915168

FOCUSED FEASIBILITY STUDY

Commercial Property
210 French Road
Cheektowaga, New York

Prepared For:

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1.0 INTRODUCTION

1.1 Background

Hazard Evaluations, Inc. (HEI) was engaged and authorized by Mr. Robert E. Mariacher, representing CMS Associates (CMS), to complete a Focused Feasibility Study (FFS) for the industrial/commercial property located at 210 French Road, Cheektowaga, New York (subject site; Figure 1 in Appendix A). It should be noted that this FFS report is being completed as part of the approved Administrative Order on Consent, Index No. B9-0501-96-10, between the New York State Department of Environmental Conservation (NYSDEC) and CMS.

Based on the findings presented in an Environmental Real Property Audit report completed by North American Environmental Services Corporation, dated October 1989, an Underground Storage Tank Removal report completed by B.U.G. Remediation, dated June 4, 1996, and a Phase II Environmental Site Evaluation Report prepared by Hazard Evaluations, Inc. (HEI), dated November, 1996, the NYSDEC required that a FFS be completed to better define subsurface conditions and evaluate potential remedial alternatives. In general, existing environmental concerns include the condition of the groundwater quality beneath the site and the possible impacts of groundwater contamination on potential receptors. As set forth in this report, the groundwater which has been contaminated by the contents of the former underground storage tank (UST) is generally within the bedrock beneath the site.

1.2 Study Objectives

Based upon both the results of previous environmental investigations completed at the subject site and on-going discussions with the NYSDEC, it has been determined that the existing contaminant source which originated from the former UST tank will require remedial action to control any future migration from this source within the shallow groundwater aquifer. The objective of this FFS is to identify an appropriate remedial action to be implemented at the subject site which will adequately control any future contaminant migration to off-site receptors. The following considerations are addressed in this FFS to support the selection of the recommended remedial action:

- o Summary of site characteristics, including the nature and extent of contamination as determined from previous investigations;
- o Identification of data inadequacies and need for additional investigative activities;
- o Identification and evaluation of potential remedial alternatives which would adequately address the on-site groundwater contamination; and
- o Recommendation of the most suitable remedial action alternative based upon HEI's current knowledge of the subject site.

The options rendered in this report are based solely on the above study objectives. Limitations to this report are presented in Appendix B.

2.0 CURRENT SITE CONDITIONS

2.1 Physical Setting

The subject site is located on the north side of French Road about 2,000 feet east of Union Road in an industrial/commercial area of the Town of Cheektowaga, Erie County, New York. French Road forms the southern boundary of the subject site, and an undeveloped tree and shrub covered parcel is located immediately south of French Road. Industrial Parkway forms part of the northern boundary, with an undeveloped brush covered land parcel also immediately adjacent to the north property line and a Fleming, Inc. warehouse facility located north of Industrial Parkway. Truco Engine, Inc. is located north/northeast of the subject property. The Rosina Food Products, Inc. facility forms the western boundary of the subject site, and several small businesses and a fire station are located along the east property boundary.

The subject site is currently occupied by a single story concrete block building (approximately 200 feet square) which is located in the southeast corner of the property along French Road. The building is of slab-on-grade construction (no basement). An at-grade receiving door is located on the back wall (north side) of the building. A sub-grade loading dock is located on the west side of the building. A storm water catch basin is located near the loading dock area. According to Mr. Robert Mariacher, the catch basin has been sealed and grouted and is no longer in use. Storm water that collects in the loading dock area is pumped from a sump onto the surface of the adjacent asphalt parking area. The building is now being used as an office, warehouse and manufacturing facility.

The subject site is served with natural gas from National Fuel Gas Corporation and electric from New York State Electric & Gas. Drinking water is supplied by the Erie County Water Authority. Sanitary sewers are managed by the Erie County Sewer Authority and storm sewers are managed by the Town of Cheektowaga. Electric service appears to be above ground with all other utility services underground. Natural gas, water and sanitary sewer services the property from utility easements along French Road and enter the building along the south and east building walls. Underground utilities along the north side of Industrial Parkway (north of the subject property) consist of gas, water and storm water. Stormwater drainage ditches are also located along the north and south sides of Industrial Parkway.

A fence-enclosed storage area is located near the north property line. The area surrounding the building is covered with asphalt paving on the west and northwest portion of the property. Entrance driveways to the property are located along French Road to the south and Industrial Parkway to the north. Small landscaped areas are located in front of the building along French Road and behind the building between the building and the fenced enclosure. An undeveloped area, recently graded and seeded, is located in the northeast corner of the property (Refer to Figure 2 in Appendix A for site features).

2.2 Meteorology

The U.S. Weather Bureau station at the Buffalo International Airport, located about four miles northeast of the subject site, is the only long-term weather station in the project area. Records have been collected there continuously since 1943. The climate of the region is characterized by long cold winters and short warm summers. The average mean annual air temperature in the Buffalo area is 47.4 degrees Fahrenheit and the average mean annual precipitation is 36.2 inches. Precipitation is moderate and fairly evenly divided throughout the twelve months. Snowfall comprises a large percentage of the annual precipitation, with the Mean annual snowfall being 91.9 inches in the Buffalo area. Snow generally begins in mid-November or early December and continues throughout the winter months into April.

Precipitation may fall as snow or rain and an entire monthly total may fall during only a few days of the month. If large amounts of rainfall occur over short periods of time, much water is lost through overland runoff. However, nearly all light rainfall will infiltrate the soil surface. If precipitation occurs as snow, a minor portion will be absorbed by the soil, but much of the water content will be lost through the runoff of snowmelt in the Spring. According to *Groundwater Resources of the Erie-Niagara Basin, New York (LaSala, A. M., 1968)*, the potential evapo-transpiration (precipitation returned to the air through direct evaporation or by transpiration of vegetation) of water in the area of the subject site is about 24.4 inches per year. Due to higher air temperatures and full vegetative conditions, most evapo-transpiration occurs during the Summer. Conversely, during the Fall and Spring, evaporation may return little precipitation to the atmosphere, thereby allowing groundwater recharge through the infiltration of precipitation to be enhanced.

2.3 On-Site Surface Runoff Drainage

The topography of the subject site slopes gently from the south along French Road toward the north/northwest along Industrial Parkway. It appears that surface water drainage along French Road is controlled by two 12-inch catch basins located on the north and south sides of French Road. On-site surface runoff flows across the parking lot area west of the building toward several storm catch basins and open drainage ditches located along the south side of Industrial Parkway. From a catch basin located on the south side of Industrial Parkway, surface runoff flows northward under Industrial Parkway to an open drainage ditch along the north side of Industrial Parkway. This open ditch connects to a series of ditches flowing northward along railroad tracks for about 1,500 feet north of the subject property. The ultimate discharge point of this ditch system appears to be Slate Bottom Creek.

2.4 Area and Site Hydrogeology

The stratigraphy in the western New York region generally consists of relatively undeformed flat-lying sedimentary rocks, including limestones and shales. The beds dip at low angles, about 40 feet per mile, to the south.

Outcrops are scarce near the subject site except in major stream beds to the north (Cayuga Creek) and to the south (Buffalo Creek). Bedrock was encountered in all test borings drilled at the site in which groundwater monitoring wells were installed. The top of rock ranges from a depth of about 6.4 feet below ground surface (MW-8) to a depth of about 2.9 feet below ground surface (TB-8). Based on the test borings completed at the subject site, the top of bedrock is generally level across the site, with elevations ranging from 93.5 feet at MW-7 to 92.3 feet at MW-8 (Elevations reference a site benchmark with an assumed elevation of 100.0 feet). A summary of bedrock depths and elevations is presented in Table 1. The bedrock encountered at the site included Strafford Limestone, the lower member of the Skaneateles Formation and Oatka Creek Shale, the upper member of the Marcellus Formation. The Strafford Limestone is a massive, gray, hard to very hard, medium bedded fossiliferous limestone with occasional dark gray shale partings. The Oatka Creek Shale is a dense dark gray to black, fissile shale with a slight petroliferous odor.

Glaciation of this area of Western New York was extensive. During the glacial period, spanning about 1.5 million years, the area was overridden many times by a thick continental ice sheet moving southward over the region, eroding the rock and changing drainage patterns. Bedrock control of the glaciation and the drainage of the glacial meltwaters were important factors in forming the present landscape. As the ice receded to the north, it left behind a veneer of dense silty or sandy basal glacial till over the weathered bedrock surface. The retreat of the ice margins across the area was occasionally interrupted by short re-advances and minor fluctuations of the ice front. These fluctuations resulted in a complex sequence of lake deposits, beach deposits, end moraines, drumlins, and meltwater channels in the area of the subject site. Soil deposits left by the glacier are well sorted and include sands and course silts, as well as gravelly silts or clays. The soil/till layer encountered on-site is characteristic of these materials, and consists of a relatively even layer approximately two feet thick.

The principal water-bearing fractures in the bedrock are joints which are regularly arranged. The rock formations at the subject site are cut by both vertical and bedding-plane joints (horizontal), along which there are hairline openings. An important feature of the shale is a discontinuous zone of fracturing that follows the upper surface of the rock and is directly connected to the overlying glacial deposits. Water enters the shale almost exclusively by percolation from these thin glacial deposits. The vertical and bedding joints, which are thin and widely spaced, extend into the shale at depth, and receive water where they intersect the fracture zone along the top of the rock or intersect the overlying glacial deposits. The shale bedrock at depth, therefore, has a much lower permeability than the relatively fractured zone at the top of the rock, and in the area of the subject site generally yield only small quantities of water. According to LaSala, yields of wells drawing from the deeper fractures in the shale bedrock range from 1 to 7 gallons per minute (gpm). Dry holes and/or wells with inadequate yields are not uncommon.

TABLE 1

SUMMARY OF TOP OF BEDROCK ELEVATIONS CMS FACILITY, 210 FRENCH ROAD CHEEKTOWAGA, NEW YORK			
WELL DESIGNATION	**GROUND SURFACE ELEVATION (ft)**	**DEPTH TO BEDROCK MEASUREMENT (ft)**	**TOP OF BEDROCK ELEVATION (ft)**
MW-1	97.45	4.20	93.25
MW-2	98.46	5.00	93.46
MW-3	97.85	4.40	93.45
MW-4	96.86	*	*
MW-5	95.17	*	*
MW-6	95.40	*	*
MW-7	98.37	4.90	93.47
MW-8	98.68	6.40	92.28
MW-9	97.26	4.60	92.66
TB-8	96.04	2.70	93.34

NOTES: 1. A relative benchmark was established on the foundation of the northwest corner of of the building at 210 French Road. Assume elevation of 100.00 feet.

* No test boring logs/well installation details available.

3.0 PREVIOUS ENVIRONMENTAL INVESTIGATIONS

On October 10, 1989, an Environmental Real Property Audit was completed for Mariacher Contracting Company, Inc. on the subject site. That report concluded that the property appeared to be in compliance with current NYSDEC regulations.

On March 5, 1996, B.U.G. Remediation (BUG) and Mariacher Contracting Company, Inc. (MCC) removed a 2,000 gallon underground storage tank which was located near the northwest corner of the building. During the tank removal, it was determined that the tank, which had contained a mixture of waste oil and chlorinated solvents, had leaked and contaminated the surrounding soils and groundwater. The contaminated soils were removed from the tank installation area and stockpiled on and under plastic sheeting on the asphalt parking surface just west of the fenced enclosure.

B.U.G. completed seven (7) test borings (TH-1 through TH-7) around the former tank area and installed six (6) groundwater monitoring wells (MW-1 through MW-6) on the subject site. Based on subsequent analytical testing, it was determined that several volatile organic compounds (VOCs) were present in both the groundwater near the former tank location and in the contaminated soils stockpiled at the subject site. B.U.G. recommended that additional work be completed on-site to better evaluate groundwater conditions and to develop a work plan to remediate the heavily contaminated soils removed from the tank excavation. The stockpiled soils remained in place for approximately six months until these contaminated soils were removed and placed in soil remediation boxes within the fenced enclosure during mid-December, 1996.

On August 5, 1996, HEI completed a Conceptual Site Remediation Work Plan for the subject site. The NYSDEC reviewed the Work Plan and responded in a September 6, 1996 letter. It should be noted that all comments presented in this NYSDEC response have been addressed either in subsequent reports or other correspondence to the agency.

On November 27, 1996, HEI completed a Phase II Environmental Site Evaluation for the subject site, and in April 1997, HEI completed a supplemental Groundwater Sampling Analytical Testing report. Both of these documents were based on an evaluation of analytical results for groundwater samples collected from the monitoring wells installed at the subject site. It should be noted that the concentrations of contaminants detected during the most recent sampling events for each monitoring well have remained generally consistent with previous sampling events, with only minor fluctuations being noted. Using all of the available groundwater monitoring data, it has been determined that the groundwater within the bedrock at the site has been contaminated in the immediate vicinity of the on-site source of contamination (former UST location). The data also indicate that much lower contaminant concentrations in the bedrock have been detected in monitoring wells located near the perimeter of the subject site. HEI suggests that these data also indicate that although some migration of the contaminants has occurred, migration to potential off-site receptors may be insignificant. A site plan showing the location of these monitoring wells and the results from the testing of the groundwater in the bedrock are set forth in Figure 1-A of Appendix A.

On June 23 and July 24, 1997, HEI completed reports containing the results of the soil sampling and analytical testing completed on representative soil samples collected from the soil box vapor extraction system constructed on the subject site. The soil box vapor extraction system was designed to remediate the contaminated soils generated by the on-site UST removal activities previously completed by BUG and MCC. The system combined the remedial technologies of soil vapor extraction and bioremediation. All the contaminated soils were placed in soil boxes that were equipped with horizontal slotted PVC vapor extraction lines connected to an explosion proof blower. The system also included the addition of microbes selected to act on the specific contaminants identified in the soil. The most recent analytical test results indicated that the concentrations of all contaminants previously detected were below NYSDEC TAGM soil clean-up guidance values. Therefore, by letter, dated August 21, 1997 (Refer to Appendix A) the NYSDEC approved the removal of the soils from the boxes for use as on-site top fill, which was graded and seeded (Refer to Figure No. 4 in Appendix A for the placement location of the remediated soil).

4.0 ADDITIONAL SITE INVESTIGATION

4.1 Subsurface Exploration

The hydrogeology of the area of the subject site was evaluated to identify geologic features which may affect the migration of contaminants. This evaluation involved determining characteristics of both the bedrock and the unconsolidated overburden deposits, focusing on the following:

- o On-site water bearing units and aquifers;
- o Release and migration of contaminants; and,
- o Engineering aspects of the site for selection of remediation alternatives.

To investigate these characteristics, as well as for other purposes, various subsurface explorations have been completed on the subject site. Seven shallow test borings were advanced in the vicinity of the former UST location to better determine the extent of soil contamination from the former UST. Six groundwater monitoring wells were then installed within these borings to determine the extent of the potential groundwater contamination and flow direction. HEI later installed two additional groundwater monitoring wells to supplement this monitoring system. Subsequently, after a review of the limited existing test boring/monitoring well data and discussions with NYSDEC, HEI advanced two additional test borings (bedrock coreholes) and installed another groundwater monitoring well in one of the completed coreholes. Refer to Figure 2 in Appendix A for test boring and monitoring well locations. In general, all test borings and monitoring wells were completed to better determine bedrock conditions for environmental considerations. The last monitoring well was installed as a possible groundwater extraction point for the proposed groundwater remediation system.

4.2 Recent Test Borings

The two additional test borings and monitoring well (BH-8 and MW-9) recently completed were advanced by Earth Dimensions, Inc. to depths of approximately 23.5 feet and 25.0 feet, respectively (Figure 2). These test borings were advanced by using 2.25-inch inside diameter (I.D.) hollow stem augers to refusal on top of rock. The augers were pulled and 4-inch I.D. flush joint casing was placed in the borehole to facilitate HQ size rock coring and the installation of a 2-inch I.D. PVC monitoring well (MW-9). No overburden soil samples were collected. Bedrock was encountered in test borings BH-8 and MW-9 at depths of 2.7 feet and 4.6 feet bgs, respectively. Rock core samples were retrieved from each of the test borings using a HQ size barrel making a 3.78-inch corehole. Each corehole was advanced to a depth of about 20 feet bgs. Drill coring water return was collected in a settling tub and recirculated. When the rock coring was completed, the drill coring water was pumped from the settling tub to a sump/sanitary sewer drain located inside the building at 210 French Road. Drill coring water, heavy with rock coring sediment was placed in several 55-gallon drums that have been sealed, labeled and are stored on-site until analytical testing is completed on the sediment to determine disposal options. Rock descriptions are recorded on boring logs (Refer to Appendix C).

Recovered rock core samples from these two test borings were screened in the field with an OVM to determine the presence of volatile organic contaminants. Organic vapor measurements were also taken in the work space near the corehole, above the open corehole and near the rock core as the core was removed from the core barrel. All OVM measurements indicated that organic vapors were not detected at concentrations above "background" organic vapor levels. Ambient "background" organic vapor measurements had been taken by HEI in the field prior to test boring activities.

The groundwater monitoring well MW-9 was set at a depth of 24.5 feet bgs. The monitoring well is constructed with a 15-foot length of 2-inch I.D. PVC slotted (0.10-inch) well screen, flush coupled with a 2-inch I.D. PVC riser pipe to the ground surface. Clean Morie #2 sand was used as a sand pack to fill the annular space between the well screen and the corehole wall from the bottom of the hole to a depth of three feet above the top of the slotted well screen (about 6.5 feet bgs). A bentonite pellet/chip seal (about three feet thick) was placed above the sand pack to a depth of 3.5 feet. Cement/bentonite grout was placed around the well from the top of the bentonite seal to ground surface. A locking well cap was installed at the top of the well riser pipe. A curb box was installed at ground surface. HEI determined the relative riser casing elevation for monitoring well MW-9 through optical survey procedures utilizing the foundation on the northwest corner of the building at 210 French Road as a benchmark (assumed elevation of 100.00 feet). A summary of the groundwater monitoring well construction details is presented in Appendix C.

4.3 Packer Pressure Tests in Rock

Packer pressure tests were completed in the two additional test borings installed at the subject site. These tests were used to estimate the order of magnitude of rock permeability based on procedures recommended by the U.S. Bureau of Reclamation in the Earth Manual (1968). Before testing, the entire pressure test set-up was assembled, cleaned and checked for proper working order. The typical test procedure consisted of coring a 10-ft section of rock and isolating a 6.5 to 10 foot section of corehole (nominally 3.78 inches in diameter) using a single pneumatic packer inflated to 175 to 200 pounds per square inch (psi) pressure placed near the top of the core run. Water was then pumped under pressure into the isolated zone between the bottom of the packer and the bottom of the corehole. In general, the total water pressure used (the sum of the water column height pressure and gauge pressure) was approximately 1 to 2 psi per foot of the boring depth to the center of the isolated zone. However, in several tests, that pressure was exceeded.

During all tests, total pressures could be built up because of the relatively small water discharges into the isolated zones. While maintaining a constant water pressure by use of a by-pass valve, the quantity of water flowing into the test section was measured with a calibrated meter and recorded for test periods of 10 to 20 minutes. At completion of a test, the pneumatic packer was deflated and removed from the corehole until the next section of corehole was ready for testing. This procedure was repeated until most of the rock portion of the corehole was tested.

