FENCE LINE
RAILROAD TRACKS
NOTE:
THE LOCATION OF DIRT ROAD SYSTEM IN THE SOUTHERN HALF OF THE SITE IS APPROXIMATE.
FORMER FIRESTONE TIRE MANUFACTURING PLANT
COURTYARD AREA
STORM WATER DETENTION POND
WETLAND AREA # 3
WETLAND AREA # 4
WETLAND AREA # 1
FORMER BURN PIT
BRUSH AREA
GEORGIA ROUTE 30 & 520
US ROUTE 82
Woodward-Clyde Consultants
SITE FEATURES

drained soils in ponded depressional areas. Most of the surface soils at the Site are either sandy loams or loamy sands.

The Dougherty Plain is characterized by Karst topography and contains numerous shallow flat-bottomed or rounded sinkholes caused by solutioning and collapse of the underlying limestone. Many of the sinkholes are filled with material of relatively low permeability and some hold water year round. At the Site, the storm water detention pond is a natural pond delineated as Wetland Area No. 3, and is likely to be the surface expression of a sinkhole (Figure 1-2).

1.3 CLIMATE AND METEOROLOGY

Southern Georgia has a warm temperate humid climate due to its latitude and proximity to the Atlantic Ocean and the Gulf of Mexico. The mean total annual precipitation for Albany is about 50 in. The annual mean monthly temperature is about 66°F with mean daily minimum temperatures ranging from approximately 37°F in January to 71°F in July and mean daily maximum temperatures ranging from approximately 60°F in January to approximately 92°F in July and August.

According to data obtained from the National Climate Data Center, no predominant wind direction exists in the Albany area. Winds in the area are calm approximately 23 percent of the time.

1.4 SURFACE WATER HYDROLOGY

The Firestone Site can be characterized as containing both well-drained areas and poorly-drained areas. The well-drained areas include the manufacturing plant area, where roof and parking lot drains discharge storm water directly into ditches, and other areas where the slope is significant to control surface water runoff. Poorly drained areas include some of the wetland areas on the Site.

The ditches and ponds have been observed to completely dry up during periods without precipitation, therefore the surface water hydrology at the Site is influenced mainly by storm events. After a significant storm event, rain falling onto the north half of the Site infiltrates into the ground and/or collects in two main ditches: the East Ditch and the West Ditch. The East and West Ditches also receive storm water from areas north, east and west of the Site. These off-site areas include Sylvester Road and nearby residential/ commercial areas. These ditches flow from north to south and empty into a storm water detention pond (Wetland Area No. 3). The water then flows through the pond to the only outlet located at the west end of the pond. From the

pond, the storm water flows through underground storm water pipes, ditches and canals and ultimately discharges to the Flint River. The Flint River converges with the Apalachicola River, which discharges to the Gulf of Mexico.

Rain falling on the southern half of the Site basically flows to one of several wetland areas present in the south. The railroad bed of the Seaboard Coastal Railroad acts as a barrier for surface water entering or leaving the Site from the south. The bed is elevated above normal ground surface and two drainage ditches parallel each side of the railroad bed. Figure 1-2 shows the surface water hydrology of the Site.

1.5 GEOLOGY

The Firestone Site is underlain by Coastal Plain sedimentary strata of pre-Cretaceous to Quaternary age. In general, the strata consist of alternating units of sand, clay, sandstone, dolomite, and limestone that dip gently and thicken in a southeastern direction. The site specific geologic units of interest consist of the Residuum, the Upper Ocala Limestone, and the Lower Ocala Limestone.

The lithology of the Residuum varies across the Site, but can generally be described as sandy clay to clayey sand. Colors also vary and have been identified to include red, brown, yellow, gray, purple, and white. The base of the Residuum unit gradates into the underlying Ocala Limestone and a distinct contact is not present between the two formations. Varying quantities of clay and weathered limestone fragments with traces of dolomitic rocks have been identified near the base of the Residuum.

The Residuum is underlain by the Ocala Limestone which is typically white to tan and grades from a highly weathered, fine to coarse grained, fossiliferous, soft limestone into a less weathered, finer grained, less fossiliferous, more indurated limestone at depths ranging from approximately 130 to 150 ft bgs. The soft, more weathered limestone is referred to as the Upper Ocala and the more indurated limestone is considered to represent the Lower Ocala.

The contact between the Residuum and the Upper Ocala, often described as the Transition Zone, is usually very weathered. Relatively significant void spaces (4 to 10 ft thick) have been identified in the Lower Ocala just below the contact with the Upper Ocala. These void spaces are underlain by a clay filled layer, which is typical of Karst features. The clays are considered to restrict the downward flow of water and subsequently create solution cavities.

1.6 HYDROGEOLOGY

Aquifer Testing Program

An Aquifer Test Program consisting of three separate tests was performed in the Floridan Aquifer by Firestone as a part of the Remedial Investigation/Feasibility Study ("RI/FS"). Specifically, the tests were performed in the Ocala Limestone and overlying Residuum which comprise the Upper Floridan Aquifer at the Site. These test were intended to characterize the conditions and properties of the formations and are listed as:

(1) Single borehole (double-packer) test;
(2) Multi-well aquifer test; and
(3) Production well monitoring tests.

The purpose of the Aquifer Testing Program was to evaluate the hydrogeologic properties of the Ocala Formation and overlying Residuum and to assess the hydraulic connection between the Residuum, Upper and Lower Ocala Formations.

The objectives of the Aquifer Testing Program were to:

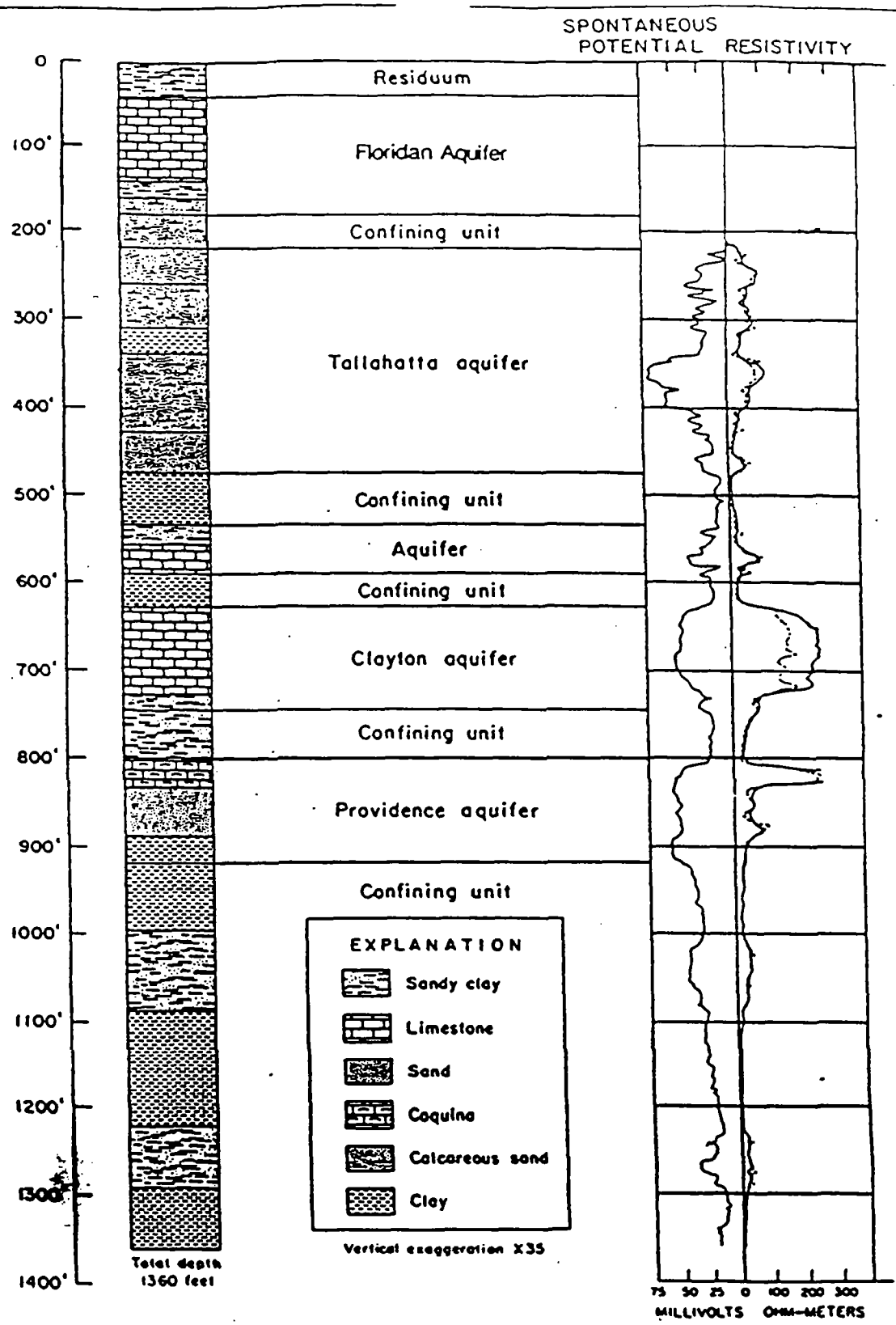
* Gather additional data to assess the rate and direction of groundwater flow in the water-bearing zones underlying the Site,

* Investigate the hydrological continuity between the permeable zones of the Ocala Formation and the overlying water-bearing zones of Residuum; and

* Gather additional data on the hydrogeologic properties (hydraulic conductivity, transmissivity, and yield) of the Ocala Formation underneath the Site.

The Aquifer Testing Program results were also used to evaluate the groundwater flow velocity and chemical migration, and to assess potential groundwater remedial alternatives during the Feasibility Study.

The two hydrogeologic water bearing units of interest at the Site consist of the Residuum and the underlying Floridian Aquifer, and have been referred to as the Residuum, Transition Zone, Upper and Lower Ocala Limestone at the Firestone Site (Figure 1-3). Hydrogeologic characterization was performed at the Site through evaluation of data generated from monitoring well installation in both units and aquifer testing performed in the Ocala Limestone. Groundwater elevation measurements were used to assess the



SOURCE: GEOHYDROLOGY OF THE ALBANY AREA, GEORGIA: HICKS, KRAUSE, AND CLARK, 1981

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CLIENT: BRIDGESTONE/FIRESTONE, INC.

PROJECT: FORMER FIRESTONE FACILITY RI/FS - ALBANY, GEORGIA

TITLE: REGIONAL HYDROSTRATIGRAPHIC UNITS

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groundwater flow trends and gradients beneath the Site. The aquifer testing was performed to determine the hydraulic properties of the Ocala Limestone in the vicinity of the courtyard.

The uppermost hydrostratigraphic unit is the Residuum. Water-saturated zones have not been encountered in the Residuum at the Site which indicates that the Residuum is not continuously saturated and the groundwater is confined in isolated permeable zones. The horizontal hydraulic conductivity was determined to have an average rate of $4x10^{-5}$cm/sec. The Residuum has been observed to possess strong downward vertical gradients with a rate ranging from approximately 0.7 to 1.9 ft/ft. It is likely that the strong vertical gradients are due to the unsaturated nature of the Residuum, continuous drainage and recharge of isolated zones, and regional downward flow components. Horizontal movement of groundwater within the Residuum is limited by the lack of continuous water-bearing zones and low horizontal hydraulic conductivity.

It was found that there is hydraulic heterogeneity in the Upper Ocala with calculated hydraulic conductivity values in the vicinity of $1x10^{-5}$cm/sec. The relatively low hydraulic conductivity of the Upper Ocala verifies its classification as a regional semi-confining unit for the Lower Ocala. The vertical gradients measured in the Upper Ocala across the Site were fairly constant and average 0.06 ft/ft. This information suggests that the downward movement of groundwater within the Upper Ocala is a result of regional stresses and natural recharge-discharge relationships. The average horizontal gradient was found to be approximately 0.002 ft/ft. The horizontal groundwater flow directions are somewhat variable; southwest-west flow directions are evident in the northeast corner of the Site, but are reversed in the southwest corner. Local variations in groundwater flow directions that are not consistent with regional directions are common in the upper portions of the Ocala. Undulations and depressions that have been identified at the bedrock surface of the Ocala, localized permeability changes, and water table mounding in the vicinity of the storm water detention pond may influence the groundwater flow patterns in the Upper Ocala at the Site.

The hydraulic conductivity of the Lower Ocala is estimated to be on the order of $3x10^{-1}$ cm/sec. This estimate is consistent with published literature describing prolific zones and potable water supplies within the lower portions of Ocala Limestone and is considerably greater than the range established for the overlying weathered materials characteristic of the Upper Ocala. The increased conductivity may be attributed to fracturing and more extensive dissolution in the Lower Ocala. The primary component of flow is horizontal with gradient of approximately 0.001 ft/ft

for the southwest portion of the Site. A relatively flat potentiometric surface has been identified across the remainder of the Site.

Recharge to the Residuum and the Ocala Limestone is primarily by infiltration of precipitation and flows vertically downward. The Residuum is leaky and provides recharge to the underlying Upper Ocala but at a limited rate. Horizontal movement in the Residuum is limited by the lack of continuous water bearing zones and low hydraulic conductivity.

1.7 DEMOGRAPHY

There are eight residential mobile home parks located directly north of the Site. Reportedly, there are a total of 250 units within these parks. Approximately, 956 people live directly north of the Site in Census Block 207 which includes, but is not limited to, these trailer parks. Additionally, within one mile of the Site, 70 people live north of Census Block 207. A large flea market is also located directly north of the Site which is open to the general public on Friday through Sunday.

Approximately 735 people live west of the Site and south of Sylvester Road within a one mile radius of the Site and approximately 340 people live west of Pine Bluff Road within one mile radius northwest of the Site.

Another residential area, north of Sylvester Road, is located approximately three miles east of the Site. There are approximately 140 residents in this area according to the 1990 Census. A mobile home park is located approximately one mile east of the Site, on Sylvester Road. According to the 1990 Census, 27 people live in ten housing units within this mobile home park. Commercial businesses east of the Site on Sylvester Road include two transportation and distribution companies. There is also a residential area less that a mile east of the Site. According to the 1990 Census, there are approximately 600 residents that live within this area.

The Seaboard Coastline Railroad separates the Site from the U.S. Marine Corps Logistics Base which is the largest industrial and residential complex located south of the Site. The Base employs approximately 2,700 civilians and provides housing for approximately 600 Marine families.

Sylvester Road Elementary School (408 students) is located approximately one mile west of the Site. In addition, two more elementary schools (1,145 students), a middle school (951 students), and a high school (1,034 students) are located approximately three miles west of the Site.

The Albany city hospital is located west of the Flint River more than three miles from the Site.

1.8 ECOLOGY

There are two distinct vegetation zones at the Site: a grassy area located on the northern half of the Site, and a wooded and wetland area located on the southern half of the Site.

The main grassy area that lies within the fenced area of the manufacturing plant and on the northern half of the Site is periodically mowed and predominantly contains Bahia grass. Some commonly occurring hydrophytic vegetation scattered throughout other grassy areas include reed grass, vasey grass, maidencane, sedges, rushes and mild water pepper.

The southern half of the Site consists of a mixed southern pine/hardwood forest and large wetland areas. The upland areas of the pine/hardwood forest consist mostly of young slash pine and live oak. Some sections of the upland area are barren or covered only with herbaceous plants including golden aster, honeysuckle, black raspberry and goldenrods. The wetland areas of the southern half contain such species as black willow, water oak, southern bayberry and cattail.

The fauna on and around the Site observed in August 1991 include, but is not limited to, mammals such as the white-tailed deer, raccoon, gray fox, gray squirrel and eastern cottontail rabbit; birds such as the common crow, mourning dove, bobwhite quail, turkeyvulture, killdeer, cattle egret, blue jay and mockingbird; reptiles such as the gopher tortoise; amphibians such as the green frog; and pond macro-invertebrates such as water boatmen, water striders and dragonflies.

Four rare species believed to inhabit Dougherty County by the Georgia Department of Natural Resources were not observed at the Site: the spotted bullhead, bluestripe shiner, hooded pitcher plant, and chafseed. However, the gopher tortoise, believed to be rare in some parts of southwestern Georgia, was spotted on the Site.

2.0 SITE HISTORY AND ENFORCEMENT ACTIVITIES

The Site is owned by the Albany-Dougherty Payroll Developement Authority. Under lease, the sole use of this Site by the former Firestone Tire & Rubber Company was the manufacture of pneumatic tires. Bridgestone/Firestone, Inc.("Bridgestone/Firestone") is the successor to Firestone Tire & Rubber Company (The names are used interchangeably throughout this ROD). Manufacturing at the facility was carried out from 1968 to 1986 within a 1,840,000 ft^2

building. Construction of the complex commenced in 1967 and several additions were built over the years. Bridgestone/Firestone, Inc. ceased operations at the Site in 1986. The Site was proposed for the NPL in June of 1988 and was finally included in October of 1989. EPA issued a Special Notice Letter to Bridgestone/Firestone in March of 1990, giving them an opportunity to conduct the RI/FS at the Site. The company entered into an Administrative Order on Consent (AOC) with EPA in 1990 to study the Site further and to evaluate possible actions to address any contamination found. Except for remedial activities discussed below, the Site remained inactive until March 1990, at which time Cooper Tire Company purchased the Bridgestone/Firestone, Inc. leasehold and began renovations for future operations.

In 1985, Bridgestone/Firestone, Inc., as a part of facility closure voluntarily initiated a study of possible contamination in soil, groundwater, and surface water. Based on the results of this assessment, a scope of work for further studies was defined. The study identified the courtyard and the burn pit as two major Areas of Contamination (AOCs). These areas are presented on Figure 1-2.

The area referred to as the courtyard is located on the eastern side of the plant and is enclosed by the manufacturing buildings on three sides. The courtyard was designed for shipping and material handling operations. Materials used in the manufacturing processes and general facility operations were delivered to the courtyard by both rail and roadway. Underground storage tanks, which were removed in interim cleanup actions in 1986, were formerly located in two areas of the courtyard. Transformers mounted on concrete pads were located in the Courtyard. Four above-ground fuel oil storage tanks remain on-site.

The second area of concern, the burn pit area, covers about 3,000 square feet near the intersection of the east drainage ditch and the storm water retention pond. The burn pit seems to have been built to collect runoff from a 6,000 gallon spill of anti-oxidant (Santoflex 13) in 1980. The fluid was later pumped into 55-gallon drums and stored adjacent to the pit. Later in 1980 this material and 65 partially rifled drums of liquid waste cement were burned as a fire training exercise.

Bridgestone/Firestone, Inc. took a series of interim cleanup measures, including additional groundwater monitoring to better define concerns identified in the 1985 study. The company presented descriptions of their past investigations to EPA in a Scoping Document submitted on October 7, 1990 as a preliminary remedial investigation report under the Administrative Order.

The cleanup actions and studies which Firestone conducted at the

Site consisted mainly of the following activities:

* Identified and analyzed soil and debris piles, and removed and disposed contaminated materials. Approximately 441 cubic yards (c.y.) of rubbish and debris and 105 c.y. of soil were taken to the Oxford Solid Waste Landfill in Albany during these general cleanup activities). Empty 5-gallon containers and a few 55-gallon drums were disposed at a regulated facility in Alabama.

* Studied PCB transformer leaks in interior of building, on the building, and in the courtyard; removed transformers, roof materials, and concrete pads; cleaned up areas surrounding former transformers and placed in a permitted facility.

* Installed monitoring wells in surficial aquifer and Upper Floridan Aquifer and collected soil samples in the courtyard to determine if the source area of the contamination would affect groundwater.

* Removed underground storage tanks (USTs).

* Studied burn pit/buried drum area, excavated the burn pit; removed and disposed of approximately 160 drums, which contained material similar to waste rubber cement and Banbury Sludge (material used to make tires/all material passed TCLP test), and contaminated soil and water; and collected samples to determine the adequacy of the cleanup.

* Identified areas of potential subsurface drum disposal which were evaluated by a magnetic survey, but no additional buried drums or waste material were identified.

* Sampled surface water and sediments in the storm water retention pond and drainage ditches flowing into the pond.

3.0 HIGHLIGHTS OF COMMUNITY PARTICIPATION

Public participation requirements in CERCLA Section 117 were met in the remedy selection process. The Community Relations Plan was finalized in 1991 for the Firestone Tire and Rubber Superfund Site. This document list contacts and interested parties throughout the government and the local community. The plan also establishes communication pathways to assure timely dissemination of pertinent information.

On August 1, 1991, EPA held a public information session to announce the start of the Firestone Site RI/FS. The RI/FS Workplan, Risk Assessment, Technical Memorandums, RI/FS Reports, Proposed Plan and any other documents EPA used to prepare a

preferred remedy were released to the public on December 30, 1992. The documents were made available to the public in both the administrative record docket and the information repository maintained at the EPA docket room at Region IV Headquarters in Atlanta, Georgia and at the Dougherty Public Library, 300 Pine Avenue in Albany, Georgia. A public comment period was held from December 30, 1992 to January 29, 1993.

Notices were placed in the Albany Herald newspaper on December 28, 1992, January 5 and 11, 1993 announcing the comment period. In addition to the public comment period and the administrative record files, a public meeting was held on January 12, 1993 at the Albany City Hall. At this meeting representatives from EPA and Georgia Enviromental Protection Division answered questions and addressed community concerns.

A response to all significant comments received during the public comment periods is included in the Responsiveness Summary (Appendix A), which is a part of this Record of Decision.

This decision document presents the selected remedial action for the Firestone Tire and Rubber Site, chosen in accordance with CERCLA, as amended by SARA and to the maximum extent practicable, the NCP. The decision for this Site is based on the administrative record. The requirements under Section 117 of CERCLA/SARA for public and state participation have been met for this remedy selection.

4.0 SCOPE AND ROLE OF RESPONSE ACTION

This ROD addresses contamination remaining in approximately 20 cubic yards of PCB contaminated soil and Volatile Organic Compounds (VOCs) in shallow groundwater (Residuum, Transition Zone and Upper Ocala) beneath the Firestone Site. The contaminated soils pose a threat to human health and the environment from possible ingestion (eating or drinking), inhalation (breathing) or dermal contact (through the skin). Also, the groundwater could pose a threat if it were to migrate off-site or be used as a water source in the future. The purpose of the selected remedy is to prevent current and future exposure to the contamination by treating the soil and groundwater to reduce movement of contaminants. This is the only ROD contemplated for the Site.

5.0 SUMMARY OF SITE CHARACTERISTICS

5.1 Nature and Extent of Contamination

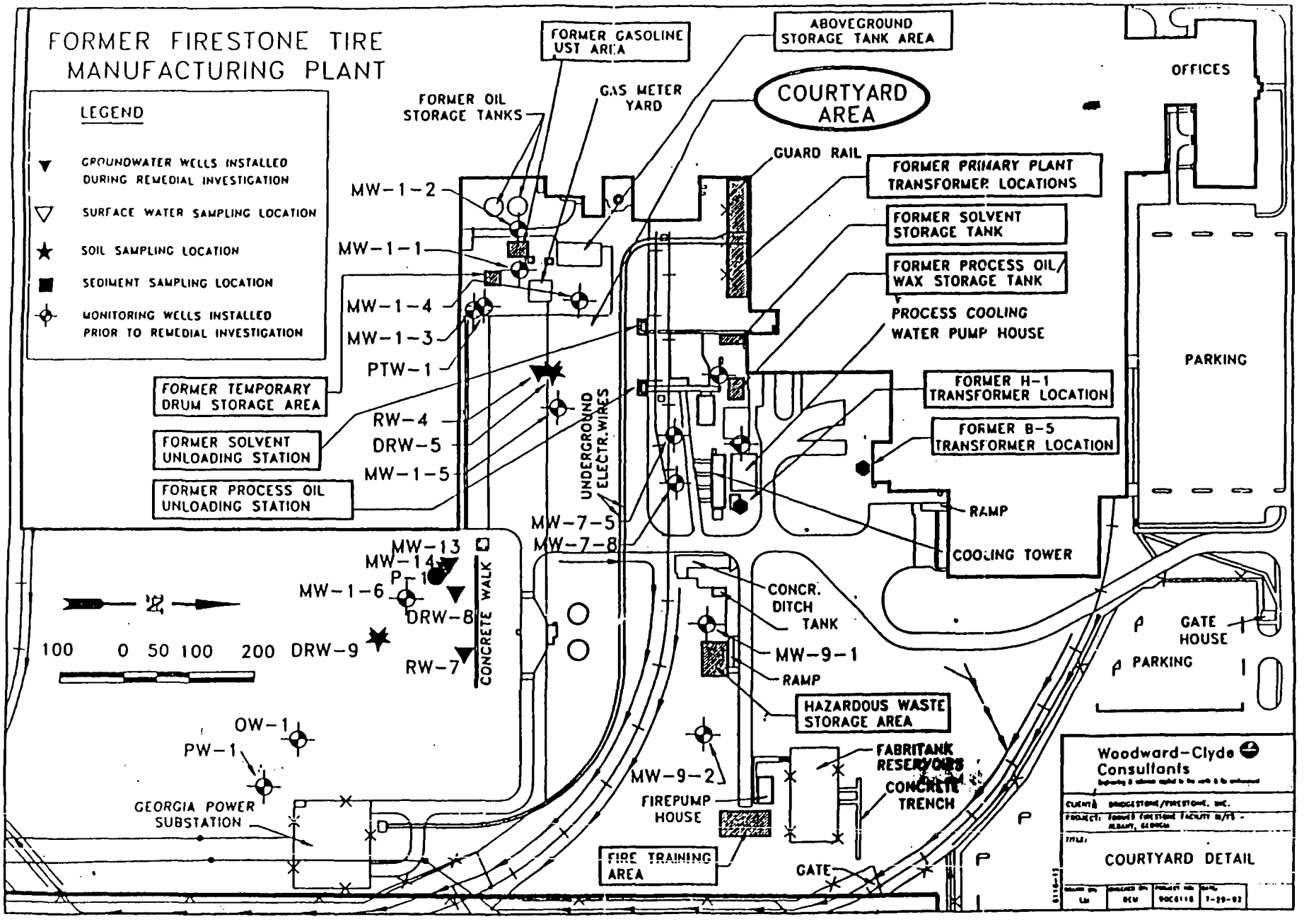
The following section provides a description of the nature and extent of the contamination found in each media during the RI.

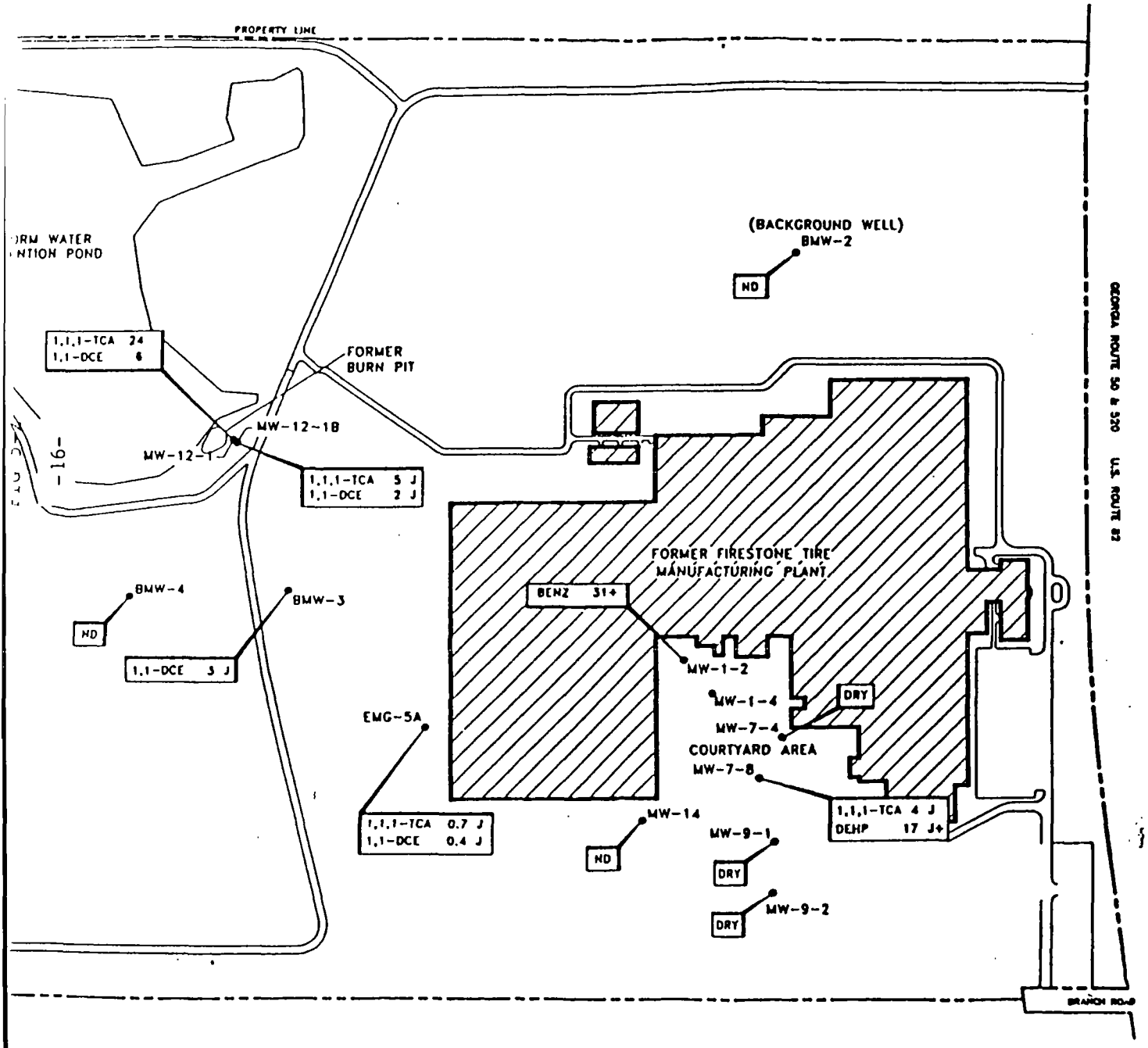
5.1.1. Confirmatory Sampling of the Former Interior PCB Transformer Locations

A total of 10 floor wipe samples were collected from interior transformer locations to verify that previous remedial activities had achieved the PCB target cleanup level of 10 ug/cm^2. The samples were collected in accordance with the FSAP and analyzed for PCBs. Sample results indicated that PCB concentrations for all areas were below detection limits.

5.1.2 Groundwater Sampling

A total of 17 groundwater wells and one piezometer were installed at depths ranging from 32-190 ft. A total of 46 groundwater samples were collected from the monitoring wells located throughout the Site, between August 14, through October 3, (Phase I), and December 9, through December 12 (Phase II), 1991. In addition to the groundwater samples, 9 duplicates, 4 matrix spikes and matrix spike duplicates (MS/MSD), 27 field blanks, 22 trip blanks and 2 equipment rinsate samples were collected as per FSAP and Quality Assurance Project Plan (QAPP). All of the groundwater samples were analyzed for the Contract Laboratory Program's (CLP) Target Compound List/Target Analyte List (TCL/TAL) parameters. Contaminants found in the groundwater at concentrations that exceed a Hazard Quotient of 1 or an upper bound cancer Risk of $1x10^{-6}$ include Antimony, Carbon-Disulfide, 1,1-Dichloroethene Beryllium, Benzene, 1,1,1-Trichloroethane, PCBs Lead,Chromium and Bis (2-Ethylhexyl) phthalate (DEHP). Groundwater sampling locations are provided in Figure 5-1. Figures 5-2 thru 5-4 provide the monitoring well locations screened in the contaminated aquifers and indicator contaminants identified during the RI activities. A summary of the contaminants detected during groundwater sampling activities is presented in Table 5-1.


FORMER FIRESTONE TIRE MANUFACTURING PLANT
LEGEND
GROUNDWATER WELLS INSTALLED DURING REMEDIAL INVESTIGATION
SURFACE WATER SAMPLING LOCATION
SOIL SAMPLING LOCATION
SEDIMENT SAMPLING LOCATION
MONITORING WELLS INSTALLED PRIOR TO REMEDIAL INVESTIGATION
FORMER GASOLINE UST AREA
ABOVEGROUND STORAGE TANK AREA
FORMER OIL STORAGE TANKS
GAS METER YARD
COURTYARD AREA
OFFICES
GUARD RAIL
FORMER PRIMARY PLANT TRANSFORMER LOCATIONS
FORMER SOLVENT STORAGE TANK
FORMER PROCESS OIL/ WAX STORAGE TANK
PROCESS COOLING WATER PUMP HOUSE
PARKING
MW-1-2
MW-1-1
MW-1-4
MW-1-3
PTW-1
FORMER TEMPORARY DRUM STORAGE AREA
RW-4
DRW-5
MW-1-5
FORMER SOLVENT UNLOADING STATION
FORMER PROCESS OIL UNLOADING STATION
UNDERGROUND ELECTR. WIRES
FORMER H-1 TRANSFORMER LOCATION
FORMER B-5 TRANSFORMER LOCATION
RAMP
COOLING TOWER
MW-7-5
MW-7-8
MW-13
MW-14
P-1
MW-1-6
DRW-8
DRW-9
RW-7
CONCRETE WALK
100 0 50 100 200
CONCR. DITCH TANK
MW-9-1
RAMP
HAZARDOUS WASTE STORAGE AREA
GATE HOUSE
PARKING
OW-1
PW-1
GEORGIA POWER SUBSTATION
MW-9-2
FIREPUMP HOUSE
FABRITANK RESERVOIRS
CONCRETE TRENCH
FIRE TRAINING AREA
GATE
Woodward-Clyde Consultants
COURTYARD DETAIL



LEGEND

- ● RESIDUUM WELL
- 9 ANALYTICAL RESULTS REPORTED IN ug/l
- ND CHEMICALS NOT DETECTED
- + CONCENTRATION EXCEEDS REMEDIATION GOALS

CHEMICALS IDENTIFIED

1,1,1-TCA	1,1,1-TRICHLOROETHANE
1,1-DCE	1,1-DICHLOROETHYLENE
BENZ	BENZENE
DEHP	DI (2-ETHYLHEXYL) PHTHALATE

J = THE VALUE IS AN ESTIMATED CONCENTRATION, OFTEN APPLIED WHEN THE CHEMICAL IS DETECTED BETWEEN THE CONTRACT-REQUIRED DETECTION LIMIT (CORL) AND THE INSTRUMENT DETECTION LIMIT (IDL)

N

0 200 400 800
SCALE FEET

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Engineering & sciences applied to the earth & its environment

CLIENT: BRIDGESTONE/FIRESTONE, INC.

PROJECT: FORMER FIRESTONE FACILITY RI/FS - ALBANY, GEORGIA

TITLE:
ANALYTICAL RESULTS FOR CHEMICALS TO BE REMEDIATED IN RESIDUUM WELLS

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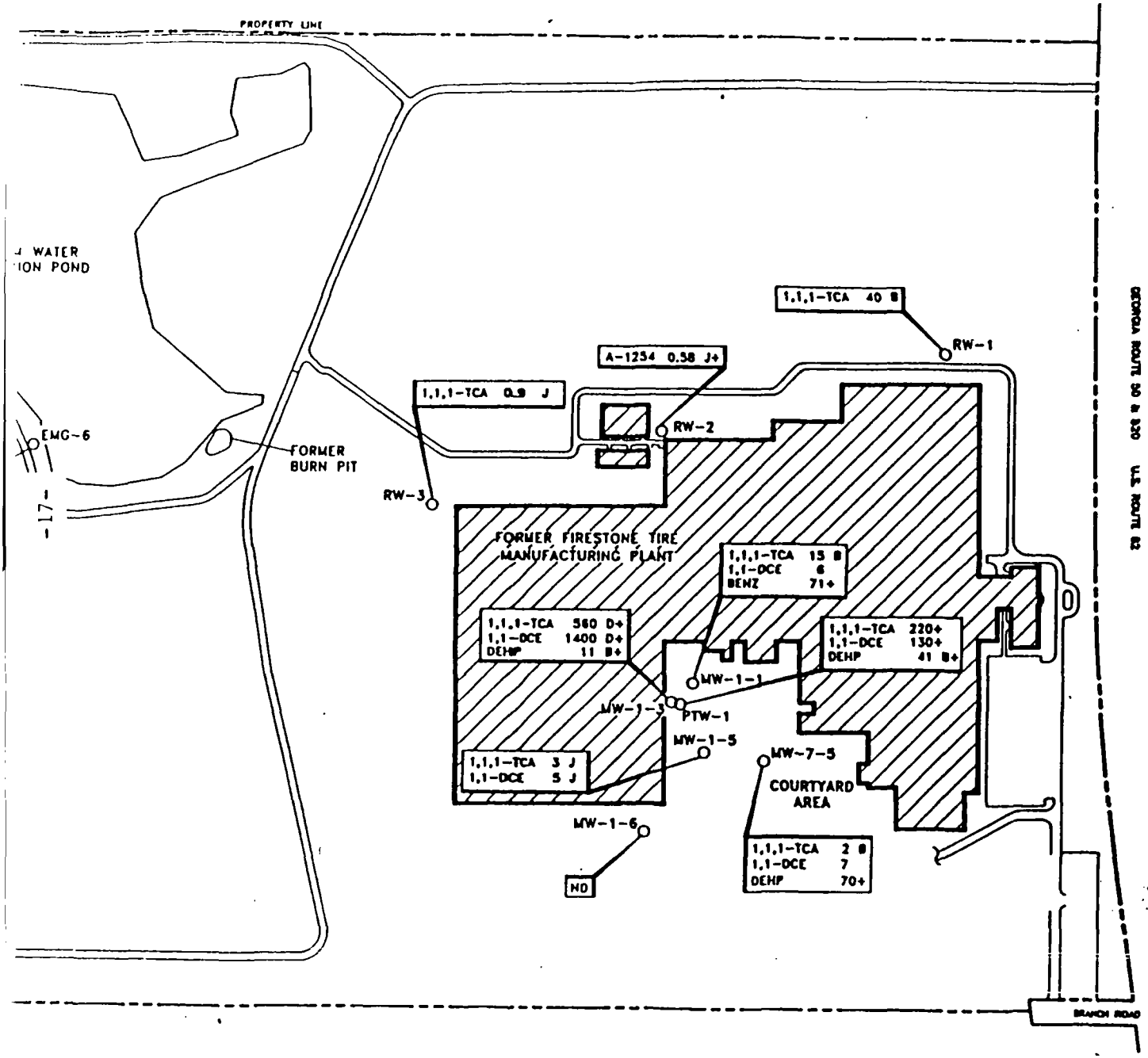

LEGEND

- O TRANSITION ZONE WELL (SCREEN/SAND PACK IN RESIDUUM/UPPER OCALA)
- 11 ANALYTICAL RESULTS REPORTED IN ug/l
- ND CHEMICALS NOT DETECTED
- + CONCENTRATION EXCEEDS REMEDIATION GOALS

CHEMICALS IDENTIFIED

1,1,1-TCA	1,1,1-TRICHLOROETHANE
1,1-DCE	1,1-DICHLOROETHYLENE
BENZ	BENZENE
DEHP	BIS (2-ETHYLHEXYL) PHTHALATE
A-1254	AROCLOR-1254

J = THE VALUE IS AN ESTIMATED CONCENTRATION, OFTEN APPLIED WHEN THE CHEMICAL IS DETECTED BETWEEN THE CONTRACT-REQUIRED DETECTION LIMIT (CDRL) AND THE INSTRUMENT DETECTION LIMIT (IDL)

D = ANALYSES OF THE SAMPLE WAS BASED UPON A SECONDARY DILUTION OF THE SAMPLE

B = THE CHEMICAL WAS DETECTED IN AN ASSOCIATED BLANK SAMPLE.

N

0 200 400 800

SCALE FEET

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CLIENT: BRIDGESTONE/FIRESTONE, INC.

