WORK PLAN
FOR THE EVALUATION OF
AQUIFER CHARACTERISTICS

Buffalo Terminal
Location No. 31-010
Buffalo, New York

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Prepared for:

EXXONMOBIL OIL CORPORATION
1001 Wampanpag Trail
Riverside, Rhode Island 02915

Prepared by:

ROUX ASSOCIATES, INC.
1377 Motor Parkway
Islandia, New York 11749

ROUX

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TABLE OF CONTENTS

TABLES

TABLE OF CONTENTS

(Continued)

FIGURES

APPENDICES

PLATES

1.0 INTRODUCTION

This Work Plan for the evaluation of aquifer characteristics (Work Plan) at the Buffalo Terminal, Buffalo, New York (Site), located at 625 Elk Street, Buffalo, New York (Figure 1) was prepared by Roux Associates, Inc. (Roux Associates) on behalf of ExxonMobil Oil Corporation (ExxonMobil). The Site has been divided into nine geographic areas, which have been defined for the purpose of assessing environmental conditions and reporting the results of area-specific activities (Figure 2). The geographic areas are the following:

- Northeast Process and Storage Area (NPSA);
- Northern Tank Yard Area (NTYA);
- Former Refinery Area (FRA);
- Central Rail and Process Area (CRPA);
- Southern Tank Yard Area (STYA);
- Eastern Tank Yard Area (Former Disposal Area [ETYA]);
- Babcock Street Properties Area (BSPA);
- Administrative Offices and Operations Area (AOOA); and
- Elk Street Properties Area (ESPA).

This work plan focuses on two geographic areas of the Site (the STYA and ETYA) where separate-phase product plumes have been delineated (Plate 1). The purpose of the evaluation of aquifer characteristics is to develop the data necessary to determine the most effective and efficient way to protect the Buffalo River by containing and recovering groundwater, controlling the migration of separate-phase product and enhancing separate-phase product recovery by inducing flow of separate-phase product to a collection point.

This work plan describes current hydrogeologic conditions, summarizes separate-phase product recovery to date, and proposes the scope of work required to complete the evaluation of aquifer characteristics. The proposed field work includes:

- Installing three test boreholes;
- Installing three recovery wells;

- Installing seven monitoring wells;
- Performing and analyzing three step tests; and
- Performing three constant-rate pumping tests;

The data collected during the above field work will be used to:

- Determine the aquifer coefficients (i.e., hydraulic conductivity, transmissivity, and storativity) in the vicinity of each recovery well and specified monitoring well locations;
- Determine the configuration of the water table under pumping and non-pumping conditions;
- Verify that the values of aquifer coefficients determined at each well location agree with the geologic data that exists for this area;
- Develop and calibrate a groundwater flow model;
- Simulate several groundwater recovery/containment scenarios using the calibrated flow model to determine the most effective means to protect the Buffalo River by capturing groundwater, controlling migration of the separate-phase product and enhancing product recovery by inducing the flow of separate-phase product to a collection point;
- Evaluate water quality under pumping conditions for use in design of treatment facilities; and
- Prepare a summary report of results and a feasibility study for modifications or additions to the existing groundwater and product containment/recovery systems.

The remainder of the Work Plan is organized as follows:

- Section 2.0 provides a summary of environmental conditions;
- Section 3.0 provides a summary of the Site environmental remediation history;
- Section 4.0 presents the proposed scope of the field work to generate the necessary data;
- Section 5.0 provides a summary of the proposed pump test data analysis;
- Section 6.0 presents a summary of the proposed groundwater model;
- Section 7.0 discusses summary report/feasibility study preparation;
- Section 8.0 discusses project schedule; and
- Section 9.0 presents references.

Included with the Work Plan is the following appendix:

- Appendix A: Roux Associates, Inc. Standard Operating Procedure for Conducting a Constant-Rate (Pumping) Test and Recovery Test

2.0 SUMMARY OF ENVIRONMENTAL CONDITIONS

Hydrogeologic conditions of the unconfined aquifer in the STYA and ETYA, including water-level elevations and separate-phase product occurrence, are monitored on a regular basis as part of the Site-wide monitoring program and product recovery efforts. Groundwater samples from selected monitoring wells are collected on a quarterly basis and analyzed to monitor groundwater quality. The following is a summary of recent results of these monitoring and sampling efforts.

2.1 Hydrogeology and Separate-Phase Product Occurrence

The following is a general description of the Site hydrogeology and occurrence of separate-phase product as a whole, and is not specifically related to any geographic area of the Site, except where noted. The description of groundwater flow direction presented below is based upon water-level and separate-product thickness data collected during the quarterly gauging round conducted in January 2002 (Table 1). The water-level and separate-phase product thickness data for the January 2002 quarterly gauging round are presented on Plate 1.

The depiction of the areal extent of separate-phase product thickness shown on Plate 1 is based on all historical data collected at the Site. Therefore, even wells that currently do not show evidence of separate-phase product, but did in the past, are included in the depiction of the plume. Wells in which product was observed during only one gauging round are not shown, except at MW-16, located south of the active Tank Truck Loading Rack, where significant petroleum-related impacts were observed during soil boring and well installation.

2.1.1 Hydrogeology

The groundwater flow direction in the area of the Site west of the former Erie-Lackawanna Railroad is generally southwest toward the Buffalo River. The influence of the western leg of the Well Point System (WPS) in drawing down the water table and affecting the direction of groundwater flow can be seen in monitoring wells in the southern portion of the Former Refinery Area (FRA) and Babcock Street Properties Area (BSPA). However, the drawdown caused by the western leg of the WPS in January 2002 indicated that the system was not operating efficiently at this time. The average drawdown caused by the WPS in January 2002 was approximately 1.3 feet less than observed in October 2001. The influence of the eastern leg of the WPS can be seen in monitoring wells in the STYA and the southwest portion of the ETYA.

The gauging data from the January 2002 quarterly round indicates that the Buffalo River level was higher than the water level observed in all wells located along the bulkhead that were gauged during the quarter. However, SB-12 and SB-39 (where water levels have been observed to be higher than the river level) could not be located under the snow and were not gauged. Therefore, in wells that were gauged during the quarter, the data demonstrates that pumping of the WPS depresses the water table sufficiently to induce recharge from the Buffalo River into the aquifer in the area between the WPS and the Buffalo River.

In the area between the operating dual-phase recovery wells and the WPS, a groundwater flow divide is created between the cones of influence of the two pumping systems.

Finally, a groundwater divide, caused by the operation of the eastern leg of the WPS, exists in the southwestern portion of the ETYA. The groundwater flow direction east of the divide is generally southeast toward the Buffalo River. The groundwater flow direction west of the divide, in the southwestern portion of the ETYA, is generally west toward the WPS.

2.1.2 Separate-Phase Product Occurrence

Separate-phase product exists throughout much of the southern portion of the Site. Product extends from the east side of the Babcock Street sewer in the BSPA through the southern portion of the FRA and the southern portion of the STYA. The eastern limit of the product plume in the STYA is approximately to the Erie-Lackawanna Railroad, which separates the STYA from the ETYA.

The separate-phase product is shown as a continuous plume extending through all three of these areas of the Site. However, it is likely that the product observed in the BSPA in the vicinity of the former Truck Loading Rack, and extending along the eastern side of the Babcock Street sewer to MW-27, is separate from the remainder of the plume. This localized plume is likely attributable to releases at the former Truck Loading Rack.

To the east of the former Barrel House in the BSPA, it is not possible to conclusively determine the configuration of the plume(s) based upon available information. SB-15, which had been located on the east side of the former Barrel House, and which would have helped to further define the plume(s), was destroyed and will be replaced. The product observed in the eastern portion of the BSPA may be one of the following:

- A localized plume, separate from the main portion of the plume on the FRA, attributable to former tanks and railcar unloading facilities located on the east side of the former Barrel House.
- A co-mingled plume comprised of product attributable to former tanks and railcar unloading facilities located on the east side of the former Barrel House and product from the main portion of the product plume on the FRA.
- Product from the main portion of the plume on the FRA that has migrated onto the BSPA.

Finally, in the BSPA, the product is shown to extend beneath the One Babcock Street Offices (former Barrel House). Based upon the available information from existing wells, it is not possible to determine if product exists beneath the building.

Localized product plumes are shown around well MW-7 in the FRA and around SB-12, MW-6 and Well Point 23 in the FRA. It is possible that the product observed at MW-6 is part of the main product plume.

A localized plume is also shown around MW-16, south of the active Tank Truck Loading Rack based upon the observance of product during one gauging round (April 2001). Product has not been observed in this location since that round, however significant petroleum-related impacts were observed soil boring installation in this area conducted in 2001. Based upon the soil boring results, two new wells (MW-36 and MW-37) were added. MW-36 was destroyed during snowplowing activities during the December 24 through 28, 2001 storm and will be replaced. These wells will continue to be monitored to determine any changes in separate-phase product occurrence in this area of the Site.

In the ETYA, a localized plume of separate-phase product extends from beneath the containment area for Tank 176 in the ETYA southward to MW-28. The plume extends from LF-3 to the west to LF-4 to the east.

No product has been observed in the northern portion of the Site, including north of well MW-31 in the FRA, the entire Northern Tank Yard Area (NTYA), the entire Northeast Process and Storage Area (NPSA), the entire Administrative Offices and Operations Area (AOOA) and the majority of the Central Rail and Process Area (CRPA).

2.2 Groundwater Quality

Water quality sampling of groundwater from the selected wells is conducted on a quarterly basis. The groundwater samples are analyzed for volatile organic compounds (VOCs) and semi-volatile organic compounds (SVOCs) according to USEPA Methods SW846 8021 and 8270 for NYSDEC STARS list compounds, respectively.

The analytical results from January 2002 are presented in Table 2 for VOCs and Table 3 for SVOCs. Groundwater quality data for benzene, toluene, ethylbenzene and xylenes (BTEX), MTBE, total VOCs, and total SVOCs collected from the wells sampled during the January, April, July and October 2001 and January 2002 quarterly sampling rounds are presented on Plate 2.

The groundwater sampling results generally indicate lower concentrations of VOCs and SVOCs at the upgradient or northern edge of the Site and higher concentrations towards the center and southern areas.

The areas of the Site where the highest concentrations of VOCs and SVOCs were observed were in the vicinity of former and/or current tanks, former and active Loading/Filling Racks and some of the former waste handling areas. In the vicinity of the former Main In-Ground Oil/Water Separator, where relatively high concentrations of VOCs and SVOCs were observed in soil, groundwater was not collected due to the presence of separate-phase product.

3.0 SITE ENVIRONMENTAL REMEDIATION HISTORY

To date the environmental remediation activities at the Site have focused on control of groundwater flow beneath the Site and recovery of separate-phase product. Two groundwater extraction systems are currently operating at the Site, the WPS and the Dual-Phase Recovery System. The groundwater recovered by these systems is treated by the Site's Water Treatment System, installed in the Remediation Building in the FRA and operational since 1993. Treated water is discharged to the BSA municipal sewer system. The following is a description of these systems and their history.

3.1 Well Point System

The WPS was installed and operational in 1971. It consists of approximately 123 well points located parallel to the Buffalo River and is configured in two legs, eastern (EWPS) and western (WWPS). The western leg consists of 23 well points and the eastern leg consists of over 100 well points. The eastern leg has run continuously since its installation, however, the western leg had not operated from 1992 through August 1999.

Each leg has an independent header collection pipe and discharge pipe to the Water Treatment System, as well as a totalizing flow meter. Each well point is approximately 25 feet deep and 2.5 inches in diameter with a drop tube assembly within the well. Most points have been modified with a riser to the surface so that the well can be accessed. Each well has a valve connecting it to the 6-inch collection header pipe.

The well points are connected in series to the header pipe that leads to a dual-phase liquid ring pump vacuum system for each leg of the WPS. Each leg has an independent pump. The eastern leg has one operating pump and one standby pump. The western leg has one operating pump. The pumps provide a vacuum that extracts fluid from all of the well points tied into each header. Total fluids pulled from the WPS are pumped directly into the piping system and transmitted to the Site's Water Treatment System.

The western leg of the WPS was rehabilitated between August 1998 and April 1999. The rehabilitation included accessing and inspecting each well point drop tube, isolation valve and connection piping to the collection header. The collection header was observed to be in poor condition and was replaced with new pipe and connections to the well points. In addition, each well point was pressure cleaned. The rehabilitation also included the purchase and installation of a new liquid ring vacuum pump. The western leg of the WPS was reactivated on August 23, 1999 and has been operated since then with only relatively short periods of downtime.

3.2 Dual-Phase Recovery System

A dual-phase recovery system was installed at the Terminal between 1991 and 1993 to recover product. The dual-phase recovery system was activated in September 1993. The five recovery wells currently operating (RW-1 through RW-5) are located in the STYA within the separate phase product plume. RW-2 currently recovers groundwater only with manual bailing of product. A sixth recovery well had been installed in RW-6 in the STYA, but is no longer in use due to insufficient product recovery.

Associated with each recovery well are product and water recovery pumps, liquid level probes, a product storage tank, product and water transfer piping and a control panel. A groundwater pump is located near the bottom of the well and the product pump is located above it. By pumping water out of the recovery well, the water level is lowered in the surrounding area, creating a "cone of depression," which is used to capture floating product and maximize its recovery. Recovered water is pumped to the Water Treatment System and recovered product is pumped to an above ground storage tank for later disposal off site.

3.3 Treatment and Discharge Systems

The Site's Water Treatment System was installed and operational by 1993. The Water Treatment System is located in the Remediation Building in the FRA. The treatment system handles all extracted groundwater (from the dual-phase recovery systems and the WPS), as well as storm water not associated with the lined active tank farm drainage system, prior to discharge to the BSA sewer system.

An upgrade of the Water Treatment System was completed in March 2000. The Water Treatment System currently consists of two treatment trains. Treatment Train 1 handles all groundwater sources described above, as well as dry-weather flow from the storm-water lift station. Treatment Train 2 handles wet weather flow from the storm-water lift station. Flow from the storm-water lift station to Train 1 or Train 2 is controlled by a manually operated valve.

Treatment Train 1 consists of a 500 gallons per minute (gpm) oil/water separator followed in series by a 300 gpm oil/water separator to remove separate-phase product and air sparging tanks to remove dissolved phase constituents. Treatment Train 2 consists of a 1,500 gpm oil/water separator followed by a 500 gpm oil/water separator in series. Train 2 is configured so that wet weather flow in excess of the capacity of the 500 gpm separator is automatically bypassed after passing through the 1,500 gpm separator. Following treatment and flow monitoring by an ultrasonic flow meter, water is discharged to the BSA sewer system. The Site's Water Treatment System is currently discharging to the BSA under BPDES Permit No. 97-05-BU045.

Water collected from the active lined tank farm for the above ground storage tanks is pumped from the dedicated lift station located in the STYA to the Lined Tank Farm Above Ground Oil/Water Separator located along the dock in the STYA prior to discharge to the Buffalo River under SPDES permit No. NY-0204480, first issued in April 1992.

3.4 Separate-Phase Product Recovery To Date

Cumulative product recovered from the dual-phase recovery systems, WPS, main In-Ground Oil/Water Separator and manual/passive product bailing since September 1993 is approximately 42,137 gallons. Approximately 32,374 gallons were recovered from automated product recovery systems (RW-1 through RW-5); approximately 9,036 gallons were recovered from the main In-Ground Oil/Water Separator, the water treatment system oil/water separators and the Site sewer system; and 727 gallons were recovered from manual/passive bailing of wells.

4.0 PROPOSED FIELD WORK

Aquifer tests are proposed at three locations to develop the data necessary to conduct the evaluation of aquifer characteristics in the unconfined aquifer beneath the Buffalo Terminal. Two testing locations are proposed within the main separate-phase product plume in the Southern Tank Yard Area (STYA) and one location is proposed in the Eastern Tank Yard Area (ETYA). The three proposed aquifer testing networks consist of:

- Recovery Well RW-7 (located in the STYA) and monitoring wells MW-18, MW-32, MW-33, MW-40, MW-41, and MW-46;
- Recovery Well RW-8 (located in the ETYA) and monitoring wells LF-6, LF-1S, LF-3, MW-3URS, MW-28, and P-15;
- Recovery Well RW-9 (located in the STYA) and monitoring wells ESI-4, MW-14, MW-20, MW-21, MW-42, MW-43, and MW-44.

The proposed aquifer testing networks are shown in Figure 3. In addition to the wells specified, background data will be collected from one or two wells outside the range of pumping influence for each aquifer testing network. Well construction details and recent gauging data for existing wells are summarized in Table 4. The three recovery wells are proposed at locations that are anticipated to be part of the groundwater and separate-phase product containment system. In addition, recovery wells were placed such that existing monitoring wells could be used as part of the aquifer testing networks.

Aquifer testing is proposed to:

- Determine the aquifer coefficients (i.e., hydraulic conductivity, transmissivity, and storativity) in the vicinity of each recovery well and specified monitoring well locations;
- Determine the configuration of the water table under pumping and non-pumping conditions;
- Verify that the values of aquifer coefficients determined at each well location agree with the geologic data that exists for this area; and
- Evaluate the effectiveness of each recovery well network to propagate a capture zone large enough to control the groundwater flow direction and control migration of the separate-phase product by inducing the flow of separate-phase product to the recovery well.

To accomplish these objectives, the following field work is proposed.

- Install test boreholes at three locations (TB-1, TB-2, and TB-3);
- Perform sieve analyses for samples collected during the installation of the three test boreholes;
- Install and develop seven monitoring wells (MW-40 through MW-46);
- Install and develop three recovery wells (RW-7, RW-8, and RW-9);
- Shut down all existing groundwater/separate-phase product recovery systems (EPWS and WWPS and RW-1 through RW-5) to allow for aquifer recharge;
- Collect fluid elevation measurements in existing and newly-installed wells over a period of time to determine static conditions;
- Perform and analyze three step tests; and
- Perform three constant-rate pumping tests.

Field task procedures are described below.

4.1 Test Borehole Installation

In accordance with ExxonMobil and Roux Associate's ground disturbance protocols, each location will be cleared to a depth of five feet below land surface (ft bls) using an ExxonMobil approved method (i.e., air knife or hand digging). Three 4-inch diameter test boreholes (TB-1, TB-2, and TB-3) will be installed prior to installation of monitoring wells and recovery wells. Two test boreholes will be located within the main plume in the STYA and one test borehole will be located in the ETYA. Proposed wells MW-40, MW-42, and RW-8, will be installed at the test boring locations TB-1, TB-2, and TB-3, respectively (Figure 3). The depth of each borehole will extend 5 feet into the confining unit (i.e., clay layer), which is estimated to be approximately 30 ft bls in the STYA and 35ft bls at the ETYA.

Test boreholes will be drilled using hollow-stem auger methods, with continuous split-spoon sampling performed from 5 feet bls to approximately 5 feet into the clay layer for lithologic description. Split-spoon soil samples below the water table will be collected and placed into appropriate sample jars for laboratory sieve analyses. Sample jars will be placed on hold at the laboratory until Roux Associates reviews the boring logs to determine which depth interval(s) will be analyzed for grain size distribution.

Results from the actual lithologic descriptions and sieve analyses for each test borehole will be used to determine screen slot size for each recovery well. Although located approximately 30 feet away, the observations and sieve analysis results from TB-1 will be assumed to represent conditions in that area of the Site and will be used for selection of materials for RW-7. Similarly, the results from TB-2 will be used for selection of materials for RW-9, which will be located approximately 30 feet away. TB-3 will be completed in the exact location of RW-8; therefore the test boring results are directly applicable.

In addition, undisturbed soil cores from approximately six inches below the water table will be collected using Shelby-tube samples each at test borehole location. Each sample will be sealed and preserved for geotechnical laboratory analyses. Shelby-tubes will be analyzed for soil parameters that include capillary-moisture relationship (ASTM D-2325), soil suction (ASTM D-5298), and porosity.

4.2 Monitoring Well Installation

In accordance with ExxonMobil and Roux Associate's ground disturbance protocols, each monitoring well location will be cleared to a depth of five feet below land surface (ft bls) using an ExxonMobil approved method (i.e., air knife or hand digging). All monitoring wells will be drilled using hollow-stem auger methods, with continuous split-spoon sampling performed from 5 feet bls to approximately 5 feet into the clay layer for lithologic description.

The proposed monitoring wells, MW-40 through MW-43, will be constructed of 4-inch diameter PVC casing and riser with fully penetrating 4-inch diameter PVC screen (i.e., screens the entire saturated thickness of the aquifer from approximately 8 feet above the water table to the top of the clay layer) and a 2-foot PVC sump below the screen. Based on data available for surrounding wells, screen slot size will be 0.020 inches (20 slot) with a Number 1 size Morie gravel pack. In addition, a 2-inch diameter Schedule 40 polyvinyl chloride (PVC) piezometer with 20-slot screen will be installed within each monitoring well and secured at the top of the well. The piezometer screen zone will be placed far enough below the water table to prevent separate-phase product accumulation in the piezometer during aquifer testing. The piezometer can be removed following the aquifer testing to allow for monitoring of separate-phase product in the well (if present).