After completing the packer pressure test in test boring MW-9 within the isolated zone between 8.5 feet and 15.0 feet, with zero water take at a pressure of 20 psi for five minutes, the water pressure was increased to 40 psi. The corehole began to take water at a rate of about 15 gallons per minute. During this portion of the pressure test, groundwater levels in the three monitoring wells near the former UST location (MW-1, MW-2 & MW-3) were measured. The groundwater levels measured at this time were about 0.5 to 1.0 feet higher than the groundwater levels measured in those monitoring wells before the rock coring began. In this context, it appears that the increased water pressure opened bedding planes/joints, enhancing a hydraulic connection between the corehole and the existing monitoring wells near the former UST location. When this test was completed and the pressure test equipment removed from the hole, water was observed flowing from the top of the corehole casing for about five minutes. Refer to Appendix D for packer pressure test data

The results of the packer pressure testing indicate that the on-site shallow bedrock has a relatively low coefficient of permeability ranging from about 2.87 x 10^{-3} ft/min to no water flow (impervious). Refer to Table 2 for a summary of the packer pressure test results. Based on these data, it appears that groundwater production from the bedrock in the area of the subject site is extremely limited, further indicating that contaminant migration through this bedrock would also be extremely limited. This evidence also suggests that contaminated groundwater within the bedrock in the vicinity of the former UST location may not have migrated from this area to any appreciable extent.

4.4 Water Level Monitoring

Static groundwater levels were measured in the nine existing monitoring wells (MW-1 through MW-9) on August 22, 1997. These groundwater level measurements were made using an electronic water level indicator manufactured by Solinst, Inc. with both audible (sound) and visual (light) signals. The probe on the water level meter was lowered into the well riser pipe until it contacted the groundwater surface. The depth of the water below the top of the well riser pipe was then measured to the nearest hundredth of a foot. The resulting groundwater elevations are summarized in Table 3. Refer to Figure 3 for the generalized groundwater potentiometric contour map.

TABLE 2

SUMMARY OF PACKER PRESSURE TESTS CMS FACILITY, 210 FRENCH ROAD CHEEKTOWAGA, NEW YORK			
TEST BORING DESIGNATION	**TEST NO.**	**COREHOLE TEST INTERVAL**	**APPROX. COEFFICIENT OF PERMEABILITY**
TB–8	#1	5.3 ft. to 13.2 ft.	8.2 x 10 ft/min
	#2	15.5 ft. to 23.5 ft.	2.33 x 10 ft/min
MW–9	#2	8.0 ft. to 15.0 ft.	* 2.87 x 10 ft/min
	#3 & #4	16.0 ft. to 25.0 ft.	No Water Flow (unable to calculate)

NOTES: * Test #1, no water flow with line pressure gauge pressure at 20 psi. Increased gauge pressure to 40 psi. Began to take water, dropped gauge pressure back to 20 psi, started test.

Refer to Appendix D for calculations.

TABLE 3

STATIC GROUNDWATER LEVELS MEASURED ON AUGUST 22, 1997 CMS FACILITY, 210 FRENCH ROAD CHEEKTOWAGA, NEW YORK				
WELL DESIGNATION	**GROUND SURFACE ELEVATION (ft)**	**REFERENCE POINT ELEVATION (ft)**	**GROUNDWATER MEASUREMENT (ft)**	**GROUNDWATER ELEVATION (ft)**
MW-1	97.45	97.28	2.55	94.73
MW-2	98.46	98.14	2.13	96.01
MW-3	97.85	97.54	2.79	94.75
MW-4	96.86	96.44	14.39	82.05
MW-5	95.17	94.90	5.56	89.34
MW-6	95.40	98.04	13.57	84.47
MW-7	98.37	100.38	10.35	90.03
MW-8	98.68	98.44	8.53	89.91
MW-9	97.26	97.09	1.88	95.21

NOTES:
1. A relative benchmark was established on the foundation of the northwest corner of the building at 210 French Road. Assume elevation of 100.00 feet.
2. Groundwater depth was measured from the top of the PVC well riser casing (reference point)

5.0 SITE CHARACTERIZATION

5.1 Nature and Extent of Contamination

Information on the source of the contamination at the subject site has been compiled and summarized in the Underground Storage Tank Closure Report, Conceptual Site Remediation Work Plan, Phase II Environmental Site Evaluation and Soil Box SVE System: Soil Sampling/ Analytical Testing Results documents completed for this site, as summarized above. Information on historical site operations has been incorporated with soil, sediment and groundwater analytical data to summarize the source and type(s) of the contamination found on-site. It should be noted that the regulatory standards and guidelines utilized for comparison are the NYSDEC's Technical Division and Administration Guidance Memorandum: Determination of Soil Cleanup Objective and Cleanup Levels, TAGM Document HWR-94-4046, dated January 24, 1994 and Ambient Water Quality standards and Guidance Values, TOGS Document 1.1.1, dated October 22, 1993.

Existing on-site environmental media and related contaminants which have been identified at concentrations above regulatory guideline values include:

- o Subsurface Soil: None (Based on the analytical results of one composite sample collected from the former UST excavation walls)
- o Sediments: None (Based on the analytical results of one sediment sample collected from the catch basin located along the north property line)
- o Groundwater: 1,1-dichloroethane, 1,1,1-trichloroethane, tetrachloroethene, cis-1,2-dichloroethene, trichloroethene, toluene, ethylbenzene and total xylenes (Near the former UST excavation)

The current condition of the contaminated media at the subject site is as follows:

- o Excavated Soils: Approximately 350 tons of contaminated soil generated from the UST removal were placed into three cells constructed of plywood and lined with plastic sheeting. A soil vapor extraction system was constructed within each of the cells and incorporated bioremediation technology. Based on recent analytical results, the concentrations of all contaminants detected in the treated soil are now below TAGM guidance values. As a result, the treated soils have been removed from the cells, were graded on-site, covered with topsoil and seeded.

o Groundwater: Groundwater contamination within the bedrock exists in the immediate area of the on-site source of contamination is substantial. Contamination significantly decreases near the site perimeter. Data also suggest that although some limited contaminant migration has occurred, migration to potential off-site receptors is, in all likelihood, insignificant.

5.2 Physical Characteristics

Physical site characteristics are important in the determination of the fate and transport of contaminants identified on-site. As part of this determination, the surface features, soils, bedrock and hydrology of the site were evaluated, and are summarized as follows:

Surface Features: Approximately three-quarters of the site is developed through the construction of the existing building and asphalt parking areas. The only undeveloped portions of the site are the lawn and landscaped area between the building and French Road, the lawn near the northwest corner of the building, and the undeveloped area which was recently graded, covered with topsoil and seeded near the northeast corner of the property. In this respect, three-quarters of the subject site is impervious to the infiltration of precipitation and snowmelt. The lawn and undeveloped areas still allow natural infiltration to occur. Therefore, a relatively a small portion of the precipitation falling on the subject site will infiltrate the subsurface soils and bedrock to recharge shallow on-site groundwater.

Soils: The natural soils identified across the entire site consist of clayey silt, sandy silt and clay in varying proportions with some fine gravel. These deposits generally exhibit moderate permeability.

Bedrock: The bedrock beneath the site is the Strafford Limestone, the lower member of the Skaneateles Formation and the Oatka Creek Shale the upper member of the Marcellus Formation. The Strafford Limestone is a massive, gray, hard to very hard, medium bedded fossiliferous limestone with occasional dark gray shale partings. The Oatka Creek Shale is a dense dark gray to black fissile shale with a slight petroliferous odor. Joints are found in all formations but are best developed in the gray shales. The widely spaced joints occur as two orthogonal sets. The shallow bedrock formations have been determined to be relatively impermeable to water flow.

Hydrology: Static groundwater levels were recently measured in the nine existing groundwater monitoring wells. The resulting groundwater elevations are summarized in Table 3. Based on these groundwater elevation data, it appears the groundwater flow beneath the subject site is generally in a northern direction toward Slate Bottom Creek located approximately 2,000 feet north of the site (Figure 3 in Appendix A).

6.0 RISK ASSESSMENT

6.1 General

The objective of this basic risk assessment is to preliminarily evaluate the potential effects on human health and the environment associated with exposure to the contaminants known to be present at the subject site. The three elements that control the risk of contaminants to public health and the environment are:

- o Presence of contaminants;
- o Routes of exposure; and,
- o Human and/or environmental receptors with potential exposure.

The presence of contaminants within various environmental media at the subject site was discussed above in Section 5.0. In summary, on-site contaminated groundwater within the bedrock represents the only environmental media exhibiting substantial contaminant levels at present. On-site soils and sediments exhibit limited contaminants below applicable NYSDEC clean-up guidance values. The remaining two elements of the risk of exposure are discussed below.

6.2 Exposure Routes

At, and in the vicinity of, the subject site, possible human exposure routes may include direct contact with contaminants in the soil, sediments, surface runoff and/or groundwater, ingestion of contaminants in soil, sediments, surface runoff and/or groundwater, or respiration of airborne contaminants. Environmental impacts appear limited to contaminant migration in the groundwater within the bedrock. The possibility for these routes to exist is discussed as follows:

- o Subsurface Soil: Minimal possibility of exposure. Remaining levels below NYSDEC guidance values based on the analytical results of one composite sample from the former UST excavation walls. Possible exposure would involve subsurface activities, (e.g. construction of new sewer facilities) which can be controlled through notification and use of personal protection equipment (PPE). Any soil contaminants are at minimal levels and there would be little risk of harm unless these soils were ingested.

- o Surface Soil: Minimal possibility for exposure. Treated soil analytical results indicate contaminants detected are below TAGM guidance values. Treated soils have been graded, covered with topsoil and seeded. Possible exposure would involve shallow excavation activities, which can be controlled through notification and use of PPE. Because of the minimal contaminant concentration within such soils, there is little risk of any human exposure or harm unless the soils were ingested.

- o Sediments: Minimal possibility for exposure. Existing levels below NYSDEC guidance values based on the analytical results of one sample from the catch basin near the north property line. Possible exposure would involve working in opened catch basin, which can be controlled through notification and use of PPE. Because the existing levels are below NYSDEC guidance values, there would be little risk of harm unless sediment was ingested.

- o Surface Runoff: No known potential for exposure. No exposed surface environmental media to contaminate runoff on-site.

- o Groundwater: Limited potential for exposure. Groundwater contamination appears to be localized in bedrock near the on-site source former UST location. The low permeability of the bedrock has restricted the migration of contaminants. Contamination in the bedrock significantly decreases near the site perimeter. Data suggest that future migration to potential off-site receptors is unlikely based on there being no receptors in the vicinity of the site. There do not appear to be any sumps located in any of the neighboring properties into which the groundwater in the bedrock could flow (see Figure 6 in Appendix A) nor are there any groundwater production wells in the vicinity of the subject site. Infiltration of small quantities into existing sewers may be possible, but would result in a minimal risk of exposure unless sewage was thereafter ingested.

- o Airborne: No known potential for exposure. On-site monitoring during drilling and soil movement and treatment programs indicated no volatiles above upwind background levels.

6.3 Potential Receptors

The limitations of the potential exposure routes associated with the contaminants from the subject site further limit potential receptors of those contaminants. While it is theoretically possible for human exposure to the contaminants on-site to exist, such exposure is unlikely and may not involve a material risk. There is also little risk of the contaminants reaching environmental receptors. These factors are discussed as follows:

- o Soil/Sediments: As indicated above, human exposure to contaminants in the on-site soil and sediments, while theoretically possible, is unlikely. Exposure would be limited to construction activities beneath the surface. Exposure can be controlled through the notification of anyone completing on-site maintenance, construction or other related activities. Moreover, as previously indicated, the soil contaminants are below approved NYSDEC guidance values and, hence, any harmful exposure would appear to be limited to ingestion of the soils containing small concentrations of contaminants. No potential sensitive environmental receptors exist for contaminated on-site soils and sediments.

- o Groundwater: Human exposures to contaminants in on-site groundwater in the bedrock can be controlled through the notification of anyone completing on-site maintenance, construction or other related activities. Again, it should be noted that it is unlikely that the contaminants would reach any human receptors. Within this commercial/industrial area of Cheektowaga, residents and businesses are supplied with municipal drinking water, thereby eliminating the ingestion exposure route. There are no known potable and/or industrial water wells within one-half mile of the subject site. As is set forth in Appendix A, there are no sumps in the immediate vicinity of the site into which the groundwater in the bedrock containing contaminants would flow. Human exposures to contaminants which could possibly flow into sewers can be controlled through the notification of municipal workers completing maintenance, construction or other related activities. However, such exposure would appear to be unlikely and any harmful exposure would have to come from ingestion. Because of the low permeability of the bedrock, the potential for any harmful quantities of contaminants to reach municipal sewers is remote. No potential sensitive environmental receptors have been identified for contaminated groundwater migrating off-site.

6.4 Assessment Summary

As stated above, the objective of this assessment is to preliminarily evaluate the potential effects on human and environmental receptors associated with exposure to the contaminants known to be present at the subject site. Obviously, those routes of exposure that present no potential for receptor exposure have not been considered further (i.e., Inhalation of airborne contaminants; Ingestion or direct contact with contaminated surface water). Also, the routes of exposure which can be easily controlled through worker notification and the use of personal protective equipment (PPE) have been eliminated from further consideration (i.e., Direct contact to and ingestion of contaminated soil and sediments; Direct contact to on-site groundwater and infiltrated groundwater into off-site sewers). As a result, the possible routes of exposure to contaminants from the subject site have been determined to be through direct contact to and the ingestion of off-site contaminated groundwater which is currently localized in the bedrock.

In considering the receptors to be exposed through these remaining routes of exposure, the ingestion of contaminated groundwater is also eliminated from further consideration, as no water supply wells are known to exist in the vicinity of the subject site. Finally, environmental receptors have been eliminated from consideration, as no sensitive areas have been identified within the highly developed commercial/industrial area of Cheektowaga, a large portion of which north of the subject site was an active rail yard throughout much of the early and mid 1900s. Also based on our survey of the surrounding properties, there do not appear to be any basement sumps in the immediate vicinity of the site into which contaminants in the bedrock would flow.

Based upon analytical data obtained during the various sampling/analysis programs completed at the subject site, the contaminants of concern are Trichloroethylene (TCE) and several related compounds. The highest cumulative concentrations of related contaminants detected in the perimeter wells on the subject site range from 2 ppm to 6 ppm (0.2% to 0.6% solutions) in wells MW-7 and MW-5, respectively. Trichloroethylene, which is the most toxic of these compounds, is a poison by the inhalation, intravenous and subcutaneous routes of entry; however, this substance is only moderately toxic by ingestion, and is an irritant to the skin and eyes (Hazardous Chemicals Desk Reference, N.I. Sax and R.J. Lewis, Sr., 1987). The inhalation of high concentrations of TCE induces narcosis, but prolonged exposures to moderate airborne concentrations only causes headaches and drowsiness. These chlorinated compounds are generally heavier than water, and will migrate downward within an aquifer system. The risk presented by acute contact to dilute concentrations appears minimal.

7.0 REMEDIAL ACTION ALTERNATIVES

7.1 Purpose and Objectives

The purpose of this section is to establish remedial objectives, to describe and evaluate potentially applicable remedial alternatives, and to recommend an alternative based on its assumed effectiveness in addressing the groundwater contamination source within the bedrock at the subject site. At a minimum, the recommended remedial alternative should minimize or mitigate all significant threats to public health and the environment presented by groundwater contamination originating from the subject site. In this context, the remedial action objectives established for this site include:

- To mitigate potential environmental impacts of the on-site groundwater contaminant source within the bedrock; and

- To provide for long-term attainment of standards for groundwater quality at the limits of the area of concern.

7.2 Description of Remedial Alternatives

Completion of the Soil Box Soil Vapor Extraction System addressed soil contamination at the site and, as previously indicated, contaminated soils from the former UST have been appropriately remediated. Soils will not be addressed further. The two remedial alternatives identified to address groundwater contamination within the area of concern (i.e., within the limits of contaminant migration) are:

- No further action; and

- Shallow groundwater collection/treatment system.

Descriptions of these two alternatives are provided as follows:

No Further Action: Under this alternative, no further remedial action addressing groundwater quality would take place. If this option was followed, the source of contaminants and contaminated groundwater within the bedrock would generally remain the same, relying on the natural attenuation of contaminants to reduce contaminant concentrations. Long-term monitoring consisting of groundwater sampling and analytical testing would be completed to monitor that site conditions do not deteriorate.

Shallow Groundwater Collection/Treatment System: This alternative would consist of the installation of a Multi-Phase Extraction (MPX) System near the on-site source of contamination. The MPX System would be used to extract contaminated groundwater from the bedrock and/or vapors from the bedrock. By applying a continuous vacuum to a pumping well, the effective hydraulic gradient should increase, thereby increasing the pumping rate and enlarging the capture zone beyond that which could be achieved by pumping alone in a rock formation of very low permeability. If this option was followed, the source of contaminants and localized on-site groundwater within the bedrock would be directly impacted through treatment. Groundwater contaminants which had migrated outside the zone of influence of this system should remain the same, relying on the natural attenuation of contaminants to reduce contaminant concentrations. Long-term monitoring consisting of groundwater sampling and analytical testing would be completed to monitor that site conditions improve.

7.3 Evaluation of Remedial Alternatives

The no further action alternative relies on naturally occurring biodegradation activities to reduce contaminant loadings in the groundwater located in the bedrock. In this context, it does not address the remaining source of contaminants on-site, but is likely to achieve long-term contaminant reductions through biodegradation and dilution. Reductions in the possibility of risk to human exposure (however unlikely at this point in time) would occur over time.

The shallow groundwater collection/treatment system alternative is substantially more protective, in that it directly acts upon the remaining source of contaminants in the vicinity of the former UST and will provide an enlarged zone of influence from the point of groundwater recovery. The system would tend to extract contaminants which are localized within the bedrock within the immediate vicinity of the former UST location on the site and tend to minimize the potential for future off-site migration of these contaminants through the bedrock. This aspect of this alternative will achieve the first remedial objective. Implementation of the shallow groundwater collection/treatment system will be necessary to determine the ultimate zone of influence and whether the entire area of concern is being addressed. This determination will also impact whether the second remedial alternative can be achieved. To complete the evaluation of the zone of influence of this system, it is likely that supplemental groundwater monitoring wells will need to be installed past the perimeter of the subject site. However, reductions in the possibility of human exposure (however unlikely at this point in time) would begin at the start-up of the system, and would increase over time with continued operation. In this context, this remedial alternative goes beyond the no further action alternative, and is recommended for implementation at the subject site.

8.0 CONCEPTUAL PLAN FOR THE RECOMMENDED ALTERNATIVE

The shallow groundwater collection/treatment system alternative will consist of a Multi-Phase Extraction (MPX) System. The MPX System will extract contaminated groundwater and/or vapors from the soil and/or bedrock. By applying a continuous vacuum to a pumping well (an existing monitoring well), the hydraulic gradient should increase, thereby increasing the pumping rate and enlarging the capture zone beyond that which could be achieved by pumping alone in the rock formation of very low permeability.

This plan involves all elements necessary to install the MPX System. Installation would start with site preparation, including selection of a location outside the northwest corner of the existing building for a winterized remediation equipment shed. Construction of the shed would begin before the remediation equipment arrives on-site. Temporary fencing will be installed around the construction area to exclude random trespassing. Protective manholes will be installed over the production well heads to be used to protect the vacuum-induced air lift intake system. Shallow trenches will be excavated to a depth of about three to four feet from the production well heads (existing monitoring wells MW-1, MW-2, MW-3 and MW-9) to the MPX System located inside the shed. After the MPX System vacuum lines are installed, the trenches will be backfilled with clean fill.