PROJECT: FORMER FIRESTONE FACILITY RI/FS - ALBANY, GEORGIA

TITLE: ANALYTICAL RESULTS FOR CHEMICALS TO BE REMEDIATED IN TRANSITION ZONE WELLS

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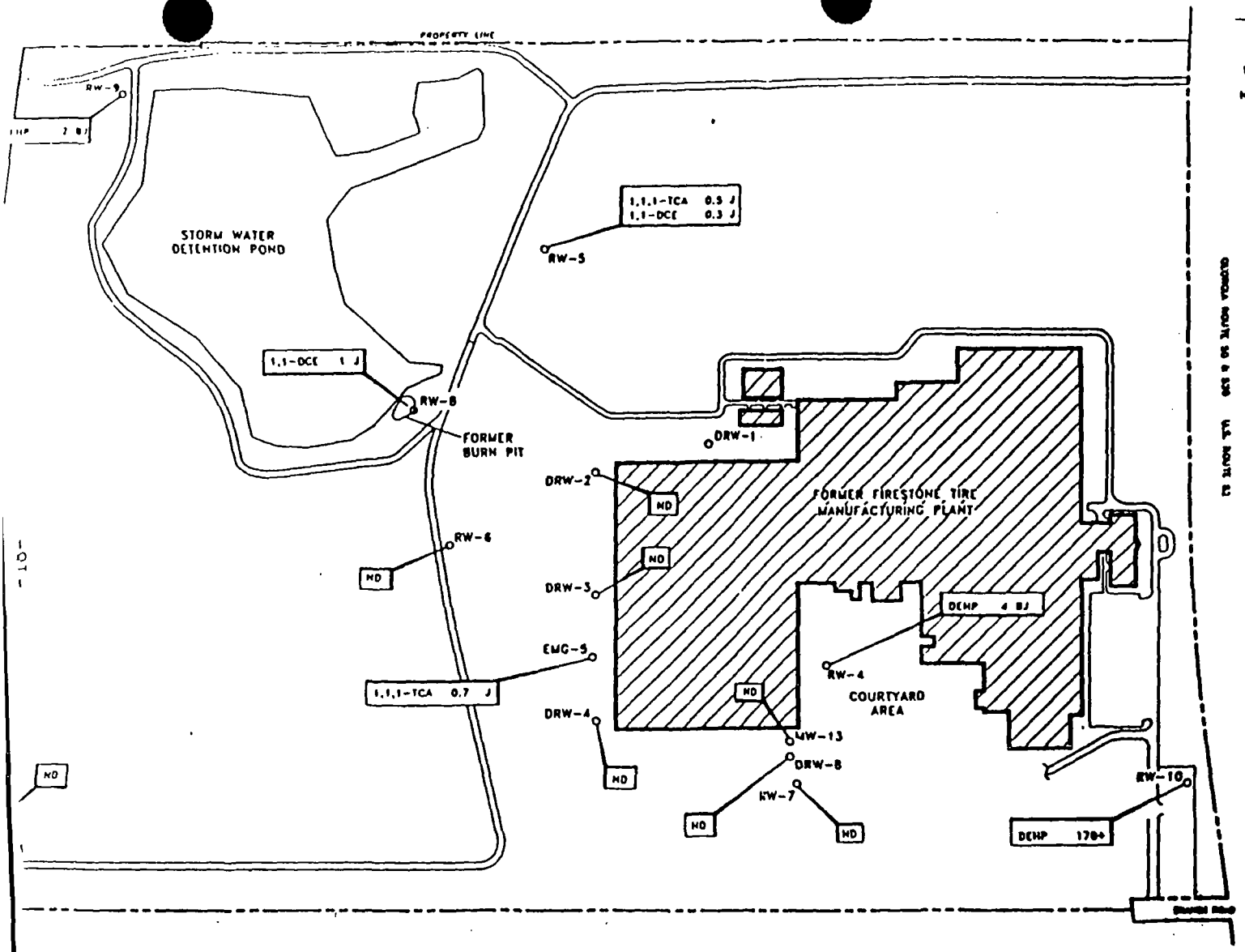

LEGEND

- O UPPER OCALA LIMESTONE WELL
- 10 ANALYTICAL RESULTS REPORTED IN ug/l
- ND CHEMICALS NOT DETECTED
- + CONCENTRATION EXCEEDS REMEDIATION GOALS

CHEMICALS IDENTIFIED

1,1,1-TCA	1,1,1-TRICHLOROETHANE
1,1-DCE	1,1-DICHLOROETHYLENE
BENZ	BENZENE
DEHP	BIS(2-ETHYLHEXYL)PHTHALATE

J = THE VALUE IS AN ESTIMATED CONCENTRATION. OFTEN APPLIED WHEN THE CHEMICAL IS DETECTED BETWEEN THE CONTRACT-REQUIRED DETECTION LIMIT (CORL) AND THE INSTRUMENT DETECTION LIMIT (IDL)

B = THE CHEMICAL WAS DETECTED IN AN ASSOCIATED BLANK SAMPLE.

N

0 200 400 800

SCALE FEET

Woodward-Clyde Consultants

Engineering & sciences applied to the earth & its environment

CLIENT: BRIDGESTONE/FIRESTONE, INC.

PROJECT: FORMER FIRESTONE FACILITY RI/FS - ALBANY, GEORGIA

TITLE: ANALYTICAL RESULTS FOR CHEMICALS TO BE REMEDIATED IN UPPER OCALA WELLS

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SUMMARY OF APPLIED CRITERIA FOR CONTAMINANTS OF CONCERN (COCs) IN GROUNDWATER IN EACH HYDROSTRATIGRAPHIC UNIT

Chemical	Residuum	Upper Ocala	Lower Ocala	Evaluated in Risk Assessment?
1,1,1-Trichloroethane	Yes	Yes	No Not detected	Yes
1,1-Dichloroethane	Yes	Yes	No Detected once	Yes
1,1-Dichloroethylene	Yes	Yes	No Detected once	Yes
Acetone	Yes	Yes	Yes	Yes
Benzene	Yes	Yes	No Not detected	Yes
Bromodichloromethane	No Not detected	No Not detected	No Present in background[4] Detected twice	No
Carbon Disulfide	Yes	Yes	Yes	Yes
Chlorobenzene	No Not detected	No Detected once	No Not detected	No
Chloroform	No Not detected	No Detected once	Yes	Yes
Dibromochloromethane	No Not detected	No Not detected	No Present in background[4] Detected twice	No
Ethylbenzene	No Not detected	Yes	No Not detected	Yes
Methylene Chloride	No Presence in blanks	No Presence in blanks	No Presence in blanks	No

SUMMARY OF APPLIED CRITERIA FOR CONTAMINANTS OF CONCERN (COCs) IN GROUNDWATER IN EACH HYDROSTATIGRAPHIC UNIT (Continued)

Chemical	Residuum	Upper Ocala	Lower Ocala	Evaluated in Risk Assessment?
Tetrachloroethylene	No Not detected	No Not detected	Yes	Yes
Toluene	No Not detected	Yes	Yes	Yes
Trichloroethylene	No Not detected	No Not detected	Yes	Yes
Xylenes	No Not detected	Yes	No Not detected	Yes
Benzoic Acid	No Not detected	No Detected once	No Detected twice	No
Bis(2-ethylhexyl)phthalate)	Yes	No Detected once	Yes Detected three times	Yes
Phenol	No Not detected	No Not detected	No Detected twice	No
Endosulfan	No Detected once	No Not detected	No Detected once	No
Lindane	No Detected once	No Not detected	No Not detected	No
Aluminum	No Comparable to background	Yes	No Comparable to background	Yes (see note 1)
Antimony	Yes	Yes	No Not detected	Yes (see note 5)
Arsenic	No Not detected	No Detected once	No Comparable to background	No
Barium	No Comparable to background	No Comparable to background	No Comparable to background	No
Beryllium	Yes	Yes	No Not detected	Yes (see note 1)

TABLE 5-1 (con't)

SUMMARY OF APPLIED CRITERIA FOR CONTAMINANTS OF CONCERN (COCs) IN GROUNDWATER IN EACH HYDROSTATIGRAPHIC UNIT (Continued)

Chemical	Residuum	Upper Ocala	Lower Ocala	Evaluated in Risk Assessment?
Cadmium	No Not detected	Yes	No Not detected	Yes (see note 1)
Calcium	No Comparable to background	No Comparable to background	No Comparable to background	No
Chromium	No Comparable to background	Yes	Yes	Yes (see note 3 and 5)
Cobalt	No Comparable to background	Yes	No Detected once	Yes (see note 1)
Copper	No Comparable to background	Yes	No Comparable to background	Yes (see note 1)
Iron	No Comparable to background	Yes	No Comparable to background	Yes (see note 1)
Lead	Yes	Yes	Yes	Yes (see note 1 and 5)
Magnesium	No Comparable to background	Yes	No Comparable to background	Yes (see note 1)
Manganese	No Comparable to background	Yes	No Comparable to background	Yes (see note 1)
Mercury	No Comparable to background	No (comparable to background at one-half detection limit)	No Not detected	No
Nickel	Yes	Yes	No Detected once	Yes (see note 5)
Potassium	No Comparable to background	No Comparable to background	Yes	No (see note 3)

SUMMARY OF APPLIED CRITERIA FOR CONTAMINANTS OF CONCERN (COCs) IN GROUNDWATER IN EACH HYDROSTATIGRAPHIC UNIT (Continued)

Chemical	Residuum	Upper Ocala	Lower Ocala	Evaluated in Risk Assessment?
Selenium	No Comparable to background	No Not detected	No Not detected	No
Silver	No Not detected	No Detected once	No Not detected	No
Sodium	No Trace element	No Comparable to background	No Comparable to background	No
Thallium	Yes	Yes	No Detected twice	Yes (see note 5)
Vanadium	No Comparable to background	Yes	No Comparable to background (less than 3x background)	Yes (see note 1)
Zinc	No Comparable to background	No Comparable to background	No Comparable to background	No

1. Chemistry from wells drawing water from both the residuum and Upper Ocala formation (transitional wells) were included in the derivation of an average concentration for the Upper Ocala. When compared with the results of the Upper Ocala background well (which does not draw from both units), the average concentration in the Upper Ocala site wells appears to be higher than the background location. However, when these average concentrations are compared with the background concentrations in the residuum, the metal concentrations are comparable. Since concentrations in the residuum and lower Ocala wells are also comparable to background concentrations, it is not clear whether it is appropriate to consider these metals in the baseline risk assessment. However, to be conservative, these metals are considered, and the ramification of that inclusion discussed in the uncertainty assessment.

2. One high concentration (42.5 ug/L) in MW-7-5 has skewed the average concentration to 3.2 ug/L, which may exceed the background concentration of < 4.5 ug/L. The average concentration without this high value is 2.1 ug/L. The geometric mean value with this high value is 1.4 ug/L. The second highest concentration is 8.5 ug/L, then 3.1 ug/L.

3. One high concentration (chromium = 269 ug/L; potassium = 175,000 ug/L) skewed the average for these chemicals, resulting in exceedence of the background concentrations. The average concentration of chromium without this value is 13.5 ug/L (compared with background of 14.5 ug/L); of potassium is 2329 ug/L (average concentration = 6060 ug/L). The geometric mean concentration for chromium and potassium including high values are 12.8 ug/L and 2588 ug/L, respectively.

4. The presence of an organic chemical in a background sample is not a criterion for selection as a contaminant of concern. The fact that an organic chemical is present in a background sample is presented as information only.

5. These (unfiltered) metals, in some instances, are included as COCs because some concentrations detected exceed the metal's MCL. In many cases, the metal is comparable to background concentrations, and in some instances, the background concentration also exceeds the MCL.

5.1.3. Surface Water Sampling

Six surface water samples were collected after storm events to characterize on-site water quality conditions. These six samples were analyzed for TCL/TAL parameters. Four additional surface water samples were collected on December 12, 1991 to compare on-site water quality to state and federal water quality criteria. Three samples were collected from the storm water detention pond and field tested for water hardness. one sample was collected from the East Ditch, located just upstream from the area where development water was discharged. This sample was analyzed for TCL VOCs. No contaminants were found in the surface water at concentrations that exceed a Hazrd Quotient of 1 or an upper bound cancer risk of $1x10^{-6}$. Surface water sampling locations are provided in Figure 5-1. A summary of the contaminants detected during surface water sampling activities is presented in table 5-4.

5.1.4 Surface Soil Sampling

A total of 22 surface soil samples were collected throughout the Site. The purpose of this sampling effort was to characterize surface soil at the Site and to obtain chemical data for use in the baseline risk assessment. The surface samples were collected in accordance with the Field Sampling and Analysis Plan and were analyzed for all TCL/TAL parameters. No contaminants were found in the surface soil at concentrations that exceed a Hazrd Quotient of 1 or an upper bound cancer risk of $1x10^{-6}$. Surface soil sampling locations are provided in Figure 5-1. A summary of the contaminants detected during surface soil sampling activities is presented in table 5-2.

5.1.5 Subsurface Soil Sampling

A total of 37 subsurface soil samples were collected at 12 soil boring locations and 6 well cluster locations. The purpose of this soil sampling effort was to develop a more complete soil profile characterization of the Site and to evaluate the potential for contamination to migrate from the soil to the groundwater. The subsurface samples were collected in accordance with the Field Sampling and Analysis Plan (FSAP) and were analyzed for all TCL/TAL parameters. PCBs were found at concentrations greater than the Toxic Substances Control Act (TSCA) - required cleanup level of 10 ppm in four subsurface soil samples collected in a former transformer location of the courtyard area. The estimated volume of contamination that exceeds 10 ppm is 20 cubic yards. No other contaminants were found in the subsurface soil at concentrations that exceed a Hazrd Quotient of 1 or an upper bound cancer risk of $1x10^{-6}$. Subsurface soil sampling locations are provided in Figure 5-1. A summary of the contaminants detected during subsurface soil sampling activities is presented in table 5-2.

SUMMARY OF APPLIED CRITERIA FOR CONTAMINANTS OF CONCERN (COCs) IN SURFACE AND SUBSURFACE SOILS

Chemical	Surface Soils	Subsurface Soils	Evaluated in Risk Assessment?
1,1,1-Trichloroethane	Yes	Yes	Yes
2-Butanone	No Presence in blanks	No Presence in blanks	No
4-Methyl-2-pentanone	Yes	Yes	Yes
Acetone	Yes	Yes	Yes
Benzene	No Not detected	Yes	Yes
Carbon Disulfide	Yes	Yes	Yes
Chlorobenzene	No Not detected	No Detected once	No
Chloroform	No Detected once	Yes	Yes
Ethylbenzene	Yes	Yes	Yes
Methylene chloride	No Presence in blanks	No Presence in blanks	No
Tetrachloroethylene	No Not detected	Yes	Yes
Toluene	Yes	Yes	Yes
Trichloroethylene	No Not detected	No Detected once	No

SUMMARY OF APPLIED CRITERIA FOR CONTAMINANTS OF CONCERN (COCs) IN SURFACE AND SUBSURFACE SOILS (continued)

Chemical	Surface Soils	Subsurface Soils	Evaluated in Risk Assessment?
Vinyl acetate	No Not detected	No Detected once	No
Xylenes	Yes	Yes	Yes
4-Nitrophenol	No Detected once	No Not detected	No
Benzoic Acid	No Not detected	No Not detected	No
Bis(2-ethylhexyl)phthalate	Yes	Yes	Yes
Di-n-butylphthalate	Yes	Yes	Yes
Fluoranthene	No Detected once	No Not detected	No
Pentachlorophenol	No Not detected	No Detected once	No
Phenanthrene	No Detected once	No Not detected	No
Pyrene	No Detected once	No Not detected	No
Aroclor-1254	Yes	No Not detected	Yes
Aroclor-1260	Yes	No Not detected	Yes
Aluminum	No Comparable to background	No Comparable to background	No

SUMMARY OF APPLIED CRITERIA FOR CONTAMINANTS OF CONCERN (COCs) IN SURFACE AND SUBSURFACE SOILS (continued)

Chemical	Surface Soils	Subsurface Soils	Evaluated in Risk Assessment?
Antimony	Yes	Yes	Yes
Arsenic	No Comparable to background	No Comparable to background	No
Barium	No Comparable to background	No Comparable to background	No
Beryllium	No Comparable to background	No Comparable to background	No
Cadmium	No Detected once	No Detected once	No
Calcium	No Comparable to background	No Comparable to background	No
Chromium	No Comparable to background	No Comparable to background	No
Cobalt	No Comparable to background	No Comparable to background	No
Copper	No Comparable to background	No Comparable to background	No
Iron	No Comparable to background	No Comparable to background	No
Lead	No Comparable to background	No Comparable to background	No
Magnesium	No Comparable to background	No Comparable to background	No
Manganese	No Comparable to background	No Comparable to background	No

SUMMARY OF APPLIED CRITERIA FOR CONTAMINANTS OF CONCERN (COCs) IN SURFACE AND SUBSURFACE SOILS (continued)

Chemical	Surface Soils	Subsurface Soils	Evaluated in Risk Assessment?
Mercury	No Detected once	No Not detected	No
Nickel	No Comparable to background	No Comparable to background	No
Potassium	No Comparable to background	No Comparable to background	No
Selenium	No Comparable to background	No Comparable to background	No
Sodium	No Comparable to background	No Comparable to background	No
Thallium	No Not detected	No Not detected	No
Vanadium	No Comparable to background	No Comparable to background	No
Zinc	Yes	No Comparable to background	Yes

SUMMARY OF SELECTION OF CONTAMINANTS OF CONCERN (COCs) IN SEDIMENTS

Chemical	Shallow Sediments	Deeper Sediments	Chemical of Interest?
1,1,1-Trichloroethane	Yes	Yes	Yes
1,1-Dichloroethane	Yes	No Not detected	Yes
1,2-Dichloroethylene	Yes	No Not detected	Yes
2-Butanone	Yes	No Presence in blanks	Yes
2-Hexanone	Yes	No Not detected	Yes
4-Methyl-2-pentanone	Yes	Yes	Yes
Acetone	Yes	Yes	Yes
Benzene	Yes	No Not detected	Yes
Carbon Disulfide	Yes	Yes	Yes
Chloroform	Yes	No Not detected	Yes
Ethylbenzene	Yes	Yes	Yes
Methylene Chloride	No Presence in blanks	No Presence in blanks	No
Toluene	Yes	Yes	Yes
Trichloroethylene	Yes	No Not detected	Yes

SUMMARY OF SELECTION OF CONTAMINANTS OF CONCERN (COCs) IN SEDIMENTS (Continued)

Chemical	Shallow Sediments	Deeper Sediments	Chemical of Interest?
Xylenes	Yes	Yes	Yes
Benzoic Acid	No Not detected	No Not detected	No
Bis(2-ethylhexyl)phthalate	Yes	Yes	Yes
Butylbenzylphthalate	No Not detected	Yes Detected once	No
Di-n-butylphthalate	Yes	No Not detected	Yes
Pyrene	Yes	No Not detected	Yes
Arochlor-1254	Yes	No Not detected	Yes
Arochlor-1260	Yes	No Not detected	Yes
Aluminum	No Comparable to background	No Comparable to background	No
Arsenic	Yes	Yes	Yes
Barium	No Comparable to background	No Comparable to background	No
Beryllium	Yes	Yes	Yes
Calcium	Yes	No Comparable to background	Yes

SUMMARY OF SELECTION OF CONTAMINANTS OF CONCERN (COCs) IN SEDIMENTS (Continued)

Chemical	Shallow Sediments	Deeper Sediments	Chemical of Interest?
Chromium	Yes	Yes	Yes
Cobalt	Yes	Yes	Yes
Copper	Yes	No Comparable to background	Yes
Iron	Yes	No Comparable to background	Yes
Lead	Yes	No Comparable to background	Yes
Magnesium	No Comparable to background	No Comparable to background	No
Manganese	No Comparable to background	No Not detected	No
Nickel	No Comparable to background	No Not detected	No
Potassium	No Comparable to background	No Comparable to background	No
Selenium	Yes	Yes	Yes
Sodium	No Comparable to background	No Comparable to background	No
Vanadium	No Comparable to background	No Comparable to background	No
Zinc	Yes	Yes	Yes

SUMMARY OF SELECTION OF CONTAMINANTS OF CONCERN (COCs) IN SURFACE WATER

Chemical	Criterion for Deletion	Comments	Chemical of Interest?
1,1,1-Trichloroethane			Yes
1,1-Dichloroethane		Detected once	Yes
4-Methyl-2-pentanone		Detected once	Yes
Acetone			Yes
Carbon Disulfide			Yes
Methylene Chloride	Presence in blanks	All detected concentrations were associated with method blank contamination.	No
Aluminum			Yes
Barium			Yes
Calcium			Yes
Chromium		Detected once	Yes
Iron			Yes
Magnesium			Yes
Manganese			Yes

TABLE 3-4

SUMMARY OF SELECTION OF CONTAMINANTS OF CONCERN (COCs) IN SURFACE WATER (Continued)

Chemical	Criterion for Deletion	Comments	Chemical of Interest?
Potassium		Detected once	Yes
Sodium			Yes
Zinc			Yes

Notes:

A limited number of samples were collected, precluding the use of frequency of detection as a criterion for selection as a contaminant of concern.
No Surface water background sample was collected, precluding the use of comparability with background as a criterion for selection as a contaminant of concern.

5.1.6 Sediment Sampling

A total of 16 grab sediment samples from ten locations and 2 composite samples from four locations were collected to characterize the on-site sediment quality. Samples were collected at 0 to 0.5 ft. and 1.5 to 3 ft intervals in accordance with the FSAP. With the exception of the composite samples, all of the samples required by the workplan were analyzed for all TCL/TAL parameters. The composite samples were analyzed for TCL semivolatile organic compound (SVOC), PCBs and pesticide parameters, and TAL parameters. Four additional sediment samples, not described in the RI/FS Workplan were collected and analyzed for Total Organic Carbon (TOC). The TOC results were used in the baseline risk assessment. No contaminants were found in the sediments at concentrations that exceed a Hazrd Quotient of 1 or an upper bound cancer risk of $1x10^{-6}$. Sediment sampling locations are provided in Figure 5-1. A summary of the contaminants detected during sediment sampling activities is presented in table 5-3.

5.1.7 Confirmatory Sampling of Former Courtyard PCB Transformers

Twenty-three soil samples from 13 locations were collected during the RI. These samples were collected to verify that remedial measures to remove courtyard transformers and surrounding soil containing PCBs had achieved the PCB target cleanup level of 10 mg/kg. The samples were collected in accordance with the FSAP and were analyzed for PCBs. Sample locations are provided in Figure 5-1.

6.0 SUMMARY OF SITE RISKS

CERCLA directs the Agency to conduct a baseline risk assessment to determine whether a Superfund Site poses a current or potential threat to human health and the environment in the absence of any remedial action. The baseline risk assessment provides the basis for determining whether or not remedial action is necessary and the justification for performing remedial action.

EPA's cleanup goals for contaminated soils are based on potential for cancer risk range of $1x10^{-4}$ to $1x10^{-6}$ (no more than an increased chance of one additional case in ten thousand to one million) or a non-cancer Hazardous Index above 1.0 (or possible exposure to total contaminants exceeding doses known <u>not</u> to cause harmful effects). The baseline risk assessment indicates that current Site risk from soil contamination exceeds action or cleanup levels only for polychlorinated biphenyls (PCBs).

Past removal activities in the courtyard area have already removed PCB transformers, concrete pads, and PCBs from the soil to 10 milligrams per kilogram (mg/kg) or parts per million (ppm), which is equivalent to the Toxic Substances Control Act (TSCA)-required cleanup level for the small volume and low concentration of PCBs present at the Site. However, 4 samples near the former PCB transformers were found to exceed 10 mg/kg (10 ppm). Concentrations varying from 17.0 to 230.0 mg/kg were identified in these samples at depths ranging from 4 to 5.5 ft. The current estimate of PCB contaminated soil remaining on-site is 20 cubic yards (c.y.). Therefore, soil cleanup will be required in this area to reduce the threat posed by the PCB contamination.

The major risk at the Site, however, is contamination in the shallow groundwater exceeding Maximum Contaminant Levels (MCLS) or other cleanup levels. The RI data indicate that several VOCs were identified in shallow wells primarily located in the courtyard area at levels exceeding MCLs or action levels. The specific VOCs are 1,1,1-trichloroethane (TCA), 1,1-dichloroethylene (DCE), Bis (2-Ethylhexyl) Phthalate (DEHP) and Benzene. In addition to the VOCS, beryllium, antimony, lead, carbon disulfide, Chromium and PCBs (PCBs only in one well) above the MCL were found in the groundwater at levels that exceed cleanup standards. Sample results from the Lower Ocala did not indicate the presence of of any hazardous constituents at levels above MCLs or any other cleanup levels.

The baseline risk assessment also evaluated the health impacts associated with potential future residential development of the manufacturing area and southern portions of the Site. When EPA assumes residents (children and adults) are living on the Site property itself and depend exclusively on local groundwater from the Upper Ocala/Transition Zone as a water source, both upper bound cancer risk (greater than $1x10^{-4}$ or an increased chance of one additional case in ten thousand) and non-cancer hazard estimate (greater than 1.0) do exceed established acceptable risk levels. In all cases unacceptable risks and hazards were a result of drinking contaminated groundwater and breathing volatile groundwater chemicals during showering. In addition, the shallow water-bearing zone does not produce an adequate water supply. However, even if the southern portions of the property were converted to residential, local shallow groundwater would probably not be used because connections to the municipal system are already available. The plant itself is already served by city water and city sewer. The total lifetime cancer risk for potential on-site residents in the southern portions of the Site would be $7x10^{-4}$ (a chance of 7 additional cancer cases in 10,000 people) which exceeds EPA's target range. The Hazard Index for substances causing harmful effects other than cancer would be 17 for this area, which greatly exceeds acceptable exposure and warrants cleanup.

Contaminants of concern (COCs) were chosen based on concentration, toxicity, mobility, and frequency of detection for the contaminants present. EPA expects that meeting cleanup goals for these will result in sufficiently reducing risks posed by less harmful contaminants as well.

6.1 CONTAMINANTS OF CONCERN

The majority of the wastes and residues generated by production operations at the facility have been managed, treated, and disposed of on-site throughout the Site's history. The significant contaminated areas of concern are the courtyard area where shipping, handling, and temporary storage of materials including hazardous substances occured and the burn pit where liquid waste was burned and partially-filled 55-gal drums containing waste materials characteristic of waste rubber cement and Banbury sludge were buried. The chemicals measured in the various environmental media in the Remedial Investigation were evaluated for inclusion as chemicals of potential concern in the risk assessment by application of screening criteria. The criteria used to select the contaminants of concern included:

1. a general review of the Site data,
2. a review of designations to the data,
3. a comparison of the detects with that of the blanks,
4. a review of the sample quantitation limits,
5. a review of the tentatively identified compounds,
6. an evaluation of the apparent statistical distribution of the data,
7. an examination of the Frequency of detection,
8. an evaluation of the contaminants verses essential nutrient trace levels elements, and;
9. a comparison of the appropriate health-based criteria.

Separate lists of chemicals of potential concern were identified for each of the past waste management areas. The contaminants of concern for the Site area include Antimony, Beryllium, Benzene, Carbon Disulfide, Chromium, 1,1-DCE, PCBs, 1,1,1-Trichloroethane, 1,1-Dichloroethylene, Chloroform, Tetrachloroethylene, Toluene, Bis(2ethylhexy)phthalate, Di-n-butylphthalate, 1,1-Dichloroethane, Acetone, Carbon Disulfide, Ethylbenzene, Trichloroethylene, Xylenes, 2-Methyl-2-pentanone, Polychlorinated Biphenyls, 2-Butanone, 1,2-Dichloroethylene, 2-Hexanone, Pyrene, Magnesium, Selenium, and Zinc.

The arithmetic average concentrations, 95% upper confidence levels, and frequency of detections of contaminants found in the various media tested are contained in Tables 6-1 through 6-8. The exposure concentrations represent a 95% upper confidence limit on the mean of data collected from both surface and

TABLE 6-1
CONCENTRATIONS OF CONTAMINANTS FOUND IN GROUNDWATER RESIDUUM WELLS

CONTAMINANT	AVERAGE CONCENTRATION (ug/L)	95% UPPER CONFIDENCE LIMIT (ug/L)	FREQUENCY OF DETECTION
1,1,1-TCA	5.9	22.81	4/8
1,1-DCA	11.3	48.69	4/8
1,1-DCE	3.3	10.53	4/8
ACETONE	8.7	15.92	3/8
BENZENE	6.7	17.41	1/8
CARBON DISULFIDE	49.5	1584.93	6/8
DEHP	10.9	25.73	2/9
ENDOSULFAN	0.06	0.11	1/9
LINDANE	0.04	0.06	1/9
ALUMINUM	15,955.56	58,348.03	9/9
ANTIMONY	18.2	39.91	1/9
BARIUM	86.86	263.57	9/9
BERYLLIUM	2.01	6.89	5/9
CALCIUM	6345.56	16,307.84	9/9
CHROMIUM	31.13	82.61	6/9
COBALT	17.93	138.63	4/9
COPPER	56.31	429.19	5/9
IRON	34,477.78	135,064.73	9/9
LEAD	13.39	49.29	6/9
MAGNESIUM	2,271.11	8,294.92	8/9
MANGANESE	962.48	10,621.48	9/9
MERCURY	0.19	0.34	1/9
NICKEL	20.80	151.20	3/9
POTASSIUM	1,247.89	2,076.67	8/9
SELENIUM	0.83	1.09	1/9

CONTAMINANT	AVERAGE CONCENTRATION (ug/L)	95% UPPER CONFIDENCE LIMIT (ug/L)	FREQUENCY OF DETECTION
SODIUM	66,060.00	1,758,114.10	9/9
THALLIUM	1.00	1.39	1/9
VANADIUM	87.51	389.46	8/9
ZINC	128.46	382.51	8/9

TABLE 6-2
CONCENTRATIONS OF CONTAMINANTS FOUND IN GROUNDWATER
UPPER OCALA

CONTAMINANT	AVERAGE CONCENTRATION (ug/L)	95% UPPER CONFIDENCE LIMIT (ug/L)	FREQUENCY OF DETECTION
1,1,1-TCA	35.82	45.06	8/25
1,1-DCA	19.87	28.60	9/25
1,1-DCE	37.20	63.77	7/25
ACETONE	15.46	21.49	16/25
BENZENE	6.24	8.43	1/25
CARBON DISULFIDE	12.57	20.06	14/25
CHLOROBENZENE	3.41	4.49	1/25
CHLOROFORM	3.44	3.83	1/25
ETHYLBENZENE	13.96	11.15	2/25
METHYLENE CHLORIDE	2.78	3.49	2/25
TOLUENE	3.94	6.21	2/25
XYLENES	35.22	18.55	3/25
BENZOIC ACID	25.46	32.64	1/24
DEHP	12.52	19.92	1/24
ALUMINUM	15,222.50	455,974.04	22/25
ANTIMONY	14.33	17.97	2/25
ARSENIC	1.04	1.12	1/25
BARIUM	122.60	203.33	25/25

CONTAMINANT	AVERAGE CONCENTRATION (ug/L)	95% UPPER CONFIDENCE LIMIT (ug/L)	FREQUENCY OF DETECTION
BERYLLIUM	4.25	7.96	11/25
CADMIUM	3.19	3.30	3/25
CALCIUM	165,624.00	343,794.52	25/25
CHROMIUM	36.04	105.63	19/25
COBALT	16.07	34.23	10/25
COPPER	62.45	120.95	15/25
IRON	17,059.52	618,528.15	25/25
LEAD	20.02	53.74	23/25
MAGNESIUM	2,301.56	3,720.64	25/25
MANGANESE	1,326.06	17,629.19	25/25
MERCURY	0.16	0.19	4/25
NICKEL	25.84	58.28	5/25
POTASSIUM	4,629.74	8,529.40	24/25
SILVER	1.76	2.07	1/25
SODIUM	23,396.40	44,621.76	25/25
THALLIUM	1.06	1.23	4/25
VANADIUM	66.41	260.02	19/25
ZINC	174.66	303.89	23/25

TABLE 6-3
CONCENTRATIONS OF CONTAMINANTS FOUND IN GROUNDWATER
LOWER OCALA

CONTAMINANT	AVERAGE CONCENTRATION (ug/L)	95% UPPER CONFIDENCE LIMIT (ug/L)	FREQUENCY OF DETECTION
1,1-DCA	1.22	6.85	1/9
1,1-DCE	1.19	6.23	1/9
ACETONE	84.89	4,068.95	7/9
BDCM	1.28	6.84	2/9

CONTAMINANT	AVERAGE CONCENTRATION (ug/L)	95% UPPER CONFIDENCE LIMIT (ug/L)	FREQUENCY OF DETECTION
CARBON DISULFIDE	7.52	445.80	4/9
CHLOROFORM	1.81	11.43	4/9
DBCM	1.23	5.96	2/9
METHYLENE CHLORIDE	0.71	1.97	1/9
PCE	1.22	5.86	2/9
TOLUENE	1.23	5.98	2/9
TCE	1.35	8.06	2/9
BENZOIC ACID	21.56	31.23	2/9
DEHP	20.50	112.30	3/9
PHENOL	12.61	26.64	2/9
ENDOSULFAN	0.05	0.08	1/9
ALUMINUM	2,023.99	3,004,155.15	7/9
ARSENIC	1.67	2.65	3/9
BARIUM	61.97	661.65	8/9
CALCIUM	37,755.56	83,246.94	9/9
CHROMIUM	41.92	529.53	6/9
COBALT	1.95	2.59	1/9
COPPER	15.54	37.39	8/9
IRON	4,171.89	19,917,768.30	8/9
LEAD	12.83	259.11	7/9
MAGNESIUM	1,170.72	3,644.06	8/9
MANGANESE	69.75	3,754.47	8/9
NICKEL	11.02	26.86	1/9
POTASSIUM	21,514.78	795,607.35	7/9
SODIUM	23,010.00	268,734.73	9/9
THALLIUM	0.72	2.81	2/9
VANADIUM	9.86	75.38	5/9
ZINC	249.22	1,328.35	9/9

TABLE 6-4
CONCENTRATIONS OF CONTAMINANTS FOUND IN SOILS
SURFACE SOILS (0-1 FT)

CONTAMINANT	AVERAGE CONCENTRATION (ug/kg)	95% UPPER CONFIDENCE LIMIT (ug/kg)	FREQUENCY OF DETECTION
1,1,1-TCA	13.16	39.05	15/17
2-BUTANONE	15.03	13.02	1/7
4-M-2-P	7.53	11.56	3/17
ACETONE	118.29	508.64	15/17
CARBON DISULFIDE	15.29	24.24	17/17
CHLOROFORM	2.76	3.16	1/17
ETHYLBENZENE	2.66	3.23	11/17
METHYLENE CHLORIDE	41.41	396.82	10/17
TOLUENE	9.06	19.61	15/17
XYLENES	7.44	11.20	12/17
4-NITROPHENOL	1,010.00	1,459.81	1/17
DEHP	327.47	453.45	5/17
DBP	172.59	236.96	3/17
FLUORANTHENE	211.76	246.39	1/17
PHENANTHRENE	206.71	265.70	1/17
PYRENE	211.76	246.39	1/17
ARCLR-1254	287.94	347.80	1/17
ARCLR-1260	240.29	316.50	3/17
ALUMINUM	9,334.12	12,644.69	17/17
ANTIMONY	3.80	6.44	8/17
ARSENIC	1.61	2.35	17/17
BARIUM	19.79	27.25	17/17
BERYLLIUM	0.19	0.25	5/17
CADMIUM	0.29	0.45	1/17
CALCIUM	3,426.00	12,469.49	17/17
CHROMIUM	13.82	18.47	17/17

CONTAMINANT	AVERAGE CONCENTRATION (ug/kg)	95% UPPER CONFIDENCE LIMIT (ug/kg)	FREQUENCY OF DETECTION
COBALT	1.26	1.87	13/17
COPPER	3.92	5.32	3/17
IRON	12,256.82	17,522.41	17/17
LEAD	9.72	16.01	6/17
MAGNESIUM	176.71	265.38	17/17
MANGANESE	127.69	223.29	17/17
MERCURY	0.05	0.06	1/17
NICKEL	2.63	4.77	8/17
POTASSIUM	112.72	176.42	15/17
SELENIUM	0.19	0.22	3/17
SODIUM	37.73	45.17	16/17
VANADIUM	37.34	51.83	17/17
ZINC	26.92	127.68	14/17

TABLE 6-5
CONCENTRATIONS OF CONTAMINANTS FOUND IN SOILS
SUBSURFACE SOILS (3-30 FT)

CONTAMINANT	AVERAGE CONCENTRATION (ug/kg)	95% UPPER CONFIDENCE LIMIT (ug/kg)	FREQUENCY OF DETECTION
1,1,1-TCA	61.83	318.22	14/21
2-BUTANONE	45.43	53.64	4/21
4-M-2-P	37.38	26.46	8/21
ACETONE	322.81	567.61	21/21
BENZENE	19.62	12.22	2/21
CARBON DISULFIDE	28.62	51.11	11/21
CHLOROBENZENE	19.69	11.92	1/21
CHLOROFORM	19.60	11.79	4/21
ETHYLBENZENE	19.60	12.14	8/21
METHYLENE CHLORIDE	51.05	323.05	12/21

CONTAMINANT	AVERAGE CONCENTRATION (ug/kg)	95% UPPER CONFIDENCE LIMIT (ug/kg)	FREQUENCY OF DETECTION
PCE	19.95	12.62	3/21
TOLUENE	20.83	19.97	14/21
TCE	19.69	11.92	1/21
VINYL ACETATE	42.90	35.18	1/21
XYLENES	22.26	22.21	11/21
DEHP	266.43	359.84	5/21
DBP	249.10	310.18	2/21
PENTACHLOROPHENOL	1304.76	1801.62	1/21
ALUMINUM	6647.14	9345.01	21/21
ANTIMONY	6.99	14.48	6/21
ARSENIC	0.96	1.62	13/21
BARIUM	6.62	10.24	20/21
BERYLLIUM	0.20	0.23	4/21
CADMIUM	0.52	0.76	1/21
CALCIUM	256.17	753.00	13/21
CHROMIUM	8.74	15.02	21/21
COBALT	1.38	2.45	9/21
COPPER	2.22	3.47	1/21
IRON	16010.48	45244.84	21/21
LEAD	6.05	9.97	5/21
MAGNESIUM	85.96	108.77	21/21
MANGANESE	48.19	125.12	21/21
NICKEL	1.65	1.87	7/21
POTASSIUM	84.36	138.42	12/21
SELENIUM	0.18	0.23	3/21
SODIUM	37.56	47.41	18/21
VANADIUM	37.01	82.53	20/21
ZINC	4.11	9.45	15/21

TABLE 6-6
CONCENTRATIONS OF CONTAMINANTS FOUND IN SEDIMENTS
SHALLOW SEDIMENTS (0-1 FT)

CONTAMINANT	AVERAGE CONCENTRATION (ug/kg)	95% UPPER CONFIDENCE LIMIT (ug/kg)	FREQUENCY OF DETECTION
1,1,1-TCA	5.31	9.22	6/8
1,1-DCA	5.31	9.27	1/8
2-BUTANONE	5.44	42.62	1/8
2-HEXANONE	12.94	23.17	1/8
4-M-2-P	40.81	193.66	1/8
ACETONE	38.88	247.55	7/8
BENZENE	5.56	8.42	1/8
CARBON DISULFIDE	20.63	45.98	8/8
CHLOROFORM	6.69	15.35	3/8
ETHYLBENZENE	3.44	4.30	4/8
METHYLENE CHLORIDE	83.94	23075.09	7/8
TOLUENE	5.81	8.98	3/8
TCE	5.56	8.42	1/8
XYLENES	10.81	34.24	4/8
DEHP	385.00	526.71	1/6
DBP	355.83	660.96	1/8
PYRENE	345.33	1090.88	1/8
AROCLOR-1254	899.17	4335.37	1/6
AROCLOR-1260	858.33	4928.70	1/8
ALUMINUM	12110.00	42349.18	6/6
ARSENIC	2.06	4.49	6/6
BARIUM	25.23	53.76	6/6
BERYLLIUM	0.43	1.65	4/6
CALCIUM	3403.67	23169.79	6/6
CHROMIUM	276.18	25730.51	6/6
COBALT	3.68	18.74	4/8

CONTAMINANT	AVERAGE CONCENTRATION (ug/kg)	95% UPPER CONFIDENCE LIMIT (ug/kg)	FREQUENCY OF DETECTION
COPPER	25.38	92.23	6/6
IRON	28060.00	289755.56	6/6
LEAD	22.87	47.79	6/6
MAGNESIUM	183.43	704.50	6/6
MANGANESE	86.12	254.74	6/6
NICKEL	3.48	40.72	1/6
POTASSIUM	134.67	524.66	2/6
SELENIUM	0.26	0.43	2/6
SODIUM	60.52	236.52	4/6
VANADIUM	80.72	173.98	6/6
ZINC	486.42	26676.25	6/6

TABLE 6-7
CONCENTRATIONS OF CONTAMINANTS FOUND IN SEDIMENTS
SUB-SURFACE SEDIMENTS (2-3 FT)

CONTAMINANT	AVERAGE CONCENTRATION (ug/kg)	95% UPPER CONFIDENCE LIMIT (ug/kg)	FREQUENCY OF DETECTION
1,1,1-TCA	4.60	17.05	5/5
4-M-2-P	16.80	2580.57	4/5
ACETONE	64.60	5436.88	5/5
CARBON DISULFIDE	13.60	39.41	5/5
ETHYLBENZENE	2.80	6.63	1/5
METHYLENE CHLORIDE	88.40	338.31	5/5
TOLUENE	2.00	4.92	4/5
XYLENES	3.40	3.86	1/5
DEHP	1267.50	91849.55	3/6
BBP	289.50	693.26	1/6
ALUMINUM	7616.67	13202.68	6/6

CONTAMINANT	AVERAGE CONCENTRATION (ug/kg)	95% UPPER CONFIDENCE LIMIT (ug/kg)	FREQUENCY OF DETECTION
ARSENIC	1.84	2.47	6/6
BARIUM	11.82	12.17	6/6
BERYLLIUM	0.38	0.90	5/6
CALCIUM	1313.00	1313.49	6/6
CHROMIUM	57.50	58.36	6/6
COBALT	2.56	3.41	4/6
COPPER	8.03	8.36	5/6
IRON	21233.33	21233.89	6/6
LEAD	12.71	13.20	5/8
MAGNESIUM	61.70	62.19	6/6
MANGANESE	70.22	71.00	6/6
POTASSIUM	64.15	64.45	1/8
SELENIUM	0.19	0.52	1/6
SODIUM	48.48	49.04	4/6
VANADIUM	76.37	76.69	6/6
ZINC	85.02	85.95	6/6

TABLE 6-8
CONCENTRATIONS OF CONTAMINANTS FOUND IN SURFACE WATER

CONTAMINANT	AVERAGE CONCENTRATION (ug/L)	95% UPPER CONFIDENCE LIMIT (ug/L)	FREQUENCY OF DETECTION
1,1,1-TCA	4.20	8.01	2/5
1,1-DCA	2.90	4.53	1/5
4-M-2-P	4.40	7.84	1/5
ACETONE	11.00	56.35	5/5
CARBON DISULFIDE	11.00	56.35	5/5
METHYLENE CHLORIDE	9.40	2246.66	1/5
ALUMINUM	196.00	659.06	4/4

CONTAMINANT	AVERAGE CONCENTRATION (ug/L)	95% UPPER CONFIDENCE LIMIT (ug/L)	FREQUENCY OF DETECTION
BARIUM	12.73	327.94	2/4
CALCIUM	8070.00	11577.16	4/4
CHROMIUM	6.53	28.61	1/4
IRON	550.50	688.37	4/4
MAGNESIUM	390.75	519.33	4/4
MANGANESE	48.40	1101.99	4/4
POTASSIUM	436.00	10144.23	1/4
SODIUM	2455.00	4158.22	4/4
ZINC	76.40	23840.22	3/4

subsurface samples and therefore, the data in the Table does not necessarily reflect land surface concentrations.