The locations of MW-40 (same location as TB-1; therefore split-spoon sampling will not be necessary) and MW-41 will be approximately 30 feet from RW-7 in the south and west directions, respectively (Figure 3). The locations of MW-42 (same location as TB-2; therefore split-spoon sampling will not be necessary) and MW-43 will be approximately 30 feet from RW-9 in the north and east directions, respectively (Figure 3).

The proposed monitoring wells, MW-44 through MW-46, will be constructed of 2-inch diameter PVC casing and riser with fully penetrating 2-inch diameter PVC screen (i.e., screens the entire saturated thickness of the aquifer from approximately 8 feet above the water table to the top of the clay layer) and a 2-foot PVC sump below the screen. Based on data available for surrounding wells, screen slot size will be 0.020 inches (20 slot) with a Number 1 size Morie gravel pack.

The location of MW-44 will be approximately 65 feet southeast from ESI-4 (Figure 3). The location of MW-45 will be approximately 100 feet south of MW-33 (Figure 3). The location of MW-46 will be approximately 30 feet south of the proposed location for MW-40. Monitoring wells MW-45 and MW-46 are located between the Well Point System and the Buffalo River.

The gravel pack for all monitoring wells will extend from the bottom of the sump to approximately 2 feet above the top of the screen zone (except where field conditions necessitate the use of a shorter gravel pack). Above each gravel pack, a 1- to 2-foot thick bentonite pellet seal will be placed and hydrated for a minimum of two hours. After the bentonite seal is installed, the borehole will be completed with cement/bentonite grout to within 2 feet of land surface and finished with a concrete cap. The grout will be installed by the tremie method to limit the possibility of voids in the well annulus. The concrete cap will be sloped to divert precipitation away from the well. Each monitoring will well be finished either approximately 2 feet above grade and fitted with a 5 foot steel casing (except where field conditions necessitate the use of a shorter casing), or finished flush with ground surface and fitted with and 8-inch diameter steel curb box.

Each monitoring well will be developed by surging and pumping. The well will be developed adequately to minimize the amount of sediment that will enter the wells during pumping, and to maximize the specific capacity (i.e., gallons per minute per foot of drawdown). Each well will be developed to a point that it is producing water free of sediment (i.e., turbidity less than 50 Nephelometric Turbidity Unit [NTU]).

Each well will be surveyed for horizontal and vertical coordinates relative to the New York State Plane Coordinate System by a surveyor licensed in the State of New York after completion. Both ground surface and top of casing (i.e., measuring point) elevations will be determined for each well. Horizontal coordinates will be accurate to ±0.1 feet and vertical coordinates will be accurate to ±0.01 feet.

4.3 Recovery Well Installation

The proposed recovery wells (i.e., RW-7, RW-8, and RW-9) will be constructed of 10-inch diameter carbon steel (black steel) casing and riser (extending from above land surface to depth of approximately 5 feet above the water table), full penetrating 10-inch diameter 304 stainless steel continuous-wrap wire-wound screen (extending from the casing to the top of the clay layer), and a 5-foot carbon steel sump below the screen (i.e., into the clay layer). Screen slot size will be based on the actual geologic conditions encountered and the grain size analysis of samples collected from within the screened intervals during drilling of the test borehole for each well. The actual drilling of the recovery wells will be performed using air rotary methods. In accordance with ExxonMobil and Roux Associate's ground disturbance protocols, the locations for RW-7 and RW-9 will be cleared to a depth of five feet below land surface (ft bls) using an ExxonMobil approved method (i.e., air knife or hand digging). The location for RW-8 was cleared previously during test boring completion.

A 2-inch diameter Schedule 40 polyvinyl chloride (PVC) piezometer with 20-slot screen will be installed within each recovery well and secured at the top of the well. The piezometer will be screened at the same interval as the recovery well to allow for accurate water-level and product thickness measurements without interference from the pump and conduits inside the well.

The gravel pack will extend from the bottom of the sump to approximately 5 feet above the top of the screen zone (except where field conditions necessitate the use of a shorter gravel pack). Above each gravel pack, a 1- to 2-foot thick bentonite pellet seal will be placed and hydrated for a minimum of two hours. After the bentonite seal is installed, the borehole will be completed with cement/bentonite grout to within 2 feet of land surface. The grout will be installed by the tremie method to limit the possibility of voids in the well annulus.

Recovery wells will be drilled using air rotary methods, with continuous split-spoon sampling performed from 5 feet bls to approximately 5 feet into the clay layer for lithologic description. The locations of the proposed recovery wells are shown in Figure 3. Recovery wells RW-7 and RW-9 will be located within the main plume in the STYA and recovery well RW-8 (same location as TB-3; therefore split-spoon sampling will not be necessary) will be located in the ETYA south of Tank #176. Recovery well RW-7 will be located approximately 122 feet south of MW-32. Recovery well RW-8 will be located approximately 30 feet from LF-1S, MW-3URS, and LF-6. Recovery well RW-9 will be located approximately 30 feet north of ESI-4.

Each recovery well will be developed by surging and pumping. The well will be developed adequately to minimize the amount of sediment that will enter the wells during pumping, and to maximize the specific capacity (i.e., gallons per minute per foot of drawdown). Each well will be developed to a point that it is producing water free of sediment (i.e., turbidity less than 50 NTU).

Each well will be surveyed for horizontal and vertical coordinates relative to the New York State Plane Coordinate System by a surveyor licensed in the State of New York after completion. Both ground surface and top of casing (i.e., measuring point) elevations will be determined for each well. Horizontal coordinates will be accurate to ±0.1 feet and vertical coordinates will be accurate to ±0.01 feet.

4.4 Static Fluid-level Measurements

After the completion of well installation and development, a complete round of manual water level and separate-phase product thickness measurements (including the Buffalo River level) will be made (static pumping conditions). All groundwater extraction systems will then be shutdown for a period of two days to allow the aquifer to recharge. As the fluid levels in the monitoring and recovery wells rebound from the shutdown of existing pumping systems, complete round of water level and separate-phase product thickness measurements (including the Buffalo River level) will be conducted twice a day for two days. The last round of water-level measurements will be considered static non-pumping levels for aquifer testing. These measurements will be used to define the configuration of the water table and separate-phase product plume under non-pumping conditions, and determine if any regional trends are present.

4.5 Aquifer Testing

Aquifer testing at each of the three well networks will consist of two phases:

- a step-drawdown test; and
- a 24-hour constant-rate pumping test.

For each aquifer test, an appropriately-sized stainless steel submersible pump intake will be set approximately one to three feet above the bottom of the test well such that only groundwater will be pumped (i.e., the pump intake will be maintained below the oil-water interface).

4.5.1 Purge Water Handling and Treatment

Groundwater pumped from RW-7 and RW-9 will be transferred to the storm water collection system, where it will flow to the storm water lift station and ultimately be pumped to the water treatment system. Groundwater pumped from RW-8 will be transferred to a frac tank for temporary containment and subsequently transferred from the frac tank to the on-site treatment system.

4.5.2 Step Testing and Analyses

Three step-drawdown tests will be performed after recovery well installation; one at each newly-installed recovery well (i.e., RW-7, RW-8, and RW-9). The purpose of the step-drawdown test is to determine the approximate specific capacity (Q_{max}) of the recovery well. The test will consist of increasing the pumping rate at the recovery well in a step-wise manner such that drawdown in the recovery well is sustained during each step. Q_{max} will be assumed for each location based on data from existing recovery wells and data generated during the development of the new recovery wells. Based on data from existing recovery wells, the Q_{max} is expected to range from 5 to 20 gallons per minute (gpm). The test will consist of three steps at approximately the following pumping rates: 1/5 Q_{max}; 2/5 Q_{max}; and 4/5 Q_{max}. Each of the steps will consist of pumping at the specified rate for one hour or until drawdown reaches asymptotic conditions. The pumping rate will be increased until the drawdown in the recovery well is approximately 80 percent of the static water column. Once this occurs, the discharge rate will be decreased until a constant rate can be maintained. This rate will be Q_{max}.

Water level fluctuations will be recorded in approximately five monitoring wells surrounding the recovery well and the piezometer within the recovery well using In-Situ, Inc., continuous recording pressure transducers (miniTROLLs™). Water level fluctuations in monitoring wells outside each aquifer test network will be periodically measured with an electronic water-level indicator (m-scope) during each step test. Roux Associates assumes that each step test will last one day. The Buffalo River level will be monitored periodically throughout the step tests.

The three proposed aquifer testing networks consist of:

- Recovery Well RW-7 (located in the STYA) and monitoring wells MW-18, MW-32, MW-33, MW-40, MW-41, and MW-48;

- Recovery Well RW-8 (located in the ETYA) and monitoring wells LF-6, LF-1S, LF-3, MW-3URS, MW-28, and P-15;

- Recovery Well RW-9 (located in the STYA) and monitoring wells ESI-4, MW-14, MW-20, MW-21, MW-42, MW-43, MW-44, and MW-47.

In addition to the wells specified, background data will be collected from one or two wells outside the range of pumping influence for each aquifer testing network. After each step test, the recovery well will be shut down and miniTROLLs™ will continue to record water levels to monitor recovery. Once water levels have recovered in the monitoring wells, the next step test will be initiated.

The order in which the step tests will be conducted is designed to minimize the down time of the EWPS and WWPS. The dual-phase recovery systems will remain off throughout the entire aquifer testing period.

<u>Step Test Schedule</u>

The first step test is scheduled to occur at the RW-7 network after the 2-day EWPS and WWPS shutdown. The Buffalo River will be inspected daily along the entire length of the bulkhead for evidence of sheen during all periods when the EWPS and WWPS are not operating. The second step test is scheduled to occur at the RW-8 network on the following day. The EWPS and WWPS will remain off throughout the step tests at RW-7 and RW-9 and will be started up after the completion of the RW-9 since it is assumed that water levels in this portion of the ETYA are unaffected by the system operation. This assumption will be confirmed during the 2-day shutdown period. The third step test is scheduled to occur at the RW-8 network on the following day. The EWPS and WWPS will be shut down after the completion of the RW-8 step test for a period of two days. During this downtime, aquifer recharge will be monitored with miniTROLLs™ and manual water-level measurements twice a day. The data collected from the step tests will be analyzed and specific capacities (Q_{max}) for each recovery well will be determined and used for the constant-rate pump tests.

4.5.3 Constant-Rate Pumping Tests

Three constant-rate pump tests will be performed after the 2-day system shutdown period following the step-drawdown tests; one at each newly-installed recovery well (i.e., RW-7, RW-8, and RW-9). Each constant-rate pumping test will be performed by pumping the recovery well at Q_{max} for approximately 24 hours or until the aquifer has reached steady-state conditions. If the aquifer has not reached steady-state conditions after 24 hours of pumping, the test will be extended until steady-state conditions are attained. After steady state has been attained, the pump will be shut off and water levels will be monitored during the aquifer recovery period. The tests will be performed in accordance with Roux Associates' Standard Operating Procedures for conducting aquifer tests (Appendix A).

During each constant-rate pumping test, logarithmic time versus linear drawdown data will be collected at each aquifer test network using miniTROLLs™. Manual water-level measurements will be collected from wells in the vicinity and within the aquifer test network to confirm the miniTROLL™ data. Where present, separate-phase product thickness will also be measured periodically using an electronic interface probe. In the event of an equipment malfunction or data loss, manual data will be used as the primary data to determine hydraulic coefficients. The manual separate-phase product thickness data will be used to calculate corrected water-level elevations, where necessary, and to evaluate the effect of water-table depression on the occurrence and thickness of separate-phase product in the recovery wells and nearby monitoring wells. A relatively constant thickness of separate-phase product will be maintained in the recovery wells during the pump tests by periodic manual bailing of product.

The discharge rate of the recovery well during each test will be measured continuously using a flow meter and totalizer. Full-time supervision of each test will be provided to ensure refueling of generators for pump power supply, and to ensure that constant flow rate is maintained. Readings from the flow meter will, at a minimum, be obtained on an hourly basis and recorded on an appropriate field form. Any deviations from Q_{max} will be recorded on the field form prior to adjusting the flow rate back to Q_{max}.

Precipitation will be monitored and recorded using the on-site rain gauge during each step test period, during each constant-rate pumping test, and during each recovery period.

Discharge Sampling and Analysis

During each constant-rate pumping test, one sample of the discharge will be collected for laboratory analyses. The sample will be collected at the end of the test just prior to turning off the pump. Each sample will be delivered to laboratory for the following analyses:

- VOCs by Method SW846 8021 for NYSDEC STARS list compounds;
- SVOCs by Method 8270 for NYSDEC STARS list compounds;

- Total iron by Method 6010;
- Total manganese by Method 6010;
- Total magnesium by Method 6010;
- Alkalinity by Method 310.1;
- Total calcium by Method 6010;
- Total suspended solids (TSS) by Method 160.2; and
- Total dissolved solids (TDS)

Results of these analyses will be evaluated as part of the feasibility study. pH will be measured in the field.

Recovery

At the end of the constant-rate pumping test, the miniTROLLs™ will be reset to record water levels at the time intervals used during the constant-rate pumping test. This will permit analysis of recovery data for the determination of hydraulic parameters. Post-test water-level measurements will continue until water levels have recovered to 95 percent of their pre-test values. Recovery data will be evaluated and analyzed to confirm pumping data, or will be analyzed as the primary data in the event of erratic pumping rates or equipment failure.

Upon completion of the post-test monitoring period, data will be downloaded from the miniTROLLs™ for computer-assisted analysis.

Constant-Rate Pump Test Schedule

The order in which the constant-rate pump tests will be conducted is designed to minimize the down time of the EWPS and WWPS. The Buffalo River will be inspected daily along the entire length of the bulkhead for evidence of sheen during all periods when the EWPS and WWPS are not operating.

The first constant-rate pump test is scheduled to occur at the RW-7 network after the 2-day EWPS and WWPS shutdown following the RW-8 step test. The EWPS and WWPS remain down during the entire pumping and aquifer recovery period and will be started up after the completion of the RW-7 pump test. Completion of each pump test will be based on the recharge of water levels back to static conditions (i.e., water levels prior to the step test at the RW-7 network). The second constant-rate pump test will be conducted at the RW-8 network after the completion of the RW-7 constant-rate pump test. The EWPS will be shut down after the completion of the RW-8 step test for a period of two days or until the aquifer has recharged back to static conditions (the WWPS will remain operating). During this downtime, aquifer recharge will be monitored with miniTROLLs™ and manual water-level measurements twice a day. The third step test will be conducted at the RW-9 network after the completion 2-day shutdown period. At the completion of the three pump tests, all existing groundwater and product recovery systems will be re-started.

5.0 PUMPING TEST DATA ANALYSIS

Pumping test data from each aquifer test network will be evaluated and analyzed to determine estimated hydraulic coefficients for the unconfined aquifer beneath the Site.

5.1 Hydraulic Coefficient Determination

Prior to analyzing the pumping test data, the screen zone depths will be corrected to account for elevation differences between the monitoring wells/piezometers and the recovery well. In addition, the quantity of data (time versus drawdown measurements) collected during each test will be reduced to produce a representative and manageable database. The drawdown measurements (or corrected drawdown measurements) versus time will be plotted and evaluated, and an appropriate analytical method will be applied to each curve, as described below.

The data from the monitoring wells/piezometers will be analyzed, where possible, using the Neuman (1975) method for an anisotropic unconfined aquifer considering delayed gravity response, to determine the hydraulic coefficients of the aquifer. The Theis (1935) method for isotropic confined aquifers may also used, where applicable. Data from the piezometers will be analyzed for hydraulic coefficients using the Cooper and Jacob (1946) method, where applicable. Recovery data from all wells will be analyzed using the Theis (1935) recovery method, where possible.

To facilitate the analyses of the time versus drawdown data from fully penetrating wells, the aquifer test analysis software package (computer program) AQTESOLV™ (HydroSOLVE, 2000) will be employed. AQTESOLV™ is an interactive menu-driven program that provides the user complete control over the analysis of aquifer test data. AQTESOLV™ provides the analyst with the option to interactively match type curves to aquifer test data directly on the screen while providing instantaneous quantification of the transmissivity and the storage coefficients.

AQTESOLV™ will be used to generate a logarithmic plot of the pumping test data from the monitoring wells/piezometers, calculate the theoretical type curves for fully penetrating wells, and match the pumping test data to a type curve according to the chosen model. Logarithmic plots showing the aquifer coefficients calculated for each set of well data will be included in the summary report of results.

6.0 GROUNDWATER MODELING

Upon completion of the field activities described in Section 4.0, a groundwater flow model will be developed using the existing model prepared for the Site as a basis (if appropriate) and data from the constant-rate pump tests. The groundwater modeling will be performed to achieve the following objectives:

- Simulate the water-table configuration under current pumping and non-pumping conditions;
- Evaluate the impact on groundwater flow of the proposed recovery wells as part of a new groundwater containment system;
- Simulate several groundwater recovery/containment scenarios using the calibrated flow model to determine the most effective means to protect the Buffalo River by capturing groundwater, controlling migration of the separate-phase product and enhancing recovery by inducing the flow of separate-phase product to a collection point; and
- Provide a calibrated model that may be used in future groundwater remediation system design efforts for the Site

The groundwater modeling will consist of the following steps:

- Construction of a model grid;
- Model calibration and sensitivity analyses of the hydraulic input parameters;
- Simulation of current pumping conditions
- Simulations of the hydraulic effect of several groundwater/product containment scenarios;
- Simulations of the hydraulic effect of additional recovery wells as part of the groundwater containment system; and
- Evaluation of the effectiveness of remedial alternatives including plume containment and pump-and-treat.

The groundwater modeling will be performed using the Modular Three-Dimensional Finite-Difference Groundwater Flow Model, widely known as MODFLOW (McDonald and Harbaugh, 1988). MODFLOW was originally distributed by the United States Geological Survey (USGS). The version of MODFLOW that will be used is MODFLOWwin32.

Particle tracking for visualization of groundwater flowpaths will be performed using MODPATH (Pollock, 1989). MODPATH is a three-dimensional particle-tracking model that works in conjunction with MODFLOW and was developed by the USGS. The version of MODPATH that will be used is MODPATHwin32.

The graphical pre- and post-processing software that will be used for groundwater modeling is Groundwater Vistas - Version 3.0 (Environmental Simulations, 2001). Groundwater Vistas is a graphical interface system for MODFLOW, MODPATH, and MT3D, as well as other models.

7.0 SUMMARY REPORT AND FEASIBILITY STUDY PREPARATION

Following evaluation of all available data relevant to separate-phase product and groundwater recovery at the Site, a separate-phase product/groundwater feasibility study report will be prepared. This report will summarize:

- Performance of the aquifer tests;
- Methodology used to analyze the aquifer testing data;
- Results of the hydraulic coefficient calculations;
- Results of groundwater modeling and simulations;
- Evaluation of remedial alternatives for groundwater containment/recovery and separate-phase product recovery enhancement; and
- Proposed alternative for separate-phase product and groundwater containment/recovery.

Geologic logs for all recovery wells and piezometers installed as part of this work will be included in the final report. The aquifer test data analyses will be presented graphically (i.e., computer-generated plots of drawdown and recovery data) and the data will be tabulated. For each well network, maps of water levels in the vicinity of the test well will be presented for both pumping and non-pumping conditions. In addition, maps will be prepared to show drawdown in the unconfined aquifer in response to pumping. Maps will also be prepared to illustrate groundwater flow patterns under the following conditions:

- Current conditions (i.e., pumping and non-pumping); and
- Pumping conditions required for groundwater containment/recovery and enhancement of separate-phase product recovery.

Based on the results of the data evaluation, recommendations will be made regarding additions/modifications to the existing groundwater and product recovery systems at the Site.

8.0 PROJECT SCHEDULE

The field activities for the evaluation of aquifer characteristics described above are scheduled to be conducted during May and June 2002. Analysis of results, groundwater modeling, feasibility study and report preparation will follow and are expected to be completed by December 2002. The proposed schedule for conducting field activities is summarized in Table 5.

Respectfully submitted,

ROUX ASSOCIATES, INC.