Water and vapor withdrawal from the production wells will be achieved through a small diameter suction tube extending to below the water level in each production well. The suction tube will be sealed at the well cap and connected via a manifold to the extraction pump capable of simultaneously processing both groundwater and vapor. The liquid ring vacuum extraction pump and the high efficiency vapor/liquid separator will be located in the shed. The air/water separator tank will be equipped with a high/low level switch which will control the transfer pump for pumping the liquid from the air/water separator tank to the multi-stage diffused air stripper prior to discharge to the ground surface near the former tank area. Air emissions will be passed through activated carbon canisters, if necessary. The treated groundwater will be discharged to the ground and recycled through the system. If the NYSDEC requires that the treated water be discharged to the sanitary sewer system, a joint discharge permit will be required from the Erie County Sewer Authority and the Buffalo Sewer Authority.

Once the MPX System is operating, a limited sampling and analytical testing program will be initiated for the first several months of operation to ensure the efficiency of the remediation system and to monitor the treated water discharge. Refer to Figures 4 and 5 presented in Appendix A for the proposed extraction well and remediation shed locations and details of the MPX System. Refer to Appendix E for remediation equipment information.

9.0 CONCLUSIONS AND RECOMMENDATIONS

This Focused Feasibility Study was completed for CMS Associates for the commercial/industrial property located at 210 French Road, Town of Cheektowaga, New York. Data obtained both by others and by HEI were relied upon for completion of this study. These data included previous studies completed at the subject site, subsurface explorations, bedrock pressure testing and analytical testing results for soil, sediment and groundwater samples. Based on the data collected and numerous discussions with the NYSDEC, it was determined that contaminated groundwater in the bedrock associated with the former underground storage tank at the subject site will require remedial action to control the remaining contaminant source with a view to keeping the contaminants localized on-site. Therefore, this Focused Feasibility Study was necessary both to better summarize and define subsurface conditions, contaminant migration routes, possible impacts of contaminants on potential receptors and to evaluate remedial alternatives. All relevant observations and findings are summarized as follows:

- o Using all of the available groundwater monitoring data, it has been determined that groundwater contaminant levels in the immediate vicinity of the on-site source of contamination (former UST location) are substantially higher than the much lower contaminant concentrations which have been detected in monitoring wells located near the perimeter of the subject site. HEI suggests that these data also indicate that although the migration of the contaminants has occurred, migration to potential off-site receptors is unlikely or insignificant.

- o The concentrations of contaminants detected during the most recent sampling events for each monitoring well have remained generally consistent with previous sampling events, with only minor fluctuations in the concentrations detected.

- o The results of the packer pressure testing completed in the two additional test borings (MW-9 & TB-8) indicate that the on-site shallow bedrock has a relatively low coefficient of permeability ranging from about 2.87×10^{-3} ft/min to no water flow (impervious). Based on these data, it appears that groundwater production from the bedrock in the area of the subject site is extremely limited, further indicating that contaminant migration through this bedrock would also be extremely limited.

- o The most recent analytical test results for the contaminated soils in the treatment boxes indicated that the concentrations of all contaminants previously detected were below NYSDEC TAGM soil clean-up guidance values. Therefore, on August 21, 1997, the NYSDEC approved the removal of the soils from the boxes for use as on-site top fill, which was graded and seeded

- Existing on-site environmental media and related contaminants which have been identified at concentrations above regulatory guideline values include:

  Subsurface Soil: None (Based on the analytical results of one composite sample collected from the former UST excavation walls)

  Sediments: None (Based on the analytical results of one sediment sample collected from the catch basin located along the north property line)

  Groundwater in Bedrock: 1,1-dichloroethane, 1,1,1-trichloroethane, tetrachloroethene, cis-1,2-dichloroethene, trichloroethene, toluene, ethylbenzene and total xylenes (Near the former UST excavation)

- The potential exposure routes exist as follows:

  Subsurface Soil: Minimal possibility of exposure. Exposure would involve subsurface construction activities. Contaminants in soils appear to be below NYSDEC guidelines.

  Surface Soil: Minimal possibility of exposure. Treated soils have been graded, covered with topsoil and seeded. Exposure would be limited to shallow excavation activities.

  Sediments: Minimal possibility for exposure. Exposure would involve working in opened catch basin, but samplings indicate water in catch basins near to site is within NYSDEC guidelines.

  Surface Runoff: No known potential for exposure.

  Groundwater: Limited potential for exposure. Groundwater contamination in the bedrock near the on-site source of the former UST is substantially higher than decreased levels near the site perimeter. Exposure would be limited to possible infiltration to nearby sewers, but the quantities would be in small concentrations and would, in any event, not appear to be harmful.

  Airborne: No known potential for exposure.

- The potential receptors exist as follows:

  Soil/Sediments: Possible human exposure to contaminants in the on-site soil and sediments would be minimal and limited to anyone completing on-site construction or other activities). No potential sensitive environmental receptors exist for contaminated on-site soils and sediments.

Groundwater: Human exposure to contaminants in on-site groundwater in the bedrock would be limited to anyone completing on-site construction or other related activities which could result in excavation of bedrock or pumping of groundwater from within the bedrock. Local residents and businesses have municipal drinking water, thereby eliminating the ingestion exposure route. There are no known potable and/or industrial water wells within one-half mile of the subject site. Off-site exposure limited to direct contact with contaminated sump water in nearby basements is unlikely because of no known sumps in basements within the immediate vicinity of the site into which the groundwater from the bedrock would flow. Contaminated infiltration to nearby sewers is possible, but would not likely expose humans to levels of contaminants in harmful concentrations. Human exposures to contaminants in sewers limited to municipal workers completing construction or other activities. No potential sensitive environmental receptors identified for contaminated groundwater migrating off-site.

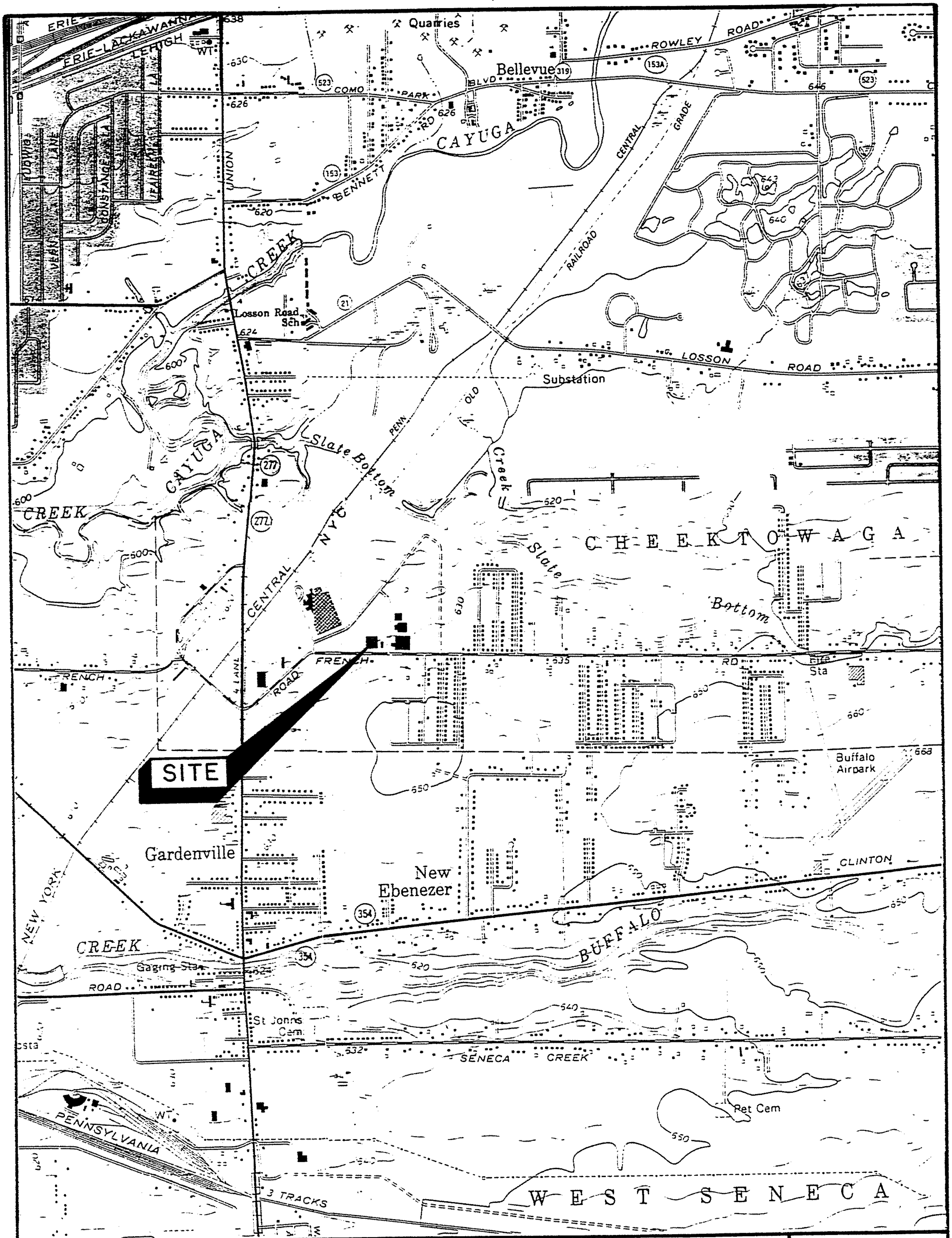
o The recommended remedial alternative is a shallow groundwater collection/treatment system which will consist of a Multi-Phase Extraction (MPX) System. The MPX System will extract contaminated groundwater and/or vapors from the soil and/or bedrock in the vicinity of the former UST where concentrations of contaminants in the groundwater in the bedrock are the highest. By applying a continuous vacuum to a pumping well (an existing monitoring well), the hydraulic gradient should increase and thus increase the pumping rate and enlarge the capture zone beyond that which could be achieved by pumping alone in the rock formation of very low permeability. This system will achieve the first remedial objective (remediate the remaining source of contaminants in the vicinity of the former UST). Whether the second remedial alternative can be achieved will need to be determined after system start-up to evaluate the ultimate zone of influence and if the entire area of concern is being addressed.

o To evaluate the extent of the zone of influence of the recommended remedial alternative, the installation of two additional off-site groundwater monitoring wells should be considered. Recommended locations include one north of Industrial Parkway between existing monitoring wells MW-5 and MW-6 and the other northeast of the subject site along Boxwood Lane near the H & S Auto Shop building and the Service Fastener Center facility.

- Once the MPX System is operating, a limited sampling and analysis program should be initiated for the first several months of operation to ensure the efficiency of the remediation system and to monitor the treated water and air discharge. After several months of operating the proposed MPX System, the semi-annual groundwater monitoring program should be continued. Analytical testing of the MPX System liquid effluent and air emissions should be done as part of this monitoring program.

APPENDIX A

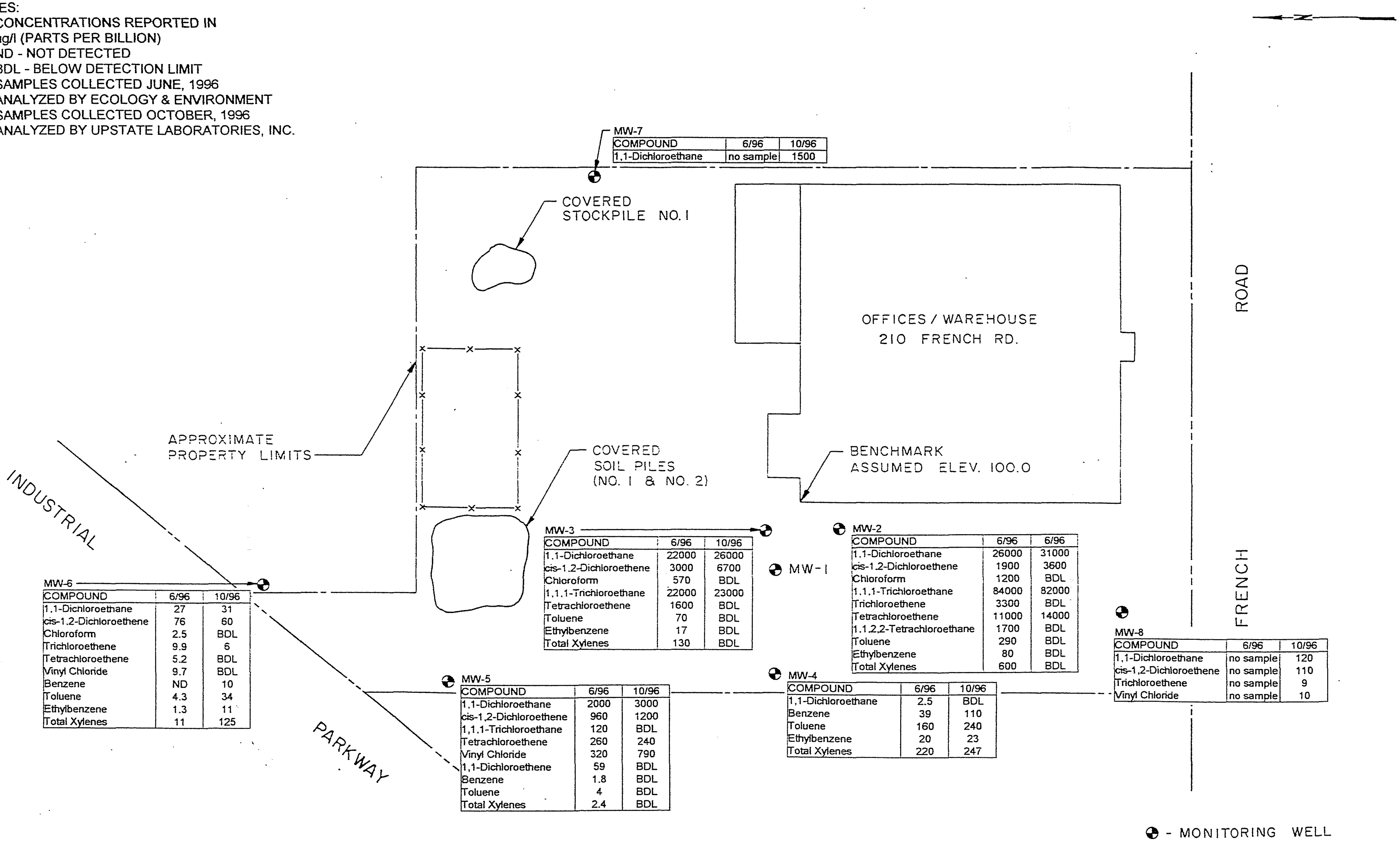
DRAWINGS



08803-C

HAZARD EVALUATIONS	MARIACHER CONTRACTING CO., INC. CHEEKTOWAGA, N.Y. LOCATION PLAN	FIGURE 1

NOTES:
- o CONCENTRATIONS REPORTED IN ug/l (PARTS PER BILLION)
- o ND - NOT DETECTED
- o BDL - BELOW DETECTION LIMIT
- o SAMPLES COLLECTED JUNE, 1996 ANALYZED BY ECOLOGY & ENVIRONMENT
- o SAMPLES COLLECTED OCTOBER, 1996 ANALYZED BY UPSTATE LABORATORIES, INC.



MW-7

COMPOUND	6/96	10/96
1,1-Dichloroethane	no sample	1500

MW-6

COMPOUND	6/96	10/96
1,1-Dichloroethane	27	31
cis-1,2-Dichloroethene	76	60
Chloroform	2.5	BDL
Trichloroethene	9.9	6
Tetrachloroethene	5.2	BDL
Vinyl Chloride	9.7	BDL
Benzene	ND	10
Toluene	4.3	34
Ethylbenzene	1.3	11
Total Xylenes	11	125

MW-3

COMPOUND	6/96	10/96
1,1-Dichloroethane	22000	26000
cis-1,2-Dichloroethene	3000	6700
Chloroform	570	BDL
1,1,1-Trichloroethane	22000	23000
Tetrachloroethene	1600	BDL
Toluene	70	BDL
Ethylbenzene	17	BDL
Total Xylenes	130	BDL

MW-2

COMPOUND	6/96	6/96
1,1-Dichloroethane	26000	31000
cis-1,2-Dichloroethene	1900	3600
Chloroform	1200	BDL
1,1,1-Trichloroethane	84000	82000
Trichloroethene	3300	BDL
Tetrachloroethene	11000	14000
1,1,2,2-Tetrachloroethane	1700	BDL
Toluene	290	BDL
Ethylbenzene	80	BDL
Total Xylenes	600	BDL

MW-8

COMPOUND	6/96	10/96
1,1-Dichloroethane	no sample	120
cis-1,2-Dichloroethene	no sample	110
Trichloroethene	no sample	9
Vinyl Chloride	no sample	10

MW-5

COMPOUND	6/96	10/96
1,1-Dichloroethane	2000	3000
cis-1,2-Dichloroethene	960	1200
1,1,1-Trichloroethane	120	BDL
Tetrachloroethene	260	240
Vinyl Chloride	320	790
1,1-Dichloroethene	59	BDL
Benzene	1.8	BDL
Toluene	4	BDL
Total Xylenes	2.4	BDL

MW-4

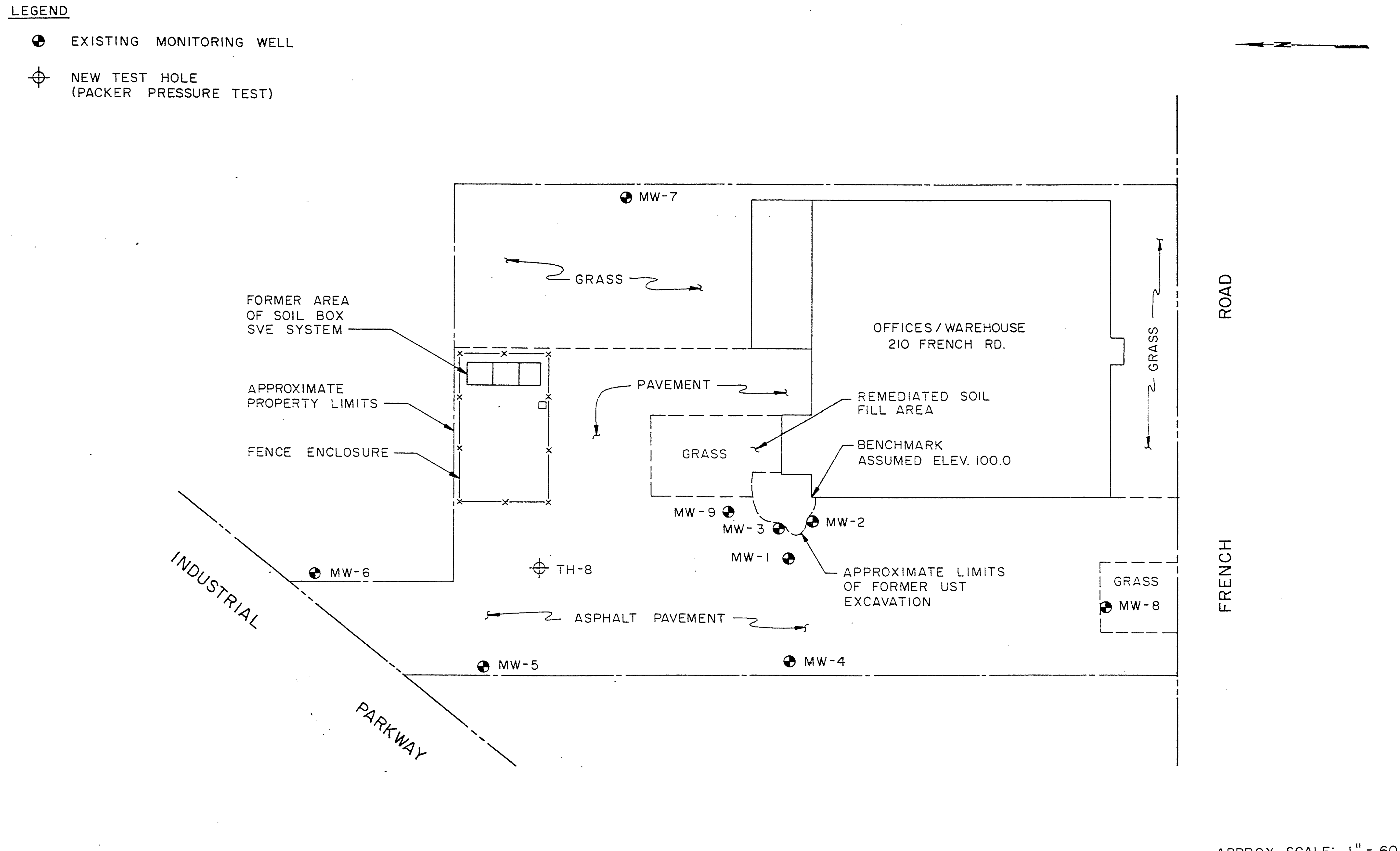
COMPOUND	6/96	10/96
1,1-Dichloroethane	2.5	BDL
Benzene	39	110
Toluene	160	240
Ethylbenzene	20	23
Total Xylenes	220	247