6.2 EXPOSURE ASSESSMENT

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

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

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

An evaluation was undertaken of all potential exposure pathways which could connect chemical sources at the Site with potential receptors. All possible pathways were first hypothesized and evaluated for completeness using EPA's criteria. Three current potentially complete exposure pathways and four future exposure pathways remained after screening. The current pathways represent exposure pathways which could or do exist under current Site conditions while the future pathways represent exposure pathways which could exist, in the future, if the current exposure conditions change.

According to the Dougherty County Planning Commission, residential use of this land is possible. In addition, industrial operation to the east would not serve as an absolute obstruction to residential development in the southern portion of the Site and to the west. As a result, a future potential residential scenario for residents living on the southern portions of the facility property was developed and evaluated.

The exposure and intake parameters used in generating risk caused by current and future scenarios are presented in Tables 6-9 through 6-14. Exposure by each of these pathways was mathematically modeled using generally conservative assumptions and is further discussed in Section 6.5.

The current pathways are:

- on-site worker
- off-site residential populations
- trespassers

The future pathways are:

- on-site worker
- off-site residential populations
- trespassers
- residents living on the southern portion of the Site

The exposure point concentrations for each of the chemicals of concern and the exposure assumptions for each pathway were used to estimate the chronic daily intakes for the potentially complete pathways, with the exception of the groundwater pathway. The chronic daily intakes were then used in conjunction with cancer potency factors and noncarcinogenic reference doses to evaluate risk. No current sensitive subpopulations were localized to the Site's area during the exposure assessment.

EXPOSURE AND INTAKE PARAMETERS FOR ASSESSING INGESTION AND DERMAL EXPOSURE TO SOIL BY WORKERS

Exposure or Intake Parameter	Value	Rationale/Discussion/Reference
Chemical concentration in soil (Cs)	95% upper confidence limit concentration or maximum concentration of surface soils in manufacturing area	Represents reasonable maximum exposure concentration. Recommended in "Risk Assessment Guidance for Superfund: Volume I - Human Health Evaluation Manual" (RAGS), EPA/540/1-89/002, 12/89.
Skin surface area (SA)	3200 cm^2/event (dy)	Represents exposure of hands and arms. Workers unlikely to wear short pants or partially exposing clothing other than shorter sleeves of shirt. No seasonal variation because of the mild climate of southern Georgia.
Adherence factor (AF)	0.6 mg/cm^2	Middle value of range recommended by EPA Region IV (0.2 mg/cm^2 - 1.0 mg/cm^2).
Absorption factor (ABS)	1% for organic chemicals 0.1% for inorganic chemicals	EPA Region IV supplemental risk assessment guidance (2/11/92).
Soil ingestion rate (IR)	50 mg/dy	"Standard Default Exposure Factors" (SDEF), OSWER Directive 9285.6-03, 3/25/91.
Fraction ingested from contaminated source (FI)	1.0	Assumes that all soil ingested during working hours is impacted.
Exposure frequency (EF)	250 dy/yr (5 dy/wk; 50 wk/yr)	Conventional work frequency (SDEF, 3/25/91).
Exposure duration (ED)	25 yr	Conventional work duration (SDEF, 3/25/91).
Body weight (BW)	70 kg	Conventional adult body weight (RAGS, 12/89).
Averaging time (AT)	Non-carcinogens: 365 d/yr x 25 yr Carcinogens: 365 dy/yr x 70 yr	Conventional averaging times (RAGS, 12/89).

EXPOSURE AND INTAKE PARAMETERS FOR ASSESSING EXPOSURE TO SEDIMENTS AND SURFACE WATER BY WORKERS

Exposure or Intake Parameter	Value	Rationale/Discussion/Reference
Chemical concentration in sediments (Cs)	95% upper confidence limit concentration or maximum concentration in sediments of manufacturing area	Represents reasonable maximum exposure concentration. Recommended by "Risk Assessment Guidance for Superfund" (RAGS), EPA/540/1-89/002 (12/89).
Sediment ingestion rate (IR)	50 mg/day	"Standard Default Exposure Factors" (SDEF), OSWER Directive 9285.6-03, (3/25/91).
Fraction ingested from contaminated source (FI)	1.0	Assumes all of soil and water contacted by workers is impacted.
Skin surface area (SA)	3200 cm^2	Represents surface area of the hands and forearms.
Soil to skin adherence factor (AF)	0.6 mg/cm^2	Middle value of range recommended by EPA Region IV (0.2 mg/cm^2 - 1.0 mg/cm^2).
Absorption factor (ABS) (for sediments)	1% for organic chemicals 0.1% for inorganic chemicals	EPA Region IV Supplemental Risk Assessment Guidance (2/11/92).
Chemical concentration in water (CW)	95th upper confidence limit or maximum concentration of surface water sampled from manufacturing area.	Represents reasonable maximum exposure concentration.
Dermal permeability constant (PC) (For surface water)	Chemical-specific	Values selected from EPA's "Interim Guidance for Dermal Exposure Assessment", OHEA-E-367 (3/91) and Flynn (1990) as cited in OHEA-E-367.
Exposure time (ET)	1 hr/day	Exposure to sediments and surface water in east drainage ditch is expected to be minimal, generally occurring only when grounds are landscaped.
Exposure frequency (EF)	24 days/yr	Exposure to sediments and surface water in east drainage ditch is expected to be minimal, generally occurring only when grounds are landscaped. A reasonable maximum amount of time performing landscaping is every other week year-round.
Exposure duration (ED)	25 years	"Standard Default Exposure Factors" (SDEF), OSWER Directive 9285.6-03, (3/25/91).
Body weight (BW)	70 kg	Conventional adult body weight (RAGS 12/89).
Averaging time (AT)	Non-carcinogens: 365 dy/yr x ED Carcinogens: 365 dy/yr x 70 yr	Conventional averaging times (RAGS 12/89).

EXPOSURE AND INTAKE PARAMETERS FOR ASSESSING INHALATION EXPOSURE TO PARTICLE AND VAPOR PHASE CHEMICALS BY WORKERS

Exposure or Intake Parameter	Value	Rationale/Discussion/Reference
Chemical Concentration in air (CA)	Modeled value based on 95% upper confidence limit concentration of chemical in soil or maximum concentration	Represents reasonable maximum exposure concentration. Recommended by "Risk Assessment Guidance for Superfund" (RAGS), EPA/540/1-89/002, 12/89.
Inhalation rate (IR)	20 m^3/workday (2.5 m^3/hr)	"Standard Default Exposure Factors" (SDEF), OSWER Directive 9285.6-03, 3/25/91.
Exposure time (ET)	5 hr/wk (1 hr/dy; 5 dy/wk)	Majority of work occurs in manufacturing building. Only occasional intermittent exposure outside is expected.
Exposure frequency (EF)	50 wk/yr (250 dy/yr)	Conventional work frequency (SDEF, 3/25/91).
Exposure duration (ED)	25 yr	Conventional work duration (SDEF 3/25/91).
Body weight (BW)	70 kg	Conventional adult body weight (RAGS 12/89).
Averaging time (AT)	Non-carcinogens: 365 dy/yr x 25 yr Carcinogens: 365 dy/yr x 70 yr	Conventional averaging times (RAGS 12/89).

EXPOSURE AND INTAKE PARAMETERS FOR ASSESSING INGESTION OF GROUNDWATER, INHALATION OF VOLATILE CHEMICALS IN GROUNDWATER AND DERMAL CONTACT WITH GROUNDWATER BY POTENTIAL FUTURE ON-SITE RESIDENTS

Exposure or Intake Parameter	Value	Rationale/Discussion/Reference
Chemical concentration in groundwater (CW)	95% upper confidence limit or maximum concentration in Upper Ocala wells in manufacturing/burn pit area or southern/western area	Represents reasonable maximum exposure ("Risk Assessment Guidance for Superfund: Volume I: Human Health Evaluation Manual (Part A)" EPA/540/1-89/002, 12/89 (RAGS).
Chemical concentration in air (CA) (showering)	Modeled value based on 95% upper confidence limit or maximum concentration in Upper Ocala wells in manufacturing/burnpit area or southern/western area	Represents reasonable maximum exposure ("Risk Assessment Guidance for Superfund: Volume I: Human Health Evaluation Manual (Part A)" EPA/540/1-89/002, 12/89 (RAGS). Modeled air concentrations are presented in other tables.
Ingestion rate (IR)	1 liter/day (ages 0-6) 2 liters/day (adults)	EPA's "Exposure Factors Handbook" (EPA/600/8/-89/043, 7/89) describes several different drinking water intake rates for children: 1 liter per day for children under 10 kg, 0.9 L/day for 2 year olds, 1.5 L/day for children 14-16 years, an average of 0.76 L/day for children 0 to 9, and a range of 1-1.7 L/day for children 5-14 yrs. EPA guidance does not recommend one value. A value of 1 L/day for children of age 0-6 is consistent with the ranges cited in this guidance, and corresponds to the age group in which soil ingestion also varies from adult intakes. A value of 2 L/day for adults is recommended in RAGS for reasonable maximum exposures (RAGS 12/89).
Inhalation rate (IR)	0.6 m^3/hr (0.01 m^3/min)	Recommended inhalation rate for showering for all age groups (RAGS, 12/89).
Skin surface area (SA)	0.73 m^2 for children 1.94 m^2 for adults	50th percentile male child body surface area for ages 3-6 (RAGS, 12/89), used to represent 0-6 yr olds, as well. 50th percentile adult male body surface area (RAGS, 12/89).
Dermal permeability constant (PC)	Chemical-specific	Values selected from EPA's "Dermal Exposure Assessment: Principles and Applications" EPA/600/8-91/011B, 1/92, and Flynn (1990) as cited in this report.
Exposure time for showering (ET)	12 min/event (day) (0.2 hr/event)	90th percentile time for showering (RAGS 12/89). Assumed to be the same length of time for bathing in younger children.
Exposure frequency (EF)	350 dy/yr	"Standard Default Exposure Factors", OSWER Directive 9285.6-03 (3/25/91).
Exposure duration (ED)	6 years for children 24 years for adults (total 30 yr)	RAGS, 12/89.
Body weight (BW)	15 kg for children (age 0-6) 70 kg for adults	RAGS, 12/89.
Averaging time (AT)	Non-carcinogens: 365 dy/yr x ED Carcinogens: 365 dy/yr x 70 yr	Convention averaging times (RAGS 12/89).

EXPOSURE AND INTAKE PARAMETERS FOR ASSESSING INGESTION AND DERMAL CONTACT WITH SURFACE SOILS FOR POTENTIAL FUTURE ON-SITE RESIDENTS

Exposure or Intake Parameter	Value	Rationale/Discussion/Reference
Chemical concentration in soil (CS)	95% upper confidence limit or maximum concentration in surface soils at the manufacturing or southern/western area	Represents reasonable maximum exposure ("Risk Assessment Guidance for Superfund - Volume I: Human Health Evaluation Manual (Part A)", EPA/540/1-89/002, 12/89 (RAGS).
Soil ingestion rate (IR)	200 mg/day for children (age 0-6) 100 mg/day for adults (> 6 yr)	RAGS, 12/89.
Fraction ingested from contaminated source (FI)	1.0	Assumes that all soil ingested is contaminated
Skin surface area (SA)	2000 cm^2 for children 3200 cm^2 for adults	Represents hands, one-half of arms and one-half of legs for children (RAGS, 12/89). Represents hands and arms (or hands and about one-third of legs and arms) for adults (RAGS, 12/89).
Adherence Factor (AF)	0.6 mg/cm^2	Middle value of range recommended by EPA Region IV (0.2-1.0 mg/cm^2) in supplemental risk assessment guidance (2/11/92).
Dermal absorption factor (ABS)	1% for organic chemicals 0.1% for inorganic chemicals	EPA Region IV supplemental risk assessment guidance (2/11/92).
Exposure frequency (EF)	350 dy/yr	EPA's "Standard Default Exposure Factors" OSWER Directive 9285.6-03, 3/25/91.
Exposure duration (ED)	6 yr at child parameters 24 yr at adult parameters (total 30 yr)	RAGS 12/89.
Body weight (BW)	15 kg (ages 0-6) 70 kg (6-24 years)	RAGS, 12/89.
Averaging time (AT)	Non-carcinogens: 365 dy/yr x ED Carcinogens: 365 dy/yr x 70 yr	Conventional averaging time (RAGS 12/89)

EXPOSURE AND INTAKE PARAMETERS FOR ASSESSING EXPOSURE TO VOLATILIZED SOIL CHEMICALS AND ENTRAINED SOIL PARTICLES FOR POTENTIAL FUTURE ON-SITE RESIDENTS

Exposure or Intake Parameter	Value	Rationale/Discussion/Reference
Chemical concentration in air (CA)	Modeled value based upon 95% upper confidence limit or maximum concentration in soil at either manufacturing area of southern/western site	Represents reasonable maximum exposure.
Inhalation rate (IR) (while outdoors)	5 m^3/day for children (0-6) 5 m^3/day for adults (6-24)	"Standard Default Exposure Factors" (OSWER Directive 9285.6-03 (3/25/91) recommends a total daily inhalation rate of 20 m^3/day, 15 m^3/day of which is indoor exposure. The remaining portion (5 m^3/day) is assumed to result from outdoor exposure. Child inhalation rates are approximately the same ("Exposure Factors Handbook" EPA/600/8-89/043, 7/89).
Exposure frequency (EF)	350 dy/yr	"Standard Default Exposure Factors" (OSWER Directive 9285.6-03 (3/25/91).
Exposure duration (ED)	6 yr (ages 0-6) 24 yr (ages 6-24) 30 years total	30 year exposure is 90th percentile amount of time residing in one location ("Risk Assessment Guidance for Superfund-Volume I: Human Health Evaluation Manual (Part A)" EPA/540/1-89/002, 12/89, (RAGS)).
Body weight (BW)	15 kg (ages 0-6 yr) 70 kg (ages 6-24)	RAGS, 12/89.
Averaging time (AT)	Non-carcinogens: 365 dy/yr x ED Carcinogens: 365 dy/yr x 70 yr	Conventional averaging time (RAGS, 12/89).

6.3. TOXICITY ASSESSMENT

Toxicity values are used in conjunction with the results of the exposure assessment to characterize Site risk. EPA has developed critical toxicity values for carcinogens and noncarcinogens. Cancer Slope Factors (CSFs) have been developed by EPA's Carcinogenic Assessment Group for estimating excess lifetime cancer risks associated with exposure to potentially carcinogenic chemicals. CSFs, which are expressed in units of $(mg/kg/day)^{-1}$, are multiplied by the estimated intake of a potential carcinogen, in mg/kg/day, to provide an upper-bound estimate of the excess lifetime cancer risk associated with exposure at that intake level. The term "upper bound" reflects the conservative estimate of the risks calculated from the CSF. Use of this conservative approach makes underestimation of the actual cancer risk highly unlikely. Cancer Slope Factors are derived from the results of human epidemiological studies or chronic animal bioassays to which animal-to-human extrapolation and uncertainty factors have been applied. The CSFs for oral ingestion and inhalation exposure to the contaminants of concern at the Site are contained in Table 6-15.

Reference doses (RfDs) have been developed by EPA for indicating the potential for adverse health effects from exposure to chemicals exhibiting noncarcinogenic effects. RfDs, which are expressed in units of mg/kg/day, are estimates of lifetime daily exposure levels for humans, including sensitive individuals. Estimated intakes of chemicals from environmental media can be compared to the RfD. RfDs are derived from human epidemiological studies or animal studies to which uncertainty factors have been applied (e.g., to account for the use of animal data to predict effects on humans). These uncertainty factors help ensure that the RfDs will not underestimate the potential for adverse noncarcinogenic effects to occur. The RfDs for oral ingestion and inhalation exposure to the contaminants of concern at the Site are contained in Table 6-15. The following information corresponds with the alphabets located in the "Weight of Evidence Category" column of the table.

> Group A - Human Carcinogen; Group B - Probable Human Carcinogen (B1 - limited evidence from epidemiologic studies; B2 - Sufficient evidence from animal studies and inadequate or no data from epidemiologic studies); Group C - Possible Human Carcinogen; Group D - Not Classifiable as to Human Carcinogenicity and Group NE - Evidence of Non-Carcinogenicity for humans.

CHRONIC REFERENCE DOSES (RfDs) AND CANCER SLOPE FACTORS (SFs) FOR CONTAMINANTS OF CONCERN (COCs)

Chemical	Oral Reference Dose (mg/kg-dy)	Uncertainty and Modifying Factors	Inhalation Reference Dose (mg/kg-dy)	Uncertainty and Modifying Factors	Oral Slope Factor $(mg/kg\text{-}dy)^{-1}$	Inhalation Slope Factor $(mg/kg\text{-}dy)^{-1}$	Weight of Evidence Category
2-Butanone	0.05[2]	1000	0.09	1000			D
1,1-Dichloroethane (1,1-DCA)	0.1	1000	0.1	1000	ND	ND	C
1,1-Dichloroethylene (1,1-DCE)	0.009	1000	ND		0.6	1.2	C
1,2-Dichloroethylene[1] (1,2-DCE)	0.02	1000	ND				NE
1,1,1-Trichloroethane (1,1,1-TCA)	0.09[2]	1000	0.3	1000			D
4-Methyl-2-pentanone (4-M-2-P)	0.05[2]	1000	0.02	1000			NE
Acetone	0.1	1000	ND				D
Benzene					0.029	0.029	A
Bis(2-ethylhexyl)-phthalate (DEHP)	0.02	1000	ND		0.014	ND	B2
Carbon Disulfide	0.1	100	0.0028	1000			NE
Chloroform	0.01	1000	ND		0.0061	0.0875	B2
Di-n-butylphthalate	0.1	1000	ND				D
Ethylbenzene	0.1	1000	0.29	300			D

CHRONIC REFERENCE DOSES (RfDs) AND CANCER SLOPE FACTORS (SFs) FOR CONTAMINANTS OF CONCERN (COCs) AND OTHER CHEMICALS CONSIDERED IN THE BASELINE RISK ASSESSMENT

Chemical	Oral Reference Dose (mg/kg-dy)	Uncertainty and Modifying Factors	Inhalation Reference Dose (mg/kg-dy)	Uncertainty and Modifying Factors	Oral Slope Factor $(mg/kg\text{-}dy)^{-1}$	Inhalation Slope Factor $(mg/kg\text{-}dy)^{-1}$	Weight of Evidence Category
Polychlorinated Biphenyls (PCBs)	ND		ND		7.7	ND	B2
Pyrene	0.03	3000	ND				D
Tetrachloroethylene (PCE)	0.01	1000	ND		0.051	0.00182	B2
Toluene	0.2	1000	0.57	100			D
Trichloroethylene (TCE)	ND		ND		0.011[3]	0.017[3]	B2
Xylenes	2	100	0.086	100			D
Antimony	0.0004	1000	ND				NE
Arsenic	0.0003	3	ND		1.75	15	A
Barium	0.05	100	0.0001	1000			NE
Beryllium	0.005	100	ND		4.3	8.4	B2
Cadmium	0.0005 (water)	10	ND	-	ND	6.1	B1
Chromium (trivalent)	1	1000	5E-07	300		[illegible]	NE

CHRONIC REFERENCE DOSES (RfDs) AND CANCER SLOPE FACTORS (SFs) FOR CONTAMINANTS OF CONCERN (COCs) AND OTHER CHEMICALS CONSIDERED IN THE BASELINE RISK ASSESSMENT

Chemical	Oral Reference Dose (mg/kg-dy)	Uncertainty and Modifying Factors	Inhalation Reference Dose (mg/kg-dy)	Uncertainty and Modifying Factors	Oral Slope Factor $(mg/kg\text{-}dy)^{-1}$	Inhalation Slope Factor $(mg/kg\text{-}dy)^{-1}$	Weight of Evidence Category
Chromium (hexavalent)	0.005	500	5E-07	300		41	A
Copper	0.037[3]	NA	ND				D
Lead	ND		ND		ND	ND	B2
Manganese	0.1	1	0.0001	900			D
Nickel	0.02	300	ND		0.84 (refinery dust)	ND	A
Selenium	0.005	3	ND				D
Vanadium	0.007	100	ND				D
Thallium	0.00007 (soluble salts)	3000	ND				NA
Zinc	0.2	10	ND				D

1. Values are presented for trans-1,2-dichloroethylene (t-1,2-DCE). Site was analyzed for total 1,2-DCE.
2. The toxicity value for this chemical has been recently withdrawn by EPA for further evaluation. The value presented is from the EPA's Health Effects Assessment Summary Tables.
3. Calculated from the drinking water standard of 1.3 mg/L.

ND Not developed; NE Not evaluated; NA Not applicable

All values from this table were obtained from EPA's Integrated Risk Information System (IRIS) accessed on January 22-25, 1992. If IRIS did not contain toxicity values, EPA's Health Effects Assessment Summary Tables, FY-91 (OERR 9200.6-303 (91-1), January 1991, was consulted.

The following chemicals were selected as chemicals of interest in some or all media, but do not possess toxicity values with which to perform an assessment: 2-hexanone, aluminum, calcium, cobalt, iron, magnesium, potassium and sodium.

6.4 RISK CHARACTERIZATION

Human health risks are characterized for potential carcinogenic and noncarcinogenic effects by combining exposure and toxicity information. Excessive lifetime cancer risks are determined by multiplying the estimated daily intake level with the cancer potency factor. These risks are probabilities that are generally expressed in scientific notation (e.g., $1x10^{-6}$). An excess lifetime cancer risk of $1x10^{-6}$ indicates that, as a plausible upper bound, an individual has a one in one million additional (above their normal risk) chance of developing cancer as a result of site-related exposure to a carcinogen over a 70-year lifetime under the assumed specific exposure conditions at a Site.

The Agency considers individual excess cancer risks in the range of $1x10^{-4}$ to $1x10^{-6}$ as protective; however the $1x10^{-6}$ risk level is generally used as the point of departure for setting cleanup levels at Superfund Sites. The point of departure risk actions that result in risks at the more protective end of the risk range.

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

The health risks resulting from exposure to the current pathways are as follows:

Overall, the baseline risk assessment indicates the unacceptable health hazards and risks are not posed to humans currently having access to the Site. The summed upper bound cancer risks for reasonable maximum exposures to current workers at the Site is within the acceptable risk range and the non-carcinogenic Hazard Index is below the comparison Hazard Index threshold value of 1.0. The overall upper bound cancer risks for reasonable maximum exposures to trespassers, both youths and adults, is at or below the lower end of the risk range($1x10^{-6}$), and noncarcinogenic Hazard Indices are below 1.0.

The health risk resulting from exposure potential future pathway are as follows:

The baseline risk assessment also evaluated the health impacts associated with potential future residential development of the manufacturing area and southern portions of the Site. When EPA assumes residents (children and adults) are living on the Site property itself and depend exclusively on local groundwater from the Upper Ocala/Transition Zone as a water source, both upper bound cancer risk (greater than $1x10^{-4}$ or an increased chance of one additional case in ten thousand) and non-cancer hazard estimate (greater than 1.0) do exceed established acceptable risk levels. In all cases unacceptable risks and hazards were a result of drinking contaminated groundwater and breathing volatile groundwater chemicals during showering. However, even if the property were converted to residential, local shallow groundwater would not be used because connections to the municipal system are already available. In addition, the shallow water-bearing zone does not produce an adequate water supply. The plant itself is already served by city water and city sewer. The total lifetime cancer risk for potential on-site residents in the southern portions of the Site would be $7x10^{-4}$ (a chance of 7 additional cancer cases in 10,000 people) which exceeds EPA's target range. The Hazard Index for substances causing harmful effects other than cancer would be 17 for this area, which greatly exceeds acceptable exposure and warrants cleanup. A summary of cancer risk and non-carcinogenic health hazard estimates for all scenarios considered at the Site and designation of chemicals and media for which remediation levels were derived are presented in Table 6-16. A potential on-site resident in the manufacturing area scenario was presented in the FS. After review, EPA has determined that the scenario is not a probable land use for that portion of the Site. However, "potential on-site residents in the southern portions of the Site" scenario shall be included with the factors used to develop the contaminants of concern for this Site. The following table presents each chemical that poses unacceptable risks for all scenario considered.

6.5 ENVIRONMENTAL RISK

There are two distinct vegetation zones at the site: a maintained grassy area on the north half of the Site and a natural-type area on the south half. The grassy area lies to the west of the manufacturing plant, and is periodically mowed in certain areas. This area contains scattered areas of some hydrophytic vegetation. Most of the hydrophytic vegetation is in a small wetland area along Sylvester Road.

Table 6-16 Summary of Cancer Risk & Non-Carcinogenic Health Hazard Estimates/Determination of Media Requiring Cleanup

RECEPTOR	MEDIUM	NON-CARCINOGENIC HAZARD INDEX (all exposure routes)	CHEMICALS WITH HAZARD QUOTIENT GREATER THAN 1	CLEANUP LEVELS DERIVED ?	UPPERBOUND CANCER RISKS (all exposure routes)	CHEMICALS WITH A RISK GREATER THAN $1X10^{-6}$	CLEANUP LEVELS DERIVED?
Current Worker	Soil	0.06	None	No	$3x10^{-5}$	PCBs	Yes
	Sediments	0.0008	None	No	$1X10^{-7}$	None	No
	Surface Water	0.0002	None	No	—	—	No
Adult Trespasser	Soil	0.3	None	No	$2x10^{-8}$	None	No
	Sediments	0.005	None	No	$1x10^{-6}$	None	No
	Surface Water	0.03	None	No	NA	NA	No
Youth Trespasser	Soil	0.5	None	No	$8x10^{-9}$	None	No
	Sediments	0.006	None	No	$5x10^{-7}$	None	No
	Surface Water	0.04	None	No	—	—	No
Potential Adult Off-site Residents	Groundwater	0.04	None	No	$7x10^{-5}$	1,1-Dichloroethene, (1,1-DCE)	Yes
Potential On-Site Residents Southern Site	Groundwater	17	Antimony, Carbon-Disulfide	Yes	$7x10^{-4}$	Beryllium, 1,1-DCE	Yes
	Soil	1	None	No	$3x10^{-8}$	None	No

The grassy area contains mainly Bahia grass and some hydrophytic vegetation, including reed grass, maidencane, sedges, rushes and mild water pepper. The wetland areas of the southern half contain such species as black willow, water oak, southern bayberry and cattail. The other large wetland area in the southeastern section of the Site contains the largest and most mature trees on the Site. Trees in this area include slash pine, water oak, laurel oak and black oak.

The fauna on and around the Site observed during the RI/FS include, but are not limited to, mammals such as the white-tailed deer, raccoon, gray fox, gray squirrel and eastern cottontail rabbit; birds such as the common crow, mourning dove, bobwhite quail, turkey vulture, killdeer, cattle egret, blue jay and marking bird; reptiles such as the gopher tortise; amphibians such as the green frog; and pond macroinvertebrates such as water boatmen, water striders and dragonflies. Faunal observations at the Site included visual observations of the animal, or any signs of the animal such as tracks, nests or song.

In general, adverse impacts to aquatic, avian and mammalian environmental receptors are unlikely. Surface water and sediment chemical concentrations are generally below comparison values and concentrations of chemicals in soils were unlikely to pose a significant food chain impact under current Site conditions. Although some isolated elevated concentrations of zinc and chromium were detected in sediments, the lack of sustained bodies of water and, therefore, the lack of widespread aquatic receptors suggests that the impact of these concentrations is likely to be limited.

7.0 DESCRIPTION OF CLEANUP ALTERNATIVES

The cleanup alternatives considered for both soil and groundwater in the Feasibility Study (FS) are discussed below, and the criteria EPA uses to evaluate the options are discussed in Section 8.

7.1 Alternatives for Groundwater Remediation

Groundwater Alternative A: No Action

In this groundwater alternative, no further cleanup action would be taken. EPA is required by the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) to use this option as the baseline against which others are compared. This alternative is not protective of the groundwater and will not achieve ARARs. There would be no cost for this alternative.

Groundwater Alternative B: Institutional Controls

Alterative B would consist of institutional controls, such as deed restrictions or well drilling bans, in combination with groundwater monitoring. This alternative would reduce any potential health risks associated with contaminated groundwater. Deed restrictions would be placed on the contaminated area to prohibit the installation of new water supply wells. The potential for cross-contaminating of the lower groundwater zones and increasing the hydraulic gradient would be prevented by prohibiting the installation of new wells. This alternative would provide for natural attenuation of contaminants to restore groundwater quality. Groundwater sampling and analysis for identified contaminants of concern would be performed quarterly in the courtyard area and at the boundary of the contaminated area. The results from the groundwater monitoring would be used to determine the effectiveness of natural attenuation as a remedial option and to assess potential contaminant migration. A review of the groundwater data collected at the Site would be evaluated quarterly until contaminant concentrations in the groundwater no longer exceed groundwater cleanup levels for three consecutive sampling events. The total cost to implement this remedy is estimated at $334,500.

Groundwater Alternative C: Institutional Controls/Containment

Groundwater Alternative C would consist of the same controls and monitoring as B with containment. This would involve installing an asphalt cap over portions of the courtyard area and any necessary drainage controls. Drainage controls would provide additional protection from infiltration and damage to the cap. Deed restrictions and groundwater monitoring would be implemented as described for Alterative B to monitor movement and the effectiveness of natural attenuation of groundwater. Groundwater sampling and analysis for identified contaminants of concern would be performed quarterly in the courtyard area and at the boundary of the contaminated area. The results from the groundwater monitoring would be used to determine the effectiveness of natural attenuation and containment as a remedial option and to assess potential contaminant migration. A review of the groundwater data collected at the Site would be evaluated quarterly until contaminant concentrations in the groundwater no longer exceed groundwater cleanup levels for three consecutive sampling events. The estimated cost is $611,500 for this alternative.

Groundwater Alternative D: Controls, Pump & On-site Treatment with Discharge to POTW

This alternative would include the same controls and monitoring as Alterative B in addition to pumping contaminated groundwater and treating it using air stripping on-site. Extraction of groundwater would be accomplished by installing pumps in the courtyard area monitoring wells in which contaminants have been detected above the cleanup levels. The installation of additional wells may be required to adequately extract the contaminated groundwater. The location and number of wells in the manufacturing area depends on the areal extent of contamination, area of influence produced by each well, and the variability in pneumatic permeability around the manufacturing area. Some pilot-scale treatability work would likely be required to complete the design of the air stripping system. The extracted groundwater would be pumped through any necessary solids removal system to remove suspended and/or dissolved solids (including metals) and through the air stripping system to remove VOC's. The treated groundwater would be discharged through the existing sewer system to the local Publicly Owned Treatment Works (POTW) after all discharge requirements are met. Groundwater sampling and analysis for identified contaminants of concern would be performed quarterly in the courtyard area and at the boundary of the contaminated area. The results from the groundwater monitoring would be used to determine the effectiveness of the treatment system as a remedial option and to assess potential contaminant migration. A review of the groundwater data collected at the Site would be evaluated quarterly until contaminant concentrations in the groundwater no longer exceed groundwater cleanup levels for three consecutive years. Groundwater cleanup levels are expected to be achieved within thirty years. The emissions from the air stripping system would meet all State and Federal air quality requirements relating to the treatment system. The estimated cost for this alternative is $1,880,000.

7.2 Alternatives for Soil Remediation

Alternatives for soil which would treat the principal threats posed by the PCB contamination vary by treatment, quantities and characteristics of the residuals and untreated wastes.

Soil Alternative A: No Action

No action would be taken to address PCBs remaining in the soil above 10 mg/kg at no further cost. The NCP requires using "no action" as a basis for comparing active cleanup measures. This alternative would not be protective and would not achieve ARARs.

Soil Alternative B: Institutional Controls

Alternative B would use deed restrictions on the Site for future and present land use as a control to reduce the risks posed by PCBs at the Site. In conjunction with deed restrictions, a security fence would be constructed around the contaminated area to reduce the possibility of ingestion or direct contact with the PCBs. A monitoring well(s) would be installed and sampled to determine if the PCBs were moving to the groundwater. The estimated cost is $82,500.

Soil Alternative C: Controls and Containment

Alterative C would use the same controls and monitoring as B in addition to containment to reduce potential health risks associated with the PCBs in soils. The fencing would reduce the possibility of direct contact with the PCBs. Containment would include the construction of an asphalt cap over the contaminated area. The cap design would include drainage controls at an estimated cost of $123,200.

Soil Alternative D: Excavation/Off-Site Disposal

Soil Alternative D would include excavation of the contaminated soil above 10 ppm and transportation to an off-site Toxic Substances Control Act (TSCA)-permitted landfill. Excavation would be done by conventional construction equipment and loaded into a lined, covered roll-off containers or dump trucks. The excavated area would be backfilled with clean fill material. Total cost is estimated at $56,200.

Soil Alternative E: Solvent Extraction/On-Site Disposal of Treated Soil/Off-Site Disposal of PCBs

This alternative would involve excavation, treatment, and on-site disposal of the treated soil. A solvent extraction process would be used to treat the contaminated soils on-site. This treatment involves removing PCBs from the excavated soil. Extracting the PCBs may require more than one stage to reduce PCB concentrations in the soil to less than 2 mg/kg so they will be acceptable for on-site disposal with no additional controls. Recovered PCBs would be placed in appropriate containers and shipped off-site for disposal at a TSCA-permitted facility. The estimated cost is $214,800 for this alternative.

8.0 SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES

A detailed comparative analysis was performed on the five soil alternatives and four groundwater alternatives during the FS

using the nine evaluation criteria set forth in the NCP. The advantages and disadvantages were compared to identify the alternative with the best balance among these nine criteria.

The NCP categorizes the none criteria into three groups:

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

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

(3) Modifying Criteria - state and community acceptance are modifying criteria that are formally taken into account after public comment is received on the proposed plan and incorporated in the ROD.

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

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

THRESHOLD CRITERIA

8.1 Overall Protection of Human Health & Environment addresses whether or not a remedy provides adequate protection and describes how risks are eliminated, reduced, or controlled through treatment, engineering controls or institutional controls. Criteria used to evaluate the protectiveness of an alternative included the following: (1) no cancer risks from exposure to groundwater with concentrations that exceed MCLs; (2) no significant risks of threshold toxic effect (HI less than 1); and (3) no significant risk or adverse impact on the environment.

Groundwater Alternative A would not protect human health or the environment from the potential risks posed by the groundwater contamination at the Site. Alternatives B and C would provide protection to human health by reducing the potential for ingesting groundwater through deed restrictions. In addition, C would reduce movement of contaminants into the deeper aquifer which is a water supply source. Groundwater extraction in D would provide additional protection through treatment of groundwater to remove the contamination.

Since Groundwater Alternative A does not eliminate, reduce or control any of the exposure pathways, it is therefore not protective of human health or the environment and will not be considered further in this analysis.

Soil Alternative A would not protect human health or the environment from risks posed by the PCBs in the soil or meet cleanup levels. Alternatives B and C would provide some protection by reducing the potential for direct contact with contaminants. The cap under Alternative C would provide additional protection for the environment by reducing the penetration of water through the source area. This would reduce the potential for contaminants to move into the groundwater. A long-term risk would exist under C because the contaminants would be contained rather than destroyed. Alternatives D and E would provide the most protection for human health and the environment by removing contaminants from the Site. Solvent extraction would treat the contaminated soils in E. Alternatives D and E would meet cleanup levels.

Since Soil Alternative A does not eliminate, reduce or control any of the exposure pathways, it is therefore not protective of human health or the environment and will not be considered further in this analysis.

8.2 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 and/or provide grounds for a waiver. The identified ARARs for this Site are listed in Section 10.2.

Groundwater Alternative A would not provide a way to evaluate compliance with the chemical-specific cleanup requirements. Action-specific requirements would not be applicable to A because no cleanup action would be taken. Alternatives B, C and D would comply with health and environmental requirements. There are no location specific requirements applicable to the Site.

The 10 mg/kg TSCA action level is appropriate as a PCB cleanup level for Site soils. No location-specific requirements are appropriate to this Site. Soil Alternative A would not meet any

standards because no action would be taken. Alternative B, Controls, would not meet any requirements because no active measures would be included. Alternatives C, D and E would comply with all federal and state action-specific requirements.

Since Soil Alternative B would not comply with the TSCA action level, it will not be considered further in this analysis.

PRIMARY BALANCING CRITERIA

8.3 Long-term Effectiveness and Permanence refers to expected residual risk and the ability of a remedy to maintain reliable protection of human health and the environment over time, once cleanup levels have been achieved. This criterion includes the consideration of residual risk and adequacy and reliability of controls.

Groundwater Alternative B would provide a means to measure change in contamination and would provide additional protection of human health by restricting future use of the property. Alternative C would provide long-term effectiveness and permanence and would also serve to reduce movement of contaminants through containment. Alterati.e D would best reduce long-term risk through extraction and treatment of groundwater.

Proper maintenance of the cap in Alternative C should ensure long-term reliability. In addition under this alternative, monitoring would provide a way to measure the effectiveness of the cap. Alternatives D and E would have better long-term effectiveness and permanence because the contamination would be removed from the Site.

8.4 Reduction Toxicity, Mobility or Volume Through Treatment refers to the anticipated performance of the treatment technologies a remedy may employ.

No contaminated groundwater would be treated under Alternatives B or C. Thus, reduction in toxicity mobility or volume would only result through the passive means of natural processes. Alternative C would result in additional reduction in contaminant mobility by preventing rain from penetrating the cap. The toxicity, mobility and volume would be reduced by Alternative D at an accelerated pace by active means.

Soil Alternative C would not reduce toxicity or volume, but would reduce the potential for movement of contaminants to the groundwater. The toxicity, mobility and volume of the contaminants would be effectively reduced in Alternatives D and E by excavating the contaminated soil and treating it either on or

off-site. Alterative E would provide the only on-site treatment remedy for the Site.

8.5 Short-Term Effectiveness refers to the period of time needed to complete the remedy and any adverse impacts on human health and the environment that may be posed during the construction and implementation of the remedy until cleanup levels are achieved.

Groundwater contamination currently exceeds cleanup levels at the boundary of the manufacturing area. Risks during cleanup under Groundwater Alternatives B, C and D would be minimal. Risk to Site workers would be somewhat higher, but this risk would be reduced by compliance with health and safety regulations.

The short-term risk to the public and the environment under Soil Alternatives C, D and E would be minimal. Risks to Site workers would be somewhat greater, but this risk would be reduced by compliance with health and safety regulations.

8.6 Implementability is the technical and administrative feasibility of a remedy, including the availability of materials and services needed to implement the chosen solution.

Groundwater Alternatives B, C and D would be the same with respect to implementability because the technologies, the materials, and services required are readily available for each. The overall effectiveness of these alternatives would be determined by sampling the groundwater at the Site and in addition for D to monitor the treated effluent.

Soil Alternative C would require working with state and local government to establish and enforce the deed restrictions. Capping, as specified under C, is a conventional and widely used method for containing contamination. However, C might be difficult to implement, as it could affect growth of the facility. Alternative D would be relatively easy to implement because excavation is a widely used and proven method for removing contamination. The last alternative would be difficult to implement due to the relatively complex nature of on-site treatment for the small volume of soils to be treated. Treatability studies would be required during design for E to insure that solvent extraction would work effectively.