Sin Senh
Project Hydrogeologist

Noelle Clarke, P.E.
Principal Engineer/
Project Manager

9.0 REFERENCES

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Table 1. Summary of Water-Level, Product Thickness and Product Bailing Data
Buffalo Terminal, ExxonMobil Oil Corporation, Buffalo, New York

Well Designation	Date	Measuring Point Elevation (ft msl)	Depth to Product (ft)	Depth to Water (ft)	Product Thickness (ft)	Specific Gravity	Corrected Elevation (ft msl)	Product Bailed (gal)	Comments
ADMINISTRATIVE OFFICES AND OPERATIONS AREA (AOOA)									
B-5MW(RR)	01/17/02	587.54		4.84			582.70		
BABCOCK STREET PROPERTIES AREA (BSPA)									
B-3MW	01/17/02	586.82		2.65			584.17		
B-4MW	01/17/02	587.05		7.6			579.45		
MW-1	01/17/02	582.13		11.55			570.58		
MW-2	01/17/02	583.09		11.72			571.37		
MW-22	01/17/02	582.36		13.66			568.70		
MW-23	01/17/02	586.14		16.91			569.23		
MW-24	01/17/02	583.67		12.98			570.69		
MW-25	01/03/02	583.28	14.95	16.63	1.68	0.8	567.99	0.5	SOLAR-POWERED PRODUCT PUMP IN WELL SINCE 10/29/01, PUMP DOWN 1/4/02 TO 1/16/02, WELL MANUALLY BAILED
MW-25	01/09/02	583.28	14.43	16.4	1.97	0.8	568.46	1	SOLAR-POWERED PRODUCT PUMP IN WELL SINCE 10/29/01, PUMP DOWN 1/4/02 TO 1/16/02, WELL MANUALLY BAILED
MW-25	01/17/02	583.28	13.55	13.68	0.13	0.8	569.70		SOLAR-POWERED PRODUCT PUMP IN WELL SINCE 10/29/01, PUMP DOWN 1/4/02 TO 1/16/02
MW-25	01/23/02	583.28	13.42	13.45	0.03	0.8	569.85		SOLAR-POWERED PRODUCT PUMP IN WELL SINCE 10/29/01, 1.63 DTP IN DRUM
MW-25	01/31/02	583.28	13.25	13.34	0.09	0.8	570.01		SOLAR-POWERED PRODUCT PUMP IN WELL SINCE 10/29/01
MW-25	02/06/02	583.28	11.79	11.8	0.01	0.8	571.49		SOLAR-POWERED PRODUCT PUMP IN WELL SINCE 10/29/01, 1.6 DTP IN DRUM
MW-25	02/13/02	583.28							SOLAR-POWERED PRODUCT PUMP IN WELL SINCE 10/29/01, 1.6 DTP IN DRUM
MW-25	02/20/02	583.28							SOLAR-POWERED PRODUCT PUMP IN WELL SINCE 10/29/01, 1.6 DTP IN DRUM
MW-25	03/01/02	583.28							SOLAR-POWERED PRODUCT PUMP IN WELL SINCE 10/29/01, 1.6 DTP IN DRUM
MW-25	03/06/02	583.28							SOLAR-POWERED PRODUCT PUMP IN WELL SINCE 10/29/01, 1.59 DTP IN DRUM
MW-25	03/14/02	583.28							SOLAR-POWERED PRODUCT PUMP IN WELL SINCE 10/29/01, 1.59 DTP IN DRUM
MW-25	03/28/02	583.28							SOLAR-POWERED PRODUCT PUMP IN WELL SINCE 10/29/01, 1.59 DTP IN DRUM
MW-26	01/17/02	584.87		0.1			584.77		
MW-27	01/03/02	582.69		14.07		0.8	568.62	0	PASSIVE BAILER IN WELL SINCE 12/12/01
MW-27	01/09/02	582.69	14.91	14.93	0.02	0.8	567.78	0.25	PASSIVE BAILER IN WELL SINCE 12/12/01
MW-27	01/16/02	582.69	13.55	13.56	0.01	0.8	569.14	0.25	PASSIVE BAILER IN WELL SINCE 12/12/01
MW-27	01/17/02	582.69	13.55	13.56	0.01	0.8	569.14	0	PASSIVE BAILER IN WELL SINCE 12/12/01
MW-27	01/23/02	582.69	13.57	13.58	0.01	0.8	569.12	0	PASSIVE BAILER IN WELL SINCE 12/12/01
MW-27	02/06/02	582.69	12.27	12.28	0.01	0.8	570.42	0.06	PASSIVE BAILER IN WELL SINCE 12/12/01
MW-27	02/13/02	582.69	12.2	12.21	0.01	0.8	570.49	0.01	PASSIVE BAILER IN WELL SINCE 12/12/01
MW-27	02/20/02	582.69	12.75	12.76	0.01	0.8	569.94	0.02	PASSIVE BAILER IN WELL SINCE 12/12/01

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Buffalo Terminal, ExxonMobil Oil Corporation, Buffalo, New York

Well Designation	Date	Measuring Point Elevation (ft msl)	Depth to Product (ft)	Depth to Water (ft)	Product Thickness (ft)	Specific Gravity	Corrected Elevation (ft msl)	Product Bailed (gal)	Comments
MW-27	03/01/02	582.69		12.72			569.97	0.01	PASSIVE BAILER IN WELL SINCE 12/12/01
MW-27	03/06/02	582.69	12.97	13.2	0.23	0.8	569.67	0.03	PASSIVE BAILER IN WELL SINCE 12/12/01
MW-27	03/14/02	582.69	13.27	13.3	0.03	0.8	569.41	0.25	PASSIVE BAILER IN WELL SINCE 12/12/01
MW-27	03/21/02	582.69	13.48	13.49	0.01	0.8	569.21	0.25	PASSIVE BAILER IN WELL SINCE 12/12/01
MW-27	03/28/02	582.69	14.75	14.76	0.01	0.8	567.94	0.06	PASSIVE BAILER IN WELL SINCE 12/12/01
MW-3	01/17/02	581.72		11.6			570.12		
SB-11/LB-1	01/17/02	582.08		12.33			569.75		
SB-14	01/17/02	584.79		6.18			578.61		
SB-16	01/17/02	583.81	11.37	11.45	0.08	0.8	572.42		
SB-17	01/09/02	583.53	13.83	14.64	0.81	0.8	569.54	1	
SB-17	01/16/02	583.53	12.93	13.52	0.59	0.8	570.48	1	
SB-17	01/17/02	583.53	12.93	13.52	0.59	0.8	570.48		
SB-17	01/23/02	583.53	13.03	13.25	0.22	0.8	570.46	0.13	
SB-17	02/06/02	583.53	11.29	12.15	0.86	0.8	572.07	1.5	
SB-17	02/13/02	583.53	11.87	12.03	0.16	0.8	571.63	0.01	
SB-17	02/20/02	583.53	11.8	11.97	0.17	0.8	571.70		
SB-17	03/01/02	583.53	12.21	12.85	0.64	0.8	571.19	1	
SB-17	03/06/02	583.53	12.03	12.35	0.32	0.8	571.44	0.25	
SB-17	03/14/02	583.53	12.27	12.91	0.64	0.8	571.13	1.5	
SB-17	03/21/02	583.53	12.41	13	0.59	0.8	571.00	0.5	
SB-17	03/28/02	583.53	12.85	13.56	0.71	0.8	570.54	1	
SB-19	01/17/02	583.13							COULD NOT GAUGE-UNDER WATER
SB-20	01/17/02	583.46		6.02			577.44		
SB-28	01/17/02	588.13		3.5			584.63		
SB-31	01/17/02	581.92		10.56			571.36		
SB-37	01/17/02	583.1							COULD NOT FIND-BURIED UNDER SNOW
SB-37	01/21/02	583.1		14			569.10		
SB-39	01/17/02	581.73							COULD NOT FIND-BURIED UNDER SNOW
WP-11	01/17/02	586.26		17.03			569.23		
WP-2	01/17/02	585.18		15.76			569.42		
WP-23	01/17/02	587.01		18.54			568.47		
WP-3	01/17/02	585.63		13.72			571.91		
RIVER	01/17/02	586.18		15.5			570.68		
RIVER	01/10/02	586.18		15.75			570.43		RIVER FROZEN, DEPTH TO ICE SHOWN
RIVER	01/11/02	586.18		15.1			571.08		RIVER FROZEN, DEPTH TO ICE SHOWN
RIVER	01/14/02	586.18		15.8			570.38		RIVER FROZEN, DEPTH TO ICE SHOWN
RIVER	01/16/02	586.18		15.5			570.68		RIVER FROZEN, DEPTH TO ICE SHOWN
RIVER	01/17/02	586.18		15.5			570.68		RIVER FROZEN, DEPTH TO ICE SHOWN
RIVER	01/18/02	586.18		15.72			570.46		RIVER FROZEN, DEPTH TO ICE SHOWN
RIVER	01/21/02	586.18		15.61			570.57		RIVER FROZEN, DEPTH TO ICE SHOWN
RIVER	01/22/02	586.18		15.49			570.69		RIVER FROZEN, DEPTH TO ICE SHOWN
RIVER	01/23/02	586.18		14.73			571.45		RIVER FROZEN, DEPTH TO ICE SHOWN
RIVER	01/24/02	586.18		16.05			570.13		RIVER FROZEN, DEPTH TO ICE SHOWN
RIVER	01/25/02	586.18		14.76			571.42		RIVER FROZEN, DEPTH TO ICE SHOWN
RIVER	01/28/02	586.18		15.9			570.28		
RIVER	01/29/02	586.18		16.04			570.14		
RIVER	01/30/02	586.18		15.74			570.44		
RIVER	01/31/02	586.18		15.01			571.17		
RIVER	02/01/02	586.18		14.41			571.77		
RIVER	02/04/02	586.18		14.57			571.61		

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RIVER	02/05/02	586.18		14.78			571.40		RIVER FROZEN, DEPTH TO ICE SHOWN
RIVER	02/06/02	586.18		14.98			571.20		RIVER FROZEN, DEPTH TO ICE SHOWN
RIVER	02/07/02	586.18		14.85			571.33		RIVER FROZEN, DEPTH TO ICE SHOWN
RIVER	02/08/02	586.18		15.14			571.04		RIVER FROZEN, DEPTH TO ICE SHOWN
RIVER	02/11/02	586.18		15.35			570.83		
RIVER	02/12/02	586.18		14.06			572.12		
RIVER	02/13/02	586.18		15.54			570.64		
RIVER	02/14/02	586.18		14.92			571.26		
RIVER	02/15/02	586.18		15.71			570.47		
RIVER	02/18/02	586.18		15.52			570.66		
RIVER	02/19/02	586.18		15.64			570.54		
RIVER	02/20/02	586.18		15.84			570.34		
RIVER	02/21/02	586.18		15.52			570.66		
RIVER	02/22/02	586.18		15.14			571.04		
RIVER	02/25/02	586.18		15.55			570.63		
RIVER	02/26/02	586.18		15.39			570.79		
RIVER	02/27/02	586.18		14.5			571.68		
RIVER	02/28/02	586.18		14.89			571.29		
RIVER	03/01/02	586.18		14.75			571.43		
RIVER	03/04/02	586.18		14.79			571.39		
RIVER	03/05/02	586.18		14.66			571.52		RIVER FROZEN, DEPTH TO ICE SHOWN
RIVER	03/06/02	586.18		15.04			571.14		RIVER FROZEN, DEPTH TO ICE SHOWN
RIVER	03/07/02	586.18		16.17			570.01		RIVER FROZEN, DEPTH TO ICE SHOWN
RIVER	03/08/02	586.18		15.21			570.97		
RIVER	03/11/02	586.18		14.92			571.26		
RIVER	03/12/02	586.18		15.28			570.90		
RIVER	03/13/02	586.18		15.48			570.70		
RIVER	03/14/02	586.18		15.25			570.93		
RIVER	03/18/02	586.18		14.97			571.21		
RIVER	03/19/02	586.18		15.6			570.58		
RIVER	03/20/02	586.18		15.15			571.03		
RIVER	03/21/02	586.18		13.9			572.28		
RIVER	03/25/02	586.18		16.06			570.12		
RIVER	03/26/02	586.18		16.05			570.13		
RIVER	03/27/02	586.18		15.42			570.76		
RIVER	03/28/02	586.18		15.25			570.93		
RIVER	03/29/02	586.18		15.33			570.85		
CENTRAL RAIL AND PROCESS AREA (CRPA)									
B-6MW	01/23/02	596.35		25.38			570.97		
MW-13	01/10/02	584.37		0.16			584.21		
MW-13	01/17/02	584.37		0.46			583.91		
MW-13	02/06/02	584.37		0.72			583.65		
MW-15	01/03/02	586.65	17.02	18	0.98	0.8265	569.46	0.5	
MW-15	01/09/02	586.65	16.86	17.81	0.95	0.8265	569.63	0.5	
MW-15	01/17/02	586.65	17.16	18.08	0.92	0.8265	569.33		
MW-15	01/23/02	586.65	16.97	17.9	0.93	0.8265	569.52	0.5	
MW-15	02/06/02	586.65	16.89	17.92	1.03	0.8265	569.58	0.75	
MW-15	02/13/02	586.65	16.94	17.97	1.03	0.8265	569.53	0.75	
MW-15	02/20/02	586.65	16.5	17.81	1.31	0.8265	569.92	1.25	
MW-15	03/01/02	586.65	16.16	17.44	1.28	0.8265	570.27	1.25	
MW-15	03/06/02	586.65	15.81	16.71	0.9	0.8265	570.68	0.5	
MW-15	03/14/02	586.65	16.63	17.74	1.11	0.8265	569.83	1	
MW-15	03/21/02	586.65	15.9	17.17	1.27	0.8265	570.53	1	
MW-15	03/28/02	586.65	16.6	17.82	1.22	0.8265	569.84	1	
MW-16	01/17/02	589.66		3.96			585.70		
MW-17	01/17/02	588.39		4.06			584.33		
MW-36	01/18/02								DESTROYED
MW-37	01/18/02	589.8		5.14			584.66		
MW-9	01/17/02	588.5		5.53			582.97		
RW-6	01/17/02	581.99		0			581.99		WATER WAS AT TOP OF CASING
EASTERN TANK YARD AREA (ETYA)									

Table 1. Summary of Water-Level, Product Thickness and Product Bailing Data
Buffalo Terminal, ExxonMobil Oil Corporation, Buffalo, New York

Well Designation	Date	Measuring Point Elevation (ft msl)	Depth to Product (ft)	Depth to Water (ft)	Product Thickness (ft)	Specific Gravity	Corrected Elevation (ft msl)	Product Bailed (gal)	Comments
B-6MW	01/23/02	596.35		25.38			570.97		
B-6MW	02/06/02	596.35		24.5			571.85		
LF-1S	01/17/02	596.27							COULD NOT FIND-BURIED UNDER SNOW
LF-2D	01/17/02	581.83		11.72			570.11		
LF-2S	01/17/02	581.77		6.96			574.81		
LF-3	01/17/02	596.17	24.09	24.22	0.13	0.8	572.05		
LF-4	01/17/02	594.87		27.7			567.17		
LF-5	01/17/02	597.62		25.45			572.17		
LF-6	01/03/02	598.14	27.29	27.3	0.01	0.8	570.85		
LF-6	01/09/02	598.14		27.13			571.01		
LF-6	01/17/02	598.14		27.18			570.96		
LF-6	01/23/02	598.14	27.1	27.11	0.01	0.8	571.04		
LF-6	02/01/02	598.14		25.56			572.58		
LF-6	02/06/02	598.14	26.53	26.58	0.05	0.8	571.60		
LF-7	01/17/02	598.28		25.87			572.41		
LF-8	01/17/02	596.99		21.81			575.18		
MW-1URS	01/10/02	594.82		13.82			581.00		
MW-1URS	01/17/02	594.82		13.62			581.20		
MW-1URS	02/06/02	594.82		12.38			582.44		
MW-28	01/03/02	599.91	29.01	29.03	0.02	0.8	570.90		SOLAR-POWERED PRODUCT PUMP IN WELL SINCE 4/5/01
MW-28	01/09/02	600.63	28.74	28.75	0.01	0.8	571.89		SOLAR-POWERED PRODUCT PUMP IN WELL SINCE 4/5/01, 2.74 DTP IN DRUM. WELL RESURVEYED IN 1/02.
MW-28	01/17/02	600.63	29	29.01	0.01	0.8	570.91		SOLAR-POWERED PRODUCT PUMP IN WELL SINCE 4/5/01, 2.74 DTP IN DRUM
MW-28	01/23/02	600.63	29.02	29.04	0.02	0.8	571.61		SOLAR-POWERED PRODUCT PUMP IN WELL SINCE 4/5/01, 2.74 DTP IN DRUM
MW-28	01/31/02	600.63	29.45	29.49	0.04	0.8	570.45		SOLAR-POWERED PRODUCT PUMP IN WELL SINCE 4/5/01, 2.74 DTP IN DRUM
MW-28	02/06/02	600.63	28.14	28.15	0.01	0.8	571.77		SOLAR-POWERED PRODUCT PUMP IN WELL SINCE 4/5/01, 2.74 DTP IN DRUM
MW-28	02/13/02	600.63							SOLAR-POWERED PRODUCT PUMP IN WELL SINCE 4/5/01, 2.74 DTP IN DRUM
MW-28	02/20/02	600.63							SOLAR-POWERED PRODUCT PUMP IN WELL SINCE 4/5/01, 2.74 DTP IN DRUM
MW-28	03/01/02	600.63							SOLAR-POWERED PRODUCT PUMP IN WELL SINCE 4/5/01, 2.74 DTP IN DRUM
MW-28	03/06/02	600.63							SOLAR-POWERED PRODUCT PUMP IN WELL SINCE 4/5/01, 2.74 DTP IN DRUM
MW-28	03/14/02	600.63							SOLAR-POWERED PRODUCT PUMP IN WELL SINCE 4/5/01, 2.74 DTP IN DRUM
MW-28	03/21/02	600.63							SOLAR-POWERED PRODUCT PUMP IN WELL SINCE 4/5/01, 2.74 DTP IN DRUM
MW-28	03/28/02	600.63							SOLAR-POWERED PRODUCT PUMP IN WELL SINCE 4/5/01, 2.74 DTP IN DRUM
MW-2URS	01/17/02	581.83		13.14			568.69		
MW-39	01/09/02	596.21		23.22			572.99		
MW-39	01/18/02	596.21		23.87			572.34		
MW-39	01/22/02	596.21	24.98	25.02	0.04	0.8	571.22		
MW-39	01/23/02	596.21	24.9	24.94	0.04	0.8	571.30		
MW-39	02/01/02	596.21	15.35	15.36	0.01	0.8	580.86		
MW-39	02/06/02	596.21	18.93	18.94	0.01	0.8	577.28		
MW-3URS	01/17/02	598.63		27.38		0.8822	571.25		
MW-4URS	01/10/02	594.59		23.69			570.90		
MW-4URS	01/17/02	594.59		23.28			571.31		

Table 1. Summary of Water-Level, Product Thickness and Product Bailing Data
Buffalo Terminal, ExxonMobil Oil Corporation, Buffalo, New York