SCALE: 1" = 60'

HAZARD EVALUATIONS

CMS ASSOCIATES
210 FRENCH ROAD, CHEEKTOWAGA, N.Y.
SUMMARY OF ANALYTICAL TESTING RESULTS

FIGURE 1-A



HAZARD EVALUATIONS

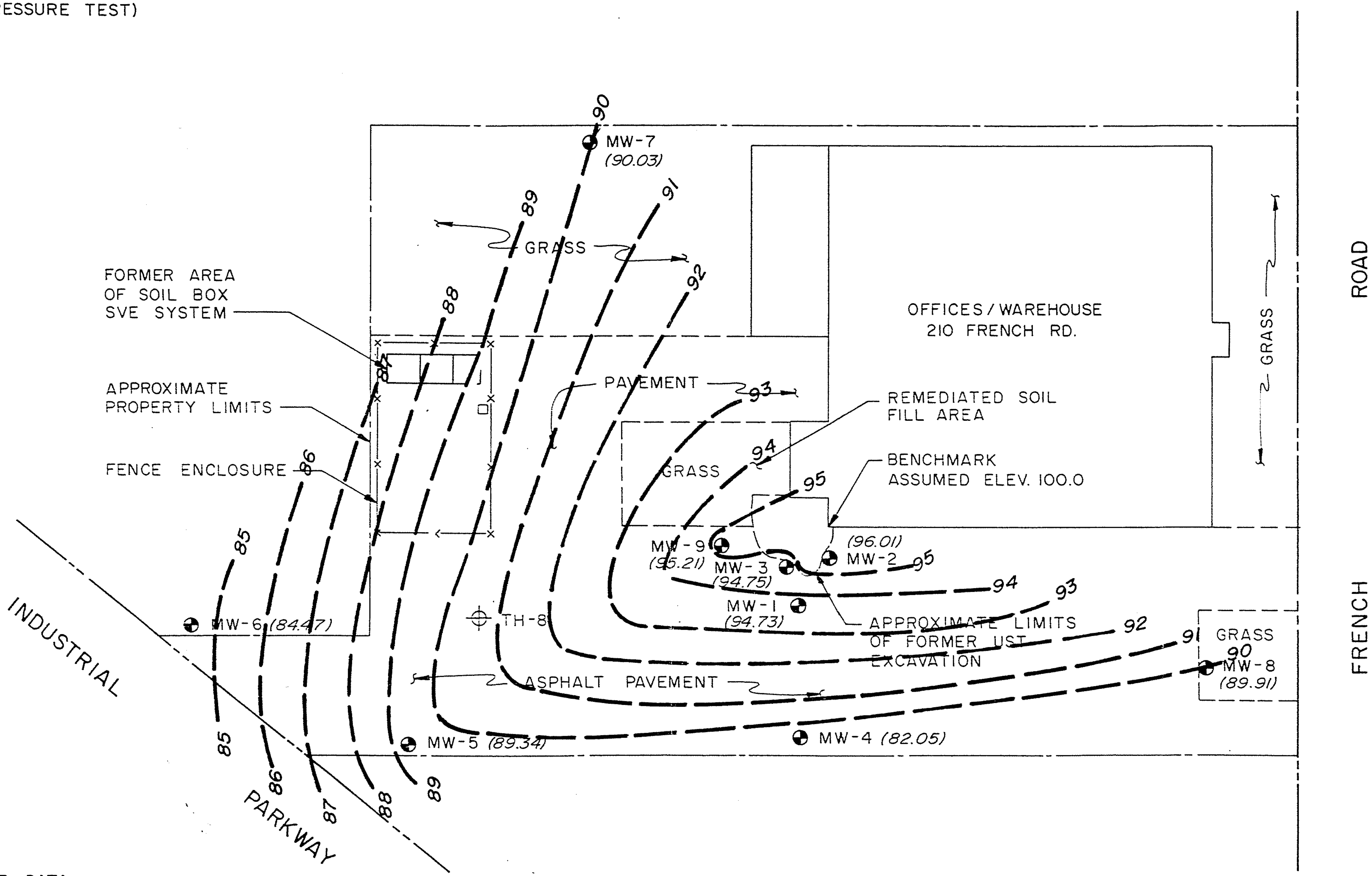
CMS ASSOCIATES
210 FRENCH ROAD, CHEEKTOWAGA, N.Y.
MONITORING WELL LOCATION PLAN

FIGURE 2

LEGEND

EXISTING MONITORING WELL

NEW TEST HOLE (PACKER PRESSURE TEST)



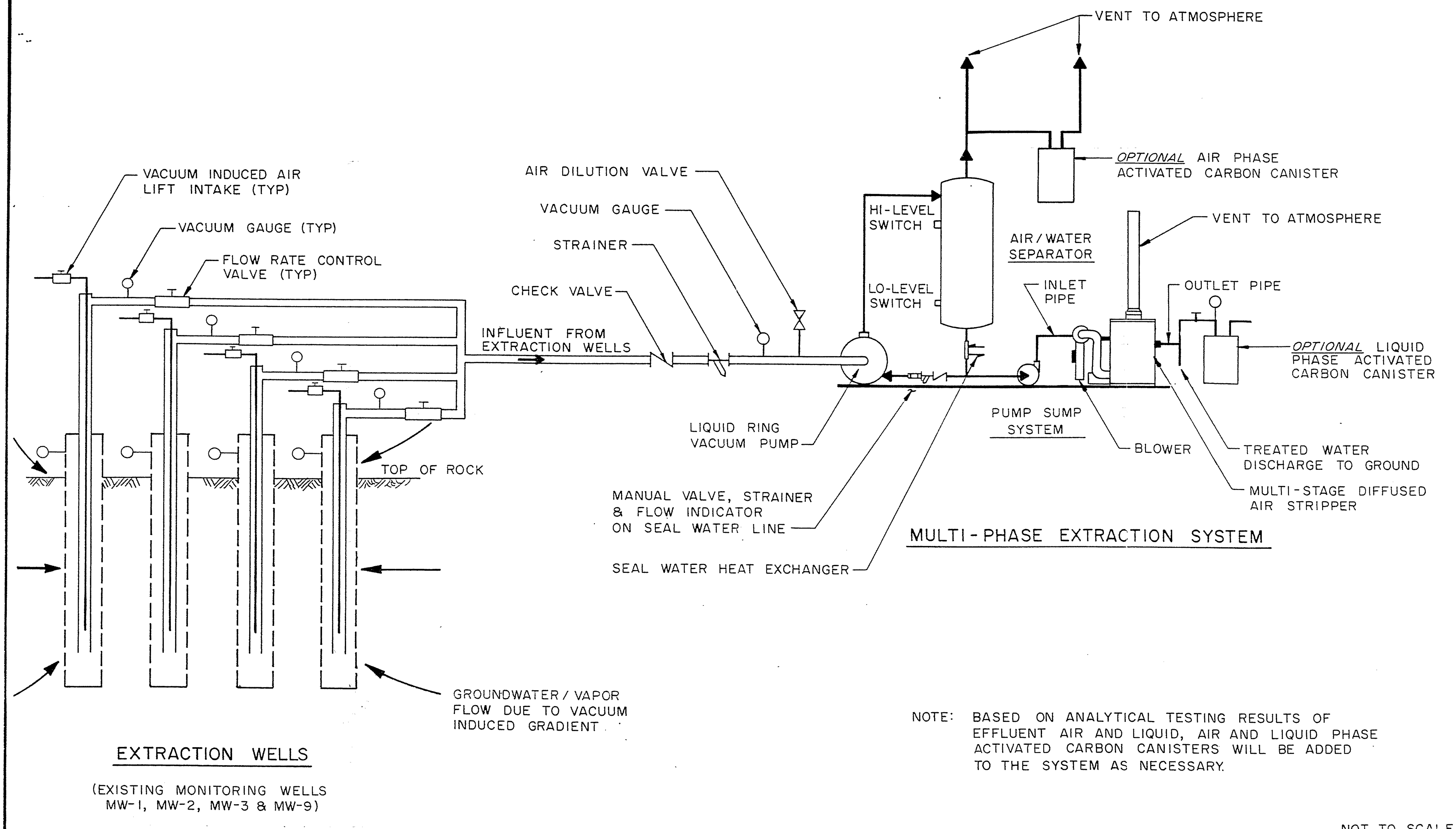
NOTE: GROUNDWATER DATA COLLECTED FROM MW-4 WAS NOT USED DURING DATA REDUCTION.

APPROX. SCALE: 1" = 60'

HAZARD EVALUATIONS

CMS ASSOCIATES
210 FRENCH ROAD, CHEEKTOWAGA, N.Y.
GROUNDWATER GRADIENT PLAN (AUGUST 22, 1997)

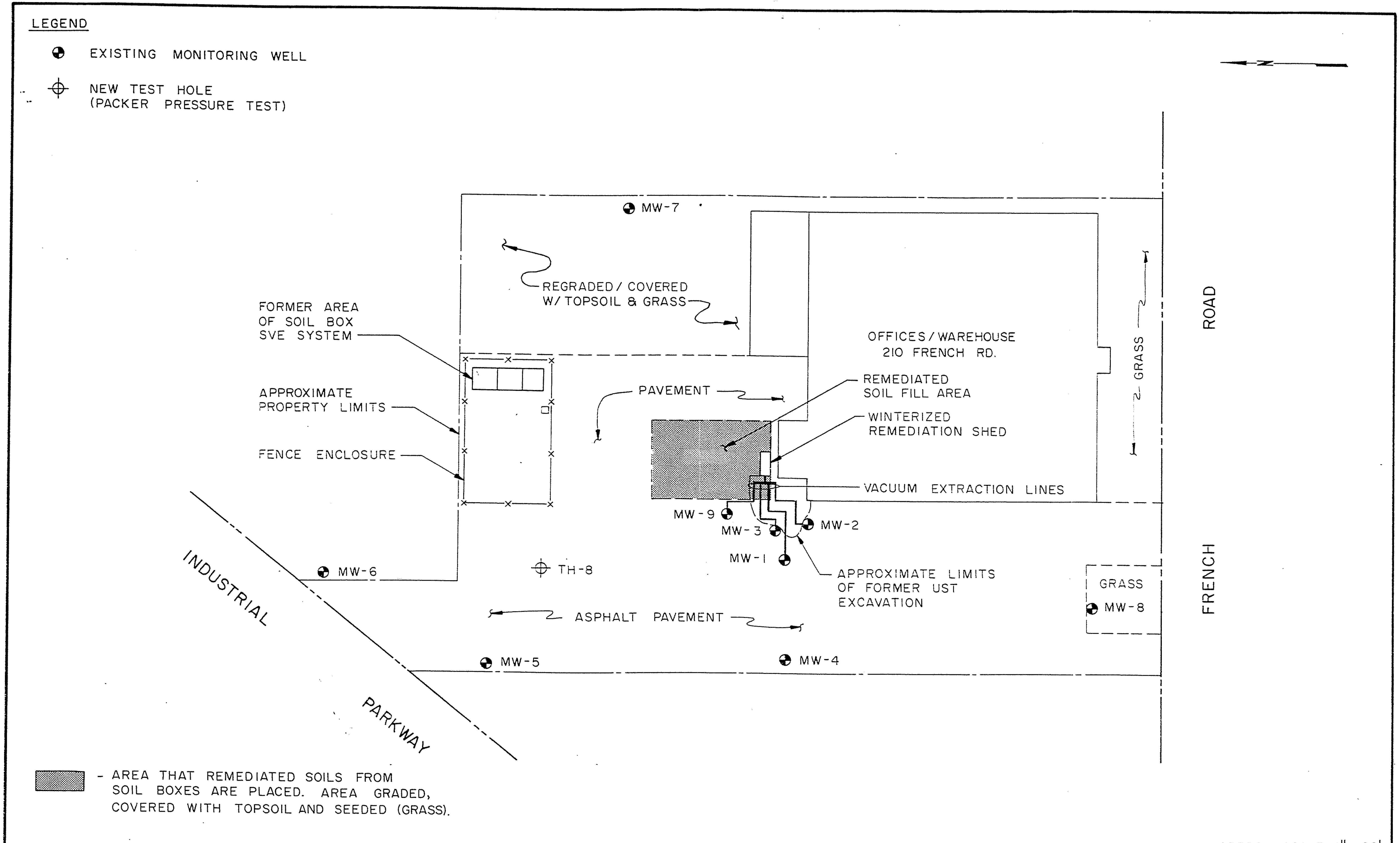
FIGURE 3



HAZARD EVALUATIONS

CMS ASSOCIATES
210 FRENCH ROAD, CHEEKTOWAGA, N.Y.
MULTI-PHASE EXTRACTION/TREATMENT SYSTEM

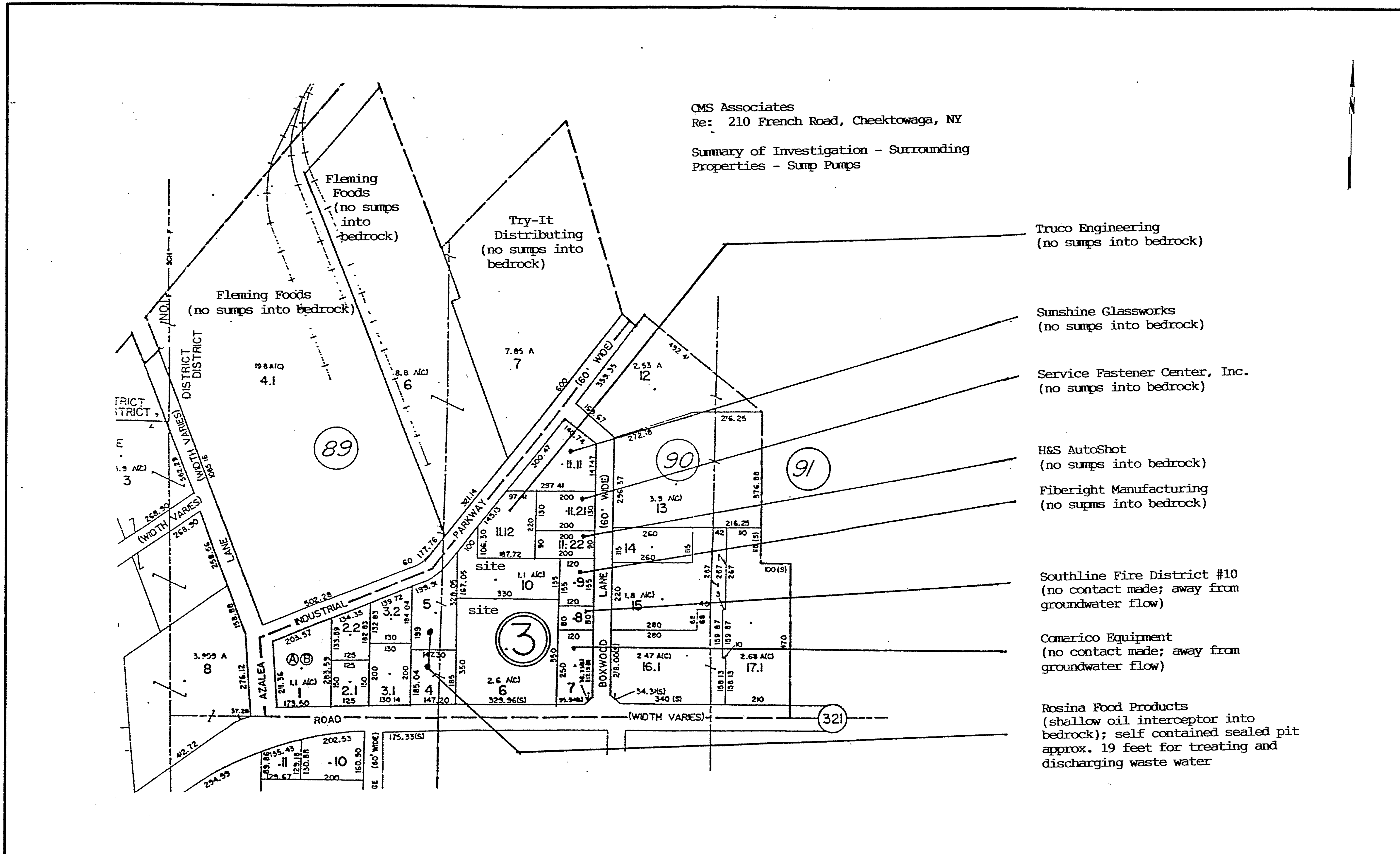
FIGURE 5



HAZARD EVALUATIONS

CMS ASSOCIATES
210 FRENCH ROAD, CHEEKTOWAGA, N.Y.
MONITORING WELL & REMEDIATION EQUIPMENT LOCATION PLAN

FIGURE 4



HAZARD EVALUATIONS

CMS ASSOCIATES
210 FRENCH ROAD, CHEEKTOWAGA, N.Y.
SURROUNDING PROPERTY SUMP SUMMARY

FIGURE 6

APPENDIX B

LIMITATIONS

APPENDIX B

LIMITATIONS

1. Hazard Evaluations, Inc. (HEI), completed this Phase II Environmental Evaluation in accordance with generally accepted current practices of other consultants undertaking similar studies. HEI observed that degree of care and skill generally exercised by other consultants under similar circumstances and conditions. HEI's findings and conclusions must be considered not as scientific certainties but as probabilities based on our professional judgment concerning the significance of the limited data gathered during the course of the investigation. Specifically, HEI does not and cannot represent that the site contains no hazardous material, petroleum products, or other latent conditions beyond that observed by HEI during this Environmental Evaluation.

2. The observations described in this report were made under conditions stated therein. The conclusions presented in the report were based solely upon the services described therein and not tasks and procedures beyond the scope of described services or the time and budgetary constraints imposed by the client.

3. In preparing this report, HEI has relied on certain information provided by other consultants the State, County and Town officials and other parties referenced herein and on information contained in the files of state and local agencies made available to HEI at the time of the study.

4. Observations were made of the subject site and on adjacent sites as indicated within the report. Where access to portions of the site or the structures on adjacent sites were limited or unavailable, HEI renders no opinion as to the presence of hazardous materials or to the presence of indirect evidence relating to hazardous materials in that portion of the site or adjacent structures.