8.7 Cost - The total costs associated with Alterative B would be lower than Alterative C or D. The total present worth cost of Alternative B is $334,500, and the total present worth of C is $611,500; while the present worth of D is $1,980,000.

Only Alternative C would require operation and maintenance costs

after the cleanup was completed. The total cost of Alternative C is estimated at $123,200; D's total cost would be $56,200, and the estimated cost for E would be $214,800.

MODIFYING CRITERIA

8.8 State Acceptance - EPA and GAEPD have cooperated throughout the RI/FS process. The State has participated in the development of the RI/FS through comment on each of the planning and decision documents developed by EPA, and the Proposed Plan and the Draft ROD and through frequent contact between the EPA and the GAEPD Site project managers. GAEPD concurs with EPA on the remedy selection to remediate the contaminated media at the Firestone Site.

8.9 Community Acceptance - Based on comments received during the January 12, 1993 public meeting and the lack of negative comments received during the comment period, it appears that the Albany community generally agrees with the selected remedy.

9.0 THE SELECTED REMEDY

Based upon consideration of the CERCLA requirements, the detailed analysis of the alternatives using the nine criteria, and public comment, EPA has selected Groundwater Alterative D (Pump and Treat) and Soil Alternative D (Off-Site Disposal) to reduce risk at the Firestone Tire and Rubber Site.

This preferred alterative will permanently treat the remaining threats at the Site. It will be fully protective, cost-effective, and attain all Federal and State requirements.

9.1 Performance Standards

(1) Soil Treatment

Soil contaminated with concentrations of PCBs that exceed 10 ppm (approximately 20 cubic yards) shall be excavated and transported to a TSCA permitted landfill. The excavated area will be backfiled with clean fill material.

(2) Groundwater Treatment

Groundwater extraction and treatment system shall be constructed by installing pumps in monitoring wells in which contaminants have been detected above the cleanup levels. The installation of additional wells may be required to adequately extract the

contaminated groundwater. The location, type and number of pumps and wells required to extract the contaminated groundwater will be determined during the Remedial Design. The extracted groundwater would be pumped through any necessary solids removal system to remove suspended and/or dissolved solids (including metals) and through the air stripping system to remove VOCs. The treated groundwater would be discharged through the existing sewer system to the local Publicly Owned Treatment Works (POTW) after all discharge requirements are met. If the POTW discharge becomes unavailable, EPA may amend the ROD to allow discharge to surface water. If EPA deems necessary, additional air strippers and/or monitoring wells will be installed as part of the remedial action to ensure compliance with the cleanup levels of the selected remedy.

The groundwater extraction system will continue to operate until cleanup levels for the contaminants of concern are reached throughout the contaminated area.

The Residuum aquifer and the Floridan aquifer (referred to in some of the documents as the Residuum, Transition Zone and upper and lower Ocala aquifers) will be treated until the cleanup levels for the contaminants, as listed below are attained.

Contaminant	Cleanup Level	Type of Regulation
Antimony	6 ug/l	SDWA MCL
Beryllium	4 ug/l	SDWA MCL
Benzene	5 ug/l	SDWA MCL
Carbon Disulfide	56 ug/l	Hazard Index = 1
* Chromium	100 ug/l	SDWA MCL
1,1-DCE	7 ug/l	SWDA MCL
PCBs	0.5 ug/l	SWDA MCL
Lead	15 ug/l	Action Level
1,1,1-TCA	200 ug/l	SDWA MCL

- Cleanup level based on Maximum Contaminant Level (MCL), cancer Risk of increased chance of cancer of 1 case in 1,000,000 people ($1x10^{-6}$), Hazard Index of 1 (dosage not causing adverse effects), or Action Level depending on whether MCLs have been established.

* Contaminant added after the Proposed Plan was issued.

  Although Chromium was not included as a contaminant of concern in the Proposed Plan, the information used to include Chromium is a part of the FS and is contained in the

Administrative Record. Chromium was found on-site in the groundwater at concentrations above the MCL (100 ug/l) and therefore EPA is adding it as a contaminant of concern. EPA has determined that this is not a significant change because the original remedy already addresses metals in the groundwater and EPA believes this remedy will also address the Chromium in the groundwater.

This ROD requires sampling and analysis during the remedial design to further define the background groundwater concentrations of the inorganic contaminants. If, based on that information, the background concentration for an inorganic contaminant exceeds the SDWA MCL, EPA will reexamine whether compliance with SDWA MCL continues to be appropriate for the inorganic contaminants. The true background for inorganics at this Site will be determined by collecting additional groundwater samples for at least the first year of the RD, from the original background sampling locations using a peristaltic pump operating at a low flow rate. This procedure will be incorporated into the quarterly sampling activities which are currently ongoing. The operation of the peristaltic pump may become ineffective at depths below 20 ft. If this situation occurs, the groundwater samples will be collected in accordance with the Region IV Standard Operating Procedures and Quality Assurance Manual used during the RI/FS activities If EPA deems it necessary, additional wells will be installed off-site to determine if the elevated concentrations of the inorganic contaminants of concern are a result of past facility activities.

The selected remedy will include groundwater extraction and treatment until established cleanup levels are achieved. During the operation of the treatment system, performance will be carefully monitored on a regular basis and adjusted as warranted by the performance data collected during operation. The operating system may include:

a) discontinuing operation of extraction wells in areas where cleanup levels have been attained;

b) alternating pumping at wells to eliminate stagnation points; and

c) pulse pumping to allow aquifer equilibration and to encourage adsorbed contaminants to partition into groundwater.

To ensure that cleanup levels continue to be maintained, the aquifer will be monitored at those wells where pumping has ceased on an occurrence of at least every 5 years following the discontinuation of groundwater extraction.

All extracted groundwater shall be treated to levels which allow for discharge to a POTW.

All air emissions from the air stripper(s) shall be in compliance with Federal and State CAA standards. The method of control of off-gas emissions, if determined necessary during RD, will be included in the RD Report(s).

(3) Institutional Controls

Institutional controls will be placed on well construction and use in the contaminated area. No well will be located, constructed or operated which results in the diminution of the extraction wells at the Site or in the degradation of the contaminated aquifers. Institutional controls will also restrict the use of groundwater containing or potentially containing levels of contamination in excess of MCLs by prohibiting the use of on-site groundwater in any manner resulting in human ingestion or contact. The well restrictions and groundwater controls shall remain in effect until EPA determines that the cleanup levels have been attained. Institutional controls shall also include deed restrictions and record notices placed in the chain of title for the Site in accordance with State law.

10.0 STATUTORY DETERMINATIONS

Under CERCLA Section 121, EPA must select remedies that are protective of human health and the environment, comply with applicable or relevant and appropriate requirements (unless a statutory waiver is justified), are cost-effective, and utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. In addition, CERCLA includes a preference for remedies that employ treatment that permanently and significantly reduce the volume, toxicity, or mobility or hazardous wastes as their principal element. The following sections discuss how the remedy meets these statutory requirements.

10.1 Protection of Human Health and the Environment

The selected remedy protects human and the environment by excavating the soil contaminated with PCB concentrations that exceed 10 ppm and transporting the material to a TSCA permitted landfill; groundwater extraction and treatment via air stripping; and institutional controls. The selected remedy provides protection of human health and the environment by eliminating, reducing, or controlling risk through treatment, and/or engineering controls.

10.2 Compliance with Applicable or Relevant and Appropriate Requirements

Remedial actions performed under CERCLA must comply with all applicable or relevant and appropriate requirements (ARARs). All alternatives considered for the Firestone Site were evaluated on the basis of the degree to which they complied with these requirements. The selected remedy was found to meet or exceed the following ARARs.

Chemical-Specific ARARs:

Safe Drinking Water Act (SDWA) Maximum Contaminant Levels (MCLs) (42 U.S.C. § 1412 (§ 300g-1); 40 C.F.R. 141.61 and 141.80) have been set as enforceable standards for public drinking water systems. These standards are relevant and appropriate to the groundwater remediation at the Site.

Clean Water Act (CWA) Federal Water Quality Criteria (33 U.S.C. § 1314(a)(1)(§ 304(a)(1)) are effluent limitations that must meet Best Available Technology(BAT). These standards may be relevant and appropriate to the discharge of water at the Site.

Discharges to Publicly Owned Treatments Works (POTWs) are subject to the requirements of section 307 of the Clean Water Act. These requirements may be applicable to discharge of the treated groundwater.

Clean Air Act (CAA) National Ambient Air Quality Standards (42 U.S.C. § 7409 (§ 109); 40 C.F.R. Part 50) establishes emissions standards, monitoring and testing requirements, and reporting requirements for eight pollutants in air emissions. These standard may be applicable to the operation of the air stripper at this Site.

Toxic Substances Control Act (TSCA) 15 U.S.C. § 2601; (40 C.F.R. Part 761.120 to 761.135) authorizes EPA to establish regulations to control selected chemical substances or mixtures that pose an imminent hazard.

Location-Specific ARARs

CAA National Ambient Air Quality Standards (42 U.S.C. § 7409 (§109); 40C.F.R. Part 50) establishes emission standards to protect public health and public welfare. The standards are national limitations on ambient air intended to protect health and welfare. The standards may be applicable for the operation of the air stripper at the Site.

Georgia Water Quality Control Act (Code of Georgia, Title 12, Chapter 5) oversees the quality and quantity of the state's water resources. Authorizes the Georgia EPD to establish water quality

standards and issue discharge permits and is applicable to the discharge of the treated groundwater.

Georgia Hazardous Waste Management Act (Code of Georgia, Title 12 Chapter 8, Article 3, including Georgia Rules for Hazardous Waste Management, 391-3-11-.01,.02,.03,.07,.08,.12,.13,.16) which establishes standards applicable to generators of hazardous waste in the State of Georgia. These regulations may be applicable if residuals from the air stripper contain concentrations of hazardous waste at levels to be considered a generator.

Georgia Air Quality Act (Code of Georgia, Title 12, Chapter 9, including Georgia Rules for Air Quality Control, 391-3-1-.02(3)(ii)) which allows more stringent emission limitations of other requirements if deemed necessary to safeguard the public health, safety or welfare of the people of the State of Georgia. The requirements are applicable to the remedial activities to be conducted at the Site.

Action-Specific ARARs

CWA Discharge Limitations (33 U.S.C. § 1311 (§ 301); 40 C.F.R. Parts 122, 125, 129, 133, 136 and 403) prohibits unpermitted discharge of any pollutant or combination of pollutants or combinations of pollutants to waters of the U.S. from any point source. Standards and limitations are established for and are applicable to the discharges of treated groundwater to a POTW and direct discharge to surface water.

CAA National Emission Standards for Hazardous Air Pollutants (42 U.S.C. § 7412 (§ 112); 40 C.F.R. Part 61) establishes emissions standards, monitoring and testing requirements, and reporting requirements for pollutants in air emissions. These standards are applicable for the operation of the air stripper at the Site.

To Be Considered Materials (TBCs)

EPA Groundwater Protection Strategy (EPA, 1984) is a policy to restore groundwater to its beneficial uses within a time frame that is reasonable.

56 FR, June 7, 1991 - MCLGs & NPDWRs for Lead & Copper [Action levels established for lead (0.015 ppm) and copper (1.3 ppm)] in groundwater.

City of Albany Sewer Ordinance establishes standards for discharge in the sewer system. Any discharge of the treated groundwater to the local sewer system must comply with these ordinances.

10.3 Cost Effectiveness

The selected remedy, Soil Alternative D and Groundwater Alternative D were chosen because they provide the best balance among criteria used to evaluate the alternatives considered in the Detailed Analysis. These alternatives were found to achieve both adequate protection of human health and the environment and to meet the statutory requirements of Section 121 of CERCLA. The present worth cost of Soil Alternative D and Groundwater Alternative D are $56,200 and $1,980,000 respectively and appears to be reasonable.

10.4 Utilization of Permanent Solutions and Alternative Treatment Technologies or Resource Recovery Technologies to the Maximum Extent Practicable

EPA and GAEPD have determined that the selected remedy represents the maximum extent to which permanent solutions and treatment technologies can be utilized in a cost-effective manner for the final ROD at the Firestone Tire and Rubber Site. Of those alternatives that are protective of human health and the environment and comply with ARARs, EPA and GAEPD have determined that the selected remedy provides the best balance of trade-offs in terms of long-term effectiveness and permanence, reduction in toxicity, mobility or volume achieved through treatment, short-term effectiveness, implementability, cost, while also considering the statutory preference for treatment as a principal element and considering State and community acceptance.

The selected remedy treats the principal threats posed by groundwater and removes the principal threats posed by soils, achieving significant contaminant reductions. This remedy provides the most cost effective treatment of any of the alternatives considered. The selection of excavation and off-Site disposal for the small volume of contaminated soils and extraction and treatment of contaminated groundwater is consistent with program expectations that highly toxic and mobile wastes are a priority for treatment to ensure the long-term effectiveness of a remedy.

10.5 Preference for Treatment as a Principal Element

By treating the contaminated groundwater by air stripping, the selected remedy addresses the principal threats posed by the Site through the use of treatment technologies. By utilizing treatment as a significant portion of the remedy, the statutory preference for remedies that employ treatment as a principal element is satisfied.

APPENDIX A

Responsiveness Summary

Firestone Tire and Rubber Company Site

Albany, Dougherty County, Georgia

RESPONSIVENESS SUMMARY

The U.S. Environmental Protection Agency (EPA) established a public comment period from December 30, 1992 to January 29, 1993 for interested parties to comment on EPA's Proposed Plan (PP) for the Firestone Site. The comment period included a public meeting on January 12, 1993, conducted by EPA and the Georgia Environmental Protection Division held at the Albany City Hall. The meeting presented the results of the studies undertaken and the preferred remedial alternative for remediation of the contaminated media at the Site.

A responsiveness summary is required by CERCLA (Superfund) Section 117 and it is policy to provide a summary of significant public comments and concerns about the Site, as raised during the public comment period and the public meeting, and the Agency's responses to those concerns. All comments summarized in this document have been factored into the remedy selection process for cleanup of the Site.

This responsiveness summary for the Firestone Site is divided into the following sections:

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

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

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

IV. Remaining Concerns: This section discusses community concerns that EPA should be aware of in design and implementation of the remedial alternative for the Site.

I. Overview

The preferred remedial alternative was presented to the public in a fact sheet released December 30, 1992. The recommended alternatives address the remaining source of contamination by excavation and off-site disposal of PCB contaminated soils and extraction and treatment of the contaminated groundwater in the residuum and upper ocala aquifers of the manufacturing area.

The major components of the selected remedy include:

Excavation of PCB-contaminated soils until established cleanup levels are reached with disposal in an off-site permitted landfill.

Backfilling the excavated areas with clean fill material.

Extraction and treatment of contaminated groundwater using existing wells and supplemental wells if necessary. The contaminated groundwater will be remediated using on-site air stripping.

Extracted groundwater after treatment would be discharged to the Local Waste Water Treatment System (Publicly Owned Treatment Works - POTW). All extracted groundwater shall be treated to levels which allow for surface water discharge as a contingency, should POTW discharge become unavailable.

Periodic groundwater monitoring will be conducted to assess the effectiveness of the remedy for a period up to 30 years.

Institutional controls will be placed on well construction and water use on the Site.

II. Background on Community Involvement and Concern

Public participation requirements in CERCLA Section 117 were met in the remedy selection process. The Community Relations Plan was finalized in 1991 for the Firestone Tire and Rubber Superfund Site. This document list contacts and interested parties throughout the government and the local community. The plan also establishes communication pathways to assure timely dissemination of pertinent information.

On August 1, 1991, EPA held a public information session to announce the start of the Firestone Site RI/FS. The RI/FS Workplan, Risk Assessment, Technical Memorandums, RI/FS Reports and any other documents EPA used to prepare a preferred remedy were released to the public on December 30, 1992. The documents were made available to the public in both the administrative

record docket and the information repository maintained at the EPA docket room at Region IV Headquarters in Atlanta, Georgia and at the Dougherty Public Library, 300 Pine Avenue in Albany, Georgia. A public comment period was held from December 30, 1992 to January 29, 1993.

Notices were placed in the Albany Herald newspaper on December 28, 1992, January 5 and 11, 1993 announcing the comment period. In addition to the public comment period and the administrative record files, a public meeting was held on January 12, 1993 at the Albany City Hall. At this meeting representatives from EPA and Georgia Environmental Protection Division answered questions and addressed community concerns.

III

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

The following is a summary of the written comments received during the comment period for the Proposed Plan addressing the contamination found at the Firestone Site and EPA's response to each.

Comment:

1. Cooper Tire indicated that the Proposed Plan states that the four above-ground fuel oil storage tanks remaining on the Site are currently used by Cooper. Cooper Tire informed EPA that the tanks are not being used nor have they ever been used by Cooper Tire. The future of the tanks have not been determined.

Response:

EPA has considered the comment and will modify future documents to indicate that the storage tanks are not currently being used by Cooper Tire.

Comment:

2. Bridgestone/Firestone Inc. indicated that the summary of the Remedial Investigation findings has not adequately reflected all of the data from the Site. It is Bridgestone/ Firestone's position that metals are present in groundwater at concentrations that are representative of background concentrations.

Response:

EPA previously agreed to allow Firestone to resample wells where inorganics exceed MCLs or proposed MCLs. This information was provided to EPA as an addendum to the RI

Report and the results incorporated into the Feasibility Study Report.

At this time it has still not been determined, to EPA's satisfaction, that the concentrations of metals in the groundwater at the Site are representative of background concentrations. As a result, in this ROD, EPA is specifying the method to be used in collecting groundwater samples to be analyzed for metals at the Site. If based on this additional sampling, it appears that metal concentrations in the groundwater are representative of background concentrations, EPA will at that time reevaluate the cleanup levels in the ROD.

Comment:

3. Bridgestone/Firestone requested that EPA define two scenarios to conclude groundwater remediation activity. In scenario #1 remediation would conclude when three consecutive quarterly sampling events indicate that the concentrations of the contaminants of concern are below the MCLs. Scenario #2 assumes that MCLs are not achievable and a contaminant concentration curve would reach an asymptotic limit above the desired MCL. The concentration curve would be established based on a minimum of two years monitoring at a quarterly frequency. Treatment of groundwater would be terminated after the bottom of the curve has been established with three consecutive sampling events.

Response:

Scenario #1 - EPA will consider the remediation complete when groundwater monitoring demonstrates that all MCLs have been achieved for three consecutive years.
Scenario #2 - At this time, EPA has no reason to believe that MCLs will not be achieved by installing the pump and treatment system. If EPA determines that the system is not adequately reducing the concentrations of the contaminants of concern, the remedy will be reevaluated.

RESPONSES TO PUBLIC CONCERNS RECEIVED DURING THE PUBLIC MEETING

Comment:

1. A commenter asked if EPA would try to clean up the groundwater in less than 30 years if it was possible.

Response:

EPA indicated that all remediation would be completed in the most efficient and cost-effective manner. Thirty years is only a standard time estimate used for costing purposes. The actual time to remediate the groundwater could take more or less than thirty years. The actual time to remediate the

groundwater will be better defined during the remedial design.

Comment:
2. A concerned citizen asked if all of the information EPA uses to make remedy selection decisions is located in the repository.

Response:
EPA indicated that all information used to make remedy selections are contained in the Administrative Record which is available in the local information repository.

Comment:
3. A concerned citizen asked if EPA had any intentions of cleaning up Arnold's Lake?

Response:
Based on the result of the data from the RI, the concentrations of the contaminants present in the Arnold's Lake area do not exceed any unacceptable health risk or MCL; and, therefore, cleanup for this area is not required.

Comment:
4. A commenter asked how many wells would be required to extract the contaminated groundwater.

Response:
During the Remedial Design the number, size and location of the extraction wells to be installed will be determined.

Comment:
5. A commenter asked how far would the extraction wells extend into the aquifers.

Response:
EPA will ensure that the extraction system will capture and extract all contamination of concern that exceed MCLs and background levels. This will be determined during the Remedial Design.

Comment:
6. A commenter that lives north (upgradient) of the Site asked if she should be as concerned about contaminated groundwater as the citizens south (downgradient) of the Site.

Response:
All citizens should be concerned to make sure things are done properly. However, based on the sample results of the RI, the contaminated groundwater is primarily contained in the manufacturing area and should cause no adverse effect on

residents north or south of the Site. EPA will continue to monitor the area and will take the necessary actions to ensure that the safety of the water supply is maintained. If the contamination spreads beyond the Facility boundaries the public will be notified.

Comment:

7. A concerned citizen asked if it was the residents responsibility or EPA's responsibility to sample the private well.

Response:

At the present time EPA has no reason to believe that contamination from the Firestone Site has migrated beyond Site boundaries. Therefore, it would be the resident's responsibility to have their private well tested if residents so desired. EPA understands that Albany Water, Gas and Light intends to sample one well north and south of the Site and present the results from the sampling activity to the community.

Comment:

8. A commenter asked how often groundwater monitoring would occur?

Response:

The details of groundwater monitoring will be decided during the remedial design. However, at a minimum groundwater will be collected and analyzed semi-annually.

Comment:

9. A commenter asked who will pay for the cost of this cleanup?

Response:

EPA will offer Bridgestone/Firestone an opportunity to conduct the design and the cleanup at the Site. If Bridgestone/Firestone will not do so, EPA will perform the cleanup and seek to recover cost from Bridgestone/Firestone.

IV. Remaining Concerns:

The primary remaining community relations concern will be to keep the community informed on the status of Site remediation. EPA will inform the local citizens if any significant modifications are made to this remedy.

Georgia Department of Natural Resources
205 Butler Street, S.E., Suite 1252, Atlanta, Georgia 30334
Joe D. Tanner, Commissioner
Harold F. Reheis, Director
Environmental Protection Division

King

June 21, 1993

Mr. Richard D. Green
Associate Director
Superfund and Emergency Response
U.S. Environmental Protection Agency
Region IV
345 Courtland Street, N.E.
Atlanta, Georgia 30365

RECEIVED
JUN 23 1993
EPA - REGION IV
ATLANTA, GA.

RE: Record of Decision
Firestone Tire & Rubber Company Site
Albany, Dougherty County, Georgia
May 21, 1993

Dear Mr. Green:

The Georgia Environmental Protection Division has reviewed the above referenced document and concurs with the Record of Decision and the Environmental Protection Agency's selected remedial action for the Firestone Tire & Rubber Company Site.

If we can be of further assistance to you, please contact Bill Mundy at (404) 656-7802.

Sincerely,

Harold F. Reheis
Director

HFR/dmb

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APPENDIX C

STATEMENT OF WORK

APPENDIX B

STATEMENT OF WORK FOR THE FIRESTONE TIRE & RUBBER SITE

DOUGHERTY COUNTY, GEORGIA

TABLE OF CONTENTS

Section		Page
I.	INTRODUCTION	1
II.	OVERVIEW OF THE REMEDY	1
III.	REMEDY	2
	A. Components	2
	B. Treatment	2
	C. Performance Standards	3
	D. Compliance Testing	3
	E. Treatability Studies	3
IV.	PLANNING AND DELIVERABLES	3
TASK I -	Project Planning	4
	A. Site Background	4
	B. Project Planning	4
TASK II -	Groundwater Remedial Design	4
	A. Remedial Design Planning	5
	B. Preliminary Design	8
	C. Intermediate Design	9
	D. Prefinal/Final design	11
TASK III -	Groundwater Remedial Action	11
	A. Remedial Action Planning	11
	B. Preconstruction Conference	16
	C. Prefinal Construction Inspection	16
	D. Final Construction Inspection	17
	E. Final Construction Report	17
TASK IV -	Groundwater Treatment System Operation and Maintenance	18
	A. Operation and Maintenance Plan	18
	B. Operation and Maintenance Manual	20
TASK V -	Groundwater Treatment Performance Monitoring	20
	A. Performance Standards Verification Plan	20

TASK VI - PCB-Contaminated Soil Remedial Action 21

A. Soil Remedial Action Planning 21
B. Soil Remediation Conference 26
C. Prefinal Soil Remediation Inspection 26
D. Final Soil Remediation Inspection 27
E. Final Soil Remediation Report 27

TASK VII - Remedial Action Report 28

References 29

Summary of Major Deliverables 32

STATEMENT OF WORK FOR THE
REMEDIAL DESIGN AND REMEDIAL ACTION FOR THE
FIRESTONE TIRE & RUBBER CO. SUPERFUND SITE - ALBANY, GEORGIA

I. INTRODUCTION

This Statement of Work ("SOW") outlines the work to be performed by the Settling Defendant as the remedy for the Firestone Tire & Rubber Co. Superfund Site in Dougherty County, Georgia (the "Site"). The work outlined is intended to implement portions of the remedy as described in the Record of Decision ("ROD") for the Site, dated June 24, 1993, and to achieve certain of the Performance Standards set forth in the ROD. The requirements of this SOW will be further detailed in work plans and other documents to be submitted by the Settling Defendant for approval as set forth in this SOW. It is not the intent of this document to provide task specific engineering or geological guidance. The definitions set forth in Section IV of the Consent Decree shall also apply to this SOW unless expressly provided otherwise herein.

The Settling Defendant is responsible for performing the Work to implement the identified portions of the selected remedy. EPA shall conduct oversight of the Settling Defendant's activities throughout the performance of the Work. The Settling Defendant shall assist EPA in conducting oversight activities.

EPA review or approval of a task or deliverable shall not be construed as a guarantee as to the adequacy of such task or deliverable. If EPA modifies a deliverable pursuant to Section XII of the Consent Decree, such deliverable as modified shall be deemed approved by EPA for purposes of this SOW. A summary of the major deliverables that Settling Defendants shall submit for the Work is attached.

II. OVERVIEW OF THE REMEDY

THE OBJECTIVES OF THIS REMEDIAL ACTION ARE TO:

Prevent or mitigate the continued or potential release of the following hazardous substances, identified as requiring action ("target hazardous substances") in Section 9.1(2) of the ROD and in the Consent Decree, to the overburden and bedrock aquifers: The target hazardous substances requiring action include Benzene, 1,1-DCE, 1,1,1-TCA and PCBs.

Reduce the risks to human health or the environment associated with direct contact with target hazardous substances, within the Site by attaining the Performance Standards established in the ROD for the target hazardous substances;

Reduce the risks to human health from inhalation or ingestion of target hazardous substances, pollutants or contaminants from the Site by attaining the Performance Standards established in the ROD for the target hazardous substances;

Reduce the threat posed to human health and the environment from current and potential migration of targeted hazardous substances in the ground water and subsurface soil at the Site by attaining the Performance Standards established in the ROD for the target hazardous substances; and

Reduce the volume, toxicity and mobility of the target hazardous substances, identified in the ROD at the Site.

III. REMEDY

The portions of the remedy identified in the ROD which are addressed by this Statement of Work include the following actions:

Excavate PCB-contaminated soils until established performance standards are reached, with disposal of contaminated soils in an off-site permitted landfill and backfilling of excavated areas with clean soil;

Extract contaminated groundwater using existing wells and additional wells, if needed, to attain the Performance Standards identified in the ROD for the target hazardous substances; treat the extracted water, if necessary, to enable the discharge of the groundwater to the local wastewater treatment system;

Provide periodic groundwater monitoring of the target hazardous substances to insure the effectiveness of the remediation activity;

Place controls on well construction and water use at the site to restrict future use.

A. Components

The major components of the remedy are described in Sections 7.1 (D), 7.2 (D), 9.0 and 9.1 of the Record of Decision.

B. Treatment

The treatment technologies for the remedy are described in Sections 9.0 and 9.1, Selected Remedy and Performance Standards sections of the Record of Decision.

C. Performance Standards

The Settling Defendant shall meet all Performance Standards, as defined in the Consent Decree including the standards set forth in the attached ROD for the target hazardous substances.

The Settling Defendant shall operate the groundwater treatment systems until the Settling Defendant has demonstrated compliance with the Performance Standards for the target hazardous substances, in accordance with the Performance Standards Verification Plan.

D. Compliance Testing

The Settling Defendant shall perform compliance testing to ensure that Performance Standards for the target hazardous substances are met. The groundwater compliance testing shall be in accordance with the Performance Standard Verification Plan developed pursuant to Task V of this SOW. Compliance testing shall commence once the Performance Standards for the target hazardous substances have been achieved by the groundwater extraction system. Compliance testing will continue for the target hazardous substances (as identified in Section 9.1(2) of the ROD) in accordance with the requirements to be specified in the Performance Standards Verification Plan.

E. Treatability Studies

The Soil and Groundwater Treatability Studies were conducted under the Remedial Investigation/Feasibilty Study ("RI/FS") for the recommended remedial actions. EPA and the Settling Defendant agree further study is not warranted based upon current information.

IV. PLANNING AND DELIVERABLES

The specific scope of this work shall be documented by the Settling Defendant in a Remedial Design ("RD") Work Plan and a Remedial Action ("RA") Work Plan ("RD/RA Work Plan"). Plans, specifications, submittals, and other deliverables shall be subject to EPA review and approval in accordance with Section XII of the Consent Decree.

The Settling Defendant shall submit a technical memorandum documenting any need for additional data along with the proposed Data Quality Objectives ("DQOs") whenever such requirements are identified. The Settling Defendant is responsible for fulfilling additional data and analysis needs identified by EPA during the RD/RA process consistent with the general scope and objectives of the Consent Decree, including this SOW.

The Settling Defendant shall perform the following tasks:

TASK I - PROJECT PLANNING

A. Site Background

The Settling Defendants shall gather and evaluate the existing information regarding the Site and shall conduct a visit to the Site to assist in planning the RD/RA as follows:

1. Review Ongoing Voluntary Groundwater Remediation Activity, Evaluate Proposed Excavation Area and Document the Need for Additional Data

   Before RD/RA activities, all existing and planned Site remediation activity data shall be compiled and reviewed by the Settling Defendant. Specifically, this shall include the ROD, RI/FS, and other available data related to the Site. This information shall be utilized in determining additional data needed for RD/RA implementation. Final decisions on the necessary data and DQOs shall be made by EPA.

2. Conduct Site Visit

   The Settling Defendant shall conduct a visit to the Site with the EPA Remedial Project Manager ("RPM") during the project planning phase to assist in developing a conceptual understanding of the RD/RA requirements for the Site. Information gathered during this visit shall be utilized to plan the project and to determine the extent of the additional data necessary to implement the RD/RA.

B. Project Planning

Once the Settling Defendant has collected and evaluated existing data and conducted a visit to the Site, the specific project scope shall be re-evaluated. The Settling Defendant shall meet with EPA at the completion of this evaluation regarding the following activities and before proceeding with Task II.

TASK II - GROUNDWATER REMEDIAL DESIGN

The Groundwater Remedial Design shall provide the technical details for a groundwater extraction and treatment facility to remediate the target hazardous substances identified in the ROD for groundwater in the manufacturing area. The manufacturing area is defined as the area within the fence boundary as shown in Figure 1-2 of the previously approved Feasibility Study (FS) for this Site. The implementation of the Groundwater Remedial Action will be in accordance with currently accepted environmental protection technologies and standard professional engineering and construction practices. The design shall

include clear and comprehensive design plans and specifications.

A. Remedial Design Planning

At the conclusion of the project planning phase, Settling Defendant shall submit a Groundwater Remedial Design ("RD") Work Plan, a Sampling and Analysis Plan, and a Health and Safety Plan to EPA. The Health and Safety Plan will be reviewed and commented on by EPA prior to the initiation of RD field activities. The Groundwater RD Work Plan and the Sampling and Analysis Plan will be reviewed and approved by EPA prior to the initiation of field activities. Upon approval of the Groundwater RD Work Plan, the Settling Defendant shall implement the Groundwater RD Work Plan in accordance with the design management schedule contained therein. Plans, specifications, submittals, and other deliverables shall be subject to EPA review and approval in accordance with Section XII of the Consent Decree. Review and/or approval of design submittals only allows the Settling Defendant to proceed to the next step of the design process. It does not imply acceptance of later design submittals that have not been reviewed, nor that the remedy, when constructed, will meet Performance Standards.

1. Groundwater RD Work Plan

The Settling Defendant shall submit a Groundwater RD Work Plan to EPA for review and approval. The Groundwater RD Work Plan shall be developed in conjunction with the addenda to the previously approved Sampling and Analysis Plan and the Health and Safety Plan submitted during the RI. Each plan may be delivered as addenda to the previous documents under separate cover. The Groundwater RD Work Plan shall include a comprehensive description of the additional data collection and evaluation activities to be performed, if any, and the plans and specifications to be prepared. A design management schedule for completion of each major activity and submission of each deliverable shall also be included.

Specifically, the Groundwater RD Work Plan shall present the following:

a. A statement of the problem(s) and potential problem(s) posed by the Site and the objectives of the RD/RA.

b. A background summary setting forth the following:

1) A brief description of the Site including the geographic location and the physiographic, hydrologic, geologic, demographic, ecological, and natural resource features;

2) A brief synopsis of the history of the Site including a summary of past disposal practices and a description of previous responses that have been conducted by local, State, Federal, or private parties;

3) A summary of the existing data including physical and chemical characteristics of the contaminants identified and their distribution among the environmental media at the Site.

c. A list and detailed description of the tasks to be performed, information needed for each task, information to be produced during and at the conclusion of each task, and a description of the work products that shall be submitted to EPA. This description shall include the deliverables set forth in the remainder of Task II.

d. A schedule with specific dates for completion of each required activity and submission of each deliverable required by the Consent Decree and this SOW. This schedule shall also include information regarding timing, initiation and completion of all critical path milestones for each activity and/or deliverable.

e. A project management plan, including a data management plan, and provision for monthly reports to EPA, and meetings and presentations to EPA at the conclusion of each major phase of the RD/RA. The data management plan shall address the requirements for project management systems, including tracking, sorting, and retrieving the data along with an identification of the software to be used, minimum data requirements, data format and backup data management. The plan shall address both data management and document control for all activities conducted during the RD/RA.

f. A description of the community relations support activities to be conducted during the RD. At EPA's request, the Settling Defendant will assist EPA in preparing and disseminating information to the public regarding the RD work to be performed.

2. Sampling and Analysis Plan

The Settling Defendant shall prepare an addendum to the existing Sampling and Analysis Plan ("SAP") submitted during the Remedial Investigation ("RI") to ensure that sample collection and analytical activities are conducted in accordance with technically acceptable protocols and that the data generated will meet the DQOs established. The SAP shall be an addendum with the previously approved Field Sampling and Analysis Plan ("FSAP") and a Quality Assurance Project Plan ("QAPP") submitted during the RI.

The FSAP shall define in detail the sampling and data-gathering methods that shall be used on the project. It shall include sampling objectives, sample location (horizontal and vertical) and frequency, sampling equipment and procedures, and sample handling and analysis. The Field Sampling and Analysis Plan shall be written so that a field sampling team unfamiliar with the Site would be able to gather the samples and field information required. The QAPP shall describe the project objectives and organization, functional activities, and quality assurance and quality control ("QA/QC") protocols that shall be used to achieve the desired DQOs. The DQOs shall, at a minimum, reflect use of analytical methods for obtaining data of sufficient quality to meet National Contingency Plan requirements as identified at 300.435(b). In addition, the QAPP shall address personnel qualifications, sampling procedures, sample custody, analytical procedures, and data reduction, validation, and reporting. These procedures must be consistent with the Region IV Environmental Compliance Branch Standard Operating Procedures and Quality Assurance Manual and the guidances specified in Section IX of the Consent Decree.

The Settling Defendant will use a previously EPA approved laboratory to conduct the proposed work and meets the requirements specified in Section IX of the Consent Decree. EPA may require that the Settling Defendant submit updated information to demonstrate that the laboratory remains qualified to conduct the work, including information on personnel

qualifications, equipment and material specification, and laboratory analyses of performance samples (blank and/or spike samples). In addition, EPA may require submittal of data packages equivalent to those generated by the EPA Contract Laboratory Program ("CLP").

3. Health and Safety Plan

The existing RI Health and Safety Plan shall be modified for conformance with Settling Defendant's health and safety program, and in compliance with OSHA regulations and protocols. The Health and Safety Plan shall include a health and safety risk analysis, a description of monitoring and personal protective equipment, medical monitoring, and provisions for site control. EPA will not approve the Settling Defendant's Health and Safety Plan, but rather EPA will review it to ensure that all necessary elements are included, and that the plan provides for the protection of human health and the environment.

B. Preliminary Design

Preliminary Design shall begin with initial design and shall end with the completion of at least approximately 30 percent of the design effort. At this stage, the Settling Defendant shall field verify, as necessary, the existing conditions of the Site. The technical requirements of the Groundwater Remedial Action shall be addressed and outlined so that they may be reviewed to determine if the final design will provide an effective remedy. Supporting data and documentation shall be provided with the design documents defining the functional aspects of the project. EPA approval of the Preliminary Design is required before proceeding with further design work, unless specifically authorized by EPA in writing by the RPM. In accordance with the design management schedule established in the approved groundwater Remedial Design Work Plan, the Settling Defendant shall submit to EPA the Preliminary Design submittal which shall consist of the following:

1. Results of Data Acquisition Activities

Data gathered during the project planning phase shall be compiled, summarized, and submitted along with an analysis of the impact of the results on design activities. In addition, surveys conducted to establish topography, rights-of-way, easements, and utility lines shall be documented. Utility requirements and acquisition of access, through purchases or easements, that are necessary to implement the RA shall also be discussed.

2. Design Criteria Report

The concepts supporting the technical aspects of the design shall be defined in detail and presented in this report. Specifically, the Design Criteria Report shall include the preliminary design assumptions and parameters, including:

a. Waste characterization
b. Pretreatment requirements
c. Volume of each media requiring treatment
d. Treatment schemes (including all media and by-products)
e. Input/output rates
f. Influent and effluent qualities
g. Materials and equipment
h. Performance Standards
i. Long-term monitoring requirements

3. Preliminary Plans and Specifications

The Settling Defendant shall submit an outline of the required drawings, including preliminary sketches and layouts, describing conceptual aspects of the design, unit processes, etc. In addition, an outline of the required specifications, including Performance Standards, shall be submitted. Construction drawings shall reflect organization and clarity, and the scope of the technical specifications shall be outlined in a manner reflecting the final specifications.

4. Plan for Satisfying Permitting Requirements

All activities must be performed in accordance with the requirements of all applicable federal and state laws and regulations. Any off-site disposal shall be in compliance with the policies stated in the Procedure for Planning and Implementing Off-site Response Actions (Federal Register, Volume 50, Number 214, November, 1985, pages 45933 - 45937) and Federal Register, Volume 55, Number 46, March 8, 1990, page 8840, and the National Contingency Plan, Section 300.440. The plan shall identify the off-site disposal/discharge permits that are required, the time required to process the permit applications, and a schedule for submittal of the permit applications.

C. Intermediate Design

Intermediate Design shall begin with completion of the Preliminary Design and end with the completion of at least 60 percent of the design effort. If EPA determines that the

Preliminary Design submittal satisfies some or all of the requirements of the Intermediate Design, a separate submittal for these requirements of the Intermediate Design will not be required. The Settling Defendant shall submit to EPA the Intermediate Design submittal which shall consist of a continuation and expansion of the Preliminary Design submittal as may be modified by any value engineering recommendations adopted by the Settling Defendant. Any value engineering recommendations adopted by the Settling Defendant shall be summarized in a report submitted with the Intermediate Design. EPA comments on the Intermediate Design and a memorandum indicating how EPA's comments were incorporated shall be included in the Prefinal/Final Design. The Intermediate Design shall be submitted in accordance with the approved design management schedule and shall consist of the following:

1. Draft Design Analyses

   The evaluations conducted to select the design approach shall be described. Design calculations shall be included.

2. Draft Plans and Specifications

   Draft construction drawings and specifications for all components of the Groundwater Remedial Action shall be prepared and presented. All plans and specifications shall conform with the Construction Specifications Institute Master Format.

3. Draft Construction Schedule

   The Settling Defendant shall develop a Draft Construction Schedule for construction and implementation of the remedial action which identifies timing for initiation and completion of all critical path tasks. The Settling Defendant shall specifically identify dates for completion of the project and major milestones.

4. Performance Standards Varification Plan

   Settling Defendant shall develop a Performance Standards Varification Plan to provide a mechanism to ensure that both short-term and long-term Performance Standards for the Remedial Action are met. Guidances used in developing the Sampling and Analysis Plan for the Remedial Design phase shall be used.

D. Prefinal/Final Design

The Settling Defendant shall submit the Prefinal Design when the design work is approximately 90 percent complete in accordance with the approved design management schedule. The Settling Defendant shall address comments generated from the Intermediate Design Review and clearly show any modification of the design as a result of incorporation of the comments. Essentially, the Prefinal Design shall function as the draft version of the Final Design. After EPA review and comment on the Prefinal Design, the Final Design shall be submitted along with a memorandum indicating how the Prefinal Design comments were incorporated into the Final Design. All Final Design documents shall be certified by a Professional Engineer registered in the State of Georgia. EPA written approval will be required for modifications to the existing voluntary treatment facility. The following items shall be submitted with or as part of the Prefinal/Final Design:

1. Complete Design Analyses

   The selected design shall be presented along with an analysis supporting the design modification approach for the groundwater treatment facility. Design calculations shall be included.