Well Designation	Date	Measuring Point Elevation (ft msl)	Depth to Product (ft)	Depth to Water (ft)	Product Thickness (ft)	Specific Gravity	Corrected Elevation (ft msl)	Product Bailed (gal)	Comments
MW-4URS	02/06/02	594.59		23.08			571.51		
MW-5URS	01/17/02	595.36		14.02			581.34		
P-15	01/17/02	597.04	25.74	25.98	0.24	0.88	571.27		
P-15	02/13/02	597.04	25.5	25.56	0.06	0.88	571.53		
P-15	02/20/02	597.04	25.81	25.96	0.15	0.88	571.21		
P-15	03/01/02	597.04	25.08	25.3	0.22	0.88	571.93		
P-15	03/06/02	597.04	25.35	25.62	0.27	0.88	571.66		
P-15	03/14/02	597.04	25.65	25.74	0.09	0.88	571.38		
P-15	03/21/02	597.04	25.72	25.77	0.05	0.88	571.31		
P-15	03/28/02	597.04	25.67	25.76	0.09	0.88	571.36		
SB-74	01/17/02	599.1		27.1			572.00		
SB-75	01/17/02	599.86		27.53			572.33		
SB-76	01/17/02	600.96		26.12			574.84		
SB-78	01/10/02	598.97		22.58			576.39		
SB-78	01/17/02	598.97		22.4			576.57		
SB-78	02/06/02	598.97		21.41			577.56		
SB-79	01/17/02	599.26		25.91			573.35		
SB-80	01/17/02	599.11		25.98			573.13		
SB-81	01/17/02	597.81		25.33			572.48		
SB-82	01/17/02	596.83		24.37			572.46		
SB-83	01/17/02	596.61		23.15			573.46		
SB-84	01/17/02	594.55		21.18			573.37		
SB-85	01/17/02	593.65		17.85			575.80		
SB-86	01/17/02	582.53		7.2			575.33		
W-1	01/17/02	595.98		17.54			578.44		
FORMER REFINERY AREA (FRA)									
B-1MW	01/17/02	590.31		2.92			587.39		
MW-29	01/03/02	586.36	9.18	9.34	0.16	0.8	577.15		
MW-29	01/16/02	586.36	5.91	6.02	0.11	0.8	580.43		
MW-29	01/18/02	586.36	6.36	6.42	0.06	0.8	579.99		
MW-29	01/23/02	586.36	7.39	7.48	0.09	0.8	578.95		
MW-29	02/06/02	586.36	5.48	5.55	0.07	0.8	580.87		
MW-29	02/20/02	586.36	7.04	7.14	0.1	0.8	579.30		
MW-29	03/01/02	586.36	7.42	7.49	0.07	0.8	578.93		
MW-29	03/06/02	586.36	7.37	7.41	0.04	0.8	578.98		
MW-29	03/14/02	586.36	7.4	7.42	0.02	0.8	578.96		
MW-29	03/21/02	586.36	7.65	7.69	0.04	0.8	578.70		
MW-29	03/28/02	586.36	8.15	8.18	0.03	0.8	578.20		
MW-30	01/03/02	587.40	12.14	12.30	0.16	0.8	575.23		
MW-30	01/09/02	587.40		10.89			576.51		
MW-30	01/16/02	587.40		10.53			576.87		
MW-30	01/18/02	587.4		11.18			576.22		
MW-30	01/22/02	587.4	12.12	12.25	0.13	0.8	575.25		
MW-30	01/23/02	587.4	11.67	11.83	0.16	0.8	575.70		
MW-30	02/06/02	587.4	10.67	10.68	0.01	0.8	576.73		
MW-31	01/18/02	588.67		4.09			584.58		
MW-34	01/18/02	591.64		5.78			585.86		
MW-5	01/17/02	585.77	7.92	7.98	0.06	0.8922	577.84		
MW-6	01/17/02	585.99		16.48			569.51		
MW-7	01/17/02	586.36				0.9593			NOT GAUGED-PRODUCT TOO THICK
RW-4	01/17/02	581.91	14.28	14.36	0.08	0.8433	567.62		
RW-5	01/17/02	581.98	17.51	17.6	0.09	0.8529	564.46		
RW-5	03/01/02	581.98	11.5	14.75	3.25	0.8529	570.00	7	PRODUCT PUMP DOWN, WELL MANUALLY BAILED
RW-5	03/06/02	581.98	11.57	12.9	1.33	0.8529	570.21	3	PRODUCT PUMP DOWN, WELL MANUALLY BAILED
SB-12	01/17/02	582.74							COULD NOT FIND-BURIED UNDER SNOW
NORTHEAST PROCESS AND STORAGE AREA (NPSA)									
B-2MW	01/17/02	588.45		5.59			582.86		
BTC-4	01/17/02	590.46							COULD NOT FIND-BURIED UNDER SNOW
BTC-5	01/17/02	590.6							COULD NOT FIND-BURIED UNDER SNOW
MW-38	01/18/02	589.12		5.12			584.00		
SOUTHERN TANK YARD AREA (STYA)									
ESI-1	01/03/02	586.69	17.91	21.06	3.15	0.8236	568.22	2.5	
ESI-1	01/09/02	586.69	17.78	21.07	3.29	0.8236	568.33	2.75	

Table 1. Summary of Water-Level, Product Thickness and Product Bailing Data
Buffalo Terminal, ExxonMobil Oil Corporation, Buffalo, New York

Well Designation	Date	Measuring Point Elevation (ft msl)	Depth to Product (ft)	Depth to Water (ft)	Product Thickness (ft)	Specific Gravity	Corrected Elevation (ft msl)	Product Bailed (gal)	Comments
ESI-1	01/17/02	586.69	17.82	20.11	2.29	0.8236	568.47		
ESI-1	01/23/02	586.69	17.69	21.02	3.33	0.8236	568.41	3.25	
ESI-1	02/01/02	586.69	17.22	21.2	3.98	0.8236	568.77	3.5	
ESI-1	02/06/02	586.69	17.46	19.96	2.5	0.8236	568.79	3	
ESI-1	02/13/02	586.69	17.43	21.03	3.6	0.8236	568.62	3	
ESI-1	02/20/02	586.69	17.23	21.5	4.27	0.8236	568.71	3.5	
ESI-1	03/01/02	586.69	16.88	21.11	4.23	0.8236	569.06	4	
ESI-1	03/06/02	586.69	16.35	21.03	4.68	0.8236	569.51	4.75	
ESI-1	03/14/02	586.69	16.49	21.05	4.56	0.8236	569.40	4.25	
ESI-1	03/21/02	586.69	15.92	20.81	4.89	0.8236	569.91	5	
ESI-1	03/28/02	586.69	16.58	20.51	3.93	0.8236	569.42	4.25	
ESI-2	01/17/02	586.5	16.45	16.92	0.47	0.8338	569.97		
ESI-2	02/06/02	586.5	16.68	19.48	2.8	0.8338	569.35	3	
ESI-2	02/13/02	586.5	15.44	17.1	1.66	0.8338	570.78	2	
ESI-2	02/20/02	586.5	16.55	16.74	0.19	0.8338	569.92		
ESI-2	03/01/02	586.5	16.02	16.25	0.23	0.8338	570.44		
ESI-2	03/06/02	586.5	15.76	16.05	0.29	0.8338	570.69		
ESI-2	03/14/02	586.5	16.1	16.38	0.28	0.8338	570.35		
ESI-2	03/21/02	586.5	15.9	16.17	0.27	0.8338	570.56		
ESI-2	03/28/02	586.5	16.19	16.45	0.26	0.8338	570.27		
ESI-3	01/10/02	588.32	19.82	19.85	0.03	0.8	568.49		
ESI-3	01/17/02	588.32	19.83	19.92	0.09	0.8	568.47		
ESI-3	02/06/02	588.32	19.24	19.3	0.06	0.8	569.07		
ESI-4	01/10/02	583.49		15.1			568.39		
ESI-4	01/17/02	583.49		15.9			567.59		
ESI-4	02/06/02	583.49		15.88			567.61		
ESI-5	01/17/02	586.97		11.77		0.856	575.20		
MW-10	01/17/02	584.78	10.65	12.79	2.14	0.7976	573.70		
MW-10	02/13/02	584.78	10.12	12.4	2.28	0.7976	574.20	2	
MW-10	02/20/02	584.78	10.25	10.89	0.64	0.7976	574.40		
MW-10	03/01/02	584.78	11	11.55	0.55	0.7976	573.67		
MW-10	03/06/02	584.78	10.77	11.49	0.72	0.7976	573.86		
MW-10	03/14/02	584.78	10.76	11.43	0.67	0.7976	573.88		
MW-10	03/21/02	584.78	10.7	11.35	0.65	0.7976	573.95		
MW-10	03/28/02	584.78	10.95	11.6	0.65	0.7976	573.70		
MW-12	01/03/02	586.68	16.85	16.96	0.11	0.8811	569.82		
MW-12	01/10/02	586.68	16.92	16.95	0.03	0.8811	569.76		
MW-12	01/17/02	586.68	17.09	17.21	0.12	0.8811	569.58		
MW-12	01/23/02	586.68	16.62	16.74	0.12	0.8811	570.05		
MW-12	02/01/02	586.68	15.78	16.75	0.97	0.8811	570.78	1	
MW-12	02/06/02	586.68	16.24	16.36	0.12	0.8811	570.43		
MW-14	01/17/02	586.91	18.15	19.6	1.45	0.8128	568.49		
MW-14	03/01/02	586.91				0.8128			PRODUCT PUMP IN WELL SINCE 9/2000
MW-14	03/06/02	586.91				0.8128			PRODUCT PUMP IN WELL SINCE 9/2000
MW-14	03/14/02	586.91				0.8128			PRODUCT PUMP IN WELL SINCE 9/2000
MW-14	03/21/02	586.91				0.8128			PRODUCT PUMP IN WELL SINCE 9/2000
MW-14	03/28/02	586.91				0.8128			PRODUCT PUMP IN WELL SINCE 9/2000
MW-18	01/03/02	582.88	Ice	Ice				0	PASSIVE BAILER IN WELL SINCE 3/30/01, BAILER REMOVED 1/02
MW-18	01/10/02	582.88	14.22	15.24	1.02	0.8212	568.48	1	
MW-18	01/17/02	582.88	14.2	15.16	0.96	0.8212	568.51		
MW-18	01/23/02	582.88	13.84	14.44	0.6	0.8212	568.93	0.25	
MW-18	02/06/02	582.88	13.49	14.52	1.03	0.8212	569.21	0.75	
MW-18	02/13/02	582.88	13.9	14.82	0.92	0.8212	568.82	1	
MW-18	02/20/02	582.88	13.73	15.87	2.14	0.8212	568.77	2.25	
MW-18	03/01/02	582.88	13.45	14.48	1.03	0.8212	569.25	1.5	
MW-18	03/06/02	582.88	13.12	14.84	1.72	0.8212	569.45	1.25	
MW-18	03/14/02	582.88	13.02	14.09	1.07	0.8212	569.67	1.25	
MW-18	03/21/02	582.88	12.28	12.72	0.44	0.8212	570.52		
MW-18	03/28/02	582.88	12.84	13.56	0.72	0.8212	569.91	0.75	
MW-20	01/02/02	585.97	16.5	16.55	0.05	0.8702	569.46		
MW-20	01/10/02	585.97	16.27	16.29	0.02	0.8702	569.70		
MW-20	01/17/02	585.97	16.61	16.86	0.25	0.8702	569.33		

Table 1. Summary of Water-Level, Product Thickness and Product Bailing Data
Buffalo Terminal, ExxonMobil Oil Corporation, Buffalo, New York

Well Designation	Date	Measuring Point Elevation (ft msl)	Depth to Product (ft)	Depth to Water (ft)	Product Thickness (ft)	Specific Gravity	Corrected Elevation (ft msl)	Product Bailed (gal)	Comments
MW-20	02/01/02	585.97	16.41	16.47	0.06	0.8702	569.55		
MW-20	02/06/02	585.97	16.34	16.41	0.07	0.8702	569.62	0.75	
MW-20	02/13/02	585.97	16.4	16.46	0.06	0.8702	569.56		
MW-20	02/20/02	585.97	15.86	15.97	0.11	0.8702	570.10		
MW-20	03/01/02	585.97	15.84	15.92	0.08	0.8702	570.12		
MW-20	03/06/02	585.97	15.65	15.71	0.06	0.8702	570.31		
MW-20	03/14/02	585.97	15.79	15.89	0.1	0.8702	570.17		
MW-20	03/21/02	585.97	15.86	15.95	0.09	0.8702	570.10		
MW-20	03/28/02	585.97	15.82	15.91	0.09	0.8702	570.14		
MW-21	01/10/02	582.69		15.57			567.12		
MW-21	01/17/02	582.69		16.29			566.40		
MW-21	02/06/02	582.69		16.86			565.83		
MW-32	01/18/02	585.59		10.56			575.03		
MW-33	01/18/02	584.62		7.4			577.22		
MW-35	01/18/02	590.65		5.35			585.30		
RW-1	01/17/02	581.8	14.69	14.88	0.19	0.8	567.07		
RW-2	01/09/02	581.61	11.85	16.25	4.4	0.8	568.88	6	
RW-2	01/17/02	581.61	12.22	13.67	1.45	0.8	569.10		
RW-2	01/23/02	581.61	11.56	12.8	1.24	0.8	569.80	1.25	
RW-2	02/06/02	581.61	14.56	14.96	0.4	0.8	566.97	0.75	
RW-2	02/13/02	581.61	13.84	14.43	0.59	0.8	567.65	0.75	
RW-2	02/20/02	581.61	13.23	14.62	1.39	0.8	568.10	2.25	
RW-2	03/01/02	581.61	9.82	10.9	1.08	0.8	571.57	1.5	
RW-2	03/06/02	581.61	9.97	10.01	0.04	0.8	571.63		
RW-2	03/14/02	581.61	13.01	13.05	0.04	0.8	568.59		
RW-2	03/21/02	581.61		12.87			568.74		
RW-2	03/28/02	581.61	12.57	12.57	0	0.8	569.04		
RW-3	01/17/02	583.21	18.6	18.89	0.29	0.8	564.55		

Table 2. Summary of Volatile Organic Compounds Detected in Groundwater During January 2002 Quarterly Sampling Round, ExxonMobil Oil Corporation, Buffalo Terminal, Buffalo, New York.

Parameter (Concentrations in µg/L)	**Sample Designation:**	B-1MW	B-2MW	B-3MW	B-4MW	B-5MW(RR)	B-6MW	ESI-4
	Sample Date:	01/23/02	01/22/02	01/21/02	01/21/02	01/21/02	01/23/02	01/22/02
	Geographic Area:	FRA	NPSA	BSPA	BSPA	AOOA	ETYA	STYA
Benzene		1 U	1 U	1 U	1 U	210	1 U	1000
Toluene		1 U	1 U	1 U	1 U	3.6 J	1 U	17
Ethylbenzene		1 U	1 U	1 U	1 U	5.3	1 U	8.8
Xylenes (total)		3 U	3 U	3 U	3 U	30 J	3 U	27
	Total BTEX:	0	0	0	0	248.9	0	1052.8
1,2,4-Trimethylbenzene		1 U	1 U	1 U	1 U	2.6 J	0.3	6.4
1,3,5-Trimethylbenzene		1 U	1 U	1 U	1 U	1.4 J	1 U	13
Isopropylbenzene		1 U	1 U	1 U	1 U	1.4 J	1 U	33
MTBE		1 U	1 U	1 U	1 U	5 U	1.7	43
n-Butylbenzene		1 U	1 U	0.2 J	1 U	5 U	1 U	12
n-Propylbenzene		1 U	1 U	1 U	1 U	5 U	1 U	37
Naphthalene		1 U	1 U	1 U	1 U	5 U	1 U	14
p-Isopropyltoluene		1 U	1 U	1 U	1 U	5 U	1 U	20 U
sec-Butylbenzene		1 U	1 U	0.3 J	1 U	5 U	1 U	8.3
tert-Butylbenzene		1 U	1 U	1 U	1 U	5 U	1 U	20 U
	Total VOCs:	0	0	0.5	0	254.3	2	1219.5

Notes:
U - Not Detected
J - Estimated concentration
µg/L - Micrograms per liter
VOCs - Volatile Organic Compounds

Table 2. Summary of Volatile Organic Compounds Detected in Groundwater During January 2002 Quarterly Sampling Round, ExxonMobil Oil Corporation, Buffalo Terminal, Buffalo, New York.

Parameter (Concentrations in µg/L)	Sample Designation: / Sample Date: / Geographic Area:	LF-2S 01/22/02 ETYA	MW-13 01/21/02 CRPA	MW-16 01/23/02 CRPA	MW-17 01/21/02 CRPA	MW-1URS 01/22/02 ETYA	MW-2 01/21/02 BSPA	MW-21 01/21/02 STYA
Benzene		7.1	38	570	1 U	1 U	0.2 J	0.5 J
Toluene		0.3	1.2	59	1 U	1 U	1 U	0.2 J
Ethylbenzene		1.4	2.5	520	0.3 J	1 U	1 U	1 U
Xylenes (total)		1.4	2.7 J	2300	0.3 J	3 U	3 U	0.4 J
	Total BTEX:	10.2	44.4	3449	0.6	0	0.2	1.1
1,2,4-Trimethylbenzene		0.3	0.4 J	1200	0.2 J	0.7	1 U	0.3 J
1,3,5-Trimethylbenzene		0.2	0.3 J	210	1 U	1 U	1 U	1 U
Isopropylbenzene		1.6	2.6	24	1 U	1 U	1 U	0.3 J
MTBE		1 U	1 U	67	1 U	0.5	1 U	2
n-Butylbenzene		2.4	0.9 J	150	1 U	0.4	1 U	1 U
n-Propylbenzene		0.9	1.5	100	0.3 J	0.2	1 U	0.2 J
Naphthalene		2 U	1 U	230	1 U	1.7	1 U	1 U
p-Isopropyltoluene		1 U	1 U	16	0.3 J	1 U	1 U	1 U
sec-Butylbenzene		1.3	1 J	50 U	0.5 J	0.2	1 U	0.5 J
tert-Butylbenzene		0.6	0.5 J	50 U	0.3 J	1 U	1 U	0.2 J
	Total VOCs:	17.5	51.6	5446	2.2	3.7	0.2	4.6

Notes:
U - Not Detected
J - Estimated concentration
µg/L - Micrograms per liter
VOCs - Volatile Organic Compounds

Table 2. Summary of Volatile Organic Compounds Detected in Groundwater During January 2002 Quarterly Sampling Round, ExxonMobil Oil Corporation, Buffalo Terminal, Buffalo, New York.

Parameter (Concentrations in µg/L)	**Sample Designation:** / **Sample Date:** / **Geographic Area:**	MW-22 01/21/02 BSPA	MW-24 01/21/02 BSPA	MW-26 01/21/02 BSPA	MW-31 01/22/02 FRA	MW-32 01/23/02 STYA	MW-33 01/23/02 STYA	MW-34 01/23/02 FRA	MW-35 01/23/02 STYA	MW-37 01/23/02 CRPA
Benzene		95	5 U	1.2	0.7	880	2.3	15	0.3	0.9
Toluene		2 U	5 U	0.6 J	0.6	510	0.4	14	0.3	0.5
Ethylbenzene		2 U	5 U	0.7 J	1.5	740	3.9	3.8	0.3	2
Xylenes (total)		2.9 J	15 U	13	2.4	7800	4.6	24	1.9	3.5
	Total BTEX:	97.9	0	15.5	5.2	9930	11.2	56.8	2.8	6.9
1,2,4-Trimethylbenzene		11	5 U	35	5.2	2600	8.5	3.4	55	1.8
1,3,5-Trimethylbenzene		2.9	5 U	0.3 J	2.3	850	8.8	1.1	2.6	1
Isopropylbenzene		6.6	2.9 J	5.6	0.7	39	4	5 U	14	1.8
MTBE		0.7 J	310	1 U	1 U	50 U	1 U	5 U	1 U	1 U
n-Butylbenzene		8.8	1.1 J	4.5	3.5	290	14	1	5.9	2.2
n-Propylbenzene		6.4	1.1 J	7.9	1.1	84	14	5 U	11	1.9
Naphthalene		10 U	3.7 J	2 U	1.8	490	10 U	2.8	2 U	2 U
p-Isopropyltoluene		10 U	5 U	0.4 J	0.6	14	1.5	5 U	0.7	0.9
sec-Butylbenzene		10	1.5 J	1.8	0.6	50 U	4.7	5 U	8	1.4
tert-Butylbenzene		4.5	5 U	0.4 J	0.2	50 U	1.2	5 U	0.6	0.8
	Total VOCs:	148.8	320.3	71.4	21.2	14297	67.9	65.1	100.6	18.7

Notes:
U - Not Detected
J - Estimated concentration
µg/L - Micrograms per liter
VOCs - Volatile Organic Compounds

Table 2. Summary of Volatile Organic Compounds Detected in Groundwater During January 2002 Quarterly Sampling Round, ExxonMobil Oil Corporation, Buffalo Terminal, Buffalo, New York.

Parameter (Concentrations in µg/L)	**Sample Designation:** **Sample Date:** **Geographic Area:**	MW-38 01/23/02 NPSA	MW-4URS 01/22/02 ETYA	MW-5URS 01/22/02 ETYA	MW-9 01/21/02 CRPA	SB-11/LB-1 01/21/02 BSPA	SB-20 01/21/02 BSPA	SB-31 01/21/02 BSPA	SB-37 01/21/02 BSPA	SB-75 01/22/02 ETYA
Benzene		0.4	1 U	1 U	750	23	2400	1 U	0.4 J	85
Toluene		1 U	1 U	1 U	13	3.4	40 J	1 U	1 U	0.7
Ethylbenzene		1 U	1 U	1 U	6.1 J	2.5	290	1 U	1 U	1 U
Xylenes (total)		0.9	3 U	3 U	17.4 J	3.8 J	743	0.4 J	3 U	3 U
	Total BTEX:	1.3	0	0	786.5	32.7	3473	0.4	0.4	85.7
1,2,4-Trimethylbenzene		0.9	1 U	1 U	19	2.7	460	0.3 J	0.5 J	1 U
1,3,5-Trimethylbenzene		0.3	1 U	1 U	5.1 J	0.4 J	130	1 U	1 U	1 U
Isopropylbenzene		1 U	1 U	1 U	33	4.2	36 J	0.2 J	0.5 J	0.4
MTBE		1 U	1 U	1 U	10 U	2 U	38 J	1.5	1 U	11
n-Butylbenzene		0.5	1 U	1 U	16	5.1	67	1 U	1.2	1 U
n-Propylbenzene		0.2	1 U	1 U	71	11	76	0.3 J	0.4 J	1 U
Naphthalene		1.9	0.3	1 U	13	5 U	68	1 U	4	1 U
p-Isopropyltoluene		0.8	1 U	1 U	10 U	5 U	10 J	0.3 J	1 U	1 U
sec-Butylbenzene		1 U	1 U	1 U	9.3 J	2.5	22 J	1 U	1.1	1 U
tert-Butylbenzene		1 U	1 U	1 U	10 U	0.9 J	50 U	1 U	0.5 J	1 U
	Total VOCs:	5.9	0.3	0	952.9	59.5	4380	3	8.6	97.1

Notes:

U - Not Detected

J - Estimated concentration

µg/L - Micrograms per liter

VOCs - Volatile Organic Compounds

Table 2. Summary of Volatile Organic Compounds Detected in Groundwater During January 2002 Quarterly Sampling Round, ExxonMobil Oil Corporation, Buffalo Terminal, Buffalo, New York.