5. Environmental tests have been limited to the tests described in this report and in prior submissions to the NYSDEC.

6. No specific attempt was made to check on the compliance of present or past owners or operators of the site with Federal, State, or Local laws and regulations, environmental or otherwise.

7. The generalized subsurface profiles described on the test boring logs and in the report text are intended to convey trends in subsurface conditions. The boundaries between strata are approximate and idealized and have been developed by interpretations of widely spaced explorations and samples. Actual soil and rock transition are probably more gradual. For specific information, refer to the test boring logs.

8. Groundwater level measurements have been made in the explorations and monitoring wells at the times and under conditions stated. It should be noted that fluctuations in the level of the groundwater may occur due to variations in rainfall, temperature and other factors occurring from the time measurements were made.

9. It should be noted that fluctuations in the concentrations of chemical compounds may occur due to variations in groundwater levels due to changes in rainfall, temperature and other factors occurring at the time samples were collected.

10. This report has been prepared for the exclusive use of CMS Associates and designated agents for the specific application to the subject property in accordance with generally accepted engineering practice. No other warranty, expressed or implied, is made. The environmental concerns noted in this report, if any, are applicable to the current identified proposed usage of the property.

APPENDIX C

TEST BORING LOGS/
WELL INSTALLATION DETAILS

DRILLING LOGS

EARTH DIMENSIONS, INC.

Soil and Hydrogeologic Investigations • Wetland Delineations
1091 Jamison Road • Elma, NY 14059
(716) 655-1717 • FAX (716) 655-2915

8D96c HOLE NO. TB 8-97 SURF. ELEVATION 96.04

PROJECT Rock Coring and Packer Testing LOCATION See location map.

210 French Rd. Cheetowaga, Erie Co., N.Y.

CLIENT Hazard Evaluations Inc. DATE STARTED 7/18/97 COMPLETED 7/22/97

DEPTH IN FT	SN	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL	WATER TABLE AND REMARKS
0–2.7								Advanced 2 1/4" HSA without sampling to 2.7 feet, then flush and spin 4 1/2" casing to rock. 2.7		Soil overburden to 2.7 feet over limestone bedrock to 11.2 feet over shale bedrock to end of coring.
2.7–11.2			RUN #1					Limestone bedrock, gray, very hard, can be etched with a knife with effort, very thinly to thinly bedded 1 to 5 inches thick with occasional thin shale partings, noticed one weathered soil filled seam from 4.4 to 4.5 feet. 11.2	CEMENT-BENTONITE GROUT	Water level 6.4 feet below ground level at completion, hole open to 23.5 feet.
11.2–20			RUN #2 RUN #3 RUN #4					Shale bedrock, medium gray to dark gray, moderately hard, can be etched with a knife, very thinly to thinly bedded 1/2 to 4 inches thick.		

HV CORE DATA

Run #	Int. (ft)	Length (ft)	Rec. (ft)	Rec. %	RQD %
1	2.7' to 7.9'	5.2'	5.2'	100	100
2	7.9' to 13.2'	5.3'	5.3'	100	30

HV CORE DATA

Run #	Int. (ft)	Length (ft)	Rec. (ft)	Rec. %	RQD %
3	13.2' to 18.0'	4.8'	4.8'	100	67
4	18.0' to *23.5'	5.5'	5.0'	91	25

N=NUMBER OF BLOWS TO DRIVE 2" SPOON 12" WITH 140 lb. WT. FALLING 30.0" PER BLOW

LOGGED BY Dale M. Gramza/Senior Geologist (amw) SHEET 1 OF 2

EARTH DIMENSIONS, INC.

Soil and Hydrogeologic Investigations • Wetland Delineations
1091 Jamison Road • Elma, NY 14059
(716) 655-1717 • FAX (716) 655-2915

8D96c HOLE NO. TB 8-97 SURF. ELEVATION 96.04

PROJECT Rock Coring and Packer Testing LOCATION See location map.

210 French Rd. Cheetowaga, Erie Co., N.Y.

CLIENT Hazard Evaluations Inc. DATE STARTED 7/18/97 COMPLETED 7/22/97

DEPTH IN FT	SN	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL	WATER TABLE AND REMARKS
	↓		RUN #4					Shale bedrock, medium gray to dark gray, moderately hard, can be etched with a knife, very thinly to thinly bedded 1/2 to 4 inches thick. 23.5		HV CORE DATA 3 13.2' to 18.0' 4.8' 4.8' 100 67 4 18.0' to *23.5' 5.5' 5.0' 91 25
								Coring completed at 23.5 feet.		
25										
										* Footnote: Run #4, all rock fell out of barrel while removing from hole. Redrilled to 23.5, greatly distorting rock core.
30										
35										
40										

N=NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30.0 " PER BLOW

LOGGED BY Dale M. Gramza/Senior Geologist (amw) SHEET 2 OF 2

EARTH DIMENSIONS, INC.

Soil and Hydrogeologic Investigations • Wetland Delineations

1091 Jamison Road • Elma, NY 14059

(716) 655-1717 • FAX (716) 655-2915

8D98c

HOLE NO. MW 9-97

SURF. ELEVATION 97.26

PROJECT Rock Coring and Packer Testing

210 French Rd. Cheetowaga, Erie Co., N.Y.

LOCATION See location map.

CLIENT Hazard Evaluations Inc.

DATE STARTED 7/17/97 COMPLETED 7/18/97

DEPTH IN FT	SN	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL	WATER TABLE AND REMARKS
0–4.6								Advanced 2 1/4" HSA without sampling to 4.6 feet, then flush and spin 4 1/2" casing to rock.	2" PVC RISER PIPE; CEMENT BENTONITE GROUT to 3.0'	← CEMENT BENTONITE GROUT. Water level at 2.8 feet below ground level at completion. ← 3.0'. Soil overburden to 4.6 feet over limestone bedrock to 13.5 feet over shale bedrock to end of boring.
4.6	RUN #1						Limestone	Limestone bedrock, gray, very hard, can be etched with a knife with effort, very thinly to medium bedded 1 to 8 inches thick with occasional slightly weathered shale partings.	BENTONITE SEAL to 6.3'; 2" PVC RISER PIPE to 9.5'	← 6.3'. ← 9.5'
	RUN #2								2" .010 SLOT PVC SCREEN; #2 SIZE SAND	
13.5	RUN #3						Shale	Shale bedrock, medium gray, moderately hard, can be etched with a knife, very thinly to thinly bedded 1/2 to 4 inches thick.	2" .010 SLOT PVC SCREEN; #2 SIZE SAND	
20										

HQ CORE DATA

Run #	Int. (ft)	Length (ft)	Rec. (ft)	Rec. %	RQD %
1	4.6' to 9.8'	5.2'	5.2'	100	88
2	9.8' to 15.0'	5.2'	5.5'	100+	57
3	15.0' to 20.0'	5.0'	4.8'	96	84

N=NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30.0 " PER BLOW

LOGGED BY Dale M. Gramza/Senior Geologist (amw)

EARTH DIMENSIONS, INC.
Soil and Hydrogeologic Investigations • Wetland Delineations
1091 Jamison Road • Elma, NY 14059
(716) 655-1717 • FAX (716) 655-2915

8D96c HOLE NO. MW 9-97 SURF. ELEVATION 97.26

PROJECT Rock Coring and Packer Testing
210 French Rd. Cheetowaga, Erie Co., N.Y.
LOCATION See location map.

CLIENT Hazard Evaluations Inc.
DATE STARTED 7/17/97 COMPLETED 7/18/97

DEPTH IN FT	SN	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WELL	WATER TABLE AND REMARKS
20–25	↓		RUN #4				Shale	Shale bedrock, medium gray, moderately hard, can be etched with a knife, very thinly to thinly bedded 1/2 to 4 inches thick.	2" .010 SLOT PVC SCREEN; #2 SIZE SAND	← 24.5'
25								25.0		← 25.0'
								Coring completed at 25.0 feet.		
30										
35										
40										

HQ CORE DATA

Run #	Int. (ft)	Length (ft)	Rec. (ft)	Rec. %	RQD %
4	20.0' to 25.0'	5.0'	5.0'	100	72

N=NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30.0 " PER BLOW

LOGGED BY Dale M. Gramza/Senior Geologist (amw)

APPENDIX D

PACKER PRESSURE TEST DATA

PACKER TESTING
and
DATA CALCULATION

REPORT OF WATER PRESSURE TESTING

JOB No.	HOLE No. TB8-97	LOCATION 210 French Rd		SHEET No. OF
DATE STARTED 7/18/97	DATE COMPLETED	SURFACE ELEVATION	DEPTH TO ROCK 2.7'	DEPTH TO GROUNDWATER 1.2
LOGGED BY DMW	CLIENT HAZ EVALUATIONS INC			

TEST No.	PACKER INFLATION PRESSURE (PSI)	DEPTH FROM	DEPTH TO	LENGTH OF INTERVAL TESTED (FEET)	WATER METER START	WATER METER END	WATER LOSS (☐ CU. FT.) (☐ GAL.) (1)	ELAPSED TIME (MIN.)	RATE OF LOSS (GPM)	PRESSURE STATIC BOREHOLE (PSI)	PRESSURE LINE GAUGE (PSI)	PRESSURE TEST BOREHOLE (PSI)	PRESSURE RECORDER SENSITIVITY (%)		PERME-ABILITY
1	200	5.3	13.2	7.9	1538.7	1538.7	0	1			13				
					1538.7	1538.8	.1	2							
					1538.8	1538.9	.1	3							
					1538.9	1539.2	.3	4							
					1539.2	1539.4	.2	5							
					1539.4	1539.7	.3	6							
					1539.7	1539.9	.2	7							
					1539.9	1540.1	.2	8							
					1540.1	1540.4	.3	9							
					1540.4	1540.6	.2	10							
					1540.6	1540.9	.3	11							
					1540.9	1541.1	.2	12							
					1541.1	1541.4	.3	13							
					1541.4	1542.7	1.3	18							

NOTE: -FOR USE WITH U.S.B.R. TEST DESIGNATION E-18. Ave .22 gpm (1) CONVERSION FACTOR: 7.48 U.S. GALLONS = 1 CU. FT.
-GAUGE PRESSURE (IN PSI) ÷ .433 = FT. WATER
-COLUMN PRESSURE = DEPTH TO UPPER PACKER OR DEPTH TO GROUNDWATER, WHICHEVER IS SMALLER.

REPORT OF WATER PRESSURE TESTING

JOB No.	HOLE No. TB8-97	LOCATION 210 French Rd	SHEET No. OF
DATE STARTED 7/22/97	DATE COMPLETED	SURFACE ELEVATION	DEPTH TO ROCK 2.7	DEPTH TO GROUNDWATER 6.4
LOGGED BY	CLIENT HAZARD EVALUATIONS INC		

TEST No.	PACKER INFLATION PRESSURE (PSI)	DEPTH FROM	DEPTH TO	LENGTH OF INTERVAL TESTED (FEET)	WATER METER START	WATER METER END	WATER LOSS (☐ CU. FT.) (☐ GAL.) (1)	ELAPSED TIME (MIN.)	RATE OF LOSS (GPM)	PRESSURE STATIC BOREHOLE (PSI)	PRESSURE LINE GAUGE (PSI)	PRESSURE TEST BOREHOLE (PSI)	PRESSURE RECORDER SENSITIVITY (%)		PERME-ABILITY
2	200	15.5	23.5	8.0	1563	1572	9	1			13				
					1572	1580.4	8.4	2							
					1580.4	1588.6	8.2	3							
					1588.6	1596.6	8.0	4							
					1596.6	1604.4	7.8	5							
					1604.4	1612.1	7.7	6							
					1612.1	1619.7	7.6	7							
					1619.7	1627.2	7.5	8							
					1627.2	1634.6	7.4	9							
					1634.6	1642.2	7.6	10							
					1642.2	1678.9	36.7	15	7.3						
					1678.9	1711.6	32.7	20	6.5						
								7.8 gpm							

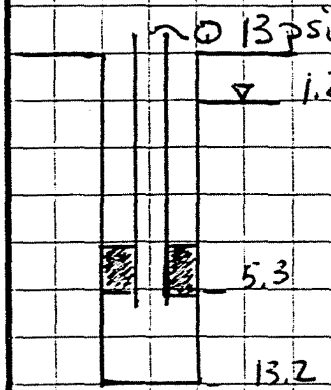
NOTE: -FOR USE WITH U.S.B.R. TEST DESIGNATION E-18. Ave 7.4 gpm (1) CONVERSION FACTOR: 7.48 U.S. GALLONS = 1 CU. FT.
-GAUGE PRESSURE (IN PSI) ÷ .433 = FT. WATER
-COLUMN PRESSURE = DEPTH TO UPPER PACKER OR DEPTH TO GROUNDWATER, WHICHEVER IS SMALLER.

PREPARED BY: DMG CLIENT: HAZ EVAL
CHECKED BY: PROJECT NO.:
DATE: 7/29/97 REV: SHEET: ___ OF ___
SUBJECT: Packer testing calculations

EARTH DIMENSIONS, INC.
1091 Jamison Road
Elma, NY 14059
(716) 655-1717
FAX (716) 655-2915

TB 8-97

TEST #1



$Q = .22\,gpm \div 7.50 = 0.03\ ft^3/min$

$H = 13\,psi \div .434 = 30' + 1.2'$

– Head Loss: Assume negligable due to low flow and short pipe length.

$H = 31.2\ ft$

$$\frac{A}{r} = \frac{7.9\,ft}{(2/12)\,ft} = 47.4$$

$C_s = 70$

$$K = \frac{Q}{C_s\, r\, H} = \frac{0.03\ ft^3/min}{70\,(2/12)'\,(31.2)'}$$

$K = 8.2 \times 10^{-5}\ ft/min$

$= 1.6 \times 10^{-4}\ cm/sec$

$4.2 \times 10^{-5}\ cm/sec$

PREPARED BY: DMG CLIENT: Haz Eval

CHECKED BY: PROJECT NO.:

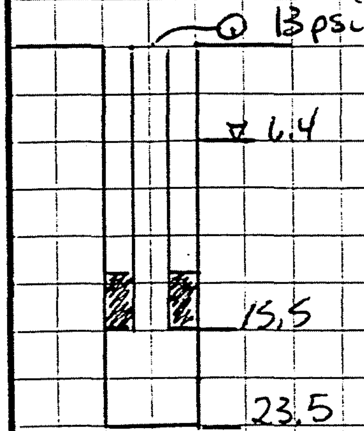
DATE: 7/29/97 REV: SHEET: OF

SUBJECT: Packer testing Calculations

EARTH DIMENSIONS, INC.
1091 Jamison Road
Elma, NY 14059
(716) 655-1717
FAX (716) 655-2915

TB 8-97

TEST #2



$Q = 7.4\,gpm \div 7.5 = 0.99\,ft^3/min$

$H = 13\,psi = 30' + 6.4'$

Head loss (Assume Negligable)

$= 36.4'$

$A/r = 8\,ft/(2/12)\,ft = 48 \qquad C_s = 70$

$K = \frac{Q}{C_s\, r\, H} \Rightarrow =$

$K = \frac{0.99\,ft^3/min}{70\,(2/12)'\,(36.4)'}$

$K = 2.33 \times 10^{-3}\,ft/min$

$= 1.16 \times 10^{-3}\,cm/sec$

REPORT OF WATER PRESSURE TESTING

JOB No.	HOLE No.	LOCATION 210 French		SHEET No. OF
DATE STARTED 7/17/97	DATE COMPLETED	SURFACE ELEVATION	DEPTH TO ROCK	DEPTH TO GROUNDWATER
LOGGED BY	CLIENT HAZARD EVALUATIONS —			

Surface Test

TEST No.	PACKER INFLATION PRESSURE (PSI)	DEPTH FROM	DEPTH TO	LENGTH OF INTERVAL TESTED (FEET)	WATER METER START	WATER METER END	WATER LOSS (☐ CU. FT.) (☐ GAL.) (1)	ELAPSED TIME (MIN.)	RATE OF LOSS (GPM)	PRESSURE: STATIC BOREHOLE (PSI)	PRESSURE: LINE GAUGE (PSI)	PRESSURE: TEST BOREHOLE (PSI)	PRESSURE: RECORDER SENSITIVITY (%)	PRESSURE	PERMEABILITY
Surface test		10' Rod	5' packer		870	898	28	1 min			30				
					898	925	27	2							
					925	952	27	3							
					952	979	27	4							
					996	1019	23	1			20				
					1019	1041	22	2							
					1041	1063	22	3							
Surface test		20' Rod	5' packer		1383	1408	25	1			30				
					1408	1433	25	2							
					1433	1459	26	3							
					1470	1491	21	1			20				
					1491	1512	21	2							
					1512	1533	21	3							

NOTE: -FOR USE WITH U.S.B.R. TEST DESIGNATION E-18.
-GAUGE PRESSURE (IN PSI) ÷ .433 = FT. WATER
-COLUMN PRESSURE = DEPTH TO UPPER PACKER OR DEPTH TO GROUNDWATER, WHICHEVER IS SMALLER.

(1) CONVERSION FACTOR: 7.48 U.S. GALLONS = 1 CU. FT.

REPORT OF WATER PRESSURE TESTING

JOB No.	HOLE No. MW9-97	LOCATION 210 French	SHEET No. OF
DATE STARTED 7/17/97	DATE COMPLETED	SURFACE ELEVATION	DEPTH TO ROCK 4.6 / DEPTH TO GROUNDWATER 3.8'
LOGGED BY DMG	CLIENT HAZARD EVALUATIONS INC		

TEST No.	PACKER INFLATION PRESSURE (PSI)	DEPTH FROM	DEPTH TO	LENGTH OF INTERVAL TESTED (FEET)	WATER METER START	WATER METER END	WATER LOSS (☐ CU. FT.) (☐ GAL.) (1)	ELAPSED TIME (MIN.)	RATE OF LOSS (GPM)	PRESSURE: STATIC BOREHOLE (PSI)	PRESSURE: LINE GAUGE (PSI)	PRESSURE: TEST BOREHOLE (PSI)	PRESSURE: RECORDER SENSITIVITY (%)		PERMEABILITY
1	200	8.0	15.0	7.0	1065	1065	0	1			20				
					1065	1065	0	2							
					1065	1065	0	5							
	Note: Increase Gauge pressure to 40psi Began Losing water, then Droped Gauge pressure Back to 20psi.														
2					1217	1230	13	1			20				
					1230	1242	12	2							
					1242	1253	11	3							
					1253	1265	12	4							
					1265	1276	11	5							
					1276	1287	11	6							
					1287	1298	11	7							
					1298	1309	11	8							
					1309	1318	9	9							
					1318	1328	10	10							
					1328	1337	9	11							

NOTE: -FOR USE WITH U.S.B.R. TEST DESIGNATION E-18. Ave → 11.1 gpm (1) CONVERSION FACTOR: 7.48 U.S. GALLONS = 1 CU. FT.
-GAUGE PRESSURE (IN PSI) ÷ .433 = FT. WATER
-COLUMN PRESSURE = DEPTH TO UPPER PACKER OR DEPTH TO GROUNDWATER, WHICHEVER IS SMALLER.