2. Final Plans and Specifications

   A complete set of construction drawings and specifications shall be submitted which describe the selected design.

3. Final Construction Schedule

   The Settling Defendant shall submit a final construction schedule to EPA for approval.

4. Construction Cost Estimate

   A good faith estimate within +15 percent to -10 percent of actual construction costs shall be submitted.

TASK III - GROUNDWATER REMEDIAL ACTION

Remedial Action shall be performed by the Settling Defendant to implement the response actions selected in the ROD for the groundwater.

A. Remedial Action Planning

Concurrent with the submittal of the Prefinal/Final Design, the Settling Defendant shall submit a draft Groundwater Remedial Action (RA) Work Plan, a Project Delivery Strategy, a Construction Management Plan, a Construction Quality Assurance Plan, and a Construction Health and Safety Plan/Contingency Plan. The Groundwater RA Work Plan, Project Delivery Strategy, Construction Management Plan, and Construction Quality Assurance Plan must be reviewed and approved by EPA and the Construction Health and Safety Plan/Contingency Plan reviewed by EPA prior to the initiation of the Remedial Action.

Upon approval of the Final Design and the Groundwater RA Work Plan, the Settling Defendant shall implement the Groundwater RA Work Plan in accordance with the construction management schedule. Significant field changes to the Groundwater RA as set forth in the Groundwater RA Work Plan and Final Design shall not be undertaken without the approval of EPA. The Groundwater RA shall be documented in enough detail to produce as-built construction drawings after the Groundwater RA is complete. Deliverables shall be submitted to EPA for review and approval in accordance with Section XII of the Consent Decree. Review and/or approval of submittals does not imply acceptance of later submittals that have not been reviewed, nor that the remedy, when constructed, will meet Performance Standards.

1. Groundwater RA Work Plan

A Work Plan which provides a detailed plan of action for completing the Groundwater RA activities shall be submitted to EPA for review and approval. The objective of this work plan is to provide for the safe and efficient completion of the Groundwater RA. The Groundwater RA Work Plan shall be developed in conjunction with the Construction Management Plan, the Construction Quality Assurance Plan, and the Construction Health and Safety Plan/Contingency Plan, although each plan may be delivered under separate cover. The Groundwater RA Work Plan shall include a comprehensive description of the work to be performed and the Final Construction schedule for completion of each major activity and submission of each deliverable.

Specifically, the Groundwater RA Work Plan shall present the following:

a. A detailed description of the tasks to be performed and a description of the work products

to be submitted to EPA. This includes the deliverables set forth in the remainder of Task III.

b. A schedule for completion of each required activity and submission of each deliverable required by this Consent Decree, including those in this SOW.

c. A project management plan, including provision for monthly reports to EPA and meetings and presentations to EPA at the conclusion of each major phase of the Groundwater RA. EPA's Project Coordinator and the Settling Defendant's Project Coordinator will meet, at a minimum, on a quarterly basis, as needed.

d. A description of the community relations support activities to be conducted during the Groundwater RA. At EPA's request, the Settling Defendant shall assist EPA in preparing and disseminating information to the public regarding the Groundwater RA work to be performed.

2. Project Delivery Strategy

The Settling Defendant shall submit a document to EPA for review and approval describing the strategy for delivering the project. This document shall address the management approach for implementing the Groundwater Remedial Action, including procurement methods and contracting strategy, phasing alternatives, and contractor and equipment availability concerns. If the construction of the remedy is to be accomplished by Settling Defendants' "in-house" resources, the document shall identify those resources.

3. Construction Management Plan

A Construction Management Plan shall be developed to indicate how the construction activities are to be implemented and coordinated with EPA during the Groundwater RA. The Settling Defendant shall designate a person to be a Remedial Action Coordinator and its representative on-site during the Groundwater Remedial Action, and identify this person in the Plan. This Plan shall also identify other key project management personnel and lines of authority, and provide descriptions of the duties of the key personnel along with an organizational chart. In addition, a plan for the administration of

construction changes and EPA review and approval of those changes shall be included.

4. Construction Quality Assurance Plan

The Settling Defendant shall develop and implement a Construction Quality Assurance Program to ensure, with a reasonable degree of certainty, that the completed Groundwater Remedial Action meets or exceeds all design criteria, plans and specifications, and Performance Standards. The Construction Quality Assurance Plan shall incorporate relevant provisions of the Performance Standards Verification Plan (see Task V). At a minimum, the Construction Quality Assurance Plan shall include the following elements:

a. The name, qualifications, duties, authorities, and responsibilities of each person assigned a QC function.

b. Description of the observations and control testing that will be used to monitor the construction and/or installation of the components of the Groundwater Remedial Action. This includes information which certifies that personnel and laboratories performing the tests are qualified and the equipment and procedures to be used comply with applicable standards. Any laboratories to be used shall be specified. Acceptance/Rejection criteria and plans for implementing corrective measures shall be addressed.

c. A schedule for managing submittals, testing, inspections, and any other QA function (including those of contractors, subcontractors, fabricators, suppliers, purchasing agents, etc.) that involve assuring quality workmanship, verifying compliance with the plans and specifications, or any other QC objectives. Inspections shall verify compliance with all environmental requirements and include, but not be limited to, air quality and emissions monitoring records and waste disposal records, etc.

d. Reporting procedures and reporting format for QA/QC activities including such items as daily summary reports, schedule of data submissions, inspection data sheets, problem identification and corrective measures reports, evaluation

reports, acceptance reports, and final documentation.

e. A list of definable features of the work to be performed. A definable feature of work is a task which is separate and distinct from other tasks and has separate control requirements.

5. Construction Health and Safety Plan/Contingency Plan

The Settling Defendant shall prepare a Construction Health and Safety Plan/Contingency Plan in conformance with Settling Defendant's health and safety program, and in compliance with OSHA regulations and protocols. The Construction Health and Safety Plan shall include a health and safety risk analysis, a description of monitoring and personal protective equipment, medical monitoring, and site control. EPA will not approve the Settling Defendant's Construction Health and Safety Plan/Contingency Plan, but rather EPA will review it to ensure that all necessary elements are included, and that the plan provides for the protection of human health and the environment. This plan shall include a Contingency Plan and incorporate Air Monitoring and Spill Control and Countermeasures Plans. The Contingency Plan is to be written for the onsite construction workers and the local affected population. It shall include the following items:

a. Name of person who will be responsible in the event of an emergency incident.

b. Plan for initial site safety indoctrination and training for all employees, name of the person who will give the training and the topics to be covered.

c. Plan and date for meeting with the local community, including local, state and federal agencies involved in the cleanup, as well as the local emergency squads and the local hospitals.

d. A list of the first aid and medical facilities including, location of first aid kits, names of personnel trained in first aid, a clearly marked map with the route to the nearest medical facility, all necessary emergency phone numbers conspicuously posted at the job site (i.e., fire, rescue, local hazardous material teams, National Emergency Response Team, etc.)

e. Plans for protection of public and visitors to the job site.

f. Air Monitoring Plan which incorporates the following requirements:

1) Personnel Monitoring during construction activities shall be conducted according to OSHA and NIOSH regulations and guidance.

2) Measurements shall be taken in the breathing zones of personnel and immediately upwind and downwind of the work areas.

B. Preconstruction Conference

A Preconstruction Conference shall be held after selection of the construction contractor but before initiation of construction. This conference shall include the Settling Defendant and federal, state and local government agencies and shall:

1. Define the roles, relationships, and responsibilities of all parties;

2. Review methods for documenting and reporting inspection data;

3. Review methods for distributing and storing documents and reports;

4. Review work area security and safety protocols;

5. Review the Construction Schedule;

6. Conduct a site reconnaissance to verify that the design criteria and the plans specifications are understood and to review material and equipment storage locations.

The Preconstruction Conference must be documented, including names of people in attendance, issues discussed, clarifications made, special instructions issued, etc.

C. Prefinal Construction Inspection

Upon preliminary project completion, the Settling Defendant shall notify EPA for the purpose of conducting a Prefinal Construction Inspection. Participants should include the Project Coordinators, Supervising Contractor, Construction Contractor, Natural Resource Trustees and other federal, state, and local agencies with a jurisdictional interest. The Prefinal

Inspection shall consist of a walk-through inspection of the entire project site. The objective of the inspection is to determine whether the construction is complete and consistent with the Consent Decree. Any outstanding construction items discovered during the inspection shall be identified and noted on a punch list. Additionally, treatment equipment shall be operationally tested by the Settling Defendant. The Settling Defendant shall certify that the equipment has performed to effectively meet the purpose and intent of the specifications. Retesting shall be completed where deficiencies are revealed. A Prefinal Construction Inspection Report shall be submitted by the Settling Defendant which outlines the outstanding construction items, actions required to resolve the items, completion date for the items, and an anticipated date for the Final Inspection.

D. Final Construction Inspection

Upon completion of all outstanding construction items, the Settling Defendants shall notify EPA for the purpose of conducting a Final Construction Inspection. The Final Construction Inspection shall consist of a walk-through inspection of the entire project site. The Prefinal Construction Inspection Report shall be used as a check list with the Final Construction Inspection focusing on the outstanding construction items identified in the Prefinal Construction Inspection. All tests that were originally unsatisfactory shall be conducted again. Confirmation shall be made during the Final Construction Inspection that all outstanding items have been resolved. Any outstanding construction items discovered during the inspection still requiring correction shall be identified and noted on a punch list. If any items are still unresolved, the inspection shall be considered to be a Prefinal Construction Inspection requiring another Prefinal Construction Inspection Report and subsequent Final Construction Inspection.

E. Final Construction Report

Within thirty (30) days following the conclusion of the Final Construction Inspection, the Settling Defendant shall submit a Final Construction Report. EPA will review the draft report and will provide comments to Settling Defendants. The Final Construction Report shall include the following:

1. Brief description of how outstanding items noted in the Prefinal Inspection were resolved;

2. Explanation of modifications made during the Groundwater RA to the Groundwater RD and Groundwater RA Work Plans and why these changes were made;

3. As-built drawings.

4. Synopsis of the construction work defined in the SOW and certification that the construction work has been completed.

TASK IV - GROUNDWATER TREATMENT SYSTEM OPERATION AND MAINTENANCE

Groundwater Operation and Maintenance ("O&M") shall be performed in accordance with the approved Groundwater Operation and Maintenance Plan for the groundwater treatment plant.

A. Operation and Maintenance Plan

The Operation and Maintenance guidelines for the existing voluntary treatment facility will be submitted for agency review within 30 days after the signing of the Consent Decree. The guidelines shall include manufactures' literature of the significant components of the existing voluntary treatment facility. At no more than the 60 percent construction stage, the Settling Defendant shall submit a Groundwater Operation and Maintenance Plan for review of the groundwater treatment system. If necessary, the Groundwater Operation and Maintenance Plan shall be modified to incorporate any design modifications implemented during the Groundwater Remedial Action. The revised Groundwater Operation and Maintenance Plan must be reviewed and approved by EPA prior to initiation of Groundwater Operation and Maintenance activities.

Upon approval of the Groundwater Operation and Maintenance Plan, the Settling Defendant shall implement the Groundwater Operation and Maintenance Plan in accordance with the schedule contained therein. This plan shall describe start-up procedures, operation, troubleshooting, training, and evaluation activities that shall be carried out by the Settling Defendant. The plan shall address the following elements:

1. Equipment start-up and operator training;

   a. Technical specifications governing treatment systems;

   b. Requirements for providing appropriate service visits by experienced personnel to supervise the installation, adjustment, start-up and operation of the systems; and,

   c. Schedule for training personnel regarding appropriate operational procedures once start-up has been successfully completed.

2. Description of normal operation and maintenance;

   a. Description of tasks required for system operation;

   b. Description of tasks required for system maintenance;

   c. Description of prescribed treatment or operating conditions; and

   d. Schedule showing the required frequency for each O&M task.

3. Description of potential operating problems;

   a. Description and analysis of potential operating problems;

   b. Sources of information regarding problems; and

   c. Common remedies or anticipated corrective actions.

4. Description of routine monitoring and laboratory testing;

   a. Description of monitoring tasks;

   b. Description of required laboratory tests and their interpretation;

   c. Required QA/QC; and

   d. Schedule of monitoring frequency and date, if appropriate, when monitoring may cease.

5. Description of alternate O&M;

   a. Should system fail, alternate procedures to prevent undue hazard; and

   b. Analysis of vulnerability and additional resource requirements should a failure occur.

6. Safety Plan;

   a. Description of precautions to be taken and required health and safety equipment, etc., for site personnel protection, and

b. Safety tasks required in the event of systems failure.

7. Description of equipment;

a. Equipment identification;

b. Installation of monitoring components;

c. Maintenance of site equipment; and

d. Replacement schedule for equipment and installation components.

8. Records and reporting;

a. Daily operating logs;

b. Laboratory records;

c. Records of operating cost;

d. Mechanism for reporting emergencies;

e. Personnel and Maintenance Records; and

f. Monthly reports to State/Federal Agencies.

B. Operation and Maintenance Manual

After review and approval of the Groundwater O&M Plan but prior to operation of the final system, the Settling Defendant shall submit an O&M manual which shall be a revision of the O&M Plan to be written from the perspective of the operating personnel. This manual shall include all necessary O&M information for the operating personnel. The O&M manual must be reviewed and approved by EPA prior to initiation of Groundwater Operation and Maintenance activities.

TASK V - GROUNDWATER TREATMENT PERFORMANCE MONITORING

Performance monitoring shall be conducted to ensure that all Performance Standards are met.

A. Performance Standards Verification Plan

The purpose of the Performance Standards Verification Plan is to provide a mechanism to ensure that both short-term and long-term Performance Standards for the Groundwater Remedial Action are met. Guidances used in developing the Sampling and Analysis Plan for the Groundwater Remedial Design phase shall be used. The Settling Defendant shall submit a Performance Standards

Verification Plan with the Intermediate Design. Once approved, the Settling Defendant shall implement the Performance Standards Verification Plan on the approved schedule. The Performance Standards Verification Plan shall include:

1. The Performance Standards Verification Field Sampling and Analysis Plan that provides guidance for all fieldwork by defining in detail the sampling and data gathering methods to be used. The Performance Standards Verification Field Sampling and Analysis Plan shall be written so that a field sampling team unfamiliar with the Site would be able to gather the samples and field information required.

2. The Performance Standards Verification Quality Assurance/Quality Control plan that describes the quality assurance and quality control protocols which will be followed in demonstrating compliance with Performance Standards.

3. Specification of those tasks to be performed by the Settling Defendant to demonstrate compliance with the Performance Standards and a schedule for the performance of these tasks.

TASK VI - PCB-CONTAMINATED SOIL REMEDIAL ACTION

The Settling Defendant shall implement the response actions selected in the ROD for the excavation of PCB-contaminated soils. Disposal of contaminated soils will be in an off-site permitted landfill. The excavated area will be backfilled with clean soils.

A. Soil Remedial Action Planning

The Settling Defendant shall submit a draft Soil Remediation Work Plan, a Soil Remediation Project Implementation Strategy, a Soil Remediation Management Plan, a Soil Remediation Quality Assurance Plan, and a Soil Remediation Health and Safety Plan/Contingency Plan. Previous agency-approved documents will be amended whenever possible and appropriate as a mechanism to expedite the submission of these deliverables. The Soil Remediation Work Plan, Soil Remediation Management Plan, and Soil Remediation Quality Assurance Plan must be reviewed and approved by EPA and the Soil Remediation Health and Safety Plan/Contingency Plan reviewed by EPA prior to the initiation of the Soil Remedial Action.

Upon approval of the Soil Remediation Work Plan, the Settling Defendant shall implement the Soil Remediation Work Plan in accordance with the soil remedial management schedule. Significant field changes to the Soil Remediation as set forth in

the Soil Remediation Work Plan shall not be undertaken without the approval of EPA. Deliverables shall be submitted to EPA for review and approval in accordance with Section XII of the Consent Decree. Review and/or approval of submittals does not imply acceptance of later submittals that have not been reviewed, nor that the remedy, when completed, will meet Performance Standards.

1. Soil Remediation Work Plan

A Soil Remediation Work Plan which provides a detailed plan of action for completing the Soil Remediation activities shall be submitted to EPA for review and approval. The objective of this work plan is to provide for the safe and efficient completion of the soil remediation. The Soil Remediation Work Plan shall be developed in conjunction with the Soil Remediation Management Plan, the Soil Remediation Quality Assurance Plan, and the Soil Remediation Health and Safety Plan/Contingency Plan, although each plan may be delivered under separate cover. The Soil Remediation Work Plan shall include a description of the work to be performed and the Final Soil Remedial schedule for completion of each major activity and submission of deliverable.

Specifically, the Soil Remediation Work Plan shall present the following:

a. A detailed description of the tasks to be performed and a description of the work products to be submitted to EPA. This includes the deliverables set forth in the remainder of Task VI.

b. A schedule for completion of each required activity and submission of each deliverable required by this Consent Decree, including those in this SOW.

c. A project management plan, including provision for monthly reports to EPA and meetings and presentations to EPA at the conclusion of each major phase of the soil remediation. EPA's Project Coordinator and the Settling Defendant's Project Coordinator will meet, at a minimum, on a quarterly basis, unless EPA determines that such meeting is unnecessary.

d. A description of the community relations support activities to be conducted during the soil remediation. At EPA's request, the Settling Defendant shall assist EPA in preparing and disseminating information to the public regarding the soil remediation work to be performed.

2. Soil Remediation Project Implementation Strategy

The Settling Defendant shall submit a document to EPA for review and approval describing the strategy for implementing the project. This document shall address the management approach for implementing the Soil Remediation Action, including phasing alternatives, and contractor and equipment availability concerns. If the construction of the remedy is to be accomplished by Settling Defendant's in-house resources, the document shall identify those resources.

3. Soil Remediation Management Plan

A Soil Remediation Management Plan shall be developed to indicate how the soil remedial activities are to be implemented and coordinated with EPA during the soil remediation. The Settling Defendant shall designate a person to be a Soil Remedial Action Coordinator and its representative on-site during the soil remediation Action, and identify this person in the Plan. This Plan shall also identify other key project management personnel and lines of authority, and provide descriptions of the duties of the key personnel along with an organizational chart. In addition, a plan for the administration of construction changes and EPA review and approval of those changes shall be included.

4. Soil Remediation Quality Assurance Plan

The Settling Defendant shall develop and implement a Soil Remediation Quality Assurance Program to ensure, with a reasonable degree of certainty, that the completed soil remediation meets or exceeds all design criteria, plans and specifications, and Performance Standards. The Soil Remediation Quality Assurance Plan shall incorporate relevant provisions of the Performance Standards Verification Plan (see Task V). At a minimum, the Soil Remediation Quality Assurance Plan shall include the following elements:

a. The name, qualifications, duties, authorities, and responsibilities of each person assigned a QC function.

b. Description of the observations and control testing that will be used to monitor the construction and/or installation of the components of the soil remediation. This includes information which certifies that personnel and laboratories performing the tests are qualified and the equipment and procedures to be used comply with applicable

standards. Any laboratories to be used shall be specified. Acceptance/Rejection criteria and plans for implementing corrective measures shall be addressed.

c. A schedule for managing submittals, testing, inspections, and any other QA function (including those of contractors, subcontractors, fabricators, suppliers, purchasing agents, etc.) that involve assuring quality workmanship, verifying compliance with the plans and specifications, or any other QC objectives. Inspections shall verify compliance with all environmental requirements and include, but not be limited to, air quality and emissions monitoring records and waste disposal records, etc.

d. Reporting procedures and reporting format for QA/QC activities including such items as daily summary reports, schedule of data submissions, inspection data sheets, problem identification and corrective measures reports, evaluation reports, acceptance reports, and final documentation.

e. A list of definable features of the work to be performed. A definable feature of work is a task which is separate and distinct from other tasks and has separate control requirements.

5. <u>Soil Remediation Health and Safety Plan/Contingency Plan</u>

The Settling Defendant shall prepare a Soil Remediation Health and Safety Plan/Contingency Plan in conformance with the Settling Defendant's health and safety program, and in compliance with OSHA regulations and protocols. The Soil Remediation Health and Safety Plan shall include a health and safety risk analysis, a description of monitoring and personal protective equipment, medical monitoring, and site control. EPA will not approve the Settling Defendant's Soil Remediation Health and Safety Plan/Contingency Plan, but rather EPA will review it to ensure that all necessary elements are included, and that the plan provides for the protection of human health and the environment. This plan shall include a Contingency Plan and incorporate Air Monitoring and Spill Control and Countermeasures Plans. The Contingency Plan is to be written for the on-site construction workers and the local affected population. It shall include the following items:

a. Name of person who will be responsible in the event of an emergency incident.

b. Plan for initial site safety indoctrination and training for all employees, name of the person who will give the training and the topics to be covered.

c. Plan and date for meeting with the local community, including local, state and federal agencies involved in the cleanup, as well as the local emergency squads and the local hospitals.

d. A list of the first aid and medical facilities including, location of first aid kits, names of personnel trained in first aid, a clearly marked map with the route to the nearest medical facility, all necessary emergency phone numbers conspicuously posted at the job site (i.e., fire, rescue, local hazardous material teams, National Emergency Response Team, etc.)

e. Plans for protection of public and visitors to the excavation area.

f. Air Monitoring Plan which incorporates the following requirements:

1) Air monitoring shall be conducted in the excavation area and at the perimeter of the soil remedial action area. Because the PCBs are entrained in soil, respirable dust/particulate shall serve as a basis of the sampling for and measurement of PCBs in the atmosphere. The Settling Defendant shall initiate dust control measures if dust is visible in the excavation area.

2) Monitoring during soil remediation activities shall be conducted according to OSHA and NIOSH regulations and guidance.

3) Excavation Area Monitoring shall consist of continuous real-time monitoring performed immediately adjacent to the PCB excavation area. Measurements shall be taken in the breathing zones of personnel and immediately upwind and downwind of the work areas.

g. A Spill Control and Countermeasures Plan which shall include the following:

1) Contingency measures for potential spills and discharges from materials handling and/or transportation.

2) A description of the methods, means, and facilities required to prevent contamination of soil, water, atmosphere, and uncontaminated structures, equipment, or material by spills or discharges.

3) A description of the equipment and personnel necessary to perform emergency measures required to contain any spillage and to remove spilled materials and soils or liquids that become contaminated due to spillage. This collected spill material must be properly disposed of.

4) A description of the equipment and personnel to perform decontamination measures that may be required for previously uncontaminated structures, equipment, or material.

B. Soil Remediation Conference

A Soil Remediation Conference shall be held after selection of the construction contractor but before initiation of soil remediation. This conference shall include the Settling Defendant and federal, state and local government agencies and shall:

1. Define the roles, relationships, and responsibilities of all parties;

2. Review methods for documenting and reporting inspection data;

3. Review methods for distributing and storing documents and reports;

4. Review work area security and safety protocols;

5. Review the Soil Remedial Schedule;

6. Conduct a site reconnaissance to verify that the soil remediation criteria and the soil remediation plans and specifications are understood and to review material and equipment storage locations.

The Soil Remediation Conference must be documented, including names of people in attendance, issues discussed, clarifications made, special instructions issued, etc.

C. Prefinal Soil Remediation Inspection

Upon preliminary project completion the Settling Defendant shall notify EPA for the purpose of conducting a Prefinal Soil

Remediation Inspection. Participants should include the Project Coordinators, Supervising Contractor, Construction Contractor, Natural Resource Trustees and other federal, state, and local agencies with a jurisdictional interest. The Prefinal Inspection shall consist of a walk-through inspection of the entire soil remedial area. The objective of the inspection is to determine whether the soil remediation is complete and consistent with the Consent Decree. Any outstanding items discovered during the inspection shall be identified and noted on a punch list. The Settling Defendant shall certify that the soil remediation has performed to effectively meet the purpose and intent of the ROD. Retesting shall be completed where deficiencies are revealed. A Prefinal Soil Remediation Inspection Report shall be submitted by the Settling Defendant which outlines the outstanding soil remedial items, actions required to resolve the items, completion date for the items and an anticipated date for the Final Inspection.

D. Final Soil Remediation Inspection

Upon completion of all outstanding soil remedial items, the Settling Defendant shall notify EPA for the purpose of conducting a Final Soil Remediation Inspection. The Final Soil Remediation Inspection shall consist of a walk-through inspection of the excavation area. The Prefinal Soil Remediation Inspection Report shall be used as a check list with the Final Soil Remediation Inspection focusing on the outstanding soil remedial items identified in the Prefinal Soil Remediation Inspection. Confirmation shall be made during the Final Soil Remediation Inspection that all outstanding items have been resolved. Any outstanding soil remedial items discovered during the inspection still requiring correction shall be identified and noted on a punch list. If any items are still unresolved, the inspection shall be considered to be a Prefinal Soil Remedial Inspection requiring another Prefinal Soil Remediation Inspection Report and subsequent Final Soil Remediation Inspection.

E. Final Soil Remediation Report

Within thirty (30) days following the conclusion of the Final Soil Remediation Inspection, the Settling Defendant shall submit a Final Soil Remediation Report. EPA will review the draft report and will provide comments to the Settling Defendant. The Final Soil Remediation Report shall include the following:

1. Brief description of how outstanding items noted in the Prefinal Inspection were resolved;

2. Explanation of modifications made during the soil remediation to the original Soil Remediation Work Plan and why these changes were made;

3. Excavation drawings.

4. Synopsis of the soil remedial work defined in the SOW and certification that the soil remedial work has been completed.

TASK VII - Remedial Action Report

As provided in Section XV of the Consent Decree, within 90 days after the Settling Defendant concludes that the Remedial Actions have been fully performed and the Performance Standards have been attained, the Settling Defendant shall so certify to the United States and shall schedule and conduct a pre-certification inspection to be attended by EPA and the Settling Defendant. If after the pre-certification inspection the Settling Defendant still believes that the Remedial Actions have been fully performed and the Performance Standards have been attained, the Settling Defendant shall submit a Remedial Action (RA) Report to EPA in accordance with Section XV, Paragraph 50, of the Consent Decree. The RA Report shall include the following:

1. A copy of the Final Soil Remediation Report and the Final Groundwater Construction Report;

2. Synopsis of the work defined in this SOW and a demonstration in accordance with the Performance Standards Verification Plan that Performance Standards have been achieved;

3. Certification that the Remedial Actions have been completed in full satisfaction of the requirements of the Consent Decree, and;

4. A description of how the Settling Defendant will Implement any remaining part of the EPA approved Groundwater Operation and Maintenance Plan.

After EPA review, the Settling Defendant shall address any comments and submit a revised report. As provided in Section XV of the Consent Decree, the Remedial Actions shall not be considered complete until EPA approves the RA Report.

REFERENCES

The following list, although not comprehensive, comprises many of the regulations and guidance documents that apply to the RD/RA process. Settling Defendants shall review these guidances and shall use the information provided therein in performing the RD/RA and preparing all deliverables under this SOW.

1. "National Oil and Hazardous Substances Pollution Contingency Plan, Final Rule", Federal Register 40 CFR Part 300, March 8, 1990.

2. "Superfund Remedial Design and Remedial Action Guidance," U.S. EPA, Office of Emergency and Remedial Response, June 1986, OSWER Directive No. 9355.0-4A.

3. "Interim Final Guidance on Oversight of Remedial Designs and Remedial Actions Performed by Potentially Responsible Parties," U.S. EPA, Office of Emergency and Remedial Response, February 14, 1990, OSWER Directive No. 9355.5-01.

4. "Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA, Interim Final," U.S. EPA, Office of Emergency and Remedial Response, October 1988, OSWER Directive No. 355.3-01.

5. "A Compendium of Superfund Field Operations Methods," Two Volumes, U.S. EPA, Office of Emergency and Remedial Response, EPA/540/P-87/001a, August 1987, OSWER Directive No. 9355.0-14.

6. "EPA NEIC Policies and Procedures Manual," EPA-330/9-78-001-R, May 1978, revised November 1984.

7. "Data Quality Objectives for Remedial Response Activities," U.S. EPA, Office of Emergency and Remedial Response and Office of Waste Programs Enforcement, EPA/540/G-87/003, March 1987, OSWER Directive No. 9335.0-7B.

8. "Guidelines and Specifications for Preparing Quality Assurance Project Plans," U.S. EPA, Office of Research and Development, Cincinnati, OH, QAMS-004/80, December 29, 1980.

9. "Interim Guidelines and Specifications for Preparing Quality Assurance Project Plans," U.S. EPA, Office of Emergency and Remedial Response, QAMS-005/80, December 1980.

10. "Users Guide to the EPA Contract Laboratory Program," U.S. EPA, Sample Management Office, August 1982.

11. "Environmental Compliance Branch Standard Operating Procedures and Quality Assurance Manual," U.S. EPA Region IV, Environmental Services Division, February 1, 1991, (revised periodically).

12. "USEPA Contract Laboratory Program Statement of Work for Organics Analysis," U.S. EPA, Office of Emergency and Remedial Response, February 1988.

13. "USEPA Contract Laboratory Program Statement of Work for Inorganics Analysis," U.S. EPA, Office of Emergency and Remedial Response, July 1988.

14. "Quality in the Constructed Project: A Guideline for Owners, Designers, and Constructors, Volume 1, Preliminary Edition for Trial Use and Comment," American Society of Civil Engineers, May 1988.

15. "Interim Guidance on Compliance with Applicable or Relevant and Appropriate Requirements," U.S. EPA, Office of Emergency and Remedial Response, July 9, 1987, OSWER Directive No. 9234.0-05.

16. "CERCLA Compliance with Other Laws Manual," Two Volumes, U.S. EPA, Office of Emergency and Remedial Response, August 1988 (Draft), OSWER Directive No. 9234.1-01 and -02.

17. "Guidance on Remedial Actions for Contaminated Ground Water at Superfund Sites," U.S. EPA, Office of Emergency and Remedial Response, (Draft), OSWER Directive No. 9283.1-2.

18. "Guide for Conducting Treatability Studies Under CERCLA," U.S. EPA, Office of Emergency and Remedial Response, Pre-publication Version.

19. "Health and Safety Requirements of Employees Employed in Field Activities," U.S. EPA, Office of Emergency and Remedial Response, July 12, 1981, EPA Order No. 1440.2.

20. "Standard Operating Safety Guides," U.S. EPA, Office of Emergency and Remedial Response, November 1984.

21. "Standards for General Industry," 29 CFR Part 1910, Occupational Health and Safety Administration.

22. "Standards for the Construction Industry," 29 CFR 1926, Occupational Health and Safety Administration.

23. "NIOSH Manual of Analytical Methods," 2d edition. Volumes I - VII, or the 3rd edition, Volumes I and II, National Institute of Occupational Safety and Health.

24. "Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities," National Institute of Occupational Safety and Health/Occupational Health and Safety Administration/United States Coast Guard/ Environmental Protection Agency, October 1985.

25. "TLVs - Threshold Limit Values and Biological Exposure Indices for 1987 - 88," American Conference of Governmental Industrial Hygienists.

26. "American National Standards Practices for Respiratory Protection," American National Standards Institute Z88.2-1980, March 11, 1981.

27. "Quality in the Constructed Project - Volume 1," American Society of Civil Engineers, 1990.

SUMMARY OF THE MAJOR DELIVERABLES FOR THE
REMEDIAL DESIGN AND REMEDIAL ACTION AT
THE FIRESTONE TIRE & RUBBER SUPERFUND SITE
ALBANY, GEORGIA

DELIVERABLE	EPA RESPONSE
TASK I PROJECT PLANNING	
No deliverables planned as part of Task I.	
TASK II GROUNDWATER REMEDIAL DESIGN	
RD Work Plan (15)	Review and Approve
Sampling and Analysis Plan (15)	Review and Approve
Health and Safety Plan (5)	Review and Comment
Preliminary Design	
Results of Data Acquisition Activities (10)	Review and Approve
Design Criteria Report (10)	Review and Approve
Preliminary Plans and Specifications (10)	Review and Approve
Plan for Satisfying Permitting Requirements (10)	Review and Approve
Intermediate Design	
Draft Design Analyses (10)	Review and Comment
Draft Plans and Specifications (10)	Review and Comment
Draft Construction Schedule	Review and Comment
Prefinal/Final Design	
Complete Design Analyses (10)	Review and Approve
Final Plans and Specifications (10)	Review and Approve

Final Construction Schedule (10)	Review and Approve
Construction Cost Estimate (5)	Review and Comment
TASK III GROUNDWATER REMEDIAL ACTION	
RA Work Plan (10)	Review and Approve
Project Delivery Strategy (10)	Review and Approve
Construction Management Plan (10)	Review and Approve
Construction Quality Assurance Plan (10)	Review and Approve
Construction Health and Safety Plan/Contingency Plan (5)	Review and Comment
Prefinal Construction Inspection Report (5)	Review and Approve
Final Construction Report (5)	Review and Approve
TASK IV GROUNDWATER TREATMENT SYSTEM OPERATION AND MAINTENANCE	
Operation and Maintenance Plan (10)	Review and Approve
Operation and Maintenance Manual (5)	Review and Approve
TASK V GROUNDWATER TREATMENT PERFORMANCE MONITORING	
Performance Standards Verification Plan (10)	Review and Approve
TASK VI PCB-CONTAMINATED SOIL REMEDIAL ACTION	
Soil Remediation Work Plan (10)	Review and Approve
Soil Remediation Project Implementation Strategy (10)	Review and Approve
Soil Remediation Management Plan (10)	Review and Approve
Soil Remediation Quality Assurance Plan (10)	Review and Approve
Soil Remediation Health and Safety Plan/Contingency Plan (10)	Review and Approve

Prefinal Soil Remediation Inspection Report	Review and Approve
Final Soil Remediation Report 10)	Review and Approve
TASK VII REMEDIAL ACTION REPORT (10)	Review and Approve

NOTE: The number in parenthesis indicates the number of copies to be submitted by Respondents. One copy shall be unbound, the remainder shall be bound.

APPENDIX D

PERFORMANCE STANDARDS VERIFICATION PLAN

TABLE OF CONTENTS

Page

LIST OF TABLES ii

LIST OF FIGURES ii

1.0 INTRODUCTION D-1

2.0 GROUND-WATER COLLECTION SYSTEM SAMPLING D-2

2.1 FREQUENCY D-2
2.2 FIELD SAMPLING PLAN D-3
2.2.1 Preliminary Observations D-4
2.2.2 Staging, Sampling Devices, and Containers D-4
2.2.3 Ground-Water Sample Collection D-5
2.2.4 Sample Custody Protocols and Field Documentation D-6

3.0 GROUND-WATER COMPLIANCE MONITORING D-7
3.1 FREQUENCY D-7
3.2 FIELD SAMPLING PLAN D-7
3.2.1 Preliminary Observations D-8
3.2.2 Well Purging D-8
3.2.3 Ground-Water Sample Collection D-8

4.0 REMEDIATION SYSTEM MONITORING D-9

5.0 ANALYTICAL PROCEDURES D-10

6.0 QUALITY ASSURANCE OBJECTIVES FOR ANALYTICAL MEASUREMENTS D-11
6.1 DATA QUALITY OBJECTIVES D-12
6.2 INTERNAL QUALITY CONTROL PROCEDURES D-13
6.2.1 Field Activities D-13
6.2.2 Laboratory Activities D-14

7.0 DECONTAMINATION PROCEDURES D-16

8.0 CALIBRATION PROCEDURES D-17

9.0 REFERENCES D-18

LIST OF TABLES

Table 1. Industrial Wastewater Permit Discharge Limitation
2. Analytical Parameters
3. Data Quality Objectives
4. Analytical Program Studies

LIST OF FIGURES

Figure 1. Performance Standards Verification Monitoring Wells

1.0 INTRODUCTION

This Performance Standards Verification Plan provides a mechanism to verify that both short-term and long-term Performance Standards for the Ground-Water Remedial Action are met. Specifically, the Performance Standards Verification Plan addresses remediation system monitoring and ground-water compliance monitoring. Activities conducted pursuant to the Performance Standards Verification Plan will be conducted in substantial accordance with Region IV standard operating procedures (USEPA, 1991), the *Remedial Investigation Sampling and Analysis Plan* (RISAP) (WCC, 1991a) and the *Remedial Investigation Quality Assurance Project Plan* (RIQAPP) (WCC, 1991b). The following sections describe specific field sampling and analysis plans and quality assurance plans to be used during implementation of this plan.

The purpose of the Performance Standards Verification Plan is (1) to evaluate remediation of the impacted ground water collected from the Residuum/Transition Zone hydrostratigraphic units located in the southwestern portion of the Courtyard, (2) to monitor wells located on the boundary of and hydraulically downgradient of the impacted area to evaluate the effectiveness of the system in preventing migration of constituents of concern, and (3) to demonstrate ground-water collection system effluent compliance with POTW discharge requirements. Ground water samples will be obtained from the recovery wells and the ground-water compliance wells prior to start up of the system and after the system has been constructed (Baseline Monitoring). Throughout the remedial action, ground-water samples will be obtained from the recovery wells and the ground-water compliance wells, and effluent samples will be obtained at the POTW outfall (Remedial Action Monitoring). The samples will be analyzed as discussed in Section 5.0. Five years after completion of the remedial action, ground water will be collected from each recovery well and analyzed as discussed in Section 5.0 (Post Remedial Action Sampling).

Section 2.0 describes field activities associated with samples collected from wells which will be part of the ground-water collection system. Section 3.0 describes field activities associated with samples collected from wells which border the ground-water collection system. Section 4.0 describes field activities associated with effluent samples collected from the ground-water collection system discharge lines. Section 5.0 describes the analytical program for the ground-water and effluent samples. Section 6.0 provides a Quality Assurance program for field and laboratory activities. Section 7.0 describes decontamination procedures to be used during sampling activities.

2.0 GROUND-WATER COLLECTION SYSTEM SAMPLING

Ground-water samples will be obtained from the wells designated as part of the ground-water collection system to evaluate the efficiency of the selected remedial action in the impacted area. Because the collected ground water will not require treatment prior to discharge to the POTW, monthly analysis of effluent at the POTW outfall will also be used to evaluate the effectiveness of the ground-water collection system. Ground-water samples will be collected from wells MW-1-1, MW-1-2, MW-1-3, and PTW-1 (Figure 1) and analyzed for the ROD-specified constituents of concern, benzene, 1,1-dichloroethene, and 1,1,1-trichloroethane. Section 2.0 provides the procedures to be employed during field and analytical activities.

2.1 FREQUENCY

Ground-water samples obtained for each phase of the ground-water collection system monitoring program will be obtained at the frequency described below.

2.1.1 Baseline Monitoring

Baseline monitoring of the remediation system will begin immediately prior to implementation of the remedial design by obtaining ground-water samples from the wells after the system has been constructed and before the collection system is brought on-line.

2.1.2 Remedial Action Monitoring

Once the ground-water collection system has been brought on-line, ground-water samples will be obtained from the four remediation wells quarterly for the first year of operation of the system. Due to the narrow well diameter (2 inch) of wells MW-1-1, MW-1-2, and MW-1-3, the system will have to be taken off-line temporarily and the pumps removed in order to obtain a ground-water sample. In addition to the quarterly recovery well monitoring, the monthly effluent monitoring will provide information to track the composite effectiveness of the remediation system. After one year of both quarterly individual well monitoring and monthly composite monitoring, the individual well monitoring will be modified to an annual schedule. The monthly composite monitoring will continue until the remedial action is complete.

The analytical data will be summarized yearly and submitted to USEPA. The remedial action will be considered complete after three consecutive years of sampling resulting in concentrations which do not exceed ROD-specified clean-up levels. If one year of sampling results in concentrations which do not exceed ROD-specified clean-up levels, any subsequent sampling events which yield analytical results exceeding clean-up levels will be verified with a confirmatory round of sampling and analysis. If the confirmatory round of sampling and analysis indicates that the constituents do not exceed clean-up levels, the data from the initial round will be considered anomalous and the data from the confirmatory round of sampling will be used to evaluate the remedial action. The analytical results will be evaluated on a well by well basis. As specified in the ROD, operation of recovery wells may be discontinued in areas where clean-up levels are attained.

2.1.3 Post Remedial Action Monitoring

Five years after completion of the remedial action, ground-water will be obtained from the four recovery wells. If, after 5 years, no ground-water sample contains a constituent of concern exceeding clean-up levels, the wells will be abandoned in accordance with state requirements.

2.2 FIELD SAMPLING PLAN

Ground-water samples will be collected from wells MW-1-1, MW-1-2, MW-1-3, and PTW-1 in accordance with the following procedures. Because the system will be actively pumping prior to sample collection, the wells that are part of the active remediation system will not require purging prior to sampling, nor will ground-water levels be determined in these wells. [NOTE: Should one or more wells be off-line temporarily (24 hours prior to sampling), ground-water levels will be measured and the well(s) will be purged of a minimum of three well volumes of water prior to sampling.] Section 3.0 describes the procedures to be used for water-level measurement and purging activities.

