BCA™

Bruce Carter Associates, L.L.C.

ENVIRONMENTAL CONSULTANTS

AIR • WATER • SOLID WASTE • OSHA • REMEDIATION SERVICES

PHASE II INVESTIGATION REPORT

TWIGG CORPORATION
659 EAST YORK STREET
MARTINSVILLE, INDIANA 46151

1691

Project No. 7403
October 30, 1998

Prepared by:
Bruce Carter Associates, L.L.C.

John W. Kilmer

John W. Kilmer, CHMM
Senior Engineer

6330 E. 75th St., Suite 300
Indianapolis, IN 46250
Phone (317) 578-4233
Fax (317) 578-4250

733 Princeton St.
Elkhart, IN 46516
Phone (219) 522-1019
Fax (219) 522-0374

149 W. Main St.
New Albany, IN 47150
Phone (812) 944-3520
Fax (812) 944-3557

(800) 291-1019

TABLE OF CONTENTS

APPENDICES

TABLES

1.0 INTRODUCTION

1.1 Site Location and History

The Twigg Corporation facility is located at 659 East York Street in Martinsville, Indiana (Figure 1). The site is located near the southeastern edge of Martinsville and is in the southeast and northeast quarter of the southeast quarter of Section 4, Township 11 North, Range 1 East (Washington Township) Morgan County, Indiana. The Twigg site and the neighboring Harmon-Motive facility are the only industrial sites in a primarily residential neighborhood.

Sanborn Fire Insurance maps, City Directories and Historical Aerial Photographs were reviewed to help determine site history. The southeast quarter of the main Twigg building was first constructed and operated prior to 1916 as the CG Chase Foundry and Machine Shop. The two small buildings to the east of the main building (Figure 2) were constructed between 1916 and 1942. The three buildings were variously operated as wood furniture factories, a wire gate factory, an aluminum fabricator (storm doors and windows), a vehicle repair shop, a warehouse and a heating and cooling contractor. Twigg Corporation (under a previous owner) first occupied the main building in the 1960's and took over the two small eastern building after 1978.

Twigg fabricates metal alloy parts for the aerospace industry and its process formerly included vapor degreasing of metal parts with chlorinated solvents. The Indiana Department of Environmental Management Office of Solid and Hazardous Waste Management (IDEM/OSHWM) inspected the (then current) hazardous waste accumulation storage area (Figures 2 and 3) in 1991 and issued a letter of violation requiring sampling. Soil sampling by Twigg in 1991 and 1992 confirmed the presence of tetrachloroethene (perc or PCE) in the soil in the waste storage

area. In 1993 Farlow Environmental Engineer, Inc. (now Bruce Carter Associates, L.L.C. - BCA) was requested to prepare a work plan for an investigation of the extent and magnitude of contaminants associated with the former waste storage area (FWSA). The Work Plan was approved by IDEM in 1994 and the investigation was conducted from 1994 to 1998. Twigg filed an application to the IDEM/Office of Environmental Response/Voluntary Remediation Program (VRP) in 1997 and the Voluntary Remediation Agreement (VRA) was signed in September, 1997.

1.2 Other Documentation

1991-1992 Alt & Witzig Reports

Two reports dated January 8, and June 8, 1992 were prepared for Twigg by Alt & Witzig Engineering, Inc. of Indianapolis (A & W, 1992a and 1992b) and were submitted to IDEM/OSHWM. The reports discuss investigations in 1991-1992 which included 15 boring to depths of 16 to 20 feet in and around the FWSA. Soil samples were collected continuously, field screened for VOCs and eleven were analyzed for VOCs. The investigations confirmed the presence of PCE in shallow soils in the FWSA and in soil near the water table (approximately eight (8) to 20 feet, BGS) beyond the FWSA.

1996 Harmon-Motive Report

A report dated September 6, 1996 prepared by Heritage Environmental Services, Inc. was provided to Twigg by Harman-Motive (Harman) and was reported submitted to IDEM (HES, 1996). The report summarizes groundwater investigation results and delineates the extent and magnitude of chlorinated and non-chlorinated VOCs on and near the Harman facility. The CVOCs in the Harman plume include PCE, TCA and their degradation products. The Harman data indicate that a groundwater plume of CVOCs are present on its site which may adjoin the Twigg plume but which does not significantly overlap it. Harman

began remediation of the plume in 1996 utilizing soil vapor extraction, air sparging and nutrient enhancement. Further information on the plume is included in Section 3.5.

1.3 Summary of Results

The investigation showed that the only contaminants present in the FWSA are chlorinated volatile organic compounds (CVOCs) and metals - lead (Pb), chromium (Cr) and cadmium (Cd). The metals are limited to the shallow soil in the FWSA and are below Tier II clean-up goals. The CVOCs are primarily in soil near the water table and in the groundwater. The CVOC plume in the groundwater extends around the Twigg site and downgradient (west) about ½ mile. The CVOCs include PCE, 1,1,1-Trichloroethane (TCA) and their degradation products. This report details the investigation and its results.

2.0 STATEMENT OF WORK

A "Workplan for Performing a RCRA Investigation" dated March, 1994 was approved by IDEM/OSHWM. The workplan included a QAPP for the soil investigation. The QAPP has been modified to include methodologies used for the groundwater investigation (mostly 1996-98). It is submitted under a separate cover as Appendix A to this report.

2.1 Objectives of Phase II Investigation

(not applicable)

2.2 Site Safety Plan

(see Appendix B)

2.3 Quality Assurance Project Plan

(see Appendix A)

3.0 SITE CHARACTERIZATION

3.1 Baseline Ecological Assessment

3.1.1 Ecological Assessment

Exposure Pathways

There are no ecological exposure pathways associated with the Twigg groundwater CVOC plume. The plume appears to be stable and the nearest likely point of discharge is Nutter Ditch, located 3,000 feet downgradient (west) of the leading edge. Ecological exposure pathways to CVOCs and metals in the subsurface soil are limited to burrowing animals, tree roots and exposure through excavation of affected soil.

Surface soil (0-2 inch) likely contains no CVOC due to volatility and the fact that the waste drums have not been stored in the FWSA for several years. There is potential ecological exposure to metals in surface soils thru surface water runoff from the FWSA. The area is level, with little runoff and high infiltration. However, some runoff flows to surface drains then through approximately 1500 feet of storm sewers southeast to Sartor Ditch, which flows to Indian Creek 1.5 miles south of the site.

The site, the plume area and all adjoining areas (the affected area) are fully developed industrial, residential and commercial areas. No endangered, threatened or rare species, high quality natural communities or areas, surface water, aquatic life, wetlands, flood plains or riparian zones are present in or near the affected area. Vegetation and wildlife observed in the affected area are limited to those typically found in an urban environment. No stressed vegetation or wildlife was observed.

Expose of surface water runoff to contaminants is possible only in the FWSA, which is level with little runoff. Some surface water runoff from the FWSA flows through storm sewers about 1500 feet southeast to Sartor Ditch, which flows to Indian Creek about 1.5 miles south of the site. Sartor Ditch is a channelized drainage ditch with limited vegetation and little or no flood plain along most of its course. For the last 3/4 mile north of Indian Creek the banks are lined with trees and the ditch is in the 100-year flood-plain (Appendix C, Tab 3). Two minor wetlands are located adjacent to the ditch 1/4 mile (0.1 acre) and ½ mile (0.5 acre) north of Indian Creek. The ditch is probably intermittent and may be recharged from groundwater. Flow was observed to be minimal during the dry fall season and the ditch may be dry during drought. Sartor Ditch is not shown on the U.S. Fish and Wildlife Service's "National Wetlands Inventory Map" as a wetland or riverine habitat. There are no documented endangered, threatened or rare species and no high quality natural communities or areas along Sartor Ditch.

Exposure Estimate

Cadmium, Chromium and Lead are present in shallow (0-2 feet) soil above background levels. No dissolved Cadmium, Chromium or Lead was detected in shallow groundwater present at approximately nine feet BGS. Therefore, it is likely that dissolved metals are not detectable in surface water runoff from the FWSA either. The concentrations of metals in suspended particulate would likely be similar to that found in the shallowest soil samples (0-6"). Average shallow soil (0-6") concentrations are:

Cadmium	=	3.0 ppm	(Background = 0.5 ppm)
Chromium	=	216 ppm	(Background = 24 ppm)
Lead	=	51 ppm	(Background = 53 ppm)

Thus, Cadmium and Chromium could potentially be above background levels in suspended sediment. (See Section 3.5 for discussion of metals concentrations in soil.)

Sartor Ditch southeast of the Twigg site drains an area of approximately 1,600 acres while the storm sewers near Twigg drain roughly 130 acres and the FWSA is approximately 0.08 acre. Thus, runoff from the FWSA would likely constitute less than 0.1% of the flow in storm runoff to Sartor Ditch near Twigg. Storm sewer discharge from near Twigg likely constitutes roughly 5% of flow in Sartor Ditch. Thus, metals in suspended sediments from the FWSA would be expected to cause an increase in the storm sewer discharge of only 0.5% for Cadmium and 0.8% for Chromium above background suspended sediment levels.

Dissolved metal concentrations in the shallow groundwater are below detection limits (5 ppb) and dissolved concentrations in surface water runoff are likely proportional to surface soil. Thus, the potential impact of dissolved metal concentrations on Sartor Ditch are also likely to be trivial. Even if all of the Chromium (approx. 14 lbs) and Cadmium (approx.0.2 lbs) in the top two inches in the FWSA were to dissolve into rainwater over a ten year period (40 inches of rainfall per year) the dissolved concentration in the runoff would be 1.9 ppm Chromium and 26 ppb Cadmium. The dissolved concentration in the storm sewer discharge would only be 1.2 ppb Chromium and 0.02 ppb Cadmium above background levels.

Potential Effects

For more sensitive aquatic species (salmon, daphnids and cladoceron) the U.S. EPA recommends an ambient water quality of less than 11 ppb Chromium (U.S. EPA, 1986). The water quality criterion for Cadmium is approximately 1 ppb (it is hardness dependent) for the protection of aquatic species.

Risk Characterization

The only potential ecological exposure (other than roots and burrowing animals) is through storm water runoff to Sartor Ditch. There are no environmentally significant areas or species on or near the affected area or Sartor Ditch and the closest wetland is 3/4 mile downstream of the storm water outfall. Worst case potential discharges of contaminants to Sartor Ditch are well below levels recommended by the U.S. EPA to avoid stresses on aquatic species.

3.1.2 Background Hydrogeologic Assessment

As estimated from the U.S. Geologic Survey Martinsville Quadrangle ten foot contour interval 7.5 minute topographic map, the elevations of the site and the neighboring areas is approximately 605 ($\pm$ 5) feet MSL. A survey of the monitoring wells on the Twigg site and west of the site indicates ground elevation varies from approximately 603.0 to 606.5 feet MSL. The topography of the neighborhood is essentially level. Surface drainage from the site is to the southeast approximately 1500 feet via storm sewers to Sartor Ditch which flows 1.5 miles southwest to Indian Creek and then to the White River.

According to the "Soil Survey of Morgan County", soil near the site is Martinsville loam which is characterized as nearly level, deep, well drained soil on outwash plains (USDA,1981). The soil is typically a brown loam underlain by a clay loam and a sandy loam to a depth of approximately five (5) feet. The substratum varies from silty clay loam to sand.

Underlying soils near the site are Holocene age alluvial deposits of sand, gravel and silt, and Wisconsinin age outwash deposits, chiefly of sand and gravel (IDNR, 1989). Unconsolidated deposits near the site are reported to a depth of approximately 100 feet (INDR, 1983) below ground surface and are underlain by Borden group Mississippian Age siltstone and shale (INDR, 1987 and USGS,

1994). Well logs (Tab 4) from Martinsville show primarily sand and gravel deposits to depths of approximately 100 feet underlain by shale bedrock. Several logs also identify isolated layers of fine grained material within the sand and gravel. Martinsville is located within the Norman Upland physiographic region which is characterized by narrow, flat-topped divides and deep V-shaped valleys.

The aquifer beneath the site is part of a surficial sand and gravel aquifer which extends throughout the White River Valley. The surficial sand and gravel deposits extend approximately one mile north, south and east of the site. The aquifer is hydraulically connected to (and fed by) buried aquifers to the east and drains to the White River located 2.4 miles west of the site. Typical hydraulic conductivities for the regional aquifer are $8x10^{-3}$ to $5x10^{-1}$ cm/sec (USGS, 1994). The water table is commonly within ten feet of the surface in the valley.

Two small lakes and Nutter Ditch (Figure 1) are approximately downgradient (west) of the site. The lakes are former gravel pits which based on interviews with long-time residents, have been inactive for 20-30 years. They have little or no drainage basins and likely have little impact on groundwater flow. Nutter ditch is continuous and likely drains groundwater during high water table or possibly all the time. Active gravel pits are located on the east bank of the White River and may be downgradient of the site.

3.2 Background Concentrations

In accordance with the 1994 work plan, background soil samples were collected at several locations and tested for Cadmium, Chromium and Lead. The background borings are 100 to 500 feet from the FWSA and were sampled at the same depth intervals as the borings in the FWSA. Sampling and analytical methods and results are discussed in Sections 3.3, 3.4 and 3.5. The results showed that some soil samples in the FWSA contain metals above background concentrations. Cleanup objective for this project will not be based on

background, but will be based on Tier II Cleanup Goals.

3.3 Sampling Methodology

The purpose of the investigation was to determine the extent and magnitude of CVOCs and metals (Cd, Cr and Pb) in the soil and groundwater on and near the Twigg property. The FWSA was the focus of the metals investigation and appears to be the primary source area for CVOCs present in the soil and groundwater over an extended area. The investigations included soil borings, groundwater probes, monitoring wells and private wells. Sample locations are shown on Figure 4.

The initial phases of the investigation included installation of nearly all of the borings on and near the Twigg site in 1994-95 to determine the extent of metals and CVOCs in the soil.. The next phases of the investigation (1996-97) included a groundwater probe investigation to determine the extent of the groundwater plume. The last phase (1997-98) of the investigation included installing the remaining monitoring wells and two to three rounds of groundwater samples to confirm the extent and magnitude of the groundwater plume. Sampling of private wells was also performed in 1996-98 to evaluate potential impact on drinking water.

A total of 28 borings (including duplicate and off-set borings) were drilled at a total of 17 locations during this investigation. Drilling was performed by Haskett Drilling Service, Inc., Soil and Exploration Services, Inc. and Earth Exploration, Inc. using truck-mounted drill rigs with 3.25-inch or 4.25- inch hollow stem augers (HSAs). Borings in which monitoring wells were installed were performed with 4.25-inch HSAs, while those in which monitoring wells were not installed were generally performed with 3.25-inch HSAs.

Split spoon soil samples were collected in 16 of the locations at intervals varying from 0.5 feet to 10 feet, while one boring (MW-9) was blank drilled. At most boring locations on

and near the Twigg site the soil was sampled at 0.5-foot-intervals to 2 feet then at one-foot to two-foot intervals to eight feet below grade. Below that depth samples were generally collected at five-foot-intervals. In borings MW-5 through MW-8 soil samples were collect at five or ten foot intervals.

The depth of the borings varied from 8.0 feet to 101.5 feet. Four borings locations (A,B,C,D) were sampled to 8.0 feet and six locations were sampled to depths of 25 to 50 feet. One location each was extended to 60 feet (MW-8), 81 feet (MW-6) and 101.5 feet (MW-1D).

Approximately 200 soil samples were collected and usually classified based on the Unified Soils Classification System (ASTM D-2484-85). Soil samples at most locations were screened by means of field headspace tests with a PID and/or colorimetric tubes. Drilling information, visual soil classifications and field screening results are summarized on the boring logs which are included in Appendix E (Tab 5).

Drilling and sampling followed a prescribed program of quality assurance and decontamination to minimize potential bias of samples. Split spoons, spatulas and other equipment that came into contact with soil samples were washed with a detergent solution and rinsed between samples. Procedures also included power washing augers before each boring and use of disposable gloves when handling soil samples. Sampling procedures are discussed in detail in the QAPP. Drilling, soil sampling, screening and decontamination procedures were performed in accordance with the QAPP.

A total of ten borings were completed as monitoring wells. One monitoring well was lost (MW-2) and two were nested at the same location (MW-1 and MW-1D). Monitoring well depth varied from 17 feet to 60 feet. Most well screens were placed based on groundwater probe results, soil analyses or field screening results to ensure that the peak CVOC concentration depth is monitored. Monitoring wells were constructed of 2-inch

I.D. schedule 40 threaded PVC with 10-foot factory slotted 10-slot (0.01 inch) well screen. The well screens were installed at the water table in MW-1, MW-3 and MW-9, but below the water table at all other locations due to the sinking nature of the plume. A single monitoring well (MW-1D) was placed below the plume to confirm thickness and monitor for changes. The hole annulus of each well was sealed with bentonite and a flush-mounted steel protective casing with locking cap was installed at the surface. Information regarding monitoring well construction is summarized on the boring logs (Tab 5).

The groundwater probe survey included collecting groundwater samples by means of a direct drive sampling system and analyzing the samples in a mobile laboratory. The sampling and analysis was performed by Innovative Probing Solutions of Mount Vernon, Illinois. A total of 28 groundwater samples were collected at 18 probe locations from depths of 17 to 45 feet. At most locations groundwater samples were collected from one depth (often 35 feet) but at several locations samples were collected from multiple depths in order to delineate the vertical extent of the plume.

All groundwater probe samples were analyzed in a mobile laboratory by a gas chromatograph with a flame ionization detector and an electron capture detector (GC/ECD). Mobile laboratory QC samples included method blanks and calibration check samples. To verify field results six samples were split with the duplicates being analyzed by a fixed laboratory. Results from the standard laboratory analysis of the six samples averaged approximately twice as high as the mobile laboratory results.

The top of the inner casing of each monitoring well was surveyed by Holloway Associates of Mooresville, Indiana relative to a benchmark from the City of Martinsville Flood Boundary Map. The resultant elevations were adjusted by +0.19 foot to match the surveyed elevations of Harman-Motive's monitoring wells. The adjustment was made to allow water levels from Harman-Motive wells to be measured and compared directly with

those of Twigg. A single well (MW-1D) was resurveyed by BCA and the elevation corrected by -0.08 foot.

All groundwater monitoring wells were developed by removing 10 to 20 well volumes of formation water. The wells were developed until the formation water was essentially free of fine particulate or monitoring parameters (temperature, conductivity) were stable. Development was performed with an electric submersible pump or a teflon bailer.

Several rounds of water level measurements were obtained on Twigg wells including one round (June 26, 1998) which was coordinated with a round of water level measurements performed by HES on the Harman wells. Groundwater elevations are summarized in Table 1 and include the Harman wells for June 26.

After measuring the water levels, but prior to sampling, each well was purged by removing at least three well volumes of formation water. The wells were purged with a teflon bailer or an electric submersible pump until the water was essentially free of fine particulate or monitoring parameters were stable.

Two full rounds of groundwater samples were collected on March 25-27 and June 25-26, 1998. Additional confirmation samples were collected on May 22, July 23 and September 9, 1998. A total of 22 monitoring well samples and five monitoring well field QC samples were collected. Groundwater sampling was performed on March 26-27, 1998 with an electric pump and on subsequent dates with a bottom-filling, bottom-discharging Teflon bailer. Groundwater sampling log sheets are included in Tab 6.

To reduce the possibility of cross-contamination of wells and sample bias, all groundwater sampling equipment was decontaminated between monitoring wells. Wells expected to have little or no contamination were purged and sampled prior to purging and sampling wells expected to have higher concentrations of contaminants. This procedure reduces

TABLE 1
GROUNDWATER ELEVATIONS
TWIGG CORPORATION
MARTINSVILLE, INDIANA

Monitoring Well I.D.	TIC Elevation (ft MSL)	11-Aug-94		26-Mar-98		22-May-98		25-Jun-98		26-Jun-98	
		Depth to GW (ft)	GW Elevation (feet)	Depth to GW (ft)	GW Elevation (feet)	Depth to GW (ft)	GW Elevation (feet)	Depth to GW (ft)	GW Elevation (feet)	Depth to GW (ft)	GW Elevation (feet)
MW-1S	603.78	9.52	594.26	10.17	593.61	8.92	594.86	6.95	596.83	6.85	596.93
MW-1D	603.78			10.17	593.61	8.92	594.86	6.95	596.83	6.85	596.93
MW-2	603.74	8.91	594.83	NA*							
MW-3	604.75	10.84	593.91	11.77	592.98	10.335	594.42	8.36	596.39	8.32	596.43
MW-4	604.35			11.665	592.69	10.24	594.11	8.29	596.06	8.27	596.08
MW-5	602.71			13.395	589.32	11.395	591.32	9.45	593.26	9.36	593.35
MW-6	603.3			13.96	589.34	11.925	591.38	9.98	593.32	9.88	593.42
MW-7	606.38			17.05	589.33	14.975	591.41	12.97	593.41	12.86	593.52
MW-8	604.05			15.85	588.20	13.645	590.41	11.56	592.49	11.46	592.59
MW-9	604.12			9.595	594.53	8.455	595.67	6.52	597.6	6.49	597.63

*well paved over and lost

HARMON WELLS		26-Jun-98	
Monitoring Well I.D.	TIC Elevation (ft MSL)	Depth to GW (ft)	GW Elevation (feet)
ETS-MW1	603.10	6.76	596.34
ETS-MW2	601.99	5.93	596.06
ETS-MW3	601.93	7.68	594.25
MW-6R	603.29	6.89	596.40
MW-10	603.05	7.92	595.13
MW-13	604.11	8.48	595.63
MW-17	602.80	7.69	595.11
MW-18	603.69	8.45	595.24
MW-19	603.86	8.55	595.31
MW-22	602.24	7.40	594.84

HARMON WELLS		26-Jun-98	
Monitoring Well I.D.	TIC Elevation (ft MSL)	Depth to GW (ft)	GW Elevation (feet)
MW-23	602.19	7.11	595.08
MW-24	603.40	7.99	595.41
MW-25	603.60	8.17	595.43
MW-27	602.00	7.28	594.72
MW-28	601.09	6.04	595.05
MW-30	602.52	6.31	596.21
MW-32	603.70	7.47	596.23
MW-33	602.34	7.95	594.39

the possibility of transferring contaminants to a clean well and obtaining false positive results for that monitoring well. In addition, to check field procedures, a total of three field blanks and two field duplicates were collect during the 1998 sampling.

The field blank collected on March 27, 1998 was found to contain approximately 1% carryover from the previous sample (MW-6). The carry over was probably due to the use of low density polyethylene (LDPE) for the pump discharge tubing. LDPE has been shown to sorb CVOCs, thus making decontamination problematic. The impact of carry-over in the first round of samples was likely trivial since clean wells were sampled first, then low level wells were sampled and wells with higher CVOC concentrations were sample last. None-the-less all subsequent sampling was performed with Teflon bailers.

Private well surveys were performed in 1996 and 1998 to determine whether any private wells were located within the CVOC plume and affected by the plume. In December, 1996 the Martinsville Water Department was contacted to determine what residences in southern Martinsville utilized private wells as their sole source of water. Thirteen of the addresses identified were relatively near or potentially downgradient of the plume. Water samples were sought from all of the locations and four of the locations located closest to the Twigg and the CVOC plume were sampled on December 3, 1996 or February 19, 1997. In July, 1998 a letter (Tab 7) was delivered to every residence within the plume area requesting information on and access to on-site (backup) private wells. Two residences were identified and the wells were sampled on July 28, 1998. Well sampling procedures are discussed in the QAPP.

Sample collection, decontamination, sample containers, preservation, and documentation procedures were performed in accordance with the QAPP, except as otherwise noted. Auger cuttings from contaminated locations were drummed and stored on-site to be treated with the remediation system when it is installed (per agreements with IDEM/OSHWM and VRP project managers).

3.4 Sample Analysis

A total of 82 soil samples were analyzed for Cd, Cr and Pb by EPA method 6010 (ICP). Sample locations, matrices, analytical methods, contains and preservation are summarized in Table 2. The samples included 20 samples and 23 duplicates/replicates from the FWSA and 39 samples (including four duplicates) from background locations. A groundwater sample from the FWSA (MW-1) was analyzed for eight RCRA metals by methods 6010 and 7470 (for mercury). Monitoring well MW-1 was also resampled and analyzed for Pb by method 7421. Analytical work was performed by PACE (formerly CCAS) of Indianapolis and National Environmental Testing (NET) of Indianapolis. The laboratory QAPs are attached to and are summarized in the BCA QAPP (Appendix A). The analytical laboratory reports and chain-of-custody forms for the soil samples are included in Appendix H (Tab 8) and the results are summarized in Table 3. The analytical laboratory reports and chain-of-custody form for the groundwater sample are included in Tab 9 and the results for Cd, Cr and Pb are included in Table 3.

A total of 20 soil samples from the FWSA were tested for pH by method 9045 by PACE. The analytical laboratory report is included in Appendix H (Tab 8).

A total of 71 soil samples (including two field duplicates) were analyzed for CVOCs by EPA methods 8010, 8240 and 8260. These included four soil samples from FB-1 (MW-1) that were analyzed for all VOCs by method 8240. Fifty-seven of the soil samples (including two field duplicates) from FB-1 through FB-8 were analyzed for halogenated VOCs by EPA method 8010. Eleven soil samples from MW-6 and MW-8 were analyzed for CVOCs by method 8260. The analytical laboratory reports and chain-of-custody forms for the soil samples are included in Appendix H (Tab 8) and the results are summarized in Table 4.

A total of 41 water samples were analyzed by EPA method 8260 for CVOCs including 23 monitoring well samples, two field duplicates, three field blanks, six groundwater probe

field duplicates, and seven private wells samples. One groundwater sample from monitoring well MW-1 (March 27, 1998) was analyzed for VOCs by method 8260, SVOCs by method 8270, PCBs by method 8080, pesticides and herbicides by method 8150. The analytical laboratory reports and chain-of-custody forms are included in Appendix I (Tab 9) for the monitoring well samples, Appendix J (Tab 10) for the field probe samples and Appendix K (Tab 11) for the private well samples. The laboratory raw data printout for MW-1 (March 27, 1998) is included under a separate cover (Volume V). The laboratory results are summarized in Table 5 for the field probes, Table 6 for the monitoring wells and Table 7 for the private wells.

TABLE 2

SUMMARY OF SAMPLE

CONTAINERS AND METHODS

Locations	Matrix	Method	Container	Preservation
A to D, FB-1 to FB-8	Soil	6010	4 oz. Glass w/Teflon-lined screw cap	Cool or Ice
FB-1 to FB-8, MW-6, MW-8	Soil	8010, 8240, 8260	4 oz Glass w/Teflon-lined screw cap	Cool or Ice
MW-1S	Groundwater	6010, 7421, 7470	500 mL plastic w/HNO_3 to pH<2	Cool or Ice
All MWs, Fps, Private Wells	Groundwater	8260	40 mL vial w/Teflon-lined septum, HC1 to pH<2	Cool or Ice
MW-1S	Groundwater	8270, 8080, 8150	1 L glass	Cool or Ice

TABLE 3

TOTAL METALS (mg/kg) IN FORMER WASTE STORAGE AREA
SUMMARY OF ANALYTICAL LABORATORY RESULTS

Twigg Corp. Project #7403

		Boring A								
Metal	Depth	Mean Conc.	# of samples	Highest ample conc	Boring B	Boring C	Boring D	Background Mean + 3SD	Non-Resid. Tier II Goal	esidential ier II Goal
Cd	0-0.5	9.75*	6	17	1.4	1.2	<0.5	2.45	1,020	135
Cr		462*	6	1600	71	97	120	138.13	10,000	1,350
Pb		189*	6	1000	18	18	10	145.65	1,000	400
Cd	0.5-1.0	<0.5*	3	<0.5	<0.5	<0.5	<0.5	1.61	1,020	135
Cr		12*	3	15	4.4	24	8.1	29.01	10,000	1,350
Pb		24.3*	3	36	5	100	12	273.34	1,000	400
Cd	1.0-1.5	<0.5*	3	<0.5	<0.5*	<0.5*	<0.5*	0.00	1,020	135
Cr		9.46*	3	14	8.05*	12.7*	10.8*	7.89	10,000	1,350
Pb		43*	3	85	7.5*	16.8*	26.5*	88.48	1,000	400
Cd	1.5-2.0	<0.5*	3	<0.5	<0.5*	<0.5*	<0.5	<0.5	1,020	135
Cr		5.9*	3	8.6	8.8*	11.3*	6.7*	9.69	10,000	1,350
Pb		11*	3	18	12.5*	7.2*	15.5*	25.02	1,000	400
Cd	3.0-4.0	<0.5*	4	<0.5	<0.5*	<0.5*	<0.5*	<0.5	730	730
Cr		8.67*	4	15	9.05*	9.95*	12.5*	19.54	7,300	7,300
Pb		1.85*	4	7.4	7.55*	5.6*	9.6*	7.44	1,000	400

> Tier II Residential Goal (but less than Non-Residential Goal)

* mean of 2 or more samples from same location

MONITORING WELL MW-1 (7-17')				
Metal	3/25/98 (mg/L)	9/9/98 (mg/L)	Non-Resid. Tier II Goal	Residential Tier II Goal
Cd	<0.005		0.051	0.005
Cr	<0.010		0.510	0.100
Pb	<0.080	<0.005	0.015	0.015

TOTAL METALS (mg/kg) IN FORMER WASTE STORAGE AREA

		Aug-94	Dec-94	Dec-94	Aug-94	Dec-94	Aug-94	Dec-94	Aug-94	Dec-94	Bkgnd
Metal	Depth	A	A2	A3	B	B2	C	C2	D	D2	Avg+3SD
Cd	0-0.5	14	10.95**	3.1	1.4		1.2		<0.5		2.4
Cr		1600	117**	15	71		97		120		138.1
Pb		200	279.75**	<4.7	18		18		10		145.6
Cd	0.5-1.0	<0.5	<0.47	<0.46	<0.5		<0.5		<0.5		1.6
Cr		12	9	15	4.4		24		8.1		29.0
Pb		25	36	12	5		100		12		273.3
Cd	1.0-1.5	<0.5	<0.49	<0.47	<0.5	<0.5	<0.5	<0.5*	<0.5	<0.5	0.0
Cr		14	5.9	8.48	8.4	7.7	18	7.4*	15	6.5	7.9
Pb		44	<5.0	85	9.8	5.2	29	4.5*	29	24	88.5
Cd	1.5-2.0	<0.5	<0.44	<0.46	<0.5	<0.47	<0.5	0.46*	<0.5	<0.45	0.0
Cr		8.6	2.7	6.4	7.6	10	20	6.95*	7.4	6	9.7
Pb		15	<4.4	18	25	<4.7	7.2	<4.6*	31	<4.5	25.0
Cd	3.0-4.0	<0.5	<0.47	<0.47*	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.0
Cr		15	9.4	5.15*	8.7	9.4	7.9	12	12	13	19.5
Pb		7.4	<4.6	<4.5*	8.2	6.9	8.8	<4.7	10	9.2	7.4

>Background Avg+3SD

* = mean of sample and field duplicate

**mean of sample, two lab duplicates and one field duplicate:
Cd Average (15, 2.1, 17, 9.7) = 10.95
Cr Average (130, 18, 180, 140) = 117
Pb Average (60, 18, 1000, 41) = 279.75
This sample shows excessive heterogeneity.

TOTAL METALS (mg/kg) IN BACKGROUND SAMPLES

Metal	Depth	FB-2	FB-2b	FB-3	FB-4	FB-4b	FB-5	FB-6	FB-7	FB-8	Average	SD (n-1)	Avg + 3SD
Cd	0.0-0.5	0.70		1.80	0.50		0.60	0.00	0.00	0.00	0.51	0.64	2.45
Cr		12.00		110.00	8.90		8.20	14.00	6.60	6.80	23.79	38.11	138.13
Pb		10.00		63.00	82.00		100.00	49.00	33.00	37.00	53.43	30.74	145.65
Cd	0.5-1.0	1.00		0.00	0.00		0.60	0.00	0.00	0.70	0.33	0.43	1.61
Cr		24.00		8.60	6.60		8.60	4.90	7.70	7.30	9.67	6.45	29.01
Pb		110.00		51.00	29.00		100.00	8.50	0.00	190.00	69.79	67.85	273.34
Cd	1.0-1.5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cr		5.70	7.15	5.30	5.50	5.00	6.00	5.80	6.70	5.75	5.88	0.67	7.89
Pb		18.00	21.50	77.00	9.00	0.00	6.80	0.00	6.40	0.00	15.41	24.36	88.48
Cd	1.5-2.0		0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cr			7.00	5.90	6.60		8.20	6.90	5.90	4.80	6.47	1.07	9.69
Pb			10.00	15.00	15.00		9.40	5.40	9.50	0.00	9.19	5.28	25.02
Cd	3.0-4.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cr		6.20	17.00	6.00	5.60	7.40	11.00	5.30	7.50	9.20	8.36	3.73	19.54
Pb		0.00	0.00	0.00	0.00	0.00	0.00	6.70	0.00	0.00	0.74	2.23	7.44

Mean of sample and field duplicate: FB-2b (1.0-1.5), FB-6 (3.0-4.0), FB-8 (1.0-1.5)

TABLE 4
SOIL SAMPLES - VOCs
ANALYTICAL LABORATORY RESULTS
TWIGG - MARTINSVILLE, Project No. 7403

		Other	Volatile Organic Compound (ppm)					
Boring	Depth (ft)	VOCs	PCE	TCE	1,1-DCE	c-DCE	TCA	1,1-DCA
FB-1	0.5-1.0	1	0.700	0.012	-	-	0.0041	-
(MW-1S)	4.0-6.0	1,2	0.260	0.0063	-	-	0.007	-
	9.0-11.0	1	42.000	-	-	-	0.580	-
	14.0-16.0	1,2	-	-	-	-	-	-
	19.0-21.0	-	-	-	-	-	-	-
	24.0-26.0	1	-	-	-	-	-	-
	29.0-31.0	1	-	-	-	-	-	-
MW-1D	45 - 46		-	-		-	-	-
	55.5 - 56		0.032	-		-	-	-
	65.5 - 66		-	-		-	-	-
	74.5 - 75		-	-		-	-	-
	81.0		-	-		-	-	-
			-	-		-	-	-
FB-2	3.0-4.0	1	-	-	-	-	-	-
(MW-2)	8.5-10.5	-	-	-	-	-	-	-
	13.5-15.5	1	-	-	-	-	0.100	-
	18.5-20.5	-	-	-	-	-	-	-
	23.5-25.5	1	-	-	-	-	-	-
FB-3	9.0-11.0	-	0.780	-	-	-	0.210	-
(MW-3)	14.0-16.0	-	0.410	-	-	-	0.260	-
	19.0-21.0	1	-	-	-	-	0.066	-
	24.0-26.0	1	-	-	-	-	-	-
	29.0-31.0	1	-	-	-	-	-	-
FB-4	4.0-5.0	-	-	-	-	-	-	-
(MW-4)	8.5-10.5	-	0.180	-	-	-	-	-
	13.5-15.5	-	8.400	-	-	-	0.240	-
	18.5-20.5	-	3.000	-	-	-	-	-
	23.5-25.5	-	0.530	-	0.032	-	1.700	-
	28.5-30.5	-	-	-	-	-	0.400	-
	34.0-35.5	3	-	-	-	-	-	-
	39.0-40.5	3	-	-	-	-	-	-
	44.0-45.5	3,4	-	-	-	-	-	-
FB-5	3.0-4.0	1	-	-	-	-	-	-
	8.5-10.5	1	-	-	-	-	-	-
	13.5-15.5	1	-	-	-	-	-	-
	18.5-20.5	1	-	-	-	-	-	-
FB-6	4.0-5.0	-	-	-	-	-	-	-
	9.0-10.5	-	0.110	-	-	-	-	-
	14.0-15.5	-	0.750	-	-	-	-	-
	19.0-20.5	-	7.700	-	-	-	-	-
	24.0-25.5	-	1.700	-	-	-	-	-
	29.0-30.5	-	-	-	-	-	0.027	-
	34.0-35.5	-	-	-	-	-	-	-
	39.0-40.5	-	-	-	-	-	-	-
FB-7	4.0-5.0	-	-	-	-	-	-	-
	9.0-10.5	-	-	-	-	-	-	-
	14.0-15.5	-	-	-	0.041	-	0.810	-
	19.0-20.5	-	-	0.0280	0.150	-	2.500	-
	24.0-25.5	-	-	-	0.052	-	1.100	-
	29.0-30.5	-	-	-	-	-	-	-
	34.0-35.5	- ,4	-	-	-	-	-	-
FB-8	1.0-1.5	-	-	-	-	-	-	-
	9.0-10.5	-	-	-	-	-	-	-
	14.0-15.5	-	-	-	-	-	0.130	-
	19.0-20.5	-	0.490	-	0.015	-	0.550	-
	24.0-25.5	-	-	-	-	-	0.500	-
	29.0-30.5	-	-	-	-	-	0.052	-
	34.0-35.5	-	-	-	-	-	-	-
	39.0-40.5	-	-	-	-	-	0.030	-
	44.0-45.5	-	-	-	-	-	-	-
	49.0-50.5	-	-	-	-	-	-	-

TABLE 4 (CONT.)