REPORT OF WATER PRESSURE TESTING

JOB No.	HOLE No. MW9-97	LOCATION 210 French Road	SHEET No. OF
DATE STARTED 7/17/97	DATE COMPLETED	SURFACE ELEVATION	DEPTH TO ROCK 4.6 / DEPTH TO GROUNDWATER 2.8
LOGGED BY DMG	CLIENT Hazard Evaluations Inc		

TEST No.	PACKER INFLATION PRESSURE (PSI)	DEPTH FROM	DEPTH TO	LENGTH OF INTERVAL TESTED (FEET)	WATER METER START	WATER METER END	WATER LOSS (☐ CU. FT.) (☐ GAL.) (1)	ELAPSED TIME (MIN.)	RATE OF LOSS (GPM)	PRESSURE: STATIC BOREHOLE (PSI)	PRESSURE: LINE GAUGE (PSI)	PRESSURE: TEST BOREHOLE (PSI)	PRESSURE: RECORDER SENSITIVITY (%)		PERME-ABILITY
3	200	16.0	25.0	9.0	1538.4	1538.4	0	1			15				
							0	2							
							0	3							
							0	4							
							0	5							
							0	6							
							0	7							
							0	8							
							0	9							
						1538.4	0	10							
4					1538.4	1538.4	0	1			20				
							0	2							
							0	3							
							0	4							
						1538.4	0	5							

NOTE: -FOR USE WITH U.S.B.R. TEST DESIGNATION E-18. Ave 0
-GAUGE PRESSURE (IN PSI) ÷ .433 = FT. WATER
-COLUMN PRESSURE = DEPTH TO UPPER PACKER OR DEPTH TO GROUNDWATER, WHICHEVER IS SMALLER.

(1) CONVERSION FACTOR: 7.48 U.S. GALLONS = 1 CU. FT.

PREPARED BY: DMG CLIENT: HAZ EVAL

CHECKED BY: PROJECT NO.:

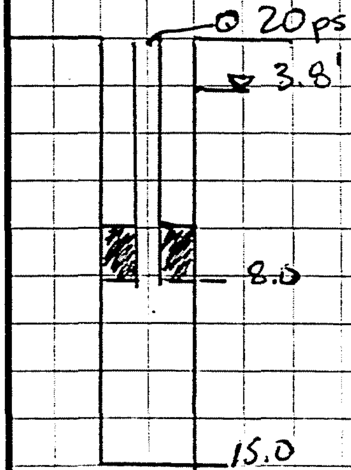
DATE: 7/29/97 REV: SHEET: OF

SUBJECT: Packer Testing Calculations

EARTH DIMENSIONS, INC.
1091 Jamison Road
Elma, NY 14059
(716) 655-1717
FAX (716) 655-2915

MW 9-97

TEST #1



$Q = 11.1 \text{ Gpm} \div 7.5 = 1.48 \text{ ft}^3/\text{min}$

$H = 20 \text{psi} \div .434 = 46.08 + 3.8$

Head Loss (Assume negligible) $= 49.88$

$\frac{A}{R} = \frac{7.0 \text{ ft}}{(2/12)'} = 42$

$C_s = 62$

$$K = \frac{Q}{C_s r H} = \frac{1.48 \text{ ft}^3/\text{min}}{62(2/12)'(49.88)'}$$

$$K = \frac{1.48 \text{ ft}^3/\text{min}}{515.42 \text{ ft}^2}$$

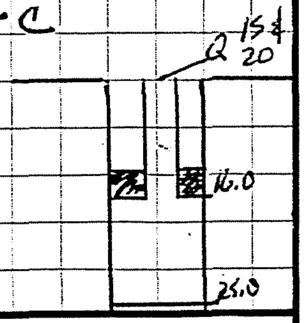
$K = 2.87 \times 10^{-3}$ ft/min

$= 1.45 \times 10^{-3}$ cm/sec

TEST #2

NO TAKE

WATER LOSS 0 gpm



APPENDIX E

REMEDIATION EQUIPMENT INFORMATION

KOBY

ALUMINUM WATERTIGHT MONITOR WELL MANHOLES

BUY DIRECT FROM THE MANUFACTURER

P.V.C. SKIRT:

- Out performs galvanized steel skirt
- No welded seam
- Will not rust
- Environmentally friendly
- Easy to cut in the field for remediation plumbing, bolder cut out, etc.

8" x 8"

Machine grooved, wedge design receiver prevents manhole from rising

3/8" Stainless steel bolts with nylon washers

Premium extra heavy duty casting

Buna-N O-ring compression seal machined in cover

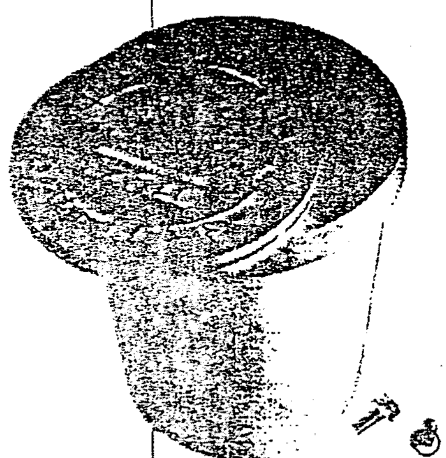
Made in U.S A.

Will not rust or corrode
Same grade aluminum used on bridges, aircraft, and marine parts

LIST PRICE

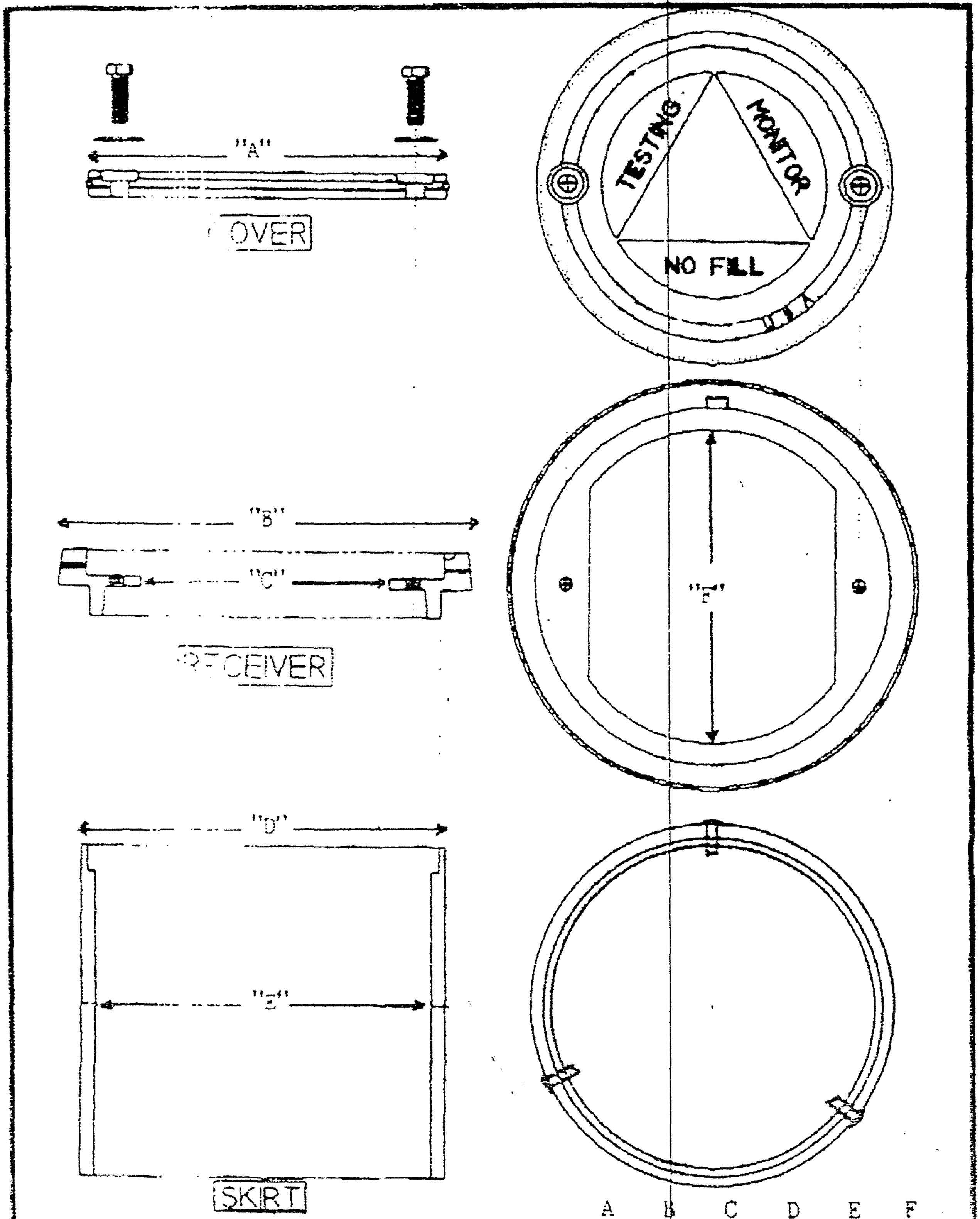
10" x 8"	$59.95
8" x 8"	$43.05
6" x 8"	$39.95

Quantity pricing available.



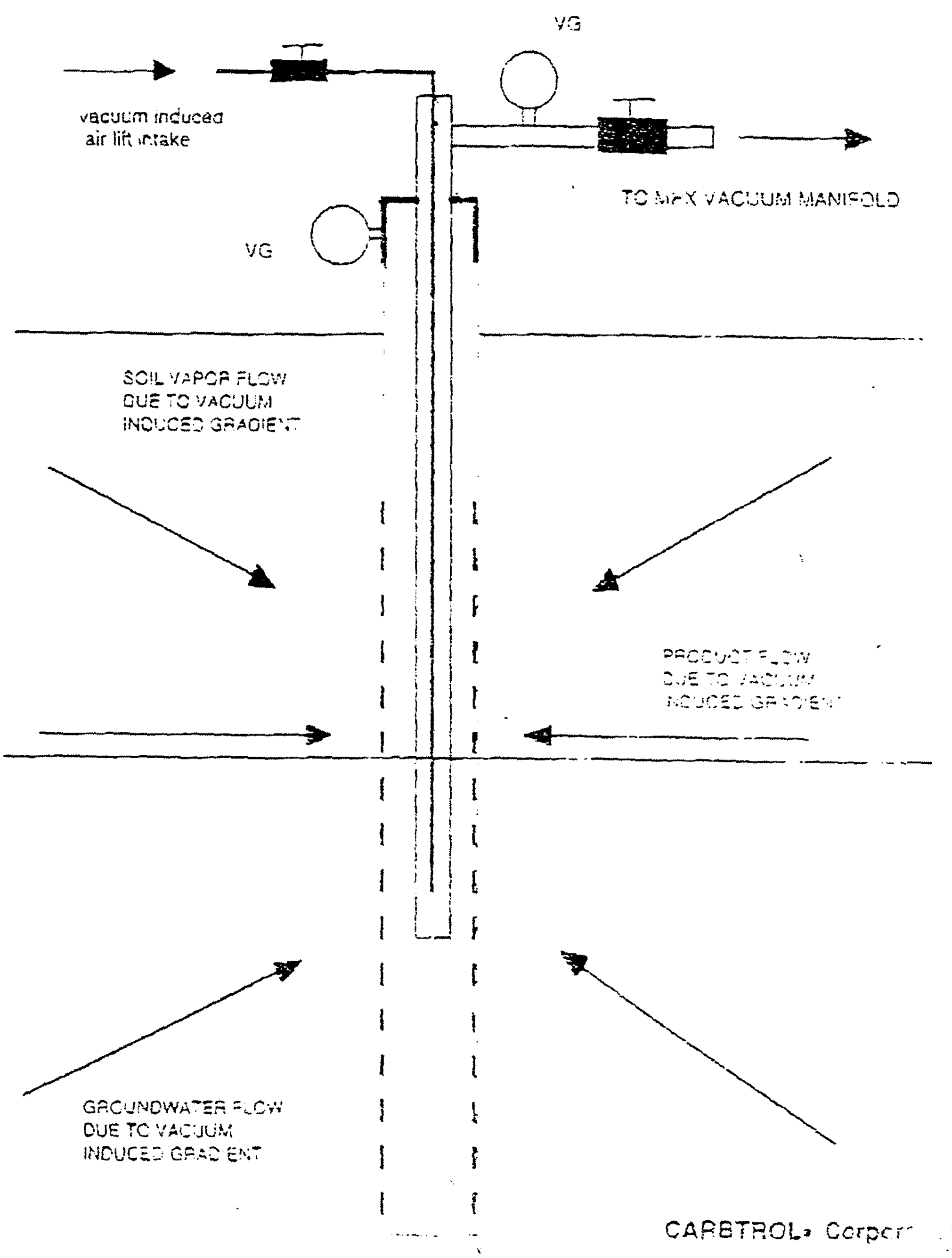
6" x 8"

KOBY
Environmental Inc.
8320 Clinton Street
Elma, N Y 14059



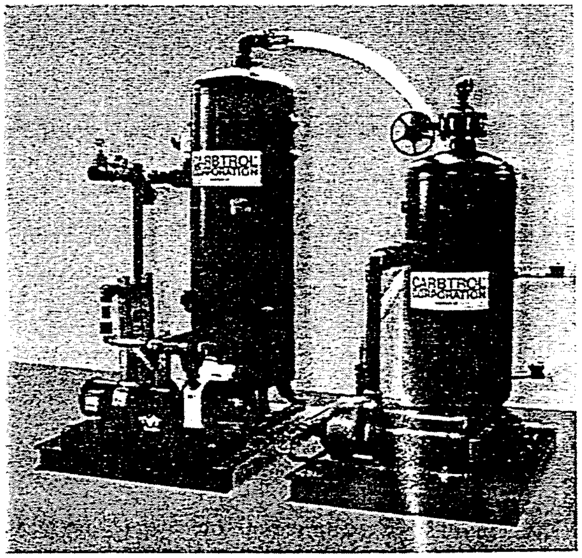
			A	B	C	D	E	F
KOBY Environmental Inc.	*ASSEMBLY DRAWING*	*24" model*	24.0"	26.0"	21.0"	25.0"	24.0"	22.0"

TYPICAL MULTI PHASE EXTRACTION WELL
SHOWING VACUUM INDUCED AIR LIFT FEATURE



CARBTROL®

MULTI-PHASE EXTRACTION SYSTEMS



MPX-100 EXTRACTOR (RIGHT) SHOWN
WITH PRE-SEPARATOR (LEFT)

CARBTROL's Multi-Phase Extraction Systems combine free product, groundwater and soil vapor extraction capabilities in a single skid mounted extraction/treatment package. The system utilizes a water sealed liquid ring pump to remove the component phases from extraction wells or trenches. CARBTROL air/water, oil/water and adsorption separation technologies are then used to treat the extracted components. Vacuums to 25 inches of mercury produced by the fluid vac system greatly increase the removal rate of groundwater and product in low permeability soils. The resulting effect is a more rapid clean up of volatile contamination.

SPECIFICATIONS

MODEL	MAX. AIR FLOW (ACFM)	MAX. WATER FLOW (GPM)	MAX. VACUUM (" HG)	HP
* MPX-75	75	7.5	25	5
MPX-100	100	15	25	7.5
MPX-130	125	20	25	10
MPX-200	230	30	25	15
MPX-300	280	40	25	20
MPX-400	450	60	25	30

For most applications, the liquid ring pump can be direct coupled to the vacuum wells or trenches. In this service the extracted groundwater serves to cool the system and augment the seal water supply.

When it is desirable to isolate the liquid ring pump from the extracted fluids, a pre-separation tank is utilized.

Our Technical Application Bulletin (#PM-8) describes the extraction process in more detail.

CARBTROL®
CORPORATION

51 Riverside Avenue, Westport, CT 06880 • 1-800-242-1150 • (203) 226-5642

MULTIPHASE EXTRACTOR

Model:	MPX-75	MPX-100	MPX-130	MPX-200	MPX-300	MPX-400
Air Flow @ 25" Hg (ACFM):	70	100	115	225	~~260~~ 280	450
Water Capacity (gpm):	7.5	15	20	30	40	60

Design Features:

Exhauster: Liquid ring vacuum pump of sparkproof construction, with bronze housing and hardened aluminum bronze rotor, direct drive, and TEFC or explosionproof motor.

Electrical:

	MPX-75	MPX-100	MPX-130	MPX-200	MPX-300	MPX-400
Motor HP:	5	7.5	10	15	20	30*
Motor Speed (RPM):	1750	1750	1750	1150	1150	1150
Voltage:	230V/1Ø or 230/460V/3Ø	230/460V/3Ø	230/460V/3Ø	230/460V/3Ø	230/460V/3Ø	230/460V/3Ø *(2) @ 15 HP

Seal Water Tank:

Construction: Carbon steel construction with high and low level switches and seal water makeup float valve.

	MPX-75	MPX-100	MPX-130	MPX-200	MPX-300	MPX-400
Size:	80 gal.	80 gal.	80 gal.	120 gal.	120 gal.	120 gal.

Valves. Manual air dilution valve
Manual seal water adjustment valve

Instrumentation: One (1) inlet vacuum gauge (0-30" Hg)
One (1) seal water temperature gauge (20-240°F)
One (1) seal water flow indicator.

Connections:

	MPX-75	MPX-100	MPX-130	MPX-200	MPX-300	MPX-400
Inlet:	2" FPT	2" FPT	2" FPT	3" FPT	3" FPT	4" FPT
Water Discharge:	2" FPT	2" FPT	2" FPT	3" FPT	3" FPT	3" FPT
Air Discharge:	4" FPT	4" FPT	4" FPT	8" FPT	8" FPT	8" FPT

Skid Mounting: All the above equipment is factory piped and mounted on a steel skid. All piping is of galvanized carbon steel construction.

Options.

- Motor starter in a weatherproof or explosionproof enclosure, wired to the exhauster motor
- Seal water tank discharge pump with level switches, to automatically pump accumulated water to the next treatment step.
- Seal water heat exchanger.
- Free Product Skid to remove free product upstream of the liquid ring pump.
- Flow indication, extra vacuum, temperature or pressure gauges, sample ports.

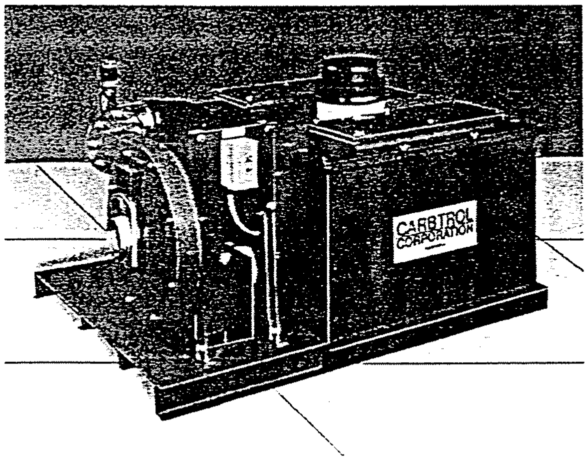
	MPX-75	MPX-100	MPX-130	MPX-200	MPX-300	MPX-400
Dimensions: L X W.	4'-6" X 4'-0"	4'-6" X 4'-0"	4'-6" X 4'-0"	4'-6" X 4'-0"	4'-6" X 4'-0"	6'-6" X 4'-0"
Height:	5'-3/4"	5'-3/4"	5'-3/4"	7'-1 3/4"	7'-1 3/4"	7'-1 3/4"
Shipping Weight (lbs.):	700	725	775	1,350	1,650	1,950
Availability (Weeks):	4-6	4-6	4-6	6-8	6-8	6-8
Drawing Number:	S-2639	S-2639	S-2639	S-2651	S-2652	-

7/10/96
SP-850/#1

CARBTROL®

MULTI-STAGE DIFFUSED AIR STRIPPER

- RESISTANT TO IRON FOULING -



FEATURES

- Easy to clean -
  No trays or packing to plug. Quick removable cleanout cover allows easy access to aeration compartment.
- High efficiency - removals up to 99.99%.
- Multiple stages to handle varying treatment requirements.
- Standard design up to 50 gpm.
- Very low profile.