Prior to any sampling event, the following steps will be taken by personnel responsible for sampling:

- Review all sampling locations.
- Assemble and inspect field equipment necessary for sample collection; verify that equipment is clean and in proper working order.
- Note and replace all items that are in short supply or that are showing indications of wear; maintain an adequate supply of spare parts for all sampling equipment.
- Calibrate equipment to manufacturer's specifications.
- Examine sample shuttles, bottles, and preservatives; contact laboratory immediately if any problems are found.
- Confirm sample delivery time and method of sample shipment with the laboratory.
- Establish a sampling team consisting of enough trained people to perform the planned sampling event efficiently and without undue haste.
- Establish a sampling schedule for the activities of the day.

2.2.1 Preliminary Observations

The order in which wells are to be sampled is from suspected clean wells to wells exhibiting higher concentrations of the constituents of concern. Each well will be examined for damage. The project manager will immediately be notified if well damage is suspected. A new pair of disposable gloves will be used at each well. The well cover will be carefully removed to avoid causing foreign material to enter the well. The pump will slowly and gently be removed from wells MW-1-1, MW-1-2, and MW-1-3 and placed on and covered by polyethylene sheeting. The pump from well PTW-1 will not be removed prior to sampling. Temperature, pH, and specific conductance will be measured and recorded after sample collection.

2.2.2 Staging, Sampling Devices, and Containers

The laboratory shall provide all the necessary sample containers. Furthermore, it shall be fully responsible for preparing the sample containers so that they comply with applicable container preparation methods and quality assurance procedures.

It is the responsibility of the field sampler to identify properly the exact location of the sample taken; the sample identification; the date and time sampled; the type of sample; the required analysis; whether or not a preservative has been used, and if so what type; the name of the sampler; and the respective project number. This information is to be documented in the field notebook. This same information is then to be placed on the sample identification label, which in turn is affixed to the sample container. Sample labels will be filled out with an indelible ink. If the field sampler determines that additional information is pertinent to the sample being taken, such data is to be recorded in the field notebook.

Field activities and documentation procedures will be conducted in general accordance with the USEPA Region IV standard operating procedures.

2.2.3 Ground-Water Sample Collection

The order in which wells are to be sampled is from suspected clean wells to wells exhibiting higher concentrations of the constituents of concern. Polyethylene sheeting will be placed on the ground surface in the vicinity of the well to be sampled. The sheeting will act as a "clean zone" for sampling activities.

Two 40-milliliter glass vials (Teflon® septum closure) pre-preserved with hydrochloric acid (HCl) are required for analysis of the constituents of concern. All sample vials are to be filled to capacity to minimize headspace for volatilization. After the sample is collected, an aliquot of ground water will be collected and analyzed in the field for pH, temperature, and specific conductance. Immediately after collection, the samples are to be placed in a cooler with ice. Samples will be shipped to the laboratory by overnight courier, if necessary, to meet analytical holding time restrictions. Sample containers will be sealed with custody tape. Chain-of-custody procedures will be conducted in general accordance with the Region IV standard operating procedures. Requested analytical parameters will be noted on Chain-of-Custody Forms. Specific chain-of-custody procedures are included in Section 5 of the RI SAP and Section 7 of the RI QAPP.

2.2.4 Sample Custody Protocols and Field Documentation

The RI SAP provides procedures for sample custody protocols and field documentation. These procedures include guidance on the following:

- Field Logbooks and Field Sheets
- Sample Labeling
- Chain of Custody
- Packaging and Shipping Protocol

3.0 GROUND-WATER COMPLIANCE MONITORING

Ground-water samples will be obtained from the wells bordering the ground-water collection system to monitor wells located on the boundary of and hydraulically downgradient of the impacted area to evaluate the effectiveness of the system in preventing migration of constituents of concern. The wells that will be used to monitor potential migration were chosen based on the site hydrogeology. Ground-water samples will be collected from wells DRW-1, DRW-2, DRW-3, and DRW-4, which are hydraulically down-gradient of the remediation system. Ground-water samples will be collected from wells MW-1-5A, RW-4, and MW-1-4, which are hydraulically side- and up-gradient of the remediation system. The compliance ground water wells to be sampled are shown on Figure 1. Ground-water samples collected as part of the ground-water compliance monitoring program will be analyzed for the ROD-specified constituents of concern, benzene, 1,1-dichloroethene, and 1,1,1-trichloroethane. Section 3.0 provides the procedures to be employed during field and analytical activities.

3.1 FREQUENCY

Monitoring of the ground-water compliance wells will begin immediately prior to implementation of the remedial design by obtaining ground-water samples from the wells after the system has been constructed and before the collection system is brought on-line (Baseline Monitoring). Ground-water samples will then be obtained from the seven compliance wells quarterly for the first year and annually for subsequent years for the duration of the remedial action, as described in Section 2.1 (Remedial Action Monitoring). If any constituent of concern is detected above clean-up levels in two consecutive sampling events, the need to modify the remediation system will be evaluated. Ground-water compliance system monitoring will be discontinued when the remedial action is considered complete.

3.2 FIELD SAMPLING PLAN

Ground-water samples will be collected from wells MW-1-4, MW-1-5A, RW-4, DRW-1, DRW-2, DRW-3, and DRW-4 in accordance with the following procedures.

3.2.1 Preliminary Observations

Prior to initiation of sampling activities, each well will be examined for damage. The project manager will immediately be notified if well damage is suspected. A new pair of disposable gloves will be used at each well. The well cover will be carefully removed to avoid causing foreign material to enter the well. If needed, the exterior and interior of the exposed riser pipe will be wiped with clean filter paper (or equivalent) and organic-free water. Prior to purging the well, the water level will be measured in the well and the volume of standing water calculated. The following formula (Equation 4-1) will be used to calculate the volume of standing water in the well based on the initial water level:

$$V = 0.41 \times d^2 \times h \qquad \text{Eqn. 1}$$

where: V = Volume of water (gallons)
d = inside diameter of well or sand pack(inches)
h = height of static water column in the well or above the screen (feet)

3.2.2 Well Purging

Prior to sampling, the well will be purged using a bailer or submersible pump. The wells will be purged in general accordance with Region IV standard operating procedures. Temperature, pH, and specific conductance will be measured while purging the wells. The purging will be considered adequate if three to five well volumes of ground water are removed or if the water quality parameters stabilize over three readings during purging, whichever occurs first. The last set of readings will be recorded as the actual reading from each well. After purging is complete, the pump or bailer will slowly and gently be removed from the well and the well will be allowed to recover prior to sampling.

3.2.3 Ground-Water Sample Collection

Ground-water collection procedures are previously described in Sections 2.2.3 and 2.2.4.

4.0 REMEDIATION SYSTEM MONITORING

Remediation system effluent to the POTW will be sampled monthly to demonstrate compliance with POTW discharge limitations. The effluent sample will be obtained at the outfall indicated on Figure 1. Effluent samples will be analyzed for volatile organic compounds as specified in the Industrial Waste-water Permit (Table 1). Samples will be collected monthly and analyzed by representatives from the City of Albany Office of Public Works (Remedial Action Monitoring). If any constituent monitored for permit discharge compliance is detected above discharge limitations in two consecutive sampling events, the need to modify the remediation system will be evaluated.

5.0 ANALYTICAL PROCEDURES

Ground-water samples collected from remediation system wells or compliance wells will be analyzed by Law Environmental National Laboratories located in Pensacola, Florida. The samples will be analyzed for benzene, 1,1-dichloroethene, and 1,1,1-trichloroethane using USEPA Test Methods for Analysis of Solid Waste (SW-846) Method 8260. The quality assurance (QA) program to be implemented is provided in Section 5.0.

Effluent samples will be collected and analyzed by the City of Albany POTW using USEPA Methods 601/602. Table 2 lists the Constituents of Concern and the associated laboratory PQLs and ROD-specified ARARs.

6.0 QUALITY ASSURANCE OBJECTIVES FOR ANALYTICAL MEASUREMENTS

The QA objectives included in this plan will establish the guidelines which define the quality of the environmental measurements required to meet the objectives of the Performance Standards Verification Plan. The specific analytical procedures are discussed in Section 5. This section addresses objectives for precision, accuracy, completeness, representativeness, and comparability.

QA objectives for precision, accuracy, and completeness for each major measurement parameter have been established for this project. Measurements are to be representative of the materials tested. Data will be calculated and reported in units consistent with similar data measurements from the site for comparison purposes. Definitions for precision, accuracy, completeness, comparability and representativeness are as follow:

- Precision is a measure of mutual agreement among individual measurements of the same property, usually under prescribed similar conditions. Precision will be evaluated by performing field and laboratory duplicate analysis.

- Accuracy is the degree of agreement of a measurement with an accepted reference or true value. Accuracy will be evaluated by performing blank and spike analyses.

- Completeness is a measure of the amount of valid data obtained from a measurement system compared to the amount that was expected to be obtained under correct normal conditions.

- Representativeness expresses the degree to which data accurately and precisely represent a characteristic of a population, parameter variations at a sampling point, a process condition, or an environmental condition. Representativeness is a qualitative parameter which is dependent upon the proper design of the sampling program and proper laboratory protocol. The sampling network was designed to provide data representative of site conditions. Representativeness will be satisfied by using proper sampling techniques and analytical procedures.

- Comparability expresses the confidence with which one data set can be compared with another. The extent to which existing and planned analytical data will be comparable depends on the similarity of sampling and analytical methods. Samples obtained from previous investigations at the facility were collected in accordance with Region IV procedures and analyzed using USEPA methodologies. The procedures used to obtain the planned analytical data, as documented in the QAPP, are expected to provide data comparable to previous investigations.

LAW will collect samples of ground-water to evaluate compliance with ARARs and ROD-specified clean-up levels. During the field sampling activities, LAW will collect a sample duplicate for every ten samples. Duplicate samples will be analyzed to check sampling and analytical reproducibility. Field rinsate blanks will be prepared on-site. These samples will be submitted to the laboratory to assess the quality of the data resulting from field decontamination activities. Trip blank samples will be analyzed for volatile organic compounds (VOCs) to check for procedural contamination and/or ambient conditions at the site that may result in sample contamination.

6.1 DATA QUALITY OBJECTIVES

Data quality objectives (DQOs) are qualitative and quantitative statements which specify the quality of the data required to support decisions concerning evaluation of the effectiveness of remediation. As such, different data uses may require different levels of data quality. There are five analytical levels which address various data uses and the QA/QC effort and methods required to achieve the desired level of quality. The five levels are defined below:

- Screening (DQO Level I): This provides the lowest data quality but the most rapid results. It is often used for health and safety monitoring at the site and to evaluate purging activities. These types of data include those generated on-site through the use of organic vapor analyzers (OVA), pH, conductivity, and other real-time monitoring equipment at the site. Level I data will be collected using an OVA for health and safety, and a ph/Temperature/Conductivity meter for purging activities.

- Field Analyses (DQO Level II): This level provides rapid results and better quality than Level I. This level may include analysis by field GC or mobile lab. No samples will be collected RA activities requiring Level II data.

- Engineering (DQO Level III): This provides an high level of data quality and is used for site characterization. Engineering analyses may include some analytical lab methods. Samples obtained from the site will be analyzed for hazardous characteristics using U.S. EPA Test Methods for Evaluating Solid Waste (SW-846) Method 8260.

- Confirmational (DQO Level IV): This level provides the highest level of data quality and is used for purposes of evaluation of remedial alternatives or assessment of risk. These analyses require implementation of the CLP Statements of Work (SOW) and subsequent use of the data validation procedures in accordance with U.S. EPA recognized protocol. No

samples collected during RA activities will be analyzed following CLP methodologies.

- Non-Standard (DQO Level V): This refers to chemical analyses by non-standard protocols, for example, when exacting detection limits or analysis of an unusual chemical compound is required. These analyses often require method development or adaptation. The level of quality control is usually similar to DQO Level IV data. No samples will be analyzed to produce Level V data.

Sampling activities and laboratory testing for the RI will require Level I and Level III DQOs (Table 3).

6.2 INTERNAL QUALITY CONTROL PROCEDURES

Section XX lists the specific QC procedures that will be implemented as part of this Performance Standards Verification Plan. Table 4 lists the QC samples that will be obtained as part of this program.

6.2.1 Field Activities

LAW's standard field sampling procedures call for preparation and submittal of three types of QC samples from the field:

- Trip blanks—One trip VOC blank for every shipper containing aqueous samples requiring VOC analysis. The trip blanks will be prepared by the laboratory using organic-free water (boiled and purged with nitrogen), preserved with an appropriate agent, transported to the site, handled as the samples are handled, and returned to the laboratory for analysis.

- Rinsate blanks—Rinsate blanks are prepared in the field to demonstrate that a sampling device (e.g., bailer or pump) has been effectively cleaned. The sampling device is filled with organic free water or organic free water is pumped through the device, transferred to the appropriate sample bottles, preserved, and returned to the laboratory for analysis. One field blank will be collected for each type of sampling equipment.

- Blind duplicates—Two sets of samples from a single source are prepared, labeled with unique sample numbers, and submitted to the laboratory without cross-referencing data and without identification as duplicates on the parameter request sheet. One blind duplicate will be collected for every 10 environmental samples collected.

6.2.2 Laboratory Activities

The quality control procedures specified in the SW-846 Method 8260 will be followed at a minimum. Highlights of the quality-control requirements follow.

The laboratory will analyze the following laboratory control samples at a rate of one per batch of samples for each matrix type and concentration level or one per 20 samples, whichever is more frequent. The control limits and corrective actions are specified in the method.

- Method standard is analyzed prior to analysis of any samples to check the accuracy of the method, under optimum conditions, excluding any chemical interference from the sample matrix.
- The method blank is performed every 12 hours of continuous operation following each continuing calibration standard analysis for volatile organic compound analyses to check for laboratory contamination.
- Surrogate spikes are added to every sample and their recovery evaluated. The surrogate spikes are unusual organic compounds that are readily identified in the analysis. Surrogate spikes are used to check the efficiency of sample preparation and analysis.
- Matrix spike/matrix spike duplicate samples are analyzed at a rate of one for each matrix type and concentration level per batch of samples or one in 20 samples, whichever is more frequent. The matrix spike consists of a mixture of standard organic compounds among the volatile, base/neutral extractable, acid extractable, and pesticide groups. The matrix spike is used to check for matrix interferences in the sample.

The results of analyses of these QC samples are used as independent, external checks on laboratory and field contamination and the precision of analyses. Records of samples maintained by the laboratory include:

- Sample-receiving logbook—to log the samples when they are received and assigned a batch number
- Instrument logbook—to record the preparation and use of standards in the laboratory
- QC logbook—to record day-to-day QC data obtained from the analysis of a batch. Quality control summary sheets are used as a convenient method to file batch QC information by parameter.

- Chemist's notebook—to record the raw data and final data for every batch.
- Quality-control charts—to track performance on individual analyses and instruments and to give early indication of analyses that may be going out of control.

7.0 DECONTAMINATION PROCEDURES

Decontamination of field equipment will generally follow the procedures set forth in Section 3.0 of the RI SAP. If a pump is to be used for more than one well, it will be decontaminated between wells according to procedures described in Section 3.0 of the SAP.

8.0 CALIBRATION PROCEDURES

Field instrumentation will be calibrated as specified in Section 6.0 of the RI SAP and Section 8.1 of the RI QAPP.

9.0 REFERENCES

Woodward-Clyde Consultants, 1991a. *Remedial Investigation Sampling and Analysis Plan Former Firestone Rubber & Tire Facility, Albany, Georgia*, Chicago, Illinois.

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United States Environmental Protection Agency, 1992. *Contract Laboratory Program Statement of Work for Organics Analysis*, OLM02.1, Sample Management Office, Cincinnati, Ohio.

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TABLES

Table 1. Industrial Wastewater Permit Discharge Limitations

Parameter	Maximum Daily Concentration ug/L	Average Daily Concentration ug/L
Benzene	20	20
Carbon Tetrachloride	100	100
Chloroform	4	4
Chlorinated Ethanes	700	700
Dichlorobenzenes (total)	4000	4000
Dichloroethenes (total)	20	20
Dichloromethane	180	180
1,1,2,2-Tetrachloroethane	10	10
1,1,1-Trichloroethane	20	20
Toluene	2000	2000
Xylenes (total)	10000	10000

Note: Two consecutive monitoring monthly monitoring events shall not exceed the listed concentration.
Source: Industrial Wastewater Contribution Permit Number T-1, User Code CO P11

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Table 2. Analytical Parameters

Parameter	Analytical Methodology	Practical Quantitation Limit* ug/L	ROD-Specified ARAR ug/L	
Ground-Water Monitoring				
Benzene	SW-846 Method 8260	5	5	(MCL)
1,1-Dichloroethene	SW-846 Method 8260	7	7	(MCL)
1,1,1-Trichloroethane	SW-846 Method 8260	5	200	(MCL)
Effluent Monitoring				
Benzene	USEPA 601/602	1	20	(IWP)
Carbon Tetrachloride	USEPA 601/602	1	100	(IWP)
Chloroform	USEPA 601/602	1	4	(IWP)
Chlorinated Ethanes	USEPA 601/602	1	700	(IWP)
Dichlorobenzenes (total)	USEPA 601/602	1	4000	(IWP)
Dichloroethenes (total)	USEPA 601/602	1	20	(IWP)
Dichloromethane	USEPA 601/602	1	180	(IWP)
1,1,2,2-Tetrachloroethane	USEPA 601/602	1	10	(IWP)
1,1,1-Trichloroethane	USEPA 601/602	1	20	(IWP)
Toluene	USEPA 601/602	1	2000	(IWP)
Xylenes (total)	USEPA 601/602	1	10000	(IWP)

Notes: MCL - Safe Drinking Water Act Maximum Contaminant Level
IWP - Industrial Wastewater Contribution Permit Discharge Limit

Entered by: JAM 8/29/95
Checked by: EHS 8/29/95

* Practical Quantitation Limits for Ground-water Compliance Monitoring were obtained from Law Environmental National Laboratories.

* Practical Quantitation Limits for Effluent Monitoring were obtained from Savannah Laboratories.

TABLE 3. Data Quality Objectives

Activity	Remedial Action Evaluation		Ground water Compliance Monitoring		Remediation System Effluent Monitoring	
Objective	Ground-water samples will be collected to evaluate the efficiency of the selected remedial alternative.		Ground-water samples will be collected to monitor potential migration of constituents of concern		Effluent samples will be collected to demonstrate compliance with wastewater permit discharge requirements.	
Data Use	Source Characterization Health		Compliance monitoring Health		Compliance monitoring Health	
Analytical Parameters (analytical level)	Field - HNu(I), pH(I), temperature(I) - conductance(I) Laboratory - SW-846 Method 8260(III)		Field - HNu(I), pH(I), temperature(I) - conductance(I) Laboratory - SW-846 Method 8260(III)		Laboratory - USEPA 601/602	
Data Use/DQO Level Required	Source Characterization/I, III Health/I		Source Characterization/I, III Health/I		Compliance monitoring/III	
Constituents of Concern	1,1-Dichloroethene 1,1,1-Trichloroethane Benzene		1,1-Dichloroethene 1,1,1-Trichloroethane Benzene		1,1-Dichloroethene 1,1,1-Trichloroethane Benzene	
ROD-Specified Clean-up Level	1,1-Dichloroethene 1,1,1-Trichloroethane Benzene	7 ug/L 200 ug/L 5 ug/L	1,1-Dichloroethene 1,1,1-Trichloroethane Benzene	7 ug/L 200 ug/L 5 ug/L	1,1-Dichloroethene 1,1,1-Trichloroethane Benzene	7 ug/L 200 ug/L 5 ug/L
Laboratory Quanititation Limit	1,1-Dichloroethene 1,1,1-Trichloroethane Benzene	7 ug/L 5 ug/L 5 ug/L	1,1-Dichloroethene 1,1,1-Trichloroethane Benzene	7 ug/L 5 ug/L 5 ug/L	1,1-Dichloroethene 1,1,1-Trichloroethane Benzene	7 ug/L 5 ug/L 5 ug/L

Entered by: JAM 8/29/95
Checked by: EHS 8/29/95

TABLE 4. ANALYTICAL PROGRAM STUDY

Sample Matrix	Field Parameters	Laboratory Parameters	Investigative Sample			Field Quality Control Samples						Matrix Spike/ Matrix Spike Duplicates			Annual Total
						Field Duplicates			Field Blanks[4]						
			No.	Freq.	Total	No.	Freq.	Total	No.	Freq.	Total	No.	Freq.	Total	
Baseline Ground Water Monitoring	pH Conductivity GW Elevation Temperature	SW-846 Method 8260 - Benzene - 1,1-Dichloroethene - 1,1,1-Trichloroethane	11	Once	11	2	Once	2	2	Once	2	1	Once	1	16
RA Ground Water Monitoring[1]	pH Conductivity GW Elevation Temperature	SW-846 Method 8260 - Benzene - 1,1-Dichloroethene - 1,1,1-Trichloroethane	11	Quarterly	44	2	Quarterly	8	2	Quarterly	8	1	Quarterly	4	64
RA Ground Water Monitoring[2]	pH Conductivity GW Elevation Temperature	SW-846 Method 8260 - Benzene - 1,1-Dichloroethene - 1,1,1-Trichloroethane	11	Annually	11	2	Annually	2	2	Annually	2	1	Annually	1	16
Post RA Ground Water Monitoring[3]	pH Conductivity GW Elevation Temperature	SW-846 Method 8260 - Benzene - 1,1-Dichloroethene - 1,1,1-Trichloroethane	11	Once	11	2	Once	2	2	Once	2	1	Once	1	16
Effluent		USEPA 601/602	1	Monthly	1	0	Monthly	0	0	Monthly	0	0	Monthly	0	1
Air[5]	VOCs		--	--	--	--	--	--	--	--	--	--	--	--	--

1. To be performed for the first year of the Remedial Action

2. To be performed subsequent to the first year of the Remedial Action

3. To be performed 5 years after completion of the Remedial Action

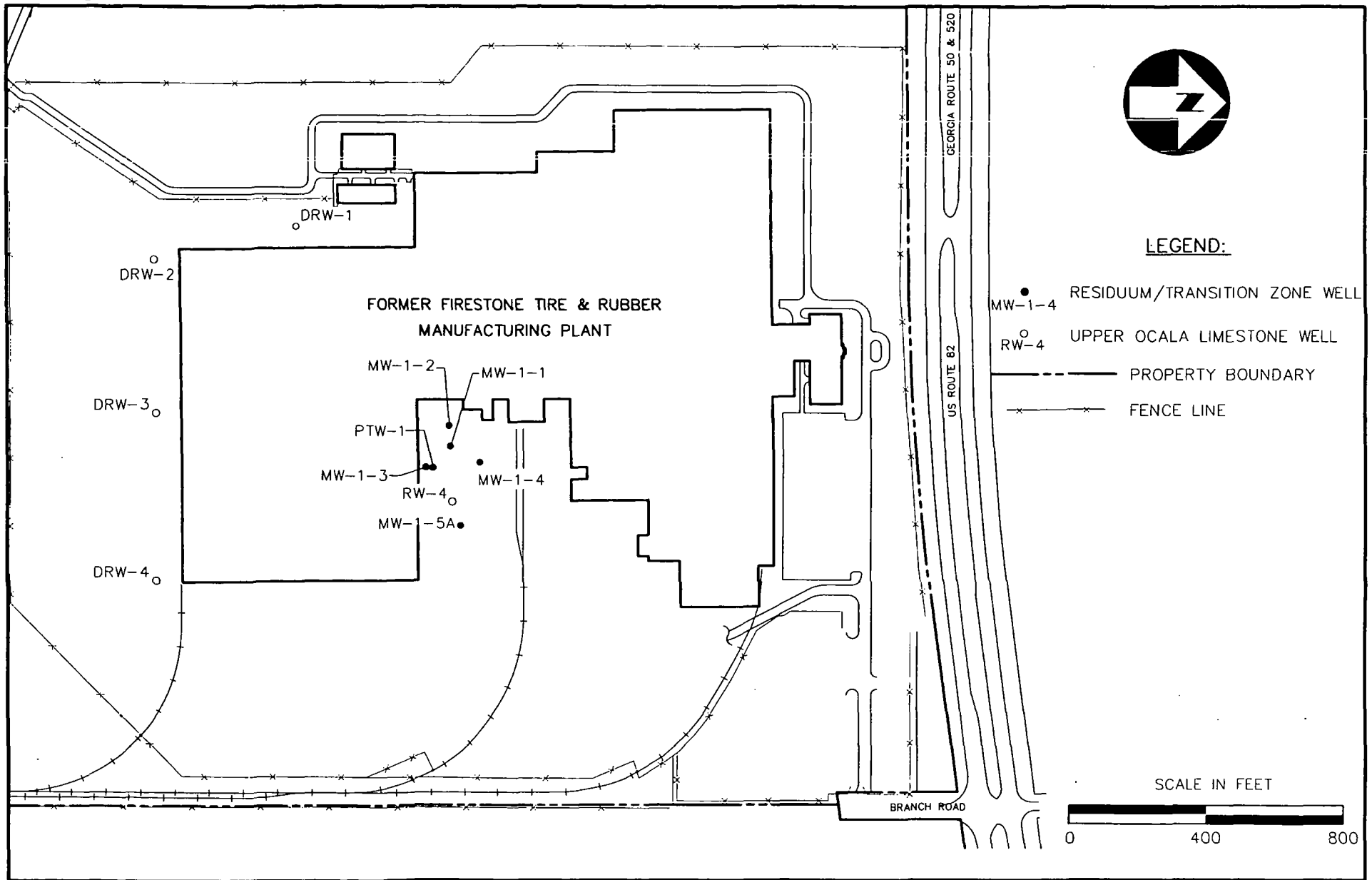
4. The field quality control samples will include rinsate blanks (RB), and trip blanks (TB). One trip blank sample will be shipped with each shipping cooler containing VOC aqueous samples.

5. Volatile organic compounds will be analyzed by PID during field operations to assess health risk.

Entered by: JAM 8/29/95
Checked by: EHS 8/29/95

FIGURE

2/BRDSTONE/FIG1-3 DATE: 8/29/95



BRIDGESTONE/FIRESTONE, INC.
ALBANY, GEORGIA

LAW
ENGINEERING AND ENVIRONMENTAL SERVICES

PERFORMANCE STANDARD VERIFICATION
MONITORING WELLS

FIRESTONE TIRE & RUBBER COMPANY SITE

PROJECT NO. 41-4537 FIGURE 1

APPENDIX E

INDUSTRIAL WASTE WATER PERMIT

INDUSTRIAL WASTEWATER CONTRIBUTION PERMIT
FOR CLASS I USERS

Department of Public Works
City of Albany, Georgia

File

rmit Number: T-1
dustrial User Code: CO F11

[illegible] accordance with all terms and conditions of the City of Albany Municipal de, Chapter 86, entitled Sewerage Ordinance, and with any applicable ovisions of federal or state law or regulation: FIRESTONE TIRE AND RUBBER CO., Class 1 user of the City of Albany's Publicly Owned Treatment Works, located 3300 SYLVESTER RD. is hereby authorized to discharge to the City of Albany's ewer system in accordance with the limitations, monitoring requirements and her conditions set forth in Parts I and II hereof. This permit is granted in cordance with the application filed on 12/06/94, and in accordance with the her data submitted to this office and historical records.

is permit shall become effective on 01/01/95. This permit and the thorization to discharge to the City of Albany's sewer system shall expire at idnight 12/31/95.

igned this 14 DAY OF DECEMBER,1994

irector of Public Works
ity of Albany, Georgia

ndustrial Pretreatment & Monitoring Supervisor
ity of Albany, Georgia

RT I

SPECIAL CONDITIONS

The Class 1 user authorized herein shall comply with all requirements of ction 28-7-D of the City of Albany Sewer Ordinance.

The Class 1 user authorized herein shall provide and operate the following nitoring facilities: VALVE AT HOLDING TANK in accordance with Section 28-7-F the City of Albany Sewer Ordinance. The existing facility is ACCEPTABLE.

The User shall provide protection from accidental discharge of prohibited terials or other substances regulated by this permit. Facilities to prevent cidental discharge of prohibited materials shall be provided and maintained at e user's own cost and expense. Detailed plans showing facilities and operating ocedures to provide this protection shall be submitted to the City for review, d shall be approved by the City before construction of the facility. Review d approval of such plans and operating procedures shall not relieve the dustrial user from the responsibility to modify the User's facility as cessary to meet the requirements of this permit. In the case of an accidental scharge, it is the responsibility of the User to telephone immediately and tify the Wastewater Treatment Plant Superintendent, (912) 430-5264, of the ident. The notification shall include location of discharge, type of waste, ntration and volume, and corrective actions.

Within five (5) days following an accidental discharge, the User shall submit the City a detailed written report describing the cause of the discharge and e measures to be taken by the User to prevent similar future occurrences. Such tification shall not relieve the User of any expense, loss, damage, or other ability which may be incurred as a result of damage to the wastewater eatment facilities, fish kills, or any other damage to persons or property; r shall such notification relieve the User of an fines, civil penalities, or her liability which may be imposed by the City of Albany Sewer Ordinance or her applicable law.

A notice shall be permanently posted on the User's bulletin board or other ominent place advising employees whom to call in the event of a dangerous scharge. Employees shall insure that all employees who may cause or suffer ch a dangerous discharge to occur are advised of the emergency notification ocedure.

DISCHARGE LIMITATIONS

l discharges must comply with limitations of Section 28-7-B of the City of bany Sewer Ordinance in addition to the volume and pollutant discharge mitations summarized in Tables I.1, I.2, and I.3 of this permit.

Table I.1 Volume of Discharge Limitations

	Quantity, million gallons	
riod	Average	Maximum
urly	400	600
ily	12,000	14,400
ekly	84,000	100,800
nthly	432,000	432,000

Table I.2 Conventional Pollutants Discharge Limitations

Parameter	Quantity				
	Unit	per hour	per day	per week	per month
ochemical oxygen demand	pounds	N/A			
tal suspended solids	pounds	N/A			
l and grease	pounds	NOT TO EXCEED 100 MG/L			
emical oxygen demand	pounds	N/A			
	pH units	NOT LESS THAN 5.5 AND NOT TO EXCEED 9.0			
mperature	degrees C	NOT TO CAUSE TEMP TO BE >40C AT POTW			

Table I.3 Priority Pollutants Discharge Limitations

rameter	Units	Max/Day	Avg daily values two consecutive monitoring days shall not exceed
NZENE	MG/L	.02	.02
RBON TETRACHLORIDE	MG/L	.1	.1
LOROFORM	MG/L	.004	.004
LORINATES ETHANES	MG/L	.7	.7
CHLOROBENZENS TOTAL	MG/L	4.0	4.0
CHLOROETHYLENES TOTAL	MG/L	.02	.02
THYLENE CHLOROIDE	MG/L	.18	.18
1,2,2,TETRACHLOROETHANE	MG/L	.01	.01
1 TRICHLOROETHANE	MG/L	.02	.02
LUENE	MG/L	2.0	2.0
LENES	MG/L	10.0	10.0

IST COMPLY WITH LIMITS OF THE CITY OF ALBANY'S SEWERAGE ORDINANCE FOR ALL

HER PARAMETERS

MONITORING AND SURVEILANCE

e City of Albany will conduct unannounced monitoring for the parameters and riod listed in Table I.4 of this permit in accordance with the Industrial etreatment Program.

ble I.4: Monitoring Frequency and Parameters
Company

nventional Pollutants		Priority Pollutants	
rameters	Frequency	Parameters	Frequency
NE	N/A	VOC	MONTHLY

addition to the City scheduled sampling program, Users may perform their own nitoring or request the City to conduct additional sampling at the User's own pense.

RT II

POWERS AND AUTHORITY OF THE CITY

The City of Albany, or its duly authorized representative or representatives, d all other duly authorized employees of the city shall be permitted to enter on the property for which this permit is awarded, for the purpose of spection, observation, measuring, sampling and testing, in accordance with the ovisions of the Sewer Ordinance.

The City may suspend the wastewater treatment service and/or a wastewater ntribution permit when such suspension is necessary, in the opinion of the ty, in order to stop an actual or threatened discharge which presents or may esent an imminent or substantial endangerment to the health or welfare of rsons, to the environment, causes interference to the City of Albany POTW or uses the City to violate any condition of its NPDES Permit.

Any User notified of a suspension of the wastewater treatment service and/or e Wastewater Contribution Permit shall immediately stop or eliminate the ntribution. In the event of a failure of the person to comply voluntarily with e suspension order, the City shall take such steps as deemed necessary cluding initiation of legal action by the City Attorney and immediate verance of the sewer connection, to prevent or minimize damage to the City of y POTW or endangerment to any individuals. The City shall reinstate the wastewater Contribution Permit and/or the wastewater treatment service upon oof of the elimination of the non-complying discharge. A detailed written atement submitted by the User describing the causes of the harmful ntribution and the measures taken to prevent any future occurrence shall be bmitted to the City with 15 calendar days of the date of occurrence.

Any User who violates the following conditions is subject to having his rmit revoked in accordance with the procedures of Section 29-10 of the City of bany Sewer Ordinance:

). Failure of a User to report factually the wastewater constituents and aracteristics of his discharge in the Permit Application Form.

). Failure of the User to report significant changes in operations, or stewater constituents and characteristics.

). Refusal of reasonable access to the User's premises for the purpose of spection or monitoring.

). Violation of conditions of the permit.

NOTIFICATION OF VIOLATIONS

ıenever the City finds that any User has violated or is violating this ıstewater contribution permit, the City may serve upon such person a written ›tice stating the nature of the violation. Within 30 days of the date of the ›tice, a plan for the satisfactory correction thereof shall be submitted to the ty by the User. Every December, the City will publish in the local newspaper ıe list of violators of the wastewater contribution permit for that year.

ART III

RIGHT OF ENTRY

1. The City shall inspect the facilities of any User to ascertain whether the purpose of this Permit is being met and all requirements are being complied with. Persons or occupants of premises where wastewater is created or discharged shall allow the City or their representative ready access at all times to all parts of the premises for the purpose of inspection, sampling, records examination or in the performance of any of their duties.

2. The City, the Georgia Environmental Protection Division (EPD), and the United States Environmental Protection Agency (EPA) shall have the right to set up on the User's property such devices as are necessary to conduct sampling inspection, compliance monitoring, and/or metering operations. Where a User has security measures in force which would require proper identification and clearance before entry into their premises, the User shall make necessary arrangements with their security guards so that upon presentation of suitable identification personnel from the City, EPD, and EPA will be permitted to enter, without delay, for the purposes of performing their specific responsibilities.

RECORDS RETENTION

1. Information and data on a User obtained from reports, questionnaires, permit applications, permits, monitoring programs, and from inspections shall be available to the public, EPD, EPA or other governmental agencies without restriction unless the User specifically requests and is able to demonstrate to the satisfaction of the City, EPD and EPA, that the release of such information would divulge information, processes or methods of production entitled to protection as trade secrets of the User. Effluent data will be available to the public without restriction.

PENALTY PROVISIONS

1. Notification of Violation

Whenever the Director of Public Works finds that any industrial user has violated or is violating this Permit, the Director of Public Works or his agent may serve upon said user written notice of the violation. Within 10 days of the receipt date of this notice, an explanation of the violation and a plan for the satisfactory correction and prevention thereof, to include specific required actions, shall be submitted to the Director of Public Works. Submission of this plan in no way relieves the user of liability for any violations occurring before or after receipt of the Notice of Violation.

2. Consent Orders

The Director of Public Works is hereby empowered to enter into Consent Orders, assurances of voluntary compliance, or other similar documents

establishing an agreement with the industrial user to correct the noncompliance within a time period also specified by the order. Consent Orders shall have the same force and effect as administrative orders issued pursuant to Section 28-10 D of the Ordinance.

3. Show Cause Hearing

The Director of Public Works may order any industrial user which causes or contributes to violation of this Permit or wastewater permit or order issued hereunder, to show cause why a proposed enforcement action should not be taken. The notice of the hearing shall be served personally or by registered or certified mail (return receipt requested) at least 10 days prior to the hearing. Such notice may be served on any principal executive, general partner or corporate officer. Whether or not a duly notified industrial user appears as noticed, immediate enforcement action may be pursued.

4. Compliance Order

When the Director of Public Works, after the Show Cause hearing for which provision is made in Section 28-10 C of the Ordinance, finds that an industrial user has violated or continues to violate the Permit or a permit or order issued thereunder, he may issue an order to the industrial user responsible for the discharge directing that, following a specified time period, sewer service shall be discontinued unless adequate treatment facilities, devices, or other related appurtenances have been installed and are properly operated. Orders may also contain such other requirements as might be reasonably necessary and appropriate to address the noncompliance, including the installation of pretreatment technology, additional self-monitoring, and management practices.

5. Cease and Desist Orders

When the Director of Public Works, after the Show Cause hearing for which provision is made in Section 28-10 C of the Ordinance, finds that an industrial user has violated or continues to violate this Permit or any permit or order issued hereunder, the Director of Public Works may issue an order to cease and desist all such violations and direct those persons in noncompliance to:

a) Comply forthwith

b) Take such appropriate remedial or preventive action as may be needed to properly address a continuing or threatened violation, including halting operations and terminating the discharge.

6. Administrative Fines

Notwithstanding any other section of this Permit, any user who is found to have violated any provision of this Permit, or permits and orders issued hereunder, shall be fined in an amount not to exceed one thousand dollars ($1,000.00) per violation. Each day on which noncompliance shall occur or continue shall be deemed a separate and distinct violation. Such assessments may be added to the user's next scheduled sewer service charge

and the Director of Public Works shall have such other collection remedies as he has to collect other individual user's property. Industrial users desiring to dispute such fines must file a request for the Director of Public Works to reconsider the fine within 10 days of being notified of the fine. Where the Director of Public Works believes a request has merit, he shall convene a hearing on the matter within 15 days of receiving the request from the industrial user.

7. Emergency Suspensions

a) The Director of Public Works may suspend the wastewater treatment service and/or wastewater permit of an industrial user whenever such suspension is necessary in order to stop an actual or threatened discharge presenting or causing an imminent or substantial endangerment to the health or welfare of persons, the POTW, or the environment.

b) Any user notified of a suspension of the wastewater treatment service and/or the wastewater permit shall immediately stop or eliminate its contribution. In the event of a user's failure to immediately comply voluntarily with the suspension order, the Director of Public Works shall take such steps as deemed necessary, including immediate severance of the sewer connection, to prevent or minimize damage to the POTW, it receiving stream, or endangerment to any individuals. The Director of Public Works shall allow the user to recommence its discharge when the endangerment has passed, unless the termination proceedings set forth in Section 28-10 H of the Ordinance are initiated against the user. An industrial user who is the subject of a suspension order under this subsection shall have the right to appeal to the Director of Public Works from such suspension, but such suspension shall remain in full force and effect pending such hearing and the decision of the Director pursuant thereto.

c) An industrial user which is responsible, in whole or in part, for imminent endangerment shall submit a detailed written statement describing the causes of the harmful contribution and the measures taken to prevent any future occurrence to the Director of Public Works prior to the date of the hearing described in paragraph 2 above.

8. Termination of Permit

Significant industrial users proposing to discharge into the POTW, must first obtain a wastewater discharge permit from the Department of Public Works. Any user who violates the following conditions of this Permit or a wastewater discharge permit or order, or any applicable State or Federal law, is subject to permit termination:

a) Violation of permit conditions

b) Failure to accurately report the wastewater constituents and characteristics of its discharge

c) Failure to report significant changes in operations or wastewater constituents and characteristics

d) Refusal of reasonable access to the user's premises for the purpose of inspection, monitoring, or sampling

Noncompliant industrial users will be notified of the proposed termination of their wastewater permit and be offered an opportunity to show cause under Section 28-10 C of the Ordinance why the proposed action should not be taken.

9. Judicial Remedies

If any person discharges sewage, industrial wastes, or other wastes into the wastewater disposal system contrary to the provisions of the Permit or any order or permit issued hereunder, the Director of Public Works, through the City Attorney, may commence an action for appropriate legal and/or equitable relief in the Dougherty County Court.

10. Injunctive Relief

Whenever an industrial user has violated or continues to violate the provisions of this Permit or permit or order issued hereunder, the Director of Public Works, through counsel may petition the Court for its issuance of a preliminary or permanent injunction or both (as may be appropriate) which restrains or compels the activities on the part of the industrial user. The Director of Public Works may also initiate nuisance abatement proceeding in the Municipal Court of the City of Albany, as an alternate remedy.

11. Civil Penalties

1. Any industrial user who has violated or continues to violate the Permit or any order or permit issued hereunder, shall be liable to the Director of Public Works for a civil penalty of not less than one thousand dollars ($1,000) plus actual damages incurred by the POTW per violation per day for as long as the violation continues. In addition to the above described penalty and damages, the Director of Public Works may recover reasonable attorney's fees, court costs, and other expenses associated with the enforcement activities, including sampling and monitoring expenses.

2. The Director of Public Works shall petition the Municipal Court of the City of Albany or any state court having jurisdiction to impose, assess, and recover such sums. In determining amount of liability, the Municipal Court fo the City of Albany or any state court having jurisdiction shall take into account all relevant circumstances, including, but not limited to, the extent of harm caused by the violation, the magnitude and duration, any economic benefit gained through the industrial user's violation, corrective actions by the industrial user, the compliance history of the user, and any other factor as justice requires.