Twigg Corporation
PN: 7403

Boring	Depth (ft)	Note	PCE	TCE	1,1-DCE	c-DCE	TCA	1,1-DCA
				Volatile Organic Compound (ppm)				
MW-6	45.0	5	-	-		-	3.000	0.037
	55.0	5	-	-		-	2.700	0.100
	60.0	5	-	-		-	0.940	0.037
	65.0	5	-	-		-	0.770	0.470
	75 - 76	5	-	-		-	-	-
	84.5-85.5	5	-	-		-	-	-
	95 - 96	5	-	-		-	0.012	0.008
	99.5 - 100	5	-	-		-	0.028	0.015
MW-8	45.0	5	-	-		-	0.130	0.020
	55.0	5	-	-		-	-	-
	60.0	5	-	-		-	0.029	0.021
TIER II Residential Goal		Surface	12.5	58.2	1.07	1,000	1,000	1,000
		Subsurface	0.227	0.076	0.084	17.1	229	40.1
TIER II Non-Resid Goal		Surface	101	25	0.15	1,000	1,000	973
		Subsurface	8.01	25.7	0.08	102	1,000	1,000

NOTES:

1) Methylene chloride was detected in sample as well as in blank or value was between the Minimum Detection Limit and the Practical Quantification Limit; other VOCs ND
2) Acetone was detected between the Minimum Detection Limit and the Practical Quantification Limit
3) Methylene chloride was detected in sample.
4) Mean of sample and field duplicate
5) DL = 5 ppb

"-" = none detected

blank space = not analyzed

[shaded box] =Clean for two or more consecutive samples

TABLE 5
GROUNDWATER PROBE SURVEY
MOBILE & FIXED LAB RESULTS
TWIGG - MARTINSVILLE

Probe Location	Depth (ft)	Volatile Organic Compound (ppb) PCE	TCE	c-DCE	TCA	1,1-DCA	t-DCE, VC & CA	Lab
December 4-5, 1996								
FP-1	16.9	<1	<1	<1	<1	<1		mobile
	25.0	<1	<1	9	1662	7		mobile
	35.0	<1	<1	15	3513	7		mobile
	45.0	<1	<1	4	895	5		mobile
	15.0	<2	<2	<2	<2	<2	<2	fixed
	25.0	<2	<2	19	3100	89	<2	fixed
	35.0	<2	<2	44	8000	660	<2	fixed
	45.0	<2	<2	27	2700	700	<2	fixed
FP-2	17.4	<1	<1	<1	<1	<1		mobile
	25.0	<1	<1	<1	<1	<1		mobile
FP-3	17.4	<1	<1	<1	<1	<1		mobile
	25.0	<1	<1	<1	6	<1		mobile
	35.0	<1	BMDL	<1	2754	<1		mobile
FP-4	17.1	<1	<1	<1	<1	<1		mobile
FP-5	17.5	<1	<1	<1	<1	<1		mobile
	35.0	<1	<1	<1	<1	<1		mobile
FP-6	35.0	<1	<1	<1	<1	<1		mobile
FP-7	35.0	<1	<1	<1	1320	<1		mobile
FP-8	35.0	<1	<1	<1	<1	<1		mobile
FP-9	35.0	<1	<1	<1	<1	<1		mobile
	45.0	<1	<1	<1	<1	<1		mobile
April 9-10, 1997								
FP-10	20.0	<1	<1	<1	7	<1		mobile
	20.0	<5	<5	<5	19	<5	<2	fixed
FP-11	15.0	3	<1	<1	<1	<1		mobile
	15.0	<5	<5	<5	<5	<5	<2	fixed
FP-12	25.0	<1	<1	<1	5	<1		mobile
	35.0	<1	<1	<1	74	<1		mobile
	45.0	<1	<1	<1	109	<1		mobile
FP-13	35.0	<1	<1	<1	<1	<1		mobile
FP-14	35.0	<1	<1	<1	<1	<1		mobile
FP-15	35.0	<1	<1	<1	<1	<1		mobile
FP-16	35.0	<1	<1	<1	<1	<1		mobile
FP-17	35.0	<1	<1	<1	<1	<1		mobile
FP-18	20.0	<1	<1	<1	<1	<1		mobile

TABLE 6
GROUNDWATER MONITORING WELLS
SUMMARY OF ANALYTICAL LABORATORY RESULTS
TWIGG - MARTINSVILLE, IN
Project No. 7403
(thru September, 1998)

			Volatile Organic Compound (ppb)							
Monitoring Well	Screen Depth (ft)	Date	PCE	TCE	c-DCE	1,1-DCE	TCA	1,1-DCA	t-DCE	Total CVOCs
MW-1S	7-17	6/26/98	7000	140	21	3	<5	<5	<5	7164
		3/27/98	2800	<5	<5	<5	11	<5	<5	2811
MW-1D	50-60	9/9/98	<1	<1	<1	<1	<1	<1	<1	<1
		9/9/98	<1	<1	<1	<1	<1	<1	<1	<1
		7/23/98	<1	<1	<1	<1	<1	<1	<1	<1
		6/25/98	490	33	7	<5	59	<5	<5	589
		3/27/98	<1	<1	<1	<1	<1	<1	<1	<1
MW-3	7-17	6/26/98	180	<5	10	<5	64	<5	<5	254
		4/8/98	210	3	19	<1	62	3		297
MW-4	15-25	6/26/98	8200	110	30	5	630	<5	<5	8975
		6/26/98	8200	130	73	<1	880	12	<5	9295
		3/27/98	7600	61	29	<1	440	6	<1	8136
		6/13/96*	6100	<50	<50	<50	280	<50		6380
		9/14/95*	10000	160	13	14	1200	<5		11387
MW-5	30-40	6/25/98	<1	<1	<1	<1	<1	<1	<1	<1
		3/27/98	<1	<1	<1	<1	<1	<1	<1	<1
MW-6	30-40	6/25/98	<5	<5	38	380	7900	46	<5	8364
		3/27/98	<1	<1	32	320	7100	39	<1	7491
MW-7	26-36	6/25/98	<1	<1	<1	<1	<1	<1	<1	<1
		3/26/98	<1	<1	<1	<1	<1	<1	<1	<1
MW-8	40-50	6/25/98	<5	<5	<5	<1	<5	32	<5	32
		5/22/98	<5	<5	<5	<5	<5	26	<5	26
		3/27/98	<1	<1	<1	<1	<1	29	<1	29
MW-9	10-20	6/25/98	<1	<1	<1	<1	<1	<1	<1	<1
		3/27/98	<1	<1	<1	<1	<1	<1	<1	<1
Fld Eq Blnk	after MW1D	9/9/98	<1	<1	<1	<1	<1	<1	<1	<1
Fld Eq Blnk	after MW4	6/26/98	<1	<1	<1	<1	<1	<1	<1	<1
Fld Eq Blnk	after MW6	3/27/98	<1	<1	<1	<1	52	<1	<1	52
Tier II Residential Goal			5	5	70	7	200	640		
Tier II Non-Residential Goal			56	260	1022	7	9198	10220		

* sampling and analysis performed by HES for Harmon

ABREVIATIONS

PCE = tetrachloroethene
TCE = trichloroethene
c-DCE = cis-1,2-Dichloroethene
t-DCE = trans-1,2-Dichloroethene

1,1-DCE = 1,1-Dichloroethene
TCA = 1,1,1-Trichloroethane
DCA = 1,1-Dichloroethane
CVOCs = Chlorinated Volatile Organic Compounds

VC = Vinyl Chloride
CA = Chloroethane

TABLE 7
PRIVATE WELL SURVEY
ANALYTICAL LABORATORY RESULTS - SUMMARY
MARTINSVILLE

Well Location	Depth (ft)	Volatile Organic Compound (ppb)								
		PCE	TCE	c-DCE	TCA	1,1-DCA	1,1-DCE	t-DCE	VC & CA	Total
December 3, 1996										
960 S. Ohio	unkn	<2	<2	<2	<2	<2		<2	<2	<2
910 S. Grant	unkn	<2	<2	<2	<2	<2		<2	<2	<2
Twigg Well	unkn	<2	<2	<2	<2	<2		<2	<2	<2
February 19, 1997										
1310 S. Cherry	unkn	<5	<5	<5	<5	<5		<5	<2	<5
610 W. Dixon	unkn	<5	<5	<5	<5	<5		<5	<2	<5
July 28, 1998										
1060 S. Ohio	25-29	<5	41	210	160	17	30	<5		458
1139 Marilyn	19-23	<1	<1	<1	<1	<1	<1	<1		<1

ABREVIATIONS

PCE = tetrachloroethene
TCE = trichloroethene
c-DCE = cis-1,2-Dichloroethene
t-DCE = trans-1,2-Dichloroethene
1,1-DCE = 1,1-Dichloroethene
VC = Vinyl Chloride
TCA = 1,1,1-Trichloroethane
DCA = 1,1-Dichloroethane
CA = Chloroethane

OTHER RESIDENCES RELYING ON PRIVATE WELLS FOR WATER SUPPLY	
ADDRESS	RESPONSE
940 South St. Clair Street	No Answer
940 East Gray Street	Resident Declined Sample
990 East Warren Street	No Answer
1340 South Catherine Street	Resident Declined Sample
1390 South Catherine Street	No Answer
1330 South Josephine Street	No Answer
1290 South Marion Street	No Answer
1340 South Mulberry Street	No Answer
590 West Dixon Street	Resident Declined Sample

3.5 Site Investigation Results

3.5.1 Hydrogeologic Investigation Results

Boring logs are included in Tab 5 and soils are summarized on Cross-Section AA' (Figure 8). The cross-section location is shown on Figure 4 and the regional hydrogeology is summarized in Section 3.1.2. Subsurface soils in the study area are alluvial or outwash deposits, primarily of sand. Sand deposits extend to approximately 100 feet and are underlain by siltstone or claystone. Boring MW-6 extended to 101.5 feet and encountered clay at 100 feet and shale at approximately 101 feet BGS. Soils overlying the bedrock are predominantly well graded and poorly graded fine to medium sand with trace to little fines and gravel. Sand and gravel layers were identified at MW-6 and MW-8 at approximately 45-50 feet and at MW-6 at approximately 70-96 feet BGS. At MW-1 a layer of silt with little clay and little to some fine sand was found at 75 feet to termination of the boring at 81 feet BGS. A layer of silty sand was also identified at MW-1 at approximately 55 to 60 feet BGS.

Near the ground surface a layer of finer-grained soil was found which was typically silty sand, but also included clayey sand and some sandy lean clay or silt. The ground surface in covered with pavement (roads and parking lots), buildings, topsoil/grass and gravel (FWSA). The surficial silty sand layer varies in thickness from zero at MW-4 to approximately 12 feet at FB-8 and is generally 6-10 feet thick.

Water level measurements are listed in Table 1 for five dates. Groundwater fluctuated from over 10 feet to approximately 7 feet BGS at MW-1 in the FWSA. The high water level in June, 1998 corresponded to a month of high precipitation, but may also be indicative of the seasonal fluctuation.

The water level data for June 26 includes the Harmon wells as well as the Twigg wells. The water table elevations for June 26 are shown on Figure 4 and the potentiometric contours are plotted for the affected area. The apparent groundwater flow direction is west to west-southwest. Review of water level data for other dates shows little variation in the apparent groundwater flow direction.

Nested wells (MW-1 and MW-1D) are located in the FWSA and are screened at 7-17 feet and 50-60 feet, respectively. No difference was observed in the water levels in these two wells indicating the absence of a vertical hydraulic gradient. Based on the difference between the groundwater elevations at MW-1 and MW-8 (a distance of 2220 feet) the gradient varied from 0.0024 (2.4 feet per thousand) in March, 1998 to 0.0020 (2.0 feet per thousand) in June, 1998.

Constant head permeability tests were performed on eight of the nine monitoring wells during this investigation. The field data and calculations are included in Appendix L (Tab 12) and the results are summarized in Table 8. Based on the method of Bower & Rice (Bower, 1976) the hydraulic conductivity varies from 1.2×10^{-3} cm/sec at MW-9 to 6.9×10^{-2} cm/sec at MW-8. The variation in conductivity relates to soil type in that MW-9 is screened in sand and gravel and has the highest conductivity. Monitoring wells MW-1, MW-1D and MW-9 were screened partly in silty sand layers (or were at a depth likely to include silty sand) and were found to have lower conductivities. Monitoring well MW-3 was not tested but has a lower conductivity (based on slow recharge) apparently due to higher silt content in the soil.

TABLE 8

Summary of Monitoring Well

Permeability Tests

Twigg, Martinsville, Project 7403

Location	Constant Head Permeability Results (cm/sec)
MW-1	8.5×10^{-3}
MW-1D	9.8×10^{-3}
MW-4	4.9×10^{-2}
MW-5	1.8×10^{-2}
MW-6	2.2×10^{-2}
MW-7	2.9×10^{-2}
MW-8	6.9×10^{-2}
MW-9	1.2×10^{-3}

Geometric Mean Permeability = 1.6×10^{-2} cm/sec

The geometric (logarithmic) mean of a series hydraulic conductivity measurements at independent locations is considered to be the best statistical representation of the conductivity of the layer as a whole. The geometric mean hydraulic conductivity of eight wells tested was found to be 1.6×10^{-2} cm/sec (45 feet/day). This permeability is within the range of published values (8×10^{-3} to 5×10^{-1} cm/sec) for the regional aquifer (USGS, 1994).

The average (or apparent) horizontal linear velocity (v) of the groundwater in the aquifer can be evaluated from:

$$v = K\ (dh/dL)/n$$

Where dh/dL is the groundwater flow gradient, K is the hydraulic conductivity and n_e is the effective porosity. Assuming:

$K = 1.6 \times 10^{-2}$ cm/sec

$dh/dL = 0.0022$

$n_e = 0.20$ (typical value for sand)

then the average linear horizontal velocity of the groundwater in the aquifer would be approximately 1.8×10^{-4} cm/sec (182 ft/year).

3.5.2 Sample Analysis Results

The analytical laboratory reports and chain-of-custody forms are included in Tabs 8, 9, 10 and 11 and the lab results are summarized in Table 3 through 7.

Metals

Based on the results summarized in Table 3, all samples are within the Tier II Non-Residential Goals. Several soil sampling locations for Cd, Cr and Pb in the FWSA are more than three standard deviations above the mean of the background samples. The background samples were obtained from 200 to 800 feet from the FWSA. At one sample location (Boring A, 0-0.5 feet) Cr and Pb were each found in a single sample above the Tier II Residential goal (1600 ppm versus 135 ppm for Cd and 1000 ppm versus 400 ppm for Pb). However, several field duplicates and laboratory duplicates were performed at that location (Boring A, 0-0.5 feet) and all other laboratory results indicated much lower concentrations. The average of six analyses for Cr and Pb (as well as Cd) at Boring A, 0-0.5 feet was below the Tier II Residential Goal.

One groundwater monitoring well was sampled and tested for dissolved metals (8 RCRA metals) including Arsenic, Barium, Cadmium, Chromium, Lead, Mercury, Selenium and Silver. None of the analytes (except Barium at 0.034 ppm) was detected above the reporting limit. The concentrations of Cd, Cr and Pb, if present, are below the Tier II Residential Goal for groundwater.

Non-Chlorinated VOCs, SVOCs and pH

Four soil samples (0.5-1.0, 4.0-6.0, 9.0-11.0, 14-16) from FB-1 and one groundwater sample from MW-1 were analyzed for VOCs by method 8240 or 8260. No non-chlorinated VOCs were detected above the reporting limit in any of the samples. Acetone was detected in two soil samples below the reporting limit but was not detected in the groundwater. Acetone is a common laboratory contaminant and its presence may have

been a laboratory artifact.

Twenty (20) soil samples from the FWSA were tested for pH by method 9045. The pH values ranged from 7.94 to 9.66 and averaged 8.40. The highest pH values were at the surface (0-1.0 feet) and were due to the presence of limestone gravel.

A groundwater sample from MW-1 was analyzed for SVOCs, PCBs, Pesticides and Herbicides (Tab 9). No SVOCs, PCBs, Pesticides, or Herbicides were detected. Monitoring well MW-1 is located in the center of the FWSA and is screened (7-17') at the top of the aquifer (typically 8-9 feet). This is the most likely location to find contaminants, if they were present. These data appear to confirm the absence of hazardous materials other than CVOCs, Pb, Cd and Cr in the FWSA.

Petroleum range gasoline hydrocarbons were reported detected by the mobile laboratory (Tab 10) during one of the groundwater probe surveys. The most significant levels were west of the plume area, near Morton Avenue. However, the observed levels were very low and no benzene, ethylbenzene, toluene or xylene (BETX) was detected in a confirmation (split) sample analyzed by the (fixed) analytical laboratory.

<u>Chlorinated VOCs - Soil</u>

Methylene Chloride (MeC1) was detected in most of the soil samples from four (of approximately ten) analytical batches. The concentrations were low and there was no apparent pattern to the detections. MeC1 was also detected in the laboratory method blank for three of the four affected sample batches. No MeC1 was detected in the groundwater at MW-1. Therefore, the reported detection of MeC1 in the soil samples is almost

certainly a laboratory artifact.

Six chlorinated VOCs were detected in the soil and/or groundwater at or near the Twigg site. These include Tetrachloroethene (PCE), Trichloroethene (TCE), cis-1,2-Dichloroethene (c-DCE), 1,1,1-Trichloroethane (TCA), 1,1-Dichloroethane (DCA) and 1,1-Dichloroethene (1,1-DCE). No other CVOCs were detected in the soil or groundwater. Tables 4, 5, 6 and 7 summarize the analytical laboratory reports for soil, groundwater probes, groundwater monitoring wells and private wells, respectively.

CVOCs were detected in a total of 34 soil samples including samples from the vadose zone, from the top of the aquifer and from the aquifer matrix. CVOC was detected in both surface soil (0-2 feet) and subsurface soil (>2 feet) in the FWSA. The maximum concentration in the soil was found to be 42.0 mg/kg (ppm) in FB-1 at 9.0-11.0 feet. The water table at MW-1 (FB-1) varies from approximately 7 to 10 feet BGS, thus the sample was from the top of the aquifer or the capillary fringe.

No CVOCs were detected in vadose zone soils outside the FWSA (Figure 5). At the capillary fringe/ top of the aquifer CVOC was found to extend an estimated 400 feet west of the FWSA (Figure 6). Beyond the limits indicated on Figure 5, CVOC, if present, is found only below the top of the water table.

CVOC was confirmed to be in the soil at depths of up to 65 feet BGS (MW-6). CVOC (TCA and DCA) was also reported detected in the two deepest samples from MW-6 at 95-96 and 99.5-100 feet. However, both samples are likely to be sampling or analytical artifacts since they are

separated from the plume and (in the case of the deepest sample) are from a dense clay layer not conducive to contaminant migration. In any case, the concentrations of TCA and DCA in the two deep samples are below levels of concern. A single soil sample form MW-1D at 55.5-56.0 feet was reported to contain PCE (below the Tier II goal for residential property). Monitoring well MW-1D is screened from 50 to 60 feet and no PCE was detected in groundwater from the well in three of four samples.

Subsurface soil (>2 feet) on the Twigg property exceeds the Tier II non-residential goal for PCE and 1,1-DCE. Subsurface soil off the Twigg property exceeds the Tier II Residential goal for PCE (and possibly 1,1-DCE) near and below the water table. Other CVOCs do not exceed Tier II goals in the soil.

Below the water table, the presence of CVOC in the soil is indicative of its presence in the groundwater at that point. Thus, soil concentrations were used to help define the extent and magnitude of CVOCs in the groundwater.

<u>Chlorinated VOCs - Groundwater</u>

CVOCs were detected in groundwater samples from six of 18 probe locations (at multiple depths), five of nine monitoring wells (multiple sampling events) and at one of eight private wells tested. Concentrations of CVOCs range to over 7,000 ppb at MW-1, MW-4 and MW-6. The concentrations of individual analytes ranged up to 8200 ppb PCE, 160 ppb TCE, 73 ppb c-DCE, 7900 ppb TCA, 46 ppb DCA and 380 ppb 1,1-DCE. PCE was the only compound found in the groundwater on Twigg property in excess of Tier II Non-Residential goals. PCE, TCE, TCA and 1,1,-

DCE were found or are estimated to be present in groundwater off the Twigg site in excess of the Tier II Residential goals.

No CVOCs were detected in MW-9, MW-1D, MW-5 and MW-7 at a limit of 1 ppb. CVOCs were reported in a sample from MW-1D on June, 1998 (589 ppb) but not in March, 1998 nor in resampling in July and September 1998. The data from June is most likely a sampling or analytical artifact.

The estimated horizontal and vertical extent and magnitude of CVOCs in the groundwater are shown on Figures 7,8 and 9. The concentration isopleths are based primarily on monitoring wells and are supplemented by groundwater probe results and soil concentrations. The concentration isopleths are also shown for the adjoining Harman-Motive plume. The Harman plume isopleths are taken from 1996 report provided by Harman. Since remediation of the Harman plume began in 1996, it is likely that concentrations in the center of the plume have decreased.

Based on the analytes and concentrations at MW-4, FB-8, HMW-19, 24, 25, and 31 the CVOCs detected in HMW-31 and 25 are likely due to transverse dispersion from the axis of the Twigg plume near MW-4 and FB-8, while CVOCs at HMW- 19 and 24 are due to the Harmon plume. It is not known, but is possible that some overlap of the plumes is present east of HMW 24 and 25.

The center of the Twigg plume extends cross-gradient north from south street to the southern edge of the main Twigg building. Only moderate transverse dispersion is evident, while substantial downgradient migration has occurred. The Twigg plume is estimated to be 2,850 feet long and 650 feet wide at it's widest. The total affected area is approximately 8.2 acres,

while the area in excess of Tier II goals is somewhat less. In the western two-thirds of the plume the predominant species is TCA and the Tier II goal is 200 ppb TCA. The eastern third of the plume is predominantly PCE and the Tier II goal is 5 ppb PCE (56 ppb on the Twigg site).

The plume varies from 7 to 11 feet thick at MW-6 and FB-2 to approximately 55 feet thick at MW-6. The CVOCs appear to have entered the aquifer primarily in the FWSA and migrated downgradient to the west. The center of the plume quickly sinks below the top of the aquifer and within approximately 400 feet downgradient of the FWSA no CVOCs are found in the groundwater at the top of the aquifer (Figure 8). The center of the plume sinks from the top of the aquifer (10 feet) at MW-1, to 15-20 feet at MW-4, to 20-25 feet at FB-8, to 35 feet at MW-6 and to 45 feet at MW-8.

Concentrations of CVOC at MW1 varied substantially between two samplings: 2811 ppb on March 27 and 7164 ppb on June 26. The difference is likely due to change in the water level, which rose three feet from ten to seven feet BGS. Monitoring well MW-1 is screened at 7-17 feet and the highest soil CVOC concentrations were found at MW-1 at the water table. Thus, changes in the water table would be expected to affect the groundwater concentrations. Other wells varied only slightly because they are screened below the top of the aquifer, where the concentrations are more stable.

The variation of the plume from primarily PCE in the eastern one-third to primarily TCA in the western two-thirds may reflect two factors. The most recent (since the 1980's) degreasing solvent in use at Twigg was PCE, but may have been primarily TCA in the past. The western part of

plume may reflect prior usage of TCA. The second factor is chromatographic separation. TCA has a higher solubility and lower K_{oc} (organic carbon to water partition coefficient) than PCE; thus TCA migrates and disperses faster and farther.

The presence of TCE, c-DCE, DCA and 1,1-DCE is due to microbial sequential reductive dechlorination of PCE and TCA (Bouwer, 1983, Barrio-Lage, 1985; Chaudhry, 1991) TCE and c-DCE are anaerobic biodegradation products of PCE, while DCA and 1,1-DCE are the degradation products of TCA. The presence of 1,1-DCE may also be due to abiotic degradation (Vogel, 1987). These are the likely degradation pathways:

PCE---> TCE---> c-DCE---> Vinyl Chloride (VC)---> Ethylene---> Carbon Dioxide

TCA---> DCA---> Chloroethane (CA)---> Carbon Dioxide

TCA---> 1,1-DCE---> Vinyl Chloride---> Ethylene --->Carbon Dioxide

Many samples were also analyzed for VC and CA, but none was detected. This may be due to rapid dispersion, volatilization and degradation and/or low rates of generation of VC and CA.

Addresses identified in the private wells survey as using on-site private wells are shown on Figures 4 and 7. Groundwater samples were tested from eight private wells including two (Twigg well and 1060 S. Ohio St.) located within the plume area. No CVOCs were detected in any of the wells except 1060 S. Ohio St. (Table 7).

The three locations in or closest to the plume (Twigg well, 1060 S. Ohio St. and 1139 Marylin St.) are back-up wells used solely for non-potable purposes (car washing, yard and fire suppression). Affected residents were notified of the results of the survey and requested to continue restricting groundwater use to non-potable activities (Tab 7). No evidence of cross-connections was observed at any of the locations with both a private well and city water.

CVOC Migration Rate

All dissolved aquifer constituents adsorb to and desorb from the aquifer solid matrix. When at a dynamic equilibrium and assuming a linear relationship, this distribution between the solid and liquid phase can be described by a linear equilibrium distribution coefficient (K):

$$K_d = \frac{\text{mg chemical adsorbed/kg soil}}{\text{mg chemical dissolved/liter of water}}$$

Soil and groundwater concentrations were measured at the same depth at MW-8, MW-6 and MW-4 (see Figure 7 and Tables 4, 5 and 6). At MW-8 the K_d value for 1,1-DCA may be estimated as:

$$K_d = (150 \text{ ug/kg})/(109 \text{ ug/l}) = 1.4 \text{ l/kg}$$

At MW-6 for 1,1,1-TCA K_d may be estimated:

$$K_d = (3{,}000 \text{ ug/kg})/(2{,}700 \text{ ug/kg}) = 1.1 \text{ l/kg}$$

At MW-4, based on average soil values in the screened interval, K_d for PCE may be estimated:

$$K_d = (3977\ ug/kg)/(7900\ ug/kg) = 0.5\ l/kg \text{ at MW-4}$$

It has been commonly found that K_d is directly related to the organic carbon content (f_{oc}) of the solid phase. Therefore, an organic carbon distribution coefficient (K_{oc}) is often used:

$$K_{oc} = K_d/f_{oc}$$

The VRP Guidance Manual lists the following K_{oc} values:

Compound	K_{oc} (l/kg)
PCE	66.9
TCA	142
DCA	30.2

Based on the estimated K_d values and the literature values for K_{oc}, the f_{oc} at the four locations may be estimated as:

Location	f_{oc}	%OC
MW-8	0.046	4.6
MW-6	0.0077	0.77
MW-4	0.0074	0.74

A typical aquifer soil would be expected to contain approximately 0.01% to 1.0% total organic carbon. The f_{oc} calculated for MW-8 is higher than normally found in an aquifer soil matrix. If the f_{oc} value calculated for MW-4 and MW-6 is used for MW-8 then the K_d for DCA would be.

$$K_d = K_{oc} F_{oc} = 30.2 \times 0.0076 = 0.23 \text{ l/kg}$$

The adsorption of dissolved organic species from the groundwater onto the solid matrix has the effect of retarding the migration of dissolved organic constituents such as PCE. The average downgradient velocity of the retarded species (v_x) at 50% of the initial concentration can be described by the relationship:

$v_x = v/[1 + (b/n_e) \times k_d]$

v = average linear groundwater velocity (182 feet/year)

b = bulk density of solid matrix (1.99 kg/1 or 124 lb/ft^3)

n_e = effective porosity (0.20)

K_d = distribution coefficient

= 0.23 l/kg for DCA at MW-8

= 1.1 l/kg for TCA at MW-6

= 0.5 l/kg for PCE at MW-4

This suggests that the average downgradient contaminant migration velocity may be approximately:

Compound	Location	V_x est. (ft/yr)
DCA	MW-8	55
TCA	MW-6	15
PCE	MW-4	30

Based on site history PCE may have been in the groundwater for 10 to 20 years. The leading edge of the PCE plume has migrated approximately 700 feet

downgradient from the FWSA. The average migration rate for the edge of the PCE plume has been 35-70 feet per year. Similarly, the leading edge of TCA has migrated approximately 2,000 feet in 20-40 years, suggesting an average travel rate of 50-100 feet per year. The leading edge of DCA is approximately 2600 feet downgradient suggesting an average migration rate of 65-130 feet per year. These rates are similar but slightly higher than current travel rate estimates based on K_d.

All plumes eventually stabilize and CVOC plumes that are 20 to 40 years old are usually considered stable. The monitoring results at the leading edge of the plume (MW-8) and near the center of the plume (MW-4 and MW-6) have been stable during the investigation. Thus, it is likely that this plume is also stable.

4.0 CONCLUSIONS

4.1 Summary of Extent of Contamination

The horizontal and vertical extent of CVOCs and metals appears to be well defined. Metals (Cd, Cr and Pb) are above background levels in the surface and subsurface soil in the FWSA but were below Tier II goals and were not detected in the groundwater. CVOCs were detected in the soil at up to 42,000 ppb in the FWSA and in the groundwater at up to 8704 ppb in the groundwater plume. The CVOCs detected were PCE (and degradation products TCE and c-DCE) and TCA (and degradation products DCA and 1,1-DCE). The groundwater CVOC plume extends approximately 2,600 feet downgradient (west-southwest) from the FWSA and is probably stable. The CVOC plume sinks as it migrates westward and was not detected at the top of the aquifer beyond approximately 400 feet west of the FWSA. No other VOCs, SVOCs, PCBs, Herbicides, Pesticides or Metals were detected in the groundwater in the FWSA.

4.2 Summary of Potential Risks

Potential human exposure pathways include excavation of soil on the Twigg site, ingestion of groundwater and exposure to vapors through migration to basements. Direct exposure to affected soils in the FWSA could occur during subsurface excavation. Vapor migration may occur laterally through the vadose zone or upward from the top of the aquifer. The area of exposure to vapor migration is limited to the area with CVOC at the top of the aquifer. This includes the Twigg site, and seven residential and one business site south and west of the Twigg site. Based on visual inspection, only one of the residences is thought to include a basement.

Drinking water throughout the project area is provided by the City of Martinsville. The city wellfield is located one mile northwest of the site and is not downgradient. Three private wells located in or near the plume are back-up wells used solely for non-drinking water purposes. Several residences rely on private wells for drinking water but are not near the plume. Five such residences were tested for CVOCs and none were detected. The nearest downgradient private wells are 600-1,600 feet west-southwest of the leading edge of the plume.

4.3 Preliminary Remedial Options

6.3.1 Metals

No remedial action is anticipated for the metals in the soil in the FWSA. All individual replicates are below the Tier II non-residential goals for cadmium, chromium and lead. The average concentrations for each sample location/depth are below the Tier II residential goals. Therefore the site will be closed with respect to metals under the Tier II goals without remediation.

6.3.2 CVOCs - Cleanup Goals

The CVOC plume extends under 50-60 individual properties in excess of Tier II residential goals for PCE, TCA, TCE or 1,1-DCE.

No CVOCs are present at the top of the aquifer for the western two-thirds of the plume. Therefore the only potential exposure route is through drinking water. If access to drinking water could be controlled through deed restrictions, then a risk assessment could be performed to determine appropriate clean-up goals in the absence of immediate potential exposure routes. In the eastern one-third of the plume CVOC is present at the top of the aquifer. If access to drinking water were controlled through deed restrictions, a risk assessment would be needed to established appropriate clean-up goals based on vapor phase exposure only.

In the absence of off-site deed restrictions the clean-up goals for off-site soil and groundwater would be Tier II Residential and Tier II Non-Residential for the Twigg site.

6.3.3 CVOCs - Remedial Options

Intrinsic Bioremediation

Intrinsic bioremediation is currently occurring throughout most of the plume. This is evidenced by the presence of biodegradation products throughout the plume and the prevalence of such compounds in some areas. In some areas intrinsic bioremediation, dispersion and volatilization will be sufficient to achieve the remedial goals.

Enhanced Bioremediation

Natural biodegradation may be enhanced by the application of nutrients to the groundwater. Methanotrophic bacteria may be enhanced by the addition of a co-metabolite such as methane or other short chain hydrocarbons. Aerobic bacteria would also be enhanced by the addition of oxygen. The addition of nutrients could be achieved through injection wells screened below the plume.

Soil Vapor Extraction

The most cost-effective means of removing high volatility compounds from a permeable vadose zone is often soil vapor extraction (SVE). SVE is also often an affective means of removing CVOCs from the top of the water table. A vacuum blower would draw air through wells screened in the vadose zone. Venting the air to the atmosphere would require an air emissions permit and may require treatment if emission rates are high. In addition, SVE may be used to remove air sparging gases from the vadose zone (see Air Sparging).

Air Sparging

This option includes pumping compressed air into the aquifer below the plume. The air bubbles rise through the water column volatilizing CVOCs. The sparged air passes through the vadose zone and vents to the atmosphere unless it is drawn into SVE wells. This option is generally cost effective.

Pump and Treat

The affected groundwater could be removed through high capacity, or many lower capacity wells. The groundwater would be treated on the surface and discharged. Treatment could include air stripping, carbon adsorption, biological treatment or UV/ozonation. Pump and treat is not a cost-effective means of remediating low solubility groundwater constituents, such as CVOCs.

Soil Excavation/Disposal

The affected soils in the FWSA could be excavated and treated/disposed offsite as hazardous waste. This is cost prohibitive due to the volume of the soil in the FWSA and the cost of off-site treatment and disposal.

4.4 Remediation Work Plan

A Remediation Work Plan is expected to be submitted 90 days after approval of the Phase II Investigation Report. If additional field investigation is required prior to approval of the Investigation Report, then submittal of the Work Plan would be delayed.

5.0 REFERENCES

A & W, 1992a. "Subsurface Investigation, Twigg Corporation, Martinsville, IN" Alt and Witzig Engineering, Inc. January 8, 1992

A & W, 1992b "Subsurface Investigation II, Twigg Corporation, Martinsville, IN", Alt and Witzig Engineering, Inc.

Barrio-Lage, G., F.Z. Parsons, R.S. Nasser, P.A. Lorenzo, 1985. "Sequential Dehalogenation of Chlorinated Ehtenes," Environ. Sci. Technol., Vol 20, No. 1, pp 96-99.

Bouwer, E.J., and P.L. McCarty. 1983. "Transformation of 1- and 2-Carbon Halogenated Aliphatic Organic Compounds Under Methanogenic Conditions". Applied and Environmental Microbiology. 45: 1286- 1294.

Bower, H. and R.C. Rice, 1976. " A Slug Test for Determing Hydraulic Conductivity of Unconfined Aquifers with Completely or Partially Penetrating Wells", Water Resource Research V.12, No. 3, pp. 423-428.

Chaudhry, G.R., and S. Chapalamadugu. 1991. Biodegradation of Halogenated Organic Compounds. Microbiological Review. 55:49-79

HES, 1996. "Remediation Start-Up Groundwater Sampling Results - June, 1996" Heritage Environmental Services, Inc.

IDNR, 1983. Map of Indiana Showing Thickness of Unconsolidated Deposits, Indiana Dept. of Natural Resources, Geological Survey, 1983.

IDNR, 1987. Bedrock Geologic Map of Indiana, Indiana Dept. of Natural Resources, Geological

Survey, 1987.

