United States
Environmental Protection
Agency

Office of
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August 1993

EPA

Superfund Record of Decision:

Rochester Property, SC

50272-101

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SUPERFUND RECORD OF DECISION
Rochester Property, SC
First Remedial Action - Final

5. Report Date 08/31/93

6.

7. Author(s)

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13. Type of Report & Period Covered 800/800

14.

15. Supplementary Notes
PB94-964027

16. Abstract (Limit: 200 words)

The 4.5-acre Rochester Property site is a former waste disposal area located in Travelers Rest, Greenville County, South Carolina. Land use in the area is mixed residential, agricultural, and recreational, with woodlands on the northern portion of the site. Two small, unnamed tributaries flow into Armstrong Creek from each side of the site and overlie surficial saphrolite aquifers. The people who reside within one-half mile of the site use municipal water and water supply wells to obtain their drinking water supply. From 1971 to 1972, the site was used for the disposal of various types of waste, including wood glue, print binders, powder materials, natural guar gums, and adhesives. The waste was placed in four onsite trenches that were approximately forty feet long by three feet wide by 10 feet deep. In 1984, 1987, and 1988, State and EPA sampling and site investigations identified significant contamination as a result of these improper disposal activities. In 1989, EPA required the PRP to remove the waste and perform sampling to document the effectiveness of the waste removal. In 1990, the buried waste was excavated and disposed of offsite at a hazardous waste facility. This ROD addresses a first and final remedy for the potential future risk posed by use of the onsite contaminated ground water. The

(See Attached Page)

17. Document Analysis a. Descriptors
Record of Decision - Rochester Property, SC
First Remedial Action - Final
Contaminated Medium: gw
Key Contaminants: VOCs (TCE), other organics (PAHs), metals (manganese)

b. Identifiers/Open-Ended Terms

c. COSATI Field/Group

18. Availability Statement	19. Security Class (This Report) None	21. No. of Pages 58
	20. Security Class (This Page) None	22. Price

(See ANSI-Z39.18) *See Instructions on Reverse* OPTIONAL FORM 272 (4-77) (Formerly NTIS-35) Department of Commerce

Abstract (Continued)

primary contaminants of concern affecting the ground water are VOCs, including TCE; other organics, including PAHs; and the metal, manganese.

The selected remedial action for this site includes installing air sparging trenches and air sparging wells, if necessary; treating the contaminated ground water in-situ using air sparging to remove TCE, promote the biodegradation of bis(2-ethylhexyl)phthalate, and oxidize soluble manganese to its insoluble form, via the addition of oxygen, causing the insoluble manganese to precipitate and be re-deposited to the soil; installing vent pipes or another venting system through the subsurface to facilitate vapor discharge; conducting bench and/or pilot treatability studies to assess the effectiveness of the remedy, if necessary; monitoring ground water, surface water, and air; and implementing institutional controls, including deed, ground water, and well use restrictions. The estimated present worth cost for this remedial action is $2,681,000, which includes an estimated annual O&M cost of $156,500.

PERFORMANCE STANDARDS OR GOALS:

Chemical-specific ground water cleanup goals are based on SDWA MCLs and a risk-based level for manganese, and include bis(2-ethylhexyl)phthalate 0.006 mg/l; manganese 0.18 mg/l; and TCE 0.005 mg/l.

RECORD OF DECISION

SUMMARY OF REMEDIAL ALTERNATIVE SELECTION

ROCHESTER PROPERTY SUPERFUND SITE

TRAVELERS REST, GREENVILLE COUNTY
SOUTH CAROLINA

PREPARED BY:

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

DECLARATION FOR THE RECORD OF DECISION

SITE NAME AND LOCATION

Rochester Property Site
Travelers Rest, Greenville County, South Carolina

STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected remedial action for the Rochester Property Superfund Site (the Site), located in Travelers Rest, Greenville County, South Carolina, which was chosen in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), 42 U.S.C. §§ 9601 et seq., and, to the extent practicable, the National Oil and Hazardous Substances Contingency Plan (NCP), 40 C.F.R. Part 300 et seq. This decision is based on the administrative record file for this Site.

The State of South Carolina concurs with the selected remedy.

ASSESSMENT OF THE SITE

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

DESCRIPTION OF THE SELECTED REMEDY

This remedial action addresses groundwater contamination.

The major components of the selected remedy include:

- ☐ In-situ air sparging which will be accomplished by pumping air, through trench(es), and possibly wells, in the saturated zone, creating a steady flow of gas, or bubbles, that rise through the aquifer;

- ☐ Vent pipes or other venting system(s) will be placed in the subsurface to facilitate vapor discharge from the vadose zone.

- The rising bubbles will contact the dissolved organic contaminant and allow the trichloroethene (TCE) to volatilize.

- The addition of oxygen to the groundwater will promote biodegradation of bis(2-ethylhexyl)phthalate and oxidation of soluble manganese to its insoluble form.

- The insoluble manganese will then precipitate and be re-deposited in the soils, where it is already naturally occurring.

SITE MONITORING

- Regular sampling of the groundwater and surface water to monitor the concentrations and movement of contaminants.

STATUTORY DETERMINATIONS

The selected remedy is protective of human health and the environment, complies with Federal and State requirements that are legally applicable or relevant and appropriate to the remedial action, and is cost effective. This remedy utilizes permanent solutions and alternative treatment technology to the maximum extent practicable for this Site. The selected groundwater remedy satisfies the preference for treatment.

Since selection of this remedy will result in contaminated groundwater remaining on-site above health-based levels until the remedial action is complete, a statutory 5 year review will be performed after commencement of the remedial action to insure that the remedy continues to provide adequate protection of human health and the environment.

Patrick M. Tobin
Patrick M. Tobin
Acting Regional Administrator

August 31, 1993
Date

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1.0 SITE LOCATION AND DESCRIPTION

The Rochester Property Site (the Site), is located in a rural unzoned portion of Greenville County, South Carolina, approximately (3) three miles west of the town of Travelers Rest (Figure 1). The Site is located north of County Road 268 and approximately one-quarter mile east of County Road 102. The Site lies approximately 300 feet north of County Road 268, also known as Ledbetter Road, on property currently owned by Carolina Properties, Greenville, Inc. The Site's geographic coordinates are 34°58'17.1" north latitude and 82°30'07.2" west longitude.

The Site consists of approximately 4.5 acres (Figure 2). The northern portion of the Site is a pine and deciduous forest, while the southern portion is a former field which has been planted with pine trees. A fence surrounds a 0.6-acre area where waste was removed from the southern portion of the Site in 1990.

The Site is located on a hill between two (2) small streams. An unnamed tributary leading to Armstrong Creek borders the Site to the north and east and flows to the east. Another small stream borders the Site to the south. This stream flows eastward and discharges into the unnamed tributary to Armstrong Creek about 400 feet east of the Site. Site surface elevations range from 1010 feet above mean sea level (MSL) at the east end of the Site to 1047 feet above MSL at the west end of the Site.

Within the one-half mile radius of the Site, it is estimated that fifty-one percent (51%) is cleared, forty-seven percent (47%) is forested, and two percent (2%) is surface water. There are four (4) predominant land use categories. These include single-family residence dwellings, agricultural lands (small farms), forest lands (timber plots), and recreation lands (hunting, fishing, or unspecified outdoor activities). No schools, hospitals, nursing homes, or similar institutions are located within this area. The area's primary water supply source is groundwater obtained from private wells. A potable water supply pipeline is present in the vicinity of most of the homes located within one-half mile of the Site.

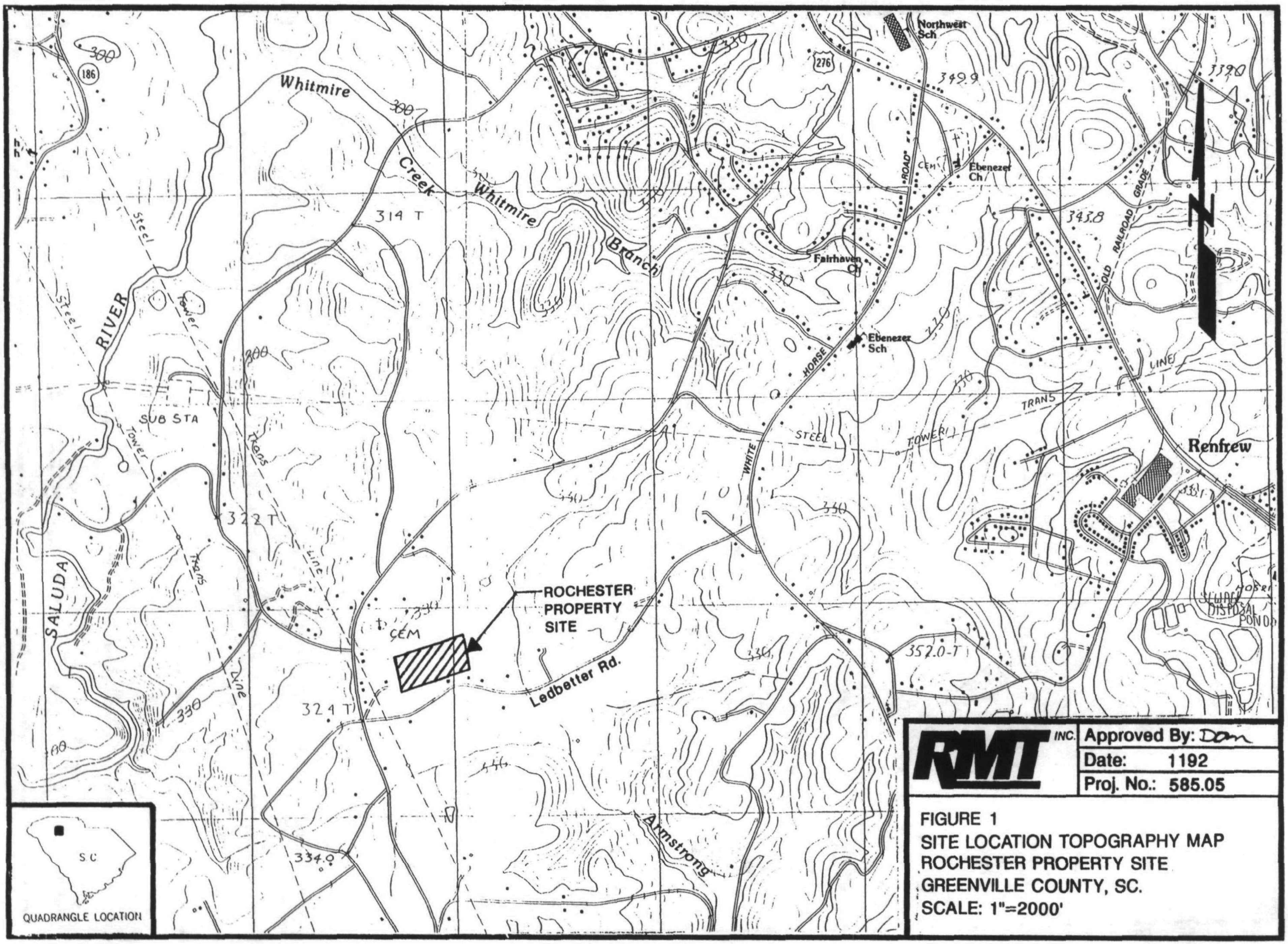

FIGURE 1
SITE LOCATION TOPOGRAPHY MAP
ROCHESTER PROPERTY SITE
GREENVILLE COUNTY, SC.
SCALE: 1"=2000'

TELEDYNE POST N32083

LEGEND

LOCATION OF FORMER WASTE EXCAVATION

STREAM

PROPERTY LINE

1020 TOPOGRAPHIC CONTOURS IN FEET ABOVE MEAN SEA LEVEL. CONTOUR INTERVAL IS 2 FEET.

SURVEY DATA TAKEN FROM PLAT PREPARED BY WEBB SURVEYING & MAPPING GROUP DATED NOV. 1987.

FIGURE 2

SITE LAYOUT MAP

RMT INC.

585.05
0893

0 60 120
SCALE IN FEET

ROCHESTER PROPERTY SITE
GREENVILLE COUNTY, SC

2.0 SITE HISTORY AND ENFORCEMENT ACTIVITIES

The Site was used for disposal of wastes which are thought to include wood glue, print binders, powder materials, natural guar gums, adhesive for food packages and adhesive restick for envelopes. The waste materials were placed in four (4) trenches sometime between late 1971 and early 1972. Each of the trenches was approximately forty (40) feet long, three (3) feet wide and ten (10) feet deep.

Previous investigations at the Site began in June 1984 when the South Carolina Department of Health and Environmental Control (SCDHEC) conducted initial sampling and then subsequently performed a Site inspection on November 8, 1984. As part of the inspection, SCDHEC sampled the waste, soils, surface water, and groundwater in the area. Additional investigations were performed by Colonial Heights Packaging, Inc.'s, consultant, RMT, Inc. (RMT), in August 1987, and February 1988, and by the United States Environmental Protection Agency's (EPA) contractor, NUS Corporation, in June 1988.