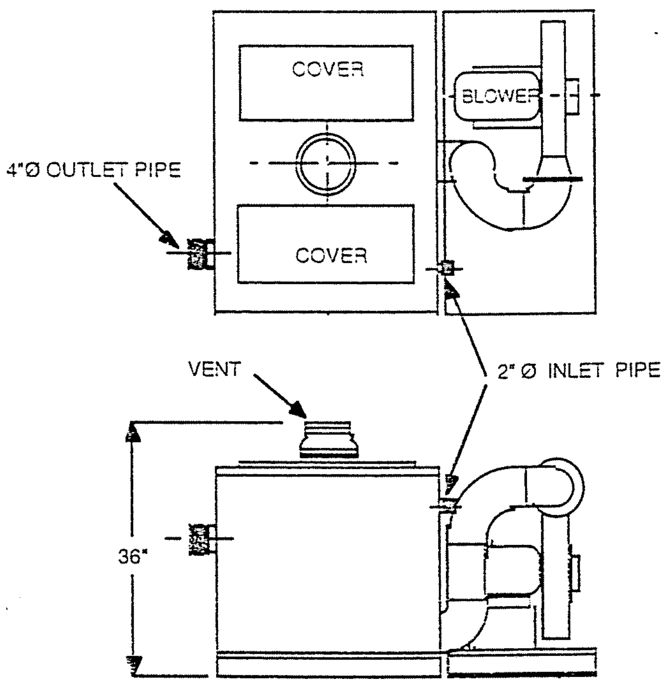
COMPONENTS

- Aeration compartments - PVC Construction with UV protection.
- Blowers - centrifugal type, direct drive, anti-spark.
- Motors and starters - TEFC or Explosion Proof.
- Two skids - one for blower, one for aeration compartment.

SPECIFICATIONS

MODEL/ STAGES	CFM*	HP	FOOTPRINT
MSD-2	100 / 200	2 / 2	4' x 3'-9"
MSD-4	200 / 400	2 / 5	4' x 5'-4"
MSD-6	300 / 600	3 / 7.5	4' x 6'-11"
MSD-8	400 / 800	5 / 7.5	4' x 8'-6"
MSD-12	600 / 1200	7.5 / 10	4' x 12'-4"

* Each aeration compartment is designed for either 50 CFM (normal operation) or 100 CFM (high air flow operation).



FOUR STAGE STRIPPER

CARBTROL®
CORPORATION

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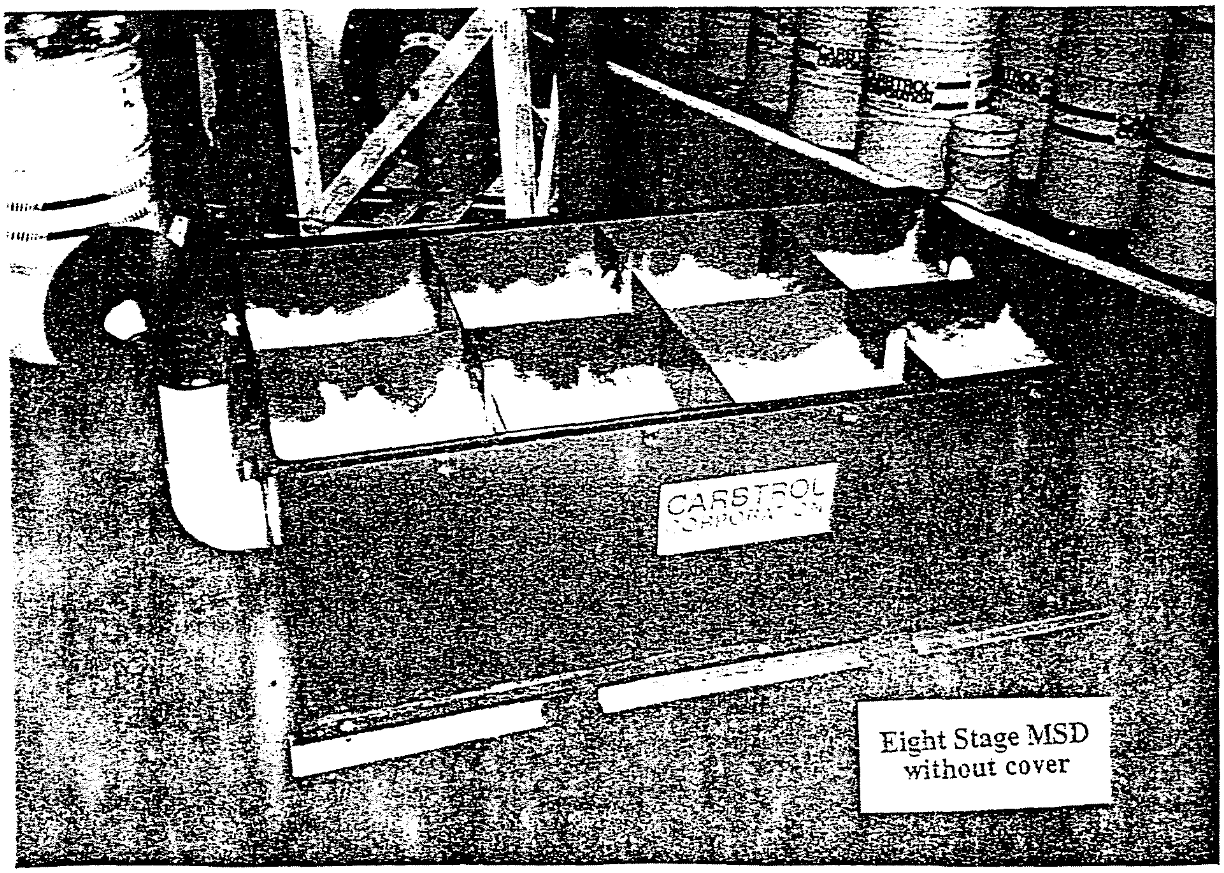
CARBTROL® CORPORATION
TYPICAL PHOTOS - MSD



PM-1
8/95
dw

CARBTROL®

Why CARBTROL'S Diffused Air Stripper Is The Best!

Very low profile enables gravity flow from upstream processes. No transfer pumps required.

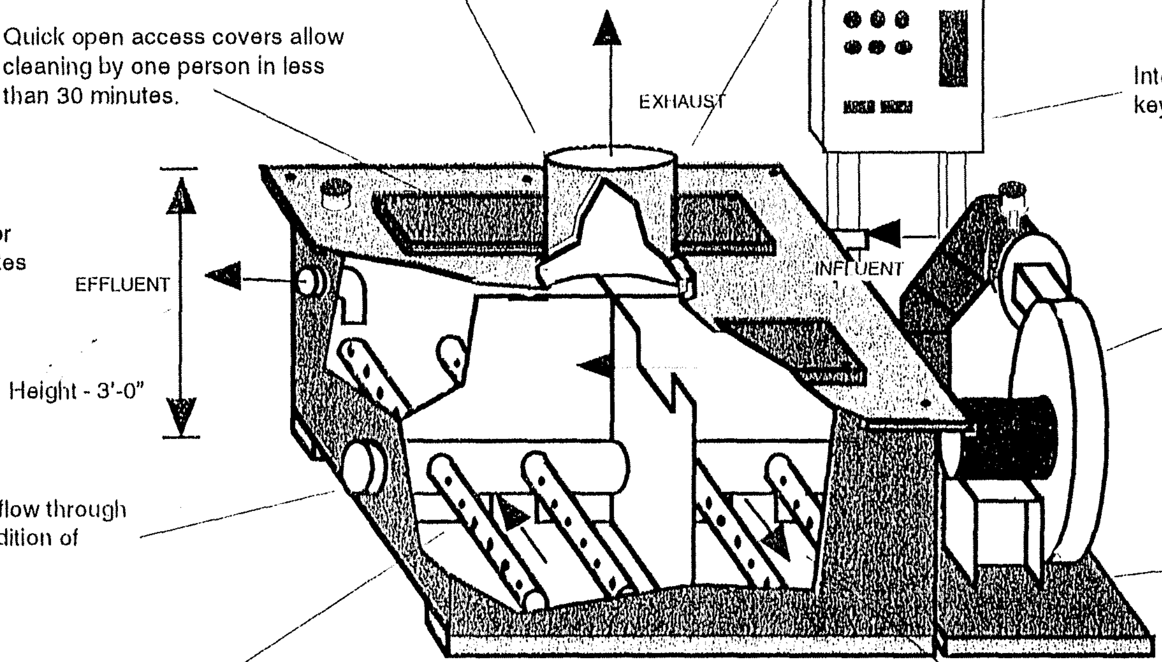
Easily fitted with activated carbon off gas treatment.

Quick open access covers allow cleaning by one person in less than 30 minutes.

Integrated control center monitors key performance parameters.

Rugged duty polymer construction eliminates corrosion.

Low pressure centrifugal fan provides low air temperatures and reliable operation.



Modular design and flow through air header permit addition of stripping cells.

All mechanical components located on a separate power skid for ease of installation and service.

Air spargers are easily removed by hand and lifted out for cleaning or replacement.

Staged multi-cell design provides voc removal efficiency equal to tray stripper or tower.

TYPICAL FOUR STAGE
DIFFUSED AIR STRIPPER

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 AT- 750/#6

SPECIFICATION

CARBTROL
CORPORATION

MULTI-STAGE DIFFUSER SYSTEM

Model:	* MSD-2-100	MSD-4-100	MSD-6-100	MSD-8-100	MSD-12-100
Design Flow (GPM):	50				
Number of air stripping tanks:	2	4	6	8	12
Diffused air stripping tanks:	PVC tanks and air diffusers, fiberglass reinforced polyester (FRP) lid				
Blower:	High pressure centrifugal fan, direct drive, with TEFC motor, inlet slide gate valve, and discharge pressure gauge.				
Electrical: Motor Horsepower:	2	5	7-1/2	7-1/2	10
Standard Voltage:	115/230 1Ø	230/460 3Ø	230/460 3Ø	230/460 3Ø	230/460 3Ø
Skid Mounting:	Diffused air stripper tanks, blower and motor starter are factory mounted, piped and wired on two skids. (MSD-12 on three skids.)				
Overall Dimensions: Length:	3'-9"	5'-4"	6'-11"	8'-6"	12'-4"
Width:	4'-0"	4'-0"	4'-0"	4'-0"	4'-0"
Height:	3'-1/2"	3'-1/2"	3'-11/2"	3'-1/2"	3'-11/2"
Piping Connections: Inlet:	2" pipe with 2" flexible coupling (supplied).				
Outlet:	4" pipe with 4" flexible coupling (supplied).				
Vent:	6"	8"	8"	(2) 8"	(2) 8"
Options:	Motor Starter. Explosionproof electrical system. Pump Sump System. Air Flow Switch. High/High Water Level Switch. Manifolding for higher water flow rates. Single phase motor available on MSD-4, -6 & -8 (TEFC only). Three phase motor available on MSD-2.				
Shipping Weight (lbs.):	550	680	900	1025	1685
Availability:	4-6 Weeks				
Drawing Number:	S-1894	S-1894	S-1894	S-1896	S-1905

8/21/96
*SP-750/#2

LIQUID PHASE CARBON USAGE ESTIMATE
CARBTROL® Corporation

PROJECT: Mariacher

FLOW IN GPM: 1.00
FLOW IN GPD: 1440.00

PERFORMANCE:

CONTAMINANT	CONC(ppb)	#CONT /DAY	# CARBON /DAY	# CONT /1000 gal	# CARBON /1000 gal
1,1-Dichloroethane	6.51329107	0.00	0.20	0.00	0.14
1,1,1-Trichloroethane	3.40293008	0.00	0.04	0.00	0.02
cis-1,2-Dichloroethylene	0.69890146	0.00	0.03	0.00	0.02
Tetrachloroethylene	0.75483942	0.00	0.00	0.00	0.00
TOTALS	11.369962	0.00	0.26	0.00	0.18

Calculation based on CARBTROL CSL carbon having an Iodine number of: 1200.00

DIFFUSED AIR STRIPPER REMOVAL ESTIMATE
CARBTROL® Corporation

PROJECT: Mariacher
FLOW IN GPM: 1
TEMP IN °F: 55
STRIPPER TYPE: Multi-Stage Diffuser

OF STAGES REQUESTED: 2
DESIGN CFM PER CELL: 100

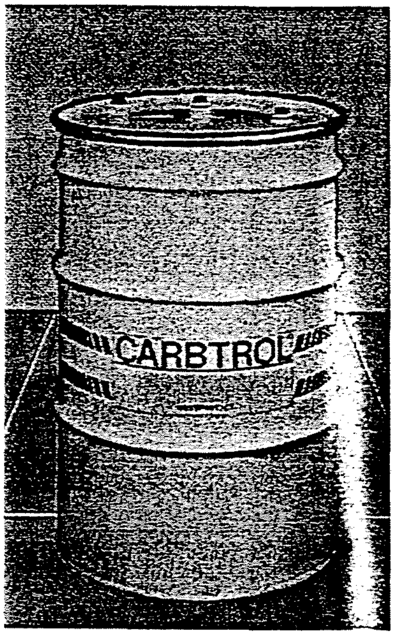
PERFORMANCE:

CONTAMINANT	INFLUENT(ppb)	ACTUAL EFFLUENT(ppb)	K FACTOR	AIR DISCHARGE #/DAY	AIR DISCHARGE ppmv
1,1-Dichloroethane	31000	6.51	2.720	0.37	5.09
1,1,1-Trichloroethane	84000	3.40	6.245	1.01	10.28
cis-1,2-Dichloroethylene	3600	0.70	2.831	0.04	0.60
Tetrachloroethylene	14000	0.75	5.407	0.17	1.38
TOTALS	132600	11.37		1.59	17.35

WILL BE USED AS NECESSARY

WATER PURIFICATION CANISTER 200 POUND ACTIVATED CARBON

L-1



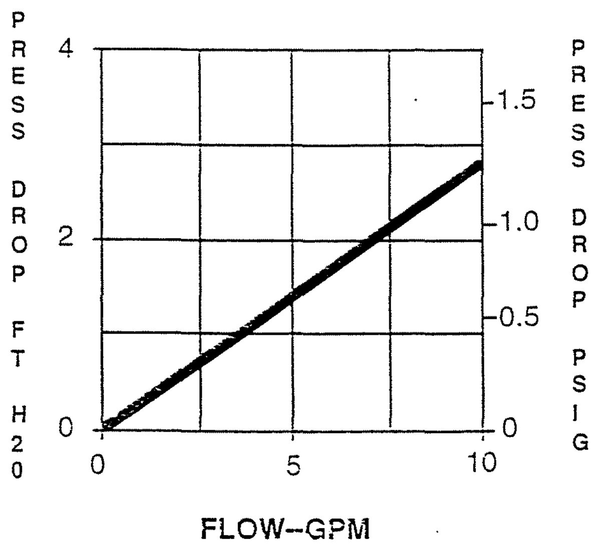
The CARBTROL L-1 (liquid) Canister handles up to 10 gpm.

FEATURES

- 200 pounds of high activity carbon.
- Large 1 1/4" internal piping. Low pressure drop allows operation of three canisters in series.
- Standard FPT couplings for easy installation - saves time and money.
- Special "no leak" lid gasket.
- Heavy duty steel drums. Acceptable for transport of hazardous spent carbon.
- Piping design eliminates channeling.

SPECIFICATIONS

DRUM:	24" Ø x 34" high, mild steel, epoxy phenolic internal coating with polyethylene liner.
CARBON:	200 lbs.
SHIPPING WEIGHT:	250 lbs.
INLET:	1 1/4" FPT, steel
OUTLET:	1 1/4" FPT, steel
INTERNAL PIPING:	1 1/4" PVC
DRAIN:	3/4" bung
PRESSURE DROP:	1.25 psi @ 10 gpm
MAX. OPERATING PRESSURE:	10 psi



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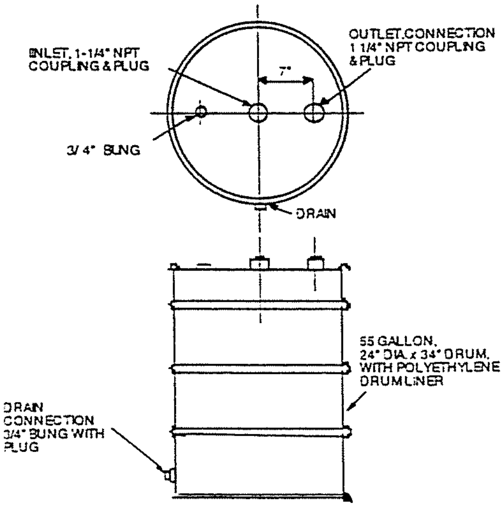
WILL BE USED AS NECESSARY

WATER PURIFICATION CANISTER 200 POUND ACTIVATED CARBON

L-1



OPTIONS

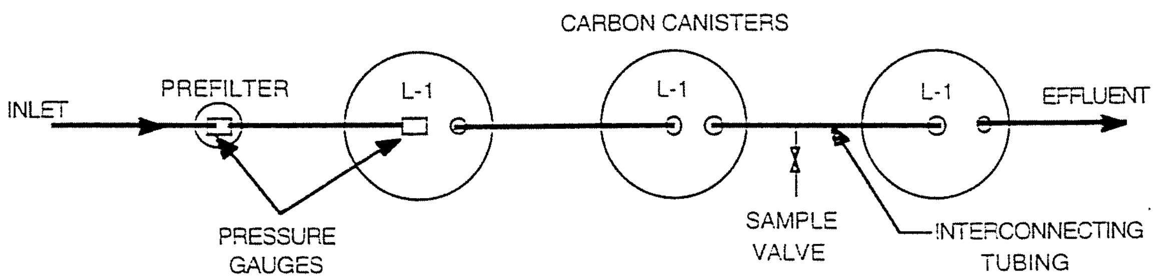
Interconnecting Piping Kit

Flexible 1 1/4" diameter PVC tubing with hose clamps. Includes inlet pressure gauge and intermediate sample valve.

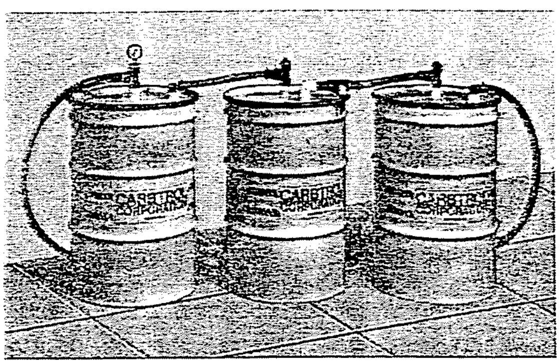
Pre-filter for Suspended Solids Removal

Pre-filter consisting of a basket filter piped and mounted on support frame. Filter is of carbon steel construction.