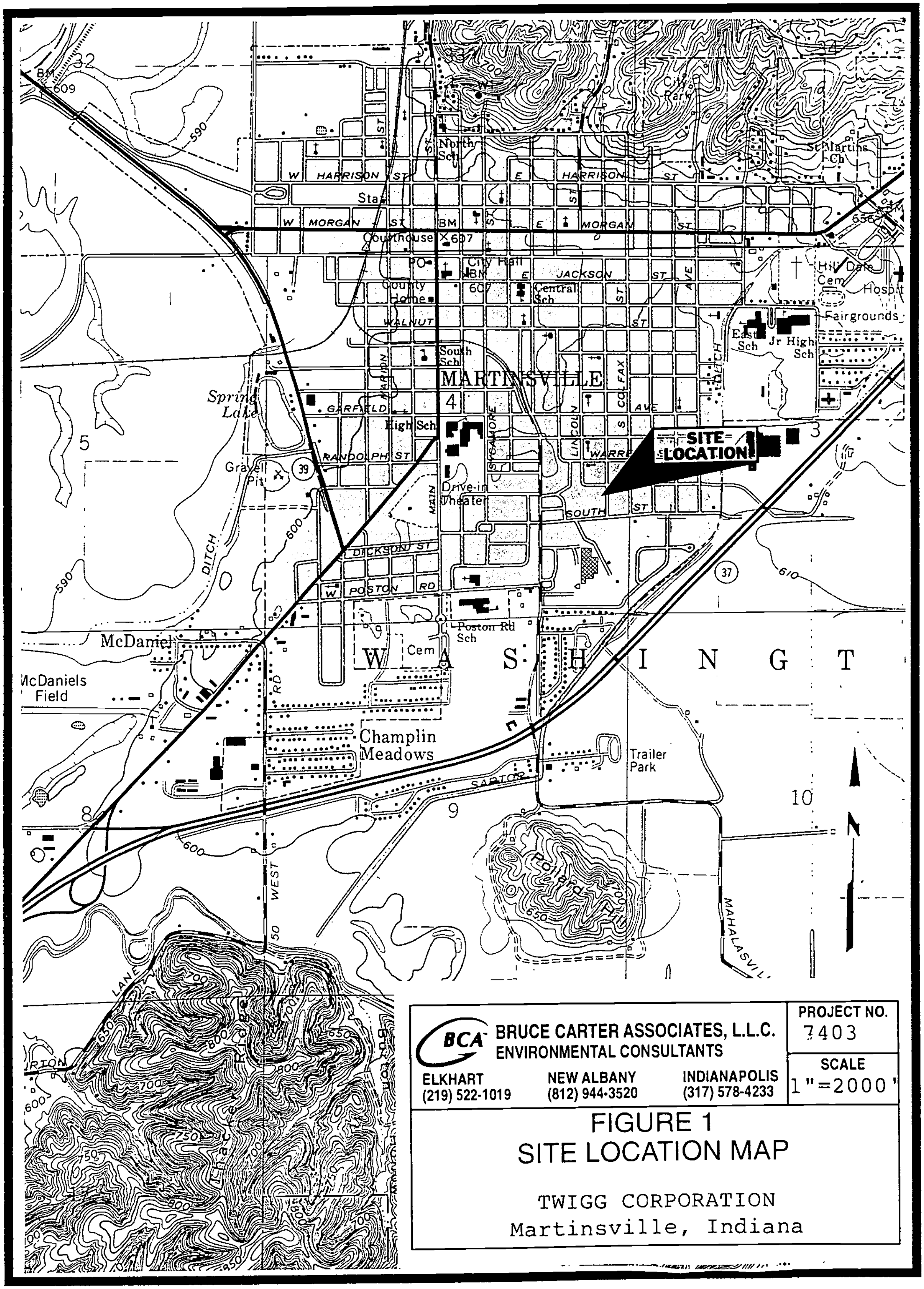
IDNR, 1989. Quaternary Geologic Map of Indiana, Indiana Dept. of Natural Resources, Geological Survey, 1989.

U.S. EPA, 1986. "Quality Criteria for Water" EPA 440/5-86-091, U. S. Environmental Protection Agency, Office of Water Regulations and standards, Washington, D.C. 20460, 1986.

USDA, 1981. "Soil Survey of Morgan County, Indiana" U.S. Department of Agriculture, Soil Conservation Service, Issue, 1981.

USGS, 1994. Hydrogeologic Atlas of Aquifers of Indiana, U.S. Geological Survey, Water Resources Investigation Report 92-4142, 1994.

Vogel, T.M., C.S. Criddle, and P.M. McCarty. 1987. "Transformations of Halogenated Aliphatic Compounds". Environmental Sci. Toxicol. 21:722-736.



BRUCE CARTER ASSOCIATES, L.L.C.
ENVIRONMENTAL CONSULTANTS

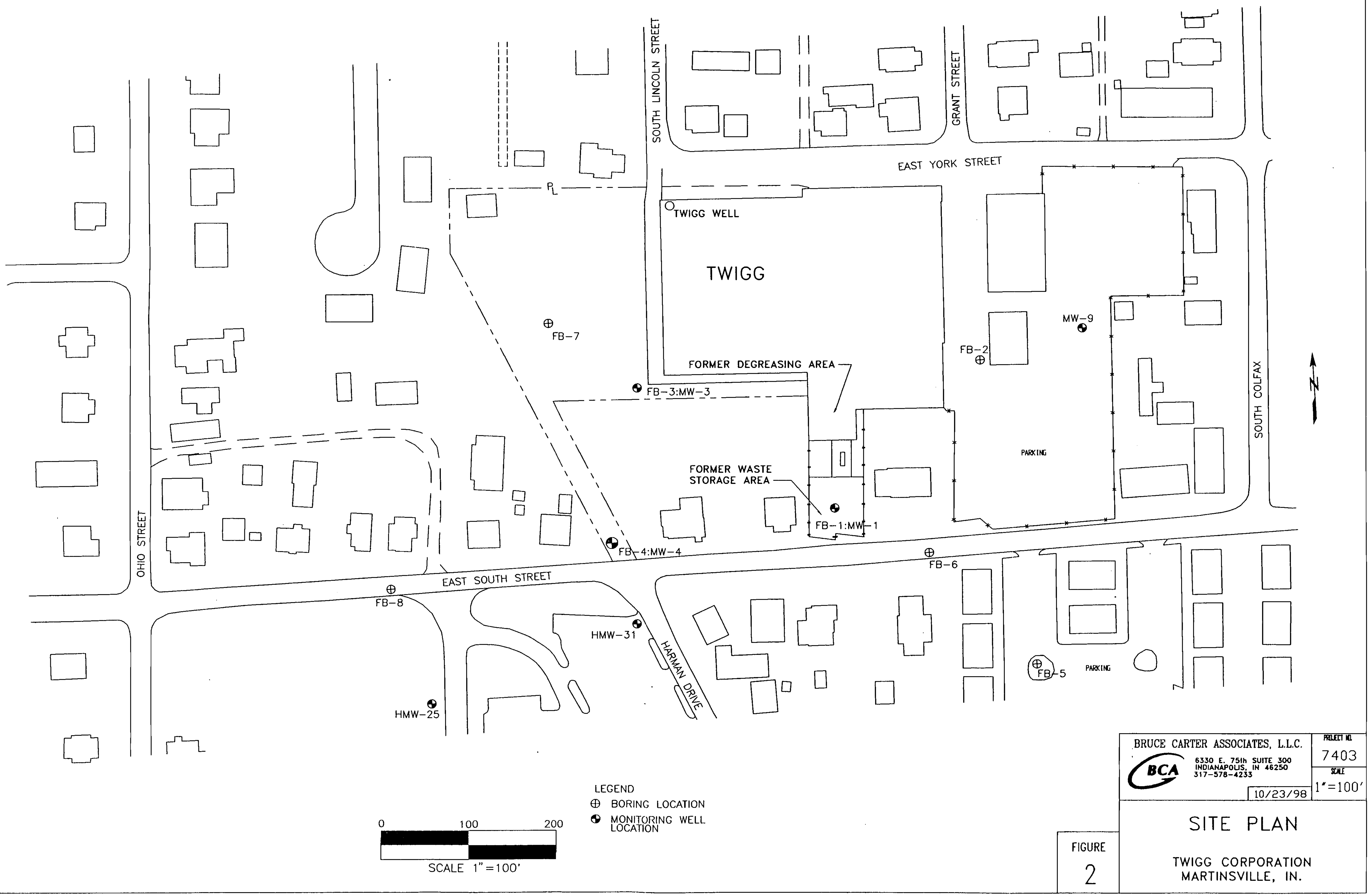
ELKHART (219) 522-1019
NEW ALBANY (812) 944-3520
INDIANAPOLIS (317) 578-4233

PROJECT NO. 7403

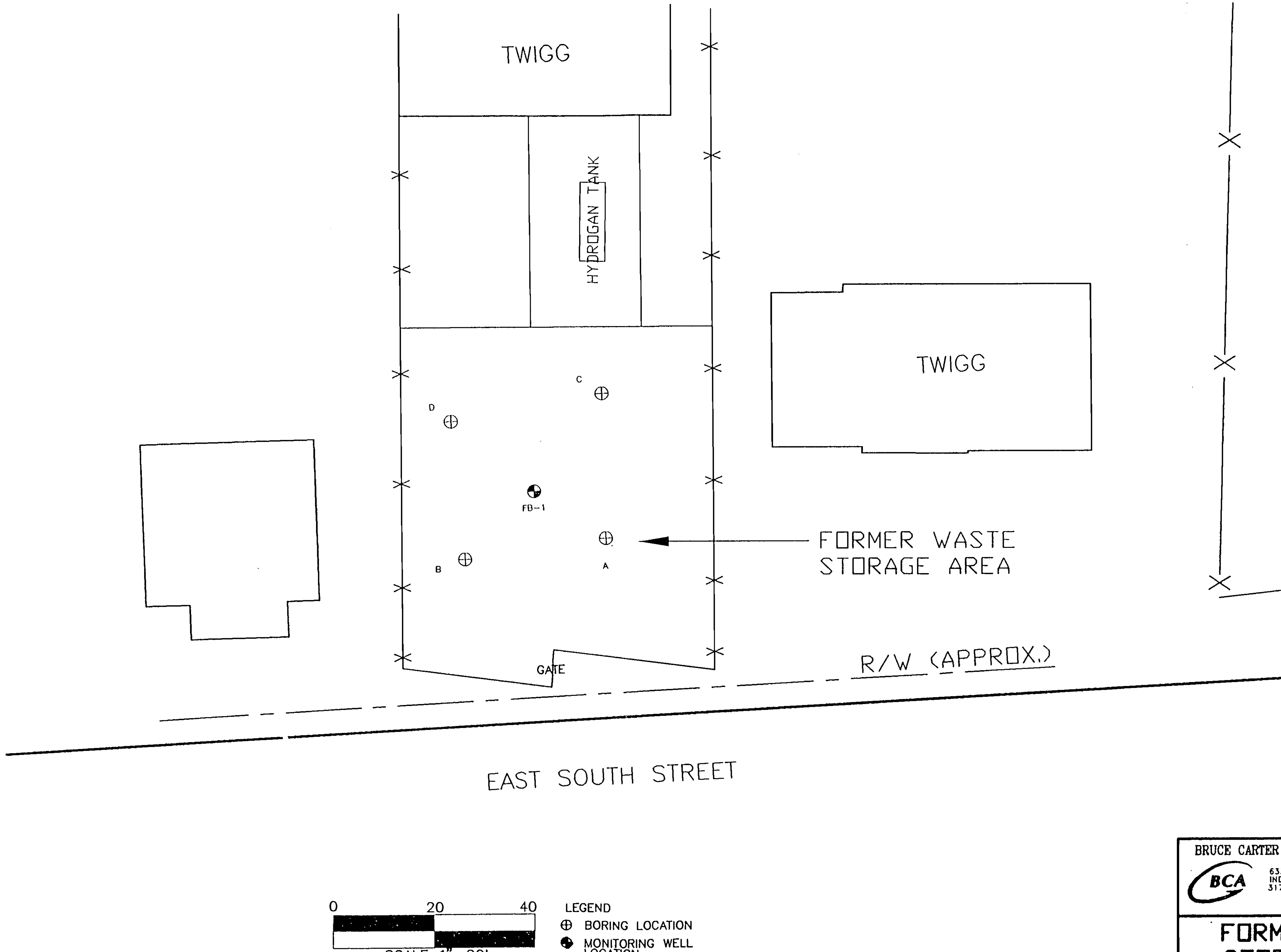
SCALE 1"=2000'

FIGURE 1
SITE LOCATION MAP

TWIGG CORPORATION
Martinsville, Indiana



SOUTH LINCOLN STREET
GRANT STREET
EAST YORK STREET
SOUTH COLFAX
OHIO STREET
EAST SOUTH STREET
HARMAN DRIVE
TWIGG WELL
TWIGG
FB-7
FB-2
MW-9
FORMER DEGREASING AREA
FB-3:MW-3
PARKING
FORMER WASTE STORAGE AREA
FB-1:MW-1
FB-4:MW-4
FB-6
FB-8
HMW-31
HMW-25
FB-5
PARKING
N
LEGEND
BORING LOCATION
MONITORING WELL LOCATION
0 100 200
SCALE 1"=100'
BRUCE CARTER ASSOCIATES, L.L.C.
BCA
6330 E. 75th SUITE 300
INDIANAPOLIS, IN 46250
317-578-4233
10/23/98
PROJECT NO.
7403
SCALE
1"=100'
SITE PLAN
TWIGG CORPORATION
MARTINSVILLE, IN.
FIGURE
2

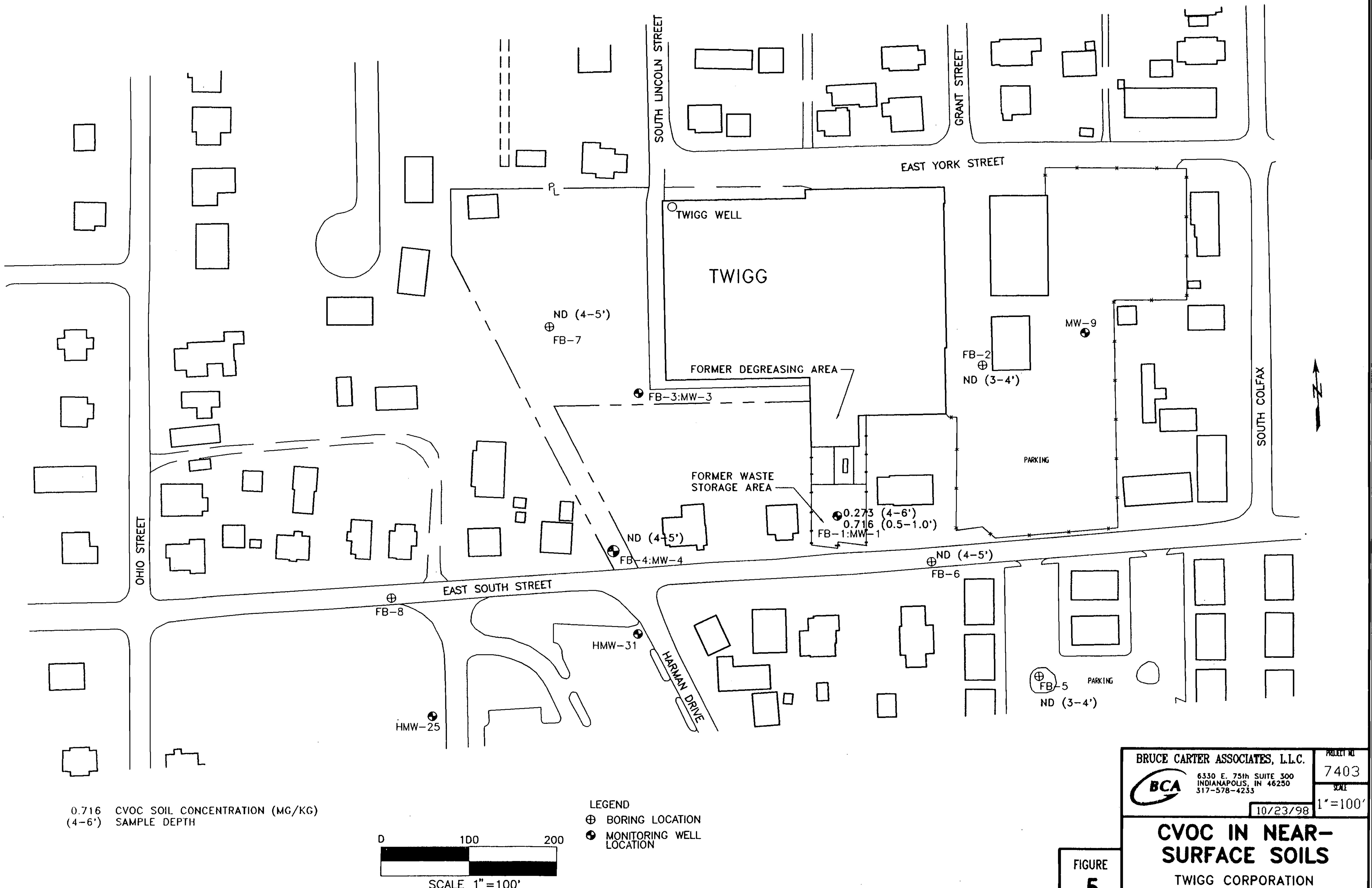


BRUCE CARTER ASSOCIATES, L.L.C.
BCA
6330 E. 75th SUITE 300
INDIANAPOLIS, IN 46250
317-578-4233
10/22/98
PROJECT NO. 7403
SCALE 1'=20'

FIGURE 3

FORMER WASTE STORAGE AREA

TWIGG CORPORATION
MARTINSVILLE, INDIANA



BRUCE CARTER ASSOCIATES, L.L.C.

BCA

6330 E. 75th SUITE 300
INDIANAPOLIS, IN 46250
317-578-4233

10/23/98

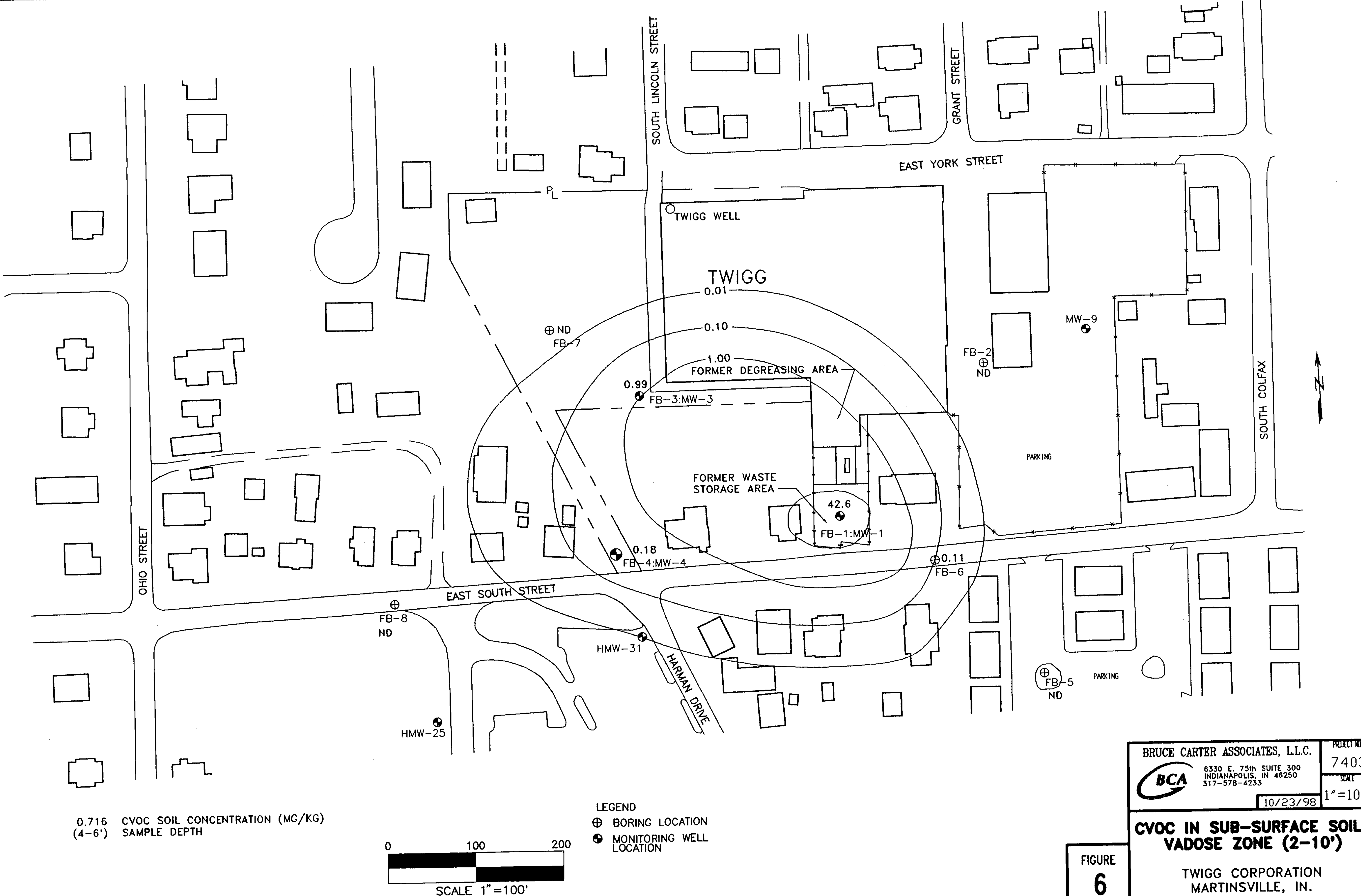
PROJECT NO. 7403

SCALE 1"=100'

FIGURE 5

CVOC IN NEAR-SURFACE SOILS

TWIGG CORPORATION
MARTINSVILLE, IN.



BRUCE CARTER ASSOCIATES, L.L.C.

BCA

6330 E. 75th SUITE 300
INDIANAPOLIS, IN 46250
317-578-4233

PROJECT NO. 7403

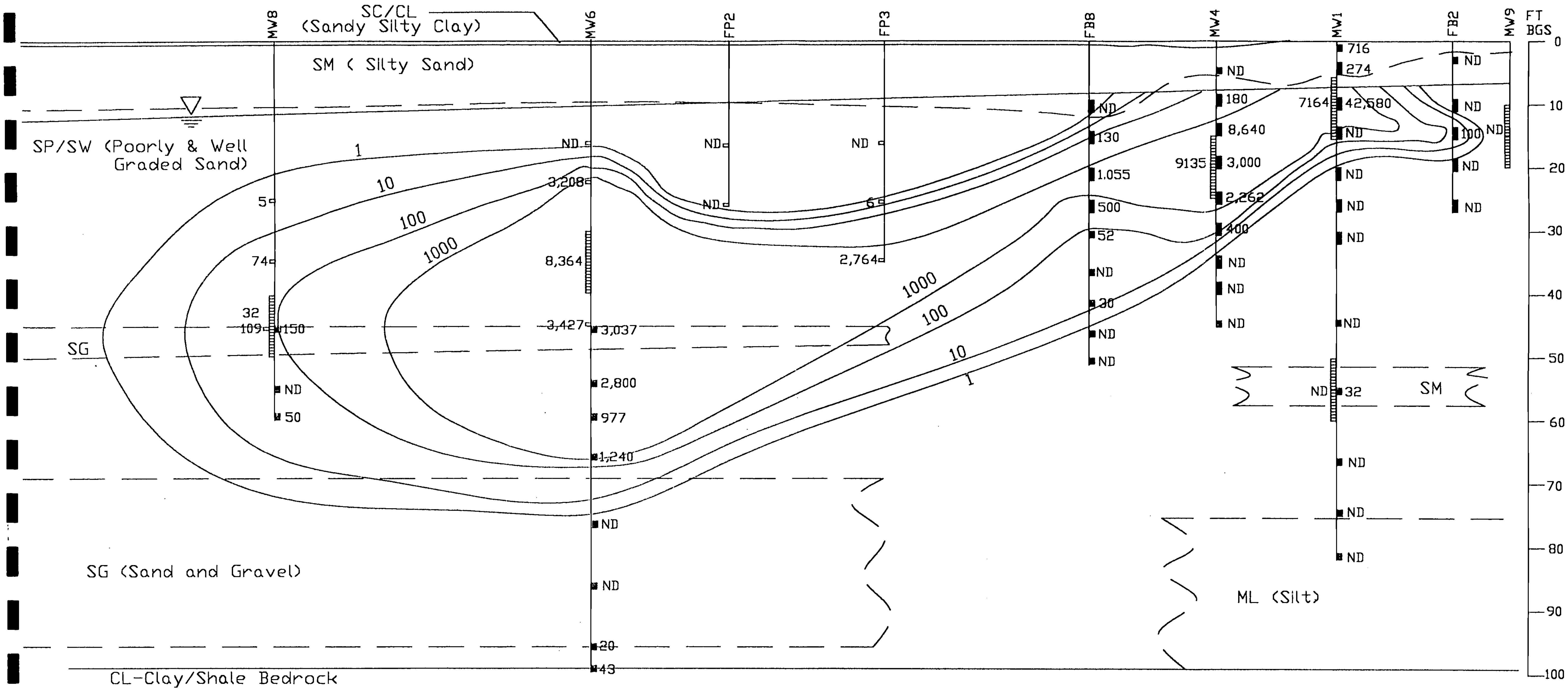
SCALE 1"=100'

10/23/98

CVOC IN SUB-SURFACE SOILS VADOSE ZONE (2-10')

TWIGG CORPORATION
MARTINSVILLE, IN.

FIGURE 6



LEGEND

180 Soil Sample Location and CVOC Concentration (ppb)

254 Monitoring Well Location and CVOC Concentration (ppb) (3/98)

17 Groundwater Probe Location and CVOC Concentration (ppb) (1996-97)

CVOC Concentration Contour

0' 200' 400'

Horizontal Scale 1"= 200'

1' 15' 30'

Vertical Scale 1"= 15'

NOTES

Ground Surface = 603±1ft MSL

CVOC = Chlorinated Volatile Organic Compounds

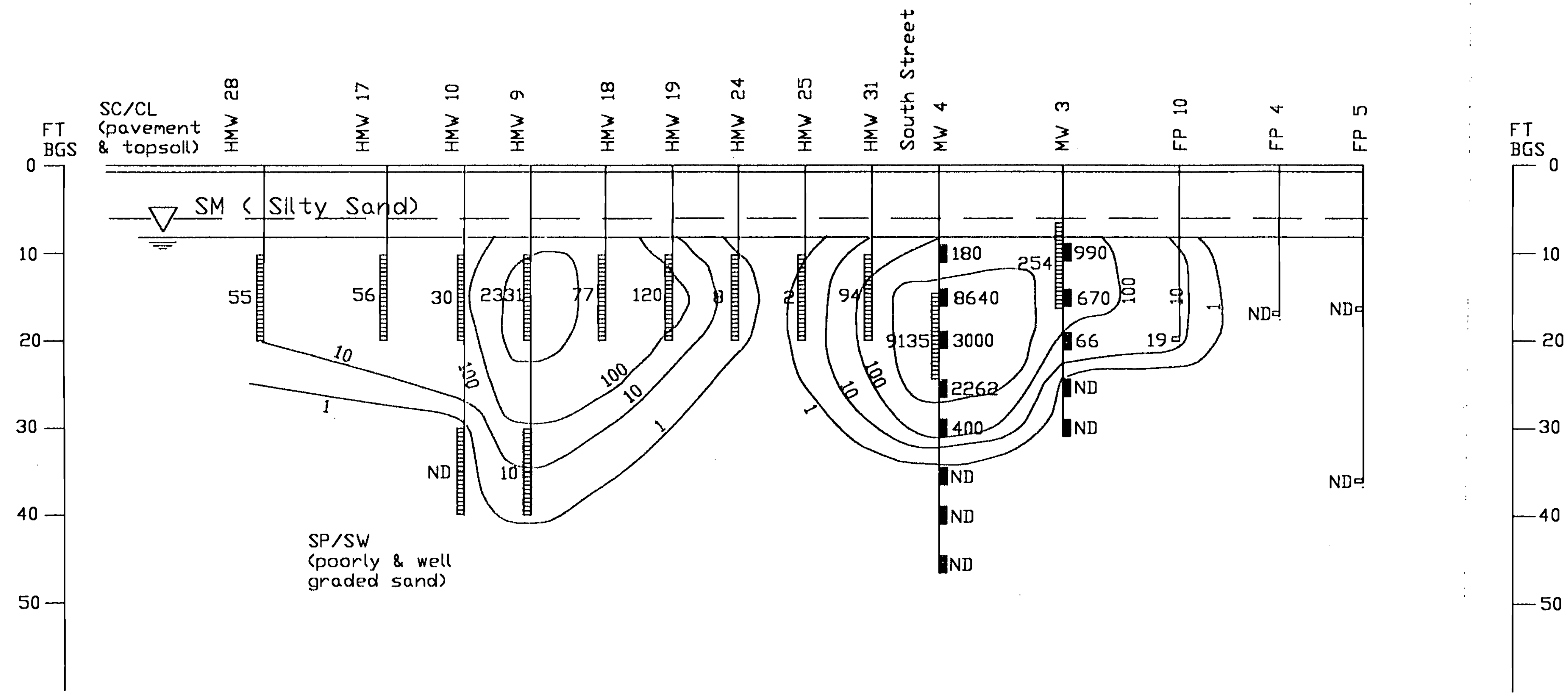
BRUCE CARTER ASSOCIATES, L.L.C.

6330 E. 75th SUITE 300
INDIANAPOLIS, IN 46250
317-578-4233

PROJECT NO.
7403

SCALE

Cross-Section A-A'
Twigg Corporation
Martinsville, IN
Figure 8



NOTES

Groung Surface = 603±1ft MSL
CVOC = Chlorinated Volatile Organic Compounds
Concentration in HMV Wells From 1996 Harmon Motive Data

0' 200' 400'
Horizontal Scale: 1"= 200'

0' 15' 30'
Vertical Scale : 1"= 15'

LEGEND

180 Soil Sample Location and CVOC Concentration (ppb)

254 Monitoring Well Location and CVOC Concentration (ppb) (3/98)

17 Groundwater Probe Location and CVOC Concentration (ppb) (1996-97)

CVOC Concentration Contour

BRUCE CARTER ASSOCIATES, L.L.C.
BCA
6330 E. 75th SUITE 300
INDIANAPOLIS, IN 46250
317-578-4233

PROJECT NO. 7403
SCALE

Cross Section B-B'
Twigg Corporation
Martinsville, IN
Figure 9

EMERGENCY PHONE NUMBERS

EMS 911

Fire 911

Police 911

See Page 5 for other numbers and directions

Location 625 York & Area West
Street Address

SITE SAFETY PLAN

Project: Twigg Corp. - Martinsville, In

Project No.: 7403

Date: 1997-98

BRUCE CARTER ASSOCIATES, L.L.C.

Indianapolis, Indiana

Prepared by: John Kilmer (name) Sr Eng (position)

Approved by: D Russell Farlow (name) Pjt Safety Mgr (position)

THE SITE SAFETY PLAN MUST:

1. Describe the known hazards and evaluate the risks associated with the incident and with each activity conducted.

2. Describe requirements for an environmental surveillance program.

3. Delineate work areas.

4. Describe Levels of Protection to be worn by personnel and delineate specific job functions.

5. List key personnel and alternates responsible for site safety, response operations, and protection of the public. In addition, list key personnel and alternates of public and private organizations who could become associated with the response.

6. Establish procedures to control site access.

7. Describe decontamination procedures for personnel and equipment.

8. Establish site emergency procedures.

9. Address emergency medical care for injuries and toxicological problems, as well as routine medical.

10. Specify any routine and special training required for responders.

11. Establish procedures for protecting workers from weather-related problems.

SITE SAFETY PLAN

A. SITE DESCRIPTION

Location: 625 E. York and areas to the west on E. South St, & E. Sycamore St.

Address:

Topographical Features: Essentially flat

Present Land Use: Site is ~~metal fabric~~ industrial. Areas west are residential

Surrounding Land Uses: Residential, except Harmon-Motive

Adjacent Populations: ~~Law~~ Area primarily single family detached residential

Site Owner: Twigg

Owner Address: Same

Owner Contact: Ralph Heitner

Telephone Number: 317-342-7126

Site Conditions: Industrial. Off-site = Residential

Site Communication System: Oral/phones

B. ENTRY OBJECTIVES/TYPE OF WORK

~~D~~ RI/FS Investigation
Direct Drive Probing, Drilling, Gnd Wtr Sampling, Site/Area
Reconaissance

C. BRUCE CARTER ASSOCIATES ~~FARLOW ENVIRONMENTAL'S~~ ON-SITE AUTHORITY/RESPONSIBILITY

Prime Contractor ✓ QA/QC Oversite ____

Sub-Contractor ____ Other ____ (define)

Technical Consultant ____

D. PROJECT ORGANIZATION

Project Manager: John Kilmer

Project Safety Office: D. Russell Farlow

On-site Supervisor/Engineer: J. Kilmer/DR Farlow

Field Team Members: ~~Various~~

E. OTHER PARTIES ON-SITE OR REGULATORY

	Company/Agency	Rep. Name	Phone
Contractor(s):	Innovative Probing Solutions		616-244-7900
	~~Probing & Drilling Contractors~~		
	Soil Exploration Services		800-654-4915
	Earth Exploration		317-273-1690
Federal:	N/A		
State:	N/A		
Local:	N/A		

F. SITE CONTROL

Security/Access Control Person and Method: On-Site Supervisor. Control = verbal.

Site Map: Attached site map clearly showing site control areas (Exclusion Zone, Contamination Reduction Area, Hotline, Outer Control Line, Decontamination Corridor, Support Area).

Site Control Boundary Field Marking By:

Zone/Boundary	Marking Method
Support Area:	
Outer Control Boundary:	
Decontamination Area:	
Hotline:	
Exclusion Zone:	~~Probing~~ - Drill Head/Well Head immediate area.

INSERT PAGE 6 - G. CHEMICAL HAZARD EVALUATION

~~Soil - only shallow soil in former waste storage area~~ is

Chlorinated VOCs

Compounds include PCE, TCE, c-DCE, TCA, DCA, 11-DCE. Some are suspected carcinogens. Potential exposure to site workers thru breathing of ~~evaporated~~ vapors. Volatilization ~~thu~~ from soil and groundwater minimal due to the small quantities ~~of soil~~ involved. Exposure risk is minimal. CVOCs have warning properties (odor) and can be detected w/ a PID far below OSHA PELs.

Metals

Pb, Cd and Cr are present in shallow soil in the waste storage area. Potential exposure may occur thru ingestion/breathing of dust. Pb, Cd & Cr concentrations are only slightly elevated, therefore the exposure risk is minimal. To further reduce exposure, minimize work in former waste storage area during dusty conditions.

H. PHYSICAL HAZARD EVALUATION

Hazard	Present (?)	Explanation
Electrical:	Yes	Drilling - overhead wires.
Excavation:	No	
Overhead:	No	
Confined Space:	No	
Heat Stress:	Yes	Minor during ~~hot mon~~ summer
Cold:	Yes	Minor during winter
Equipment:	Yes	Probing & drilling equipment
Drowning:	No	
OTHER:	No	

I. PERSONAL PROTECTIVE EQUIPMENT TO USE

Location	Job Function	Level of Protection			
All	Probing	A	B	C	D
All	Drilling	A	B	C	D
All	GW Sampling	A	B	C	D
All	Site Reconaissance	A	B	C	D
		A	B	C	D
		A	B	C	D
		A	B	C	D
		A	B	C	D

NOTES: ~~Probing~~, Drilling and GW Sampling job functions ~~are~~ include exposure to contaminated soils and groundwater - thus Hazwopper training is required for them.

Specific PPE

Level A:	Level B:
NA	NA

Level C:

NA

Level D: & work gloves near

Hard hat, & boots - drill head
& probe head

Work clothes - All

Inner gloves - when handling heavily contaminated soil

Other:

J. MONITORING PROCEDURES (If required by the Project Leader)

Monitoring the site for identity and concentration of contamination in all media:

PID monitoring of soil as required by on-site supervisor

Medical monitoring procedures for evidence of personnel exposure:

N/A

Personnel monitoring procedures (chemicals and heat stress):

Chemicals - monitor soil w/ PID during drilling activity.
Heat - ~~Keep~~ drink plenty of fluids, monitor for early signs of heat stress.

K. DECONTAMINATION AND DISPOSAL

Disposal Procedures (contaminated personnel, surfaces, materials, instruments, equipment, etc):

Drum soil & GndWtr from contaminated locations. Pressure wash drilling equipment. ~~to~~ Soap and water for other exposed surfaces and personnel

Disposal Procedures (contaminated equipment, supplies, disposables, washwater):

Drummed Soil & GndWtr - ~~hold for~~ store at Twigg for treatment w/ remediation system.
Gloves & misc trash - dispose with regular trash

L. EMERGENCY PROCEDURES

In the event of personnel exposure (skin contact, inhalation, ingestion):

Contact hospital for extreme

In the event of personnel injury:

Call Hospital/EMS

In the event of potential or actual fire or explosion:

Call Fire Department

In the event of potential or actual ionizing radiation exposure:

N/A

In the event of environmental accident (spread of contamination outside sites):

Soil - shovel into drums

Water - N/A

405-342-4945

M. EMERGENCY SERVICES (Complete here or have separate list available on-site)

	Location	Telephone
Emergency Medical Facility		
	Morgan Co Hospital	342-8441
	1200 John R Wooden	
Ambulance Service		
	Rural Metro Amb. Svc.	800-539-2614
	Main & Garfield	
Fire Department		
	~~Washington Town~~	342-6614
	Martinsville City Fire Dept	
	59 So. Jefferson	
Police Department		
	Martinsville Police Dept	#-342-6614
	59 So. Jefferson	
Poison Control Center		
	I65 & 21st St.	800-382-9097
	Methodist Hospital	
	Indianapolis In 46206	

PERSONNEL POTENTIALLY EXPOSED TO HAZARDOUS SUBSTANCES

Personnel Authorized to enter site

1. No Entry Restrictions
2. __________
3. __________
4. __________
5. __________

Other personnel assigned to handle hazardous substances (decontaminated, analyze samples)

1. BCA Staff and subcontractors
2. __________
3. __________
4. __________
5. __________

O. ALTERNATIVE WORK PRACTICES

(Describe alternative work practices not specified in this Chapter. Indicate work practices specified in the Chapter for which proposed alternative work practices will serve as substitute).