Based on the analysis of the waste collected by EPA and SCDHEC, EPA ranked the Site and included it on the National Priorities List Proposed Update in the Federal Register, Vol. 51, No. 111, on Tuesday, June 10, 1986. The Site was added to the National Priorities List, pursuant to Section 105 of CERCLA, 42 U.S.C. § 9605, on October 4, 1989, with a Hazard Ranking Score of 41.34.

On June 5, 1989, EPA and Colonial Heights Packaging, Inc., signed an Administrative Order on Consent, Docket No. 89-09-C, requiring that Colonial Heights Packaging, Inc., submit a workplan to characterize the vertical and horizontal extent of affected media, remove affected materials, and perform sampling to document the effectiveness of the waste removal. The buried waste was excavated in January 1990, and disposed of off-site at a secure hazardous waste landfill.

EPA and Colonial Heights Packaging, Inc., signed another Administrative Order on Consent, Docket Number 92-04-C, dated February 19, 1992, to conduct the Remedial Investigation and Feasibility Study (RI/FS).

The first phase of field work was conducted from July 1992, to August 1992, and the second phase was conducted in December 1992. RMT submitted to EPA, on behalf of Colonial Heights Packaging, Inc., the Final RI Report in April 1993, and the Final FS Report in May 1993.

3.0 HIGHLIGHTS OF COMMUNITY PARTICIPATION

An information repository, which includes the Administrative Record, was established at the Travelers Rest Library in 1992, and is available to the public at both the information repository maintained at the Travelers Rest Library, 315 South Main Street, Travelers Rest, South Carolina, 29690, and at EPA, Region IV Library, 345 Courtland Street, Atlanta, Georgia, 30365. The notice of availability of these documents was published in the Greenville News on June 14, 1993.

A public comment period for the proposed plan was held from June 14, 1993, to July 14, 1993. A public meeting was held on June 28, 1993, where representatives from EPA answered questions regarding the Site and the remedial alternatives under consideration, which were discussed in the proposed plan. An extension to the public comment period was requested and granted. The comment period ended August 13, 1993.

EPA received oral comments during the June 28, 1993, public meeting, and written comments during the sixty (60) day public comment period. Responses to the comments received by EPA are included in the Responsiveness Summary (Appendix A).

This ROD presents EPA's selected remedial action for the Site, chosen in accordance with CERCLA, as amended by SARA, and to the extent practicable, the NCP. The remedial action selection for this Site is based on information contained in the Administrative Record. The public and state participation requirements under Section 117 of CERCLA, 42 U.S.C. § 9617, have been met for this Site.

4.0 SCOPE AND ROLE OF THIS ACTION WITHIN SITE STRATEGY

The purpose of the remedial alternative selected in this ROD is to reduce potential future risks at this Site. There is no unacceptable current risk present at the Site. The groundwater remedial action will remove potential future risks posed by use of the contaminated groundwater, for potable water supply. This is the only ROD contemplated for this Site.

5.0 SUMMARY OF SITE CHARACTERISTICS

The RI investigated the nature and extent of contamination on and near the Site, and defined the potential risks to human health and the environment posed by the Site. A supporting RI objective was to characterize the Site-specific geology and hydrogeology. A total of forty-three (43) soil samples, twenty-nine (29) groundwater samples, eleven (11) surface water samples, and five

(5) sediment samples were collected during the RI. The main portion of the RI was conducted from July 1992, to August 1992, and December 1992. Locations of groundwater, surface soil, subsurface soil, surface water, and sediment samples are shown in Figures 3 through 7.

5.1 Meteorology

The Site is located in the Piedmont physiographic province of South Carolina on the eastern flank of the southern Appalachian Mountains. These mountains act to shield this portion of the Piedmont province from the full effect of cold fronts which move southeastward toward this area during the winter months. The winter season is characterized by temperate or moderate conditions while the summer months are warm and humid.

During the summer, the temperature rises to 90°F or above on almost half the days, but usually falls to 70°F or lower during the night. In the winter, temperatures remain below freezing through the day on only three (3) to four (4) occasions. Mean winter temperatures average in the low 30's (°F). Approximately two (2) to three (3) freezing rain storms and two (2) to three (3) small snow storms occur each winter. The mean annual temperature for this area is approximately 60°F.

Precipitation is predominately rainfall and is relatively evenly distributed throughout the year. The average annual rainfall is fifty-seven (57) inches per year.

5.2 Geologic and Hydrogeologic Setting

5.2.1 Geology/Soils

The Site is situated in the Piedmont physiographic province of South Carolina. The Piedmont is a broad plateau ranging from 400 to 1200 feet above sea level. Piedmont areas are characterized by low, rounded, gently sloping hills having relatively deeply incised dendritic drainage patterns. In this area, upland Piedmont sites typically have a thick layer of highly weathered residual soil and weathered rock (saprolite) overlying competent bedrock.

Residual materials generally consist of sandy clays, sandy silts, silty sands, or silts, and often contain solid rock fragments. The contact between the saprolite and bedrock typically is gradational and is often characterized by a zone of fractured rock material. Saprolite soils often retain the fabric of the original parent rock and may have preferentially fractured zones similar to competent rock. The residual soil and saprolite thickness in the Piedmont is variable, but may be greater than eighty (80) feet.

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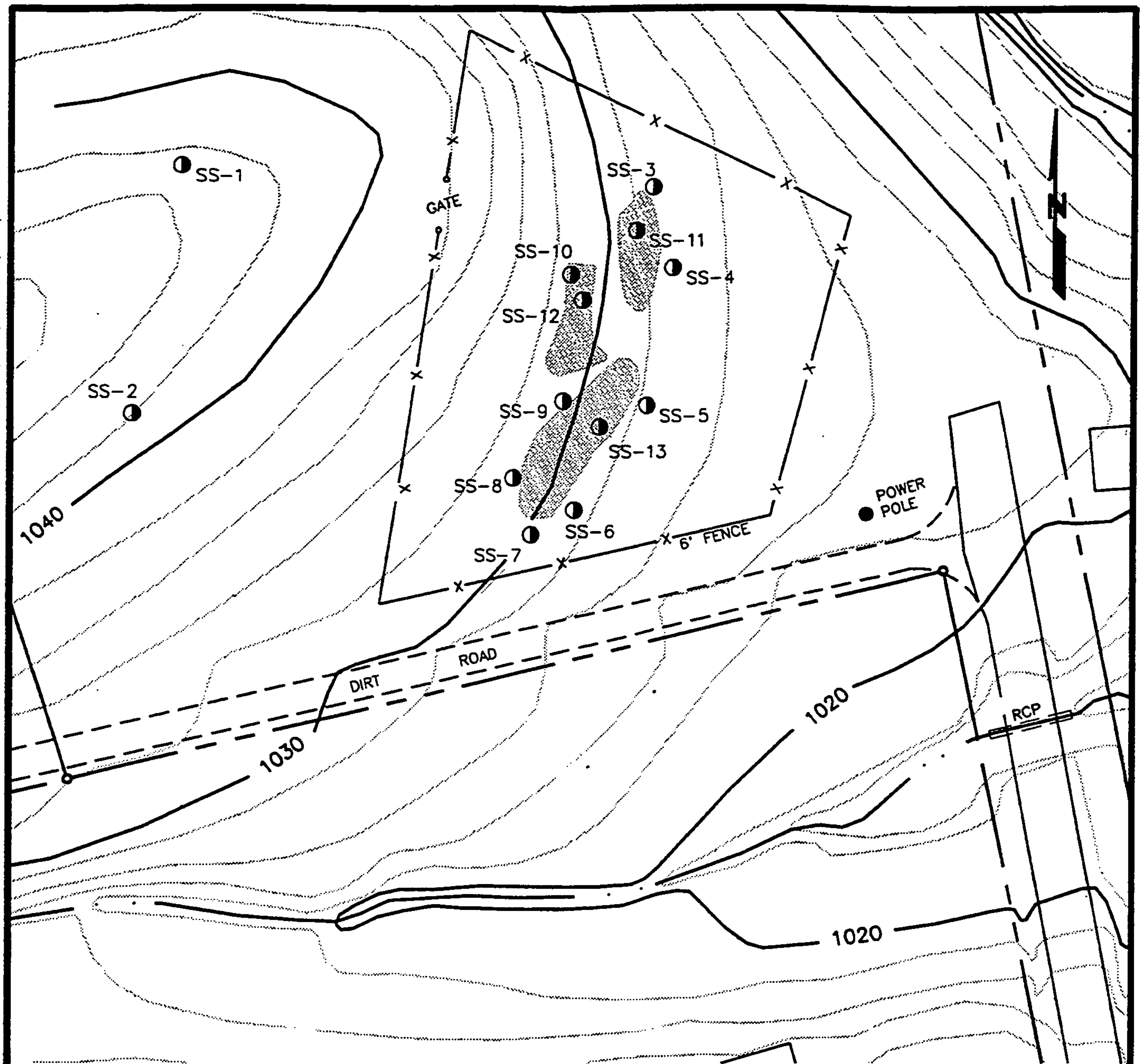

LEGEND

SS-1 SURFACE SOIL SAMPLE POINT LOCATIONS

LOCATION OF FORMER WASTE EXCAVATION

STREAM

PROPERTY LINE

1020 TOPOGRAPHIC CONTOURS IN FEET ABOVE MEAN SEA LEVEL. CONTOUR INTERVAL IS 2 FEET.

SURVEY DATA TAKEN FROM PLAT PREPARED BY WEBB SURVEYING & MAPPING GROUP DATED NOV. 1987.

FIGURE 3

SURFACE SOIL SAMPLING POINTS

RMT INC.

585.06
0893

0 60 120
SCALE IN FEET

ROCHESTER PROPERTY SITE
GREENVILLE COUNTY, SC

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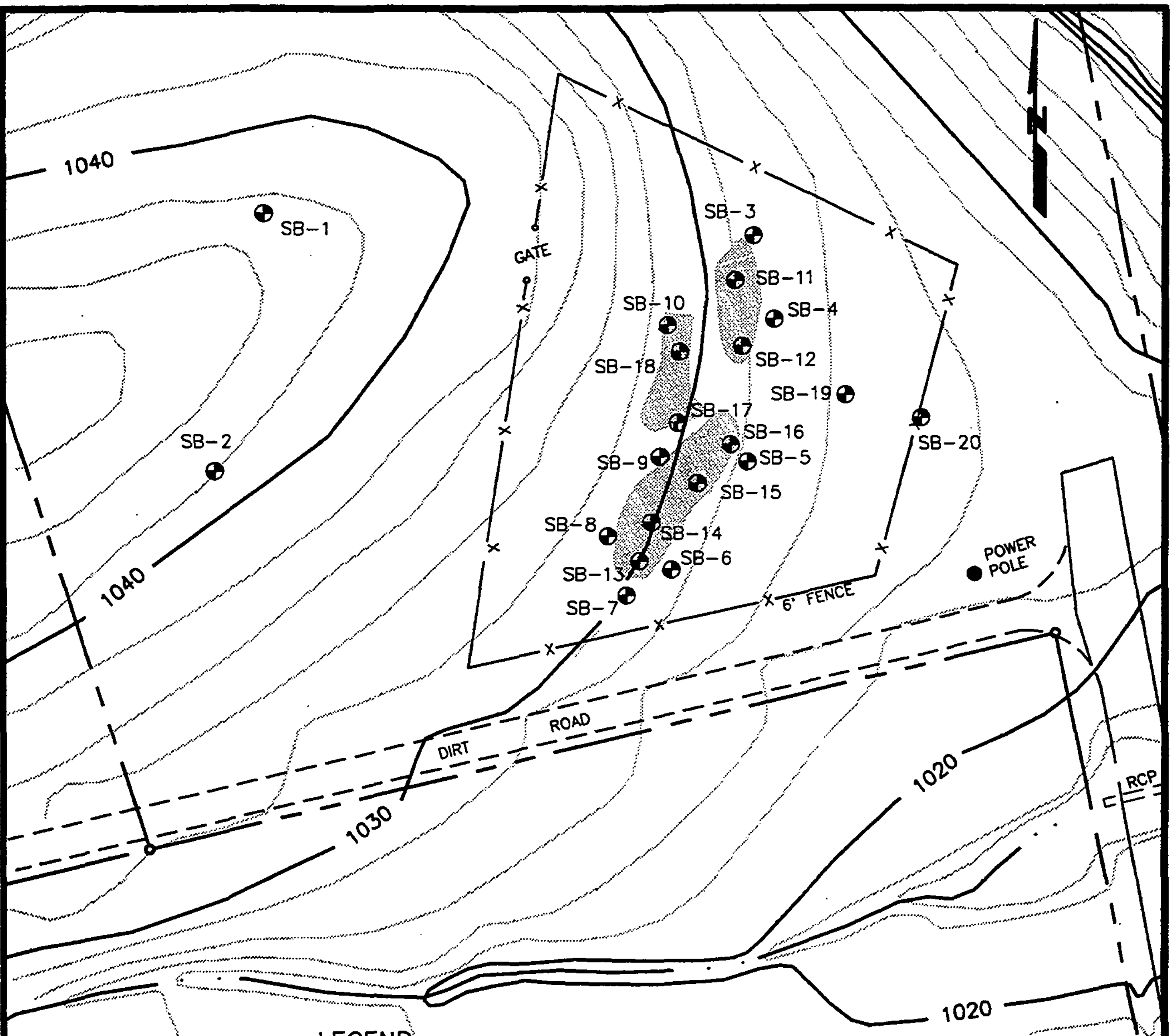

LEGEND

SB-1 SOIL BORING LOCATIONS

LOCATION OF FORMER WASTE EXCAVATION

STREAM

PROPERTY LINE

1020 TOPOGRAPHIC CONTOURS IN FEET ABOVE MEAN SEA LEVEL. CONTOUR INTERVAL IS 2 FEET.

SURVEY DATA TAKEN FROM PLAT PREPARED BY WEBB SURVEYING & MAPPING GROUP DATED NOV. 1987.