Parameter (Concentrations in µg/L)	Sample Designation: / Sample Date: / Geographic Area:	SB-78 01/22/02 ETYA	SB-83 01/22/02 ETYA
Benzene		1 U	1 U
Toluene		1 U	1 U
Ethylbenzene		1 U	1 U
Xylenes (total)		3 U	3 U
	Total BTEX:	0	0
1,2,4-Trimethylbenzene		1 U	1 U
1,3,5-Trimethylbenzene		1 U	1 U
Isopropylbenzene		1 U	1 U
MTBE		1 U	1 U
n-Butylbenzene		1 U	1 U
n-Propylbenzene		1 U	1 U
Naphthalene		1 U	1 U
p-Isopropyltoluene		1 U	1 U
sec-Butylbenzene		1 U	1 U
tert-Butylbenzene		1 U	1 U
	Total VOCs:	0	0

Notes:
U - Not Detected
J - Estimated concentration
µg/L - Micrograms per liter
VOCs - Volatile Organic Compounds

Table 3. Summary of Semivolatile Organic Compounds Detected in Groundwater During January 2002 Quarterly Sampling Round, ExxonMobil Oil Corporation, Buffalo Terminal, Buffalo, New York.

Parameter (Concentrations in µg/L)	**Sample Designation:** / **Sample Date:** / **Geographic Area:**	B-1MW 01/23/02 FRA	B-2MW 01/22/02 NPSA	B-3MW 01/21/02 BSPA	B-4MW 01/21/02 BSPA	B-5MW(RR) 01/21/02 AOOA	B-6MW 01/23/02 ETYA	ESI-4 01/22/02 STYA
Acenaphthene		10 U	11 U	10 U	10 U	10 U	10 U	4
Anthracene		10 U	11 U	10 U	10 U	10 U	10 U	3
Benzo[a]anthracene		10 U	11 U	1 J	10 U	10 U	10 U	2
Benzo[a]pyrene		10 U	11 U	3 J	10 U	10 U	10 U	1
Benzo[b]fluoranthene		10 U	11 U	5 J	10 U	10 U	10 U	10 U
Benzo[g,h,i]perylene		10 U	11 U	3 J	10 U	10 U	10 U	10 U
Benzo[k]fluoranthene		10 U	11 U	2 J	10 U	10 U	10 U	10 U
Chrysene		10 U	11 U	2 J	10 U	10 U	10 U	3
Dibenzo[a,h]anthracene		10 U	11 U	10 U	10 U	10 U	10 U	10 U
Fluoranthene		10 U	11 U	2 J	10 U	10 U	10 U	2
Fluorene		10 U	11 U	10 U	10 U	10 U	10 U	9
Indeno[1,2,3-cd]pyrene		10 U	11 U	4 J	10 U	10 U	10 U	10 U
Naphthalene		10 U	11 U	2 J	10 U	10 U	10 U	10 U
Phenanthrene		10 U	11 U	1 J	10 U	10 U	10 U	12
Pyrene		10 U	11 U	5 J	10 U	10 U	10 U	9
	Total SVOCs:	0	0	30	0	0	0	45

Notes:
U - Not Detected
J - Estimated concentration
µg/L - Micrograms per liter
SVOCs - Semivolatile Organic Compounds

Table 3. Summary of Semivolatile Organic Compounds Detected in Groundwater During January 2002 Quarterly Sampling Round, ExxonMobil Oil Corporation, Buffalo Terminal, Buffalo, New York.

Parameter (Concentrations in µg/L)	**Sample Designation:**	LF-2S	MW-13	MW-16	MW-17	MW-1URS	MW-2	MW-21
	Sample Date:	01/22/02	01/21/02	01/23/02	01/21/02	01/22/02	01/21/02	01/21/02
	Geographic Area:	ETYA	CRPA	CRPA	CRPA	ETYA	BSPA	STYA
Acenaphthene		10 U	10 U	5	1 J	2	11 U	10 U
Anthracene		10 U	10 U	48 U	1 J	10 U	1 J	10 U
Benzo[a]anthracene		10 U	10 U	48 U	11 U	10 U	4 J	10 U
Benzo[a]pyrene		10 U	10 U	48 U	11 U	10 U	11	10 U
Benzo[b]fluoranthene		10 U	10 U	48 U	11 U	10 U	16	10 U
Benzo[g,h,i]perylene		10 U	10 U	48 U	11 U	10 U	18	10 U
Benzo[k]fluoranthene		10 U	10 U	48 U	11 U	10 U	7 J	10 U
Chrysene		10 U	10 U	48 U	11 U	10 U	6 J	10 U
Dibenzo[a,h]anthracene		10 U	10 U	48 U	11 U	10 U	4 J	10 U
Fluoranthene		10 U	10 U	48 U	1 J	1	7 J	10 U
Fluorene		10 U	10 U	6	4 J	3	11 U	10 U
Indeno[1,2,3-cd]pyrene		10 U	10 U	48 U	11 U	10 U	18	10 U
Naphthalene		10 U	10 U	270	2 J	10 U	11 U	10 U
Phenanthrene		10 U	10 U	11	2 J	6	2 J	10 U
Pyrene		10 U	10 U	48 U	3 J	2	9 J	10 U
	Total SVOCs:	0	0	292	14	14	103	0

Notes:
U - Not Detected
J - Estimated concentration
µg/L - Micrograms per liter
SVOCs - Semivolatile Organic Compounds

Table 3. Summary of Semivolatile Organic Compounds Detected in Groundwater During January 2002 Quarterly Sampling Round, ExxonMobil Oil Corporation, Buffalo Terminal, Buffalo, New York.

Parameter (Concentrations in µg/L)	Sample Designation: / Sample Date: / Geographic Area:	MW-22 01/21/02 BSPA	MW-24 01/21/02 BSPA	MW-26 01/21/02 BSPA	MW-31 01/22/02 FRA	MW-32 01/23/02 STYA	MW-33 01/23/02 STYA	MW-34 01/23/02 FRA	MW-35 01/23/02 STYA	MW-37 01/23/02 CRPA
Acenaphthene		3 J	2 J	11 U	10 U	8	1	10 U	16	3
Anthracene		2 J	1 J	11 U	10 U	4	10 U	1	5	1
Benzo[a]anthracene		4 J	10 U	11 U	10 U	12	10 U	2	14	2
Benzo[a]pyrene		2 J	10 U	11 U	10 U	5	10 U	3	30	2
Benzo[b]fluoranthene		1 J	10 U	11 U	10 U	4	10 U	2	15	2
Benzo[g,h,i]perylene		10 U	10 U	11 U	10 U	2	10 U	4	39	2
Benzo[k]fluoranthene		10 U	10 U	11 U	10 U	10 U	10 U	10 U	3	10 U
Chrysene		5 J	10 U	11 U	10 U	15	10 U	2	14	3
Dibenzo[a,h]anthracene		10 U	10 U	11 U	10 U	3	10 U	1	11	10 U
Fluoranthene		4 J	10 U	11 U	10 U	4	10 U	1	6	2
Fluorene		4 J	3 J	11 U	10 U	8	1	10 U	27	4
Indeno[1,2,3-cd]pyrene		10 U	10 U	11 U	10 U	2	10 U	2	15	10 U
Naphthalene		1 J	10 U	11 U	2	370	2	2	3	3
Phenanthrene		6 J	10 U	11 U	10 U	21	1	2	62	8
Pyrene		18	3 J	11 U	10 U	14	2	4	71	6
	Total SVOCs:	50	9	0	2	472	7	26	331	38

Notes:
U - Not Detected
J - Estimated concentration
µg/L - Micrograms per liter
SVOCs - Semivolatile Organic Compounds

Table 3. Summary of Semivolatile Organic Compounds Detected in Groundwater During January 2002 Quarterly Sampling Round, ExxonMobil Oil Corporation, Buffalo Terminal, Buffalo, New York.

Parameter (Concentrations in µg/L)	**Sample Designation:**	MW-38	MW-4URS	MW-5URS	MW-9	SB-11/LB-1	SB-20	SB-31	SB-37
	Sample Date:	01/23/02	01/22/02	01/22/02	01/21/02	01/21/02	01/21/02	01/21/02	01/21/02
	Geographic Area:	NPSA	ETYA	ETYA	CRPA	BSPA	BSPA	BSPA	BSPA
Acenaphthene		1	10 U	10 U	4 J	1 J	36	11 U	9 U
Anthracene		1	10 U	10 U	10 U	10 U	15	11 U	9 U
Benzo[a]anthracene		5	10 U	10 U	10 U	10 U	10	11 U	9 U
Benzo[a]pyrene		3	10 U	10 U	10 U	10 U	7 J	1 J	9 U
Benzo[b]fluoranthene		3	10 U	10 U	10 U	10 U	5 J	2 J	9 U
Benzo[g,h,i]perylene		2	10 U	10 U	10 U	10 U	4 J	1 J	9 U
Benzo[k]fluoranthene		1	10 U	10 U	10 U	10 U	1 J	11 U	9 U
Chrysene		15	10 U	10 U	10 U	10 U	14	2 J	9 U
Dibenzo[a,h]anthracene		10 U	10 U	10 U	10 U	10 U	2 J	11 U	9 U
Fluoranthene		6	10 U	10 U	10 U	10 U	12	3 J	9 U
Fluorene		2	10 U	10 U	6 J	2 J	53	11 U	9 U
Indeno[1,2,3-cd]pyrene		2	10 U	10 U	10 U	10 U	2 J	1 J	9 U
Naphthalene		2	10 U	10 U	1 J	2 J	110	11 U	9 U
Phenanthrene		5	10 U	10 U	11	10 U	150	11 U	9 U
Pyrene		8	10 U	10 U	2 J	2 J	43	3 J	9 U
	Total SVOCs:	56	0	0	24	7	464	13	0

Notes:
U - Not Detected
J - Estimated concentration
µg/L - Micrograms per liter
SVOCs - Semivolatile Organic Compounds

Table 3. Summary of Semivolatile Organic Compounds Detected in Groundwater During January 2002 Quarterly Sampling Round, ExxonMobil Oil Corporation, Buffalo Terminal, Buffalo, New York.

Parameter (Concentrations in µg/L)	Sample Designation: / Sample Date: / Geographic Area:	SB-75 01/22/02 ETYA	SB-78 01/22/02 ETYA	SB-83 01/22/02 ETYA	SB-114 01/21/02 NTYA	SB-148 01/21/02 FRA	SB-154 01/21/02 FRA	SB-181 01/21/02 STYA
Acenaphthene		11 U	13 U	10 U	400 U	500 U	2900	430 U
Anthracene		11 U	13 U	10 U	400 U	690	5300	430 U
Benzo[a]anthracene		11 U	13 U	10 U	950	1900	8400	430 U
Benzo[a]pyrene		11 U	13 U	10 U	1200	2200	7300	500
Benzo[b]fluoranthene		11 U	13 U	10 U	1500	2400	7700	660
Benzo[g,h,i]perylene		11 U	13 U	10 U	890	1600	3900	760
Benzo[k]fluoranthene		11 U	13 U	10 U	580	1200	3300	430 U
Chrysene		11 U	13 U	10 U	1000	1700	8100	430 U
Dibenzo[a,h]anthracene		11 U	13 U	10 U	400 U	500 U	1400	430 U
Fluoranthene		11 U	13 U	10 U	1800	4200	20000	450
Fluorene		11 U	13 U	10 U	400 U	500 U	2800	430 U
Indeno[1,2,3-cd]pyrene		11 U	13 U	10 U	930	1700	4900	510
Naphthalene		11 U	13 U	10 U	400 U	500 U	1300	430 U
Phenanthrene		11 U	13 U	10 U	620	2500	21000	430 U
Pyrene		11 U	13 U	10 U	1700	3400	17000	520
	Total SVOCs:	0	0	0	11170	23490	115300	3400

Notes:
U - Not Detected
J - Estimated concentration
µg/L - Micrograms per liter
SVOCs - Semivolatile Organic Compounds

Table 4. Monitoring Well and Recovery Well Construction Details, Buffalo Terminal, ExxonMobil Oil Corporation, Buffalo, New York

Designation	Type	Northing	Easting	Measuring Point Elevation (ft msl)	Land Surface Elevation (ft msl)	Depth of Well (ft bls)	Depth of Screen Top (ft bls)	Depth of Screen Bottom (ft bls)	Diameter (inches)
B-1MW	MW	1044457.50	1080872.50	590.31	588.3	9.3	1.3	9.3	4
B-2MW	MW	1044007.40	1082062.51	588.45	584.9	13	1	13	4
B-3MW	MW	1044327.70	1080211.61	586.82	584.5	10.7	3.7	10.7	4
B-4MW	MW	1043890.50	1080152.91	587.05	584.3	13	3	13	4
B-5MW(RR)	MW	1043634.30	1081294.81	587.54	585.31	10	2	10	4
B-6MW	MW	1042699.80	1082456.00	596.35	594	27.5	17.5	27.5	4
ESI-1	MW	1043019.30	1081468.49	586.69	583.1	23	6.3	21.3	4
ESI-2	MW	1042959.40	1081706.10	586.50	583	23	11.5	21.5	4
ESI-3	MW	1042920.30	1081328.01	588.32	584.5	23	12.5	22.5	4
ESI-4	MW	1042731.50	1081543.00	583.49	582.2	21	8.5	18.5	4
LF-1S	MW	1042645.90	1082324.10	596.27	594.3	30	15	30	2
LF-2D	MW	1042477.80	1081587.81	581.83	579.6	31	26	31	2
LF-2S	MW	1042475.40	1081591.19	581.77	579.5	17	5	17	2
LF-3	MW	1042654.80	1082247.81	596.17	594.1	34	16	36	4
LF-4	MW	1042715.00	1082408.40	594.87	595.6	36	16	36	4
LF-5	MW	1042656.80	1082384.61	597.62	595	37	17	37	4
LF-6	MW	1042608.10	1082280.09	598.14	595.8	36	16	36	4
LF-7	MW	1042549.90	1082142.10	598.28	596.1	38	18	38	4
LF-8	MW	1042479.00	1081852.81	596.99	594.8	37	17	37	4
MW-1	MW	1043594.70	1080134.59	582.13	582.5	20	7	20	4
MW-10	MW	1043173.50	1081017.69	584.78	582.7	17	7	17	4
MW-12	MW	1043065.90	1081247.91	586.68	582.8	22.5	7.5	22.5	4
MW-13	MW	1043202.10	1081345.49	584.37	584.6	20	1	20	4
MW-14	MW	1042883.40	1081552.20	586.91	581.8	22	10	22	4
MW-15	MW	1043051.30	1081606.51	586.65	584.3	22.4	7.4	22.4	4
MW-16	MW	1043313.10	1081727.10	589.15	586.12	14.5	0.3	14.8	4
MW-17	MW	1043592.80	1081111.00	588.39	585	15	2	15	4
MW-18	MW	1043013.10	1081189.10	582.88	583.2	28	10	28	4
MW-1URS	MW	1043236.00	1082398.71	594.82	593.9	21.5	11.3	21.5	2
MW-2	MW	1043520.90	1080173.61	583.09	583.5	18.5	8.5	18.5	4
MW-20	MW	1042733.60	1081225.80	585.97	583.1	25	10	25	4
MW-21	MW	1042595.70	1081422.49	582.69	583.1	28	10	28	4
MW-22	MW	1043210.80	1080322.10	582.36	582.6	20	5	20	4
MW-23	MW	1043247.50	1080276.90	586.14	586.6	25	5	25	4
MW-24	MW	1043593.90	1080226.70	583.67	584.1	20	5	20	4

Table 4. Monitoring Well and Recovery Well Construction Details, Buffalo Terminal, ExxonMobil Oil Corporation, Buffalo, New York

Designation	Type	Northing	Easting	Measuring Point Elevation (ft msl)	Land Surface Elevation (ft msl)	Depth of Well (ft bls)	Depth of Screen Top (ft bls)	Depth of Screen Bottom (ft bls)	Diameter (inches)
MW-25	MW	1043604.70	1080319.40	583.28	583.8	20	5	20	4
MW-26	MW	1043792.80	1080421.80	584.87	585.3	8	0.7	8	4
MW-27	MW	1043509.60	1080229.90	582.69	583.7	27	7	27	4
MW-28	MW	1042564.90	1082272.30	599.91	596.3	32	22	32	2
MW-29	MW	1043431.60	1080522.69	586.36	583.33	22	2	22	4
MW-2URS	MW	1042518.20	1081667.59	581.83	579.3	16	5.8	16	2
MW-3	MW	1043443.20	1080131.21	581.72	582.4	21.5	8.5	21.5	4
MW-3 URS	MW	1043443.20	1080131.21	599.58	596.37	21.5	8.5	21.5	2
MW-30	MW	1043359.91	1080729.93	587.40	584.78	22	2	22	4
MW-31	MW	1043616.49	1080597.57	588.67	585.83	22	2	22	4
MW-32	MW	1043081.40	1080994.41	585.59	582.75	22	2	22	4
MW-33	MW	1042847.98	1081186.70	584.62	581.94	27	2	27	4
MW-34	MW	1044279.96	1080644.60	591.64	588.44	10	2	10	4
MW-35	MW	1044233.30	1080978.31	590.65	588.07	10	2	10	4
MW-37	MW	1043293.21	1081601.54	589.80	587.08	9	1.5	9	4
MW-38	MW	1043888.69	1082155.88	589.12	586.39	17	2	17	4
MW-39	MW	1042767.78	1082281.82	596.21	594.26	31	6	31	4
MW-4URS	MW	1042834.60	1082726.89	594.59	592.2	29.3	19.2	29.3	2
MW-5	MW	1043384.30	1080515.19	585.77	583	17	7	17	4
MW-5URS	MW	1042865.60	1081982.41	595.36	593.6	23	12.8	23	2
MW-6	MW	1043164.00	1080494.49	585.99	583.2	17	2	17	4
MW-7	MW	1043104.50	1080625.50	586.36	583.7	18.5	8.5	18.5	4
MW-9	MW	1043436.10	1081018.20	588.50	585.4	18	3	18	4
P-15	MW	1042685.60	1082332.70	597.04	594.1	25	21.5	25	2
SB-11/LB-1	MW	1043305.00	1080190.91	582.08	582.1	24	7	24	4
SB-12	MW	1043113.70	1080462.99	582.74	583	18	3	18	2
SB-13	MW	1043532.30	1080236.99	583.44	583.9	15	5	15	4
SB-14	MW	1043232.10	1080357.31	584.79	582.8	23	5	23	4
SB-16	MW	1043684.50	1080352.71	583.81	584	17	5	17	4
SB-17	MW	1043625.30	1080264.49	583.53	583.8	20	5	20	4
SB-19	MW	1043670.00	1080417.09	583.13	583.8	20	5	20	4
SB-20	MW	1043631.90	1080407.59	583.46	583.8	15	5	15	4
SB-28	MW	1043795.50	1080384.21	588.13	585.3	15	5	15	4
SB-31	MW	1043666.50	1080113.80	581.92	582.6	15	5	15	4
SB-37	MW	1043355.86	1080150.72	583.10	NA	20	5	20	4

Table 4. Monitoring Well and Recovery Well Construction Details, Buffalo Terminal, ExxonMobil Oil Corporation, Buffalo, New York