P. SITE SAFETY PLAN AMENDMENTS/REVISIONS

Amendment 1: __________ __________

Amendment 2: __________ __________

Amendment 3: __________ __________

DNR Indiana Department of Natural Resources

Frank O'Bannon, Governor
Larry D. Macklin, Director

Nature Preserves
402 W. Washington Street W267
Indianapolis, IN 46204-2748
PH: 317/232-4052
FAX: 317/233-0133

October 8, 1998

Mr. John W. Kilmer
Bruce Carter Associates, LLC
6330 E. 75th Street, Suite 300
Indianapolis, IN 46250

Dear Mr. Kilmer:

I am responding to your request for information on the endangered, threatened, or rare (ETR) species, high quality natural communities, and natural areas documented from a project site in Martinsville and Sartor Ditch to Indian Creek in Martinsville, Morgan County, Indiana. The Indiana Natural Heritage Data Center has been checked and there are no ETR species and significant areas documented from this project area.

The information I am providing does not preclude the requirement for further consultation with the U.S. Fish and Wildlife Service as required under Section 7 of the Endangered Species Act of 1973. You should contact the Service at their Bloomington, Indiana office.

U.S. Fish and Wildlife Service
620 South Walker St.
Bloomington, Indiana 47403-2121
(812)334-4261

At some point, you may need to contact the Department of Natural Resources' Environmental Review Coordinator so that other divisions within the department have the opportunity to review your proposal. For more information, please contact:

Larry Macklin, Director
Department of Natural Resources
attn: Stephen H. Jose
Environmental Coordinator
Division of Fish and Wildlife
402 W. Washington Street, Room W273
Indianapolis, IN 46204
(317)232-4080

Please note that the Indiana Natural Heritage Data Center relies on the observations of many individuals for our data. In most cases, the information is not the result of comprehensive field surveys conducted at particular sites. Therefore, our statement that there are no documented significant natural features at a site should not be interpreted to mean that the site does not support special plants or animals.

Due to the dynamic nature and sensitivity of the data, this information should not be used for any project other than that for which it was originally intended. It may be necessary for you to request updated material from us in order to base your planning decisions on the most current information.

Thank you for contacting the Indiana Natural Heritage Data Center. You may reach me at (317)232-4052 if you have any questions or need additional information.

Sincerely,

Ronald P. Hellmich

Ronald P. Hellmich
Indiana Natural Heritage Data Center

FILE COPY

Bruce Carter Associates, L.L.C.
ENVIRONMENTAL CONSULTANTS
AIR • WATER • SOLID WASTE • OSHA • REMEDIATION SERVICES

October 05, 1998

Mr, Ron Hellmich
DNR Division of Nature Preserve
402 W. Washington
Indianapolis, IN 46204

Dear Mr. Hellmich:

This is to request a database search for endangered, threatened, or rare species, high quality natural communities and high quality natural areas at sites in and near Martinsville, Morgan County, Indiana. The site includes an area in Martinsville and Sartor Ditch from Martinsville to Indian Creek. (See attached USGS map).

This is part of a larger report with an October 30 deadline. I need your information by October 14, if possible. Fax results when they are ready (578-4250). Please call if you have any questions (578-4233).

Very Truly Yours
Bruce Carter Associates, L.L.C.

John W. Kilmer

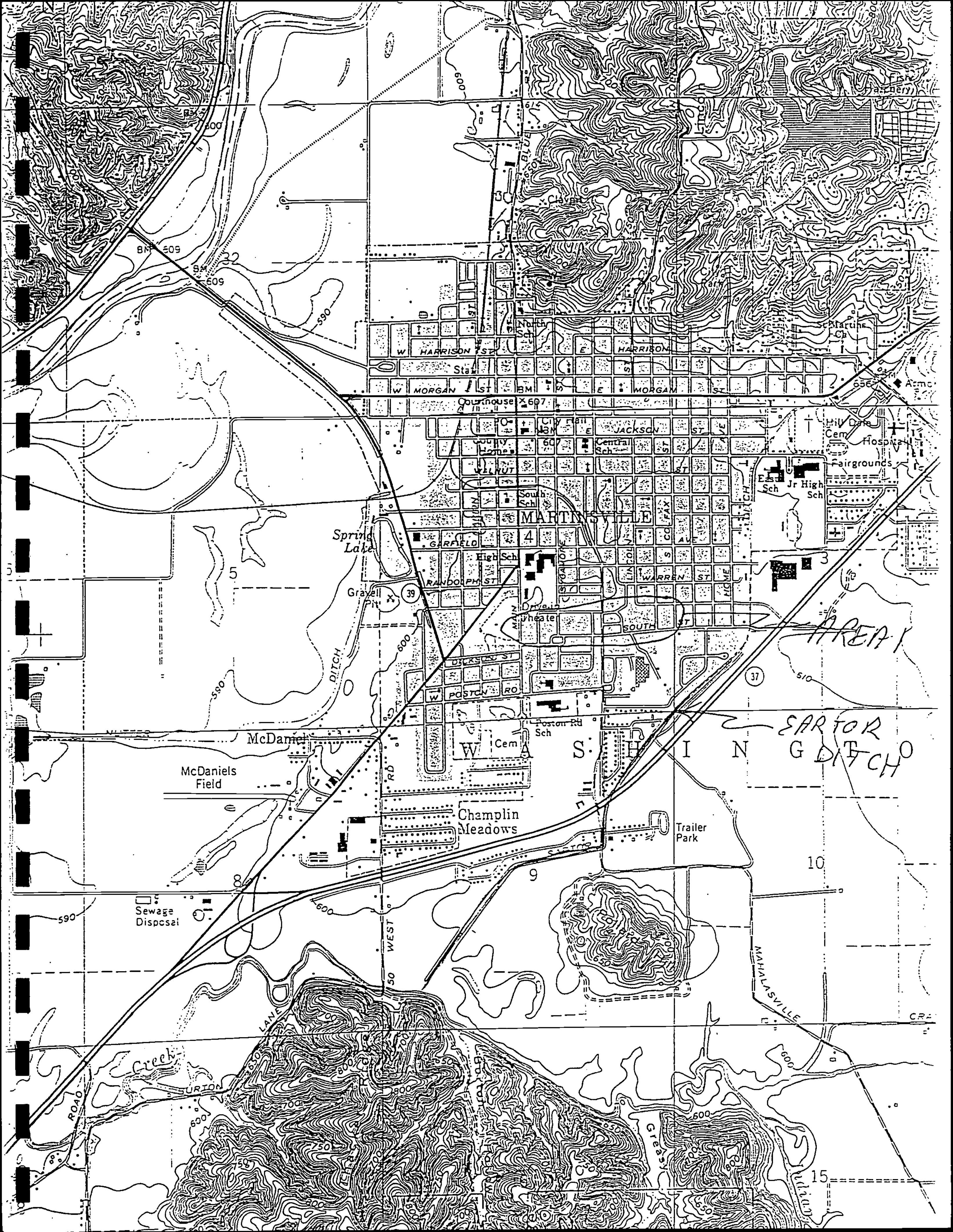
John W. Kilmer
Senior Engineer

6330 E. 75th St., Suite 300
Indianapolis, IN 46250
Phone (317) 578-4233
Fax (317) 578-4250

733 Princeton St.
Elkhart, IN 46516
Phone (219) 522-1019
Fax (219) 522-0374

149 W. Main St.
New Albany, IN 47150
Phone (812) 944-3520
Fax (812) 944-3557

(800) 291-1019



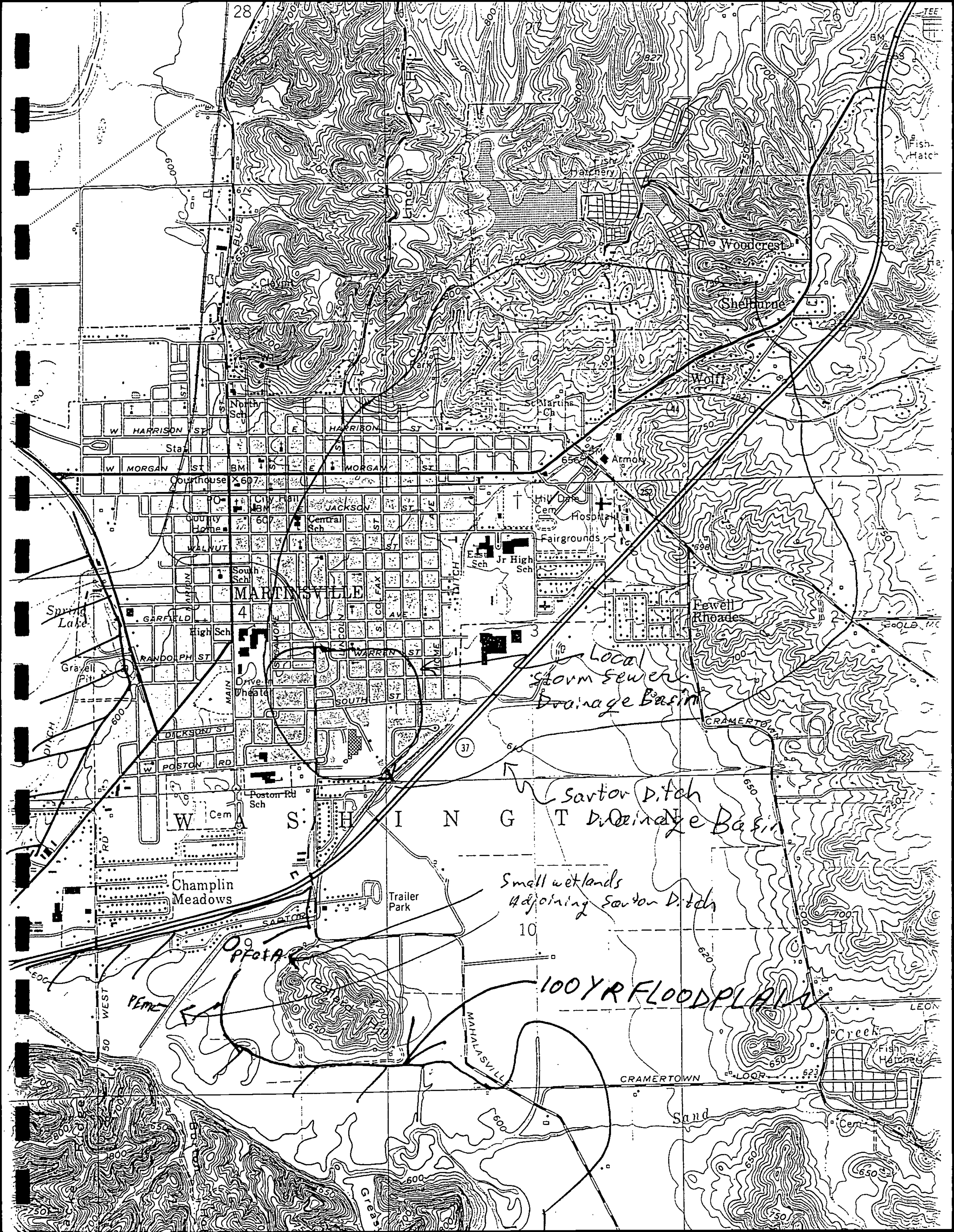
MARTINSVILLE
W HARRISON ST
E HARRISON ST
W MORGAN ST
E MORGAN ST
Courthouse
City Hall
JACKSON ST
Central Sch
County Home
North Sch
South Sch
High Sch
Spring Lake
GARFIELD
RANDOLPH ST
WARREN ST
Gravel Pit
Drive-in Theater
SOUTH ST
W POSTON RD
Poston Rd Sch
Cem
McDaniel
McDaniels Field
Champlin Meadows
Trailer Park
Sewage Disposal
Hill Dale Cem
Hospital
Fairgrounds
East Sch
Jr High Sch
St Martins Ch
Fish Hatchery
Armc
W A S H I N G T O
MAHALASVILLE
WEST
ROAD
Creek
AREA I
SARTOR DITCH

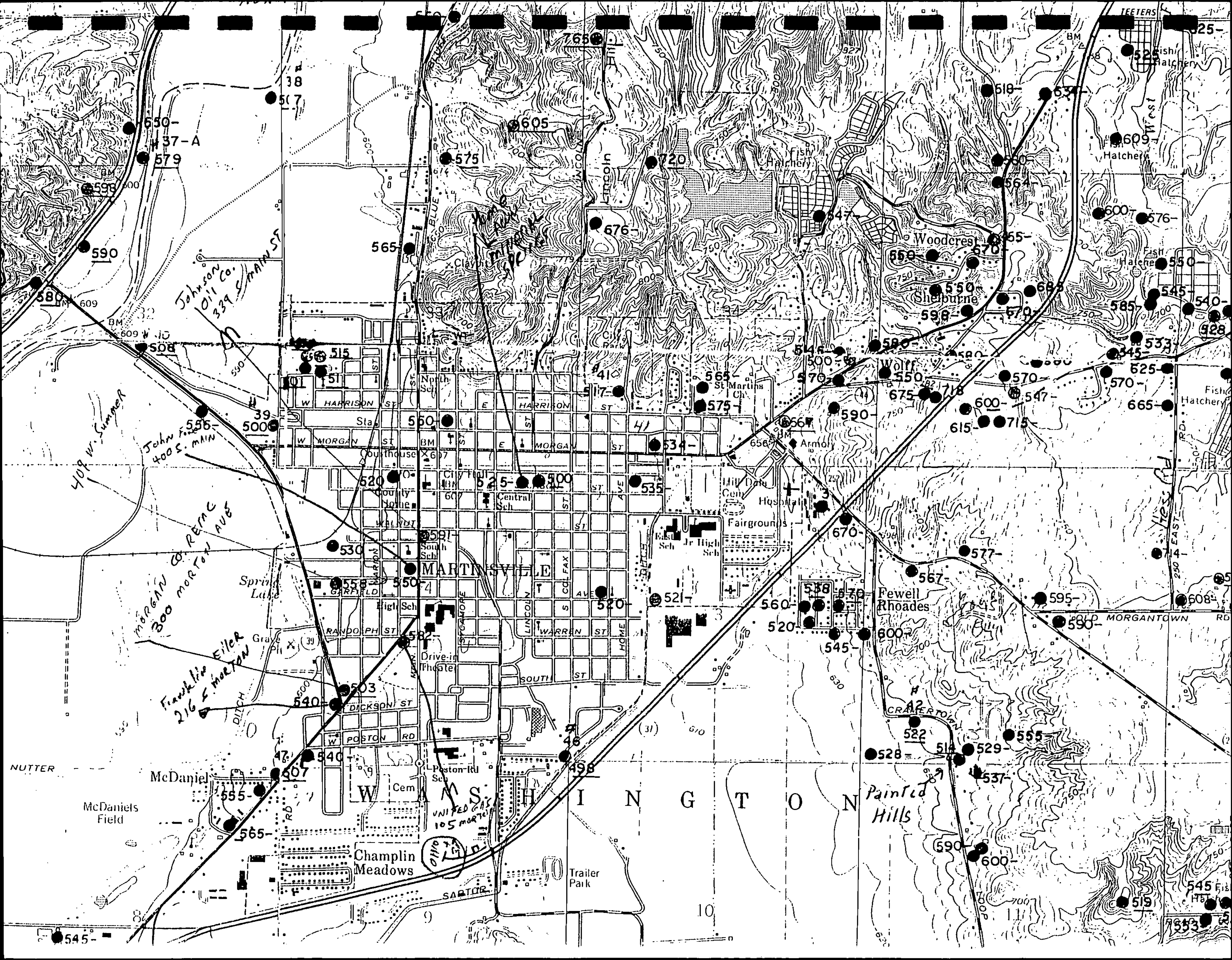
FROM "National Wetlands Inventory Map"
US Fish and Wildlife Service

Area 1 – ½ acre, PFO1A (Lacustrine, Forested, Broadleaf, Temporarily Flooded,,

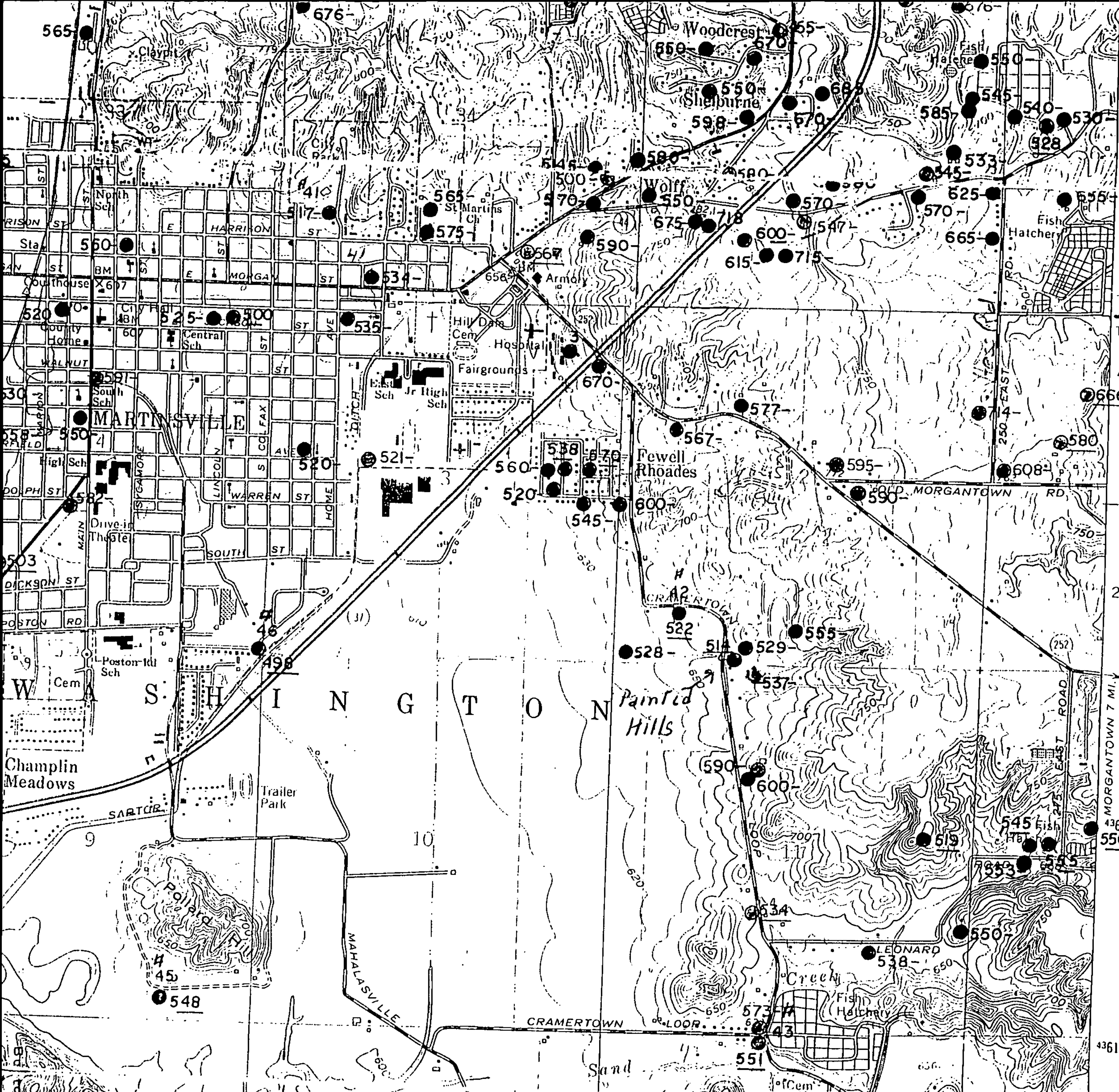
Area 2 – 1/10 acrea, PEMC (Lacustrine, Emergent, Seasonally Flooded)

Indian Creek – R2UBH (Riverine, Lower Perennial, Unconsolidated Bottom, Permanently Flooded)


MARTINSVILLE
W A S H I N G T O N
Woodcrest
Shelburne
Wolff
Fewell
Rhoades
Champlin Meadows
Trailer Park
Fish Hatchery
Courthouse
City Hall
Central Sch
County Home
North Sch
South Sch
High Sch
Drive-in Theater
Poston Rd Sch
East Sch
Jr High Sch
Fairgrounds
Hospital
Hill Dale Cem
Armory
St Martins Ch
Spring Lake
Gravel Pit
W HARRISON ST
E HARRISON ST
W MORGAN ST
E MORGAN ST
JACKSON ST
WALNUT ST
GARFIELD AVE
RANDOLPH ST
WARREN ST
SOUTH ST
DICKSON ST
W POSTON RD
CRAMERTOWN
MAHALASVILLE
SARTOR
Sand
Creek
Local Storm Sewer Drainage Basin
Sartor Ditch Drainage Basin
Small wetlands Adjoining Sartor Ditch
100YR FLOODPLAIN
PFOtA
PEMC



MARTINSVILLE
WASHINGTON
Johnson Oil Co. 339 S MAIN ST
409 W. Summer
John Fox 400 S. MAIN
MORGAN CO. REMC 300 MORTON AVE
Franklin Eiler 216 S MORTON
UNITED GAS 105 MORTON
Painted Hills
Woodcrest
Shelburne
Wolff
Fewell
Rhoades
Lincoln
Fish Hatchery
Courthouse
City Hall
County Home
Central Sch
South Sch
North Sch
High Sch
Drive-in Theatre
Poston Rd Sch
Cem
Champlin Meadows
Trailer Park
Fairgrounds
Jr High Sch
East Sch
Hospital
Armory
St Martins Ch
City Park
Spring Lake
McDaniel
McDaniels Field
NUTTER
SARTOR
MORGANTOWN RD
CRAMERTOWN
TEETERS
HARRISON ST
MORGAN ST
WALNUT
GARFIELD
RANDOLPH ST
DICKSON ST
POSTON RD
SYCAMORE
LINCOLN
COLFAX
WARREN ST
SOUTH ST
HOME AVE
BLUE
250 EAST


MARTINSVILLE
WASHINGTON
Woodcrest
Shelburne
Wolff
Claypit
City Park
North Sch
Courthouse
County Home
Central Sch
South Sch
High Sch
Drive-in Theatre
Poston Rd Sch
Champlin Meadows
Trailer Park
St Martins Ch
Armory
Hill Dale Cem
Hospital
Fairgrounds
East Sch
Jr High Sch
Fewell Rhoades
Painted Hills
Fish Hatchery
OLD MORGANTOWN RD
MORGANTOWN 7 MI.
CRAMERTOWN LOOP
MAHALASVILLE
SARTOR
LEONARD
Creek
Sand
12 N
11 N
3762 IV NE (COPE)

S

WATER WELL RECORD

State Form 35680R2

Mail completed record within 30 days to:
DIVISION OF WATER
INDIANA DEPARTMENT OF NATURAL RESOURCES
2475 DIRECTORS ROW
INDIANAPOLIS, INDIANA 46241
PHONE (317) 232-4160

WELL LOCATION (Fill in completely)

County where drilled: Morgan

Civil Township: Washington

Driving directions to the well location (Include county road names, numbers, subdivisions, lot number with consideration to intersecting roads and trip origination) There is space for a map on reverse side.

In Martinsville
300 Morton Ave.

OWNER — CONTRACTOR

Well owner: Morgan County REMC

Address: 300 Morton Ave. Martinsville, IN

Building contractor: —

Address: —

Drilling contractor: Joseph Huser Services, Inc.

Address: 5728 S. Emerson Ave. Indpls.

Equipment operator: JOE HUSER, SHAWN COREY, KEVIN MCKEAND

Completion date: 6/88

CONSTRUCTION DETAILS

Type of well: ☒ Drilled ☐ Gravel pack ☐ Driven ☐ Other

Use of well: ☐ Home ☐ Industry ☐ Test ☐ Irrigation ☐ Public supply ☐ Stock ☒ Other (specify) geothermal

Method of drilling: ☐ Cable tool ☒ Rotary ☐ Jet ☐ Rev. rotary ☐ Bucket rig

Casing length ____ feet Diameter ____ inches

Screen length ____ feet Diameter ____ inches

Screen slot size ____ Total depth ____

Depth of pump setting

Type of pump: ☐ Submersible ☐ Shallow-well jet ☐ Deep-well jet ☐ Other (specify) ______

WELL CAPACITY TEST

(Check one) ☐ Bailing ☐ Pumping

Test rate ______ gpm ______ hrs Drawdown ____ feet

Static level (depth to water) ____ feet

Water quality (clear, cloudy, odor, etc.)

Geothermal wells - all similar

WELL LOG

Formations: type of material	From	To
TOPSOIL / CLAY	0 ft.	11 ft.
CLAY, SAND, GRAVEL	11	98
GREY SHALE, SOFT	98	175

C

all holes pressure grouted with bentonite grout

(Additional space for Well Log on reverse side)

Signed: Joseph B Huser

Date: 10/7/88

~~Bedrock MC 503~~

FOR ADMINISTRATIVE USE ONLY
(Well driller does not fill out) 01-01 15153

County Morgan	Twp. 11N	Rge. 1E	NE ¼ SW ¼ SW ¼	Sec. 4
Topo map Martinsville 7½	Ft. W of EL	Ground elevation 601 ft		Subdivision name
Field located By EL Date 5-24-93	1300 Ft. N of SL	Depth to bedrock 98 ft		Lot no.
Courthouse location By Date	1100 Ft. E of WL	Bedrock elevation 503 ft		~~4362900N~~ ~~548810E~~
Location accepted w/o verification by	Ft. S of NL	Aquifer elevation		

WELL LOG
(Continued from front side)

Formations: type of material	From ft	To ft
well verified by		
REMC employee		
location: wells covered		
over in grass/lot south		
of building		

SKETCH SHOWING LOCATION
Locate with reference to highways, intersecting county roads, and distinctive landmarks.

N

W

E

S

~~(MC503)~~ •C

UTM NORTH 4362900
UTM EAST 548810
**COMMENTS MC 503

~~601~~
~~98~~
~~503 BRel~~

DIVISION OF WATER RESOURCES
INDIANA DEPARTMENT OF CONSERVATION
311 WEST WASHINGTON STREET
INDIANAPOLIS, INDIANA

S

WATER WELL RECORD

INFORMATION ON WELL LOCATION

County in which well was drilled: Morgan Civil Township: Washington

Congressional township: ______ Range: ______ Number of section: ______
(Fill in as completely as possible)

Describe in your own words the well location with respect to nearby towns, roads, streets or distinctive landmarks: 1/4 Mile South west of jct 39 and 37 highway at Dairy Queen

Name of owner: Franklin Eiler Address: 216 S Marion St Martinsville

Name of Well Drilling Contractor: Paul Amos

Address: Martinsville Ind

Name of Drilling Equipment Operator: Paul Amos

INFORMATION ON THE WELL

Completed depth of well: 65 ft. Date well was completed: 3-4-61

Diameter of outside casing or drive pipe: 4" od Length: 62'

Diameter of inside casing or liner: ______ Length: ______

Diameter of Screen: ~~4" od~~ 3.5 Length: ~~5' 3~~ 5.25 Slot size: # 6 Strip

Type of Well: Drilled ☑ Gravel Pack ☐ Driven ☐ Other ______

Use of Well: For home ☐ For industry ☐ For public supply ☐ Stock ☐

Method of Drilling: Cable Tools ☒ Rotary ☐ Rev. Rotary ☐ Jet ☐ Driven ☐

Static water level in completed well (Distance from ground to water level) 16' ft.

Bailer Test: Hours tested 1 Rate ____ g.p.m. Drawdown ____ ft. (Difference between static level and water level at end of test)

Pumping Test: Hours tested 3 Rate 3000 # g.p.m. Drawdown — ft.

Signature Paul Amos

Date 3-4-61

FOR WELL LOG SPACE USE REVERSE SIDE OF THIS SHEET

[redacted] (Well Driller does not fill out)

COUNTY: MORGAN

TWP. 11N RGE. 1E SW 1/4 SW 1/4 SW 1/4 SEC. 34

200'S

Topo. Map: MARTINSVILLE

Loc. accepted w/o verification Yes ✓ No

El. of grnd. surface at well: 635

Courthouse Loc. By Date

Depth to bedrock:

Field Located By [illegible] Date 3-22-61

Well Log processed by: [illegible]

Placed in Master Well Log File Date

WATER WELL LOG

FORMATIONS (Color, type of material, hardness, etc.)	From	To
Sand and Clay	0	18
Clay Sand gravel	18	30
Fine Sand and little gravel	30	63
gravel	60	65

FEET W OF EL

FEET N OF SL 200

FEET E OF WL 450

FEET S OF NL

BEDROCK ELEV

UTM NORTH 4362137

UTM EAST 548605

SUBDIVISION

LOT #

**COMMENTS MC540

REMARKS:

INSTRUCTIONS

This Water Well Record form is designed to record the most essential data concerning a water well. We request that you be as accurate as possible in recording this information as it may be of great assistance in the planning and development of new water supplies.

An accurate location of the well is equally as important as an accurate well log. Please include all information possible in the space provided for well location.

As specified in Chapter 6 of the Acts of 1959, a copy of this report must be submitted within thirty days after the completion of a well to the Division of Water Resources, Indiana Department of Conservation, 311 West Washington Street, Indianapolis, Indiana.

Martinsville
~~Test for #1 Well~~

S

DIVISION OF WATER RESOURCES
INDIANA DEPARTMENT OF CONSERVATION
609 STATE OFFICE BUILDING
INDIANAPOLIS, INDIANA 46209
MElrose 3-6757

WATER WELL RECORD

INFORMATION ON WELL LOCATION

County in which well was drilled: Morgan Civil Township: Washington

Congressional township: 11N Range: 1E Number of section: 4

(Fill in as completely as possible)

Describe in your own words the well location with respect to nearby towns, roads, streets or distinctive landmarks: South Mulberry St. by tile building on South side of R R tracks, west side of st.

test for #1 drilled well

Name of owner: Martinsville W.W. Address: Martinsville

Name of Well Drilling Contractor: Layne Northern

Address:

Name of Drilling Equipment Operator: Poole

INFORMATION ON THE WELL

Completed depth of well: 100 ft. Date well was completed:

Diameter of outside casing or drive pipe: Length:

Diameter of inside casing or liner: Length:

Diameter of Screen: Length: Slot size:

Type of Well: Drilled ☒ Gravel Pack ☐ Driven ☐ Other

Use of Well: For home ☐ For industry ☐ For public supply ☒ test Stock ☐

Method of Drilling: Cable Tools ☐ Rotary ☐ Rev. Rotary ☐ Jet ☐ Driven ☐

Static water level in completed well (Distance from ground to water level) ft.

Bailer Test: Hours tested Rate g.p.m. Drawdown ft. (Difference between static level and water level at end of test)

Pumping Test: Hours tested Rate g.p.m. Drawdown ft.

~~Rated capacity 1400 gpm Pump.~~

Signature Ferris - no date - no source

Date Breckenridge engr

FOR WELL LOG SPACE USE REVERSE SIDE OF THIS SHEET 11-5-64

WATER WELL LOG

FORMATIONS (Color, type of material, hardness, etc.)	From	To
hard clay	0	10
gravel	10	15
sand, coarse	15	20
sand & gravel	20	47
gravel, coarse, some large stones	47	50
clay, gravelly, hardpan	50	53
gravel	53	60
clay, hard	60	63
gravel, clean, good	63	73
sand clean good	73	78
sand clean good & gravel	78	98
clay, gravelly	98	100
✓ shale ~~@ 100'~~	100	

REMARKS:

UTM NORTH 4363684
UTM EAST 549390
*COMMENTS MC

(TEST) •C

FOR ADMINISTRATIVE USE ONLY
(Well driller does not fill out)

COUNTY: Morgan TWP 11N RGE 1E NE ¼ SE ¼ NW ¼ SEC 14
Topo Map: Martinsville ~~NE~~
Well log ~~classified~~ copied By U Date 3-64
Courthouse located By ___ Date ___
Field located By U Date 4-64
Acc, w/o verification By ___ Date ___

___ Ft W of EL, Ground elevation 605
___ Ft N of SL, Depth to bedrock 100
2000 Ft E of WL, Bedrock elevation 505
1400 Ft S of NL, Aquifer elevation ___

01-01 207400

INSTRUCTIONS

This Water Well Record form is designed to record the most essential data concerning a water well. We request that you be as accurate as possible in recording this information as it may be of great assistance in the planning and development of new water supplies.

An accurate location of the well is equally as important as an accurate well log. Please include all information possible in the space provided for well location.

As specified in Chapter 6 of the Acts of 1959, a copy of this report must be submitted within thirty days after the completion of a well to the Division of Water Resources, Indiana Department of Conservation.

Martinsville #
2 Drilled

S

DIVISION OF WATER RESOURCES
INDIANA DEPARTMENT OF CONSERVATION
609 STATE OFFICE BUILDING
INDIANAPOLIS, INDIANA 46209
MElrose 3-6757

WATER WELL RECORD

INFORMATION ON WELL LOCATION

County in which well was drilled: Morgan Civil Township: Washington

Congressional township: 11 N Range: 1 E Number of section: 4

(Fill in as completely as possible)

Describe in your own words the well location with respect to nearby towns, roads, streets or distinctive landmarks: South Mulberry St. north side of tracks in back of W W shop. 75 from Plant 125 from center of road.

Well has 2 pumps

Name of owner: Martinsville W.W. #2 Drilled Address: Martinsville

Name of Well Drilling Contractor: Layne Northern

Address: Indianapolis

Name of Drilling Equipment Operator: Pool

INFORMATION ON THE WELL

Completed depth of well: 98 ft. Date well was completed: 7-10 1940

Diameter of outside casing or drive pipe: 46 - 26 in Length:

Diameter of inside casing or liner: Length:

Diameter of Screen: 26 in Length: 25 ft. Slot size: #6 & #4 slot

Type of Well: Drilled ☒ Gravel Pack ☐ Driven ☐ Other

Use of Well: For home ☐ For industry ☐ For public supply ☒ Stock ☐

Method of Drilling: Cable Tools ☐ Rotary ☐ Rev. Rotary ☐ Jet ☐ Driven ☐

Static water level in completed well (Distance from ground to water level) 20 lsd ft.

Bailer Test: Hours tested ____ Rate ____ g.p.m. Drawdown ____ ft. (Difference between static level and water level at end of test)

7-10-40

Pumping Test: Hours tested 9 Rate 2000 g.p.m. ~~Drawdown~~ dd 17 ft.

(37 ft level)

~~Rated Capacity of pump 1400 gpm~~

(Ferris) 1944

Signature J. G. Ferris USGS - 2-14-44 citing E.W. Canatsey as source

Date Breckenridge - Engr.