FIGURE 4

SUBSURFACE SOIL SAMPLING POINTS

RMT INC.

585.06
0893

0 60 120
SCALE IN FEET

ROCHESTER PROPERTY SITE
GREENVILLE COUNTY, SC

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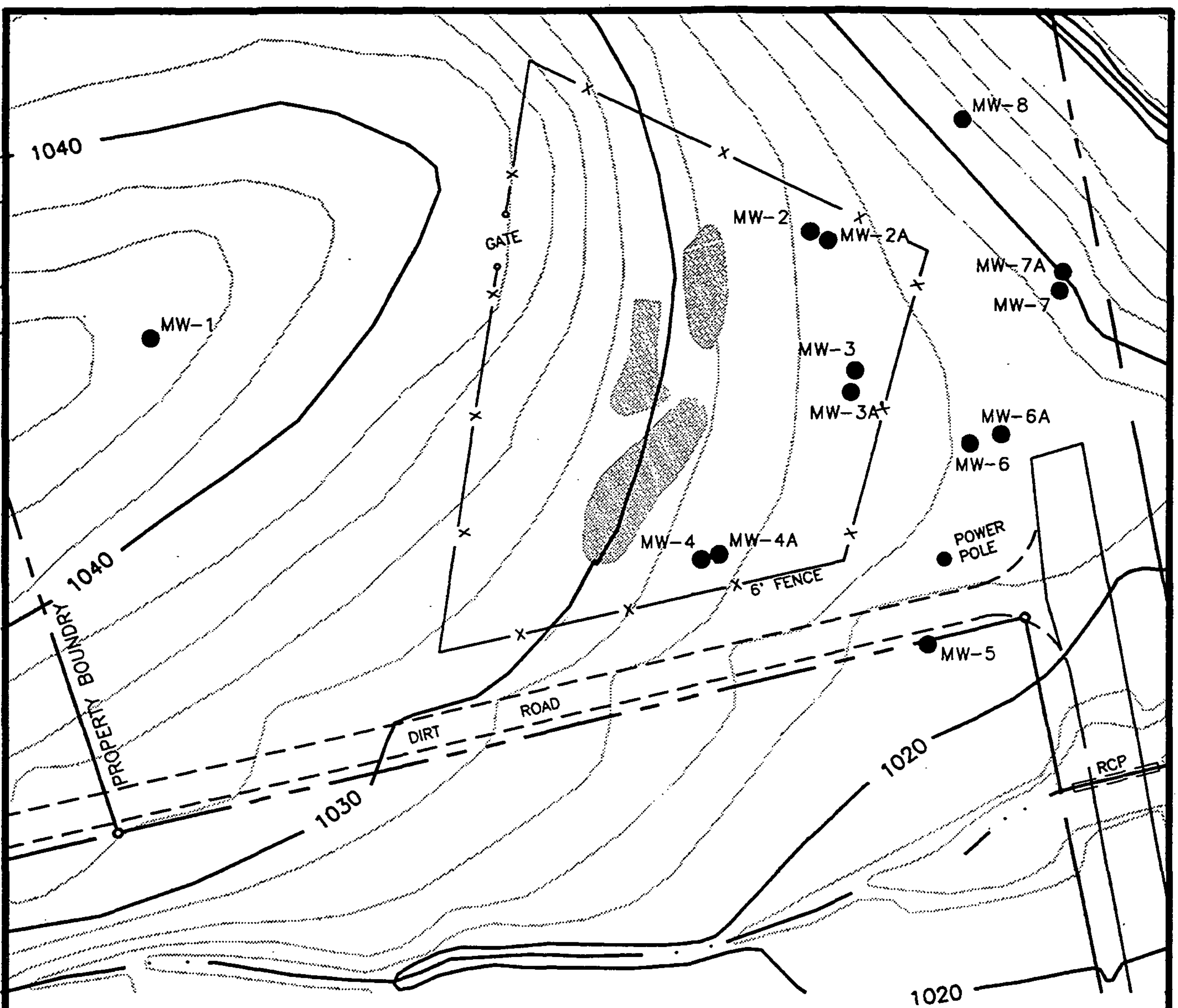

LEGEND

MW-1 — MONITORING WELL LOCATIONS

LOCATION OF FORMER WASTE EXCAVATION

STREAM

PROPERTY LINE

1020 — TOPOGRAPHIC CONTOURS IN FEET ABOVE MEAN SEA LEVEL. CONTOUR INTERVAL IS 2 FEET.

SURVEY DATA TAKEN FROM PLAT PREPARED BY WEBB SURVEYING & MAPPING GROUP DATED NOV. 1987.

FIGURE 5

GROUND WATER SAMPLING POINTS

RMT INC.

585.05
0893

0 60 120
SCALE IN FEET

ROCHESTER PROPERTY SITE
GREENVILLE COUNTY, SC

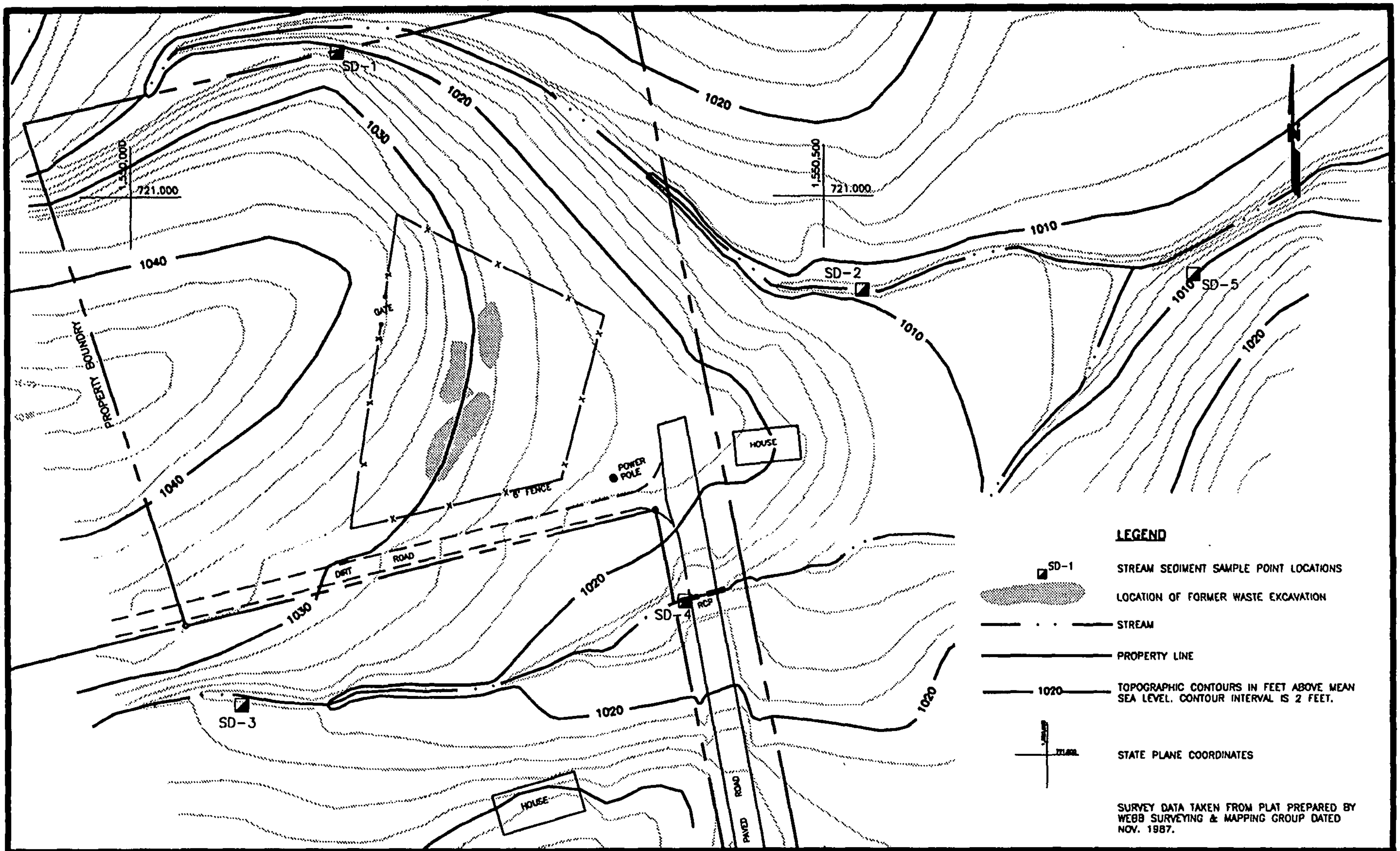

FIGURE 6

STREAM SEDIMENT SAMPLING POINTS

SCALE 1" = 100'

RMT INC.

585.05
0893

ROCHESTER PROPERTY SITE
GREENVILLE COUNTY, SC

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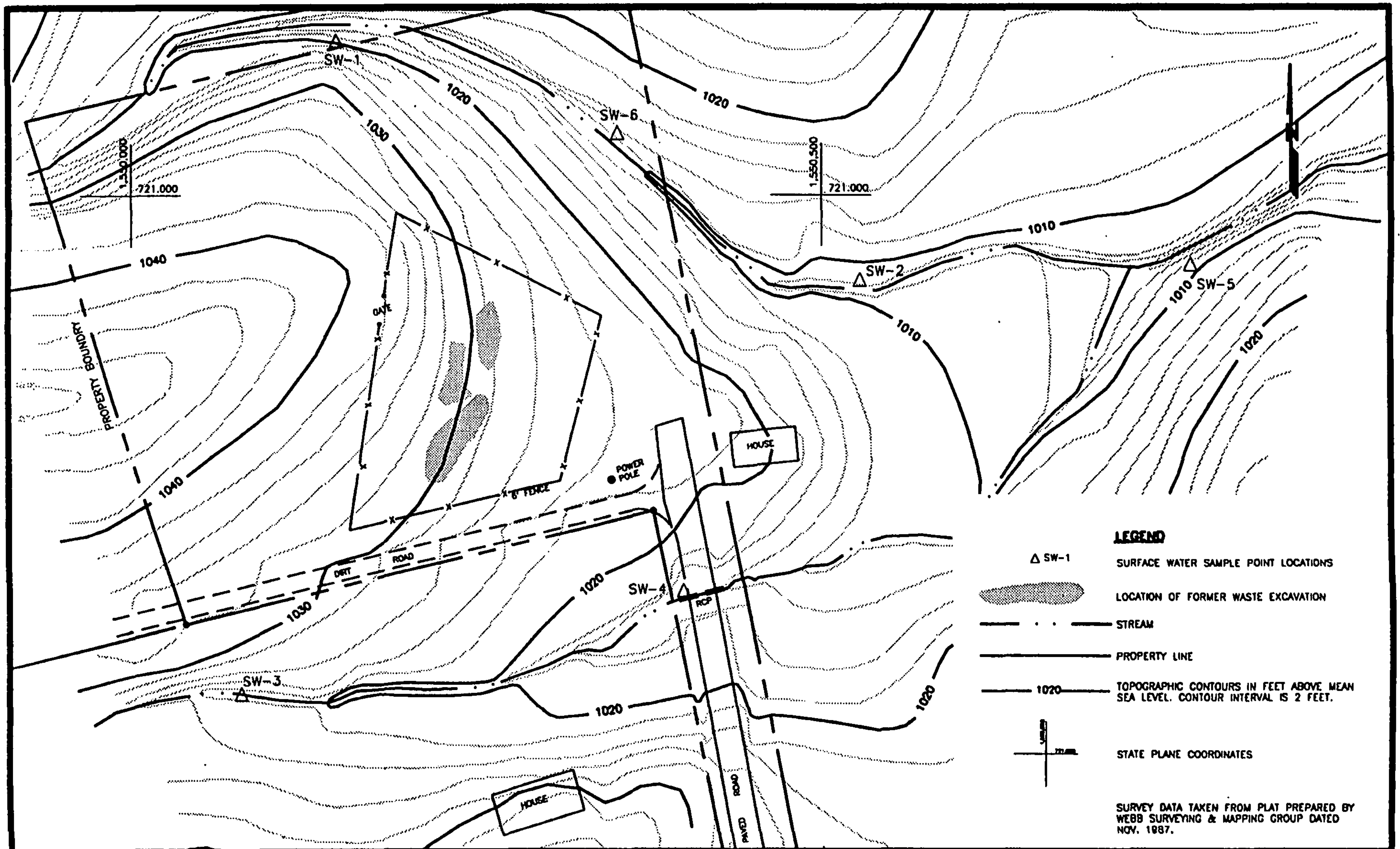

FIGURE 7

SURFACE WATER SAMPLING POINTS

RMT INC. 585.05 0893

0 100 200
SCALE IN FEET

ROCHESTER PROPERTY SITE
GREENVILLE COUNTY, SC

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The Piedmont province is characterized by metamorphic rocks which have been intruded by igneous rocks. These rocks are predominately granites, gneisses, schists, and associated metamorphosed sediments. Rock assemblages may include granite, mica schist, granite gneiss, gneiss-schist complexes, mica-granite gneiss, and diabase dikes. Rock composition ranges from felsic (predominately acid silicates) to mafic (predominately basic silicates). The top of bedrock surface, at the Site, was encountered, at depths ranging from 50.2 to 69.5 feet below land surface. No bedrock outcrops were observed on the Site property or in the channel ways of the north and south streams, however, from examinations of saprolite soil samples, the bedrock beneath the Site is probably a gneiss of granitic origin.