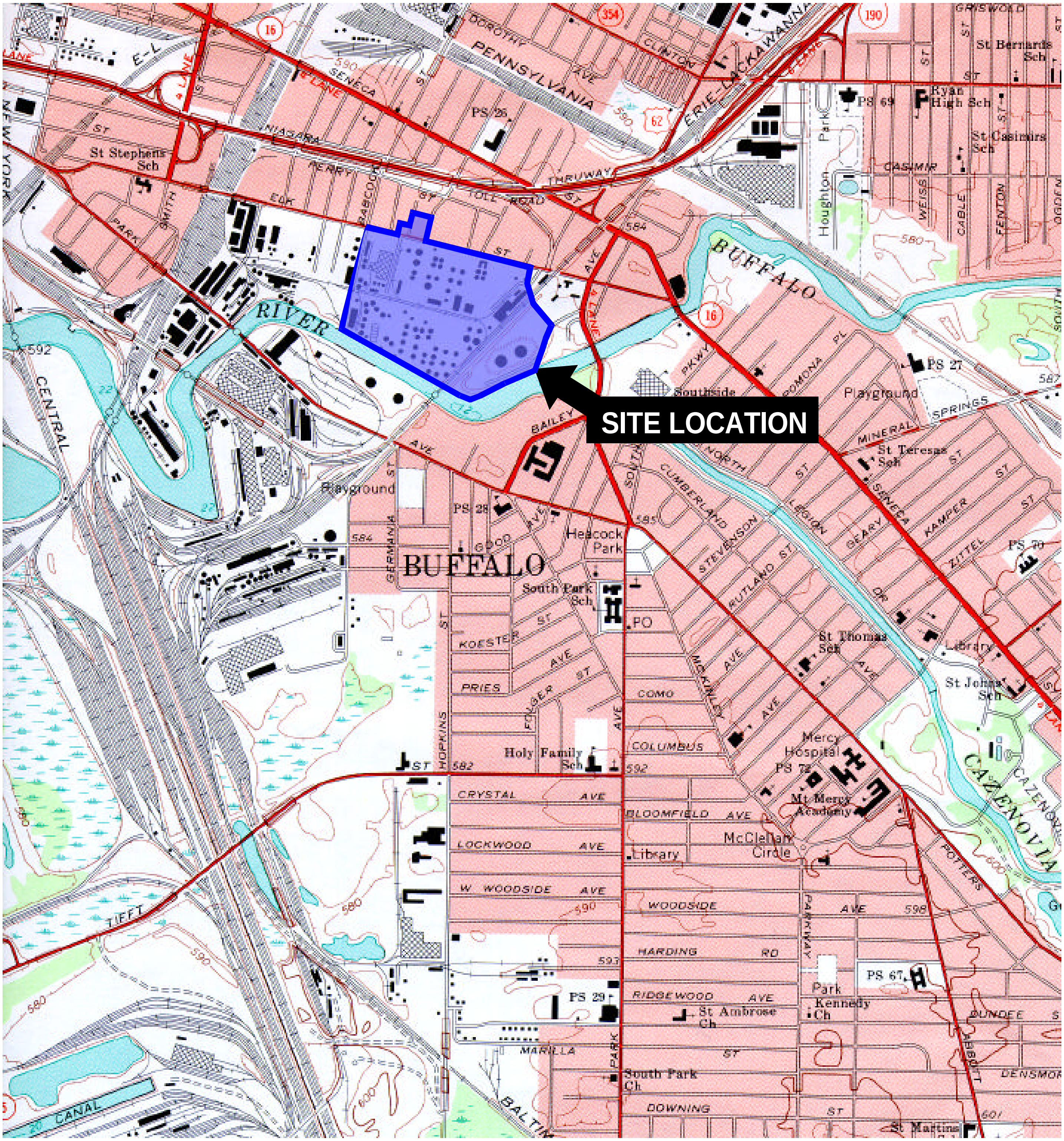
Designation	Type	Northing	Easting	Measuring Point Elevation (ft msl)	Land Surface Elevation (ft msl)	Depth of Well (ft bls)	Depth of Screen Top (ft bls)	Depth of Screen Bottom (ft bls)	Diameter (inches)
SB-39	MW	1043289.41	1080177.56	581.73	NA	20	5	20	4
SB-74	MW	1042641.40	1082427.60	599.10	596.6	36	16	36	2
SB-75	MW	1042545.50	1082228.10	599.86	596.9	36	16	36	2
SB-76	MW	1042524.10	1082180.20	600.96	597.7	35	15	35	2
SB-78	MW	1042484.50	1082084.00	598.97	595.6	35	15	35	2
SB-79	MW	1042470.30	1082030.30	599.26	596.4	36	16	36	2
SB-80	MW	1042460.40	1081985.90	599.11	596.4	39	19	39	2
SB-81	MW	1042446.40	1081936.80	597.81	594.9	39	19	39	2
SB-82	MW	1042440.70	1081896.50	596.83	594	39	19	39	2
SB-83	MW	1042448.10	1081840.40	596.61	593.6	38	18	38	2
SB-84	MW	1042444.90	1081795.80	594.55	591.8	34	13	34	2
SB-85	MW	1042509.00	1081755.90	593.65	590.8	31	11	31	2
SB-86	MW	1042513.20	1081712.90	582.53	579.5	22.5	2.5	22.5	2
W-1	MW	1042605.50	1082115.09	595.98	593.6	27	17	27	4
RW-1	RW	1043021.20	1081198.41	581.80	582.9	28	10	25	8
RW-2	RW	1042857.90	1081571.30	581.61	583.1	27	10	25	8
RW-3	RW	1043129.40	1081043.69	583.21	584.6	27	5	25	8
RW-4	RW	1043241.50	1080679.30	581.91	583.7	27	5	25	8
RW-5	RW	1043356.40	1080494.41	581.98	583.1	30	3	28	8
RW-6	RW	1043075.90	1081517.99	581.99	583.8	25	8	23	8

ft msl = Feet above mean sea level
ft bls = Feet below land surface
NA = Not available

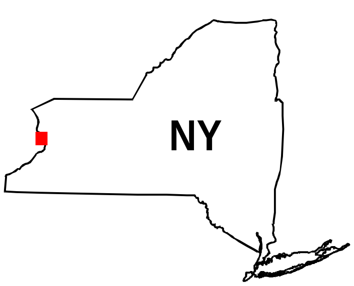
Table 5. Preliminary Schedule for Aquifer Testing
Buffalo Terminal, ExxonMobil Oil Corporation, Buffalo, New York

Task	Day	Status of Existing Recovery Systems	Field Activities	Staff
Aquifer Recovery	Day 1	EWPS and WWPS Off	Measure water levels 2 times/day	GES
	Day 2			
Step Testing	Day 3	EWPS and WWPS Off	Step Test at RW-7 (STYA)	Roux/GES
	Day 4		Step Test at RW-9 (STYA)	
	Day 5	EWPS and WWPS On	Step Test at RW-8 (ETYA)	
Aquifer Recovery	Day 6	EWPS and WWPS Off	Measure water levels with miniTrolls and manual measurements	GES
	Day 7			
Pump Testing	Day 8	EWPS and WWPS Off	Pump Test at RW-7 (STYA)	Roux/GES
	Day 9		Aquifer Recovery Period	
	Day 10	EWPS and WWPS On	Pump Test at RW-8 (ETYA)	
	Day 11		Aquifer Recovery Period	
Aquifer Recovery	Day 12	EWPS Off and WWPS On	Measure water levels with miniTrolls and manual measurements	GES
	Day 13			
Pump Testing	Day 14	EWPS Off and WWPS On	Pump Test at RW-9 (STYA)	Roux/GES
	Day 15		Aquifer Recovery Period	

Note: Dual-phase recovery systems will be shut off on Day 1 and remain off through all aquifer testing.
EWPS = Eastern leg of the well point system
WWPS = Western leg of the well point sysetm



QUADRANGLE LOCATION



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SOURCE:
USGS; 1965, Buffalo SE, New York
7.5 Minute Topographic Quadrangle

0 2000'

Title:

SITE LOCATION MAP

BUFFALO TERMINAL

Prepared for:

EXXONMOBIL OIL CORPORATION

ROUX ASSOCIATES, INC.
Environmental Consulting & Management

Compiled by: N.C.	Date: 16APR02	FIGURE
Prepared by: G.M.	Scale: AS SHOWN	1
Project Mgr.: N.C.	Office: NY	
File No.: MC5218302.CDR	Project No.: 17252Y04	

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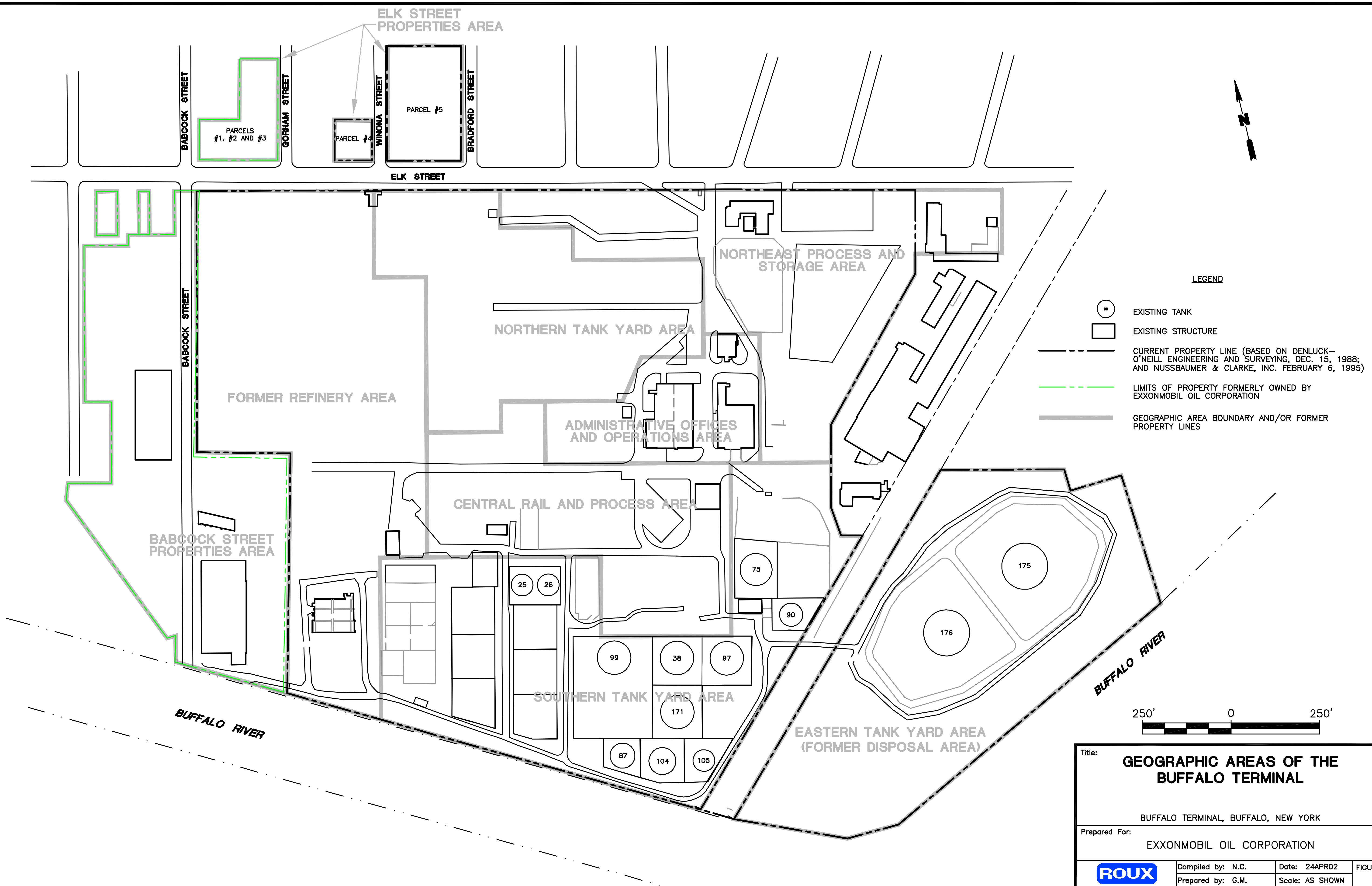

Title:

GEOGRAPHIC AREAS OF THE BUFFALO TERMINAL

BUFFALO TERMINAL, BUFFALO, NEW YORK

Prepared For:

EXXONMOBIL OIL CORPORATION

ROUX

ROUX ASSOCIATES, INC.
Environmental Consulting & Management

Compiled by: N.C.	Date: 24APR02	FIGURE
Prepared by: G.M.	Scale: AS SHOWN	2
Project Mgr: N.C.	Office: NY	
File No: MC5218303	Project: 17252Y04	

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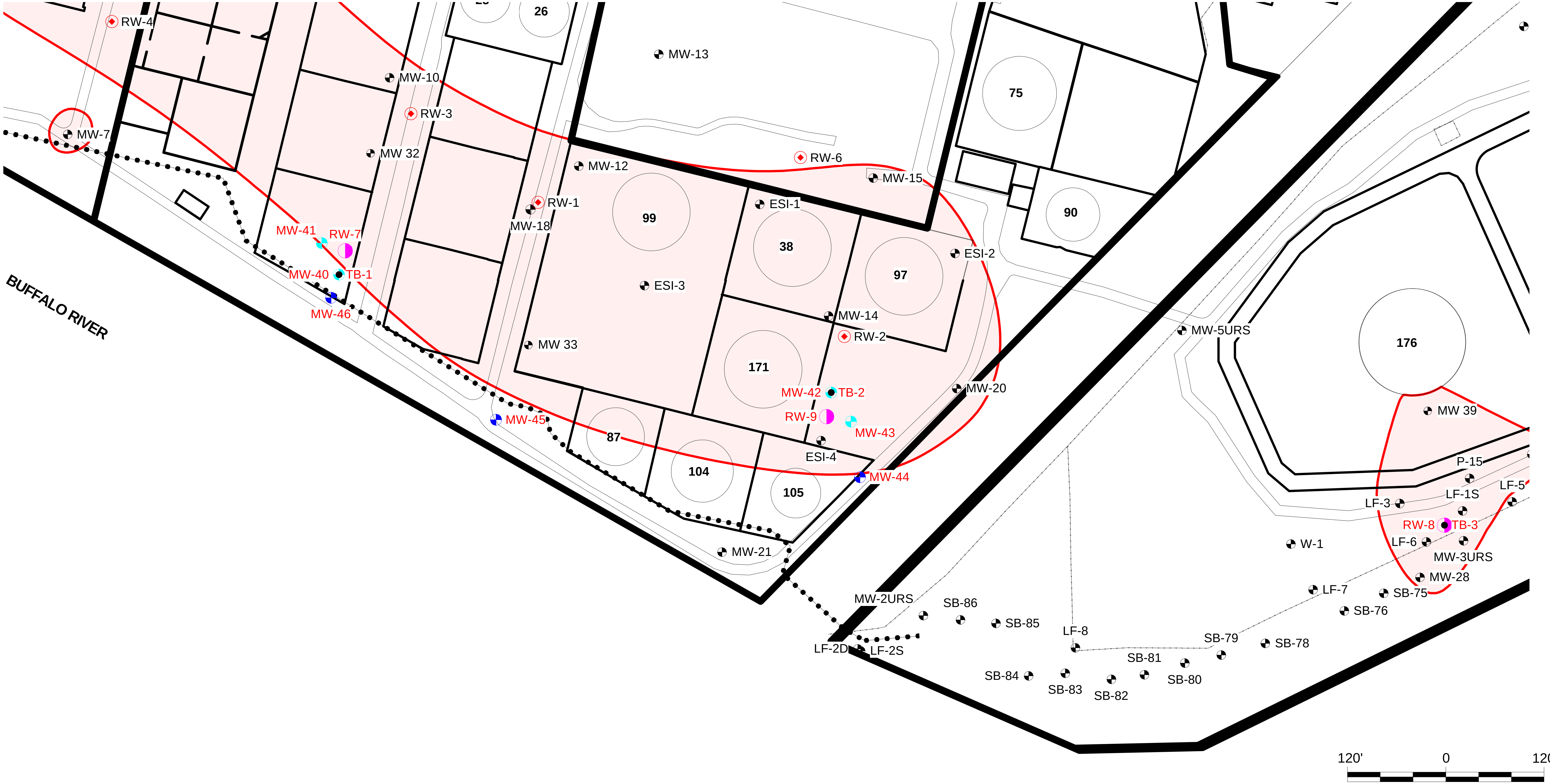

EXPLANATION

RW-1	LOCATION AND DESIGNATION OF EXISTING RECOVERY WELL
MW-18	LOCATION AND DESIGNATION OF EXISTING MONITORING WELL
RW-7	LOCATION AND DESIGNATION OF PROPOSED 10-INCH DIAMETER RECOVERY WELL
TB-1	LOCATION AND DESIGNATION OF PROPOSED TEST BOREHOLE
MW-40	LOCATION AND DESIGNATION OF PROPOSED 4-INCH DIAMETER MONITORING WELL WITH A 2-INCH DIAMETER PIEZOMETER INSIDE
MW-44	LOCATION AND DESIGNATION OF PROPOSED 2-INCH DIAMETER MONITORING WELL
	HORIZONTAL EXTENT OF HISTORICAL AND CURRENT FREE-PRODCT PLUME AS OF JANUARY 2001

N

Title:

PROPOSED WELL LOCATIONS

BUFFALO TERMINAL, BUFFALO, NEW YORK

Prepared For:

EXXONMOBIL OIL CORPORATION

ROUX ASSOCIATES INC
Environmental Consulting & Management

Compiled by: S.S.	Date: 4/24/02	FIGURE
Prepared by: S.S.	Scale: AS SHOWN	3
Project Mgr: N.C.	Office: NY	
File No: MC5218301.WOR	Project: 17252Y	

APPENDIX A

ROUX ASSOCIATES, INC.
Standard Operating Procedure for
Conducting a Constant-Rate (Pumping)
Test and Recovery Test

Date: May 5, 2000

1.0 PURPOSE

The purpose for this standard operating procedure (SOP) is to describe the methods to be used for conducting constant-rate (pumping) tests and recovery tests. Constant-rate tests are designed to measure the response of an aquifer to stress imposed on it (i.e., pumping or injection of water). In the constant-rate test, the well is pumped or recharged at a constant rate for a significant period of time, usually 24 hours or longer. Pumping tests are conducted to quantify hydraulic coefficients and characterize boundary conditions. Pumping tests can also be used to qualitatively or quantitatively evaluate the degree of hydraulic connection between and within flow systems which is particularly applicable to bedrock ground-water systems where hydraulic parameter determination may not be possible.

Drawdown is measured throughout the test at preselected time intervals to provide the data necessary to quantitatively characterize the aquifer. Automatic water-level records may be used which provide a detailed, continuous drawdown record and are periodically checked by manually measuring the water level with a steel tape and chalk or an electronic sounding device (m-scope).

Pumping tests are generally the easiest aquifer tests to interpret, and can provide the most accurate, quantitative information; thus pumping tests are favored when conditions are suitable (i.e., when hydrogeologic conditions are such that the system can sustain a properly designed constant-rate pumping test).

Measurements of water-level recovery after the pump is shutdown may be used to confirm the results of the drawdown test. Additionally, problems such as those created by a fluctuating pumping rate and corresponding drawdown measurements during the drawdown phase can be eliminated during the recovery phase (which is not effected by pumpage). Therefore, data loggers and/or the automatic recorders should remain in operation to measure the extended recovery period of the water levels to provide a suitable database in the event that recovery data analysis is undertaken.

2.0 EQUIPMENT AND MATERIALS

2.1 The following items may be needed for aquifer testing:

a. Electronic sounding device (m-scope).

b. Steel tape (in 0.01-foot increments) and chalk (e.g., blue carpenter's).

c. Data loggers and pressure transducers.

d. Field forms (i.e., Daily Log, Pumping Test, and Well Inspection Checklist) and study notebook.

e. Rain gauge.

f. Barometer.

g. Stop watch or watch with second display/hand.

h. Pump.

i. Extension cord(s) or generator and fuel/power supply.

j. Water-level recorders (e.g., Stevens type).

k. Flashlights/illumination.

l. Stream gauge and/or tide gauge.

m. Shelter.

n. In-line flow meter and/or orifice and manometer.

o. Valve(s).

p. On-site holding tanks or tank trucks, or treatment capability.

q. Discharge line (leak free).

r. Water-quality meters (pH, conductivity, temperature).

s. Extra batteries (flashlight, meters).

t. Non-absorbent cord (e.g., polypropylene).

u. Portable personal computer (PC), appropriate cables, software, and floppy disks.

v. Five-gallon bucket.

w. Clean cloth or paper towel.

x. Non-phosphate, laboratory-grade detergent solution.

y. Distilled or deionized water and potable water.

3.0 DECONTAMINATION

3.1 Make sure all equipment that enters the well(s) is(are) decontaminated and cleaned before use. Use new, clean materials when decontamination is not appropriate (e.g., non-absorbent cord, disposable gloves). Document, and initial and date the decontamination procedures on the appropriate field form (e.g., Daily Log) and in the field notebook.

a. Decontaminate a pump by: 1) wearing disposable gloves, 2) flushing it and the discharge hose (if not disposable) with non-phosphate, laboratory-grade detergent and distilled/deionized or potable water solution, 3) rinsing with potable water, and 4) rinsing or wiping pump-related equipment (electrical lines, cables, discharge hose) with a clean cloth and potable water. If a turbine pump is used, then ensure that all materials that are set in the well or above it (well head) are steam cleaned for decontamination purposes.

b. Decontaminate a transducer and cable by: 1) wearing disposable gloves, 2) wiping transducer-related equipment (e.g., probe, cables) with a clean cloth and non-phosphate, laboratory-grade detergent solution, and 3) rinsing or wiping equipment with a clean cloth and distilled/deionized water or potable water.

c. Decontaminate a float/probe and cable (water-level recorder) by: 1) wearing disposable gloves, 2) wiping equipment with a clean cloth and non-phosphate, laboratory-grade detergent solution, and 3) rinsing or wiping equipment with a clean cloth and distilled/deionized water or potable water.

d. Decontaminate a steel measuring tape or electronic sounding device (m-scope) by: 1) wearing disposable gloves, 2) wiping water-level measurement equipment with a clean cloth and non-phosphate, laboratory-grade detergent solution, and 3) rinsing or wiping equipment with a clean cloth and distilled/deionized water or potable water.