FOR WELL LOG SPACE USE REVERSE SIDE OF THIS SHEET 11-5-64

WATER WELL LOG

FORMATIONS (Color, type of material, hardness, etc.)	From	To
Top soil	0	4
Sand & Gravel	4	57
Boulders	57	60
Sand & gravel	88	88
Coarse Sand & Gravel	98	98
Clay	98	

REMARKS: ~~75 Hp motor; 3 stage;~~
~~1400 Capacity at 134 lb. head~~

FOR ADMINISTRATIVE USE ONLY 01-01 207350
(Well driller does not fill out)

COUNTY: Morgan TWP 11N RGE 1E SE NE NW SEC 4
Topo Map: Martinsville 7½
Well log ~~classified~~ copied By 4 Date 5-64
Courthouse located By ___ Date ___
Field located By 24 Date 4-64
Acc. w/o verification By ___ Date ___

___ Ft W of EL, Ground elevation 605
___ Ft N of SL, Depth to bedrock ___
2000 Ft E of WL, Bedrock elevation ___
1100 Ft S of NL, Aquifer elevation ___

(CHEMICAL ANALYSIS) •C

UTM NORTH 4363762
UTM EAST 549073
**COMMENTS MC

Martinsville
#2 Drilled

INSTRUCTIONS

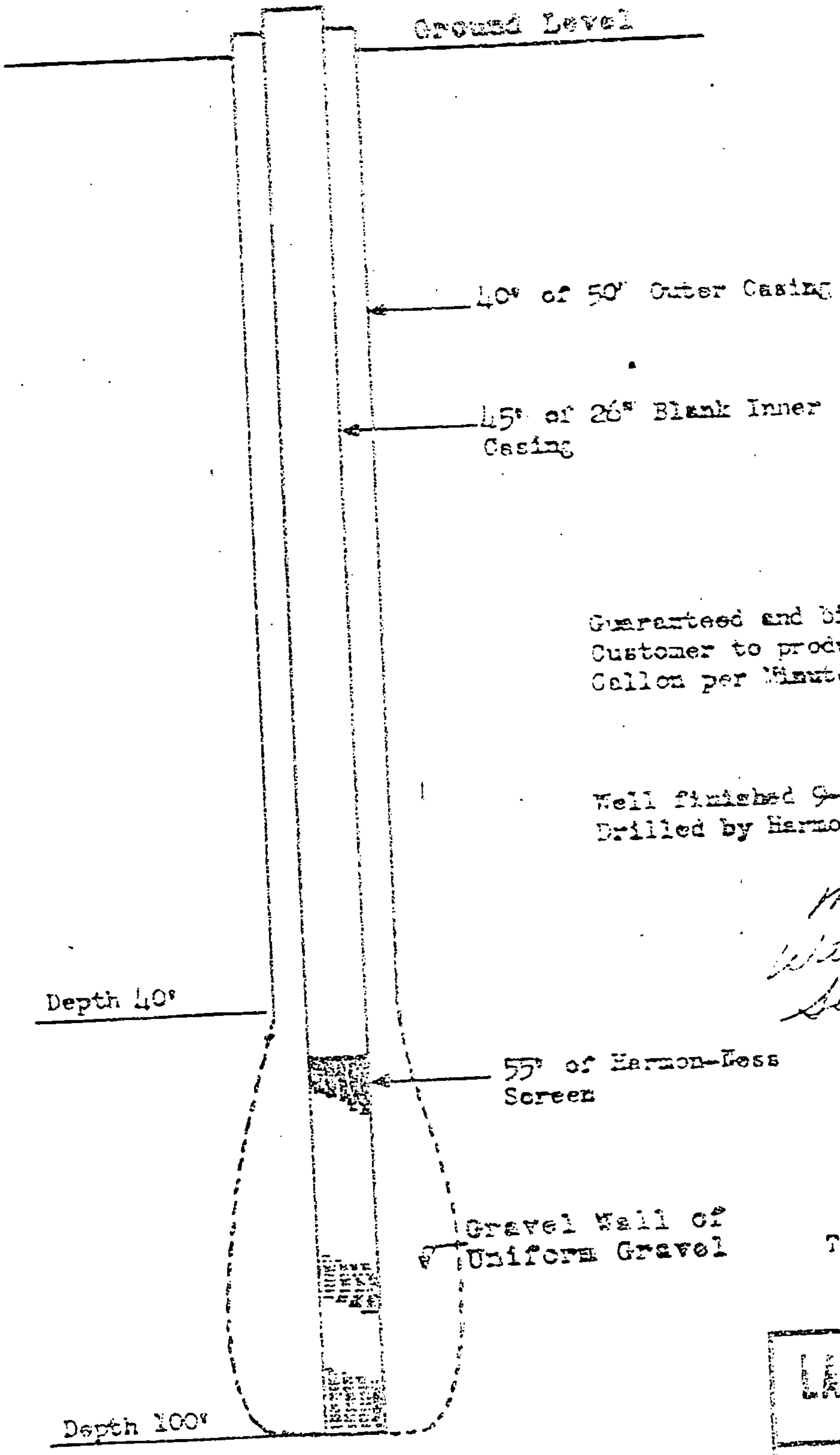
This Water Well Record form is designed to record the most essential data concerning a water well. We request that you be as accurate as possible in recording this information as it may be of great assistance in the planning and development of new water supplies.

An accurate location of the well is equally as important as an accurate well log. Please include all information possible in the space provided for well location.

As specified in Chapter 6 of the Acts of 1959, a copy of this report must be submitted within thirty days after the completion of a well to the Division of Water Resources, Indiana Department of Conservation.

Not Drawn To Scale

S



Guaranteed and billed to Customer to produce 700 Gallon per Minute.

Well finished 9-8-25
Drilled by Harmon-Ness Company

Morgan Co.
Washington twp
Sec. T N R E

All depths measured from Ground Level

TOWN OF MARTINSVILLE, INDIANA
Martinsville, Indiana

LAYNE NORTHERN CO. INC. MISHAWAKA, INDIANA	
DRAWN BY	DRAWING NO.
APPROVED BY	
DATE 1-10-40	

GLINNON & KERN, CHI.

DIVISION OF WATER RESOURCES
INDIANA DEPARTMENT OF CONSERVATION
311 WEST WASHINGTON STREET
INDIANAPOLIS, INDIANA

S

WATER WELL RECORD

INFORMATION ON WELL LOCATION

County in which well was drilled: Morgan Civil Township: Washington

Congressional township: ________ Range: ________ Number of section: ________

(Fill in as completely as possible)

Describe in your own words the well location with respect to nearby towns, roads, streets or distinctive landmarks: drilled for south side shoping center at south west edge of martinsville junctions of 39 and 37 Highway's

Name of owner: Sam Kagan Address: south side shoping center

Name of Well Drilling Contractor: Paul Amos

Address: R.R. 2 Martinsville Ind

Name of Drilling Equipment Operator: Paul Amos

INFORMATION ON THE WELL

Completed depth of well: 67 ft. Date well was completed: Feb 11-64

Diameter of outside casing or drive pipe: 6 dl Length: 61'

Diameter of inside casing or liner: ________ Length: ________

Diameter of Screen: ~~6 od~~ 5.75 Length: 6' Slot size: 50

Type of Well: Drilled ☐ Gravel Pack ☐ Driven ☐ Other Shoping center and laundry

Use of Well: For home ☐ For industry ☒ For public supply ☐ Stock ☐

Method of Drilling: Cable Tools ☒ Rotary ☐ Rev. Rotary ☐ Jet ☐ Driven ☐

Static water level in completed well (Distance from ground to water level) 16' ft.

Bailer Test: Hours tested ____ Rate ____ g.p.m. Drawdown ____ ft. (Difference between static level and water level at end of test)

Pumping Test: Hours tested 4 Rate 82 g.p.m. Drawdown — ft.

Signature Paul Amos

Date Feb. 11 - 64

FOR WELL LOG SPACE USE REVERSE SIDE OF THIS SHEET

WATER WELL LOG

FORMATIONS (Color, type of material, hardness, etc.)	From	To
Clay (sandy)	0	20'
gravel sand	20	45
Sand and Gravel	45	67
(Water from 35")		

REMARKS:

(Well Driller does not fill out)

COUNTY: MORGAN TWP. 11N RGE. 1E NE 1/4 SW 1/4 SW 1/4 SEC. 4

Topo. Map: MARTINSVILLE 7X Loc. accepted w/o verification Yes __ No __

El. of grnd. surface at well: 605 Courthouse Loc. By __ Date __

Depth to bedrock: __ Field Located By JMK Date 5-22-61

Well Log processed by: DB Placed in Master Well Log File Date __

FEET W OF EL __
FEET N OF SL 1000
FEET E OF WL 1000
FEET S OF NL __
BEDROCK ELEV __
UTM NORTH 4362811
UTM EAST 518769
SUBDIVISION __ LOT # __
COMMENTS MC 540

INSTRUCTIONS

This Water Well Record form is designed to record the most essential data concerning a water well. We request that you be as accurate as possible in recording this information as it may be of great assistance in the planning and development of new water supplies.

An accurate location of the well is equally as important as an accurate well log. Please include all information possible in the space provided for well location.

As specified in Chapter 6 of the Acts of 1959, a copy of this report must be submitted within thirty days after the completion of a well to the Division of Water Resources, Indiana Department of Conservation, 311 West Washington Street, Indianapolis, Indiana.

DIVISION OF WATER
DEPARTMENT OF NATURAL RESOURCES, STATE OF INDIANA
STATE OFFICE BUILDING
INDIANAPOLIS, INDIANA 46204
Telephone 633-5267 Area Code 317

MCP #

WATER WELL RECORD

WELL LOCATION

(Fill in completely - Refer to instruction sheet)

County in which well was drilled Morgan Civil Township

Driving directions to the well location: Include County Road Names, Numbers, Subdivision Name, lot number, distinctive landmarks, etc.

NAME OF WELL OWNER and/or BUILDING CONTRACTOR

Well Owner Address U.S. GEOLOGICAL SURVEY 1819 NORTH MERIDIAN STREET INDIANAPOLIS, IND. 46202

Building Contractor Address

Name of Well Drilling Contractor:

Address

Name of Drilling Equipment Operator: Watson / Dawkins

WELL INFORMATION

Depth of well: 24 Date well was completed: 7/10/79

Diameter of casing or drive pipe: 2" Galv Total Length: 21

Diameter of liner (if used): Total Length:

Diameter of Screen: 1 1/4" Length: 3' Slot Size: 40

Type of Well: Observation Drilled ☒ Gravel Pack ☐ Driven ☐ Other

Use of Well: For Home ☐ For Industry ☐ For Public Supply ☐ Stock ☐

Auger

Method of Drilling: Cable Tools ☐ Rotary ☐ Rev. Rotary ☐ Jet ☐ Bucket Rig ☐

Static water level in completed well (Distance from ground to water level) 6.36 feet

Bailer Test: Hours Tested Rate g.p.m. Drawdown ft.

Pumping Test: Hours Tested Rate g.p.m. Drawdown ft.

(Drawdown is the difference between static level and water level at end of test)

Signature

Date

FOR WELL LOG SPACE USE REVERSE SIDE OF THIS SHEET

WATER WELL LOG

FORMATIONS (Color, type of material, hardness, etc.)	From	To
BRN CLAY W/ SOME SAND	0	5
BRN SAND & CLAY	5	8
GR. SAND W/ SOME CLAY	8	10
GR. SAND W/ TR. SILT WATER 3' MED. SAND	10	70
HARDPAN	70	72
MED SAND	72	80
MED SAND W/ TR. GRAVEL	80	97
WEATHERED BEDROCK	97	100
SET ROCK	*100	

FOR ADMINISTRATIVE USE ONLY
(Well driller does not fill out)

COUNTY MORGAN TWP. 11N RGE. 1E SE ¼ SE ¼ SE SEC 4 Subdivision Name

Topo Map MARTINSVILLE Ft W of EL. Ground Elevation 598.67

Field Located By USGS Date Ft N of SL. Depth to bedrock 100

Courthouse Location By Date Ft E of WL. Bedrock elevation 498

Location accepted w/o verification by Ft S of NL. Aquifer elevation Lot Number

(MC)·C

UTM NORTH
UTM EAST
**COMMENTS MO

DIVISION OF WATER RESOURCES
INDIANA DEPARTMENT OF CONSERVATION
609 STATE OFFICE BUILDING
S INDIANAPOLIS, INDIANA 46209
MElrose 3-6757

WATER WELL RECORD

INFORMATION ON WELL LOCATION

County in which well was drilled: Morgan Civil Township: ______

Congressional township: ______ Range: ______ Number of section: ______

(Fill in as completely as possible)

Describe in your own words the well location with respect to nearby towns, roads, streets or distinctive landmarks: Martinsville Corner of Jackson and Lincoln ~~[illegible]~~

S of Jackson 50 ft.

Name of owner: Home Lawn Mineral Springs Address: Martinsville

Name of Well Drilling Contractor: Loy and Sons

Address: ______

Name of Drilling Equipment Operator: Kinty

INFORMATION ON THE WELL

Completed depth of well: 85 ft. Date well was completed: 12/9/54

Diameter of outside casing or drive pipe: 10" Length: ______

Diameter of inside casing or liner: ______ Length: ______

Diameter of Screen: 10 Length: 10 Slot size: #40

Type of Well: Drilled ☑ Gravel Pack ☐ Driven ☐ Other ______

Use of Well: For home ☐ For industry ☐ For public supply ☐ Stock ☐

Method of Drilling: Cable Tools ☑ Rotary ☐ Rev. Rotary ☐ Jet ☐ Driven ☐

Static water level in completed well (Distance from ground to water level) 19 ft.

Bailer Test: Hours tested ______ Rate ______ g.p.m. Drawdown ______ ft. (Difference between static level and water level at end of test)

Pumping Test: Hours tested ______ Rate 287 g.p.m. Drawdown 29 ft.

Signature ______

Date ______

FOR WELL LOG SPACE USE REVERSE SIDE OF THIS SHEET

WATER WELL LOG

FORMATIONS (Color, type of material, hardness, etc.)	From	To
yellow sand	0	31
brown sticky clay	31	42
fine brown sand	42	63
fine muddy sand	63	74
coarse gravel	74	83
sand and gravel	83	85

REMARKS:

UTM NORTH 4364056
UTM EAST 549664
**COMMENTS MC

(CHEMICAL ANALYSIS) •C

FOR ADMINISTRATIVE USE ONLY
(Well driller does not fill out)

COUNTY: Morgan TWP 12 RGE 1E NW 1/4 NE 1/4 SE 1/4 SEC. 4

Topo Map: Martinsville NE

1150 Ft W of EL, Ground elevation 610

Ft N of SL, Depth to bedrock

Ft E of WL, Bedrock elevation

220 Ft S of NL, Aquifer elevation

Well log classified By ____ Date ____

Courthouse located By ____ Date ____

Field located By ____ Date ____

Acc. w/o verification By ____ Date ____

INSTRUCTIONS

This Water Well Record form is designed to record the most essential data concerning a water well. We request that you be as accurate as possible in recording this information as it may be of great assistance in the planning and development of new water supplies.

An accurate location of the well is equally as important as an accurate well log. Please include all information possible in the space provided for well location.

As specified in Chapter 6 of the Acts of 1959, a copy of this report must be submitted within thirty days after the completion of a well to the Division of Water Resources, Indiana Department of Conservation.

DIVISION OF WATER RESOURCES
INDIANA DEPARTMENT OF CONSERVATION
311 WEST WASHINGTON STREET
INDIANAPOLIS, INDIANA

S

WATER WELL RECORD

INFORMATION ON WELL LOCATION

County in which well was drilled: Morgan Civil Township: ______

Congressional township: ______ Range: ______ Number of section: ______

(Fill in as completely as possible)

Describe in your own words the well location with respect to nearby towns, roads, streets or distinctive landmarks: 400 South Main Street, Martinsville, Indiana

Name of owner: John Fewell Address: 400 S. Main St., Mart., Ind.

Name of Well Drilling Contractor: Paul Amos

Address: R. R. 2 , Box 7, Martinsville, Indiana, 46151

Name of Drilling Equipment Operator: Ed Randolph

INFORMATION ON THE WELL

Completed depth of well: 51 ft. Date well was completed: July 16, 1964

Diameter of outside casing or drive pipe: 5 inch Length: 46 ft.

Diameter of inside casing or liner: ______ Length: ______

Diameter of Screen: Cook No.50 slot ~~Length~~: ~~7' 6"~~ 7.5 long Slot size: ______

Type of Well: Drilled [X] Gravel Pack [ ] Driven [ ] Other ______

Use of Well: For home [ ] For industry [ ] For public supply [ ] Stock [ ]
Used for Laundry

Method of Drilling: Cable Tools [X] Rotary [ ] Rev. Rotary [ ] Jet [ ] Driven [ ]

Static water level in completed well (Distance from ground to water level) 15 ft.

Bailer Test: Hours tested ______ Rate 20 g.p.m. Drawdown ______ ft. (Difference between static level and water level at end of test)

Pumping Test: Hours tested ______ Rate ______ g.p.m. Drawdown ______ ft.

Signature Paul Amos

Date ______

FOR WELL LOG SPACE USE REVERSE SIDE OF THIS SHEET

WATER WELL LOG

FORMATIONS (Color, type of material, hardness, etc.)	From	To
Muddy sand	0	16
Muddy sand and gravel	16	28
Sand and gravel	28	51

REMARKS:

COUNTY: Morgan TWP. 11N RGE. 1E NE 1/4 SE 1/4 NW 1/4 SEC. 4

(Well Driller does not fill out)

Topo. Map: Martinsville Loc. accepted w/o verification Yes ___ No ___

El. of grnd. surface at well: 602 Courthouse Loc. By ___ Date ___

Depth to bedrock: 51 Field Located By YMB Date 8/30/73

Well Log processed by: Dm 10/1/64 Placed in Master Well Log File Date ___

551

FEET W OF EL ___
FEET N OF SL ___
FEET E OF WL 2400
FEET S OF NL 2000
BEDROCK ELEV. ___
UTM NORTH 4363491
UTM EAST 547863
SUBDIVISION ___
LOT # ___
*COMMENTS MC 550

INSTRUCTIONS

This Water Well Record form is designed to record the most essential data concerning a water well. We request that you be as accurate as possible in recording this information as it may be of great assistance in the planning and development of new water supplies.

An accurate location of the well is equally as important as an accurate well log. Please include all information possible in the space provided for well location.

As specified in Chapter 6 of the Acts of 1959, a copy of this report must be submitted within thirty days after the completion of a well to the Division of Water Resources, Indiana Department of Conservation, 311 West Washington Street, Indianapolis, Indiana.

RECORD OF WATER WELL

State Form 35680 (R3 / 11-87)

S

Mail complete record within 30 days to:
INDIANA DEPARTMENT OF NATURAL RESOURCES
Division of Water
2475 Directors Row
Indianapolis, Indiana 46241
Telephone number (317) 232-4160

(Fill in completely)

WELL LOCATION

County where drilled	Civil township	Township	Range	Section
Morgan	Martinsville			

Driving directions to the well location (include county road names, number, subdivisions lot number with consideration to intersecting, road and trip origination there is space for a map on reverse side.

United Gas Sta.
105 Morten Ave.
Martinsville, Ind.

OWNER - CONTRACTOR

Name of well owner: United Gas Co.	Telephone Number: ( )
Address (Street and number, city, state): 105 Morten Ave, Martinsville	ZIP code
Name of building contractor: ASI Environmental Tech.	Telephone number: (317) 243-2137
Address (Street and number, city, state): P.O. Box 418253, Indianapolis, Ind.	ZIP code: 46241
Name of drilling contractor: Fox Drilling Inc.	Telephone number: (708) 773-4877
Address (Street and number, city, state): 500 Park Blvd. Suite 1212, Itasca, Ill.	ZIP code: 60143

Name of equipment operator	License number	Date of completion
Willie Holloman	460	5/9/90

CONSTRUCTION DETAILS

Use of well: ☐ Home ☐ Industry ☐ Test ☐ Irrigation ☐ Public supply ☐ Stock ☒ Other (specify): Monitor

Method of drilling: ☐ Rotary ☐ Rev. rotary ☐ Cable tool ☐ Jet ☐ Bucket rig ☒ Other H.S.A.

Casing length	Material	Diameter
10 feet	PVC	2 inches

Screen length	Material	Diameter
10 feet	PVC	2 inches

Screen slot size	Total depth of well
.010	20

Depth of pump setting:

Water quality (Clear, cloudy, odor, etc.):

Type of pump: ☐ Shallow-well jet ☐ Submersible ☐ Deep-well jet ☐ Other (specify): ______

WELL CAPACITY TEST

Check one: ☐ Air ☐ Bailing ☐ Pumping

Test rate ______ gpm ______ hrs.

Drawdown ______ feet

Static level (depth to water) ______ feet

WELL LOG

Formations: type of material	From (Feet)	To (Feet)
Clay + Sand	0'	20'

(Additional space for well log on reverse side)

GROUTING INFORMATION

Grout material	Depth of grout	Method of installation	Number of bags used
Cement w/5% Bentonite	From 8' To 0.5'	Treme. Pipe	2

WELL ABANDONMENT

Sealing material	Depth filled	Method of installation	Number of bags used
	From To		

I hereby swear or affirm, under the penalties for perjury that the information submitted herewith is to the best of my knowledge and belief, true, accurate and complete.

Signature of owner of authorized representative: [signature] Pres.

Date: 2/14/91

FOR ADMINISTRATIVE USE ONLY
(well driller does not fill out)

01-01 15152

County	Township	Range		Section
Morgan	11N	1E	NE ¼ NE ¼ SW	4

Topo map: Martinsville	Ft. W of EL	Ground elevation: 602 ft	Subdivision name
Field located By: E L Date: 5-24-93	2150 Ft. N of SL	Depth to bedrock	Lot number
Courthouse location By Date	2200 Ft. E of WL	Bedrock elevation	U.T.M. ~~4363165N~~
Location accepted w/o verification by	Ft. S of NL	Aquifer elevation: 582 ft	~~549130E~~

(continued from front side)

WELL LOG Formations: type of material	FROM Feet	TO Feet
well verified by	C	
employee		
location: NW of store		

SKETCH SHOWING LOCATION
(Locate with reference to highways, intersecting county roads and distinctive landmarks.)

N

W

E

S

There were 4 monitoring wells on this property. -
All others are photocopies

(~~MC~~ 582)

•C

UTM NORTH 4363165
UTM EAST 549130
**COMMENTS MC 582

~~602~~
~~20~~
582 aq el

RECORD OF WATER WELL

State Form 35680 (R3 / 11-87)

S

Mail complete record within 30 days to:
INDIANA DEPARTMENT OF NATURAL RESOURCES
Division of Water
2475 Directors Row
Indianapolis, Indiana 46241
Telephone number (317) 232-4160

(Fill in completely)

WELL LOCATION

County where drilled	Civil township	Township	Range	Section
MORGAN	WASHINGTON			

Driving directions to the well location (include county road names, number, subdivisions lot number with consideration to intersecting, road and trip origination there is space for a map on reverse side.

OWNER - CONTRACTOR

Name of well owner: JOHNSON OIL CO.	Telephone Number: ( )
Address (Street and number, city, state): 339 S. MAIN ST. MARTINSVILLE INDIANA	ZIP code
Name of building contractor	Telephone number: ( )
Address (Street and number, city, state)	ZIP code
Name of drilling contractor: AMERICAN ENVIRONMENTAL CORP.	Telephone number: ( )
Address (Street and number, city, state): 8465 GUION RD. SUITE G INDPLS IN	ZIP code

Name of equipment operator	License number	Date of completion
WM. SCOTT AHO	972	11/26/91

CONSTRUCTION DETAILS

Use of well:
☐ Home ☐ Industry ☐ Test ☐ Irrigation
☐ Public supply ☐ Stock ☒ Other (specify): MONITORING

Method of drilling:
☐ Rotary ☐ Rev. rotary
☐ Cable tool ☐ Jet ☐ Bucket rig ☐ Other

Casing length	Material	Diameter
4.9 feet	PVC	4 inches

Screen length	Material	Diameter
10 feet	PVC	4 inches

Screen slot size	Total depth of well
10	15.5'

Depth of pump setting	Water quality (Clear, cloudy, odor, etc.)

Type of pump: ☐ Shallow-well jet
☐ Submersible ☐ Deep-well jet ☐ Other (specify): ______

WELL LOG

Formations: type of material	From (Feet)	To (Feet)
CLAYEY SAND	1	7
SANDY SILT	7	13
GRAVEL & SANDS	13	

(Additional space for well log on reverse side)

WELL CAPACITY TEST

Check one: ☐ Air ☐ Bailing ☐ Pumping

Test rate ______ gpm ______ hrs.

Drawdown ______ feet

Static level (depth to water) ______ feet

GROUTING INFORMATION

Grout material	Depth of grout From To
Method of installation: HSA	Number of bags used

WELL ABANDONMENT

Sealing material	Depth filled From To
Method of installation	Number of bags used

I hereby swear or affirm, under the penalties for perjury that the information submitted herewith is to the best of my knowledge and belief, true, accurate and complete.

Signature of owner of authorized representative: Ann Dunn

Date: 12/27/91

FOR ADMINISTRATIVE USE ONLY
(well driller does not fill out)

01-01 15154

County Morgan	Township 11N	Range 1E	SW ¼ NW ¼ NE	Section 4
Topo map Martinsville	Ft. W of EL	Ground elevation ✗ 604 ft		Subdivision name
Field located By EL Date 5-24-93	Ft. N of SL	Depth to bedrock		Lot number
Courthouse location By Date	2500 Ft. E of WL	Bedrock elevation		U.T.M. ~~4363750N~~ ~~549220E~~
Location accepted w/o verification by	1250 Ft. S of NL	Aquifer elevation ✗ 591 ft		

(continued from front side)

WELL LOG Formations: type of material	FROM Feet	TO Feet
well verified by construction		
worker; wells were dug		
up and removed. (all wells removed) ✗		
new gas station		
being built. new wells drilled		
#15154, 15155, 15157		

SKETCH SHOWING LOCATION
(Locate with reference to highways, intersecting county roads and distinctive landmarks.)

N

W E

S

~~(MC 591)~~ C

UTM NORTH 4363750
UTM EAST 549220
**COMMENTS MC 591

~~604~~
~~13~~
~~591 ayel~~

DIVISION OF WATER
DEPARTMENT OF NATURAL RESOURCES, STATE OF INDIANA
STATE OFFICE BUILDING
INDIANAPOLIS, INDIANA 46204
Telephone 633-5267 Area Code 317

WATER WELL RECORD

WELL LOCATION

(Fill in completely - Refer to instruction sheet)

County in which well was drilled Morgan Civil Township Washington

Driving directions to the well location: Include County Road Names, Numbers, Subdivision Name, lot number, distinctive landmarks, etc.

Take 67 to Martinsville Junction 39, Turn left. Go across R.R. tracks. Turn left at Hook's Drugs. 1st. Street on right corner lot with rock garden.

NAME OF WELL OWNER and/or BUILDING CONTRACTOR

Well Owner Leroy Mathana Address 409 W. Sumner

Building Contractor ______ Address ______

Name of Well Drilling Contractor: Ed Randolph Well Drilling

Address P.O.Box 242 Paragon Indiana, 46166

Name of Drilling Equipment Operator: Ed Randolph

WELL INFORMATION

Depth of well: 40 Date well was completed: 3-14-89

Diameter of casing or drive pipe: 6" Total Length: 37 feet

Diameter of liner (if used): ______ Total Length: ______

Diameter of Screen: 5" Length: 4 feet Slot Size: 40/1006

Type of Well: Drilled [x] Gravel Pack [ ] Driven [ ] Other ______

Use of Well: For Home [x] For Industry [ ] For Public Supply [ ] Stock [ ]

Method of Drilling: Cable Tools [x] Rotary [ ] Rev. Rotary [ ] Jet [ ] Bucket Rig [ ]

Static water level in completed well (Distance from ground to water level) 11 feet

Bailer Test: Hours Tested 32 Rate 30 g.p.m. ______ Drawdown 10 ft.

Pumping Test: Hours Tested ______ Rate ______ g.p.m. ______ Drawdown ______ ft.

(Drawdown is the difference between static level and water level at end of test)

Signature Edmund B Randolph

Date 3-14-89

FOR WELL LOG SPACE USE REVERSE SIDE OF THIS SHEET

WATER WELL LOG

FORMATIONS (Color, type of material, hardness, etc.)	From	To
Topsoil	0	1
yellow clay	1	12
yellow sand fine	12	19
course sand	19	27
yellow sand gravel	27	40

well verified by owner
location east 15ft from house

FOR ADMINISTRATIVE USE ONLY
(Well driller does not fill out)

01-01 15157

COUNTY Morgan TWP. 11N RGE. 1E SE ¼ SW ¼ NW SEC 4 Subdivision Name

Topo Map Martinsville

Field Located By [illegible] Date 5-24-93

Courthouse Location By ____ Date ____

Location accepted w/o verification by ____

____ Ft W of EL.

____ Ft N of SL.

1000 Ft E of WL.

2000 Ft S of NL.

Ground Elevation 598 ft

Depth to bedrock ____

Bedrock elevation ____

Aquifer elevation 558

Lot Number ____

UTM NORTH	4363490
UTM EAST	548765
**COMMENTS	MC 558

598
-40
558

Farlow Environmental Engineers, Inc.
8645 Guion Road
Suite B
Indianapolis, IN 46268
Phone (317) 872-9600 Fax (317) 872-9616

Log of Boring A
(19' SE of MW-1)
Twigg Corp.
Martinsville, Ind.

Job Number: 7403

Elevation:

Driller: Haskett Drilling	**Drilling**	**Date**	**Time**
Drill Method: 3.25" Hollow Stem Auger	**Started**	8/08/94	10:47 AM
Sample Method: Split Spoon	**Finished**	8/08/94	11:00 AM

Borehole Diameter: 6" in. **Water Level:** N/A **Logged By:** Sam Nieman **Checked By:**

PID/Syns.*	Recovery %	Blow Counts	Sample No.	Depth (feet)	Graphic Log	Materials Description
N/A	90	13	1			GREY AND WHITE, DRY, POORLY GRADED GRAVEL (GP)
N/A	90	5	2	1		BROWN, MOIST, SILTY SAND (SM)
N/A	95	3	3			DARK BROWN AND DARK GRAY, MOIST, SILTY SAND (SM)
N/A	95	3	4	2		BROWN, MOIST, SILTY SAND (SM)
				3		
N/A	70	3 2	5			MEDIUM BROWN, MOIST, POORLY GRADED SAND (SP)
				4		BOTTOM OF HOLE AT 4.0 FEET SEALED W/ BENTONITE UPON COMPLETION
				5		
				6		
				7		
				8		
				9		
				10		
				11		
				12		
				13		
				14		
				15		
				16		
				17		
				18		
				19		
				20		

Farlow Environmental Engineers, Inc.
8645 Guion Road
Suite B
Indianapolis, IN 46268
Phone (317) 872-9600 Fax (317) 872-9616

Log of Boring A2
(Offset 1.5' SE of A)
Twigg Corp.
Martinsville, Ind.

Job Number: 7403

Elevation:

Driller: Haskett Drilling	**Drilling**	**Date**	**Time**
Drill Method: 3.25" Hollow Stem Auger	**Started**	12/12/94	2:00 PM
Sample Method: Split Spoon	**Finished**	12/12/94	3:30 PM

Borehole Diameter: 6" in. **Water Level:** N/A **Logged By:** Derrick Copsey **Checked By:**

PID/Syns.*	Recovery %	Blow Counts	Sample No.	Depth (feet)	Materials Description
N/A	95	11	1		WHITE TO GREY, DRY, FINE POORLY GRADED GRAVEL (GP) WITH SAND
N/A	95	5	2	1	DARK BROWN, MOIST, FINE TO MEDIUM, SILTY SAND (SM)
N/A	95	2	3		VERY DARK BROWN, MOIST, FINE TO MEDIUM, SILTY SAND (SM)
N/A	95	1	4	2	BROWN TO DARK BROWN, MOIST, FINE TO MEDIUM, SILTY SAND (SM)
				3	
N/A	85	3 3	5	4	REDDISH BROWN, MOIST, MEDIUM, POORLY GRADED SAND WITH SILT (SP-SM)
N/A	90	4 3	6	5	DARK YELLOWISH BROWN, MOIST, MEDIUM, POORLY GRADED SAND WITH SILT (SP-SM)
N/A	80	3 3	7	6	SAME AS ABOVE
				7	
N/A	80	2 3	8	8	BROWN, MOIST, MEDIUM, POORLY GRADED SAND WITH SILT (SP-SM)
					BOTTOM OF HOLE AT 8.0 FEET FORMATION SAND (8'-2') BENTONITE (2'-0')
				9	
				10	
				11	
				12	
				13	
				14	
				15	
				16	
				17	
				18	
				19	
				20	

Farlow Environmental Engineers, Inc. 8645 Guion Road Suite B Indianapolis, IN 46268 Phone (317) 872-9600 Fax (317) 872-9616	**Log of Boring A3** (offset 2' NW of A) Twigg Corp. Martinsville, Ind.	**Sheet 1 of 1** **Job Number:** 7403 **Elevation:**

	Drilling	**Date**	**Time**
Driller: Haskett Drilling			
Drill Method: 3.25" Hollow Stem Auger	**Started**	12/12/94	3:30 PM
Sample Method: Split Spoon	**Finished**	12/12/94	4:30 PM

Borehole Diameter: 6" in. | **Water Level:** N/A | **Logged By:** Derrick Copsey | **Checked By:**

PID/Syns.*	Recovery %	Blow Counts	Sample No.	Depth (feet)	Materials Description
N/A	95	11	1	0	WHITE TO GREY, DRY, FINE TO MEDIUM, WELL GRADED GRAVEL (GP)
N/A	95	5	2	1	DARK TO VERY DARK BROWN, MOIST, FINE, SILTY SAND (SM)
N/A	95	2	3		VERY DARK BROWN, MOIST, FINE TO MEDIUM, SILTY SAND (SM)
N/A	95	1	4	2	BROWN TO DARK BROWN, MOIST, FINE TO MEDIUM, SILTY SAND (SM)
				3	
N/A	85	3 3	5	4	YELLOWISH BROWN, MOIST, MEDIUM, POORLY GRADED SAND WITH SILT (SP-SM)
N/A	90	4 3	6	5	DARK YELLOWISH BROWN, MOIST, MEDIUM, POORLY GRADED SAND WITH SILT (SP-SM)
N/A	80	3 3	7	6	SAME AS ABOVE
				7	
N/A	80	2 3	8	8	BROWN, MOIST, MEDIUM, POORLY GRADED SAND WITH SILT (SP-SM)
				9	BOTTOM OF HOLE AT 8.0 FEET FORMATION SAND (8'-2') BENTONITE (2'-0')
				10	
				11	
				12	
				13	
				14	
				15	
				16	
				17	
				18	
				19	
				20	

Farlow Environmental Engineers, Inc. 8645 Guion Road Suite B Indianapolis, IN 46268 Phone (317) 872-9600 Fax (317) 872-9616	**Log of Boring B** (19' SW of MW-1) Twigg Corp. Martinsville, Ind.	**Sheet 1 of 1** **Job Number:** 7403 **Elevation:**

Driller: Haskett Drilling		**Drilling**	**Date**	**Time**
Drill Method: 3.25" Hollow Stem Auger		**Started**	8/08/94	10:30 AM
Sample Method: Split Spoon		**Finished**	8/08/94	10:43 AM
Borehole Diameter: 6" in.	**Water Level:** N/A	**Logged By:** Sam Nieman	**Checked By:**	

PID/Syns.*	Recovery %	Blow Counts	Sample No.	Depth (feet)	Graphic Log	Materials Description
N/A	80	24	1			LIMESTONE GRAVEL AND SAND, DRY (SG)
N/A	80	11	2	1		LIMESTONE GRAVEL AND SAND, DRY (SG)
N/A	90	8	3			BROWN AND GRAY, MOIST, SILTY CLAYEY SAND (SM)
N/A	90	3	4	2		DARK BROWN, MOIST, SILTY CLAYEY SAND (SM/SC)
				3		
N/A	80	4 3	5			BROWN, MOIST, MEDIUM W/ SOME FINE POORLY GRADED SAND (SP)
				4		BOTTOM OF HOLE AT 4.0 FEET SEALED W/ BENTONITE UPON COMPLETION
				5		
				6		
				7		
				8		
				9		
				10		
				11		
				12		
				13		
				14		
				15		
				16		
				17		
				18		
				19		
				20		

Farlow Environmental Engineers, Inc.
8645 Guion Road
Suite B
Indianapolis, IN 46268
Phone (317) 872-9600 Fax (317) 872-9616

Log of Boring B2
(Offset 3' SE of B)
Twigg Corp.
Martinsville, Ind.

Job Number: 7403

Elevation:

Driller: Haskett Drilling	Drilling	Date	Time
Drill Method: 3.25" Hollow Stem Auger	Started	12/20/94	11:30 AM
Sample Method: Split Spoon	Finished	12/20/94	12:30 PM

Borehole Diameter: 6" in. | Water Level: N/A | Logged By: Derrick Copsey | Checked By:

PID/Syns.*	Recovery %	Blow Counts	Sample No.	Depth (feet)	Graphic Log	Materials Description
N/A	50	5	1	1		BROWN, DRY, FINE, SILTY SAND (SM)
N/A	50	3	2	2		SAME AS ABOVE
N/A	90	5 3	3	3		YELLOWISH BROWN, MOIST, MEDIUM, POORLY GRADED SAND WITH SILT (SP-SM)
N/A	80	3 4	4	4		SAME AS ABOVE
N/A	70	5 4	5	5		BROWN, MOIST, FINE TO MEDIUM, SILTY SAND (SM)
				6		
N/A	90	6 4	6	7		BROWN, MOIST, MEDIUM, POORLY GRADED SAND WITH SILT (SP-SM)
				8		BOTTOM OF HOLE AT 8.0 FEET FORMATION SAND (8'-2') BENTONITE (2'-0')

Depth scale: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20

Farlow Environmental Engineers, Inc.
8645 Guion Road
Suite B
Indianapolis, IN 46268
Phone (317) 872-9600 Fax (317) 872-9616

Log of Boring C
(27' NE of MW-1)
Twigg Corp.
Martinsville, Ind.