The soils encountered at the Site are formed by the in-place weathering of the underlying bedrock. The exception is the fill material encountered in the former waste disposal trenches. Two (2) categories of undisturbed soil, residual soil, and saprolite, are present on-site, mantling the bedrock. Residual soils are the product of a high degree of weathering and thoroughly decomposed bedrock. Saprolite is weathered decomposed in-place rock which is characterized by its retention of the original fabric or structure of the parent bedrock.

The residual soil thickness encountered in borings ranged from 2.5 to 10.5 feet. These materials were classified as silts, clayey silts, or silty clays. The observed thickness of the underlying saprolite ranged from forty-five (45) to sixty (60) feet. These saprolitic materials were classified as silts except near bedrock contacts where silty sands were encountered. The saprolite present at the Site is typically highly micaceous due to the nature of the underlying rock from which the saprolite developed. Sample natural moisture content ranged from 14.1 to 53.5 percent.

5.2.2 Hydrogeology

Information on the hydrogeology of the Site was obtained from the thirteen (13) monitoring wells installed during the RI. Groundwater at the Site is first encountered in the unconsolidated soil zones overlying bedrock. The water table was encountered at depths ranging from approximately 5.5 feet below surface grade to approximately twenty-three (23) feet below surface grade. The direction of groundwater flow within the saprolite aquifer is to the east-northeast towards the north stream segment where it likely discharges. Water level measurements collected from top of rock wells show that these wells are screened in an unconfined aquifer and that the deeper portion of this water table aquifer also flows toward the northeast. The horizontal hydraulic gradient is approximately 0.028 feet per foot. Aquifer tests show the horizontal hydraulic conductivity (k) of the surficial aquifer is in the 10^{-4} cm/sec range. The range of test values was from 2.8 x 10^{-3} cm/sec (or 7.8 feet/day) to 4.7 x 10^{-5} cm/sec (or 0.1 feet/day). The geometric mean of hydraulic conductivity values of water table wells was 5.9 x 10^{-4} cm/sec (or 1.7 feet/day). The geometric mean of hydraulic conductivity values of top of bedrock wells was 1.4 x 10^{-4} cm/sec (or 0.4 feet/day). The geometric mean of hydraulic conductivity values of all Site wells was 3.4 x 10^{-4} cm/sec (or 0.9 feet/day).

Vertical hydraulic conductivity results for representative aquifer soil samples, as determined from laboratory falling head tests on Shelby tube samples, range from 4.5 x 10^{-4} cm/sec, to 1.7 x 10^{-6} cm/sec. The geometric mean of laboratory determined vertical permeability value of representative aquifer samples was 8.2 x 10^{-5} cm/sec (or 0.2 feet/day). There is apparently little variation in this aquifer's permeability in the vertical (0.9 feet/day) and horizontal (0.2 feet/day) directions.

The surficial aquifer's estimated average horizontal velocity is 0.10 feet per day or approximately thirty-nine (39) feet per year (assuming an effective porosity of 0.25 percent). More conservatively, if the aquifer's groundwater flow is calculated using 0.42 percent (the average of all silts) as an estimate of porosity, the horizontal velocity is 0.06 feet per day or approximately twenty (23) feet per year. This range of values is consistent with the range of velocities expected in silty saprolitic aquifers.

5.3 Nature and Extent of Contamination

Environmental contamination at the Site can be summarized as follows:

Groundwater Contamination. Seven (7) monitoring wells were installed during the first phase of field work and were sampled twice and analyzed for all TCL/TAL parameters. Six (6) additional wells were installed during the second phase of field work. All thirteen (13) wells were then sampled and analyzed for all TCL/TAL parameters except pesticides. Three (3) contaminants of concern (COCs), trichloroethene (TCE), bis(2-ethylhexyl) phthalate, and manganese, were detected in the groundwater in the saprolite aquifer.

Levels of the TCE ranged from the detection limit (normally 0.010 mg/l), to 0.180 mg/l. TCE concentrations exceeded the Maximum Contaminant Level (MCL) for this contaminant in three (3) of the thirteen (13) wells.

Bis(2-ethylhexyl)phthalate was detected in two (2) wells during the first sampling event; 0.033 mg/l (though the duplicate was 0.013 mg/l) in one well, and 0.013 mg/l in the other well.

During the second sampling event, bis(2-ethylhexyl)phthalate was detected in only one of these wells at 0.009 mg/l. It was not detected in any wells during the third sampling event, and was detected in the blanks for all the sampling events. The levels detected in the blanks for the first sampling round was .0005 mg/l in the method blanks, up to .008 mg/l in the field blanks, and .033 mg/l in the rinsate blanks. Bis(2-ethylhexyl)phthalate was found at .0004 mg/l in the method blank during the second round of sampling, but was not detected in the field or rinsate blanks. The MCL for bis(2-ethylhexyl)phthalate is 0.006 mg/l.

Manganese levels ranged from the detection limit to 1.39 mg/l, and exceeded the risk-based criterion (.180 mg/l), derived in the Baseline Risk Assessment, in five (5) of the thirteen (13) wells.

Surface Water Contamination. Samples from the unnamed creek, northeast of the Site, showed levels of TCE at 0.016 mg/l at one location and 0.005 mg/l at a second location. Extremely low levels of seven (7) other volatile organic compounds (VOCs), below 0.005 mg/l, were detected. The TCE value is below the Ambient Water Quality Criteria of 21.9 mg/l. Inorganic parameters that were detected were within background ranges.

Soil and Sediment Contamination. Insignificant levels of various substances were detected in the soil and sediment samples. The levels detected did not exceed background levels for the inorganics and were primarily below 0.5 mg/l for the organics.

6.0 SUMMARY OF SITE RISKS

A Baseline Risk Assessment was conducted to evaluate the risks present at the Site to human health and the environment, under present day conditions and under assumed future use conditions.

The purpose of a Baseline Risk Assessment is to provide a basis for taking action and to identify the contaminants and the exposure pathways that need to be addressed by the remedial action. It serves as an indication of the risks posed by the Site if no action were to be taken.

This section of the ROD contains a brief summary of the results of the Baseline Risk Assessment conducted for the Site. Currently, there is no one living on the Site, and only a few persons residing close to the Site. There are potable water supply wells within one-half mile of the Site, however, there is also municipal water available. Future land use will likely remain residential, with the potential for future resident use of groundwater as a potable water source.

Carcinogenic risk and noncarcinogenic Hazard Index (HI) ratios were calculated for both the current land use scenario, with residents near the Site, and the anticipated future land use scenario, which is residential use. The Baseline Risk Assessment determined that the total cancer risk (using Reasonable Maximum Exposure) for the **current** residential scenario is less than 1×10^{-6}. Therefore, the Site does not pose an unacceptable cancer risk under the current exposure scenario. The total Hazard Index for the **current** resident is 0.038. This hazard index is well below any level of concern for noncarcinogens (1.0) and indicates the Site does not pose an unacceptable non-carcinogenic risk under the current exposure scenario evaluated in the Baseline Risk Assessment. Therefore, there is no unacceptable **current** risk at the Rochester Property Site.

The Baseline Risk Assessment also determined that the total cancer risk for the **future** Site residential scenario was 6.8×10^{-5}. This risk level is within the EPA acceptable risk range (1×10^{-4} to 1×10^{-6}). However, EPA may decide that a baseline risk level less than 10^{-4} (i.e., a risk between 10^{-4} and 10^{-6}) is unacceptable due to site-specific conditions and that remedial action is warranted. For the Site, EPA believes that a Remedial Action is warranted, since the future land use will probably be residential, and MCLs were exceeded for the organic contaminants. The Hazard Index for the **future** Site residential scenario was 8.9 for an adult; this level exceeds the acceptable hazard index of 1.0. The non-carcinogenic risk is attributable to the ingestion of the manganese present in the groundwater.

No substantial risk to wildlife or the environment was found to exist under present or future conditions.

The Baseline Risk Assessment concluded that the surface soils, the surface water, and the sediments at the Site are not media of concern. During the FS, it was determined that the subsurface soil was not a media of concern. The Baseline Risk Assessment determined that the groundwater was the only media posing an unacceptable level of risk to human health or the environment. The actual or threatened releases of hazardous substances from this Site, if not addressed by implementing the response action selected in this Record of Decision, may present an imminent and substantial endangerment to public welfare or the environment.

6.1 Contaminants of Concern

Data collected during the RI were evaluated in the Baseline Risk Assessment. Contaminants were not included in the Baseline Risk Assessment evaluation if any of the following criteria applied:

* If an inorganic compound or element, it was not detected at or above twice the background concentration.

* If an inorganic compound or element, it was detected at low concentrations, had very low toxicity, and was judged to be naturally occurring.

* The data included analytical results flagged as "N" (presumptive evidence) or "R" (not usable).

The results of the Baseline Risk Assessment concluded that the only media of concern was the groundwater, and that the contaminants of concern were trichloroethene (TCE), bis(2-ethylhexyl)phthalate, and manganese. Levels of the TCE ranged from nondetect (the detection limit was normally 0.010 mg/l), to 0.180 mg/l. Bis(2-ethylhexyl)phthalate levels ranged from nondetect to 0.033 mg/l. Manganese levels ranged from nondetect to 1.39 mg/l.

For each contaminant of concern, exposure point concentrations were determined in the Baseline Risk Assessment. The upper ninety-five percent (95%) confidence limit of the arithmetic means of all detections was used, unless it exceeded the maximum detected concentration. If this occurred then the maximum detected concentration was used. The exposure point concentrations calculated in the Baseline Risk Assessment were 0.050 mg/l for TCE, 0.033mg/l for bis(2-ethylhexyl)phthalate, and 1.39 mg/l for manganese.

6.2 Exposure Assessment

The Site is located in a residential area that is expected to remain as such, though currently there is no on-site resident. There are potable wells within a half-mile radius of the Site, however municipal water is available. Based on this information, the Baseline Risk Assessment determined that there was only one reasonable exposure pathway, the ingestion of the contaminated groundwater.

The Baseline Risk Assessment also determined that the only population that could potentially be exposed to Site contaminants would be a potential future on-site resident, and only if the resident installed a private well. It was determined that there was no current exposure pathway or current exposed population.

For exposure to the contaminants by a resident, it was assumed that the resident would ingest two (2) liters per day of groundwater for 350 days a year for a thirty (30) year period. It was assumed that a child would be exposed for the same time period, but would only consume 1 liter per day of water.

6.3 Toxicity Assessment of Contaminants

The purpose of the toxicity assessment is to assign toxicity values (criteria) to each chemical evaluated in the Baseline Risk Assessment. The toxicity values are used in combination with the estimated doses to which a human could be exposed (as discussed in the Risk Characterization subsection of the Baseline Risk Assessment) to evaluate the potential human health risks associated with each contaminant. Human health criteria developed by EPA (cancer slope factors and non-cancer reference doses) were preferentially obtained from the Integrated Risk Information System (IRIS, 1993) or the 1992 Health Effects Assessment Summary Tables (HEAST; EPA, 1992). In some cases the Environmental Criteria Assessment Office (ECAO, 1992) was contacted to obtain criteria for chemicals which were not listed in IRIS or HEAST.