ARRANGEMENT (3) L-1 Canisters in series for 10 gpm flow (Contact time @ 10 gpm - 15 minutes)

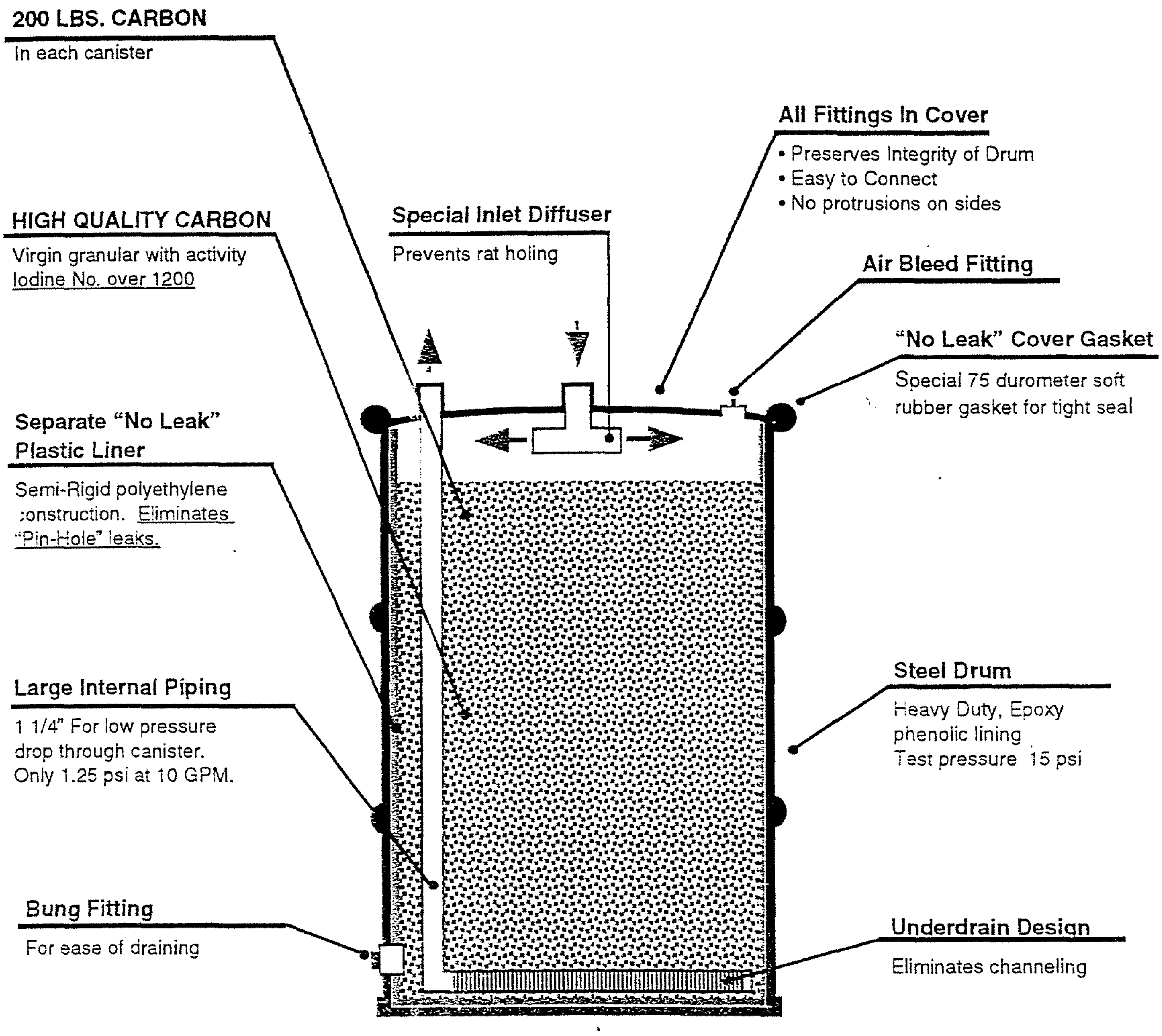


TYPICAL INSTALLATION



WILL BE USED AS NECESSARY

Here's Why CARBTROL'S L-1 Liquid Phase Canister Is the Best !!



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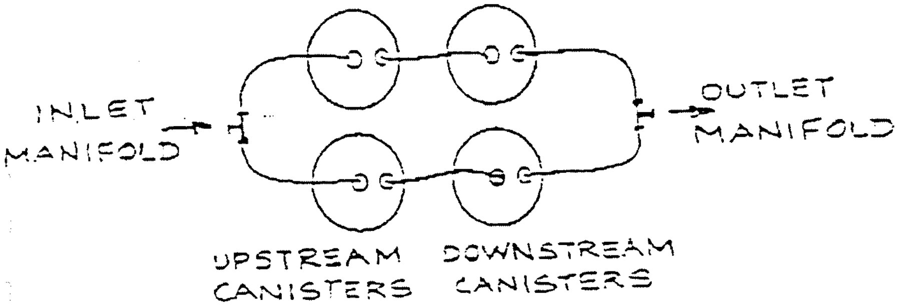
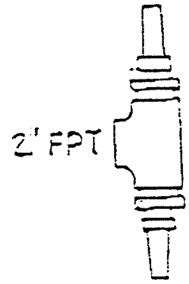
WILL BE USED AS NECESSARY

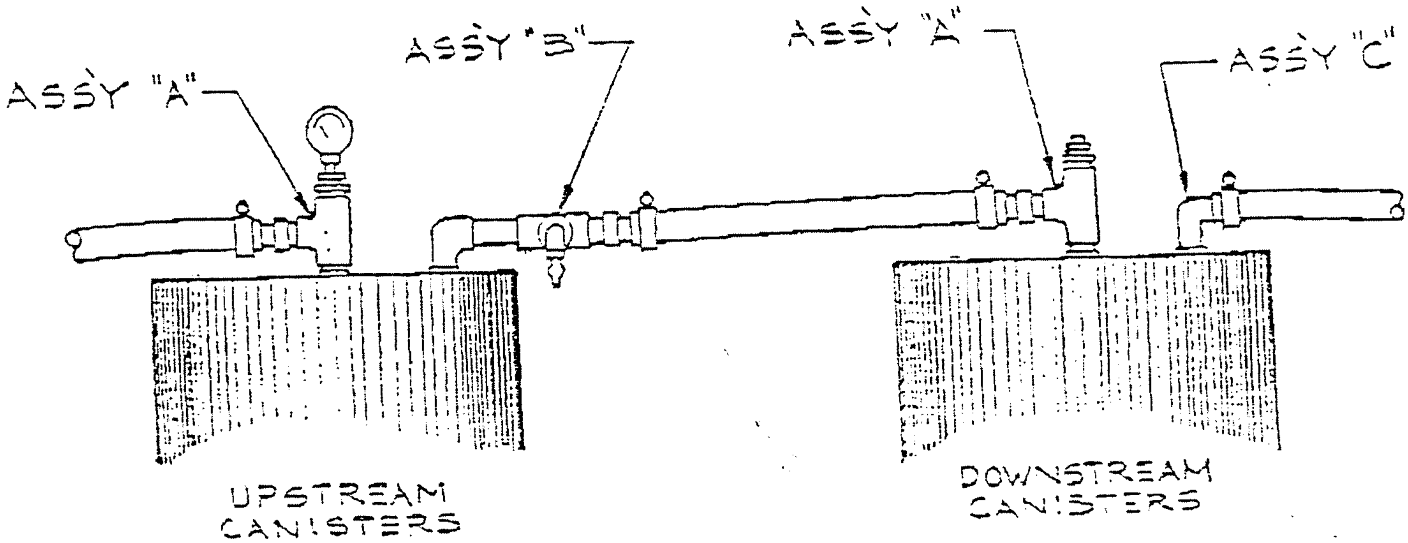
L-1 CARBTROL SPECIAL PIPING KIT
20 GPM



SCHEMATIC



ASSEMBLY "D"
INLET & OUTLET MANIFOLD



CANISTER INLET & OUTLET PIPING

WILL BE USED AS NECESSARY

AIR PURIFICATION CANISTERS 140-200 LB. ACTIVATED CARBON

G-1
G-2
G-3

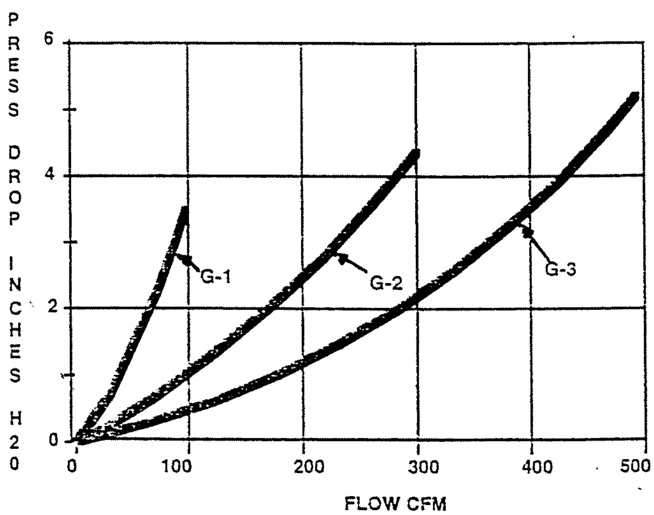
The CARBTROL "G" Canisters handles flows up to 500 CFM.

FEATURES

- High activity carbon.
- Epoxy lined steel or polyethylene construction.
- Acceptable for transport of hazardous spent carbon.
- Side drain for removal of accumulated condensate.
- Low pressure drop.
- PVC internal piping.
- High temperature (180°F) steel units available.

APPLICATIONS

- Soil vapor remediation
- Air stripper exhausts
- Tank vents
- Exhaust hoods
- Work area purification
- Sewage plant odor control



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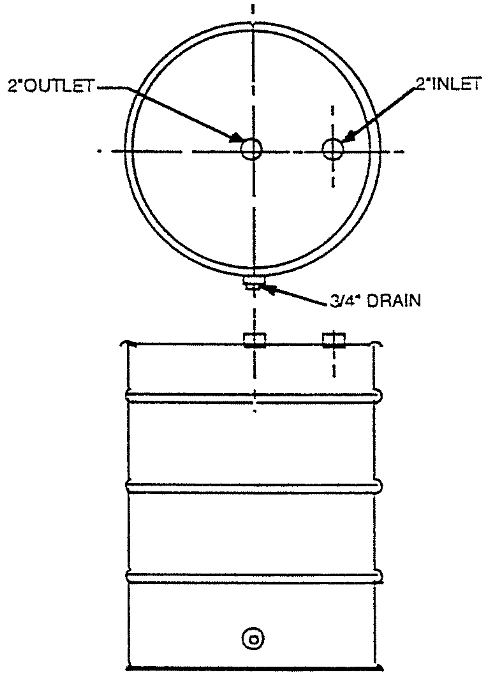
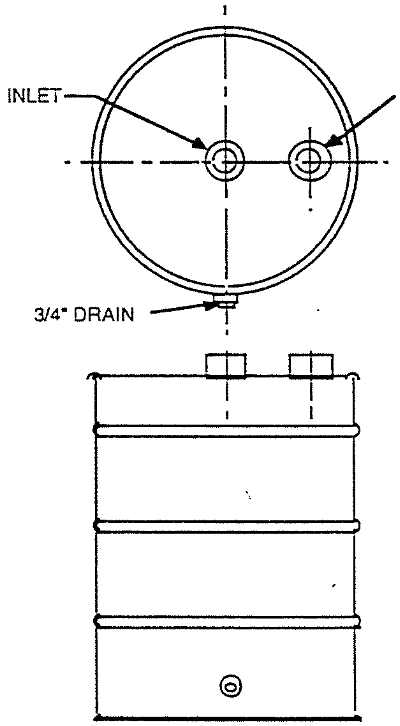
AIR PURIFICATION CANISTERS 140-200 LB. ACTIVATED CARBON

G-1
G-2
G-3



MODEL G-1



MODEL G-2,G-3

SPECIFICATIONS

MODEL	DIAMETER/HEIGHT	CARBON WEIGHT	INLET/OUTLET	MAX. RATED FLOW	APPROX. SHIP WT.
G-1*	24"/36"	200 lbs.	2"/2"	100 CFM	240 lbs.
G-2*	24"/36"	170 lbs.	4"/4"	300 CFM	210 lbs.
G-3P	24"/36"	140 lbs.	6"/6"	500 CFM	180 lbs.
G-3S	24"/34"	140 lbs.	4"/4"	500 CFM	180 lbs.

* Specify: Polyethylene (P) or Epoxy Lined Steel (S)

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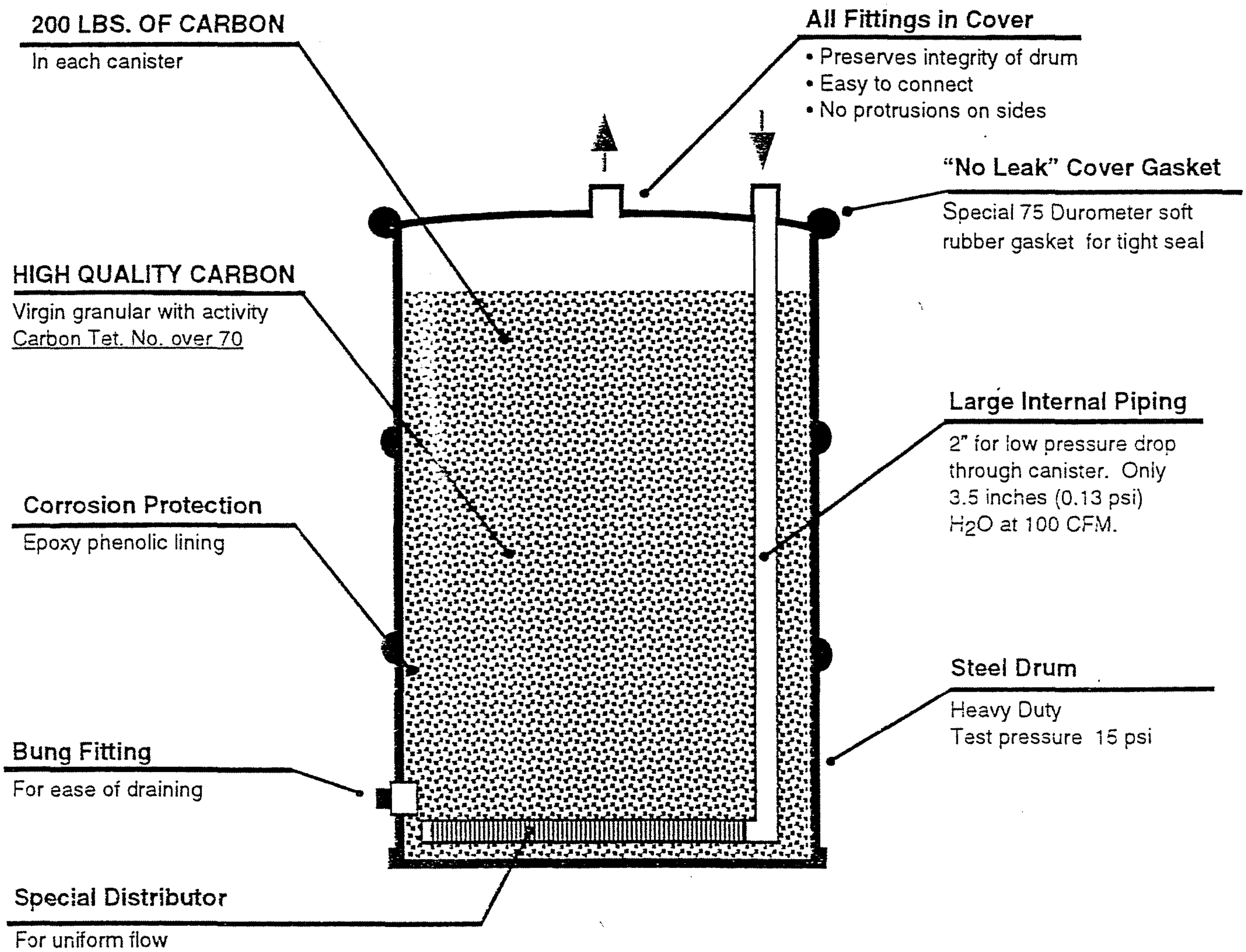
WILL BE USED AS NECESSARY

Here's Why CARBTROL'S G-1 Vapor Phase Canister Is the Best !!



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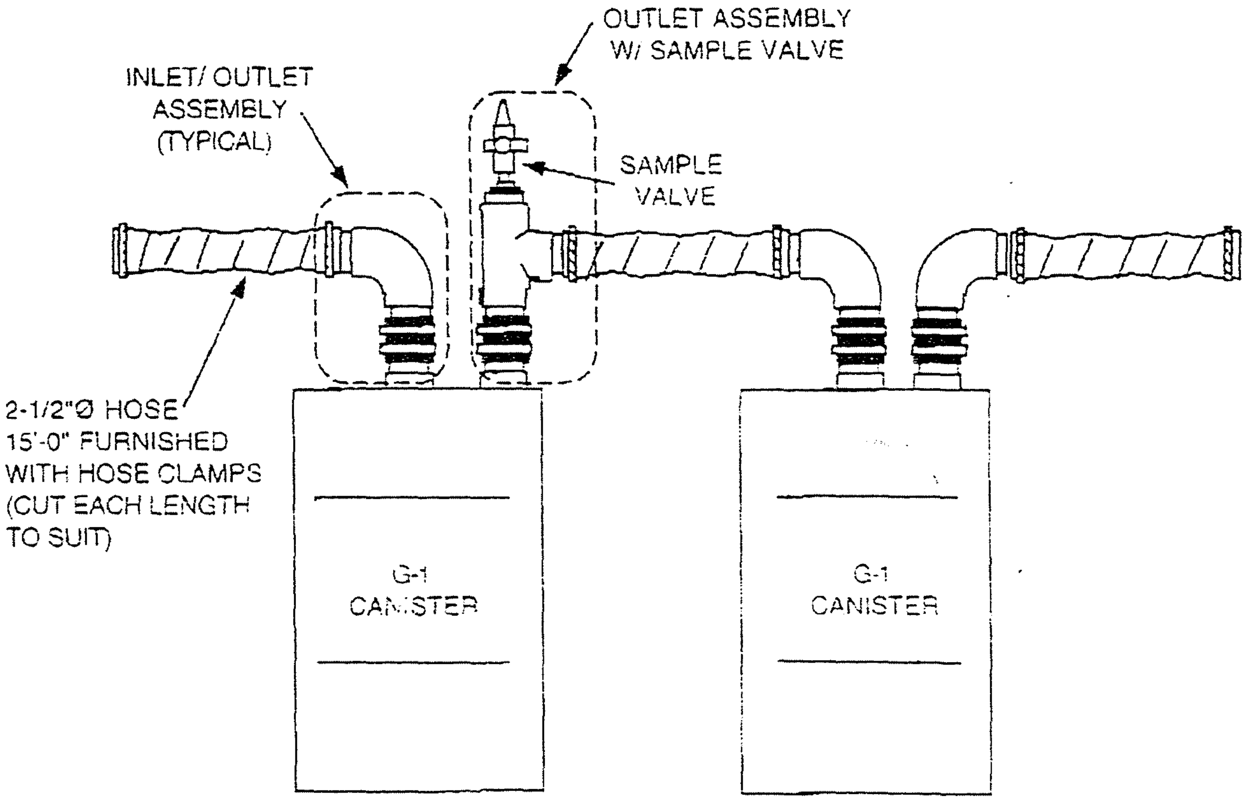
 AT-116/#2

WILL BE USED AS NECESSARY



CARBTROL® CORPORATION		39 RIVERSIDE AVENUE WESTPORT CONN. 06880 (203) 226-5642
SCALE ----		BY MTB
DATE 4-7-94	Wah	REV
G-1 CANISTER PIPING KIT		
ARRANGEMENT	S	DWG 2121/0