Job Number: 7403

Elevation:

Driller: Haskett Drilling	**Drilling**	**Date**	**Time**
Drill Method: 3.25" Hollow Stem Auger	**Started**	8/08/94	11:04 AM
Sample Method: Split Spoon	**Finished**	8/08/94	11:18 AM

Borehole Diameter: 6" in. **Water Level:** N/A **Logged By:** Sam Nieman **Checked By:**

PID/Syns.*	Recovery %	Blow Counts	Sample No.	Depth (feet)	Materials Description
N/A	70	8	1	0–0.5	GREY AND WHITE, DRY, POORLY GRADED GRAVEL (GP)
N/A	75	4	2	0.5–1	BROWN, MOIST, SILTY SAND (SM)
N/A	70	6	3	1–1.5	BROWN, MOIST, SILTY SAND (SM)
N/A	80	3	4	1.5–2	BROWN, MOIST, SILTY SAND (SM)
N/A	65	3 2	5	3–4	BROWN, MOIST, MEDIUM POORLY GRADED SAND (SP)
				4	BOTTOM OF HOLE AT 4.0 FEET SEALED W/ BENTONITE UPON COMPLETION

Depth (feet): 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20

Farlow Environmental Engineers, Inc.
8645 Guion Road
Suite B
Indianapolis, IN 46268
Phone (317) 872-9600 Fax (317) 872-9616

Log of Boring C2
(Offset 3' SW of C)
Twigg Corp.
Martinsville, Ind.

Job Number: 7403

Elevation:

Driller: Haskett Drilling	**Drilling**	**Date**	**Time**
Drill Method: 3.25" Hollow Stem Auger	**Started**	12/20/94	10:30 AM
Sample Method: Split Spoon	**Finished**	12/20/94	11:15 AM

Borehole Diameter: 6" in. | **Water Level:** N/A | **Logged By:** Derrick Copsey | **Checked By:**

PID/Syns.*	Recovery %	Blow Counts	Sample No.	Depth (feet)	Graphic Log	Materials Description
N/A	90	5	1	1		BROWN, MOIST, MEDIUM, POORLY GRADED SAND WITH SILT (SP-SM)
N/A	80	6	2	2		SAME AS ABOVE
N/A	80	4 5	3	3		SAME AS ABOVE
N/A	75	5 5	4	4		SAME AS ABOVE
N/A	90	4 4	5	5		SAME AS ABOVE
				6		
N/A	70	6 5	6	7		BROWN, MOIST, MEDIUM, POORLY GRADED SAND (SP)
				8		BOTTOM OF HOLE AT 8.0 FEET FORMATION SAND (8'-2') BENTONITE (2'-0')
				9		
				10		
				11		
				12		
				13		
				14		
				15		
				16		
				17		
				18		
				19		
				20		

Farlow Environmental Engineers, Inc.
8645 Guion Road
Suite B
Indianapolis, IN 46268
Phone (317) 872-9600 Fax (317) 872-9616

Log of Boring D
(22' NW of MW-1)
Twigg Corp.
Martinsville, Ind.

Sheet 1 of 1

Job Number: 7403

Elevation:

Driller: Haskett Drilling	**Drilling**	**Date**	**Time**
Drill Method: 3.25" Hollow Stem Auger	**Started**	8/08/94	11:20 AM
Sample Method: Split Spoon	**Finished**	8/08/94	11:32 AM

Borehole Diameter: 6" in. **Water Level:** N/A **Logged By:** Sam Nieman **Checked By:**

PID/Syns.*	Recovery %	Blow Counts	Sample No.	Depth (feet)	Materials Description
N/A	80	16	1		GREY AND WHITE, DRY, POORLY GRADED GRAVEL (GP)
N/A	90	6	2	1	SAA, CHANGING TO BROWN, MOIST SILTY SAND
N/A	80	5	3		BROWN, MOIST, SILTY SAND (SM)
N/A	80	2	4	2	BROWN, MOIST, SILTY SAND (SM)
				3	
N/A	75	3 2	5		REDDISH BROWN, MOIST, POORLY GRADED SAND W/ SILT (SP/SM)
				4	BOTTOM OF HOLE AT 4.0 FEET SEALED W/ BENTONITE UPON COMPLETION
				5	
				6	
				7	
				8	
				9	
				10	
				11	
				12	
				13	
				14	
				15	
				16	
				17	
				18	
				19	
				20	

Farlow Environmental Engineers, Inc. 8645 Guion Road Suite B Indianapolis, IN 46268 Phone (317) 872-9600 Fax (317) 872-9616	**Log of Boring D2** (Offset 3' NE of D) Twigg Corp. Martinsville, Ind.	**Sheet 1 of 1** **Job Number:** 7403 **Elevation:**

Driller: Haskett Drilling	**Drilling**	**Date**	**Time**
Drill Method: 3.25" Hollow Stem Auger	**Started**	12/20/94	10:30 AM
Sample Method: Split Spoon	**Finished**	12/20/94	11:15 AM

Borehole Diameter: 6" in. | **Water Level:** N/A | **Logged By:** Derrick Copsey | **Checked By:**

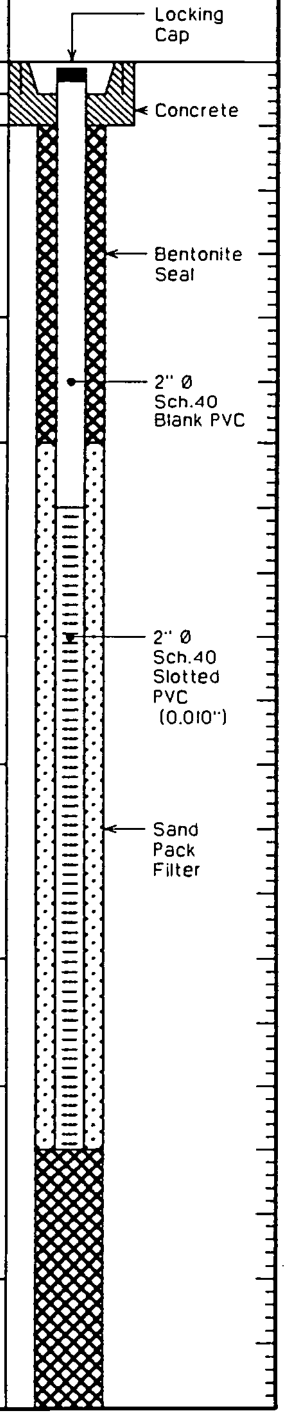
PID/Syns.*	Recovery %	Blow Counts	Sample No.	Depth (feet)	Graphic Log	Materials Description
N/A	90	3	1	1		BROWN, MOIST, MEDIUM, POORLY GRADED SAND WITH SILT (SP-SM)
N/A	90	3	2	2		SAME AS ABOVE
N/A	90	5 3	3	3		SAME AS ABOVE
N/A	90	3 3	4	4		SAME AS ABOVE
N/A	40	4 2	5	5		SAME AS ABOVE
				6		
N/A	80	3 4	6	7		BROWN, MOIST, MEDIUM, POORLY GRADED SAND (SP)
				8		BOTTOM OF HOLE AT 8.0 FEET FORMATION SAND (8'-2') BENTONITE (2'-0')
				9		
				10		
				11		
				12		
				13		
				14		
				15		
				16		
				17		
				18		
				19		
				20		

Farlow Environmental Engineers, Inc. 8645 Guion Road Suite B Indianapolis, IN 46268 Phone (317) 872-9600 Fax (317) 872-9616	**Log of Well MW-1** (former waste storage area) Twigg Corp. Martinsville, Ind.	**Sheet 1 of 2** **Job Number:** 7403 **Elevation:**

Driller: Haskett Drilling	**Drilling**	**Date**	**Time**
Drill Method: 4.25" HSA, Mud Rotary	**Started**	8/8/94	11:38 AM
Sample Method: Split Spoon	**Finished**	8/9/94	10:40 AM
Borehole Diameter: 8.5" in. **Water Level:** 7-10' BGS ('98)	**Logged By:** Sam Niemann	**Checked By:**	

PID/Syns.*	Recovery %	Blow Counts	Sample No.	Depth (feet)	Materials Description
				0	GREY AND WHITE, DRY, POORLY GRADED GRAVEL (GP)
			1	1	BROWN, MOIST, WELL GRADED SAND WITH TRACE TO SOME FINES (SW-SM)
58/ 100*	90	3 3 3 3	2	4	REDDISH BROWN, FINE AND MEDIUM, MOIST, POORLY GRADED SAND WITH TRACE TO SOME FINES (SP-SM)
270/ >250*	95	1 1 0 1	3	9	BROWN AND GREY, WET, WELL GRADED SAND (SW) WITH TRACE FINES
2.4/ N.D.*	100	1 2 6 9	4	14	GREY AND BROWN, MEDIUM AND FINE, WET, POORLY GRADED SAND (SP)
0.3/ N.D.*	80	1 2 7 17	5	19	BROWN, FINE TO COARSE, WET, WELL GRADED SAND (SW) WITH SOME GRAVEL

Well Completion



Farlow Environmental Engineers, Inc.
8645 Guion Road
Suite B
Indianapolis, IN 46268
Phone (317) 872-9600 Fax (317) 872-9816

Log of Well MW-1
(former waste storage area)
Twigg Corp.
Martinsville, Ind.

Job Number: 7403

Elevation:

PID/Syns.*	Recovery %	Blow Counts	Sample No.	Depth (feet)	Graphic Log	Materials Description	Well Completion
				21–24			Bentonite Seal
0.1/ N.D.*	85	12 14 14 21	6	24–26		BROWN, MEDIUM TO COARSE, WET, POORLY GRADED SAND (SP) WITH SOME GRAVEL	
				26–29			
0.3/ N.D.*	45	8 8 12 11	7	29–31		BROWN, MEDIUM, WET, WELL GRADED SAND (SW)	
				31		BOTTOM OF HOLE AT 31.0 FEET	

Depth scale: 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44

Bruce Carter Associates, L.L.C.
6630 E. 75th St
Suite 300
Indianapolis, IN 46250
Phone (317) 578-4233 Fax (317) 578-4250

Log of Well MW-1D
(offset 5' S of MW-1)
Twigg Corp.
Martinsville, Ind.

Job Number: 7403

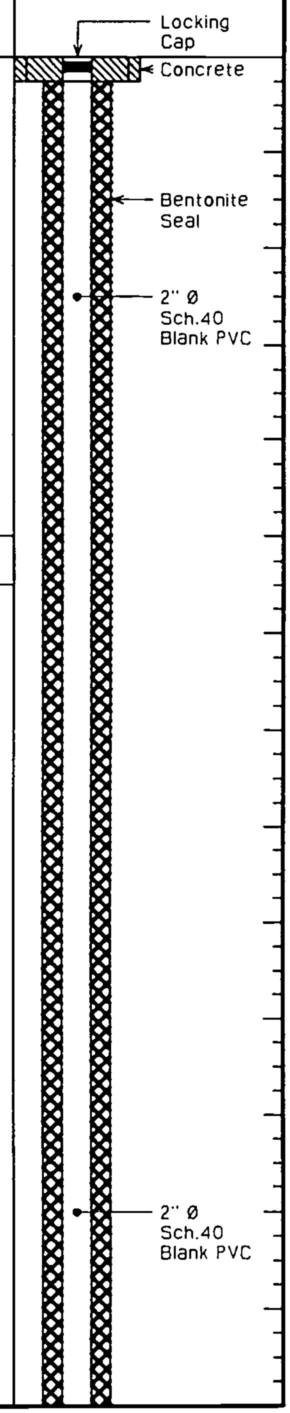
Elevation:

	Drilling	Date	Time
Driller: Earth Exploration			
Drill Method: 4.25" Hollow Stem Auger	**Started**	2/24/98	8:45 AM
Sample Method: Split Spoon	**Finished**	2/24/98	3:00 PM

Borehole Diameter: 8.5" in. | **Water Level:** 7-10.2' BGS ('98) | **Logged By:** JW Kilmer | **Checked By:**

PID/Sens.	Recovery %	Blow Counts	Sample No.	Depth (feet)	Graphic Log	Materials Description
				2		
				4		
				6		
				8		
				10		Boring Blank-Drilled to 44'
				12		
				14		
				16		
				18		
				20		
				22		
				24		
				26		

Well Completion



Bruce Carter Associates, L.L.C.
6630 E. 75th St
Suite 300
Indianapolis, IN 46250
Phone (317) 578-4233 Fax (317) 578-4250

Log of Well MW-1D
(offset 5' S of MW-1)
Twigg Corp.
Martinsville, Ind.

Job Number: 7403

Elevation:

PID/Sens.	Recovery %	Blow Counts	Sample No.	Depth (feet)	Graphic Log	Materials Description	Well Completion
				30			
				32			
				34			
				36			
				38			
				40			
				42			
0	100	6 18 13 15	1	44		Wet, tan, fine to medium, trace course poorly graded SAND (SP)	
				46			
				48			
				50			Formation Sand
				52			
0	100	12 18 22 26	2	54		SAA (SP), 6" of tan, fine SILTY SAND (SM)	
				56			2" Ø Sch.40 Slotted PVC (0.010")
				58			

Bruce Carter Associates, L.L.C.
6630 E. 75th St
Suite 300
Indianapolis, IN 46250
Phone (317) 578-4233 Fax (317) 578-4250

Log of Well MW-1D
(offset 5' S of MW-1)
Twigg Corp.
Martinsville, Ind.

Job Number: 7403

Elevation:

PID/Sens.	Recovery %	Blow Counts	Sample No.	Depth (feet)	Graphic Log	Materials Description	Well Completion
				62			
0	75	10 16 20 25	3	64–66		SAA (SP), fine SAND, little fines	
				68			
				70			
				72			
0	58	5 9 13 17	4	74–76		6" SAA (SP) 8" grey SILT (ML), low plasticity, little clay, little to some fine sand	
				78			
0	100	9 13 15 19	5	79–81		SAA (ML)	
						BOTTOM OF HOLE AT 81.0 FEET	
				82			
				84			
				86			
				88			
				90			

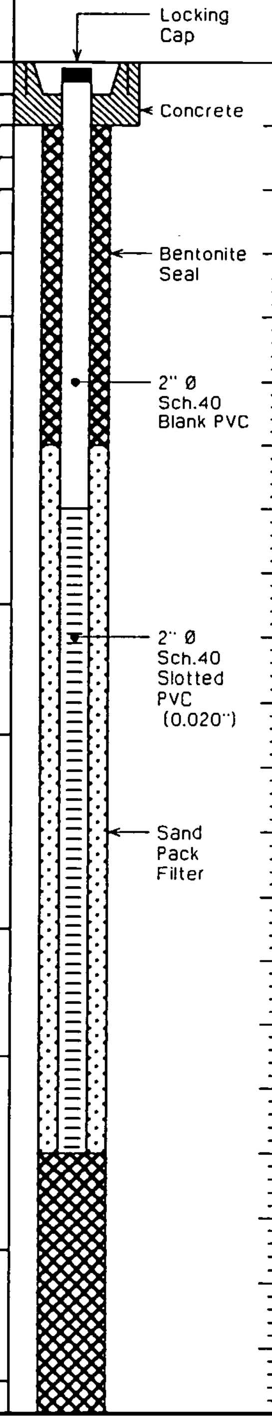
Farlow Environmental Engineers, Inc. 8645 Guion Road Suite B Indianapolis, IN 46268 Phone (317) 872-9600 Fax (317) 872-9616	**Log of Well MW-2 (FB-2)** (parking lot E of Twigg - paved over) Twigg Corp. Martinsville, Ind.	**Sheet 1 of 2** **Job Number:** 7403 **Elevation:**

Driller: Haskett Drilling	**Drilling**	**Date**	**Time**
Drill Method: 4.25" HSA, Mud Rotary	**Started**	8/10/94	
Sample Method: Split Spoon	**Finished**		

Borehole Diameter: 8.5" in.	**Water Level:** 9 BGS ('94)	**Logged By:** Sam Niemann	**Checked By:**

PID/Syns.*	Recovery %	Blow Counts	Sample No.	Depth (feet)	Materials Description
	70	30	1	0–0.5	LIGHT GREY, DRY, WELL GRADED GRAVEL (GW) WITH SAND
	70	19	2		SAME AS ABOVE, CHANGING TO BROWN, MEDIUM TO COARSE, MOIST, WELL GRADED SAND (SW) WITH GRAVEL AT 0.6 FEET
	40	14	3		BROWN, MEDIUM TO COARSE, MOIST, WELL GRADED SAND (SW) WITH GRAVEL
	40	7	4		BROWN, MOIST, CLAYEY SAND (SC) WITH ABUNDANT SAND
0.1/ N.D.*	90	1 3	5	3–4	REDDISH BROWM, MEDIUM, MOIST, POORLY GRADED SAND (SP) WITH TRACE FINES
N.D./ N.D.*	50	2 2 2 4	6	9–11	BROWN, FINE TO COARSE, WET, WELL GRADED SAND (SW)
0.2/ N.D.*	90	9 11 13 14	7	14–16	BROWN, FINE TO MEDIUM, WET, WELL GRADED SAND (SW)
0.2/ N.D.*	90	8 9 10 15	8	19–21	SAME AS ABOVE

Well Completion



Farlow Environmental Engineers, Inc.
8645 Guion Road
Suite B
Indianapolis, IN 46268
Phone (317) 872-9600 Fax (317) 872-9616

Log of Well MW-2 (FB-2)
(parking lot E of Twigg - paved over)
Twigg Corp.
Martinsville, Ind.

Job Number: 7403

Elevation:

PID/Syns.*	Recovery %	Blow Counts	Sample No.	Depth (feet)	Graphic Log	Materials Description	Well Completion
				22–23			Bentonite Seal
0.1/ N.D.*	70	16 21 13 13	9	24–25.5		SAME AS ABOVE WITH SOME AREAS OF COARSE SAND, CHANGING TO SILT (ML) WITH ABUNDANT FINE SAND AT 25.0 FEET	
				26–44		BOTTOM OF HOLE AT 25.5 FEET	

Farlow Environmental Engineers, Inc. 8645 Guion Road Suite B Indianapolis, IN 46268 Phone (317) 872-9600 Fax (317) 872-9616	**Log of Boring FB-2B** (offset from FB-2) Twigg Corp. Martinsville, Ind.	**Sheet 1 of 1** **Job Number:** 7403 **Elevation:**

Driller: Haskett Drilling	**Drilling**	**Date**	**Time**
Drill Method: 3.25" Hollow Stem Auger	**Started**	12/21/94	12:40 PM
Sample Method: Split Spoon	**Finished**	12/21/94	2:00 PM
Borehole Diameter: 6" in. **Water Level:** N/A	**Logged By:** Derrick Copsey	**Checked By:**	

PID/Syns.*	Recovery %	Blow Counts	Sample No.	Depth (feet)	Graphic Log	Materials Description
N/A	90	6	1	1		DARK BROWN, MOIST, FINE, SILTY SAND (SM)
N/A	95	8	2	2		BROWN, MOIST, FINE TO MEDIUM SILTY SAND (SM)
N/A	80	3 4	3	3		SAME AS ABOVE
N/A	75	5 5	4	4		BROWN, MOIST, VERY FINE SILTY SAND (SM)
N/A	80	2 2	5	5		SAME AS ABOVE
				6		
N/A	90	2 2	6	7		BROWN, MOIST, MEDIUM, POORLY GRADED SAND WITH SILT (SP-SM)
				8		BOTTOM OF HOLE AT 8.0 FEET
				9		
				10		
				11		
				12		
				13		
				14		
				15		
				16		
				17		
				18		
				19		
				20		

Farlow Environmental Engineers, Inc.
8645 Guion Road
Suite B
Indianapolis, IN 46268
Phone (317) 872-9600 Fax (317) 872-9616

Log of Well MW-3
(near SW corner of Twigg bldg)
Twigg Corp.
Martinsville, Ind.

Job Number: 7403

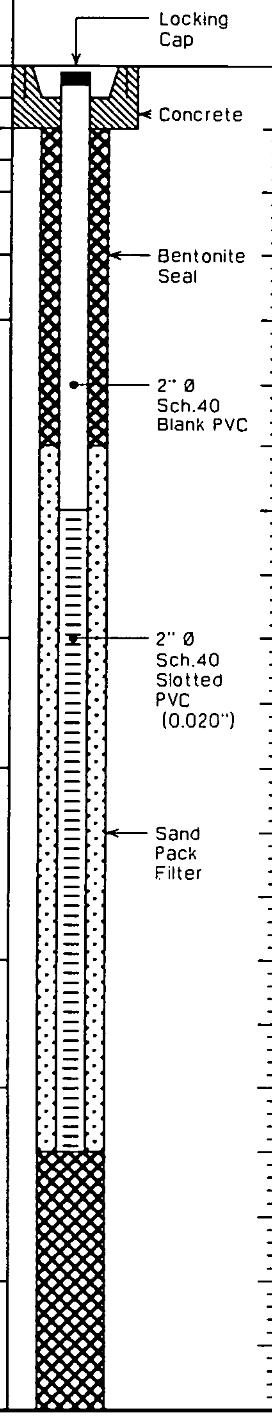
Elevation:

	Drilling	Date	Time
Driller: Haskett Drilling			
Drill Method: 4.25" HSA, Mud Rotary	Started	8/9/94	11:00 AM
Sample Method: Split Spoon	Finished	8/9/94	2:15 PM

Borehole Diameter: 8.5" in. | **Water Level:** 8.5-12' BGS (1998) | **Logged By:** Sam Niemann | **Checked By:**

PID/Syns.*	Recovery %	Blow Counts	Sample No.	Depth (feet)	Materials Description
N.D.	80	3	1		GRASS AND TOPSOIL (DARK BROWN, MOIST, SANDY CLAY (CL-SC))
N.D	85	7	2	1	BROWN, MOIST, FINE TO COARSE, WELL GRADED SAND (SW) WITH SOME FINES
0.2	80	6	3	2	BROWN, FINE TO MEDIUM, MOIST, WELL GRADED SAND (SW) WITH FINES
N.D.	90	4	4		SAME AS ABOVE
0.3	100		5	3	BROWN, MEDIUM, MOIST, POORLY GRADED SAND (SP)
1.8/ N.D.*	100	1 1 1 2	6	9	BROWN, MEDIUM TO COARSE, MOIST, POORLY GRADED SAND (SP)
0.7	100	2 2 4 7	7	14	SAME AS ABOVE
4.2/ N.D.*	80	8 10 9 11	8	19	BROWN, MEDIUM TO COARSE, WET, WELL GRADED SAND (SW) COARSENING WITH DEPTH

Well Completion



Farlow Environmental Engineers, Inc. 8645 Guion Road Suite B Indianapolis, IN 46268 Phone (317) 872-9600 Fax (317) 872-9616	**Log of Well MW-3** (near SW corner of Twigg bldg) Twigg Corp. Martinsville, Ind.	**Sheet 2 of 2** **Job Number:** 7403 **Elevation:**

PID/Syns.*	Recovery %	Blow Counts	Sample No.	Depth (feet)	Graphic Log	Materials Description	Well Completion
				22–24			Bentonite Seal
1.0/ N.D.*	90	11 18 23 25	9	24–26		BROWN, GREY, MEDIUM TO COARSE, WET, WELL GRADED SAND (SW) WITH SOME GRAVEL	
				26–29			
0.2/ N.D.*	90	9 14 12 13	10	29–31		SAME AS ABOVE	
				31		BOTTOM OF HOLE AT 31.0 FEET	

Depth scale: 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44

Farlow Environmental Engineers, Inc. 8645 Guion Road Suite B Indianapolis, IN 46268 Phone (317) 872-9600 Fax (317) 872-9616	**Log of Boring FB-4** (N of Harmon Dr & South St) Twigg Corp. Martinsville, Ind.	**Sheet 1 of 2** **Job Number:** 7403 **Elevation:**

Driller: Haskett Drilling	**Drilling**	**Date**	**Time**
Drill Method: Mud Rotary	**Started**	8/11/94	9:05 AM
Sample Method: Split Spoon	**Finished**	8/11/94	11:00 AM

Borehole Diameter: 6" in.	**Water Level:**	**Logged By:** Sam Niemann	**Checked By:**

PID/Syns.*	Recovery %	Blow Counts	Sample No.	Depth (feet)	Graphic Log	Materials Description
	80	3	1			DARK BROWN, DRY SANDY CLAY (CL)
	80	5	2	1		DARK BROWN, DRY, SC/CL
	60	7	3			DARK BROWN, MOIST CLAYEY SAND (SC)
	60	11	4	2		DARK BROWN, MOIST SW/SC
				3		
	100	6 5	5	4		BROWN, MEDIUM, MOIST, POORLY GRADED SAND WITH TRACE TO SOME FINES (SP-SM)
40#/ N.D.*	100	4 6	6	5		SAME AS ABOVE
				6 7 8		
72#/ N.D.*	60	2 2 2 3	7	9 10		BROWN, MEDIUM WITH TRACE FINE, WET, POORLY GRADED SAND (SP)
				11 12 13		
11/ 24*	90	7 9 9 8	8	14 15		SAME AS ABOVE
				16 17 18		
23/ 45*	85	7 10 9 13	9	19 20		SAME AS ABOVE

Farlow Environmental Engineers, Inc.
8645 Guion Road
Suite B
Indianapolis, IN 46268
Phone (317) 872-9600 Fax (317) 872-9616

Log of Boring FB-4
(same loc'n as MW-4)
Twigg Corp.
Martinsville, Ind.

Job Number: 7403

Elevation:

PID/Syns.*	Recovery %	Blow Counts	Sample No.	Depth (feet)	Graphic Log	Materials Description
				22–23		
0.8/ N.D.*	90	10 9 11 13	10	24–25		SAME AS ABOVE
				26–28		
0.4/ N.D.*	40	4 4 3 5	11	29–30		SAME AS ABOVE
				31–44		BOTTOM OF HOLE 30.5 FEET

= PID Reading is suspect. Very slow needle climb rate. Reading should probably be much lower. (Water vapor interference)

Farlow Environmental Engineers, Inc.
8645 Guion Road
Suite B
Indianapolis, IN 46268
Phone (317) 872-9600 Fax (317) 872-9616

Log of Well MW-4 (FB-4b)

(Offset from FB-4)
Twigg Corp.
Martinsville, Ind.

Job Number: 7403

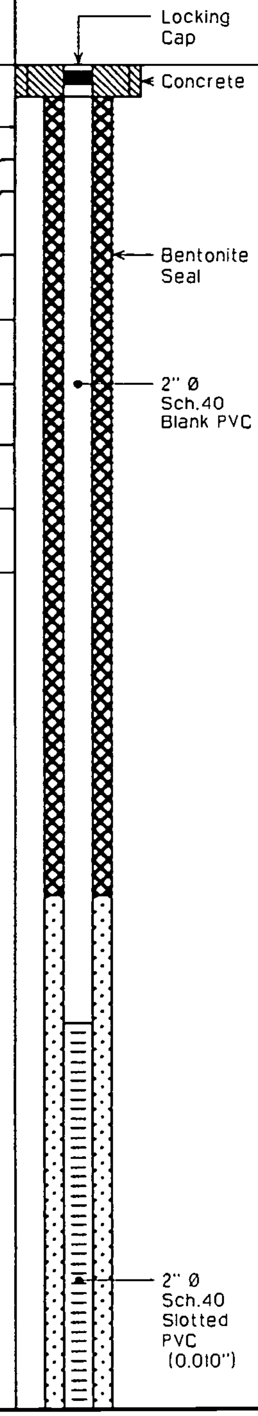
Elevation:

	Drilling	Date	Time
Driller: Haskett Drilling			
Drill Method: Holow Stem Auger/Mud Rotary	Started	12/13/94	9:00 AM
Sample Method: Split Spoon	Finished	12/14/94	3:00 PM

Borehole Diameter: 6" in. **Water Level:** 8.5-11.8' BGS ('98) **Logged By:** Derrick Copsey **Checked By:**

PID/Syns.*	Recovery %	Blow Counts	Sample No.	Depth (feet)	Materials Description
N/A	90	3	1	1	REDDISH BROWN, MOIST, FINE, SILTY SAND (SM)
N/A	90	2	2	2	REDDISH BROWN, MOIST, MEDIUM, POORLY GRADED SAND WITH SILT (SP-SM)
N/A	90	3 5	3	3	BROWN, MOIST, FINE TO MEDIUM, POORLY GRADED SAND WITH SILT (SP-SM)
N/A	80	5 5	4	4	SAME AS ABOVE
N/A	90	3 6	5	5	BROWN, MOIST, MEDIUM, POORLY GRADED SAND (SP)
N/A	90	3 2	6	7	REDDISH BROWN, MOIST, MEDIUM, SILTY SAND (SM)

Well Completion



Farlow Environmental Engineers, Inc.
8645 Guion Road
Suite B
Indianapolis, IN 46268
Phone (317) 872-9600 Fax (317) 872-9616

Log of Well MW-4 (FB-4b)
(Offset from FB-4)
Twigg Corp.
Martinsville, Ind.

Job Number: 7403

Elevation:

PID/Syns.*	Recovery %	Blow Counts	Sample No.	Depth (feet)	Materials Description	Well Completion
				22–34		Sand Pack Filter (to 25); Formation Sand
N.D./ N.D.	80	4 5 10	7	34–35.5	BROWN, WET, MEDIUM, POORLY GRADED SAND (SP)	
N.D./ N.D.	50	8 6 8	8	39–40.5	REDDISH BROWN, WET, MEDIUM, POORLY GRADED SAND WITH SILT (SP-SM)	
N/A	50	8 12 17	9	44–	SAME AS ABOVE	

Farlow Environmental Engineers, Inc. 8645 Guion Road Suite B Indianapolis, IN 46268 Phone (317) 872-9600 Fax (317) 872-9616	**Log of Well MW-4 (FB-4b)** (Offset from FB-4) Twigg Corp. Martinsville, Ind.	**Sheet 3 of 3** **Job Number:** 7403 **Elevation:**

PID/Syns.*	Recovery %	Blow Counts	Sample No.	Depth (feet)	Graphic Log	Materials Description	Well Completion
N/A	50		9				
				46			
				47			
				48			
				49			
N.D./-	60	12 11 10	10	50		BROWN, WET, MEDIUM, POORLY GRADED SAND (SP)	
				51		BOTTOM OF HOLE AT 50.5 FEET. Samples from 39.0 - 50.5 obtained from boring offset 3' east of FB-4b.	
				52			
				53			
				54			
				55			
				56			
				57			
				58			
				59			
				60			
				61			
				62			
				63			
				64			
				65			
				66			
				67			
				68			

Farlow Environmental Engineers, Inc.
8645 Guion Road
Suite B
Indianapolis, IN 46268
Phone (317) 872-9600 Fax (317) 872-9616

Log of Boring FB-5
(parking lot SE of Twigg)
Twigg Corp.
Martinsville, Ind.

Job Number: 7403

Elevation:

Driller: Haskett Drilling	**Drilling**	**Date**	**Time**
Drill Method: Mud Rotary	**Started**	8/10/94	8:50 AM
Sample Method: Split Spoon	**Finished**	8/10/94	10:30 AM

Borehole Diameter: 8.5" in. **Water Level:** **Logged By:** Sam Niemann **Checked By:**

PID/Syns.*	Recovery %	Blow Counts	Sample No.	Depth (feet)	Materials Description
	80	3	1	0–0.5	DARK BROWN, FINE TO VERY COARSE, DRY, WELL GRADED SAND (SW) WITH GRAVEL AND FINES
	80	6	2	0.5–1	SAME AS ABOVE WITH INCREASED FINES
	90	8	3	1–1.5	BROWN, MOIST SC/CL WITH GRAVEL
	90	4	4	1.5–2	SAME AS ABOVE
	100	3 3	5	3–4	REDDISH BROWN, MOIST, CLAYEY SAND (SC) WITH SOME SILT
N.D./ N.D.*	60	2 3 4 3	6	8.5–10.5	BROWN, MEDIUM TO COARSE, WET, WELL GRADED SAND (SW) WITH TRACE GRAVEL
N.D./ N.D.*	90	9 12 12 13	7	13.5–15.5	SAME AS ABOVE, CHANGING TO BROWN, MOIST SILT (ML) WITH SOME SAND AT 15.1 FEET
N.D./ N.D.*	85	8 11 13 12	8	18.5–20.5	BROWN, FINE TO VERY COARSE, WET, WELL GRADED SAND (SW) WITH TRACE GRAVEL
				20.5	BOTTOM OF HOLE AT 20.5 FEET

Farlow Environmental Engineers, Inc.
8645 Guion Road
Suite B
Indianapolis, IN 46268
Phone (317) 872-9600 Fax (317) 872-9616

Log of Boring FB-6
(South St 120' SE of MW-1)
Twigg Corp.
Martinsville, Ind.

Job Number: 7403

Elevation:

	Drilling	Date	Time
Driller: Haskett Drilling			
Drill Method: 3.25" HSA/Mud Rotary	**Started**	12/15/94	9:00 AM
Sample Method: Split Spoon	**Finished**	12/16/94	1:00 PM

Borehole Diameter: 6" in. **Water Level:** N/A **Logged By:** Derrick Copsey **Checked By:**

PID/Syns.*	Recovery %	Blow Counts	Sample No.	Depth (feet)	Materials Description
N/A	N/A	N/A	1	0	ASPHALT
N/A	80	11	2	1	BROWN, DRY, FINE TO COARSE, POORLY GRADED SAND (SP)
N/A	70	12	3	1.5	BROWN, MOIST, FINE, POORLY GRADED SAND (SP) WITH TRACE GRAVEL
N/A	80	19	4	2	SAME AS ABOVE
				2.5–3	
N/A	90	6 3	5	3	BROWN, MOIST, FINE POORLY GRADED SAND WITH SILT (SP-SM)
9.2/ N.D.	90	2 3	6	4	SAME AS ABOVE
N/A	90	9 10	7	5	SAME AS ABOVE
				6	
N/A	90	4 3	8	7	BROWN, MOIST, FINE TO MEDIUM, SILTY SAND (SM)
				8	
10.0/ N.D.	90	3 2 3	9	9	SAME AS ABOVE
				10.5–14	
13.0/ N.D.	90	4 6 7	10	14	BROWN, WET, MEDIUM, POORLY GRADED SAND (SP)
				15.5–19	
22.0/	90	9 9 12	11	19	SAME AS ABOVE

Farlow Environmental Engineers, Inc.
8645 Guion Road
Suite B
Indianapolis, IN 46268
Phone (317) 872-9600 Fax (317) 872-9616

Log of Boring FB-6

(South St 120' SE of MW-1)
Twigg Corp.
Martinsville, Ind.

Job Number: 7403

Elevation:

PID/Syns.*	Recovery %	Blow Counts	Sample No.	Depth (feet)	Graphic Log	Materials Description
				22		
				23		
28.0/ 2.0	90	8 9 9	12	24 25		SAME AS ABOVE
				26		
				27		
				28		
10.0/ N.D.	80	5 5 7	13	29 30		SAME AS ABOVE
				31		
				32		
				33		
N.D./ N.D.	80	2 2 11	14	34 35		SAME AS ABOVE
				36		
				37		
				38		
N.D./ N.D.	75	5 13 17	15	39 40		SAME AS ABOVE
				41		
				42		
				43		
N.D./ N.D.	70	8 8 9	16	44		SAME AS ABOVE

Farlow Environmental Engineers, Inc. 8645 Guion Road Suite B Indianapolis, IN 46268 Phone (317) 872-9600 Fax (317) 872-9616	**Log of Boring FB-6** (South St 120' SE of MW-1) Twigg Corp. Martinsville, Ind.	**Sheet 3 of 3** **Job Number:** 7403 **Elevation:**

PID/Syns.*	Recovery %	Blow Counts	Sample No.	Depth (feet)	Graphic Log	Materials Description
	70		16			
				46		
				47		
				48		
				49		SAME AS ABOVE
N.D./-	60	8 11 11	17	50		
				51		BOTTOM OF HOLE AT 50.5 FEET
				52		
				53		
				54		
				55		
				56		
				57		
				58		
				59		
				60		
				61		
				62		
				63		
				64		
				65		
				66		
				67		
				68		

Farlow Environmental Engineers, Inc.
8645 Guion Road
Suite B
Indianapolis, IN 46268
Phone (317) 872-9600 Fax (317) 872-9616

Log of Boring FB-7
(in field W of Twigg)
Twigg Corp.
Martinsville, Ind.