Slope factors (SF) have been developed by EPA for estimating excess lifetime cancer risks associated with exposure to potentially carcinogenic contaminants of concern. SFs, which are expressed as risk per milligram per kilogram of dose, 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 SF. Use of this approach makes underestimation of the actual cancer risk highly unlikely. Slope factors are derived from the results of human epidemiological studies or chromic animal bioassay data to which mathematical extrapolation from high to low dose, and from animal to human dose, has been applied, and statistics to account for uncertainty have been applied (e.g. to account for the use of animal data to predict effects on humans).

Reference doses (RfDs) have been developed by EPA for indicating the potential for adverse health effects from exposure to the chemicals of concern exhibiting noncarcinogenic effects. RfDs, which are expressed in units of mg/kg-day, are estimates of daily exposure levels for humans, including sensitive subpopulations, that are likely to be without risk of adverse effect. Estimated intakes of contaminants of concern from environmental media (e.g. the amount of a chemicals of concern ingested from contaminated drinking water) can be compared to the RfD. RfDs are derived from human epidemiological studies to which uncertainty factors have been applied (e.g., to account for the use of animal data to predict effects on humans).

Carcinogenic contaminants are classified according to EPA's weight-of-evidence system. This classification scheme is summarized below:

Group A: Known human carcinogen.

Group B1: Probable human carcinogen, based on limited human epidemiological evidence.

Group B2: Probable human carcinogen, based on inadequate human epidemiological evidence but sufficient evidence of carcinogenicity in animals.

Group C: Possible human carcinogen, limited evidence of carcinogenicity in animals.

Group D: Not classifiable due to insufficient data.

Group E: Not a human carcinogen, based on adequate animal studies and/or human epidemiological evidence.

Both TCE and bis(2-ethylhexyl)phthalate are classified as B2 carcinogens. The slope factor used for TCE was 1.10E-02 (the reference used was ECAO, 1992) and the slope factor used for bis(2-ethylhexyl)phthalate was 1.40E-02 (IRIS, 1993). Manganese is a noncarcinogen that potentially could affect the central nervous system. The reference dose used for manganese was 5.00E-03 (IRIS, 1993).

6.4 Risk Characterization

The final step of the Baseline Risk Assessment, the generation of numerical estimates of risk, was accomplished by integrating the exposure and toxicity information.

For a carcinogen, risks are estimated as the incremental probability of an individual developing cancer over a life-time as a result of exposure to the carcinogen. Excess life-time cancer risk is calculated from the following equation:

$$\text{Risk} = \text{CDI} \times \text{SF}$$

where:

Risk = a unitless probability (e.g. 2×10^{-5}) of an individual developing cancer,

CDI = chronic daily intake averaged over seventy (70) years (mg/kg-day), and

SF = slope-factor, expressed as $(mg/kg\text{-}day)^{-1}$

These risks are probabilities that are generally expressed in scientific notation (e.g. 1×10^{-6}). An excess lifetime cancer risk of 1×10^{-6} indicates that, as a reasonable maximum estimate, an individual has a 1 in 1,000,000 chance of developing cancer as a result of site-related exposure to a carcinogen over a seventy (70) year lifetime under the specific exposure conditions at a Site.

The potential for noncarcinogenic effects is evaluated by comparing an exposure level over a specified time period (e.g., life-time) with a reference dose derived for a similar exposure period. The ratio of exposure to toxicity is called a hazard quotient (HQ). An HQ less than 1 indicates that a receptor's dose of a single contaminant is less than the RfD, and that the toxic noncarcinogenic effects from that chemical are unlikely. By adding the HQs for all chemical(s) of concern that affect the same target organ (e.g. liver) within a medium or across all media to which a given population may reasonably be exposed, the Hazard Index (HI) is generated. An HI less than 1 indicates that, based on the sum of all HQs from different contaminants and exposure routes, toxic noncarcinogenic effects from all contaminants are unlikely.

The HQ is calculated as follows:

Non-cancer HQ = CDI/RfD

where:

CDI = Chronic Daily Intake

RfD = reference dose; and

CDI and RfD are expressed in the same units and represent the same period (i.e., chronic, subchronic, or short-term).

It was determined in the Baseline Risk Assessment that there is no current unacceptable carcinogen or noncarcinogen risk at the Site.

Under the future use scenario, the lifetime carcinogenic risk is estimated to be 6.8 x 10^{-5}. The estimated lifetime carcinogenic risk is due to the potential ingestion of organic contaminants in the groundwater, primarily TCE, 1.3 x 10^{-5}, as well as, bis(2-ethylhexyl)phthalate, 6.9 x 10^{-6}. Though not contaminants of concern, (all were detected below 0.004 mg/l), the following chemicals contributed to the derived carcinogenic risk number: benzene (3.45 x 10^{-6}), chloroform (6.44 x 10^{-6}), bromodichloromethane (3.69 x 10^{-6}), and beryllium (3.45 x 10^{-5}).

Under the future use scenario, the lifetime noncarcinogenic risk, is estimated to be HI = 8.9. The risk is due to the potential ingestion of inorganic contaminants in the groundwater, primarily manganese (HQ = 7.74), as well as TCE (HQ = 0.454). Also included in the derived number, though not a COC, is Butylbenzlphthalate, HQ = 0.235.

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

7.0 DESCRIPTION OF GROUNDWATER REMEDIAL ALTERNATIVES

The FS considered a wide variety of general response actions and technologies for remediating groundwater. No other media at the Site require remedial action. Table 1 summarizes these response actions and technologies, and provides the rationale for why each was retained or rejected for further consideration in the development of remedial alternatives.

Based on the FS, Baseline Risk Assessment, and Applicable or Relevant and Appropriate Requirements (ARARs), the remedial action objectives (RAOs) listed below were established for the Site. Alternatives were developed with the goal of attaining these objectives:

- Reduce to acceptable levels the excess risk to humans and environmental receptors associated with the media and contaminants of concern at the Site. This will be accomplished by reduction in the concentrations of contaminants that result in excess risk to human health and the environment.

- Reduce the potential to ingest groundwater from the Site containing:

TABLE 1

SCREENING OF REMEDIAL TECHNOLOGIES
ROCHESTER FEASIBILITY STUDY

GENERAL RESPONSE ACTIONS	REMEDIAL TECHNOLOGY	PROCESS OPTIONS	EFFECTIVENESS	IMPLEMENTABILITY	RELATIVE COST
MEDIUM: GROUND WATER					
No Action	Monitoring	Sampling	Useful means of documenting characteristics of ground water, but does not alter ground water contamination.	Technically implementable.	Low capital, moderate O&M
Institutional Action	Access Restrictions	Deed Restrictions	Dependent upon continued implementation in the future. Does not affect ground water contamination.	Requires legal assistance for development of specific components and legal authority for ensurance of implementation.	Low capital and O&M
		Water Treatment	Effective means of preventing exposure to ground water.	Technically implementable. Not necessary due to lack of affected private wells.	Moderate capital, moderate O&M
	Alternate Water Supply	Municipal Water Supply	Effective means of preventing exposure to ground water.	Technically implementable. Not necessary due to lack of affected private wells. Requires approval by local utility authority.	Moderate to high capital, low O&M
Containment	Vertical Barriers	Slurry Walls	Effective in containing ground water flow.	Depth to bedrock is too great to be implemented at site.	Moderate to high
		Sheet Piles	Effective in containing ground water flow.	Depth to bedrock is too great to be implemented at site.	Moderate to high
		Injected Screens	Effective in containing ground water flow.	Depth to bedrock is too great to be implemented at site.	Moderate to high
		Grout Curtain	Effective in containing ground water flow.	Depth to bedrock is too great to be implemented at site.	Moderate to high
Removal	Extraction	Extraction Wells	Effectiveness is dependent on aquifer characteristics.	Implementable and typically acceptable to regulatory agencies.	Moderate capital, low O&M

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Screened = Process options will not be considered further.

TABLE 1 (Continued)

SCREENING OF REMEDIAL TECHNOLOGIES
ROCHESTER FEASIBILITY STUDY

GENERAL RESPONSE ACTIONS	REMEDIAL TECHNOLOGY	PROCESS OPTIONS	EFFECTIVENESS	IMPLEMENTABILITY	RELATIVE COST
Removal (Continued)	Extraction (Continued)	Collection Trench	Effectiveness is dependent on aquifer characteristics.	Depth to bedrock is too great to be implemented at site.	Moderate to low capital, low O&M
Treatment	Biological Treatment	Batch Biodegradation	Potentially effective for removal of organics. Bench testing required to determine effectiveness.	Not technically implementable due to low concentration of organic contaminants.	Moderate to high capital and O&M
		In-Situ Biodegradation	Potentially effective for removal of organics. Increased oxygen may reduce dissolved manganese.	Technically implementable as a component of alternative	Moderate capital and O&M
	Physical Chemical	Air Stripping	Effective for treatment of VOCs.	Can be implemented in conjunction with other technologies.	Low capital, moderate O&M
		In-Situ Air Sparging	Effective for treatment of organic compounds and manganese. Will serve as oxygen supply to enhance biological degradation.	Technically implementable	Low capital, moderate O&M
		Carbon Adsorption	Effective on most dissolved organics	Can be implemented in conjunction with other technologies.	High capital, moderate to high O&M.
		Chemical Oxidation	Effective for degradation of organic wastes. Will aid precipitation of manganese.	Presence of manganese would require pretreatment to prevent fouling of UV lamps.	Moderate to high capital and O&M. Not cost effective.
		Chemical Precipitation through aeration	Effective for removal of metals, including manganese.	Can be implemented in conjunction with other technologies.	High capital and moderate to high O&M.

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Screened = Process options will not be considered further.

TABLE 1 (Continued)

SCREENING OF REMEDIAL TECHNOLOGIES
ROCHESTER FEASIBILITY STUDY

GENERAL RESPONSE ACTIONS	REMEDIAL TECHNOLOGY	PROCESS OPTIONS	EFFECTIVENESS	IMPLEMENTABILITY	RELATIVE COST
Treatment (Continued)	Physical Chemical (Continued)	Filtration	Effective for removal of precipitated metals, including manganese.	Can be implemented in conjunction with other technologies.	Moderate to high capital and O&M.
		Greensand Filter	Effective for removal of iron and manganese.	Can be implemented in conjunction with other technologies.	Moderate to high capital and O&M. Not cost effective for small mass loading of manganese expected.
		Ion Exchange	Effective for removal of metals, including manganese.	Can be implemented in conjunction with other technologies.	Moderate to high capital and O&M. Not cost effective for small mass loading of manganese expected.
		Reverse Osmosis	Can effectively concentrate inorganic contaminants of concern. TCE and BEHP could cause loading problems.	Can be implemented in conjunction with other technologies.	Moderate to high capital and O&M. Not cost effective for small mass loading of manganese expected.

Screened = Process options will not be considered further.

TABLE 1 (Continued)

SCREENING OF REMEDIAL TECHNOLOGIES
ROCHESTER FEASIBILITY STUDY

GENERAL RESPONSE ACTIONS	REMEDIAL TECHNOLOGY	PROCESS OPTIONS	EFFECTIVENESS	IMPLEMENTABILITY	RELATIVE COST
Disposal	On-Site Disposal	Local Stream	Effective and reliable discharge method.	May requires NPDES discharge permit (if off-site).	Low capital, very low O&M.
		Infiltration	Rate of infiltration limited in soils with low hydraulic conductivities.	Technically implementable.	Moderate capital, low to very low O&M.
	Off-Site Disposal	POTW	Effective and reliable discharge method.	Sewer not locally available. Waste must be hauled to POTW.	Low capital, high O&M.

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Screened = Process options will not be considered further.

- Carcinogen concentrations above Federal or State standards, or in the absence of standards, above levels that would exceed an acceptable cancer risk range of 10^{-4} to 10^{-6} (unless the risk manager decides that a risk level less than 10^{-4} (i.e., a risk between 10^{-4} and 10^{-6}) is unacceptable due to site-specific conditions);

- Noncarcinogen concentrations above Federal or State standards, or in the absence of standards, above levels that would exceed an acceptable Hazard Index (HI) of 1.0.

Technologies considered potentially applicable to groundwater contamination (Table 1, Section 7.0 above) were further evaluated on effectiveness and implementability. Listed below are those alternatives which passed this final screening, and are proposed for groundwater remediation.

The remedial alternatives are listed below. The last groundwater alternative is a set ("A" and "B"), Alternative 4A and 4B differ only in which option is used for discharging treated groundwater.