4.0 PROCEDURE

4.1 Inspect the protective casings of the wells and the well casings, and note any items of concern such as a missing lock, or bent or damaged casing(s). Complete a Well Inspection Checklist for each well, and initial and date upon completion.

4.2 Enter all pertinent data concerning the pumping well, piezometers and/or observation wells, to be measured on the Pumping Test form, appropriate field forms (e.g. Daily Log form) and the study notebook.

4.3 Measure water levels (depth to water below a predetermined measuring point [MP]) in the pumping well and all piezometers and/or observation wells (synoptic round of water-level measurements) to an accuracy of 0.01 foot at least one day prior to the pumping test. Document the water levels, and initial and date data entries. The synoptic round of water-level measurements will include wells and piezometers inside and outside of the influence (impact) of the area tested.

4.4 Sound (measure the total depth) the test well and each well and/or piezometer measured in the synoptic round to an accuracy of 0.01 foot. Document the sounded depth, and initial and date data entries. Compare the sounded depth to the as-built total well/piezometer depth to ensure no appreciable sanding or silting (clogging) has occurred. If appreciable clogging has taken place, then the well or piezometer must be redeveloped to re-establish good hydraulic connection between the well or piezometer and the aquifer. Wells and piezometers must respond quickly to changes in water levels.

4.5 Establish background wells and/or piezometers to measure water-level trends outside the influence of the pumping well.

4.6 Install precleaned transducers and program data loggers, and/or install precleaned floats/probes and set up recorders on several, select wells and/or piezometers for an extended period of time (e.g., one week) prior to the test to monitor water-level trends throughout the test area. At least two hours of readings at quarter-hour to half-hour intervals should be collected immediately prior to start-up of the test. If water levels in the aquifer are fluctuating, then more readings will be necessary. Water-level fluctuation data may be needed to correct aquifer test data.

4.7 Obtain as many pretest (nonpumping), synoptic water-level readings as possible to provide a sound background water-level data base. If available, dedicate an individual to collect continuous, synoptic water-level measurements on the day of the test, from the time of arrival onsite to the start of the test.

4.8 Set up a rain gauge onsite to measure precipitation before, during, and after the test. Monitor the rain gauge on a regular basis, particularly if the tested aquifer is shallow. If precipitation is occurring at the beginning of the test, then the test should be postponed until optimum meteorological conditions prevail and water levels, if changing, return to static conditions. If needed, precipitation data collected during the test (after start-up) will be used to correct aquifer test data affected by recharge.

4.9 Set up a continuous recording barometer onsite to measure barometric pressure before, during, and after the test. If needed, data from this instrument will be used to correct aquifer test data for changes in barometric pressure during the pumping test.

4.10 Install a stream or tide gauge to measure changes in stream stage or tidal fluctuations before, during, and after the test if the pumping test site is located near a surface-water body. If needed, this data will be used to correct aquifer test data for changes in surface-water body elevations.

4.11 Ensure that the pumping system selected for the test is properly installed including the power supply and leak-free discharge line complete with a valve(s), flow meter, or manometer and orifice.

4.12 Make arrangements to dispose of the pumped water in an appropriate manner. If the pumped water is contaminated, then disposal may be via treatment and discharge, trucking offsite, etc. Water that is discharged onsite must be a substantial distance from the test site to preclude adversely affecting the test (e.g., recharging the aquifer during testing and influencing water levels).

4.13 Make sure that the proper transducers (data loggers) and gear ratios (water-level recorders) are used to measure the full anticipated range of drawdown in the wells and/or piezometers.

4.14 Install a precleaned transducer (which is preferred over manual measurement devices, e.g., steel tape and chalk or m-scope) in the test well, connect it to the data logger, and verify that the equipment is working. Program the data logger accordingly, using the PC and appropriate software.

4.15 Install precleaned transducers and program data loggers, and/or install precleaned floats/probes and set up recorders in select piezometers and/or observation wells to be monitored during the test (e.g., those impacted by the test, those serving as background). Verify that the equipment is working.

4.16 Conduct a step-drawdown (step) test several days before the scheduled constant-rate pumping test to check the performance of the pumping well and establish the pumping rate to be used for the final test. (Refer to the SOP for conducting a step-drawn test.) Use both automatic and manual water-level measuring devices to measure water levels in the wells and record appropriate measurements on the Pumping Test form and in the field notebook. The rate chosen for the pumping test will be the maximum rate the well can produce and sustain in order to stress the aquifer as much as possible.

4.17 Set the discharge line valve(s) so they will be preset and marked for the desired pumping rate (obtained from the step test).

4.18 Check that the in-line flow meter and/or manometer is indicating that the pumping rate is the same as that selected from the step test. It is preferred to use both devices to measure and monitor discharge to provide a check and a back up.

4.19 Begin the pumping test only after the water level in the aquifer has returned to the nonpumping (static) conditions observed prior to the step test.

4.20 Check that all equipment is functioning properly before starting the test (e.g., transducers and data loggers, automated water-level recorders, m-scopes, valves in proper position, generator running properly and sufficient fuel [if needed], power supply, etc.)

4.21 Synchronize all watches prior to the test.

4.22 Begin the pumping test on the hour or half-hour and pump at a constant rate until sufficient data is collected to analyze the test (at least 24 hours or longer if needed). Some pumping tests may require several days (sometimes up to and exceeding 1 week) to collect the data needed to analyze the test.

4.23 Measure water levels (drawdown) on a specified schedule. An example of the frequency of measurements to produce a uniform plot of water-level data on a logarithmic scale follows:

Elapsed Time (minutes)	Frequency of Measurement
0 - 1	Every 15 seconds
1 - 5	Every 30 seconds
5 - 10	Every minute
10 - 30	Every 2 minutes
30 - 60	Every 5 minutes
60 - 120	Every 10 minutes
120 - 180	Every 20 minutes
180 - 360	Every 30 minutes
360 - 1,440	Every hour
1,440 - 2,880	Every 2 hours
2,880 - end of test	Every 4 hours

4.24 Check the drawdown measurements obtained with the automated water-level measuring devices (on a regular basis) manually using a m-scope and/or a steel tape and chalk to an accuracy of 0.01 foot. If a recorder is used, then "tick" recorders and document the time next to each "tick" in the chart. Manual measurements should be made as close to the established schedule as possible. However, if a reading is missed, then take a measurement as soon as possible after the scheduled reading and record the actual time. This will maintain the time versus drawdown relationship needed to analyze the test data. Record water-level data on the Pumping Test form, and initial and date data entry.

4.25 Check the discharge rate using the in-line flow meter and/or manometer on a regular basis. If adjustments have to be made to maintain the constant pumping rate, then adjust the valve. Record readings and adjustments (if made) on the Pumping Test form and the field notebook, and initial and date data entry.

4.26 Measure temperature, pH, and conductivity of discharged water on a periodic, regular basis. Record data on the Pumping Test form and in the field notebook, and initial and date data entry.

4.27 Note any changes, throughout the pumping test, that are pertinent to the test such as changes in water color or turbidity, time and length of any temporary pump shut down, effects of any nearby pumping wells, precipitation events, etc. Document these notes on the Pumping Test form and in the field notebook, and initial and date data entry.

4.28 Measure water levels in the pumping well and as many piezometers and/or wells as practical (to an accuracy of 0.01 foot) following recovery procedures if there is a shutdown, no matter how brief.

4.29 Measure water levels together during a change in personnel for at least one period of measurement to ensure consistency. Note the personnel change and time on the Pumping Test form and in the field notebook, and initial and date data entry.

4.30 Begin plotting the drawdown verses time data, when time allows, on the appropriate graph paper (semi-logarithmic and/or full logarithmic) to perform a preliminary analysis of the data for hydraulic coefficients and determine if the pumping test can be terminated or has to be extended. Correct drawdown data as needed before plotting (e.g., for dewatering, barometric efficiency, tidal fluctuations, regional trends, etc.)

4.31 Shut down the pumping test at the specified time or when sufficient data has been collected to analyze the pumping test data. Shut down should occur on the hour or half-hour so that recovery starts on the hour or half-hour.

4.32 Close the valve (closest to the pump) as quickly as possible to prevent back flow of water into the pumping well.

4.33 Measure recovery (rise in water levels) to an accuracy of 0.01 foot until water levels return as close as possible to pretest levels. The identical measurement schedule followed for the drawdown phase should be followed during the recovery phase. Automated water-level recorders should be left in select wells and/or piezometers (same ones monitored during pretest) to monitor water levels for an extended period of time (one or more days).

4.34 Collect at least one round of synoptic water-level measurements after water levels have recovered following the test.

4.35 Secure all wells and/or piezometers after the collection of water-level data is completed (i.e., replace cap and/or cover, and lock).

4.36 Clean (decontaminate) all test equipment that came in contact with the ground water according to the appropriate protocol given in Section 3.0. Dispose of all materials that cannot be decontaminated in an appropriate manner (e.g., discharge hose, etc.).

END OF PROCEDURE

Date: May 5, 2000

1.0 PURPOSE

The purpose for this standard operating procedure (SOP) is to describe the methods to be used for conducting step-drawdown (step) tests. A step test is used for any, or all, of the following: 1) to select an appropriate pumping rate for a constant-rate (pumping) test; 2) to estimate long-term well yield; 3) to evaluate well efficiency; and 4) to calculate hydraulic conductivity.

Pumping is started at a low discharge rate (based on the results of well development) and is then increased in steps to stress the aquifer. It is important that the steps be of equal duration and that a fairly wide range in pumping rates be developed from the first step to the last step. Step-drawdown tests are extremely useful in bedrock wells to estimate the depth to the most productive water-bearing fracture zone and provide an indication of the well efficiency. Water-level behavior in the pumping well should be closely watched during the test. If at a second or third step, the pumping water level drops sharply and approaches the maximum available drawdown, then clearly the pumping rate has exceeded the capacity of the formation and the long-term pumping rate must be reduced accordingly.

2.0 EQUIPMENT AND MATERIALS

2.1 The following items may be needed for conducting a step-drawdown test:

a. Electronic sounding device (m-scope).

b. Steel tape (in 0.01-foot increments) and chalk (e.g., blue carpenter's).

c. Data loggers and pressure transducers.

d. Field forms (i.e., Daily Log, Pumping Test, and Well Inspection Checklist) and study notebook.

e. Rain gauge.

f. Barometer.

g. Stop watch or watch with second display/hand.

h. Pump.

i. Generator and fuel/power supply.

j. Water-level recorders (e.g., Stevens type).

k. Flashlights/illumination.

l. Stream gauge and/or tide gauge.

m. Shelter.

n. In-line flow meter and/or orifice and manometer.

o. Valve(s).

p. On-site holding tanks or tank trucks, or treatment capability.

q. Discharge line (leak free).

r. Water-quality meters (pH, conductivity, temperature).

s. Extra batteries (flashlight, meters).

t. Non-absorbent cord (e.g., polypropylene).

u. Portable personal computer (PC), appropriate cables, software, and floppy disks.

v. Five-gallon bucket.

w. Clean cloth or paper towel.

x. Non-phosphate, laboratory-grade detergent solution.

y. Distilled or deionized water and potable water.

3.0 DECONTAMINATION

3.1 Make sure all equipment that enters the well(s) is(are) decontaminated and cleaned before use. Use new, clean materials when decontamination is not appropriate (e.g., non-absorbent cord, disposable gloves). Document, and initial and date the decontamination procedures on the appropriate field form (e.g., Daily Log) and in the field notebook.

a. Decontaminate a pump by: 1) wearing disposable gloves, 2) flushing it and the discharge hose (if not disposable) with non-phosphate, laboratory-grade detergent and distilled/deionized or potable water solution, 3) rinsing with potable water, and 4) rinsing or wiping pump-related equipment (electrical lines, cables, discharge hose) with a clean cloth and potable water. If a turbine pump is used, then ensure that all materials that are set in the well or above it (well head) are steam cleaned for decontamination purposes.

b. Decontaminate a transducer and cable by: 1) wearing disposable gloves, 2) wiping transducer-related equipment (e.g., probe, cables) with a clean cloth and non-phosphate, laboratory-grade detergent solution, and 3) rinsing or wiping equipment with a clean cloth and distilled/deionized water or potable water.

c. Decontaminate a float/probe and cable (water-level recorder) by: 1) wearing disposable gloves, 2) wiping equipment with a clean cloth and non-phosphate, laboratory-grade detergent solution, and 3) rinsing or wiping equipment with a clean cloth and distilled/deionized water or potable water.

d. Decontaminate a steel measuring tape or electronic sounding device (m-scope) by: 1) wearing disposable gloves, 2) wiping water-level measurement equipment with a clean cloth and non-phosphate, laboratory-grade detergent solution, and 3) rinsing or wiping equipment with a clean cloth and distilled/deionized water or potable water.

4.0 PROCEDURE

4.1 Inspect the protective casings of the wells and the well casings, and note any items of concern such as a missing lock, or bent or damaged casing(s). Complete a Well Inspection Checklist for each well, and initial and date upon completion.

4.2 Enter all pertinent data concerning the pumping well, piezometers and/or observation wells, to be measured on the Pumping Test form, appropriate field forms (e.g. Daily Log form) and in the field notebook. Use one Pumping Test form for each well measured.

4.3 Measure water levels (the depth to water below the predetermined measuring point [MP]) in the test well, and all piezometers and/or observation wells to be monitored during the test (synoptic round of water-level measurements) to an accuracy of 0.01 foot prior to the step test. Document the water levels, and initial and date data entries. The synoptic round of water-level measurements will include wells and piezometers inside and outside of the influence (impact) of the area tested.

4.4 Sound (measure the total depth) the test well, and each observation well and/or piezometer measured in the synoptic round to an accuracy of 0.01 foot. Document the sounded depth, and initial and date data entries. Compare the sounded depth to the as-built total depth of the well/piezometer to ensure no appreciable sanding or silting (clogging) has occurred. If appreciable clogging has taken place, then the well or piezometer must be redeveloped to re-establish good hydraulic connection between the well or piezometer and the aquifer. Wells and piezometers must respond quickly to changes in water levels.

4.5 Determine if the step test is to be conducted in an area where water levels can fluctuate during the course of the test (e.g., near pumping or recharge wells, tidal influences, shallow aquifers subject to quick response to precipitation events, etc.); if so, then establish a background well(s) or piezometer(s) to measure water-level trends outside the influence of the test well. Water-level fluctuation data may be needed to correct step-test data.

4.6 Set up a rain gauge, a continuous recording barometer, and/or a continuous recording stream or tide gauge to measure, respectively, precipitation, barometric pressure, and/or surface-water elevation, if site conditions warrant monitoring these parameters (i.e., if any of these stresses have the potential to affect test results). If needed, data from these instruments will be used to correct step-test data for changes in ground-water levels associated with recharge from precipitation, barometric pressure, and/or changes in surface-water elevation.

4.7 Ensure that the pumping system selected for the test is properly installed including the power supply and leak-free discharge line complete with a valve(s), flow meter, and manometer and orifice.

4.8 Make arrangements to dispose of the pumped water in an appropriate manner. If the pumped water is contaminated, then disposal may be via treatment and discharge, trucking offsite, etc. Water that is discharged onsite must be a substantial distance from the test site to preclude adversely affecting the test (e.g., artificially recharging the aquifer during testing and influencing water levels).

4.9 Make sure that the proper transducers (data loggers) and gear ratios (water-level recorders) are used to measure the full anticipated range of drawdown in the well(s) and/or piezometer(s).

4.10 Install a precleaned transducer (which is preferred over manual measurement devices, e.g., steel tape and chalk or m-scope) in the test well, connect it to the data logger, and verify that the equipment is working. Program the data logger accordingly, using the PC and appropriate software.

4.11 Install precleaned transducers and program data loggers, and/or install precleaned floats/probes and set up recorders in select piezometers and/or observation wells to be monitored during the test (e.g., those impacted by the test, those serving as background), and verify that the equipment is working.

4.12 Synchronize all watches prior to the test (if more than one individual is involved in the test).

4.13 Begin the step test on the hour or half-hour and pump at a constant, low rate (e.g., 25 percent of the estimated capacity determined during development).

4.14 Maintain the pumping rate until the water level approaches or achieves stabilization (which usually, but not necessarily, occurs within one to four hours).

4.15 Collect water-level (drawdown) measurements to an accuracy of 0.01 foot on a specified schedule. This schedule will be established based on the response (drawdown versus time) of the well to the pumping stress.

4.16 Check the drawdown measurements obtained with the automated water-level measuring devices (on a regular basis) manually using a m-scope and/or a steel tape and chalk to an accuracy of 0.01 foot. If recorders are used, then "tick" the recorder and document the time next to each "tick" on the chart. Record this data on the Pumping Test form and in the field notebook, and initial and date data entry.

4.17 Check the discharge rate using a 5-gallon bucket and stopwatch or watch with second display/hand, the in-line flow meter and/or manometer (depending on the set-up and pumping rate) on a regular basis. Record readings and adjustments (if made) on the Pumping Test form and in the field notebook, and initial and date data entry.

4.18 Measure temperature, pH, and conductivity of discharged water on a periodic, regular basis. Record data on the Pumping Test form and the field notebook, and initial and date data entry.

4.19 Note any changes, throughout the step test, that are pertinent to the test such as changes in water color or turbidity, time and length of any temporary pump shut down, effects of any nearby pumping wells, precipitation events, etc. Document these notes on the Pumping Test form and in the field notebook, and initial and date data entry.

4.20 Increase the discharge rate incrementally after stabilization or near-stabilization is achieved and maintain the increased rate for the same length of time, if the well can sustain the increased rate. In general, four or more incremental steps follow, such as two, three, four (100 percent of the estimated capacity), and greater than four times the initial rate. The key factors are that the steps be of equal duration and that a fairly wide range in pumping rates be developed from the first step to the last.

4.21 Shut down the step test after the last step and/or the capacity of the well has been exceeded, or when sufficient data has been collected to analyze the step test. Close the valve closest to the pump as quickly as possible to prevent back flow of water into the pumping well.

4.22 Measure recovery (rise in water levels) to an accuracy of 0.01 foot until water levels return as close as possible to pretest levels. The identical measurement schedule followed for the drawdown phase should be followed during the recovery phase. Automated water-level recorders may be left in the test well and select wells/piezometers to monitor water levels for an extended period of time (one or more days) depending on the data collected or data base required. If observation wells and/or piezometers were also monitored during the step test, then collect at least one round of synoptic water-level measurements after water levels have recovered following the test.

4.23 Transfer the data to the PC, if the pressure transducer(s) and data logger were used, on a periodic basis during the test and before monitoring water levels for an extended period of time. This will prohibit loss of test data and "wrapping" (writing over) of data if the storage capacity of the data logger is exceeded.

4.24 Secure the test well, and observation wells and/or piezometers if used, after the collection of water-level data is completed (i.e., replace cap and/or cover, and lock).

4.25 Clean (decontaminate) all test equipment that came in contact with the ground water according to the appropriate protocol given in Section 3.0. Dispose of all materials that cannot be decontaminated in an appropriate manner (e.g., discharge hose, etc.).