Job Number: 7403

Elevation:

Driller: Haskett Drilling	**Drilling**	**Date**	**Time**
Drill Method: 3.25" HSA/Mud Rotary	**Started**	12/20/94	2:30 PM
Sample Method: Split Spoon	**Finished**	12/21/11:00 AM	11:00 PM

Borehole Diameter: 6" in. **Water Level:** N/A **Logged By:** Derrick Copsey **Checked By:**

PID/Syns.*	Recovery %	Blow Counts	Sample No.	Depth (feet)	Materials Description
N/A	80	11	1	0–0.5	DARK BROWN, DRY, FINE TO MEDIUM, SILTY SAND (SM)
N/A	80	10	2	0.5–1	WHITE TO GREY, DRY, FINE TO MEDIUM, POORLY GRADED GRAVEL WITH SAND (GP)
N/A	70	11	3	1–1.5	BROWN, DRY, FINE TO MEDIUM,SILTY SAND (SM)
N/A	70	8	4	1.5–2	SAME AS ABOVE
				2–3	
N/A	90	4 5	5	3–4	BROWN, DRY, MEDIUM, POORLY GRADED SAND WITH SILT (SP-SM)
N.D.	90	4 4	6	4–5	SAME AS ABOVE
N/A	100	4 4	7	5–6	BROWN, MOIST, FINE, SILTY SAND (SM)
				6–7	
N/A	90	6 8	8	7–8	BROWN, MOIST, FINE TO MEDIUM, POORLY GRADED SAND (SP)
				8–9	
N.D./ N/A	70	5 5 3	9	9–10.5	SAME AS ABOVE
				10.5–14	
2.20/ N/A	80	7 8 7	10	14–15.5	BROWN, WET, MEDIUM TO COARSE, POORLY GRADED SAND (SP)
				15.5–19	
0.20/ N/A	80	6 13 14	11	19–20.5	SAME AS ABOVE

Farlow Environmental Engineers, Inc.
8645 Guion Road
Suite B
Indianapolis, IN 46268
Phone (317) 872-9600 Fax (317) 872-9616

Log of Boring FB-7
(in field W of Twigg)
Twigg Corp.
Martinsville, Ind.

Job Number: 7403

Elevation:

PID/Syns.*	Recovery %	Blow Counts	Sample No.	Depth (feet)	Graphic Log	Materials Description
				22		
				23		
N.D./ N/A	40	8 8 9	12	24–25	▨	BROWN, WET, MEDIUM, POORLY GRADED SAND (SP)
				26		
				27		
				28		
	60	11 10 12	13	29	▨	DARK GREY, DRY, VERY FINE TO FINE, SILTY SAND (SM)
N.D./ N/A			14	30	▨	BROWN, WET, MEDIUM TO COARSE, POORLY GRADED SAND WITH GRAVEL (SP)
				31		
				32		
				33		
N.D./ N.D.	50	2 2 11	15	34–35	▨	BROWN, WET, FINE TO MEDIUM, POORLY GRADED SAND (SP)
				36		BOTTOM OF HOLE AT 35.5 FEET
				37		
				38		
				39		
				40		
				41		
				42		
				43		
				44		

Farlow Environmental Engineers, Inc.
8645 Guion Road
Suite B
Indianapolis, IN 46268
Phone (317) 872-9600 Fax (317) 872-9616

Log of Boring FB-8
(in South St W of Harmon)
Twigg Corp.
Martinsville, Ind.

Job Number: 7403

Elevation:

	Drilling	Date	Time
Driller: Haskett Drilling			
Drill Method: 3.25" HSA /Mud Rotary	Started	12/19/94	10:00 AM
Sample Method: Split Spoon	Finished	12/19/94	4:30 PM

Borehole Diameter: 6" in. **Water Level:** N/A **Logged By:** Derrick Copsey **Checked By:**

PID/Syns.*	Recovery %	Blow Counts	Sample No.	Depth (feet)	Materials Description
	80	11	1	0–0.5	ASPHALT
N/A	80	10	2	0.5–1	ASPHALT AND SUB-BASE
N/A	70	11	3	1–1.5	BROWN, DRY, MEDIUM, SILTY SAND (SM)
N/A	70	8	4	1.5–2	SAME AS ABOVE
				2–3	
N/A	90	4 5	5	3–4	SAME AS ABOVE
0.0/ N/A.	90	4 4	6	4–5	BROWN, DRY, MEDIUM, POORLY GRADED, SAND WITH SILT (SP-SM)
N/A	100	4 4	7	5–6	BROWN, MOIST, MEDIUM, SILTY SAND (SM)
				6–7	
N/A	90	6 8	8	7–8	SAME AS ABOVE
				8–9	
0.0/ N/A	70	5 5 3	9	9–10.5	SAME AS ABOVE
				10.5–14	
2.2/ N/A	80	7 8 7	10	14–15.5	BROWN, WET, WELL GRADED SAND WITH GRAVEL (SW)
				15.5–19	
0.2/ N/A	80	6 13 14	11	19–20.5	BROWN, WET, FINE TO MEDIUM, POORLY GRADED SAND (SP)

Farlow Environmental Engineers, Inc.
8645 Guion Road
Suite B
Indianapolis, IN 46268
Phone (317) 872-9600 Fax (317) 872-9616

Log of Boring FB-8
(in South St W of Harmon)
Twigg Corp.
Martinsville, Ind.

Job Number: 7403

Elevation:

PID/Syns.*	Recovery %	Blow Counts	Sample No.	Depth (feet)	Materials Description
				22	
				23	
N.D./ N/A	40	8 8 9	12	24–25	SAME AS ABOVE
				26	
				27	
				28	
	40	11 10 12	13	29	SAME AS ABOVE
0.0/ N/A			14	30	
				31	
				32	
				33	
0.0	50	12 13 15	15	34–35	BROWN, WET, MEDIUM, POORLY GRADED SAND (SP)
				36	
				37	
				38	
0.0	60	6 5 9	16	39–40	SAME AS ABOVE
				41	
				42	
				43	
0.0	70	5 8 12	17	44	SAME AS ABOVE

Farlow Environmental Engineers, Inc.
8645 Guion Road
Suite B
Indianapolis, IN 46268
Phone (317) 872-9600 Fax (317) 872-9616

Log of Boring FB-8
(in South St W of Harmon)
Twigg Corp.
Martinsville, Ind.

Job Number: 7403

Elevation:

PID/Syns.*	Recovery %	Blow Counts	Sample No.	Depth (feet)	Graphic Log	Materials Description
0.0	70		17			
				46		
				47		
				48		
0.0	40	6 8 9	18	49–50		BROWN, WET, FINE TO MEDIUM, POORLY GRADED SAND (SP)
				51		Bottom Of Hole = 50.5'. Formation sand = 50.5 - 5' Bentonite = 5' - 1' Concrete = 1' - 0'
				52		
				53		
				54		
				55		
				56		
				57		
				58		
				59		
				60		
				61		
				62		
				63		
				64		
				65		
				66		
				67		
				68		

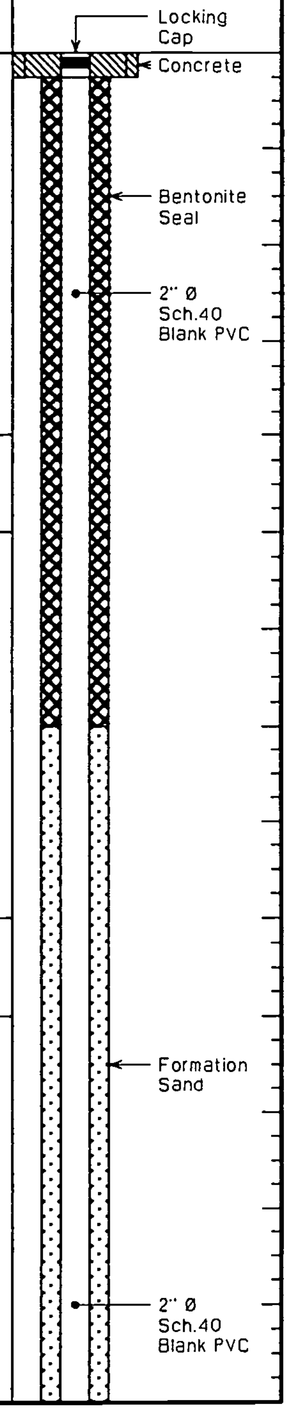
Bruce Carter Associates, L.L.C. 6630 E. 75th St Suite 300 Indianapolis, IN 46250 Phone (317) 578-4233 Fax (317) 578-4250	**Log of Well MW-5** (SW corner of South St & Sycamore) Twigg Corp. Martinsville, Ind.	**Sheet 1 of 2** **Job Number:** 7403 **Elevation:**

Driller: SES	**Drilling**	**Date**	**Time**
Drill Method: 4.25" Hollow Stem Auger	**Started**	9/29/97	3:00 PM
Sample Method: Split Spoon	**Finished**	9/29/97	7:00 PM

Borehole Diameter: 8.5" in. | **Water Level:** 9.5-13.4' BGS ('98 | **Logged By:** DR Farlow | **Checked By:** JW Kilmer

PID/Sens.	Recovery %	Blow Counts	Sample No.	Depth (feet)	Graphic Log	Materials Description
	50	1 2 2 1	1	8–10		Moist, very dark Brown (2/2) SANDY SILT (ML) changing to well graded SILTY SAND (SM)
	100	7 4 4 4	2	18–20		Wet, brown (5/3) well graded SAND (SW) w/ trace gravel & trace fines

Well Completion



Bruce Carter Associates, L.L.C.
6630 E. 75th St
Suite 300
Indianapolis, IN 46250
Phone (317) 578-4233 Fax (317) 578-4250

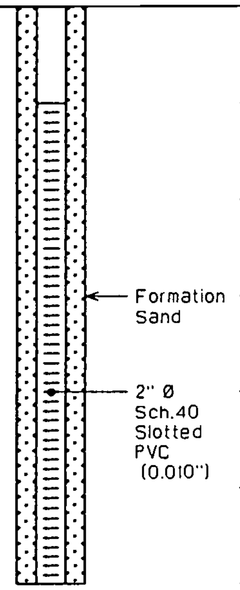
Log of Well MW-5
(SW corner of South St & Sycamore)
Twigg Corp.
Martinsville, Ind.

Job Number: 7403

Elevation:

PID/Sens.	Recovery %	Blow Counts	Sample No.	Depth (feet)	Graphic Log	Materials Description
	100	2 6 5 5	3	30–32		SAA (SW), no gravel
	50	5 10 15 18	4	38–40		Brown (5/3) fine to medium poorly graded SAND (SP) w/ trace fines
				40		BOTTOM OF HOLE AT 40.0 FEET

Well Completion



Bruce Carter Associates, L.L.C.
6630 E. 75th St
Suite 300
Indianapolis, IN 46250
Phone (317) 578-4233 Fax (317) 578-4250

Log of Well MW-6
(in Victory Park)
Twigg Corp.
Martinsville, Ind.

Job Number: 7403

Elevation:

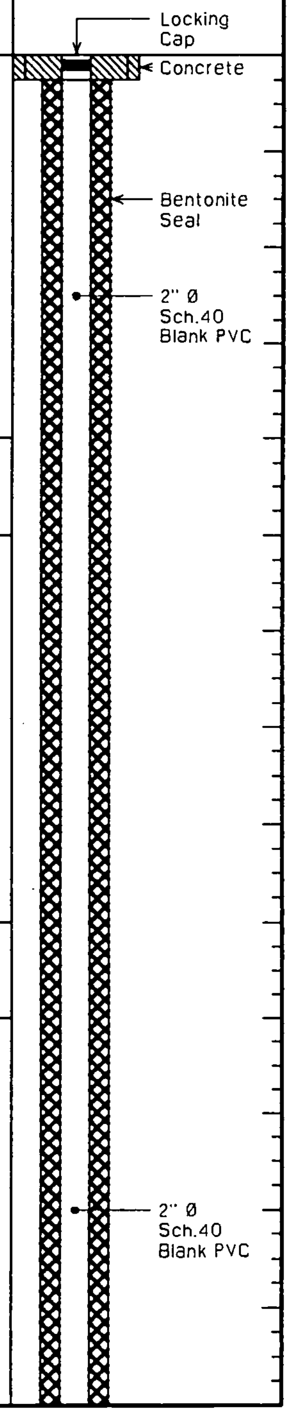
Driller: SES	**Drilling**	**Date**	**Time**
Drill Method: 4.25" Hollow Stem Auger	**Started**	9/30/97	8:00 AM
Sample Method: Split Spoon	**Finished**	9/30/97	5:00 PM

Borehole Diameter: 8.5" in. | **Water Level:** 10-14' BGS ('98) | **Logged By:** DR Farlow | **Checked By:** JW Kilmer

PID/Sens.	Recovery %	Blow Counts	Sample No.	Depth (feet)	Graphic Log	Materials Description
	60	2 7 7 6	1	8–10		Dark yellowish brown poorly graded fine SAND (SP). (Moist sandy SILTY CLAY on augers near surface)
	80	2 6 6 6	2	18–20		Wet, dark greyish brown (4/2) poorly graded fine & medium SAND (SP), trace course sand, trace gravel, trace fines

Depth scale (feet): 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26

Well Completion



Bruce Carter Associates, L.L.C.
6630 E. 75th St
Suite 300
Indianapolis, IN 46250
Phone (317) 578-4233 Fax (317) 578-4250

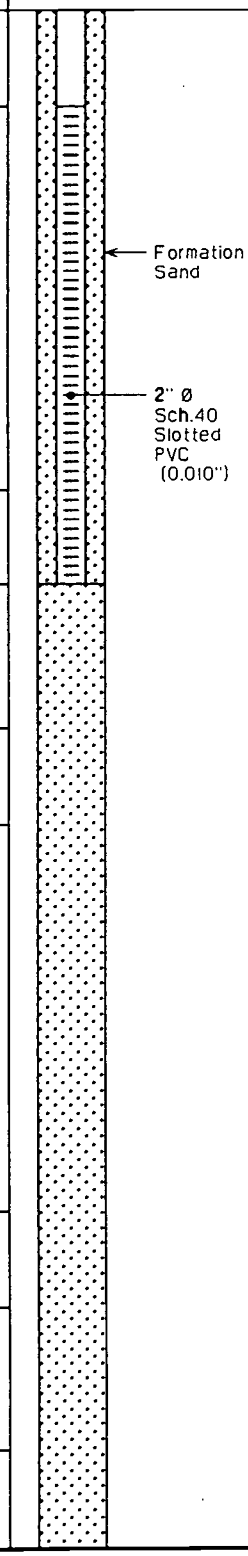
Log of Well MW-6
(in Victory Park)
Twigg Corp.
Martinsville, Ind.

Job Number: 7403

Elevation:

PID/Sens.	Recovery %	Blow Counts	Sample No.	Depth (feet)	Materials Description
	80	8 13 12 11	3	28–30	15" SAA (SP), 5" clay & sand (SC-CL), dark greyish brown (4/2), wet
		5 12 18 19	4	38–40	SAA (SP)
	50	5 6 8 10	5	43–45	Wet, dark greyish brown (4/2), Well graded SAND (SW), grading to well graded SAND & GRAVEL (SG), trace fines
	80	8 16 24 23	6	53–55	SAA (SW), little fine gravel, trace fines
	100	11 14 20 32	7	58–60	SAA (SW), no gravel

Well Completion



Bruce Carter Associates, L.L.C.
6630 E. 75th St
Suite 300
Indianapolis, IN 46250
Phone (317) 578-4233 Fax (317) 578-4250

Log of Well MW-6
(in Victory Park)
Twigg Corp.
Martinsville, Ind.

Job Number: 7403

Elevation:

PID/Sens.	Recovery %	Blow Counts	Sample No.	Depth (feet)	Graphic Log	Materials Description	Well Completion
				62			
	70	10 25 32 34	8	64		SAA (SW), little fines	
				66		BOTTOM OF HOLE AT 65.0 FEET (NOTE: Samples from 43' to 65' were zero recovery in MW-6. Recorded lithology is from offset boring drilled on 10/2/97 and grouted to sfc upon completion.)	
				68			
				70			
				72			
				74			
				76			
				78			
				80			
				82			
				84			
				86			
				88			
				90			

Bruce Carter Associates, L.L.C.
6630 E. 75th St
Suite 300
Indianapolis, IN 46250
Phone (317) 578-4233 Fax (317) 578-4250

Log of Well MW-6 Alt
(boring offset 10' W of MW-6)
Twigg Corp.
Martinsville, Ind.

Job Number: 7403

Elevation:

		Drilling	Date	Time
Driller: Earth Exploration				
Drill Method: 4.25" Hollow Stem Auger		Started	2/23/98	9:00 AM
Sample Method: Split Spoon		Finished	2/23/98	3:00 PM
Borehole Diameter: 8.5" in.	**Water Level:** N/A	**Logged By:** JW Kilmer	**Checked By:**	

PID/Sens.	Recovery %	Blow Counts	Sample No.	Depth (feet)	Graphic Log	Materials Description	Well Completion
						BLANK DRILLED TO 74.5 FEET	
				2			
				4			
				6			
				8			
				10			
				12			
				14			
				16			
				18			
				20			Bentonite Seal
				22			
				24			
				26			

Bruce Carter Associates, L.L.C.
6630 E. 75th St
Suite 300
Indianapolis, IN 46250
Phone (317) 578-4233 Fax (317) 578-4250

Log of Well MW-6 Alt
(boring offset 10' W of MW-6)
Twigg Corp.
Martinsville, Ind.

Job Number: 7403

Elevation:

PID/Sens.	Recovery %	Blow Counts	Sample No.	Depth (feet)	Graphic Log	Materials Description	Well Completion
				30			
				32			
				34			
				36			
				38			
				40			
				42			
				44			
				46			
				48			
				50			
				52			
				54			
				56			Bentonite Seal
				58			

Bruce Carter Associates, L.L.C.
6630 E. 75th St
Suite 300
Indianapolis, IN 46250
Phone (317) 578-4233 Fax (317) 578-4250

Log of Well MW-6 Alt
(boring offset 10' W of MW-6)
Twigg Corp.
Martinsville, Ind.

Job Number: 7403

Elevation:

PID/Sens.	Recovery %	Blow Counts	Sample No.	Depth (feet)	Graphic Log	Materials Description	Well Completion
	38	6 11 16 20	1	75–76.5		Wet, tan, well graded SAND & GRAVEL (SG), trace fines	
	75	9 13 27 32	2	85–86.5		SAA (SG), grey speckled	
				90			Bentonite Seal

Depth scale: 62, 64, 66, 68, 70, 72, 74, 76, 78, 80, 82, 84, 86, 88, 90

Bruce Carter Associates, L.L.C.
6630 E. 75th St
Suite 300
Indianapolis, IN 46250
Phone (317) 578-4233 Fax (317) 578-4250

Log of Well MW-6 Alt

(boring offset 10' W of MW-6)
Twigg Corp.
Martinsville, Ind.

Job Number: 7403

Elevation:

PID/Sens.	Recovery %	Blow Counts	Sample No.	Depth (feet)	Graphic Log	Materials Description	Well Completion
		19 25 30 36	3	95–96.5		SAA (SG)	
	50		4	100–101.5		3" brown sand, 6" grey hard clay (CL), 1" shale.	
				101.5		Bottom of the Hole = 101.5 feet	

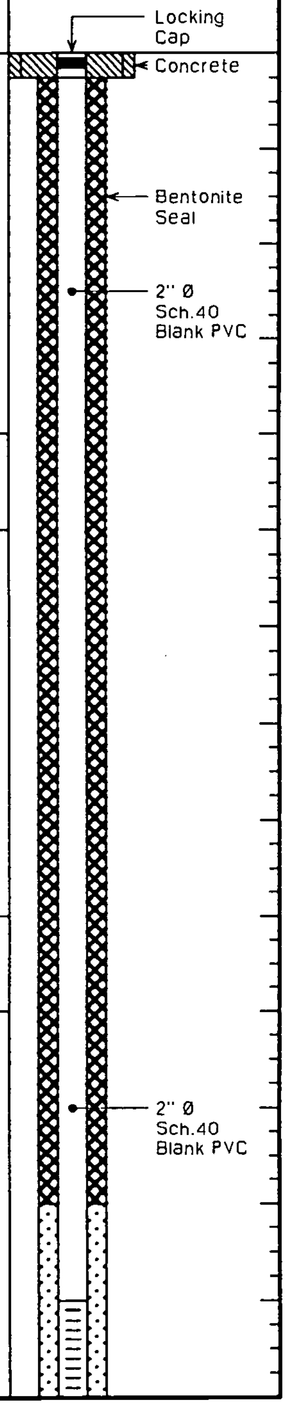
Bruce Carter Associates, L.L.C. 6630 E. 75th St Suite 300 Indianapolis, IN 46250 Phone (317) 578-4233 Fax (317) 578-4250	**Log of Well MW-7** (Sycamore St, N of Victory Park) Twigg Corp. Martinsville, Ind.	**Sheet 1 of 2** **Job Number:** 7403 **Elevation:**

	Drilling	**Date**	**Time**
Driller: SES			
Drill Method: 4.25" Hollow Stem Auger	**Started**	10/1/97	2:40 PM
Sample Method: Split Spoon	**Finished**	10/1/97	7:00 PM

Borehole Diameter: 8.5" in.	**Water Level:** 13-17.2' BGS ('98)	**Logged By:** DR Farlow	**Checked By:** JW Kilmer

PID/Sens.	Recovery %	Blow Counts	Sample No.	Depth (feet)	Graphic Log	Materials Description
				0–8		
	50	1 2 2 2	1	8–10		Brown SILT & SAND (ML-SM) to 9', then Moist dark yellowish brown (4/6) poorly graded fine SAND (SP)
				10–18		
	100	1 2 2 5	2	18–20		Wet dark grayish brown (4/2) well graded SAND (SW) w/ trace to little gravel, trace fines
				20–28		

Well Completion



Bruce Carter Associates, L.L.C.
6630 E. 75th St
Suite 300
Indianapolis, IN 46250
Phone (317) 578-4233 Fax (317) 578-4250

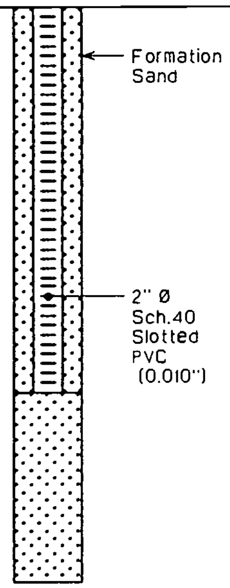
Log of Well MW-7
(Sycamore St, N of Victory Park)
Twigg Corp.
Martinsville, Ind.

Job Number: 7403

Elevation:

PID/Sens.	Recovery %	Blow Counts	Sample No.	Depth (feet)	Graphic Log	Materials Description
	100	4 2 1 3	3	30		SAA (SW), w/ some gravel @ 30'
				32		
				34		
				36		
	50	4 10 20 16	4	38		Wet dark grayish brown (4/2) poorly graded fine & medium SAND (SP), w/ little course sand
				40		BOTTOM OF HOLE AT 40.0 FEET
				42		
				44		
				46		
				48		
				50		
				52		
				54		
				56		
				58		

Well Completion



Bruce Carter Associates, L.L.C.
6630 E. 75th St
Suite 300
Indianapolis, IN 46250
Phone (317) 578-4233 Fax (317) 578-4250

Log of Well MW-8
(South St & Main St)
Twigg Corp.
Martinsville, Ind.

Job Number: 7403

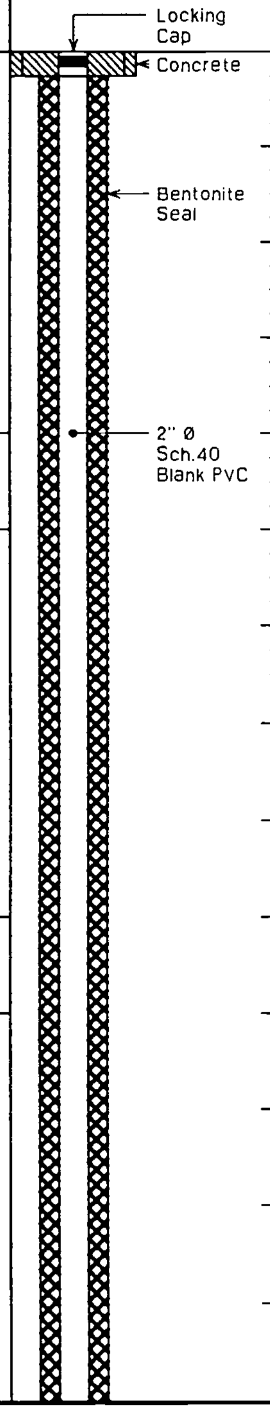
Elevation:

	Drilling	Date	Time
Driller: SES			
Drill Method: 4.25" Hollow Stem Auger	Started	10/1/97	7:30 AM
Sample Method: Split Spoon	Finished	10/1/97	1:00 PM

Borehole Diameter: 8.5" in. | **Water Level:** 11.6-16' BGS ('98) | **Logged By:** DR Farlow | **Checked By:** JW Kilmer

PID/Sens.	Recovery %	Blow Counts	Sample No.	Depth (feet)	Graphic Log	Materials Description
	50	1 2 2 2	1	8–10		Moist brown SILTY SAND (SM) changing to dark brown (3/3) well graded SAND (SW) w/ trace fines & trace gravel
	80	3 2 1 2	2	18–20		Wet hard brown (4/2) well graded SAND (SW), trace gravel, trace fines. Two silt lenses (1/4") noted at 19-20'.

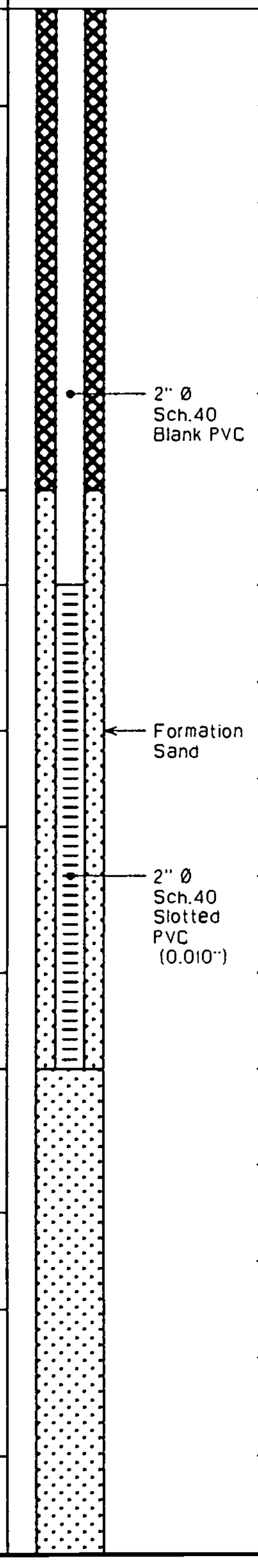
Well Completion



Bruce Carter Associates, L.L.C. 6630 E. 75th St Suite 300 Indianapolis, IN 46250 Phone (317) 578-4233 Fax (317) 578-4250	**Log of Well MW-8** (South St & Main St) Twigg Corp. Martinsville, Ind.	**Sheet 2 of 2** **Job Number:** 7403 **Elevation:**

PID/Sens.	Recovery %	Blow Counts	Sample No.	Depth (feet)	Graphic Log	Materials Description
	70	8 9 10 8	3	30		SAA (SW)
				32 34 36		
	75	12 16 18 17	4	38 40		Wet poorly graded fine to medium SAND (SP) w/ little course sand, trace fines and trace gravel grading to dark brown (5/3) well graded SAND (SW) at 40'.
				42		
	80	14 23 19 14	5	44		SAA (SW) to 44'. Dark brown (5/3) well graded SAND & GRAVEL (SG), trace fines at 44'.
				46		
0/0	80	10 23 20 18	6	48 50		SAA (SG)
				52		
0/0	90	10 23 38 26	7	54		SAA w/ little gravel (SW)
				56		
0/0	90	10 24 31 38	8	58		SAA (SW)

Well Completion



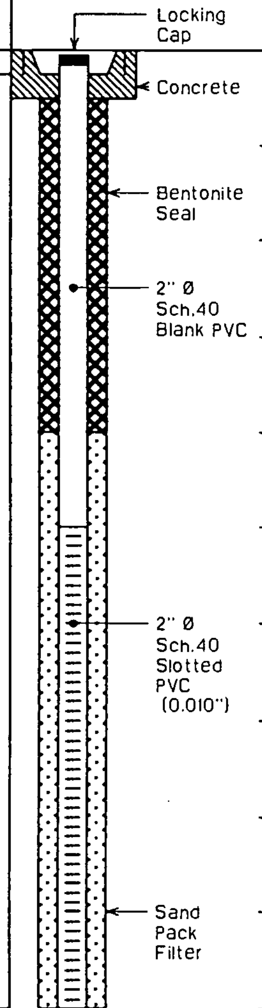
Bruce Carter Associates, L.L.C. 6630 E. 75th Street Suite 300 Indianapolis, IN 46250 Phone (317) 578-4233 Fax (317) 578-4250	**Log of Well MW-9** (parking lot east of Twigg) Twigg Corp. Martinsville, Ind.	**Sheet 1 of 1** **Job Number:** 7403 **Elevation:**

	Drilling	**Date**	**Time**
Driller: Earth Exploration			
Drill Method: 4.25" HSA	**Started**	2/23/98	3:30 PM
Sample Method: Split Spoon	**Finished**	2/23/98	6:00 PM

Borehole Diameter: 8.5" in. | **Water Level:** 6.5-9.6' BGS ('98) | **Logged By:** JW Kilmer | **Checked By:**

PID/Syns.	Recovery %	Blow Counts	Sample No.	Depth (feet)	Graphic Log	Materials Description
				0		Asphalt and gravel base
						Blank drilled. Auger cutting SILTY SAND (SM) to 6-9 feet follow by fine-medium poorly graded SAND (SP).
				2		
				4		
				6		
				8		
				10		
				12		
				14		
				16		
				18		
				20		Bottom of the Hole = 20.0 feet.
				22		
				24		
				26		

Well Completion



BCA™

Bruce Carter Associates, L.L.C.

ENVIRONMENTAL CONSULTANTS

AIR • WATER • SOLID WASTE • OSHA • REMEDIATION SERVICES

GROUND-WATER SAMPLING FIELD DATA LOGSHEET

FACILITY/SITE NAME Twigg Well I.D. MW-1(S) P.N. 7403

1. WATER LEVEL MEASUREMENTS (before purging)

Date 9 Time ____ Method (check one) ☐ steel tape ☐ electric meter ☐ well sounder ☐ other (specify)

Reference Point (check one) ☐ top of well casing ☐ top of protective casing Units (check one) ☐ feet ☐ meters

a. Depth to water from reference point ____

b. Height of reference point above ground surface ____

c. Depth to water from ground surface (a-b) ____

2. PURGING

Date 9/9/98 Time 11:45 Equipment (bailer or pump type) electric submersible

Inside diameter of well 2 inches

3-well volumes = (____ feet) - (____ feet) x ____ = 4.5 gallons

(total depth of well from ground) (total to water from ground (c above)) (conversion factor*)

*conversion factors: for a 2-inch well = 0.5 -or- for a 4-inch well = 2.0 (rounded up to the nearest tenth)

Amount actually purged 12 gallons Well pumped dry? ☐ yes ☒ no

3. SAMPLING

Date 9/9/98 Time 12:00 Equipment (bailer or pump type) bailer

Component materials (e.g, tubing, pump parts, bailer material) teflon w/ teflon wire

List containers filled in the field:

(a) Unfiltered Samples (specify parameters)

1 500 ml

1 500 ml MW1S DUPLICATE

(b) Samples to be filtered (specifty container type, e.g., glass polyethylene, etc.)

Sampler's Name ____

4. FIELD MEASUREMENTS

Temperature ____ °C

pH __ . __ 4 Replicates if a hazardous waste site

Conductivity ____

Meter Type ____ ____

Time Completed ____ ____

5. SAMPLE PREPARATION

Date 9/9/98 Time 12:00 Filtering Method field filter in-line .45 μm ☒ Preservation Completed

12:15 MW1S DUPL

Sampler Preparer's Name J. W. Kilmer

6. COMMENTS AND OBSERVATIONS (notes concerning well, samples, procedures, etc.)

Pumped til clear - almost no sediment

Equipment Blank collected before sample.

BCA™

Bruce Carter Associates, L.L.C.

ENVIRONMENTAL CONSULTANTS

AIR • WATER • SOLID WASTE • OSHA • REMEDIATION SERVICES

GROUND-WATER SAMPLING FIELD DATA LOGSHEET

FACILITY/SITE NAME TWIGG Well I.D. MW-1D P.N. 7403

1. WATER LEVEL MEASUREMENTS (before purging)

Date______ Time ______ Method (check one) ☐ steel tape ☐ electric meter ☐ well sounder ☐ other (specify)

Reference Point (check one) ☐ top of well casing ☐ top of protective casing Units (check one) ☐ feet ☐ meters

a. Depth to water from reference point ______

b. Height of reference point above ground surface ______

c. Depth to water from ground surface (a-b) ______

2. PURGING

Date 9/9/98 Time 10:45 Equipment (bailer or pump type) electric submersible

Inside diameter of well 2 inches

3-well volumes = (60 feet) - (10 feet) x 0.5 = 25 gallons

(total depth of well from ground) (total to water from ground (c above)) (conversion factor*)

*conversion factors: for a 2-inch well = 0.5 -or- for a 4-inch well = 2.0 (rounded up to the nearest tenth)

Amount actually purged 30 gallons Well pumped dry? ☐ yes ☒ no

3. SAMPLING

Date 9/9/98 Time 11:15 Equipment (bailer or pump type) bailer

Component materials (e.g, tubing,pump parts, bailer material) teflon bailer

List containers filled in the field:

(a) Unfiltered Samples (specify parameters)

4 x 40ml VOA

2 x 40 ml VOA (DUPLICATE)

(b) Samples to be filtered (specifty container type, e.g., glass polyethylene, etc.)

Sampler's Name J. W. Kilmer

4. FIELD MEASUREMENTS

Temperature______ °C

pH __ . __ 4 Replicates if a hazardous waste site

Conductivity ______

Meter Type ______

Time Completed ______

5. SAMPLE PREPARATION

Date______ Time______ Filtering Method______ ☐ Preservation Completed

Sampler Preparer's Name______

6. COMMENTS AND OBSERVATIONS (notes concerning well, samples, procedures, etc.)

Pumped til water clear, no sediment

Equipment Blank collected before sample.

Bruce Carter Associates, L.L.C.
ENVIRONMENTAL CONSULTANTS
AIR • WATER • SOLID WASTE • OSHA • REMEDIATION SERVICES

GROUND-WATER SAMPLING FIELD DATA LOGSHEET

FACILITY/SITE NAME TW16a Well I.D. MW-1D P.N. 7403

1. WATER LEVEL MEASUREMENTS (before purging)

Date ______ Time ______ Method (check one) ☐ steel tape ☐ electric meter ☐ well sounder ☐ other (specify)

Reference Point (check one) ☐ top of well casing ☐ top of protective casing Units (check one) ☐ feet ☐ meters
a. Depth to water from reference point ______
b. Height of reference point above ground surface ______
c. Depth to water from ground surface (a-b) ______

2. PURGING

Date 7/23/98 Time 12:45 Equipment (bailer or pump type) Electric Submersible

Inside diameter of well 2 inches

3-well volumes = (60 feet) - (10 feet) x 0.5 = 25 gallons
(total depth of well from ground) (total to water from ground (c above)) (conversion factor*)

*conversion factors: for a 2-inch well = 0.5 -or- for a 4-inch well = 2.0 (rounded up to the nearest tenth)

Amount actually purged 25 gallons Well pumped dry? ☐ yes ☒ no

3. SAMPLING

Date 7/23/98 Time 1:30 Equipment (bailer or pump type) Teflon bailer, bottom emptying
Component materials (e.g, tubing, pump parts, bailer material)
teflon

List containers filled in the field:
(a) Unfiltered Samples (specify parameters)
3x 40ml VOA

(b) Samples to be filtered (specifty container type, e.g., glass polyethylene, etc.)

Sampler's Name ______

4. FIELD MEASUREMENTS

Temperature ______ °C

pH __ . __ 4 Replicates
__ . __ if a hazardous
__ . __ waste site
__ . __

Conductivity ______

Meter Type ______ ______
Time Completed ______ ______

5. SAMPLE PREPARATION

Date ______ Time ______ Filtering Method ______ ☐ Preservation Completed

Sampler Preparer's Name ______

6. COMMENTS AND OBSERVATIONS (notes concerning well, samples, procedures, etc.)

Purged til Clear - no sediment in sample

BRUCE CARTER ASSOCIATES L.L.C.
6330 EAST 75TH STREET SUITE 300 INDIANAPOLIS, INDIANA 46250

CHAIN OF CUSTODY RECORD

PROJ. NO.	PROJECT NAME
7403	TWIGG

SAMPLERS: (Signature) John W. Kilmer

STA. NO.	DATE	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CONTAINERS	Chlorinated VOCs*						REMARKS
	7/23/98	1:30		✓	MW-1D	3							*PCE, TCE, c1,2DCE, t-1,2DCE
													TCA, DCA, 1,1-DCE
													Questions? Call John Kilmer

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
John W Kilmer	7/23/98 4:30p				
Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Relinquished by: (Signature)	Date / Time	Received for Laboratory by: (Signature)	Date / Time	Remarks	
		CWalsh	7/23/98 1630	Hand delivered Received at 5.2°C/on ice [redacted]n H[redacted]spa	

BCA™

Bruce Carter Associates, L.L.C.