Alternative 1: No Action

Alternative 2: Institutional Controls and Access Restrictions

Alternative 3: In-Situ Air Sparging

Alternative 4A: Groundwater Recovery with Air Stripping, Filtration, and Carbon Adsorption, with Surface Water Discharge

Alternative 4B: Groundwater Recovery with Air Stripping, Filtration, and Carbon Adsorption, with Discharge to Infiltration Trenches

Each of the five (5) alternatives is discussed below. Alternative 1 will not meet the remediation goals presented in Section 9.1.3 of this ROD. Alternative 2 should meet the remediation goals through natural attenuation. Alternatives 3, 4A, and 4B will meet the remediation goals through treatment.

"O&M costs" refer to the costs of operating and maintaining the treatment described in the alternative, for an assumed period of ten (10) years, and/or monitoring the groundwater for an assumed period of thirty (30) years. All of the five (5) alternatives have anticipated O&M costs. O&M costs were calculated using a five percent (5%) discount rate per year.

The components of Alternative 2, institutional controls and groundwater monitoring, are included for all alternatives except Alternative 1, the "no action" alternative, which would not have the access restrictions and/or deed restrictions.

Certain ARARs (see Section 9) are applicable, or relevant and appropriate, to each of the groundwater remedial alternatives. Site groundwater is classified by South Carolina as Class GB (SC Water Classifications and Standards, Regulation 61-68), and by EPA as Class IIA (Guidelines for Ground Water Use and Classification, EPA Ground Water Protection Strategy, US EPA 1986).

Alternative 1 would not meet the relevant and appropriate ARARs, identified in Section 9, concerning groundwater as a potable water source. These are the National Primary and Secondary Drinking Water Standards, promulgated in 40 C.F.R. Parts 141-143, and the State of South Carolina Primary Drinking Water Regulations, SC Reg. 61-58. These ARARs would not be met because Site groundwater violates MCLs specified in these regulations.

In addition, the CERCLA preference for treatment to reduce the toxicity, mobility, or volume of the contaminants, wherever possible, would not be satisfied by Alternatives 1 or 2.

Alternative 2 would not meet the CERCLA preference for treatment. Assuming successful implementation, however, it would meet the relevant and appropriate drinking water standards specified above, albeit at a very slow rate. The remaining alternatives, 3, 4A, and 4B, would achieve these standards, and would also meet the CERCLA preference for treatment.

Alternatives 3, 4A, and 4B, would be subject to the following applicable or relevant and appropriate requirements (ARARs) or criteria to be considered (TBCs): National Ambient Air Quality Standards (NAAQS), 40 C.F.R. Part 50; National Emissions Standards for Hazardous Air Pollutants (NESHAPs), 40 C.F.R. Part 61, TBC; South Carolina Ambient Air Quality Standards (SC Reg R61-62); and South Carolina Well Standards and Regulations, (R61-71).

Other ARARs for Alternatives 4A and 4B include the Clean Water Act Pretreatment Standards (40 C.F.R. Parts 122, 125, 129, 133, and 136), and depending on the disposal option, South Carolina NPDES Discharge Limitations for treated water (R61-9) if discharge is to a stream and South Carolina No Discharge

Permit Requirements for treated waters (R61) for discharge to infiltration trenches.

The treatment system related to Alternatives 4A and 4B, may produce a sludge, and possibly spent carbon, that may be subject to the identification (40 C.F.R. Part 261, SCHWMR 61-79.261), transportation (40 C.F.R. Part 262, SCHWMR 61-79.262), manifestation (40 C.F.R. Part 263, SCHWMR 61-79.263), and land disposal restriction (40 C.F.R. Part 268, SCHWMR 61-79.268) requirements of the Resource Conservation and Recovery Act (RCRA) 42 U.S.C. §§ 6901 et seq., as amended, if the resulting sludge is determined to be a RCRA hazardous waste.

7.1 Alternative 1: No Action

Under the no action alternative, the Site is left "as is" and no funds are expended for the cleanup or control of the contaminated groundwater. Monitoring of contaminants of concern and their degradation contaminants, not including their innocuous compounds, would be included as part of this alternative. Monitoring of the contaminants would involve the collection and analysis at regular intervals, of groundwater samples from existing Site monitoring wells, as well as surface water samples from previous creek locations, to allow tracking of contaminant concentrations and to monitor the speed, direction, and extent of contaminant migration. The number and location of well and surface water samples will be determined during remedial design. In addition, the need for any additional monitoring wells, which may be sampled for additional contaminants, will be determined during the remedial design/remedial action phases. These wells may be added if it is determined later that groundwater contamination has left the Site property or if further characterization of the Site is needed. Future risks to persons living on and near the Site will remain. Because hazardous contaminants would remain on-site, a Five (5) Year Review would be required under CERCLA.

Capital Cost:	$ 27,000.00
Annual O&M Cost:	116,800.00
Total Present Worth Cost:	$ 1,925,000.00

7.2 Alternative 2: Institutional Controls and Access Restrictions

Under this alternative, institutional controls would be implemented to restrict the withdrawal and use of contaminated groundwater on-site. A second requirement of this alternative will be the monitoring of contaminants, as described in Alternative 1.

The institutional controls would apply to the Rochester Property Site, and include deed restrictions and well permit restrictions. Deed restrictions would prevent future use of the contaminated groundwater for purposes such as potable water supply or irrigation. These restrictions would be written into the property deed to inform future property owners of the possibility of contaminated groundwater beneath the property. Permit restrictions, issued by the State of South Carolina, would restrict all well drilling permits issued for new wells on the Site property that may draw water from the contaminated groundwater.

Capital Cost:	$ 40,000.00
Annual O&M Cost:	116,800.00
Total Present Worth Cost:	$ 1,938,000.00

7.3 Alternative 3: In-Situ Air Sparging

In-situ air sparging would be accomplished by pumping air through gravel-filled trenches, and if required by EPA, wells, in the saturated zone, creating a steady flow of gas, or bubbles, that rise through the aquifer. Air sparging creates a crude form of an air stripper in the subsurface. The rising bubbles contact the dissolved contaminants and allow the TCE to volatilize. In addition to stripping the TCE, the addition of oxygen to the groundwater would promote biodegradation of bis(2-ethylhexyl) phthalate and oxidation of soluble manganese to its more insoluble form. The insoluble manganese would then precipitate and be re-deposited in the soils, where it is already naturally occurring.

At the Site, all TCE contamination has been found in the shallow, water table wells. Therefore, horizontal air sparging trenches would be installed at a depth below the water table. In addition, air sparging wells may also be installed, if it is determined in the remedial design that the air sparging trenches will not reduce the inorganic contaminant to below the performance standard. Following excavation of the trenches, perforated pipe would be laid horizontally in the trenches, and the trenches would be backfilled with gravel. The air would be sparged below the water table, thus reducing the contaminants of concern to below the performance standards. The number and location of trenches required to remediate groundwater will be determined during remedial design. It is possible that only one trench will be required. Also, the need for supplemental air sparging wells to remediate the inorganic contaminant, including the number and locations, would be determined during remedial design.

The vapors would travel through the gravel and through the topsoil layer (if present) to the land surface. Vent pipes or other venting system(s) would be placed through the subsurface to facilitate vapor discharge. The estimated amount of TCE that would volatilize to the atmosphere is extremely low, about 1.5 pounds per year.

In addition to the treatment processes described above, this alternative would include implementation of all of the groundwater monitoring and institutional controls described in Alternatives 1 and 2, thereby ensuring the effectiveness of the alternative and limiting future use of groundwater until the performance standards are continuously achieved.

Capital Cost:	$ 420,000.00
Annual O&M Cost:	156,500.00
Total Present Worth Cost:	$ 2,681,000.00

7.4 Alternatives 4A and 4B: Groundwater Extraction and Treatment

Alternatives 4A and 4B involve placing extraction wells throughout the contaminated groundwater to actively remediate the aquifer. This would also prevent further migration of the contaminated groundwater. It would involve installing extraction wells, removing water from the aquifer, and treating extracted groundwater. The groundwater would be treated to remove inorganic and organic contaminants. In addition to groundwater treatment, institutional controls, as described in Alternative 2, would be implemented to limit current and future use of groundwater until the performance standards are continuously achieved. Also, contaminant monitoring would be performed to monitor the effectiveness of the alternative in achieving the remediation goals, as described in Alternative 1.

The groundwater would be sequentially treated by air stripping to remove the TCE and oxidize the manganese, filtered to remove insoluble manganese, and filtered with activated carbon to remove the bis(2-ethylhexyl)phthalate. If, during future sampling events, it is determined that bis(2-ethylhexyl)phthalate is not present in the groundwater, the carbon filtration portion of the treatment system would be removed.

An air stripping unit works by fostering a controlled evaporation or "stripping" process. The unit has a "tower" or vertical cylinder, filled with a packing media which provides a large surface area for contact between the water and air. The water to be treated is pumped to the top of the tower and cascades downward through the packing media. Air is blown upwards through the bottom of the tower and exits at the top. The high volume of air passing over the thin film of water on the packing evaporates (strips) the volatile organic contaminants from the water. In the process, contaminants are transferred from water to air. The limited volatile emissions (1.5 pounds per year) from the air stripper would not require any additional emissions control system. After treatment, the groundwater extracted from beneath the Site could be piped to a local stream (Alternative 4A). This disposal option may require obtaining, or at least meeting, the substantive requirements of a National Pollution Discharge Elimination System (NPDES) permit. Maintenance of the discharge permit would, at a minimum, require regular effluent monitoring for TCE, bis(2-ethylhexyl)phthalate, and manganese. Alternatively, the treated groundwater could be introduced into a series of reinfiltration trenches (Alternative 4B). These trenches would each contain a perforated PVC pipe embedded in a gravel layer and would be analogous to a septic tank leach field. The length, depth, width, and number of trenches, would be determined during the Remedial Design phase.

Reinfiltration of the treated groundwater would not require any discharge permit. However, implementation of this alternative would require submittal of a Preliminary Engineering Design Report to the State of South Carolina for approval. In addition, this disposal option would, at a minimum, require regular effluent monitoring for TCE, bis(2-ethylhexyl)phthalate, and manganese.

Preliminary groundwater modeling indicates that three (3) to four (4) extraction wells would be needed to recover the contaminated groundwater at a potential yield of approximately two (2) to three (3) gallons per minute (gpm) per well. Given the relatively slow horizontal movement of Site groundwater, this alternative would take longer to reach the remediation goals than Alternative 3, because of the time necessary for the contaminated groundwater to reach the extraction wells. It is estimated to take three (3) to ten (10) years to reach the remediation goals, but it could take longer.

Alternative 4A:	Capital Cost:	$ 520,000.00
	Annual O&M Cost:	201,300.00
	Total Present Worth Cost:	$ 3,071,000.00

Alternative 4B:	Capital Cost:	$ 567,000.00
	Annual O&M Cost:	197,000.00
	Total Present Worth Cost:	$ 3,084,000.00

8.0 SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES FOR GROUNDWATER

The five (5) alternatives for groundwater remediation were evaluated based upon the nine (9) criteria set forth in 40 C.F.R. § 300.430(e)(9) of the NCP. In the sections which follow, brief summaries of how the alternatives were judged against these nine (9) criteria are presented. In addition, the sections are prefaced by brief descriptions of the criteria.

8.1 Groundwater Remediation Alternatives

For ease of reference, the five (5) groundwater remedial alternatives that EPA considered are listed in Table 2.

8.1.1 Threshold Criteria

Two (2) threshold criteria must be achieved by a remedial alternative before it can be selected.

1. Overall protection of human health and the environment addresses whether the alternative will adequately protect human health and the environment from the risks posed by the Site. Included is an assessment of how and whether the risks will be properly eliminated, reduced, or controlled through treatment, engineering controls, and/or institutional controls.

All of the alternatives, with the exception of Alternative 1, No Action, will provide overall protection of human health and the environment. Alternative 2, Institutional Controls/Natural Attenuation, achieves protection from the contaminants by preventing exposure to affected groundwater by establishing deed restrictions prohibiting future uses of groundwater under the Site, and by allowing natural biodegradation to reduce the concentrations of organic contaminants in the affected groundwater. This alternative should also provide protection from the inorganic contaminants.

Alternative 3, In-Situ Air Sparging, utilizes in-situ sparging technology to reduce contaminant concentrations in the ground water and deed restrictions to prohibit future uses of groundwater during the remedial period.

Alternative 4A, Groundwater Extraction, Treatment, and Discharge to a Local Stream, and Alternative 4B Groundwater Extraction, Treatment, and Discharge to Reinfiltration Trenches, will likewise achieve overall protection through extraction and treatment of groundwater.