CRIMINAL PROSECUTION

1. Any industrial user who willfully or negligently violates any provision of this Permit or any orders or permits issued hereunder shall, upon conviction in the Municipal Court of the City of Albany, be guilty of a misdemeanor, punishable by a fine not to exceed $500.00 per violation per day or imprisonment for not more than six months or both.

2. Any industrial user who knowingly makes any false statements, representations, or certifications in any application, record, report plan or other document filed or required to be maintained pursuant to this Permit, or wastewater permit, or who falsifies, tampers with, or knowingly renders inaccurate any monitoring device or method required under this Permit shall, upon conviction, be punished by a fine of not more than $500.00 per violation per day or imprisonment for not more than six months or both.

NONTRANSFERABILITY

1. This permit is nontransferable.

SLUG CONROL AND SPILL PREVENTION

Notice of Potential Problems with Slug Loading. All users shall notify the POTW treatment plant superintendent immediately of all spills or slug discharges. All conditions and materials specified under Sec. 28-7 (B) of the Ordinance are applicable.

2. All users permitted by the City shall prepare and submit for approval to the Director of Public Works a Spill Control Plan. The plan must be updated and approved by the Director of Public Works every twenty-four (24) months. If the Director of Public Works notifies the industrial user of needing a Spill Control Plan or of updating the existing plan, the plan must contain at least the following elements:

   a) description of discharge practices, including nonroutine batch discharges;

   b) description of stored chemicals and hazardous materials;

   c) written procedures for promptly notifying the POTW treatment plant superintendent of slug discharges that would violate a discharge prohibition under 40 CFR 403;

   d) any necessary procedures to prevent adverse impacts from accidental spills, including:

      1) inspection and maintenance of storage area;
      2) handling and transfer of materials;
      3) loading and unloading operations;
      4) worker training;
      5) building of containment structures or equipment;
      6) measures for containing toxic organic pollutants (including solvents); and/or

7) measures and equipment for emergency response.

3. The Director of Public Works or the person designated by the Director of Public Works shall have access to the facilities and to verify that th measures outlined in the Spill Control Plan are implemented according t the plan.

4. Spill Control Plans and updates are due on the next business day after the 60 calendar days from the notification and must be signed by th plant manager or person of highest local authority of the industry o commercial establishment.

5. In the case of an accidental discharge, it is the responsibility of the User to telephone immediately and notify the POTW Plant of the incident The notification shall include location of discharge, type of waste concentration and volume, and corrective actions.

6. Within five (5) days following an accidental discharge, the User shall submit to the City a detailed written report describing the cause of th discharge and the measures to be taken by the User to prevent simila future occurrences. Such notification shall not relieve the User of an expense, loss, damage, or other liability which may be incurred as result of damage to the wastewater treatment facilities, fish kills, o any other damage to persons or property; nor shall such notificatio relieve the User of any fines, civil penalties, or other liability whic may be imposed by this article or other applicable law.

7. A notice shall be permanently posted on the User's bulletin board or other prominent place advising employees whom to call in the event of dangerous discharge. Employers shall insure that all employees who ma cause or suffer such a dangerous discharge to occur are advised of th emergency notification procedure.

APPENDIX F

RESULTS OF CHEMICAL ANALYSIS

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

000030

MW-1-1

Lab Name: Law Environmental, Inc. Contract: 41-4537

Lab Code: E Case No.: 41537 SAS No.: SDG No.: 71106

Matrix: (soil/water) WATER Lab Sample ID: AA71108

Sample wt/vol: 5.000 (g/mL) ML Lab File ID: 32739

Level: (low/med) Date Received: 05/11/95

% Moisture: not dec._____ Date Analyzed: 05/12/95

GC Column: DB624 ID: .53 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
71-43-2	Benzene	61.	

FORM I VOA 3/90

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

MW-1-2

Lab Name: Law Environmental, Inc. Contract: 41-4537

Lab Code: E Case No.: 41537 SAS No.: SDG No.: 71106

Matrix: (soil/water) WATER Lab Sample ID: AA71106

Sample wt/vol: 5.000 (g/mL) ML Lab File ID: 32737

Level: (low/med) Date Received: 05/11/95

% Moisture: not dec._____ Date Analyzed: 05/12/95

GC Column: DB624 ID: .53 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
71-43-2	Benzene	7.	

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

MW-1-4

000022

Lab Name: Law Environmental, Inc. Contract: 41-4537

Lab Code: E Case No.: 41537 SAS No.: SDG No.: 71106

Matrix: (soil/water) WATER Lab Sample ID: AA71107

Sample wt/vol: 5.000 (g/mL) ML Lab File ID: 32738

Level: (low/med) Date Received: 05/11/95

% Moisture: not dec._____ Date Analyzed: 05/12/95

GC Column: DB624 ID: .53 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
75-35-4	1,1-Dichloroethene	7.	U
71-43-2	Benzene	5.	U

FORM I VOA 3/90

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO. 00001

MW-1-4

Lab Name: Law Environmental, Inc. Contract: 41-4537

Lab Code: LENL-P Case No.: 41537 SAS No.: SDG No.: 72341

Matrix: (soil/water) WATER Lab Sample ID: AA72343

Sample wt/vol: 5.000 (g/mL) ML Lab File ID: 33009

Level: (low/med) LOW Date Received: 05/26/95

% Moisture: not dec._____ Date Analyzed: 06/01/95

GC Column: DB624 ID: .53 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
75-35-4	1,1-Dichloroethene	7.	U
71-43-2	Benzene	5.	U

FORM I VOA 3/90

CASE NARRATIVE

LENL-Pensacola
7215 Pine Forest Road
Pensacola, FL 32526

Report Date: 05/18/95
SDG No.: 71106
Case No.: 41537
Contract No.: 41-4537

The following are the sample numbers contained in this Sample Delivery Group correlated with the Laboratory ID numbers:

SAMPLE NUMBER	LABORATORY ID	SAMPLES RECEIVED
1. RW-2	AA71109	05/11/95
2. RW-0510	AA71110	05/11/95

COMMENT:
Pesticides/PCBs-

Please Note: The laboratory Method Detection Limit (MDL) for Aroclor 1254 is 0.38 ug/L.

Concentrations printed on the PE Nelson External Standard Reports in the raw data will not necessarily match the calculation reported on the Form 1. The PE Nelson Data System does not perform final result calculations according to SOW 3/90. Please disregard any inconsistencies.

1D
PESTICIDE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO. 000008

RW-2

Lab Name: Law Environmental, Inc. Contract: SEE COC

Lab Code: LENL-P Case No.: 41537 SAS No.: SDG No.: 71106

Matrix: (soil/water) WATER Lab Sample ID: AA71109

Sample wt/vol: 1020.0 (g/mL) ML Lab File ID: CMAYY59

% Moisture: _____ decanted: (Y/N)___ Date Received: 05/11/95

Extraction: (SepF/Cont/Sonc) CONT Date Extracted: 05/11/95

Concentrated Extract Volume:10000.0 (uL) Date Analyzed: 05/13/95

Injection Volume: .5 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7.0 Sulfur Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
11097-69-1	Aroclor-1254	.98	U

FORM I PEST 3/90

CASE NARRATIVE

LENL-Pensacola
7215 Pine Forest Road
Pensacola, FL 32526

Report Date: 06/19/95
SDG No.: 72341
Case No.: 41537
Contract No.: 41-4537

The following are the sample numbers contained in this Sample Delivery Group correlated with the Laboratory ID numbers:

SAMPLE NUMBER	LABORATORY ID	SAMPLES RECEIVED
1. RW-2	AA72341	05/26/95

COMMENT:
Pesticides/PCBs-

Please Note: The Laboratory Method Detection Limit (MDL) for Aroclor 1254 is 0.38 ug/L.

Concentrations printed on the PE Nelson External Standard Reports in the raw data will not necessarily match the calculation reported on the Form 1. The PE Nelson Data System does not perform final result calculations according to SOW 3/90. Please disregard any inconsistencies.

1D
PESTICIDE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

RW-2

Lab Name: Law Environmental, Inc. Contract: SEE COC

Lab Code: LENL-P Case No.: 41537 SAS No.: SDG No.: 72341

Matrix: (soil/water) WATER Lab Sample ID: AA72341

Sample wt/vol: 1010.0 (g/mL) ML Lab File ID: IMAYY78

% Moisture: _____ decanted: (Y/N)___ Date Received: 05/26/95

Extraction: (SepF/Cont/Sonc) CONT Date Extracted: 05/30/95

Concentrated Extract Volume: 10000.0 (uL) Date Analyzed: 06/02/95

Injection Volume: .5 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7.0 Sulfur Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
11097-69-1	Aroclor-1254	.99	U

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

WELLCOMP

Lab Name: Law Environmental, Inc. Contract: 41-4537

Lab Code: LENL-P Case No.: 41537 SAS No.: SDG No.: 73553

Matrix: (soil/water) WATER Lab Sample ID: AA73556

Sample wt/vol: 5.000 (g/mL) ML Lab File ID: 52466

Level: (low/med) LOW Date Received: 06/15/95

% Moisture: not dec._____ Date Analyzed: 06/17/95

GC Column: DB624 ID: .53 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
74-87-3	Chloromethane	10.	U
74-83-9	Bromomethane	10.	U
75-01-4	Vinyl Chloride	10.	U
75-00-3	Chloroethane	10.	U
75-09-2	Methylene Chloride	.8	BJ
67-64-1	Acetone	10.	U
75-15-0	Carbon Disulfide	5.	U
75-35-4	1,1-Dichloroethene	2.	J
75-34-3	1,1-Dichloroethane	1.	J
540-59-2	1,2-Dichloroethene(total)	5.	U
67-66-3	Chloroform	5.	U
107-06-2	1,2-Dichloroethane	5.	U
78-93-3	2-Butanone	10.	U
71-55-6	1,1,1-Trichloroethane	5.	U
56-23-5	Carbon Tetrachloride	5.	U
75-27-4	Bromodichloromethane	5.	U
78-87-5	1,2-Dichloropropane	5.	U
10061-01-5	cis-1,3-Dichloropropene	5.	U
79-01-6	Trichloroethene	5.	U
124-48-1	Dibromochloromethane	5.	U
79-00-5	1,1,2-Trichloroethane	5.	U
71-43-2	Benzene	13.	
10061-02-6	trans-1,3-Dichloropropene	5.	U
75-25-2	Bromoform	5.	U
108-10-1	4-Methyl-2-pentanone	10.	U
591-78-6	2-Hexanone	5.	U
127-18-4	Tetrachloroethene	5.	U
79-34-5	1,1,2,2-Tetrachloroethane	5.	U
108-88-3	Toluene	5.	U
108-90-7	Chlorobenzene	5.	U
100-41-4	Ethylbenzene	2.	J
100-42-5	Styrene	5.	U
1330-20-7	Xylene(Total)	3.	J
75-69-4	Trichlorofluoromethane	5.	U

APPENDIX G

RESULTS OF SYSTEM CAPACITY TEST

BRIDGESTONE/FIRESTONE PUMP TEST

6/10/95 - 6/12/95

AMC/RAJ

- RADIUS OF INFLUENCE ≥ 100 feet
  - MW-1-4 had approximately 0.8' of drawdown. The well is approximately 100' from closest of 4 pump wells (MW-1-1)

- 4 PUMP WELLS: PTW-1, MW-1-1, MW-1-2, MW-1-3
- 3 Monitoring wells: MW-1-4, MW-1-5A, RW-4

- AVERAGE PUMP RATES

From Pump Cycle Data

PTW-1 = 0.11 gpm

MW-1-1 = 0.12 gpm

MW-1-2 = 0.23 gpm

MW-1-3 = 0.05 gpm

0.51 gpm

From Holding Tank Data

Total = 0.5 gpm average

- Total Drawdown

PTW-1 = 22.96 ft

MW-1-3 = 20.0 ft

- Specific Capacity (assuming wells are 100% effecient)

S.C = Q/s

PTW-1 = (0.11)/(22.96) = 4.8×10^{-3} gpm/ft

MW-1-3 = (0.05)/(20) = 2.5×10^{-3} gpm/ft

- Transmissivity from PTW-1 *
  - approximately 35' saturated thickness (residuum)
  - $Q = 0.11$ gpm
  - Theis Curve Match Point (see attached)

    $W(u) = 1$ $\quad s = 9.5$

    $u = 1$ $\quad t = 92$ minutes
  - $T = \frac{15.3\,Q}{s}(W(u)) = 0.2\ ft^2/d = \boxed{1.5\ gpd/ft}$
  - $K = T/b = 0.2/35 = \boxed{5 \times 10^{-3}\ ft/d}$
  - No storativity ~~as PTW~~ value determined as PTW-1 is a pump well.

* This analysis assumes drawdown is due only to PTW-1 and not affected by other pump wells

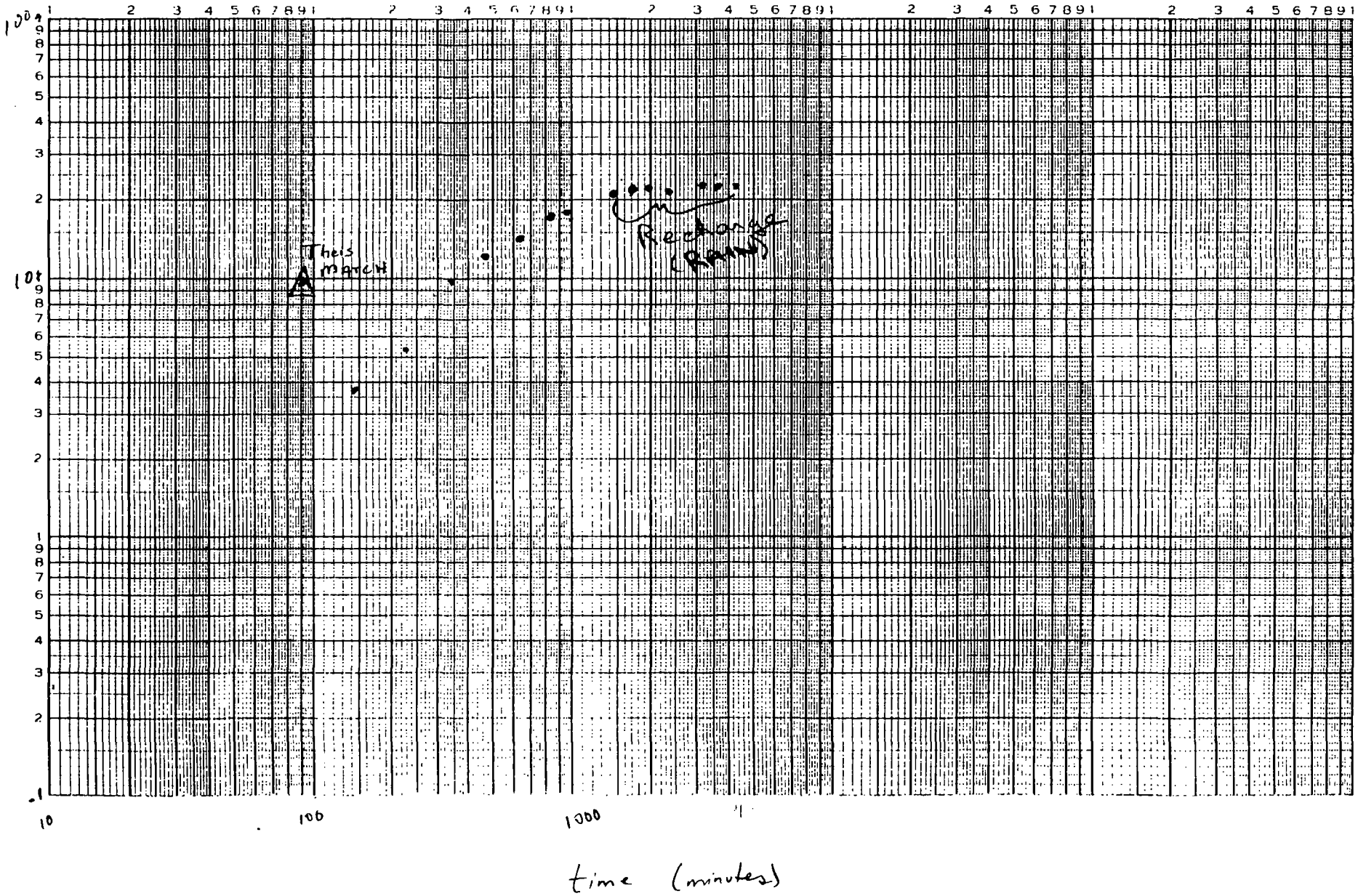
BRIDGESTONE / FIRESTONE 6/10 - 6/12 PUMP TEST

PTW - 1 (pump well) Q ≅ 0.11 gpm

Theis Curve Match Point:

$W(u) = 1$ $s = 9.5$

$u = 1$ $t = 92$ minutes



Full Logarithmic 3 x 3

WATER LEVEL TEST DATA
BRIDGESTONE / FIRESTONE
ALBANY, GEORGIA

Well I.D.: MW-1-3 Type of Test: Drawdown

Measuring Point (TOC or Ground Surface):

Start Date: 6/10/95 Time: M.P. Elevation (Ft – MSL):

Initial Water Depth Below M.P. (Ft): ~~42.80~~ 43.02 Measuring Point (TOC or Ground Surface): TOC

Monitoring/Test Section Depth from M.P. (Ft) From To

Monitoring/Test Section Length (Ft)

Data Collected By	Date/Time	Elapsed Time (min)	Tape Held At M.P.	Cut Length (ft)	Water Depth Below M.P. (ft)	Draw-Down (ft)	Tape I.D.
RAS	6-10-95/10:25	145	—	—	52.78	9.76	WLI
RAS	6-10-95/11:50	230	—	—	56.60	13.58	WLI
RAS	6-10-95/13:43	343	—	—	57.40	14.38	WLI
RAS	6-10-95/15:51	471	—	—	58.40	15.38	WLI
TMK	6-10-95/18:22	622	—	—	58.50	15.48	WLI
TMK	6-10-95/19:59	719	—	—	60.05	17.03	WLI
TMK	6-10-95/21:52	832	—	—	60.85	17.83	WLI
TMK	6-10-95/23:27	927	—	—	61.10	18.09	WLI
RAS	6-11-95/08:45	1485	—	—	62.88	19.86	WLI ← on top of pump
RAS	6-11-95/10:01	1561	—	—	63.02	20.00	WLI ← Det on top of pump
RAS	6-11-95/12:46	1726	—	—	62.82	19.80	WLI
RAS	6-11-95/14:05	1805	—	—	62.64	19.62	WLI
RAS	6-11-95/16:16	1936	—	—	62.70	19.68	WLI
TMK	6-11-95/18:00	2040	—	—	62.90	19.88	WLI
TMK	6-11-95/20:02	2162	—	—	62.30	19.28	WLI
TMK	6-11-95/21:55	2275	—	—	62.70	19.68	WLI
TMK	6-11-95/23:43	2383	—	—	62.90	19.88	WLI
RAS	6-12-95/09:15	2955	—	—	62.52	19.50	WLI
RAS	6-12-95/09:56	2996	—	—	62.35	19.33	WLI
TMK	6-12-95/11:49	3109	—	—	62.60	19.58	WLI
TMK	6-12-95/14:14	3254	—	—	62.90	19.88	WLI
RAS	6-12-95/15:55	3355	—	—	62.62	19.60	WLI
TMK	6-12-95/18:06	3486	—	—	62.68	~~19~~ 19.66	WLI
TMK	6-12-95/20:03	3603	—	—	62.50	19.48	WLI
TMK	6-12-95/22:23	3743	—	—	62.70	19.68	WLI
TMK	6-13-95/08:04	4324	—	—	62.70	19.68	WLI

DATA CHECKED BY: DATE:
DATA REVIEWED BY: DATE:

MW-1-3

WATER LEVEL TEST DATA
BRIDGESTONE / FIRESTONE
ALBANY, GEORGIA

Well I.D.: PTW-1 [redacted] Type of Test: Drawdown [redacted]

Measuring Point (TOC or Ground Surface): _____

Start Date: 6/10/95 Time: _____ M.P. Elevation (Ft – MSL): _____

Initial Water Depth Below M.P. (Ft): 43.84 Measuring Point (TOC or Ground Surface): TOC

Monitoring/Test Section Depth from M.P. (Ft) From _____ To _____

Monitoring/Test Section Length (Ft) _____

Data Collected By	Date/Time	Elapsed Time (min)	Tape Held At M.P.	Cut Length (ft)	Water Depth Below M.P. (ft)	Draw-Down (ft)	Tape I.D.
RAS	6-10-95/10:26	146	—	—	47.60	3.76	WLI
RAS	6-10-95/11:48	228	—	—	49.20	5.36	WLI
RAS	6-10-95/13:45	345	—	—	53.72	9.88	WLI
RAS	6-10-95/15:50	470	—	—	56.14	12.30	WLI
TMK	6-10-95/18:19	619	—	—	58.21	14.37	WLI
TMK	6-10-95/19:57	717	—	—	59.60	15.76	WLI
TMK	6-10-95/21:50	830	—	—	61.10	17.26	WLI
TMK	6-10-95 23:25	925	—	—	61.83	17.99	WLI
RAS	6-11-95/08:42	1482	—	—	64.94	21.10	WLI
RAS	6-11-95/10:00	1560	—	—	65.13	21.29	WLI
RAS	6-11-95/12:48	1728	—	—	65.40	21.56	WLI
RAS	6-11-95/14:04	1804	—	—	65.54	21.70	WLI
RAS	6-11-95/16:12	1932	—	—	65.54	21.70	WLI
TMK	6-11-95/18:03	2043	—	—	65.55	~~21.76~~ 21.71 TMK	WLI
TMK	6-11-95/20:00	2160	—	—	65.55	21.71	WLI
TMK	6-11-95/21:53	2273	—	—	65.40	21.56	WLI
TMK	6-11-95/23:41	2381	—	—	65.40	21.56	WLI
RAS	6-12-95/09:14	2954	—	—	66.66	22.82	WLI
RAS	6-12-95/09:55	3015	—	—	66.80	22.96	WLI
~~TMK~~ RAS	6-12-95/11:47	3107	—	—	66.80	22.96	WLI
TMK	6-12-95/14:11	3251	—	—	66.60	22.76	WLI
RAS	6-12-95/15:54	3354	—	—	66.58	22.74	WLI
TMK	6-12-95/18:04	3484	—	—	66.42	22.58	WLI
TMK	6-12-95/TMK 20:01	3601	—	—	66.40	22.56	WLI
TMK	6-12-95/22:21	3741	—	—	66.80	22.96	WLI
TMK	6-13-95/03:02	4322	—	—	66.30	22.46	WLI

DATA CHECKED BY: _____ DATE: _____

DATA REVIEWED BY: _____ DATE: _____

PTW-1

WATER LEVEL TEST DATA
BRIDGESTONE / FIRESTONE
ALBANY, GEORGIA

Well I.D.: MW-1-4 Type of Test: Drawdown

Measuring Point (TOC or Ground Surface):

Start Date: 6/10/95 Time: M.P. Elevation (Ft – MSL):

Initial Water Depth Below M.P. (Ft): ~~16.86~~ 17.05 Measuring Point (TOC or Ground Surface): TOC

Monitoring/Test Section Depth from M.P. (Ft) From To

Monitoring/Test Section Length (Ft)

Data Collected By	Date/Time	Elapsed Time (min)	Tape Held At M.P.	Cut Length (ft)	Water Depth Below M.P. (ft)	Draw-Down (ft)	Tape I.D.
RAS	6-10-95/10:07	129	18.00	0.87	17.11	0.06	RAS-1
RAS	6-10-95/11:57	237	18.00	0.88	17.12	0.07	RAS-1
RAS	6-10-95/14:00	360	18.00	0.89	17.11	0.06	RAS-1
RAS	6-10-95/15:54	474	18.00	0.92	17.08	0.03	RAS-1 2X
TMK	6-10-95/18:28	628	18.00	0.87	17.13	0.08	RAS-1
TMK	6-10-95/20:03	723	18.00	0.78	17.22	0.17	RAS-1
TMK	6-10-95/21:55	835	18.00	0.84	17.16	0.11	RAS-1
TMK	6-10-95/23:30	930	18.00	0.87	17.13	0.08	RAS-1
RAS	6-11-95/08:49	1489	18.00	0.91	17.09	0.04	RAS-1
RAS	6-11-95/10:05	1565	18.00	0.96	17.04	-0.01	RAS-1
RAS	6-11-95/13:06	1746	18.00	0.94	17.06	0.01	RAS-1
RAS	6-11-95/14:10	1810	18.00	0.95	17.05	0.00	RAS-1
RAS	6-11-95/16:28	1948	18.00	0.98	17.02	-0.03	RAS-1
TMK	6-11-95/18:07	2047	18.00	0.96	17.04	-0.01 ~~-0.02~~	RAS-1
TMK	6-11-95/20:05	2165	18.00	0.91	17.09	0.04	RAS-1
TMK	6-11-95/22:00	2280	18.00	0.83	17.17	0.12	RAS-1
TMK	6-11-95/23:45	2385	18.00	0.77	17.23	0.18	~~TMK~~ RAS-1
RAS/TMK	6-12-95 09:23	2963	18.00	0.60	17.40	0.35	RAS-1
RAS	6-12-95/10:07	3007	18.00	0.58	17.42	0.37	RAS-1
~~TMK~~ RAS	6-12-95/11:52	3112	18.00	0.56	17.44	0.39	RAS-1
TMK	6-12-95/14:18	3258	18.00	0.56	17.44	0.39	RAS-1
RAS	6-12-95/16:05	3365	18.00	0.56	17.44	0.39	RAS-1
TMK	6-12-95/18:09	3489	18.00	0.53	17.47	0.42	RAS-1
TMK	6-12-95/20:07	3607	18.00	0.45	17.55	0.50	RAS-1
TMK	6-12-95/22:25	3742	18.00	0.38	17.62	0.57	RAS-1
TMK	6-13-95/08:08	4328	19.00	1.17	17.83	0.78	RAS-1

DATA CHECKED BY: DATE:
DATA REVIEWED BY: DATE:

MW-1-4

WATER LEVEL TEST DATA
BRIDGESTONE / FIRESTONE
ALBANY, GEORGIA

Well I.D.: RW-4 Type of Test: Drawdown

Measuring Point (TOC or Ground Surface):

Start Date: 6/10/95 Time: M.P. Elevation (Ft – MSL):

Initial Water Depth Below M.P. (Ft): ~~45.17~~ 45.25 Measuring Point (TOC or Ground Surface): TOC

Monitoring/Test Section Depth from M.P. (Ft) From To

Monitoring/Test Section Length (Ft)

Data Collected By	Date/Time	Elapsed Time (min)	Tape Held At M.P.	Cut Length (ft)	Water Depth Below M.P. (ft)	Draw-Down (ft)	Tape I.D.
RAS	6-10-95/09:55	115	46.00	0.75	45.25	0.00	RAS-1
RAS	6-10-95/12:00	240	46.00	0.72	45.28	0.03	RAS-1
RAS	6-10-95/14:04	364	46.00	0.70	45.30	0.05	RAS-1
RAS	6-10-95/16:00	480	46.00	0.70	45.30	0.05	RAS-1
TMK	6-10-95/18:34	634	46.00	0.79	45.21	-0.04	RAS-1
TMK	6-10-95/20:06	726	46.00	0.84	45.16	-0.09	RAS-1
TMK	6-10-95/22:04	844	46.00	0.79	45.21	-0.04	RAS-1
TMK	6-10-95/23:33	933	46.00	0.78	45.22	-0.03	RAS-1
RAS	6-11-95/08:55	1495	46.00	0.78	45.22	-0.03	RAS-1
RAS	6-11-95/10:10	1570	46.00	0.79	45.21	-0.04	RAS-1
RAS/TMK	6-11-95/13:09	1749	46.00	0.77	45.23	-0.02	RAS-1
RAS	6-11-95/14:14	1814	46.00	0.75	45.25	0.00	RAS-1
RAS	6-11-95/16:30	1950	46.00	0.78	45.22	-0.03	RAS-1
TMK	6-11-95/18:10	2050	46.00	0.83	45.17	-0.08	RAS-1
TMK	6-11-95/20:08	2168	46.00	0.89	45.11	-0.14	RAS-1
TMK	6-11-95/22:04	2884	46.00	0.91	45.09	-0.16	RAS-1
TMK	6-11-95/23:48	2388	46.00	0.91	45.09	-0.16	RAS-1
RAS/TMK	6-12-95/09:26	2966	46.00	0.90	45.10	-0.15	RAS-1
RAS	6-12-95/10:12	3012	46.00	0.91	45.09	-0.16	RAS-1
TMK	6-12-95/11:55	3115	46.00	0.91	45.09	-0.16	RAS-1
RAS	6-12-95/14:40	3280	46.00	0.90	45.10	-0.15	RAS-1
RAS	6-12-95/16:10	3370	46.00	0.92	45.08	-0.17	RAS-1
TMK	6-12-95/18:12	3492	46.00	0.95	45.05	-0.20	RAS-1
TMK	6-12-95/20:12	3612	46.00	0.96	45.04	-0.21	RAS-1
TMK	6-12-95/22:28	3748	46.00	0.97	45.03	-0.22	RAS-1
TMK	6-13-95/08:13	4333	46.00	0.95	45.05	-0.20	RAS-1

DATA CHECKED BY: DATE:
DATA REVIEWED BY: DATE:

RW-4

WATER LEVEL TEST DATA
BRIDGESTONE / FIRESTONE
ALBANY, GEORGIA

Well I.D.: MW-1-5A Type of Test: Drawdown

Measuring Point (TOC or Ground Surface):

Start Date: 6/10/95 Time: M.P. Elevation (Ft – MSL):

Initial Water Depth Below M.P. (Ft): ~~46.07~~ 45.95 Measuring Point (TOC or Ground Surface): TOC

Monitoring/Test Section Depth from M.P. (Ft) From To

Monitoring/Test Section Length (Ft)

Data Collected By	Date/Time	Elapsed Time (min)	Tape Held At M.P.	Cut Length (ft)	Water Depth Below M.P. (ft)	Draw-Down (ft)	Tape I.D.
RAS	6-10-95/10:00	120	47.00	1.03	45.97	0.02	RAS-1
RAS	6-10-95/12:02	242	47.00	1.06	45.94	-0.01	RAS-1
RAS	6-10-95/14:08	368	47.00	1.10	45.90	-0.05	RAS-1
RAS	6-10-95/16:02	482	47.00	1.16	45.84	-0.11	RAS-1
TMK	6-10-95 18:37	637	47.00	1.14	45.86	-0.09	RAS-1
TMK	6-10-95 20:09	729	47.00	1.04	45.96	0.01	RAS-1
TMK	6-10-95 22:07	847	47.00	1.07	45.93	-0.02	RAS-1
TMK	6-10-95 23:35	935	47.00	1.07	45.93	-0.02	RAS-1
RAS	6-11-95/09:00	1500	47.00	1.10	45.90	-0.05	RAS-1
RAS	6-11-95/10:12	1572	47.00	1.12	45.88	-0.07	RAS-1
RAS/TMK	6-11-95/12:10	1750	47.00	1.13	45.87	-0.08	RAS-1
RAS	6-11-95/14:17	1817	47.00	1.16	45.84	-0.11	RAS-1
RAS	6-11-95/16:35	1955	47.00	1.23	45.77	-0.18	RAS-1
TMK	6-11-95/18:13	2053	47.00	1.26	45.74	-0.21	RAS-1
TMK	6-11-95/20:10	2170	47.00	1.26	45.74	-0.21	RAS-1
TMK	6-11-95/22:09	2889	47.00	1.22	45.78	-0.17	RAS-1
TMK	6-11-95/23:50	2390	47.00	1.23	45.77	-0.18	RAS-1
RAS/TMK	6-12-95/09:29	2969	47.00	1.27	45.73	-0.22	RAS-1
RAS	6-12-95/10:15	3015	47.00	1.26	45.74	-0.21	RAS-1
TMK	6-12-95/11:57	3117	47.00	1.28	45.72	-0.23	RAS-1
RAS	6-12-95/14:47	3288	47.00	1.34	45.66	-0.29	RAS-1
RAS	6-12-95/16:15	3375	47.00	1.35	45.65	-0.30	RAS-1
TMK	6-12-95/18:17	3497	47.00	1.34	45.66	-0.29	RAS-1
TMK	6-12-95/20:15	3615	47.00	1.28	45.72	-0.23	RAS-1
TMK	6-12-95/22:32	3752	47.00	1.25	45.75	-0.20	RAS-1
TMK	6-13-95/03:17	4337	47.00	1.21	45.79	-0.16	RAS-1

DATA CHECKED BY: DATE:

DATA REVIEWED BY: DATE:

MW-1-5A

APPENDIX H

LETTER FROM LAW TO CITY OF ALBANY PUBLIC WORKS DIVISION

LAW
ENGINEERING AND ENVIRONMENTAL SERVICES, INC.

August 9, 1995

Mr. Hank Garner
Public Works Division
City of Albany
P.O. Box 447
Albany, Georgia 31703-4801

Subject: **Industrial Wastewater Contribution Permit**
Firestone Tire & Rubber Company Superfund Site
Albany, Dougherty County, Georgia
LAW Project 41-4537

Dear Mr. Garner:

This letter has been prepared to confirm the conversation between you and representatives of Law Engineering and Environmental Services, Inc. (LAW) concerning the subject site. On July 24, 1995, Jane Moore, Earl Scott, and James Beauchamp of LAW contacted you by telephone to discuss pretreatment requirements for discharge of wastewater to the Albany Publicly Owned Treatment Works (POTW). In the case of the subject site, the wastewater stream is composed of ground water obtained from a ground-water collection system. We are in the process of evaluating discharge from the ground-water collection system and the necessity for pretreatment.

During the conversation you indicated that pretreatment of ground-water generated at the site was not required provided that the provisions of the Industrial Wastewater Contribution Permit were met. Additionally, you indicated that the wastewater was analyzed by the POTW for volatile organic compounds using USEPA Methods 601/602.

If this letter does not reflect your understanding of the conversation between you and representatives of LAW, or if you have questions concerning these issues, please contact us at (404)-421-3400.

Sincerely,

LAW ENGINEERING AND ENVIRONMENTAL SERVICES, INC.

Jane A. Moore
Project Chemist

James W. Beauchamp, P.E.
Principal Process Engineer

Earl H. Scott, P.G.
Principal

cc: Timothy A. Bent - Bridgestone/Firestone, Inc.
Stephen C. Jones - Jones, Day, Reavis & Pogue
Charles L. King, Jr. - United States Environmental Protection Agency
Mary Lou Winn - Georgia Environmental Protection Division

112 TOWNPARK DRIVE • KENNESAW, GEORGIA 30144
(770)421-3400 • FAX (770)421-3486
ONE OF THE LAW COMPANIES

APPENDIX I

GROUND-WATER VOLUME CALCULATION

LAW
ENGINEERING AND ENVIRONMENTAL SERVICES, INC.

JOB NO. 41-4537 SHEET 1 OF 2
JOB NAME Bridgestone / Firestone
BY AMC DATE 8/31/95
CHECKED BY JCM DATE 8/31/95

Volume of Contaminated Ground Water = (Area)(Saturated Thickness)(Effective Porosity)

Area of Contamination = 39,420 feet^2

Saturated Thickness of Residuum

Average (MW-1-1 + PTW-1) = $\frac{59.5' + 76'}{2}$ = 67.75'

Depth To Ground water (MW-1-2) = 17.0'

Sat. Thickness = 67.75' − 17.0' = 50.75 feet

Effective Porosity (ne)

Based on Specific capacity test (June, 1995) (See attached)

Effective Porosity = $\frac{\text{Volume ground water removed}}{\text{Volume of aquifer}}$

PTW-1: Pump rate = 0.11 gpm
drawdown = 22.96 feet
time = 3015 minutes
radius of influence = 50' (assumed based on 100' r.o.i for four pump wells at 0.5 gpm. The r.o.i. for PTW-1 is belived to be a conservative estimate)

Volume ground water removed = 0.11 gpm × 3015 min
= 332 gallons

Volume Aquiter = 1/3 π (r.o.i)^2 drawdown
= 1/3 π (~~22.96~~ 50)^2 22.96
= 60,100 ft^3 × $\frac{7.48 \text{ gal}}{\text{ft}^3}$
= 449,548 gal

LAW
ENGINEERING AND ENVIRONMENTAL SERVICES, INC.

JOB NO 41-4537 SHEET 2 OF 2
JOB NAME Bridgestone/Firestone
BY AMG DATE 8/31/95
CHECKED BY JAM DATE 8/31/95

$$n_e = \frac{332 \text{ gal}}{449,548 \text{ gal}}$$

$$= 0.0007$$

$$= 0.07\%$$

The above calculation based on two assumptions:

(1) The ROI of PTW-1 is assumed to be 50 feet

(2) The drawdown in PTW-1 is assumed to be due to pumping of PTW-1 only.