END OF PROCEDURE

AREA	Structure Number	Current Structure Name (Original Structure Name)
Northeast Process and Storage Area	21	Leased to Police Community Services (Main Office)
	22	Former Biotreatment Cell
	23	Gated Entrance
Northern Tank Yard Area	35	Sub–Station C
Former Refinery Area	69	Main Inground Oil/Water Separator
	73	Remediation Building (Pump House #25, Fire House)
Central Rail and Process Area	105	Brick Building (Dehydrator/Pipe Line Pump House #38)
	112	Tank Truck Loading Rack
Southern Tank Yard Area	133	Vapor Recovery Unit
Babcock Street Properties Area	135	One Babcock Street Offices (Barrel House)
	140	Various Tenants of One Block of Babcock Street (Lakes Division Garage)
	141	One Babcock Street Storage Building (Truck Loading Rack)
Administrative Offices and Operations Area	146	Electrical Sub–Station A (Furnace Room)
	150	Laboratory Building
	152	Main Office/Mechanical Shops
	153	Store House
Elk Street Properties Area		Parcel #4
		Parcel #5

LEGEND

EXISTING TANK

153 EXISTING STRUCTURE

CURRENT PROPERTY LINE (BASED ON DENLUCK–O'NEILL ENGINEERING AND SURVEYING, DEC. 15, 1988; AND NUSSBAUMER & CLARKE, INC. FEBRUARY 6, 1995)

LIMITS OF PROPERTY FORMERLY OWNED BY EXXONMOBIL OIL CORPORATION

GEOGRAPHIC AREA BOUNDARY AND/OR FORMER PROPERTY LINES

MW–1 LOCATION AND DESIGNATION OF MONITORING WELL

MW–4 LOCATION AND DESIGNATION OF MONITORING WELL ABANDONED IN 2001

RW–5 LOCATION AND DESIGNATION OF RECOVERY WELL

569.07 GROUNDWATER ELEVATION, MEASURED IN FEET ABOVE MEAN SEA LEVEL

5.20 FREE–PRODUCT THICKNESS IN FEET

NM NOT MEASURED

ND NOT DETECTED

584 LINE OF EQUAL GROUNDWATER ELEVATION, MEASURED IN FEET ABOVE MEAN SEA LEVEL (DASHED WHERE INFERRED)

APPROXIMATE GROUNDWATER FLOW DIRECTION

WELL POINT SYSTEM

SECTION OF WELL POINT SYSTEM NOT OPERATIONAL

MH LOCATION AND DESIGNATION OF MANHOLE

HISTORICAL AND CURRENT SEPARATE–PHASE PRODUCT

WELL DESIGNATION	AVERAGE FLOW RATE FOR JANUARY 2002 (GALLONS PER MINUTE)
RW–1	5.1
RW–2	3.5
RW–3	0.8
RW–4	0.3
RW–5	1.9
EASTERN WPS	45.0
WESTERN WPS (4)	–

NOTE:

1. LF–2D GROUNDWATER ELEVATION NOT USED; SCREENED AT DEEPER INTERVAL.
2. SB–28 WATER TABLE ELEVATION WAS NOT USED AS IT WAS REPLACED BY WELL MW–26.
3. SB–7, SB–13 AND SB–10 WERE NOT GAUGED AS THEY WERE REPLACED BY MW–25, MW–27 AND MW–22, RESPECTIVELY.
4. FLOW METER DID NOT OPERATE PROPERLY DURING JANUARY 2002.
5. SB–19 WAS NOT GAUGED BECAUSE IT WAS SUBMERGED UNDER STANDING WATER.
6. AT MW–30 AND MW–39, PRODUCT WAS NOT OBSERVED DURING THE QUARTERLY GAUGING ROUND ON JANUARY 18, 2002, HOWEVER, IT WAS OBSERVED DURING THE QUARTERLY SAMPLING ROUND ON JANUARY 22, 2002. THE DATA SHOWN IS FROM JANUARY 22, 2002 FOR THESE WELLS.
7. SB–12, SB–39, LF–1S AND BTC–5 WERE NOT GAUGED BECAUSE THEY WERE BURIED UNDER SNOW. SB–37 WAS NOT GAUGED ON JANUARY 18, 2002 BECAUSE IT WAS BURIED UNDER SNOW BUT IT WAS LOCATED AND GAUGED/SAMPLED ON JANUARY 21, 2002 (THIS IS DATA SHOWN).
8. WATER–TABLE ELEVATION AT SB–14 NOT USED FOR CONTOURING DUE TO ANOMALOUSLY HIGH READING.
9. WATER–TABLE ELEVATION AT LF–4 NOT USED FOR CONTOURING DUE TO ANOMALOUSLY LOW READING.

120' 0 120'

Title:

GROUNDWATER POTENTIOMETRIC MAP JANUARY 2002

BUFFALO TERMINAL, BUFFALO, NEW YORK

Prepared For:

EXXONMOBIL OIL CORPORATION

ROUX ASSOCIATES, INC.
Environmental Consulting & Management

Compiled by: N.C.	Date: 16APR02	PLATE
Prepared by: G.M.	Scale: AS SHOWN	1
Project Mgr: N.C.	Office: NY	
File No: MC5218305	Project: 17252Y04	

N:\PROJECTS\MC172Y\MC52Y184\MC5218305.DWG

AREA	Structure Number	Current Structure Name (Original Structure Name)
Northeast Process and Storage Area	21	Leased to Police Community Services (Main Office)
	22	Former Biotreatment Cell
	23	Gated Entrance
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Former Refinery Area	69	Main Inground Oil/Water Separator
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		Parcel #5

LEGEND

EXISTING TANK

153 EXISTING STRUCTURE

CURRENT PROPERTY LINE (BASED ON DENLUCK-O'NEILL ENGINEERING AND SURVEYING, DEC. 15, 1988; AND NUSSBAUMER & CLARKE, INC. FEBRUARY 6, 1995)

LIMITS OF PROPERTY FORMERLY OWNED BY EXXONMOBIL OIL CORPORATION

GEOGRAPHIC AREA BOUNDARY AND/OR FORMER PROPERTY LINES

MW-1 LOCATION AND DESIGNATION OF MONITORING WELL

MW-4 LOCATION AND DESIGNATION OF MONITORING WELL ABANDONED IN 2001

RW-5 LOCATION AND DESIGNATION OF RECOVERY WELL

WELL POINT SYSTEM

SECTION OF WELL POINT SYSTEM NOT OPERATIONAL

MH LOCATION AND DESIGNATION OF MANHOLE

HISTORICAL AND CURRENT SEPARATE-PHASE PRODUCT

SAMPLE LOCATION — SAMPLE DATE

SB-12	01/19/01	04/25/01	07/25/01	10/16/01	01/21/02	
Total BTEX	ND	ND	NS	ND	NS	TOTAL BTEX CONCENTRATION IN ug/L
MTBE	4.6	ND	NS	0.2	NS	MTBE CONCENTRATION IN ug/L
Total VOC's	5.7	0.2	NS	0.3	NS	TOTAL VOC CONCENTRATION IN ug/L
Total SVOC's	ND	1.0	NS	ND	NS	TOTAL SVOC CONCENTRATION IN ug/L

ND NOT DETECTED

NS NOT SAMPLED DUE TO PRODUCT IN WELL

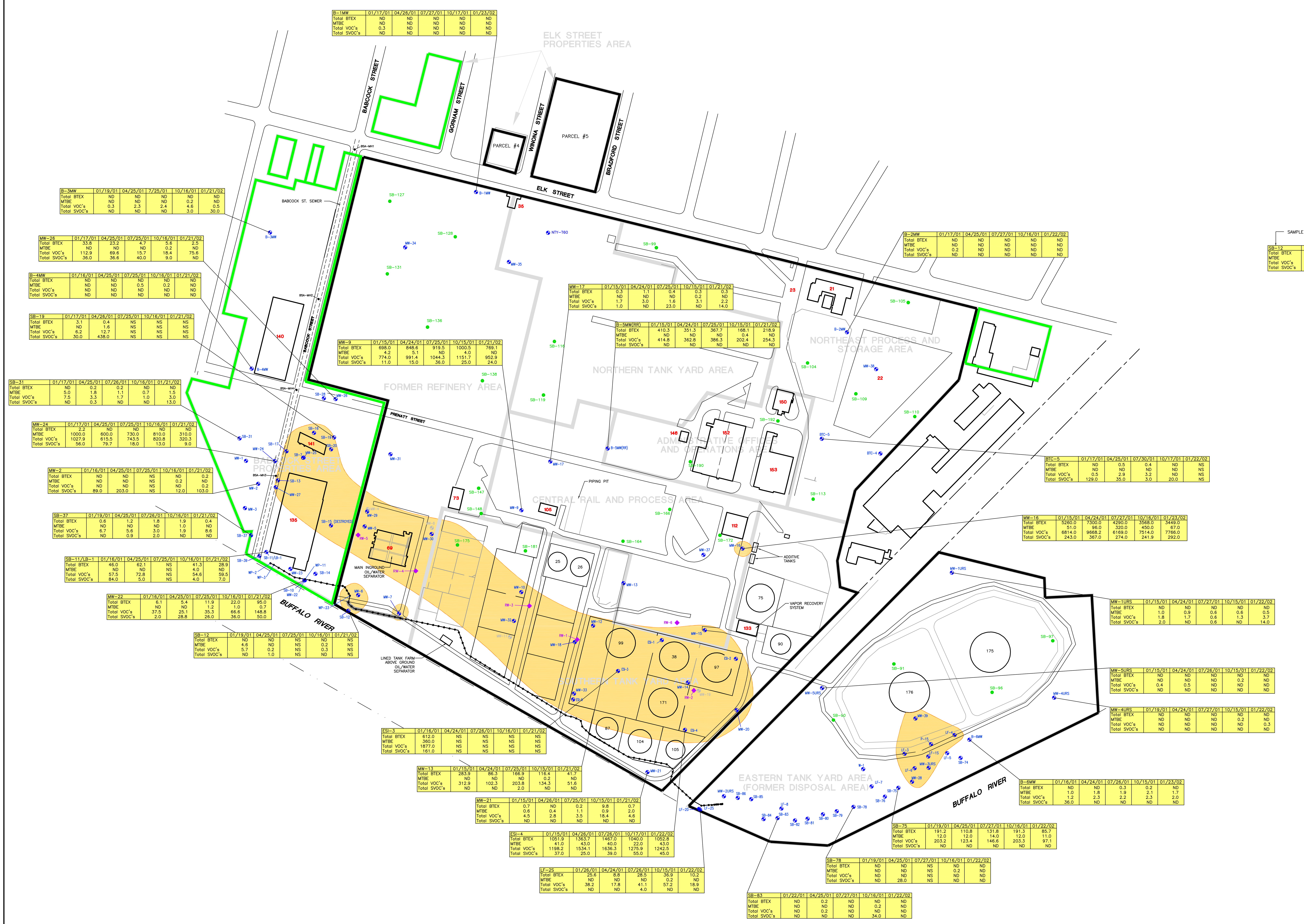
BTEX BENZENE, TOLUENE, ETHYLBENZENE AND XYLENES

MTBE METHYL TERTIARY-BUTYL ETHER

VOC VOLATILE ORGANIC COMPOUNDS

SVOC SEMI VOLATILE ORGANIC COMPOUNDS

ug/L MICROGRAMS PER LITER



B-1MW	01/17/01	04/26/01	07/27/01	10/17/01	01/23/02
Total BTEX	ND	ND	ND	ND	ND
MTBE	ND	ND	ND	ND	ND
Total VOC's	0.3	ND	ND	ND	ND
Total SVOC's	ND	ND	ND	ND	ND

B-3MW	01/19/01	04/25/01	7/25/01	10/16/01	01/21/02
Total BTEX	ND	ND	ND	ND	ND
MTBE	ND	ND	ND	0.2	ND
Total VOC's	0.3	2.3	2.4	4.6	0.5
Total SVOC's	ND	ND	ND	3.0	30.0

MW-26	01/17/01	04/25/01	07/25/01	10/16/01	01/21/02
Total BTEX	33.8	23.2	4.7	5.6	2.5
MTBE	ND	ND	ND	0.2	ND
Total VOC's	112.9	69.6	15.7	18.4	7.6
Total SVOC's	36.0	36.6	40.0	9.0	ND

B-4MW	01/18/01	04/25/01	07/25/01	10/16/01	01/21/02
Total BTEX	ND	ND	ND	ND	ND
MTBE	ND	ND	0.5	0.2	ND
Total VOC's	ND	ND	ND	ND	ND
Total SVOC's	ND	ND	ND	ND	ND

SB-19	01/17/01	04/26/01	07/25/01	10/16/01	01/21/02
Total BTEX	3.1	0.4	NS	NS	NS
MTBE	ND	1.6	NS	NS	NS
Total VOC's	6.2	12.7	NS	NS	NS
Total SVOC's	30.0	438.0	NS	NS	NS

SB-31	01/17/01	04/25/01	07/26/01	10/16/01	01/21/02
Total BTEX	ND	0.2	0.2	ND	ND
MTBE	5.0	1.8	1.1	0.7	2.5
Total VOC's	7.5	3.3	1.7	1.0	3.0
Total SVOC's	ND	0.3	ND	ND	13.0

MW-24	01/17/01	04/25/01	07/25/01	10/16/01	01/21/02
Total BTEX	2.2	ND	ND	ND	ND
MTBE	1000.0	600.0	730.0	810.0	310.0
Total VOC's	1027.9	615.5	743.5	820.8	320.3
Total SVOC's	56.0	79.7	18.0	13.0	9.0

MW-2	01/16/01	04/25/01	07/25/01	10/16/01	01/21/02
Total BTEX	ND	ND	NS	ND	0.2
MTBE	ND	ND	NS	0.2	ND
Total VOC's	ND	ND	NS	ND	0.2
Total SVOC's	89.0	203.0	NS	12.0	103.0

SB-37	01/19/01	04/25/01	07/26/01	10/16/01	01/21/02
Total BTEX	0.6	1.2	1.8	1.9	0.4
MTBE	ND	ND	ND	1.0	ND
Total VOC's	6.7	5.6	3.0	1.9	8.6
Total SVOC's	ND	0.9	2.0	ND	ND

SB-11/LB-1	01/16/01	04/25/01	07/25/01	10/16/01	01/21/02
Total BTEX	46.0	62.1	NS	41.3	28.9
MTBE	ND	ND	NS	4.0	ND
Total VOC's	57.5	72.8	NS	54.6	59.5
Total SVOC's	84.0	5.0	NS	4.0	7.0

MW-22	01/16/01	04/25/01	07/25/01	10/16/01	01/21/02
Total BTEX	6.1	5.4	11.9	22.0	95.0
MTBE	ND	ND	1.2	1.0	0.7
Total VOC's	37.5	25.1	35.3	66.6	148.8
Total SVOC's	2.0	28.8	26.0	36.0	50.0

SB-12	01/19/01	04/25/01	07/25/01	10/16/01	01/21/02
Total BTEX	ND	ND	NS	ND	NS
MTBE	4.6	ND	NS	0.2	NS
Total VOC's	5.7	0.2	NS	0.3	NS
Total SVOC's	ND	1.0	NS	ND	NS

MW-9	01/15/01	04/24/01	07/25/01	10/15/01	01/21/02
Total BTEX	698.0	848.6	919.5	1000.5	769.1
MTBE	4.2	5.1	ND	4.0	ND
Total VOC's	774.0	991.4	1044.3	1151.7	952.9
Total SVOC's	11.0	15.0	36.0	25.0	24.0

MW-17	01/15/01	04/24/01	07/25/01	10/15/01	01/21/02
Total BTEX	0.3	1.1	0.4	0.3	0.3
MTBE	ND	ND	ND	0.2	ND
Total VOC's	1.7	3.0	1.6	3.1	2.2
Total SVOC's	1.0	ND	23.0	ND	14.0

B-5MW(RR)	01/15/01	04/24/01	07/25/01	10/15/01	01/21/02
Total BTEX	410.3	351.3	367.7	168.1	218.9
MTBE	ND	ND	ND	0.4	ND
Total VOC's	414.8	362.8	386.3	202.4	254.3
Total SVOC's	ND	ND	ND	ND	ND

B-2MW	01/17/01	04/25/01	07/27/01	10/16/01	01/22/02
Total BTEX	ND	ND	ND	ND	ND
MTBE	ND	ND	ND	ND	ND
Total VOC's	0.2	ND	ND	ND	ND
Total SVOC's	ND	ND	ND	ND	ND

BTC-5	01/17/01	04/25/01	07/30/01	10/17/01	01/22/02
Total BTEX	ND	0.5	0.4	ND	NS
MTBE	ND	ND	ND	ND	NS
Total VOC's	0.5	2.9	3.2	ND	NS
Total SVOC's	129.0	35.0	3.0	20.0	NS

MW-16	01/15/01	04/24/01	07/27/01	10/16/01	01/23/02
Total BTEX	5260.0	7300.0	4290.0	3568.0	3449.0
MTBE	51.0	96.0	320.0	450.0	67.0
Total VOC's	6814.0	9668.2	6169.0	7514.0	7766.0
Total SVOC's	243.0	367.0	274.0	241.9	292.0

MW-1URS	01/15/01	04/24/01	07/27/01	10/15/01	01/22/02
Total BTEX	ND	ND	ND	ND	ND
MTBE	1.0	0.9	0.6	0.6	0.5
Total VOC's	1.8	1.7	0.6	1.3	3.7
Total SVOC's	2.0	ND	0.6	ND	14.0

MW-5URS	01/15/01	04/24/01	07/26/01	10/15/01	01/22/02
Total BTEX	ND	ND	ND	ND	ND
MTBE	ND	ND	ND	0.2	ND
Total VOC's	0.4	0.5	ND	ND	ND
Total SVOC's	ND	ND	ND	ND	ND

MW-4URS	01/19/01	04/24/01	07/27/01	10/15/01	01/22/02
Total BTEX	ND	ND	ND	ND	ND
MTBE	ND	ND	ND	0.2	ND
Total VOC's	ND	ND	ND	ND	0.3
Total SVOC's	ND	ND	ND	ND	ND

B-6MW	01/16/01	04/24/01	07/26/01	10/15/01	01/23/02
Total BTEX	ND	ND	0.3	0.2	ND
MTBE	1.0	1.8	1.9	2.1	1.7
Total VOC's	1.2	2.3	2.2	2.3	2.0
Total SVOC's	36.0	ND	ND	ND	ND

SB-75	01/19/01	04/25/01	07/27/01	10/16/01	01/22/02
Total BTEX	191.2	110.8	131.8	191.3	85.7
MTBE	12.0	12.0	14.0	12.0	11.0
Total VOC's	203.2	123.4	146.6	203.3	97.1
Total SVOC's	ND	ND	ND	ND	ND

SB-78	01/19/01	04/25/01	07/27/01	10/16/01	01/22/02
Total BTEX	ND	ND	NS	ND	ND
MTBE	ND	ND	NS	0.2	ND
Total VOC's	ND	ND	NS	ND	ND
Total SVOC's	ND	28.0	NS	ND	ND

SB-83	01/22/01	04/25/01	07/27/01	10/16/01	01/22/02
Total BTEX	ND	0.2	ND	ND	ND
MTBE	ND	ND	ND	0.2	ND
Total VOC's	ND	0.2	ND	ND	ND
Total SVOC's	ND	ND	ND	34.0	ND

ESI-3	01/16/01	04/24/01	07/26/01	10/16/01	01/21/02
Total BTEX	612.0	NS	NS	NS	NS
MTBE	360.0	NS	NS	NS	NS
Total VOC's	1877.0	NS	NS	NS	NS
Total SVOC's	161.0	NS	NS	NS	NS

MW-13	01/15/01	04/24/01	07/25/01	10/15/01	01/21/02
Total BTEX	283.9	86.3	166.9	116.4	41.7
MTBE	ND	ND	ND	0.2	ND
Total VOC's	312.9	102.3	203.8	134.3	51.6
Total SVOC's	ND	ND	2.0	ND	ND

MW-21	01/15/01	04/26/01	07/25/01	10/15/01	01/21/02
Total BTEX	0.7	ND	0.2	9.8	0.7
MTBE	0.6	0.4	1.1	0.9	2.0
Total VOC's	4.5	2.8	3.5	18.4	4.6
Total SVOC's	ND	ND	ND	ND	ND

ESI-4	01/15/01	04/26/01	07/26/01	10/17/01	01/22/02
Total BTEX	1051.9	1363.7	1467.0	1040.0	1052.8
MTBE	41.0	43.0	40.0	22.0	43.0
Total VOC's	1198.2	1534.1	1636.3	1275.9	1242.5
Total SVOC's	37.0	25.0	39.0	55.0	45.0

LF-2S	01/26/01	04/24/01	07/26/01	10/15/01	01/22/02
Total BTEX	25.6	8.8	28.5	36.9	10.2
MTBE	ND	ND	ND	0.2	ND
Total VOC's	38.2	17.8	41.1	57.2	18.9
Total SVOC's	ND	ND	4.0	ND	ND

NOTES:

1. MW-2, SB-11/LB-1 AND SB-12 WERE NOT SAMPLED IN JULY BECAUSE THE WELLS DID NOT RECHARGE AFTER PURGING.
2. SB-19 WAS NOT SAMPLED IN JULY BECAUSE PRODUCT WAS PRESENT. SB-19 WAS NOT SAMPLED IN OCTOBER 2001 AND JANUARY 2002 BECAUSE IT WAS SUBMERGED UNDER STANDING WATER.
3. SB-12 AND BTC-5 WERE NOT SAMPLED IN JANUARY 2002 BECAUSE THEY WERE BURIED UNDER SNOW.

120' 0 120'

Title: **SUMMARY OF QUARTERLY GROUNDWATER SAMPLING DATA FROM JANUARY, APRIL, JULY AND OCTOBER 2001 AND JANUARY 2002**

BUFFALO TERMINAL, BUFFALO, NEW YORK

Prepared For: EXXONMOBIL OIL CORPORATION

ROUX ASSOCIATES, INC. *Environmental Consulting & Management*

Compiled by: N.C.	Date: 30APR02	PLATE
Prepared by: G.M.	Scale: AS SHOWN	2
Project Mgr: N.C	Office: NY	
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