TABLE 2

COMPARATIVE ANALYSIS OF ALTERNATIVES
ROCHESTER PROPERTY FEASIBILITY STUDY

	ALTERNATIVE 1 NO ACTION	ALTERNATIVE 2 INSTITUTIONAL CONTROLS	ALTERNATIVE 3 IN-SITU AIR SPARGING	ALTERNATIVE 4A GROUND WATER EXTRACTION, TREATMENT, AND DISCHARGE TO LOCAL STREAM	ALTERNATIVE 4b GROUND WATER EXTRACTION, TREATMENT, AND DISCHARGE TO REINFILTRATION TRENCHES
Description	Assumes no engineered controls to prevent migration or interrupt exposure pathways. The alternative is considered complete at this point.	Establish security fencing and deed restrictions. Allows for natural attenuation.	Install a air sparging trench to enhance volatilization and biodegradation of organics and to increase oxygen level in subsurface to aid in the precipitation of manganese.	Install recovery wells to contain and extract affected ground water. Treat contaminated ground water and discharge under an NPDES permit.	Install recovery wells to contain and extract affected ground water. Treat contaminated ground water and discharge under an No Discharge permit.
Criteria Overall protection of human health and the environment	No change in existing conditions. This alternative is not protective of human health and the environment.	This alternative would minimize exposure to affected ground water and limit exposure pathways. Future exposure concentration available to receptor could be reduced through natural attenuation.	This alternative would minimize exposure to affected ground water and limit exposure pathways from source to receptors. Future exposure concentration available to receptor would be reduced through enhanced volatilization and biodegradation of COCs.	This alternative is overall protective of human health and the environment. This alternative is as protective for organics as Alternative 3, but more protective for inorganics.The short-term risk is slightly elevated due to exposure to contaminants during construction.	This alternative is overall protective of human health and the environment. This alternative is as protective for organics as Alternative 3, but more protective for inorganics.The short-term risk is slightly elevated due to exposure to contaminants during construction.
Compliance with ARARs	Does not comply with ARARs	Will comply with ARARs for organic contaminants in 5-14 years through natural attenuation.	Will comply with ARARs in 4-5 years through volatilization and enhanced biological degradation.	Will meet ARARs through treatment of affected ground water in 3-10 years.	Will meet ARARs through treatment of affected ground water in 3-10 years.
Long-term effectiveness and Permanence	The alternative is considered complete at this time; therefore no long term effectiveness has been achieved. Ground water monitoring will be effective in assessing migration of affected ground water.	Will be effective in reducing organic contaminant concentrations in 5-14 years through natural attenuation.	Will be effective in reducing contaminant concentrations in 4-5 years through volatilization, enhanced biodegradation, and aeration of the subsurface.	Extraction and treatment will reduce affected ground water and be long-term effective. Containment of ground water can be achieved in 1-3 years. Treatment will achieve remediation goals in 3-10 years.	Extraction and treatment will reduce affected ground water and be long-term effective. Containment of ground water can be achieved in 1-3 years. Treatment will achieve remediation goals in 3-10 years.

TABLE 2 (Continued)

COMPARATIVE ANALYSIS OF ALTERNATIVES
ROCHESTER PROPERTY FEASIBILITY STUDY

	ALTERNATIVE 1 NO ACTION	ALTERNATIVE 2 INSTITUTIONAL CONTROLS	ALTERNATIVE 3 IN-SITU AIR SPARGING	ALTERNATIVE 4A GROUND WATER EXTRACTION, TREATMENT, AND DISCHARGE TO LOCAL STREAM	ALTERNATIVE 4b GROUND WATER EXTRACTION, TREATMENT, AND DISCHARGE TO REINFILTRATION TRENCHES
Reduction of toxicity, mobility, or volume through treatment	Will not reduce toxicity, mobility or volume.	Will not reduce toxicity and volume through treatment. However, contaminant concentrations will decrease through natural attenuation in 5-14 years.	Will reduce toxicity and volume through volatilization and enhanced degradation in 4-5 years.	Treatment will reduce toxicity and volume of contaminants. Removal of ground water will reduce mobility of contaminants.	Treatment will reduce toxicity and volume of contaminants. Removal of ground water will reduce mobility of contaminants.
Short-term effectiveness	No effect on the environment or on the affected ground.	Will provide the greatest short-term effectiveness, since no construction activities are involved.	Site disturbances are manageable.	Site disturbances are manageable. Mobility in air environment will be slightly increased.	Site disturbances are manageable. Mobility in air environment will be slightly increased.
Implementability	Readily implementable. Some of the monitoring wells have already been installed.	Equal to Alternative 1.	Readily implementable. Design and installation downtime minimal compared to extraction and discharge alternatives	This alternative is readily implementable using existing, proven technologies. Obtaining a NPDES permit may be difficult.	This alternative is readily implementable using existing, proven technologies. Obtaining a No Discharge permit may be difficult.
Cost	$ 1.9 million	$ 1.9 million	$ 2.7 million	$ 3.1 million	$ 3.1 million

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Future cancer risk through groundwater ingestion will be reduced to less than 1×10^{-6} through natural attenuation of organic contaminants in Alternative 2, through volatilization and enhanced degradation of organic contaminants in Alternative 3, and through extraction and treatment in Alternative 4.

Future noncarcinogenic effects through groundwater ingestion will be reduced to acceptable levels, through oxidation of manganese in Alternative 3, and through extraction and treatment in Alternative 4. Future noncarcinogenic effects through groundwater ingestion should be reduced to acceptable levels in Alternative 2.

2. Compliance with applicable or relevant and appropriate requirements (ARARs) addresses whether an alternative will meet all of the requirements of Federal and State environmental laws and regulations, as well as other laws, and/or justifies a waiver from an ARAR. The specific ARARs which will govern the selected remedy are listed and described in Section 9.0, the Selected Remedy.

The evaluation of the ability of the proposed alternatives to comply with ARARs included a discussion of chemical-specific and action-specific ARARs presented in Section 7. As stated earlier, there are no known location-specific ARARs for the Site. All of the alternatives, with the exception of Alternative 1, No Action, will meet their respective ARARs at the completion of the remedial activities.

8.1.2 Primary Balancing Criteria

Five (5) criteria were used to weigh the strengths and weaknesses of the alternatives, and were used to select one of the five (5) alternatives. Assuming satisfaction of the threshold criteria, these five (5) criteria are EPA's main considerations in selecting an alternative as the remedy.

1. Long term effectiveness and permanence refers to the ability of the alternative to maintain reliable protection of human health and the environment over time, once the remediation goals have been met. Alternative 1, No Action, will not provide long term effectiveness. Alternatives 2, Institutional Controls/ Natural Attenuation, and Alternative 3, In-Situ Air Sparging, achieve permanent reduction in organic contaminants through biological degradation and volatilization, respectively, after which the manganese should be reconverted to an insoluble form. Alternative 3 would increase the oxygen to the subsurface at a much higher rate than Alternative 2, thus attaining remediation levels in a shorter time period.

Alternative 2 is projected to result in groundwater concentrations below remediation goals (MCLs) in five (5) to fourteen (14) years. Alternative 3, In-Situ Air Sparging, is projected to result in groundwater concentrations below remediation goals (MCLs) in four (4) to five (5) years.

Alternative 4, Groundwater Extraction and Treatment, will utilize volatilization, filtration and absorption to remove contaminants from the groundwater, and therefore, be effective in the long-term.

2. Reduction of toxicity, mobility, or volume through treatment addresses the anticipated performance of the treatment technologies that an alternative may employ. The 1986 amendments to CERCLA, the Superfund Amendments and Reauthorization Act (SARA), directs that, when possible, EPA should choose a treatment process that permanently reduces the level of toxicity of Site contaminants, eliminates or reduces their migration away from the Site, and/or reduces their volume on a Site.

Alternative 1, No Action, does not achieve a reduction in the toxicity, mobility, or volume of the contaminants since the alternative is considered complete at this time.

Alternative 2, Institutional Controls/Natural Attenuation, is not a treatment technology and, therefore, does not satisfy the statutory preference for selecting remedial actions that employ treatment technologies that permanently and significantly reduce the toxicity, mobility, or volume of the contaminants. However, the organic concentrations will decrease in five (5) to fourteen (14) years, after which the manganese should be reconverted to an insoluble form.

Alternatives 3, In-Situ Air Sparging, and Alternative 4, Groundwater Extraction and Treatment, use active treatment technologies to reduce the toxicity, mobility, and volume of the contaminated groundwater. Reduction of organic contaminant concentrations in the groundwater can be achieved by Alternative 3 through enhanced biodegradation and in-situ volatilization of the contaminants in an estimated four (4) to five (5) years. This alternative is expected to reduce the concentration of manganese in the groundwater following return of the aquifer to background conditions through active reoxidation and precipitation.

Alternative 4, Groundwater Extraction and Treatment, will likewise achieve a permanent reduction of the concentrations of contaminants in the groundwater through the above ground treatment schemes within an estimated three (3) to ten (10) year operation period. Containment of the contaminated groundwater should be achieved in one (1) to three (3) years.

3. Short-term effectiveness refers to the potential for adverse effects to human health or the environment posed by implementation of the remedy.

Of the alternatives that achieve ARARs, Alternative 2, Institutional Controls, affords the greatest level of short-term protection because it presents the least risk to remedial workers, the community, and the environment. The other alternatives could release minimal volatile emissions during excavation and/or treatment system construction. Standard construction management techniques should address any potential short-term fugitive emissions.

Since there is no current risk at the Site posed by direct contact and/or ingestion of surface soils, the time frame to achieve short-term protectiveness is shorter for those alternatives that do not involve invasive techniques. Field implementation of Alternative 3, In-Situ Air Sparging, is expected to take three (3) months. Field implementation of Alternative 4, Groundwater Extraction and Treatment is expected to take six (6) months.

4. Implementability considers the technical and administrative feasibility of an alternative, including the availability of materials and services necessary for implementation.

Of the alternatives that will comply with ARARs, Alternative 2, Institutional Controls, will be the easiest to implement since it does not involve the construction of a treatment system.

The construction technologies required to implement Alternative 3, In-Situ Air Sparging, are comparable with standard trenching and well installation activities. The air sparging system has additional operational requirements compared to Alternative 2 because of the air supply system.

The construction technologies required to implement Alternative 4, Groundwater Extraction and Treatment, are well established and very reliable. The extraction and treatment systems will have additional operational requirements compared to Alternatives 1, 2, and 3, because of the complexities of a continuous operation of a groundwater extraction system, the operation of a multi-component treatment system, and requisite discharge limits on the resulting treated effluent. The extraction and treatment system is more difficult to operate and maintain than options proposed under Alternative 2 and Alternative 3.

The technical implementability of all the evaluated alternatives is reasonable. Technologies required to implement the alternatives are readily available and proven at full-scale in similar field efforts. Obtaining discharge permits are a prerequisite for the implementation of Alternative 4, if discharge is to the creek.

5. Cost includes both the capital (investment) costs to implement an alternative, plus the long-term O&M expenditures applied over a projected period of operation. The total present worth cost for each of the four alternatives is presented in Table 3, and in Section 7.

8.1.3 Modifying Criteria

State acceptance and community acceptance are two (2) additional criteria that are considered in selecting a remedy, once public comment has been received on the Proposed Plan.

1. State acceptance: The State of South Carolina concurs with this remedy. South Carolina's letter of concurrence is provided in Appendix B to this ROD.

2. Community acceptance was indicated by the verbal comments received at the Rochester Property Site Proposed Plan public meeting, held on June 28, 1993. The public comment period opened on June 14, 1993, and closed on August 13, 1993 (after a 30-day extension). Written comments received concerning the Site, and those comments expressed at the public meeting, are addressed in the Responsiveness Summary attached as Appendix A to this ROD.

9.0 THE SELECTED REMEDY

9.1 Groundwater Remediation

Based upon consideration of the requirements of CERCLA, the NCP, the detailed analysis of the five (5) alternatives and public and state comments, EPA has selected a remedy that addresses groundwater contamination at this Site. At the completion of this remedy, the risk remaining at this Site will be 1×10^{-6}, and HI less than 1, which is considered protective of human health and the environment.

The selected remedy for the Site is:

Alternative 3, In-Situ Air Sparging

Total present worth cost of the selected remedy is:

$ 2,681,000.00.

This remedy consists of in-situ air sparging of contaminated groundwater. The following subsections describe this remedy component in detail, provide the criteria (ARARs and TBC material) which shall apply, and establish the performance standards for implementation.

9.1.1 Description

This remedy component consists of the design, construction and operation of an in-situ air sparging system, and development and implementation of a Site monitoring plan to monitor the system's performance. The groundwater treatment specified below shall be continued until the performance standards listed in Section 9.1.3. are achieved, at a minimum, in all of the monitoring wells that are associated with the Site.

In-situ air sparging will be accomplished by pumping air, through trenches and, possibly wells, in the saturated zone, creating a steady flow of gas, or bubbles, that rise through the aquifer. The rising bubbles contact the dissolved contaminants and allow the TCE to volatilize. In addition to stripping the TCE, the addition of air (containing oxygen) to the groundwater will promote biodegradation of bis(2-ethylhexyl)phthalate and oxidation of soluble manganese to its more insoluble form. The insoluble manganese will then precipitate and be re-deposited in the soils, where it is already naturally occurring. Treatability studies (bench and/or pilot) will be conducted, if determined to be necessary during Remedial Design.