Literature values (see attached) for geologic materials similar to those present at the site list effective porosity as 1%. We have chosen this value as it allows a more conservative estimate of the total volume of contaminated ground water at the site.

$$V_{cont.\ ground\ water} = (\text{Area})(\text{Saturated Thickness})(n_e)$$

$$= (39,420 \text{ ft}^2)(50.75 \text{ ft})(0.01)$$

$$= 20,000 \text{ ft}^3 \times \frac{7.48 \text{ gal}}{\text{ft}^3}$$

$$\boxed{\text{Volume} = 149,000 \text{ gallons}}$$

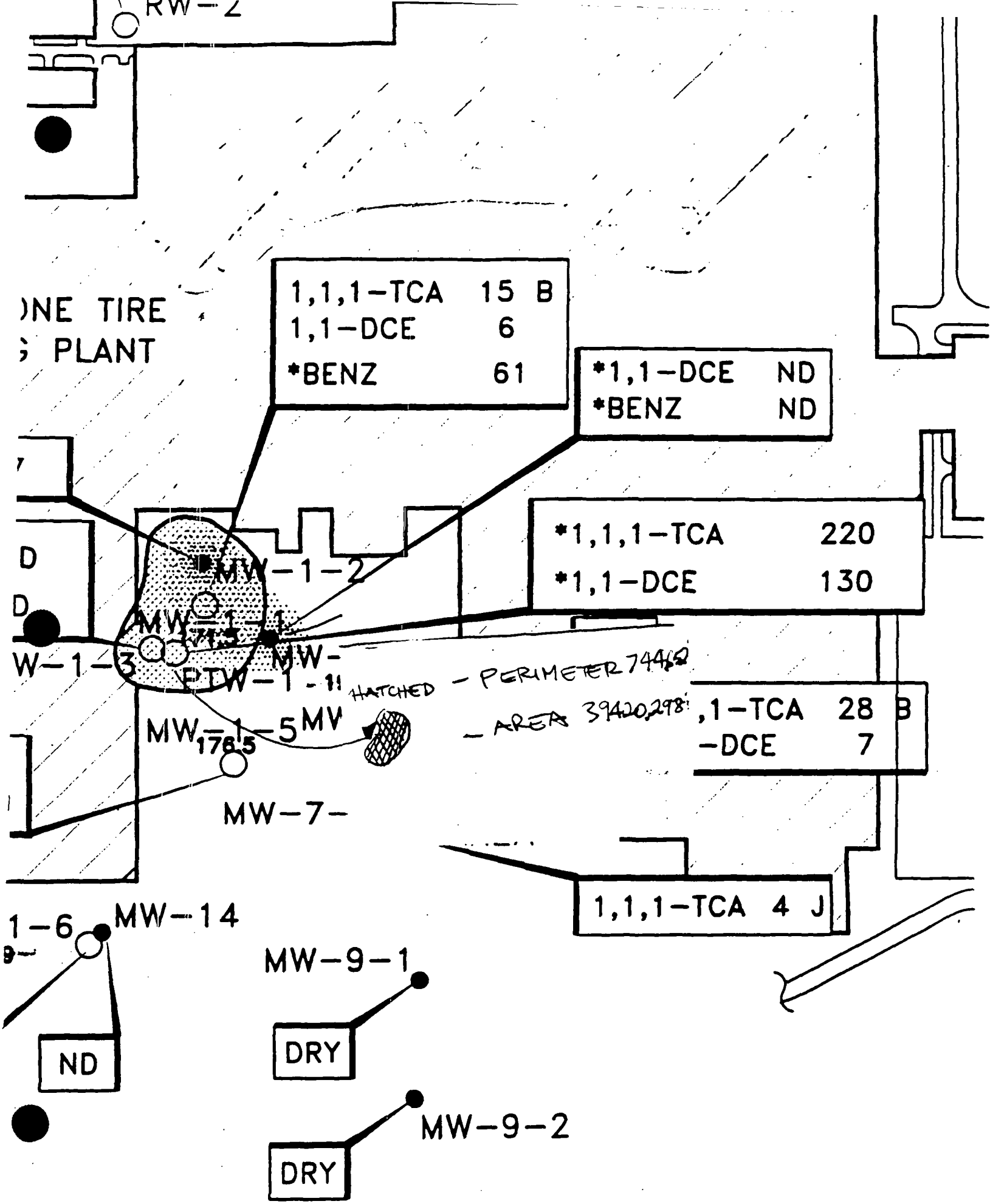

RW-2
ONE TIRE
PLANT
1,1,1-TCA 15 B
1,1-DCE 6
*BENZ 61
*1,1-DCE ND
*BENZ ND
*1,1,1-TCA 220
*1,1-DCE 130
MW-1-2
MW-1-1
W-1-3
MW-
PTW-1-1
HATCHED - PERIMETER 744.62
- AREA 39420.298
,1-TCA 28 B
-DCE 7
MW-1-5
MW
176.5
MW-7-
1,1,1-TCA 4 J
1-6
MW-14
MW-9-1
ND
DRY
MW-9-2
DRY

Table 2.3. Ground-Water Elevations

Well Number	Surface Elevationšul· (feet, MSL)	Top of Casing Elevationšul· (feet, MSL)	Static Water Level March 28, 1995 (feet)	Water Elevation March 28, 1995 (feet, MSL)	Static Water Level May 22, 1995 (feet)	Water Elevation May 22, 1995 (feet, MSL)
Residuum/Transition Zone						
BMW-2A	210.6	213.4	7.6	205.8	8.9	204.5
BMW-3	214.0	215.9	22.2	193.7	29.5	186.5
BMW-4	217.1	219.4	25.3	194.1	29.0	190.4
EMG-1	213.1	215.3	44.6	170.7	46.1	169.3
EMG-2	216.5	218.7	43.3	175.4	47.2	171.5
EMG-6	205.1	207.8	33.7	174.1	37.5	170.3
EMG-7	202.8	205.4	35.0	170.4	33.9	171.5
MW-1-1	213.4	216.0	44.5	171.5	49.9	166.1
MW-1-2	214.16	213.69	17.7	196.0	16.8	196.9
MW-1-3	212.1	214.2	63.9	150.4	43.1	171.2
MW-1-4	212.6	214.1	19.8	194.3	22.6	191.5
MW-1-5A	212.2	212.1	41.6	170.5	46.4	165.7
MW-1-6A	214.5	214.4	42.6	171.9	48.7	165.7
MW-7-4	214.8	217.7	43.3	174.4	DRY	--
MW-7-5	212.9	214.6	41.7	172.9	47.1	167.5
MW-7-8	212.6	214.1	22.9	191.2	25.6	188.5
MW-12-1	206.3	208.9	10.9	198.0	20.9	188.0
MW-12-1B	207.5	209.5	11.7	197.8	23.3	186.2
MW-14	214.6	214.3	39.2	175.1	43.3	171.0
PTW-1	212.5	214.6	55.7	158.9	44.5	170.1
RW-1	213.5	215.2	42.5	172.7	49.9	165.3
RW-2	214.1	215.2	45.0	170.2	51.3	163.9
RW-3	214.5	216.6	45.4	171.2	49.8	166.8
Upper Ocala Wells						
DRW-1	214.4	215.9	44.8	171.1	50.7	165.2
DRW-2	214.3	216.4	46.5	169.9	52.4	164.0
[illegible]	214.3	216.0	46.6	169.4	52.6	163.4
[illegible]	214.4	216.5	46.6	169.9	52.8	163.7

DRW-8	214.6	214.4	44.0	170.4	50.0	164.4
EMG-3	213.3	215.7	41.6	174.1	47.8	167.9
EMG-5B	214.5	216.8	46.3	170.5	52.3	164.5
MW-13	214.6	214.4	43.8	170.6	49.8	164.6
RW-4	212.0	211.7	39.9	171.8	44.8	166.9
RW-5	213.3	215.3	44.3	171.0	46.9	168.5
RW-6	214.4	216.4	44.5	171.9	50.5	165.9
RW-7	214.5	214.0	41.2	172.8	47.0	167.0
RW-8	206.9	209.1	37.2	171.9	41.7	167.4
RW-9	204.6	206.6	36.5	170.1	36.1	170.5
RW-10A	215.0	214.8	40.5	174.3	45.4	169.5
Lower Ocala Wells						
DRW-5	212.3	212.0	42.9	169.2	49.0	163.0
DRW-6A	212.3	214.0	45.3	168.7	51.4	162.6
DRW-7A	206.5	208.7	40.6	168.0	46.5	162.2
DRW-9	214.6	214.3	44.9	169.3	51.0	163.2
DRW-10	204.1	206.1	39.0	167.1	44.8	161.4
DRW-11	214.6	214.4	45.4	169.1	51.4	163.0
OW-1	214.5	217.3	47.9	169.4	54.0	163.3
OW-2	216.5	217.3	49.2	168.1	55.0	162.3
Surface Water Staff Gaugesšu2›						
Staff Gauge #	--	204.59	3.0	201.6	DRY	--
Staff Gauge #	--	209.38	DRY	--	DRY	--
Staff Gauge #	--	217.05	DRY	--	DRY	--

Notes:

u1 šiThe Remedial Investigation Report›, Woodward-Clyde Consultants, 1992, was used as the source for the surveyed elevations. Elevations for BMW-2A, MW-1-2, MW-1-5A, MW-1-6A, RW-10A and the staff gauges were surveyed by Marbury Engineering in April 1995.

u2 Staff gauge elevations were measured at the top of the gauge.

Entered by: MLP 3/31/95
Checked by: JAM 4/5/95

Big bucks

90C6116-0343

Some damage
Lot of sand has shown up

TABLE 2-1
FORMER FIRESTONE TIRE FACILITY
ALBANY, GEORGIA
GROUNDWATER MONITORING WELLS AND SPECIFICATIONS

THE MONITORING WELLS WERE GROUPED ACCORDING TO THE HYDROSTRATIGRAPHIC UNITS AT THE SITE

WELL DESIGNATION	WELL LOCATION	SURFACE ELEVATION feet, MSL	SCREENED DEPTH (feet, bgs)	Depth of SCREEN feet, MSL	SURFACE CASING [size I.D. in / material/depth(bgs)	INTERMEDIATE CASING [size ϕ.D. in / material / depth (bgs)]	SCREEN SIZE [dia(in)/length(ft)/ slots (in)]	OTHER COMMENTS
GROUP 1 – WELLS INSTALLED IN THE RESIDUUM								
P-1	Aquifer Test Observation p.	213.98	35.0-45.0	168.98	--	(2 /PVC riser, single casing)	2/ 10 / 0.02	Flush mounted piezometer, not to be sampled.
MW-1-2	Courtyard Area	214.00	25.0-35.0	179.00	--	(2 /PVC riser, single casing)	2/ 10 / 0.015	
MW-1-4	Courtyard Area	212.60	23.0-33.0	179.60	--	(2 /PVC riser, single casing)	2/ 10 / 0.015	
MW-7-4	Courtyard Area	214.80	29.0-39.0	175.80	--	(2 /PVC riser, single casing)	2/ 10 / 0.015	
MW-7-6	Courtyard Area	212.60	25.0-35.0	177.60	--	(2 /PVC riser, single casing)	2/ 10 / 0.015	
MW-9-1	Courtyard Area	212.20	34.0-44.0	168.20	--	(2 /PVC riser, single casing)	2/ 10 / 0.015	
MW-9-2	Courtyard Area	211.40	23.0-33.0	178.40	--	(2 /PVC riser, single casing)	2/ 10 / 0.015	
MW-12-1	Former Burn Pit	206.30	16.0-26.0	180.30	--	(2 /PVC riser, single casing)	2/ 10 / 0.015	
MW-12-1B	Former Burn Pit	207.46	22.0-32.0	175.46	--	(2 /st.steel riser, single casing)	2 / 10 / 0.01	Replacement Well for MW-12-1.
MW-14	Aquifer Test Observation w.	214.63	46.0-56.0	158.63	--	(2 /st.steel riser, single casing)	2/ 10 / 0.02	Flush mounted.
BMW-2	West of Plant	210.50	5.0-15.0	195.50	--	(2 /PVC riser, single casing)	2/ 10 / 0.015	
BMW-3	South of Plant	214.00	36.0-46.0	168.00	--	(2 /PVC riser, single casing)	2/ 10 / 0.015	
BMW-4	South of Plant	217.10	35.0-45.0	172.10	--	(2 /PVC riser, single casing)	2/ 10 / 0.015	
EMG-5A	South Side of Plant	214.50	15.0-20.0	195.50	--	(2 /PVC riser, single casing)	2/ 5 / NA	
GROUP 2 – WELLS INSTALLED IN THE UPPER OCALA LIMESTONE								
MW-1-1	Courtyard Area	213.40	49.0-59.0	154.40	--	(2 /PVC riser, single casing)	2/ 10 / 0.015	Well straddles Residuum and Upper Ocala
MW-1-3	Courtyard Area	212.10	55.0-65.0	147.10	--	(2 /PVC riser, single casing)	2/ 10 / 0.015	Well straddles Residuum and Upper Ocala
MW-1.-5	Courtyard Area	212.60	50.0-60.0	152.60	--	(2 /PVC riser, single casing)	2/ 10 / 0.015	Well straddles Residuum and Upper Ocala
MW-1-6	Courtyard Area	214.50	49.0-59.0	155.50	--	(2 /PVC riser, single casing)	2/ 10 / 0.015	Well straddles Residuum and Upper Ocala
MW-7-5	Courtyard Area	212.90	40.0-50.0	162.90	--	(2 /PVC riser, single casing)	2/ 10 / 0.015	Well straddles Residuum and Upper Ocala
MW-13	Aquifer Test Observation w.	214.61	95.0-105.0	109.61	6 / PVC / 91.5	--	2/10 / 0.02	Flush mounted.
RW-1	West Side of Plant	213.50	61.0-71.0	142.50	--	(4 /PVC riser, single casing)	2/ 10 / 0.015	Well straddles Residuum and Upper Ocala
RW-2	West Side of Plant	214.10	49.0-59.0	155.10	--	(4 /PVC riser, single casing)	2/ 10 / 0.015	Well straddles Residuum and Upper Ocala
RW-3	Southwest Corner of Plant	214.50	58.0-68.0	146.50	--	(4 /PVC riser, single casing)	2/ 10 / 0.015	Well straddles Residuum and Upper Ocala
RW-4	Courtyard	211.97	80.0-90.0	121.97	8 / steel / 73.2	--	4/ 10 / 0.02	Flush mounted.
RW-5	Southwest of Plant	213.33	58.5-68.5	144.83	8 / steel / 50.0	--	4/ 10 / 0.02	
RW-6	South of Plant	214.37	81.0-91.0	123.37	8 / steel / 73.0	--	4/ 10 / 0.02	
RW-7	Aquifer Test Observation w.	214.48	95.0-105.0	109.48	8 / steel / 59.5	--	4/ 10 / 0.02	Flush mounted
RW-8	Former Burn Pit	209.07	52.0-62.0	147.07	8 / steel / 44.0	--	4/ 10 / 0.02	
RW-9	South of S/W Detention Pond	204.55	50.0-60.0	144.55	8 / steel / 42.0	--	4/ 10 / 0.02	
RW-10	Northeast Corner of Site	214.71	50.5-60.5	154.21	8 / steel / 40.2	--	4/ 10 / 0.02	

TABLE 2-1

FORMER FIRESTONE TIRE FACILITY

ALBANY, GEORGIA

GROUNDWATER MONITORING WELLS AND SPECIFICATIONS

90C6116-0343

THE MONITORING WELLS WERE GROUPED ACCORDING TO THE HYDROSTRATIGRAPHIC UNITS AT THE SITE

WELL DESIGNATION	WELL LOCATION	SURFACE ELEVATION feet, MSL	SCREENED DEPTH (feet, bgs)	Depth of SCREEN feet, MSL	SURFACE CASING [size I.D. in / material/depth(bgs)	INTERMEDIATE CASING (size (I.D. in / material / depth (bgs)]	SCREEN SIZE [dia(in)/length(ft)/ slots (in)]	OTHER COMMENTS
GROUP 2 - WELLS INSTALLED IN THE UPPER OCALA LIMESTONE (CONTINUED)								
EMG-1	Southwest Corner of Site	213.10	42.0-52.0	159.10	--	(2 /PVC riser, single casing)	2/ 10 / NA	Well straddles Residuum and Upper Ocala
EMG-2	South End of Site	216.50	56.0-66.0	150.50	--	(2 /PVC riser, single casing)	2/ 10 / NA	Well straddles Residuum and Upper Ocala
EMG-3	Southeast Corner of Site	213.30	48.0-58.0	155.30	--	(2 /PVC riser, single casing)	2/ 10 / NA	
EMG-5	South Side of Plant	214.20	55.0-65.0	149.20	--	(2 /PVC riser, single casing)	2/ 10 / NA	
EMG-6	SE of S/W Detention Pond	205.05	34.0-44.0	159.05	--	(2 /PVC riser, single casing)	2/ 10 / NA	Well straddles Residuum and Upper Ocala
EMG-7	South of S/W Detention Pond	202.80	30.0-40.0	156.80	--	(2 /PVC riser, single casing)	2/ 10 / NA	Well straddles Residuum and Upper Ocala
PTW-1	Courtyard Area	212.50	16.0-84.0	128.50	--	(2 /PVC riser, single casing)	2/ 68 / 0.015	Well straddles Residuum and Upper Ocala
DRW-1	West Side of Plant	214.40	120.0-130.0	84.40	--	(4 /PVC riser, single casing)	(no screen)	
DRW-2	South Side of Plant	214.30	124.0-134.0	80.30	--	(4 /PVC riser, single casing)	(no screen)	
DRW-3	South Side of Plant	214.30	125.0-135.0	79.30	--	(4 /PVC riser, single casing)	(no screen)	
DRW-4	South Side of Plant	214.40	121.0-131.0	83.40	--	(4 /PVC riser, single casing)	(no screen)	
DRW-8	Aquifer Test Pumping Well	214.58	90.0-130.0	84.58	10 / steel / 56.0	--	6/ 40 / 0.03	Geophysically logged, flush mounted.
GROUP 3 - WELLS INSTALLED IN THE LOWER OCALA LIMESTONE								
DRW-5	Courtyard Area	212.30	166.0-176.0	36.30	12 / PVC / 74.0	8 / steel / 145.0	4/ 10 / 0.02	Geophysically logged, flush mounted.
DRW-6A	Southwest of Plant	212.32	160.0-170.0	42.32	12 / PVC / 55.0	8 / steel / 147.0	4/ 10 / 0.02	Geo. logged, orig. boring DRW-6 was abandoned
DRW-7A	Former Burn Pit	206.48	180.0-190.0	16.48	12 / PVC / 55.0	8 / steel / 170.0	4/ 10 / 0.02	Geo. logged, org. boring DRW-7 was cored.
DRW-9	Aquifer Test Observation w.	214.58	178.0-188.0	26.58	12 / PVC / 46.2	8 / steel / 168.0	4/ 10 / 0.02	Geo. logged, HX size rock cored, flush mounted.
DRW-10	South of S/W Detention Pond	204.10	160.0-170.0	34.10	12 / PVC / 44.5	8 / steel / 143.0	4/ 10 / 0.02	Geophysically logged.
DRW-11	Northeast Corner of Site	214.30	159.5-169.5	44.80	12 / PVC / 50.0	8 / steel / 145.0	4/ 10 / 0.02	Geo. logged, flush mnt, riser grouted with cement.
OW-1	East of Plant	214.50	120.0-270.0	--	--	4 / steel /120	(no screen)	Observation well installed in 1967
OW-2	South of Plant	216.50	120.0-275.0	--	--	4 / steel /120	(no screen)	Observation well installed in 1967
PW-1	East of Plant	214.40	165.0-265.0	--	--	16 / steel / 165	(no screen)	Production Well installed in 1968
PW-2	Southeast of Plant	219.70	150.0-284.0	--	--	16 / steel / 150	(no screen)	Production Well installed in 1968

BRIDGESTONE/FIRESTONE PUMP TEST

6/10/95 - 6/12/95

AMCL

- RADIUS OF INFLUENCE ≥ 100 feet
  - MW-1-4 had approximately 0.8' of drawdown. The well is approximately 100' from closest of 4 pump wells (MW-1-1

- 4 PUMP WELLS: PTW-1, MW-1-1, MW-1-2, MW-1-3
- 3 Monitoring wells: MW-1-4, MW-1-5A, RW-4

- AVERAGE PUMP RATES

From Pump Cycle Data

PTW-1 = 0.11 gpm

MW-1-1 = 0.12 gpm

MW-1-2 = 0.23 gpm

MW-1-3 = 0.05 gpm

0.51 gpm

From Holding Tank Data:

Total = 0.5 gpm average

- Total Drawdown

PTW-1 = 22.96 ft

MW-1-3 = 20.0 ft

- Specific Capacity (assuming wells are 100% effecient)

S.C = Q/s

PTW-1 = (0.11)/(22.96) = 4.9×10^{-3} gpm/ft

MW-1-3 = (0.05)/(20) = 2.5×10^{-3} gpm/ft

- Transmissivity from PTW-1 *
  - approximately 35' saturated thickness (residuum)
  - $Q = 0.11$ gpm
  - Theis Curve Match Point (see attached)

    $W(u) = 1$ $\quad s = 9.5$

    $u = 1$ $\quad t = 92$ minutes
  - $T = \frac{15.3\,Q}{s}(W(u)) = 0.2\ ft^2/d = \boxed{1.5\ gpd/ft}$
  - $K = T/b = 0.2/35 = \boxed{5 \times 10^{-3}\ ft/d}$
  - No storativity ~~as PTW~~ value determined as PTW-1 is a pump well.

* This analysis assumes drawdown is due only to PTW-1 and not affected by other pump wells

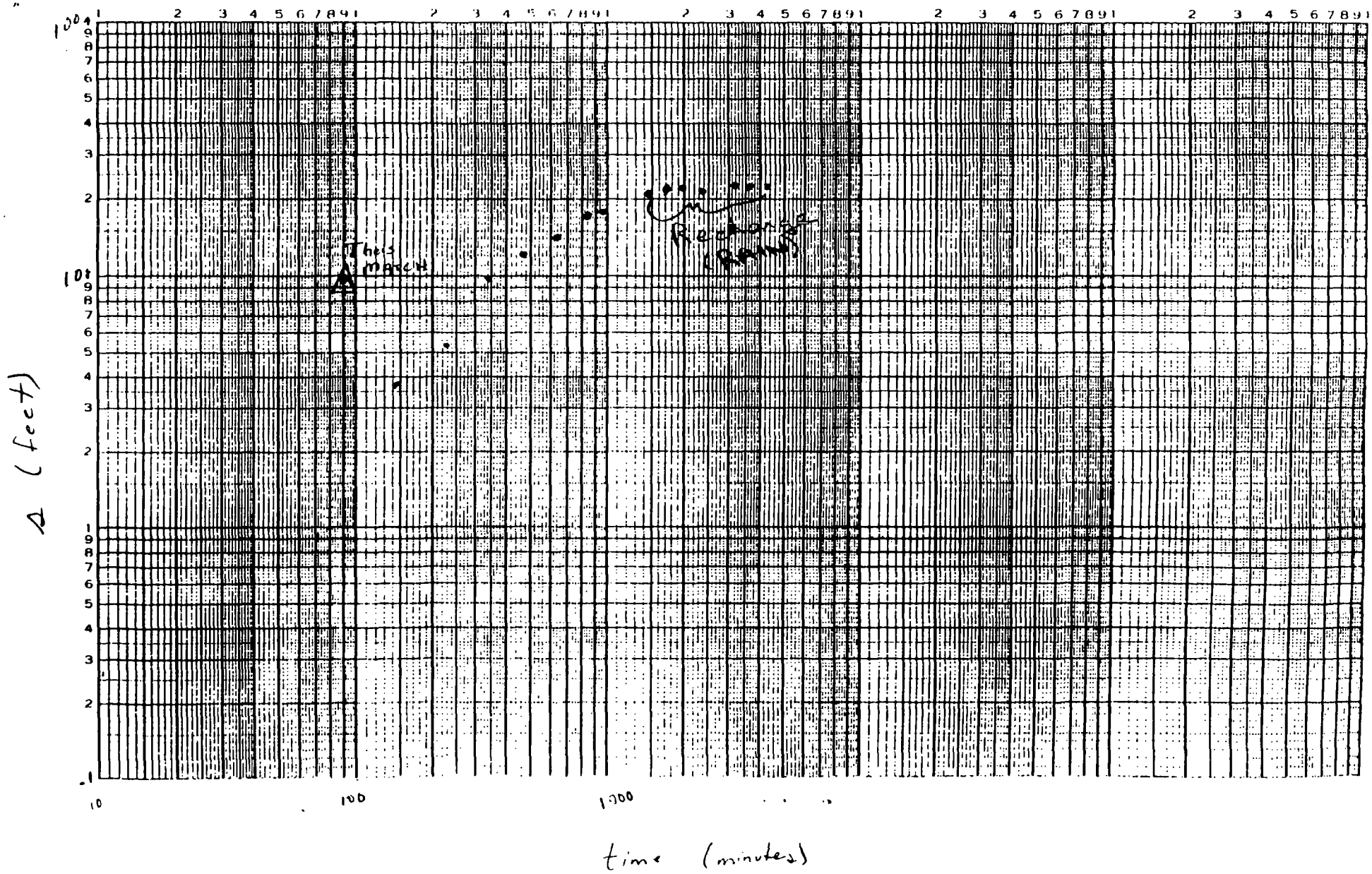
BRIDGESTONE / FIRESTONE 6/10 - 6/12 PUMP TEST

PTW - 1 (pump well) $Q \cong 0.11$ gpm

Theis Curve Match Point:

$w(u) = 1$ $s = 9.5$

$u = 1$ $t = 92$ minutes



Full Logarithmic

12-191

BRIDGESTONE / FIRESTONE
ALBANY, GEORGIA

Well I.D.: MW-1-3 Type of Test: Drawdown

Measuring Point (TOC or Ground Surface):

Start Date: 6/10/95 Time: M.P. Elevation (Ft – MSL):

Initial Water Depth Below M.P. (Ft): ~~42.80~~ 43.02 Measuring Point (TOC or Ground Surface): TOC

Monitoring/Test Section Depth from M.P. (Ft) From To

Monitoring/Test Section Length (Ft)

Data Collected By	Date/Time	Elapsed Time (min)	Tape Held At M.P.	Cut Length (ft)	Water Depth Below M.P. (ft)	Draw-Down (ft)	Tape I.D.
RAS	6-10-95/10:25	145	—	—	52.78	9.76	WLI
RAS	6-10-95/11:50	230	—	—	56.60	13.58	WLI
RAS	6-10-95/13:43	343	—	—	57.40	14.38	WLI
RAS	6-10-95/15:51	471	—	—	58.40	15.38	WLI
TMK	6-10-95/18:22	622	—	—	58.50	15.48	WLI
TMK	6-10-95/19:59	719	—	—	60.05	17.03	WLI
TMK	6-10-95/21:52	832	—	—	60.85	17.83	WLI
TMK	6-10-95/23:27	927	—	—	61.10	18.09	WLI
RAS	6-11-95/08:45	1485			62.88	19.86	WLI ← on top of pump
RAS	6-11-95/10:01	1561	—	—	63.02	20.00	WLI ← Def [illegible] of pump
RAS	6-11-95/12:46	1726	—	—	62.82	19.80	WLI
RAS	6-11-95/14:05	1805	—	—	62.64	19.62	WLI
RAS	6-11-95/16:16	1936	—	—	62.70	19.68	WLI
TMK	6-11-95/18:00	2040	—	—	62.90	19.88	WLI
TMK	6-11-95/20:02	2162	—	—	62.30	19.28	WLI
TMK	6-11-95/21:55	2275	—	—	62.70	19.68	WLI
TMK	6-11-95/23:43	2383	—	—	62.90	19.88	WLI
RAS	6-12-95/09:15	2755	—	—	62.52	19.50	WLI
RAS	6-12-95/09:56	2796	—	—	62.35	19.33	WLI
TMK	6-12-95/11:49	3109	—	—	62.60	19.58	WLI
TMK	6-12-95/14:14	3254	—	—	62.90	19.88	WLI
RAS	6-12-95/15:55	3355	—	—	62.62	19.60	WLI
TMK	6-12-95/18:06	3486	—	—	62.68	19.66	WLI
TMK	6-12-95/20:03	3603	—	—	62.50	19.48	WLI
TMK	6-12-95/22:23	3743	—	—	62.70	19.68	WLI
TMK	6-13-95/08:04	4324	—	—	62.70	19.68	WLI

DATA CHECKED BY: DATE:
DATA REVIEWED BY: DATE:

MW-1-3

BRIDGESTONE / FIRESTONE
ALBANY, GEORGIA

Well I.D.: PTW-1 [redacted] Type of Test: [redacted]

Measuring Point (TOC or Ground Surface):

Start Date: 6/10/95 Time: M.P. Elevation (Ft - MSL):

Initial Water Depth Below M.P. (Ft): 43.84 Measuring Point (TOC or Ground Surface): TOC

Monitoring/Test Section Depth from M.P. (Ft) From To

Monitoring/Test Section Length (Ft)

Data Collected By	Date/Time	Elapsed Time (min)	Tape Held At M.P.	Cut Length (ft)	Water Depth Below M.P. (ft)	Draw-Down (ft)	Tape I.D.
RAS	6-10-95/10:26	146	—	—	47.60	3.76	WLI
RAS	6-10-95/11:48	228	—	—	49.20	5.36	WLI
RAS	6-10-95/13:45	345	—	—	53.72	9.88	WLI
RAS	6-10-95/15:50	470	—	—	56.14	12.30	WLI
TMK	6-10-95/18:19	619	—	—	58.21	14.37	WLI
TMK	6-10-95/19:57	717	—	—	59.60	15.76	WLI
TMK	6-10-95/21:50	830	—	—	61.10	17.26	WLI
TMK	6-10-95 23:25	925	—	—	61.83	17.99	WLI
RAS	6-11-95/08:42	1482	—	—	64.94	21.10	WLI
RAS	6-11-95/10:00	1560	—	—	65.13	21.29	WLI
RAS	6-11-95/12:48	1728	—	—	65.40	21.56	WLI
RAS	6-11-95/14:04	1804	—	—	65.54	21.70	WLI
RAS	6-11-95/16:12	1932	—	—	65.54	21.70	WLI
TMK	6-11-95/18:03	2043	—	—	65.55	~~21.70~~ 21.71 TMK	WLI
TMK	6-11-95/20:00	2160	—	—	65.55	21.71	WLI
TMK	6-11-95/21:53	2273	—	—	65.40	21.56	WLI
TMK	6-11-95/23:41	2381	—	—	65.40	21.56	WLI
RAS	6-12-95/09:14	2954	—	—	66.66	22.82	WLI
RAS	6-12-95/09:55	3015	—	—	66.80	22.96	WLI
~~RAS~~ TMK	6-12-95/11:47	3107	—	—	66.80	22.96	WLI
TMK	6-12-95/14:11	3251	—	—	66.60	22.76	WLI
RAS	6-12-95/15:54	3354	—	—	66.58	22.74	WLI
TMK	6-12-95/18:09	3484	—	—	66.42	22.58	WLI
TMK	6-12-95/20:01	3601	—	—	66.40	22.56	WLI
TMK	6-12-95/22:21	3741	—	—	66.90	22.96	WLI
TMK	6-13-95/03:02	4322	—	—	66.30	22.46	WLI

DATA CHECKED BY: DATE:
DATA REVIEWED BY: DATE:

PTW-1

BRIDGESTONE / FIRESTONE
ALBANY, GEORGIA

Well I.D.: MW-1-4 Type of Test: Drawdown

Measuring Point (TOC or Ground Surface):

Start Date: 6/10/95 Time: M.P. Elevation (Ft – MSL):

Initial Water Depth Below M.P. (Ft): ~~16.86~~ 17.05 Measuring Point (TOC or Ground Surface): TOC

Monitoring/Test Section Depth from M.P. (Ft) From To

Monitoring/Test Section Length (Ft)

Data Collected By	Date/Time	Elapsed Time (min)	Tape Held At M.P.	Cut Length (ft)	Water Depth Below M.P. (ft)	Draw-Down (ft)	Tape I.D.
[illegible]	[illegible]/10:07	129	18.00	[illegible]	17.11	0.06	RAS-1
RK	6-10-95/11:57	237	18.00	0.88	17.12	0.07	RAS-1
RK	6-10-95/14:00	360	18.00	0.89	17.11	0.06	RK-1
RK	6-10-95/15:54	474	18.00	0.92	17.08	0.03	RK-1 2X
TMK	6-10-95/18:28	628	18.00	0.87	17.13	0.08	RAS-1
TMK	6-10-95/20:03	723	18.00	0.78	17.22	0.17	RAS-1
TMK	6-10-95/21:55	835	18.00	0.84	17.16	0.11	RAS-1
TMK	6-10-95/23:30	930	18.00	0.87	17.13	0.08	RAS-1
[illegible]	[illegible]/08:49	1457	18.00	0.91	17.09	0.04	RAS-1
[illegible]	6-11-95/10:05	1565	[illegible]	0.96	17.04	-0.01	RAS-1
RAS	6-11-95/13:06	1746	18.00	0.94	17.06	0.01	RAS-1
RAS	6-11-95/14:10	1810	18.00	0.95	17.05	0.00	RAS-1
RAS	6-11-95/16:28	1948	18.00	0.98	17.02	-0.03	RAS-1
TMK	6-11-95/18:07	2047	18.00	0.96	17.04	~~-0.02~~ -0.01	RAS-1
TMK	6-11-95/20:05	2165	18.00	0.91	17.09	0.04	RAS-1
TMK	6-11-95/22:00	2280	18.00	0.83	17.17	0.12	RAS-1
TMK	6-11-95/23:45	2385	18.00	0.77	17.23	0.18	~~TMK~~ RAS-1
RAS/TMK	6-12-95 09:23	2963	18.00	0.60	17.40	0.35	RAS-1
RAS	6-12-95/10:07	3007	18.00	0.58	17.42	0.37	RAS-1
~~TMK~~ RAS	6-12-95/11:52	3112	18.00	0.56	17.44	0.39	RAS-1
TMK	6-12-95/14:18	3258	18.00	0.56	17.44	0.39	RAS-1
RAS	6-12-95/16:05	3365	18.00	0.56	17.44	0.39	RK-1
TMK	6-12-95/18:09	3489	18.00	0.53	17.47	0.42	RAS-1
TMK	6-12-95/20:07	3607	18.00	0.45	17.55	0.50	RAS-1
TMK	6-12-95/22:25	3742	18.00	0.38	17.62	0.57	RAS-1
TMK	6-13-95/08:03	4328	19.00	1.17	17.83	0.78	RAS-1

DATA CHECKED BY: DATE:
DATA REVIEWED BY: DATE:

MW-1-4

BRIDGESTONE / FIRESTONE
ALBANY, GEORGIA

Well I.D.: RW-4 Type of Test: Drawdown

Measuring Point (TOC or Ground Surface):

Start Date: 6/10/95 Time: M.P. Elevation (Ft – MSL):

Initial Water Depth Below M.P. (Ft): ~~45.17~~ 45.25 Measuring Point (TOC or Ground Surface): TOC

Monitoring/Test Section Depth from M.P. (Ft) From To

Monitoring/Test Section Length (Ft)

Data Collected By	Date/Time	Elapsed Time (min)	Tape Held At M.P.	Cut Length (ft)	Water Depth Below M.P. (ft)	Draw-Down (ft)	Tape I.D.
RAS	6-10-95/07:55	115	46.00	0.75	45.25	0.00	RW-1
RAS	6-10-95/12:00	240	46.00	0.72	45.28	0.03	RAS-1
RAS	6-10-95/14:04	364	46.00	0.70	45.30	0.05	RW-1
RAS	6-10-95/16:00	480	46.00	0.70	45.30	0.05	RAS-1
TMK	6-10-95/18:34	634	46.00	0.79	45.21	-0.04	RAS-1
TMK	6-10-95/20:06	726	46.00	0.84	45.16	-0.09	RAS-1
TMK	6-10-95/22:04	844	46.00	0.79	45.21	-0.04	RAS-1
TMK	6-10-95/23:33	933	46.00	0.78	45.22	-0.03	RAS-1
RAS	6-11-95/08:55	1495	46.00	0.78	45.22	-0.03	RAS-1
RAS	6-11-95/10:10	1570	46.00	0.79	45.21	-0.04	RAS-1
RAS/TMK	6-11-95/13:09	1749	46.00	0.77	45.23	-0.02	RAS-1
RAS	6-11-95/14:14	1814	46.00	0.75	45.25	0.00	RAS-1
RAS	6-11-95/16:30	1950	46.00	0.78	45.22	-0.03	RAS-1
TMK	6-11-95/18:10	2050	46.00	0.83	45.17	-0.08	RAS-1
TMK	6-11-95/20:08	2168	46.00	0.89	45.11	-0.14	RAS-1
TMK	6-11-95/22:04	2884	46.00	0.91	45.09	-0.16	RAS-1
TMK	6-11-95/23:48	2388	46.00	0.91	45.09	-0.16	RAS-1
RAS/TMK	6-12-95/09:26	2966	46.00	0.90	45.10	-0.15	RAS-1
RAS	6-12-95/10:12	3012	46.00	0.91	45.09	-0.16	RAS-1
TMK	6-12-95/11:55	3115	46.00	0.91	45.09	-0.16	RAS-1
RAS	6-12-95/14:40	3280	46.00	0.90	45.10	-0.15	RAS-1
RAS	6-12-95/16:10	3370	46.00	0.92	45.08	-0.17	RAS-1
TMK	6-12-95/18:12	3492	46.00	0.95	45.05	-0.20	RAS-1
TMK	6-12-95/20:12	3612	46.00	0.96	45.04	-0.21	RAS-1
TMK	6-12-95/22:28	3748	46.00	0.97	45.03	-0.22	RAS-1
TMK	6-13-95/03:13	4333	46.00	0.95	45.05	-0.20	RAS-1

DATA CHECKED BY: DATE:
DATA REVIEWED BY: DATE:

RW-4

BRIDGESTONE / FIRESTONE
ALBANY, GEORGIA

Well I.D.: MW-1-5A Type of Test: Drawdown

Measuring Point (TOC or Ground Surface):

Start Date: 6/10/95 Time: M.P. Elevation (Ft – MSL):

Initial Water Depth Below M.P. (Ft): ~~46.07~~ 45.95 Measuring Point (TOC or Ground Surface): TOC

Monitoring/Test Section Depth from M.P. (Ft) From To

Monitoring/Test Section Length (Ft)

Data Collected By	Date/Time	Elapsed Time (min)	Tape Held At M.P.	Cut Length (ft)	Water Depth Below M.P. (ft)	Draw-Down (ft)	Tape I.D.
RAS	6-10-95/[illegible]	120	47.00	1.03	45.77	0.02	RAS-1
RAS	6-10-95/12:02	242	47.00	1.06	45.94	-0.01	RAS-1
RAS	6-10-95/14:08	368	47.00	1.10	45.90	-0.05	RAS-1
RAS	6-10-95/16:02	482	47.00	1.16	45.84	-0.11	RAS-1
TMK	6-10-95 18:37	637	47.00	1.14	45.86	-0.09	RAS-1
TMK	6-10-95 20:09	729	47.00	1.04	45.96	0.01	RAS-1
TMK	6-10-95 22:07	847	47.00	1.07	45.93	-0.02	RAS-1
TMK	6-10-95 23:35	935	47.00	1.07	45.93	-0.02	RAS-1
RAS	6-11-95/09:00	1500	47.00	1.10	45.90	-0.05	RAS-1
RAS	6-11-95/10:12	1572	47.00	1.12	45.88	-0.07	RAS-1
RAS/TMK	6-11-95/13:10	1750	47.00	1.13	45.87	-0.08	RAS-1
RAS	6-11-95/14:17	1817	47.00	1.16	45.84	-0.11	RAS-1
RAS	6-11-95/16:35	1955	47.00	1.23	45.77	-0.18	RAS-1
TMK	6-11-95/18:13	2053	47.00	1.26	45.74	-0.21	RAS-1
TMK	6-11-95/20:10	2170	47.00	1.26	45.74	-0.21	RAS-1
TMK	6-11-95/22:09	2889	47.00	1.22	45.78	-0.17	RAS-1
TMK	6-11-95/23:50	2390	47.00	1.23	45.77	-0.18	RAS-1
RAS/TMK	6-12-95/09:29	2969	47.00	1.27	45.73	-0.22	RAS-1
RAS	6-12-95/10:15	3015	47.00	1.26	45.74	-0.21	RAS-1
TMK	6-12-95/11:57	3117	47.00	1.28	45.72	-0.23	RAS-1
RAS	6-12-95/14:47	3288	47.00	1.34	45.66	-0.29	RAS-1
RAS	6-12-95/16:15	3375	47.00	1.35	45.65	-0.30	RAS-1
TMK	6-12-95/18:17	3497	47.00	1.34	45.66	-0.29	RAS-1
TMK	6-12-95/20:15	3615	47.00	1.28	45.72	-0.23	RAS-1
TMK	6-12-95/22:32	3752	47.00	1.25	45.75	-0.20	RAS-1
TMK	6-13-95/03:17	4337	47.00	1.21	45.79	-0.16	RAS-1

DATA CHECKED BY: DATE:

DATA REVIEWED BY: DATE:

MW-1-5A

TABLE 3-2
SUMMARY OF GROUNDWATER MONITORING WELL INFORMATION
FORMER FIRESTONE FACILITY - ALBANY, GEORGIA

WELL ID	SURFACE ELEVATION (FT msl)	9-28-91 GROUNDWATER ELEVATION (FT msl)	12-17-91 GROUNDWATER ELEVATION (FT msl)	SAND PACK DEPTH (FT bgs)	SCREEN/ OPEN HOLE (FT bgs)	EST. DEPTH TO BASE OF RESIDUUM (FT bgs)
RESIDUUM						
MW-14	214.6	182.21	176.09	44	46-56	-
P-1	214.0	-	-	-	35-45	-
MW-12-1	206.3	186.09	182.2	13	16-26	-
MW-12-1B	207.5	183.14	DRY	18	22-32	-
MW-1-2	214.0	193.17	193.46	19	25-35	-
MW-1-4	212.6	194.23	189.37	20	23-33	-
MW-7-4	214.8	DRY	DRY	25.5	29-39	-
MW-7-8	212.6	190.59	186.30	25	25-35	-
MW-9-1	212.2	170.66	DRY	30	34-44	-
MW-9-2	211.4	DRY	DRY	19	23-33	-
BMW-2	210.5	205.24	205.19	2.5	5-15	-
BMW-3	214.0	191.56	182.10	30	36-46	-
BMW-4	217.1	192.32	187.50	28	35-45	-
EMG-5A	214.5	196.13	196.58	11	15-20	-
UPPER OCALA						
MW-1-1 *	213.4	167.63	164.19	43	49-59	59.5
MW-1-3 *	212.1	172.35	168.08	51	55-65	-
MW-1-5 *	212.2	166.23	161.47	46	50-60	52.0
MW-1-6 *	214.5	174.89	170.18	43	49-59	57.5
MW-7-5 *	212.9	170.24	165.33	34	40-50	45.0
MW-7-7 *	213.8	REMOVED	REMOVED	40	45-55	48.0
PTW-1 *	212.5	172.09	167.02	14	16-84	76.0
EMG-1 *	213.1	169.36	167.41	40	42-52	42.0
EMG-2 *	216.5	173.03	169.75	38	56-66	40.0
EMG-4 *	206.3	REMOVED	REMOVED	44	48-58	50.0
EMG-6 *	205.1	170.62	165.06	30.5	34-44	34.0
EMG-7 *	202.8	169.27	168.00	25	30-40	25.0
RW-1 *	213.5	168.43	161.62	56.5	61-71	63.0
RW-2 *	214.1	165.25	161.62	43	49-59	49.0
RW-3 *	214.5	168.18	164.64	52	58-68	54.0
EMG-3	213.3	169.28	164.14	37	48-58	30.0
EMG-5	214.5	165.61	161.64	53	55-65	33.0
MW-13	214.6	166.35	161.49	91	95-105	86.5
RW-4	212.0	167.84	162.99	76	80-90	67.0
RW-5	213.3	167.88	166.01	54.5	58.5-68.5	44.2
RW-6	214.4	167.54	163.66	77	81-91	67.0
RW-7	214.5	169.95	164.72	93	95-105	39.0
RW-8	206.9	167.58	165.02	48	52-62	37.6
RW-9	204.6	169.05	167.49	46	50-60	34.0
RW-10	214.7	171.65	166.78	43.5	50.5-60.5	30.5
DRW-8	214.6	166.10	161.17	85.5	90-130	47.0
DRW-1	214.4	-	160.38	-	120-130	45.0
DRW-2	214.3	165.03	160.40	-	124-134	45.0
DRW-3	214.3	164.24	159.61	-	125-135	45.0
DRW-4	214.4	164.55	159.85	-	121-131	45.0

50 ft