Horizontal air sparging trenches (and possibly wells) would be installed at a depth below the water table. The vertical extent of groundwater contamination will be confirmed and updated during the Remedial Design. Following excavation of the trenches, perforated pipe would be laid horizontally in the trenches, and the trenches would be backfilled with gravel. The air would be sparged below the water table, thus reducing the contaminants of concern to below the performance standards. The number and location of trenches required to remediate groundwater will be determined during remedial design. It is possible that only one trench will be required. Also the need for supplemental air sparging wells to remediate the inorganic contaminant, including the number and locations, will be determined during remedial design.

The vapors would travel through the gravel and through the topsoil layer (if present) to the land surface. Vent pipes or other venting system(s) will be placed through the subsurface to facilitate vapor discharge. The estimated amount of TCE that would volatilize to the atmosphere is extremely low, about 1.5 pounds per year.

In addition to the treatment processes described above, this alternative will include implementation of all of the institutional controls and contaminant monitoring requirements described in Alternatives 1 and 2, thereby monitoring the effectiveness of the alternative and limiting future use of groundwater until clean-up goals are achieved.

The institutional controls would apply to the Rochester Property Site, and include deed restrictions and well permit restrictions. Deed restrictions would prevent future use of the contaminated groundwater for purposes such as potable water supply or irrigation. These restrictions would be written into the property deed to inform future property owners of the possibility of contaminated groundwater beneath the property. Permit restrictions, issued by the State of South Carolina, would restrict all well drilling permits issued for new wells on the Site property that may draw water from the contaminated groundwater. Institutional controls will also include a fence, or other suitable method subject to EPA approval, surrounding the previous disposal trenches and all in-situ air sparging operations, including the trenches, wells, and equipment.

Monitoring of contaminants of concern and their degradation contaminants, not including their innocuous compounds, would be included as part of this alternative. Monitoring of the contaminants would involve the collection and analysis at regular intervals, of groundwater samples from existing Site monitoring wells, as well as surface water samples from previous creek locations, to allow tracking of contaminant concentrations and to monitor the speed, direction, and extent of contaminant migration. The number and location of well and surface water samples will be determined during remedial design. In addition, the need for any additional monitoring wells, which may be sampled for additional contaminants, will be determined during the remedial design/remedial action phases. These wells may be added if it is determined later that groundwater contamination has left the Site property or if further characterization of the Site is needed.

Air monitoring, both on-site and at the periphery, which may involve continuous real-time air monitoring, will be performed, during Remedial Action.

The goal of this remedial action is to restore groundwater to its beneficial use as a drinking water source. Based on the information collected during the RI and on a careful analysis of all remedial alternatives, EPA and the State of South Carolina believe that the selected groundwater remedy will achieve this goal.

If it is determined, on the basis of the preceding criteria and the system performance data, that certain portions of the aquifer cannot be restored to their beneficial use, all or some of the following measures involving long-term management may occur, for an indefinite period of time, as a modification of the existing system:

* engineering controls such as physical barriers as containment measures;

* chemical-specific ARARs will be waived for the cleanup of those portions of the aquifer based on the technical impracticability of achieving further contaminant reduction;

* institutional controls will be provided/maintained to restrict access to those portions of the aquifer that remain above remediation goals;

* continued monitoring of specified wells and surface water locations; and

* periodic re-evaluation of remedial technologies for groundwater restoration.

The decision to invoke any or all of these measures may be made during a review of the remedial action, which will occur minimally at five (5) year intervals in accordance with Section 121(c) of CERCLA, 42 U.S.C. § 9621(c).

<u>9.1.2 Applicable or Relevant and Appropriate Requirements (ARARs)</u>

<u>Applicable Requirements.</u> Groundwater remediation shall comply with all applicable portions of the following Federal and State of South Carolina regulations:

SC Reg. 61-62, South Carolina Air Pollution Control Regulations and Standards, promulgated pursuant to the Pollution Control Act, SC Code of Laws, 1976, as amended. Establishes limits for emissions of hazardous air pollutants and particulate matter, and establishes acceptable ambient air quality standards within South Carolina.

SC Reg. 61-68, South Carolina Water Classifications and Standards, promulgated pursuant to the Pollution Control Act, SC Code of Laws, 1976, as amended. These regulations establish classifications for water use, and set numerical standards for protecting state waters.

SC Reg. 61-71, South Carolina Well Standards and Regulations, promulgated under to the Safe Drinking Water Act, SC Code of Laws, 1976, as amended. Standards for well construction, location and abandonment are established for remedial work at environmental or hazardous waste sites.

Relevant and Appropriate Requirements. The following regulations are relevant to groundwater remediation at the Site.

40 C.F.R. Parts 141-143, National Primary and Secondary Drinking Water Standards, promulgated under the authority of the Clean Water Act. These regulations establish acceptable maximum levels of numerous substances in public drinking water supplies, whether publicly owned or from other sources such as groundwater. Maximum Contaminant Levels (MCLs) are specifically identified in 40 C.F.R. § 300.430(a)(1)(ii)(F) of the NCP as remedial action objectives for ground waters that are current or potential sources of drinking water supply. Therefore, MCLs are relevant and appropriate as criteria for groundwater remediation at this Site.

40 C.F.R. Part 61, promulgated under the authority of the Clean Air Act. These are the National Emissions Standards for Hazardous Air Pollutants (NESHAPs). Standards for emissions to the atmosphere fall under these regulations.

SC Reg. 61-58, South Carolina Primary Drinking Water Regulations, promulgated pursuant to the Safe Drinking Water Act, SC Code of Laws, 1976, as amended. These regulations are similar to the federal regulations described above, and are relevant and appropriate as remediation criteria for the same reasons set forth above.

Criteria "To Be Considered" (TBC) and Other Guidance. As noted above in Section 9.1.2, TBC criteria were utilized and/or established in the Baseline Risk Assessment and in the FS. Groundwater cleanup standards were established based on these documents and both are thus considered TBC.

In the Baseline Risk Assessment, TBC material used included information concerning toxicity of, and exposure to, Site contaminants. Sources of such data included the Integrated Risk

Information System (IRIS), Health Effects Assessment Summary Tables (HEAST), and EPA guidance as specified in the Baseline Risk Assessment.

In the FS, groundwater concentrations protective of human health and the environment were calculated based on the Site-specific risk calculations from the Baseline Risk Assessment. Certain of these levels were established as remediation goals in cases where there is no MCL for a particular contaminant. Specific contaminants for which health-based goals were established were for manganese. The groundwater remediation goals are established as performance standards in the Section 9.1.3.

Other TBC material include the following:

Guidelines for Groundwater Use and Classification, EPA Groundwater Protection Strategy, U.S. EPA, 1986. This document outlines EPA's policy of considering a site's groundwater classification in evaluating possible remedial response actions.

As described under Section 1.4, the groundwater at the Site is classified by EPA as Class IIB and by South Carolina as Class GB groundwater, indicating its potential as a source of drinking water.

40 C.F.R. Part 50, National Ambient Air Quality Standards (NAAQS), promulgated under the authority of the Clean Air Act. This regulation includes the National Ambient Air Quality Standards (NAAQS), and establishes a national baseline of ambient air quality levels. The state regulation which implements this regulation, South Carolina Reg. 62-61, is applicable to the groundwater portion of the remedy.

Other requirements. As described above in Section 9.1.2, remedial design often includes the discovery and use of unforeseeable but necessary requirements. Therefore, during design of the groundwater component of the selected remedy, EPA may, through a formal ROD modification process such as an Explanation of Significant Differences or a ROD Amendment, elect to designate further ARARs which apply, or are relevant and appropriate, to groundwater remediation at this Site.

9.1.3 Performance Standards

The standards outlined in this section comprise the performance standards defining successful implementation of this portion of the remedy. The groundwater remediation goals in Table 3 below shall be the performance standards for groundwater treatment.

TABLE 3
REMEDIATION LEVELS (Rls) FOR GROUNDWATER AT THE SITE

	CHEMICAL OCCURRENCE		CONCENTRATION RANGE (ppm)	Rls (ppm)	MCL (ppm)	RISK/HI
	NUMBER OF DETECTIONS	NUMBER OF SAMPLES				
Manganese	25	32	ND - 1.390	0.180	0.05[a]	<1.0
Trichloroethene	9	32	ND - 0.180	0.005	0.005	10^{-6}
Bis(2-ethylhexyl) phthalate	3	32	ND - 0.033	0.006	0.006	10^{-6}

KEY
a = Secondary MCL (not health based)
ND = Non Detect

9.2 Monitor Site Groundwater and Surface Water

Groundwater and surface water samples shall be collected and analyzed on a regular schedule to be determined by EPA in the Remedial Design phases. Analytical parameters for groundwater and surface water samples will include the known Site contaminants of concern (COCs), unless the COCs are no longer present or are below the remediation levels consistently. Specific wells and surface water locations to be sampled will be determined during the Remedial Design. The analytical data generated will be used to track the concentrations and movement of groundwater contaminants.

10.0 STATUTORY DETERMINATIONS

The selected remedy for this Site meets the statutory requirements set forth at Section 121(b)(1) of CERCLA, 42 U.S.C. § 9621(b)(1). This section states that the remedy must protect human health and the environment; meet ARARs (unless waived); be cost-effective; use permanent solutions, and alternative treatment technologies or resource recovery technologies to the maximum extent practicable; and finally, wherever feasible, employ treatment to reduce the toxicity, mobility or volume of the contaminants. The following sections discuss how the remedy fulfills these requirements.

Protection of human health and the environment: The groundwater remediation alternative will volatilize the TCE, add oxygen to the groundwater to biodegrade the bis(2-ethylhexyl)phthalate, and oxidize the soluble manganese into its more insoluble form, thereby reducing and eventually removing the future risks to human health which could result from ingestion of the groundwater.

Compliance with ARARs: The selected remedy will meet ARARs, which are listed in Sections 9.1.2 of this ROD.

Cost effectiveness: Among the groundwater alternatives that are protective of human health and the environment and comply with all ARARs, the selected alternative is the most cost-effective choice because it uses a treatment technology to remediate the contamination in basically the shortest time frame, at a cost similar to the other alternatives.

Utilization of permanent solutions, and alternative treatment technologies or resource recovery technologies to the maximum extent practicable: The selected remedy represents the use of treatment for a permanent solution. Among the alternatives that are protective of human health and the environment and comply with all ARARs, EPA and the State of South Carolina have determined that the selected remedy achieves the best balance of trade-offs in terms of long-term effectiveness and permanence, reduction of toxicity/mobility/volume, short-term effectiveness, implementability, and cost. The selected groundwater action is more readily implementable than the other alternatives considered. Preference for treatment as a principal remedy element: The proposed groundwater remediation alternative will fulfill the preference for treatment as a principal element.

APPENDIX B

STATE OF SOUTH CAROLINA CONCURRENCE LETTER

ROCHESTER PROPERTY SUPERFUND SITE

Waste
N SRB

South Carolina
DHEC
Department of Health and Environmental Control
2600 Bull Street, Columbia, SC 29201

August 25, 1993

Mr. Patrick Tobin
Acting Regional Administrator
US EPA, Region IV
345 Courtland Street, N.E.
Atlanta, Georgia 30365

RE: Final Draft Record of Decision (ROD)
Rochester Property Site
Greenville County

Dear Mr. Tobin:

The Department has reviewed, commented on, and concurs with the Record of Decision (ROD) for the alternatives selected for remedial action at the Rochester Property site. The alternatives for remedial activities selected by EPA include in-situ air sparging to treat contaminated groundwater and a venting system to facilitate vapor discharge from the vadose zone.

In concurring with this ROD, the South Carolina Department of Health and Environmental Control (SCDHEC) does not waive any right or authority it may have to require corrective action in accordance with the South Carolina Hazardous Waste Management Act and the South Carolina Pollution Control Act. These rights include, but are not limited to, the right to ensure that all necessary permits are obtained, all clean-up goals and criteria are met, and to take a separate action in the event clean-up goals and criteria are not met. Nothing in the concurrence shall preclude SCDHEC from exercising any administrative, legal and equitable remedies available to require additional response actions in the event that: (1)(a) previously unknown or undetected conditions arise at the site, or (b) SCDHEC receives additional information not previously available concerning the premises upon which SCDHEC relied in concurring with the selected remedial alternative; and (2) the implementation of the remedial alternative selected in the ROD is no longer protective of public health and the environment.

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This concurrence with the selected remedy for the Rochester Property Site is contingent upon the State's above-mentioned reservation of rights. If you have any questions, please feel free to contact Mr. Lewis Bedenbaugh at (803)734-5211.

Sincerely,

R. Lewis Shaw, P.E.
Deputy Commissioner
Environmental Quality Control

cc: Hartsill Truesdale
Lewis Bedenbaugh
Keith Lindler
Rebecca Dotterer
Harry Mathis
Charles Gorman
Doug Johns

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