ENVIRONMENTAL CONSULTANTS

AIR • WATER • SOLID WASTE • OSHA • REMEDIATION SERVICES

GROUND-WATER SAMPLING FIELD DATA LOGSHEET

FACILITY/SITE NAME Twigg Well I.D. MW-5 P.N. ______

1. WATER LEVEL MEASUREMENTS (before purging)

Date 6/25/98 Time ~~3:30~~ 3:30 Method (check one) ☐ steel tape ☐ electric meter ☐ well sounder ☐ other (specify)

Reference Point (check one) ☒ top of well casing ☐ top of protective casing Units (check one) ☐ feet ☐ meters

a. Depth to water from reference point ______
b. Height of reference point above ground surface ______
c. Depth to water from ground surface (a-b) ______

2. PURGING

Date 6/25/98 Time 3:30 Equipment (bailer or pump type) Pump

Inside diameter of well ______ inches

3-well volumes = (______ feet) - (______ feet) x ______ = 13.8 gallons
(total depth of well from ground) (total to water from ground (c above)) (conversion factor*)

*conversion factors: for a 2-inch well = 0.5 -or- for a 4-inch well = 2.0 (rounded up to the nearest tenth)

Amount actually purged 20 gallons Well pumped dry? ☐ yes ☒ no

3. SAMPLING

Date 4:00 Time ______ Equipment (bailer or pump type) Bailer

Component materials (e.g, tubing,pump parts, bailer material) ______

List containers filled in the field:
(a) Unfiltered Samples (specify parameters)

3 VOA

(b) Samples to be filtered (specifty container type, e.g., glass polyethylene, etc.)

______

Sampler's Name ______

4. FIELD MEASUREMENTS

Temperature ______ °C

pH __ . __ 4 Replicates if a hazardous waste site
__ . __
__ . __
__ . __

Conductivity ______

Meter Type ______ ______
Time Completed ______ ______

5.SAMPLE PREPARATION

Date ______ Time ______ Filtering Method ______ ☐ Preservation Completed

Sampler Preparer's Name ______

6.COMMENTS AND OBSERVATIONS (notes concerning well, samples, procedures, etc.)

BCA™

Bruce Carter Associates, L.L.C.

ENVIRONMENTAL CONSULTANTS

AIR • WATER • SOLID WASTE • OSHA • REMEDIATION SERVICES

GROUND-WATER SAMPLING FIELD DATA LOGSHEET

FACILITY/SITE NAME Tw.99 Well I.D. MW-7 P.N. ____

1. WATER LEVEL MEASUREMENTS (before purging)

Date 6/25/98 Time ____ Method (check one) [ ] steel tape [ ] electric meter [ ] well sounder [ ] other (specify)

Reference Point (check one) [x] top of well casing [ ] top of protective casing Units (check one) [ ] feet [ ] meters

a. Depth to water from reference point ____

b. Height of reference point above ground surface ____

c. Depth to water from ground surface (a-b) ____

2. PURGING

Date 6/25/98 Time 4:15 Equipment (bailer or pump type) ____

Inside diameter of well ____ inches

3-well volumes = (____ feet) - (____ feet) x ____ = 11.2 gallons
(total depth of well from ground) (total to water from ground (c above)) (conversion factor*)

*conversion factors: for a 2-inch well = 0.5 -or- for a 4-inch well = 2.0 (rounded up to the nearest tenth)

Amount actually purged 20 gallons Well pumped dry? [ ] yes [x] no

3. SAMPLING

Date 6/25/98 Time 4:58 Equipment (bailer or pump type) ____

Component materials (e.g, tubing,pump parts, bailer material) ____

List containers filled in the field:

(a) Unfiltered Samples (specify parameters)

3 VOA

(b) Samples to be filtered (specifty container type, e.g., glass polyethylene, etc.)

Sampler's Name ____

4. FIELD MEASUREMENTS

Temperature ____ °C

pH __ . __ 4 Replicates if a hazardous waste site

__ . __

__ . __

__ . __

Conductivity ____

Meter Type ____ ____

Time Completed ____ ____

5. SAMPLE PREPARATION

Date ____ Time ____ Filtering Method ____ [ ] Preservation Completed

Sampler Preparer's Name ____

6. COMMENTS AND OBSERVATIONS (notes concerning well, samples, procedures, etc.)

BCA™

Bruce Carter Associates, L.L.C.

ENVIRONMENTAL CONSULTANTS

AIR • WATER • SOLID WASTE • OSHA • REMEDIATION SERVICES

GROUND-WATER SAMPLING FIELD DATA LOGSHEET

FACILITY/SITE NAME Twigg Well I.D. MW-1D P.N. ______

1. WATER LEVEL MEASUREMENTS (before purging)

Date 6/25/98 Time ~~[illegible]~~ 5:15 Method (check one) ☐ steel tape ☐ electric meter ☐ well sounder ☐ other (specify)

Reference Point (check one) ■ top of well casing ☐ top of protective casing Units (check one) ☐ feet ☐ meters

a. Depth to water from reference point 6.958

b. Height of reference point above ground surface ______

c. Depth to water from ground surface (a-b) ______

2. PURGING

Date ______ Time 5:17 Equipment (bailer or pump type) ______

Inside diameter of well ______ inches

3-well volumes = (______ feet) - (______ feet) x ______ = 24.5 gallons

(total depth of well from ground) (total to water from ground (c above)) (conversion factor*)

*conversion factors: for a 2-inch well = 0.5 -or- for a 4-inch well = 2.0 (rounded up to the nearest tenth)

Amount actually purged 30 gallons Well pumped dry? ☐ yes ☐ no

3. SAMPLING

Date 6/25/98 Time 5:40 Equipment (bailer or pump type) ______

Component materials (e.g, tubing, pump parts, bailer material) ______

List containers filled in the field:

(a) Unfiltered Samples (specify parameters)

______

(b) Samples to be filtered (specifty container type, e.g., glass polyethylene, etc.)

______

Sampler's Name ______

4. FIELD MEASUREMENTS

Temperature ______ °C

pH __ . __ 4 Replicates if a hazardous waste site

Conductivity ______

Meter Type ______

Time Completed ______

5. SAMPLE PREPARATION

Date ______ Time ______ Filtering Method ______ ☐ Preservation Completed

Sampler Preparer's Name ______

6. COMMENTS AND OBSERVATIONS (notes concerning well, samples, procedures, etc.)

BCA™

Bruce Carter Associates, L.L.C.

ENVIRONMENTAL CONSULTANTS

AIR • WATER • SOLID WASTE • OSHA • REMEDIATION SERVICES

GROUND-WATER SAMPLING FIELD DATA LOGSHEET

FACILITY/SITE NAME__________ Well I.D. MW-9 P.N.______

1. WATER LEVEL MEASUREMENTS (before purging)

Date 5:59 Time 6/25/98 Method (check one) ☐ steel tape ☐ electric meter ☐ well sounder ☐ other (specify)

Reference Point (check one) ☐ top of well casing ☐ top of protective casing Units (check one) ☐ feet ☐ meters

a. Depth to water from reference point ______

b. Height of reference point above ground surface ______

c. Depth to water from ground surface (a-b) ______

2. PURGING

Date 6/25/98 Time 6:00 Equipment (bailer or pump type)______

Inside diameter of well______inches

3-well volumes = (______feet) - (______feet) x ______ = 5.2 gallons

total depth of well from ground; total to water from ground (c above); conversion factor*

*conversion factors: for a 2-inch well = 0.5 -or- for a 4-inch well = 2.0 (rounded up to the nearest tenth)

Amount actually purged 15 gallons Well pumped dry? ☐ yes ☐ no

3. SAMPLING

Date 6/25/98 Time 6:15 Equipment (bailer or pump type)______

Component materials (e.g, tubing,pump parts, bailer material)

______

List containers filled in the field:

(a) Unfiltered Samples (specify parameters)

______

(b) Samples to be filtered (specifty container type, e.g., glass polyethylene, etc.)

______

Sampler's Name______

4. FIELD MEASUREMENTS

Temperature______°C

pH__.__ 4 Replicates
__.__ if a hazardous
__.__ waste site
__.__

Conductivity ______

Meter Type ______ ______

Time Completed ______ ______

5.SAMPLE PREPARATION

Date______ Time______ Filtering Method______ ☐ Preservation Completed

Sampler Preparer's Name______

6.COMMENTS AND OBSERVATIONS (notes concerning well, samples, procedures, etc.)

BCA™

Bruce Carter Associates, L.L.C.

ENVIRONMENTAL CONSULTANTS

AIR • WATER • SOLID WASTE • OSHA • REMEDIATION SERVICES

GROUND-WATER SAMPLING FIELD DATA LOGSHEET

FACILITY/SITE NAME ______ Well I.D. MW-8 P.N. ______

1. WATER LEVEL MEASUREMENTS (before purging)

Date 6:45 Time 6/25/98 Method (check one) ☐ steel tape ☐ electric meter ☐ well sounder ☐ other (specify)

Reference Point (check one) ☐ top of well casing ☐ top of protective casing Units (check one) ☐ feet ☐ meters

a. Depth to water from reference point ______
b. Height of reference point above ground surface ______
c. Depth to water from ground surface (a-b) ______

2. PURGING

Date 6:45 Time 6/25/98 Equipment (bailer or pump type) ______

Inside diameter of well ______ inches

3-well volumes = (______ feet) - (______ feet) x ______ = 18 gallons
total depth of well from ground; total to water from ground (c above); conversion factor*

*conversion factors: for a 2-inch well = 0.5 -or- for a 4-inch well = 2.0 (rounded up to the nearest tenth)

Amount actually purged ______ gallons Well pumped dry? ☐ yes ☐ no

3. SAMPLING

Date 6/25/98 Time 7:05 Equipment (bailer or pump type) ______
Component materials (e.g, tubing, pump parts, bailer material) ______

List containers filled in the field:
(a) Unfiltered Samples (specify parameters)
______
______
______
______

(b) Samples to be filtered (specifty container type, e.g., glass polyethylene, etc.)
______
______
______
______

Sampler's Name ______

4. FIELD MEASUREMENTS

Temperature ______ °C

pH __ . __ 4 Replicates
__ . __ if a hazardous
__ . __ waste site
__ . __

Conductivity ______
______
______
______

Meter Type ______ ______
Time Completed ______ ______

5. SAMPLE PREPARATION

Date ______ Time ______ Filtering Method ______ ☐ Preservation Completed

Sampler Preparer's Name ______

6. COMMENTS AND OBSERVATIONS (notes concerning well, samples, procedures, etc.)

BCA™

Bruce Carter Associates, L.L.C.

ENVIRONMENTAL CONSULTANTS

AIR • WATER • SOLID WASTE • OSHA • REMEDIATION SERVICES

GROUND-WATER SAMPLING FIELD DATA LOGSHEET

FACILITY/SITE NAME________ Well I.D. MW-6 P.N._____

1. WATER LEVEL MEASUREMENTS (before purging)

Date 6/25/98 Time 7:20 Method (check one) ☐ steel tape ☐ electric meter ☐ well sounder ☐ other (specify)

Reference Point (check one) ☐ top of well casing ☐ top of protective casing Units (check one) ☐ feet ☐ meters

a. Depth to water from reference point _____

b. Height of reference point above ground surface _____

c. Depth to water from ground surface (a-b) _____

2. PURGING

Date 6/25/98 Time 7:25 Equipment (bailer or pump type)________

Inside diameter of well_____inches

3-well volumes = (______feet) - (______feet) x ______ = 11.5 gallons

(total depth of well from ground) (total to water from ground (c above)) (conversion factor*)

*conversion factors: for a 2-inch well = 0.5 -or- for a 4-inch well = 2.0 (rounded up to the nearest tenth)

Amount actually purged______gallons Well pumped dry? ☐ yes ☐ no

3. SAMPLING

Date 7:45 Time 6/25/98 Equipment (bailer or pump type)________

Component materials (e.g, tubing,pump parts, bailer material)________

List containers filled in the field:

(a) Unfiltered Samples (specify parameters)

____

(b) Samples to be filtered (specifty container type, e.g., glass polyethylene, etc.)

____

Sampler's Name________

4. FIELD MEASUREMENTS

Temperature_____°C

pH __ . __ 4 Replicates if a hazardous waste site

Conductivity ________

Meter Type ________

Time Completed ________

5. SAMPLE PREPARATION

Date______ Time_____ Filtering Method______ ☐ Preservation Completed

Sampler Preparer's Name________

6. COMMENTS AND OBSERVATIONS (notes concerning well, samples, procedures, etc.)

BCA™

Bruce Carter Associates, L.L.C.

ENVIRONMENTAL CONSULTANTS

AIR • WATER • SOLID WASTE • OSHA • REMEDIATION SERVICES

GROUND-WATER SAMPLING FIELD DATA LOGSHEET

FACILITY/SITE NAME Twigg Well I.D. MW-3 P.N. ______

1. WATER LEVEL MEASUREMENTS (before purging)

Date 6/26/98 Time 1:00 Method (check one) ☐ steel tape ☐ electric meter ☐ well sounder ☐ other (specify)

Reference Point (check one) ☐ top of well casing ☐ top of protective casing Units (check one) ☐ feet ☐ meters

a. Depth to water from reference point ______

b. Height of reference point above ground surface ______

c. Depth to water from ground surface (a-b) ______

2. PURGING

Date 6/26/98 Time 1:03 Equipment (bailer or pump type) Bailor

Inside diameter of well ______ inches

3-well volumes = (______ feet) - (______ feet) x ______ = 2.5 gallons

(total depth of well from ground) (total to water from ground (c above)) (conversion factor*)

*conversion factors: for a 2-inch well = 0.5 -or- for a 4-inch well = 2.0 (rounded up to the nearest tenth)

Amount actually purged 3 gallons Well pumped dry? ☐ yes ☐ no

3. SAMPLING

Date 2:15 Time 6/26/98 Equipment (bailer or pump type) ______

Component materials (e.g, tubing, pump parts, bailer material) ______

List containers filled in the field:

(a) Unfiltered Samples (specify parameters)

______

(b) Samples to be filtered (specifty container type, e.g., glass polyethylene, etc.)

______

Sampler's Name ______

4. FIELD MEASUREMENTS

Temperature ______ °C

pH __ . __ 4 Replicates if a hazardous waste site

Conductivity ______

Meter Type ______

Time Completed ______

5. SAMPLE PREPARATION

Date ______ Time ______ Filtering Method ______ ☐ Preservation Completed

Sampler Preparer's Name ______

6. COMMENTS AND OBSERVATIONS (notes concerning well, samples, procedures, etc.)

Bruce Carter Associates, L.L.C.

ENVIRONMENTAL CONSULTANTS

AIR • WATER • SOLID WASTE • OSHA • REMEDIATION SERVICES

GROUND-WATER SAMPLING FIELD DATA LOGSHEET

FACILITY/SITE NAME Twigg Well I.D. MW-1S P.N. ______

1. WATER LEVEL MEASUREMENTS (before purging)

Date 3:15 Time 6/26/98 Method (check one) ☐ steel tape ☐ electric meter ☐ well sounder ☐ other (specify)

Reference Point (check one) ☐ top of well casing ☐ top of protective casing Units (check one) ☐ feet ☐ meters

a. Depth to water from reference point ______

b. Height of reference point above ground surface ______

c. Depth to water from ground surface (a-b) ______

2. PURGING

Date 3:25 Time 6/26/98 Equipment (bailer or pump type) ______

Inside diameter of well ______ inches

3-well volumes = (______ feet) - (______ feet) x ______ = 4.5 gallons
total depth of well from ground; total to water from ground (c above); conversion factor*

*conversion factors: for a 2-inch well = 0.5 -or- for a 4-inch well = 2.0 (rounded up to the nearest tenth)

Amount actually purged ______ gallons Well pumped dry? ☐ yes ☐ no

3. SAMPLING

Date 3:30 Time 6/26/98 Equipment (bailer or pump type) ______

Component materials (e.g, tubing, pump parts, bailer material) ______

List containers filled in the field:

(a) Unfiltered Samples (specify parameters)

______

(b) Samples to be filtered (specifty container type, e.g., glass polyethylene, etc.)

______

Sampler's Name ______

4. FIELD MEASUREMENTS

Temperature ______ °C

pH ___ . ___ 4 Replicates if a hazardous waste site

Conductivity ______

Meter Type ______

Time Completed ______

5. SAMPLE PREPARATION

Date ______ Time ______ Filtering Method ______ ☐ Preservation Completed

Sampler Preparer's Name ______

6. COMMENTS AND OBSERVATIONS (notes concerning well, samples, procedures, etc.)

BCA™

Bruce Carter Associates, L.L.C.

ENVIRONMENTAL CONSULTANTS

AIR • WATER • SOLID WASTE • OSHA • REMEDIATION SERVICES

GROUND-WATER SAMPLING FIELD DATA LOGSHEET

FACILITY/SITE NAME Twigg Well I.D. MW-4 P.N.______

1. WATER LEVEL MEASUREMENTS (before purging)

Date 6/26/98 Time 4:20 Method (check one) ☐ steel tape ☐ electric meter ☐ well sounder ☐ other (specify)

Reference Point (check one) ☐ top of well casing ☐ top of protective casing Units (check one) ☐ feet ☐ meters

a. Depth to water from reference point ______
b. Height of reference point above ground surface ______
c. Depth to water from ground surface (a-b) ______

2. PURGING

Date 6/26/98 Time 4:25 Equipment (bailer or pump type)______

Inside diameter of well_____inches

3-well volumes = (_______feet) - (_______feet) x _______ = 10.9 gallons
(total depth of well from ground) (total to water from ground (c above)) (conversion factor*)

*conversion factors: for a 2-inch well = 0.5 -or- for a 4-inch well = 2.0 (rounded up to the nearest tenth)

Amount actually purged______gallons Well pumped dry? ☐ yes ☐ no

3. SAMPLING

Date 6/26/98 Time 4:35 Equipment (bailer or pump type)______
Component materials (e.g, tubing,pump parts, bailer material)______

List containers filled in the field:
(a) Unfiltered Samples (specify parameters)

______
______
______
______

(b) Samples to be filtered (specifty container type, e.g., glass polyethylene, etc.)

______
______
______
______

Sampler's Name______

4. FIELD MEASUREMENTS

Temperature______°C

pH __ . __ 4 Replicates
__ . __ if a hazardous
__ . __ waste site
__ . __

Conductivity ______
______
______
______

Meter Type ______ ______
Time Completed ______ ______

5. SAMPLE PREPARATION

Date______ Time______ Filtering Method______ ☐ Preservation Completed

Sampler Preparer's Name______

6. COMMENTS AND OBSERVATIONS (notes concerning well, samples, procedures, etc.)

BCA™

Bruce Carter Associates, L.L.C.

ENVIRONMENTAL CONSULTANTS

AIR • WATER • SOLID WASTE • OSHA • REMEDIATION SERVICES

GROUND-WATER SAMPLING FIELD DATA LOGSHEET

FACILITY/SITE NAME TWIGG Well I.D. MW-8 P.N. 7403

1. WATER LEVEL MEASUREMENTS (before purging)

Date 5/22 Time 0845 Method (check one) ☐ steel tape ☒ electric meter ☐ well sounder ☐ other (specify)

Reference Point (check one) ☒ top of well casing ☐ top of protective casing Units (check one) ☒ feet ☐ meters

a. Depth to water from reference point 13.645

b. Height of reference point above ground surface 37/4"

c. Depth to water from ground surface (a-b) ______

2. PURGING

Date 5/22/98 Time 2:45 Equipment (bailer or pump type) electric submersible

Inside diameter of well 2 inches

3-well volumes = (50 feet) - (13.96 feet) x 0.5 = 18 gallons

(total depth of well from ground) (total to water from ground (c above)) (conversion factor*)

*conversion factors: for a 2-inch well = 0.5 -or- for a 4-inch well = 2.0 (rounded up to the nearest tenth)

Amount actually purged 20 gallons Well pumped dry? ☐ yes ☒ no

3. SAMPLING

Date 5/22/98 Time 3:15 Equipment (bailer or pump type) bailer

Component materials (e.g, tubing, pump parts, bailer material) teflon

List containers filled in the field:

(a) Unfiltered Samples (specify parameters)

3 x 40ml VOA

(b) Samples to be filtered (specifty container type, e.g., glass polyethylene, etc.)

Sampler's Name John E. Kilmer

4. FIELD MEASUREMENTS

Temperature ______ °C

pH ___ . ___ 4 Replicates if a hazardous waste site

Conductivity ______

Meter Type ______

Time Completed ______

5. SAMPLE PREPARATION

Date ______ Time ______ Filtering Method ______ ☐ Preservation Completed

Sampler Preparer's Name ______

6. COMMENTS AND OBSERVATIONS (notes concerning well, samples, procedures, etc.)

Pumped clean, didn't turn very cloudy.

BCA™

Bruce Carter Associates, L.L.C.

ENVIRONMENTAL CONSULTANTS
AIR • WATER • SOLID WASTE • OSHA • REMEDIATION SERVICES

GROUND-WATER SAMPLING FIELD DATA LOGSHEET

FACILITY/SITE NAME Twigg (Martinsville) Well I.D. MW#18 P.N. 7403

1. WATER LEVEL MEASUREMENTS (before purging)

Date 3/26 Time 2:30 Method (check one) ☐ steel tape ☒ electric meter ☐ well sounder ☐ other (specify)

Reference Point (check one) ☒ top of well casing ☐ top of protective casing Units (check one) ☒ feet ☐ meters

a. Depth to water from reference point 10.16
b. Height of reference point above ground surface ______
c. Depth to water from ground surface (a-b) ______

2. PURGING

Date 3/27 Time ~~3:00~~ 2:45 Equipment (bailer or pump type) electric submersible

Inside diameter of well 2 inches

3-well volumes = (19 feet) - (10.16 feet) x 0.5 = 4.5 gallons
(total depth of well from ground) (total to water from ground (c above)) (conversion factor*)

*conversion factors: for a 2-inch well = 0.5 -or- for a 4-inch well = 2.0 (rounded up to the nearest tenth)

Amount actually purged 15 gallons Well pumped dry? ☐ yes ☒ no

3. SAMPLING

Date 3/27 Time 3:00 Equipment (bailer or pump type) electric submersible

Component materials (e.g, tubing, pump parts, bailer material)
steel/plastic pump Poly tubing

List containers filled in the field:

(a) Unfiltered Samples (specify parameters)
3 40ml VOA w/HCL
3 1 liter amber glass
1 500 ml plastic *

(b) Samples to be filtered (specifty container type, e.g., glass polyethylene, etc.)
N/A

Sampler's Name J. Kilmer/J/Korman

4. FIELD MEASUREMENTS

Temperature 56.7 °C

pH __ . __ 4 Replicates if a hazardous waste site

Conductivity 442
449

Meter Type Hydac
Time Completed 3:00

*** 5. SAMPLE PREPARATION**

Date 3/27 Time 3:10 Filtering Method .45 µm ☐ Preservation Completed
Nouton field filtration kit
Sampler Preparer's Name John Kilmer/Korman

6. COMMENTS AND OBSERVATIONS (notes concerning well, samples, procedures, etc.)

Pumped Clear

BCA™

Bruce Carter Associates, L.L.C.

ENVIRONMENTAL CONSULTANTS

AIR • WATER • SOLID WASTE • OSHA • REMEDIATION SERVICES

GROUND-WATER SAMPLING FIELD DATA LOGSHEET

FACILITY/SITE NAME Twigg Manufacturing Martinsville Well I.D. MW #5 P.N. ______

1. WATER LEVEL MEASUREMENTS (before purging)

Date 3/27/98 Time 8:00 Method (check one) ☐ steel tape ☒ electric meter ☐ well sounder ☐ other (specify)

Reference Point (check one) ☒ top of well casing ☐ top of protective casing Units (check one) ☐ feet ☐ meters

a. Depth to water from reference point ______
b. Height of reference point above ground surface ______
c. Depth to water from ground surface (a-b) ______

2. PURGING

Date 3/27/98 Time 8:15 Equipment (bailer or pump type) Electric Submersible

Inside diameter of well 2 inches

3-well volumes = (40 feet) - (13.35 feet) x .5 = 13.825 gallons

(total depth of well from ground) (total to water from ground (c above)) (conversion factor*)

*conversion factors: for a 2-inch well = 0.5 -or- for a 4-inch well = 2.0 (rounded up to the nearest tenth)

Amount actually purged 15 gallons Well pumped dry? ☐ yes ☒ no

3. SAMPLING

Date 3/27/98 Time 8:20 Equipment (bailer or pump type) Electric Submersible Pump

Component materials (e.g, tubing, pump parts, bailer material) Stainless/Plastic Pump

List containers filled in the field:

(a) Unfiltered Samples (specify parameters)

~~[illegible]~~ 3X40mL VOA

(b) Samples to be filtered (specifty container type, e.g., glass polyethylene, etc.)

Polyethylene Tubing

Sampler's Name ______

4. FIELD MEASUREMENTS

Temperature 58.5°C

pH ___ : ___ 4 Replicates if a hazardous waste site

Conductivity 668 / 687 / 705 / 706

Meter Type Hydac

Time Completed ______

5. SAMPLE PREPARATION

Date ______ Time ______ Filtering Method ______ ☐ Preservation Completed

Sampler Preparer's Name ______

6. COMMENTS AND OBSERVATIONS (notes concerning well, samples, procedures, etc.)

BCA™

Bruce Carter Associates, L.L.C.

ENVIRONMENTAL CONSULTANTS

AIR • WATER • SOLID WASTE • OSHA • REMEDIATION SERVICES

GROUND-WATER SAMPLING FIELD DATA LOGSHEET

FACILITY/SITE NAME Twigg (Martinsville) Well I.D. MW # 9 P.N. ____

1. WATER LEVEL MEASUREMENTS (before purging)

Date ~~3/26/98~~ 26 Time 8:50 am Method (check one) ☐ steel tape ☒ electric meter ☐ well sounder ☐ other (specify)

Reference Point (check one) ☒ top of well casing ☐ top of protective casing Units (check one) ☐ feet ☐ meters

a. Depth to water from reference point ____

b. Height of reference point above ground surface ____

c. Depth to water from ground surface (a-b) ____

2. PURGING

Date 3/27/98 Time 9:00 am Equipment (bailer or pump type) ____

Inside diameter of well 2 inches

3-well volumes = (20 feet) - (9.55 feet) x 0.5 = 5.225 gallons

(total depth of well from ground) (total to water from ground (c above)) (conversion factor*)

*conversion factors: for a 2-inch well = 0.5 -or- for a 4-inch well = 2.0 (rounded up to the nearest tenth)

Amount actually purged ~6~ gallons Well pumped dry? ☐ yes ☒ no

3. SAMPLING

Date 3/27/98 Time 9:00am Equipment (bailer or pump type) submersible electric

Component materials (e.g, tubing, pump parts, bailer material) Stainless/Plastic pump

List containers filled in the field:

(a) Unfiltered Samples (specify parameters)

3X40mL VOA Bottles with teflon lined Septa.

(b) Samples to be filtered (specifty container type, e.g., glass polyethylene, etc.)

N/A

Polyethylene Tube

Sampler's Name ____

4. FIELD MEASUREMENTS

Temperature 58.5 °F.

pH __ . __ 4 Replicates if a hazardous waste site

Conductivity 452 / 291 / 366 / 406 / 402

Meter Type Hydac

Time Completed 9:15

5. SAMPLE PREPARATION

Date ____ Time ____ Filtering Method ____ ☐ Preservation Completed

Sampler Preparer's Name ____

6. COMMENTS AND OBSERVATIONS (notes concerning well, samples, procedures, etc.)

silty Samples (cloudy)

Bruce Carter Associates, L.L.C.

BCA™

ENVIRONMENTAL CONSULTANTS

AIR • WATER • SOLID WASTE • OSHA • REMEDIATION SERVICES

GROUND-WATER SAMPLING FIELD DATA LOGSHEET

FACILITY/SITE NAME Twigg Manufacturing (Martinsville) Well I.D. MW# 1D P.N. ______

1. WATER LEVEL MEASUREMENTS (before purging)

Date 3/27/98 Time 10:00 AM Method (check one) ☐ steel tape ☒ electric meter ☐ well sounder ☐ other (specify)

Reference Point (check one) ☒ top of well casing ☐ top of protective casing Units (check one) ☐ feet ☐ meters

a. Depth to water from reference point ______
b. Height of reference point above ground surface ______
c. Depth to water from ground surface (a-b) ______

2. PURGING

Date 3/27/98 Time 10:00 AM Equipment (bailer or pump type) Electric Submersible Pump

Inside diameter of well ______ inches

3-well volumes = (60 feet) - (10.25 feet) x .5 = 24.5 gallons

(total depth of well from ground) (total to water from ground (c above)) (conversion factor*)

*conversion factors: for a 2-inch well = 0.5 -or- for a 4-inch well = 2.0 (rounded up to the nearest tenth)

Amount actually purged 25 gallons Well pumped dry? ☐ yes ☒ no

3. SAMPLING

Date 3/27/98 Time 10:15 AM Equipment (bailer or pump type) Electric Submersible Pump

Component materials (e.g, tubing, pump parts, bailer material) Stainless/Plastic Polyethylene tubing

List containers filled in the field:

(a) Unfiltered Samples (specify parameters)

~~2x~~ 3X40ml VOA

(b) Samples to be filtered (specifty container type, e.g., glass polyethylene, etc.)

HCL Added By Lab

Sampler's Name John Kilmer / Jeff Korman

4. FIELD MEASUREMENTS

Temperature 58.5°F

pH __ . __ 4 Replicates if a hazardous waste site

__ . __

__ . __

__ . __

Conductivity 680, 687, 690, 688

Meter Type Hydac

Time Completed 10:30

5. SAMPLE PREPARATION

Date ______ Time ______ Filtering Method ______ ☐ Preservation Completed

Sampler Preparer's Name ______

6. COMMENTS AND OBSERVATIONS (notes concerning well, samples, procedures, etc.)

Bruce Carter Associates, L.L.C.

BCA™

ENVIRONMENTAL CONSULTANTS

AIR • WATER • SOLID WASTE • OSHA • REMEDIATION SERVICES

GROUND-WATER SAMPLING FIELD DATA LOGSHEET

FACILITY/SITE NAME Twigg Manufacturing (Martinsville) Well I.D. MW# 1D P.N. ______

1. WATER LEVEL MEASUREMENTS (before purging)

Date 3/27/98 Time 10:00 Am Method (check one) ☐ steel tape ☒ electric meter ☐ well sounder ☐ other (specify)

Reference Point (check one) ☒ top of well casing ☐ top of protective casing Units (check one) ☐ feet ☐ meters

a. Depth to water from reference point ______

b. Height of reference point above ground surface ______

c. Depth to water from ground surface (a-b) ______

2. PURGING

Date 3/27/98 Time 10:00 Am Equipment (bailer or pump type) Electric Submersible Pump

Inside diameter of well ______ inches

3-well volumes = (60 feet) - (10.25 feet) x .5 = 24.5 gallons

(total depth of well from ground) (total to water from ground (c above)) (conversion factor*)

*conversion factors: for a 2-inch well = 0.5 -or- for a 4-inch well = 2.0 (rounded up to the nearest tenth)

Amount actually purged 25 gallons Well pumped dry? ☐ yes ☒ no

3. SAMPLING

Date 3/27/98 Time 10:15 Am Equipment (bailer or pump type) Electric Submersible Pump

Component materials (e.g, tubing, pump parts, bailer material) Stainless/Plastic Polyethylene tubing

List containers filled in the field:

(a) Unfiltered Samples (specify parameters)

~~[illegible]~~ 3X40ml VOA

(b) Samples to be filtered (specifty container type, e.g., glass polyethylene, etc.)

HCL Added By Lab

Sampler's Name John Kilmer / Jeff Korman

4. FIELD MEASUREMENTS

Temperature 58.5 °F

pH __ . __ / __ . __ / __ . __ / __ . __ 4 Replicates if a hazardous waste site

Conductivity 680 / 687 / 690 / 688

Meter Type Hydac

Time Completed 10:30

5. SAMPLE PREPARATION

Date ______ Time ______ Filtering Method ______ ☐ Preservation Completed

Sampler Preparer's Name ______

6. COMMENTS AND OBSERVATIONS (notes concerning well, samples, procedures, etc.)

Bruce Carter Associates, L.L.C.

ENVIRONMENTAL CONSULTANTS

AIR • WATER • SOLID WASTE • OSHA • REMEDIATION SERVICES

GROUND-WATER SAMPLING FIELD DATA LOGSHEET

FACILITY/SITE NAME Twigg (Martinsville) Well I.D. # 8 MW P.N. ____

1. WATER LEVEL MEASUREMENTS (before purging)

Date 3/27/98 Time 11:00 Method (check one) ☐ steel tape ☒ electric meter ☐ well sounder ☐ other (specify)

Reference Point (check one) ☒ top of well casing ☐ top of protective casing Units (check one) ☐ feet ☐ meters

a. Depth to water from reference point ____

b. Height of reference point above ground surface ____

c. Depth to water from ground surface (a-b) ____

2. PURGING

Date 3/27/98 Time 11:00 Equipment (bailer or pump type) Electric Submersible Pump

Inside diameter of well ____ inches

3-well volumes = (40 feet) - (15.80 feet) x .5 = 12.1 gallons

(total depth of well from ground) (total to water from ground (c above)) (conversion factor*)

*conversion factors: for a 2-inch well = 0.5 -or- for a 4-inch well = 2.0 (rounded up to the nearest tenth)

Amount actually purged 15 gallons Well pumped dry? ☐ yes ☒ no

3. SAMPLING

Date 3/27/98 Time 11:00 Equipment (bailer or pump type) Electric submersible Pump

Component materials (e.g, tubing, pump parts, bailer material) stainless/ Plastic Pump

List containers filled in the field:

(a) Unfiltered Samples (specify parameters)

3 x 40 ml VOA

(b) Samples to be filtered (specifty container type, e.g., glass polyethylene, etc.)

Polyethylene Tube

Sampler's Name John Kilmer/ Jeff Korman

4. FIELD MEASUREMENTS

Temperature 58.6 °F

pH ___ . ___ 4 Replicates if a hazardous waste site

Conductivity 639 / 643 / 644 / 640

Meter Type Hydac

Time Completed ____

5. SAMPLE PREPARATION

Date ____ Time ____ Filtering Method ____ ☐ Preservation Completed

Sampler Preparer's Name ____

6. COMMENTS AND OBSERVATIONS (notes concerning well, samples, procedures, etc.)

BCA™

Bruce Carter Associates, L.L.C.

ENVIRONMENTAL CONSULTANTS

AIR • WATER • SOLID WASTE • OSHA • REMEDIATION SERVICES

GROUND-WATER SAMPLING FIELD DATA LOGSHEET

FACILITY/SITE NAME Twigg Martinsville Well I.D. MW #6 P.N. ______

1. WATER LEVEL MEASUREMENTS (before purging)

Date 3/27/98 Time 11:15 Method (check one) ☐ steel tape ☒ electric meter ☐ well sounder ☐ other (specify)

Reference Point (check one) ☒ top of well casing ☐ top of protective casing Units (check one) ☐ feet ☐ meters

a. Depth to water from reference point ______

b. Height of reference point above ground surface ______

c. Depth to water from ground surface (a-b) ______

2. PURGING

Date 3/27/98 Time 11:30 Equipment (bailer or pump type) Electric Submersible Pump

Inside diameter of well ______ inches

3-well volumes = (40 feet) total depth of well from ground - (13.9 feet) total to water from ground (c above) x ______ conversion factor* = 11.5 gallons

*conversion factors: for a 2-inch well = 0.5 -or- for a 4-inch well = 2.0 (rounded up to the nearest tenth)

Amount actually purged 15 gallons Well pumped dry? ☐ yes ☒ no

3. SAMPLING

Date 3/27/98 Time 11:30 Equipment (bailer or pump type) Electric Submersible

Component materials (e.g, tubing,pump parts, bailer material) Stainless / Plastic Pump

List containers filled in the field:

(a) Unfiltered Samples (specify parameters)

3 40 ml VOA

(b) Samples to be filtered (specifty container type, e.g., glass polyethylene, etc.)

Polyethylene tubing

Sampler's Name John Kilner / Jeff Kurman

4. FIELD MEASUREMENTS

Temperature 60.0 °F

pH __ . __ 4 Replicates if a hazardous waste site

Conductivity 585 / 532 / 528 / 529

Meter Type Hydac

Time Completed ______

5. SAMPLE PREPARATION

Date ______ Time ______ Filtering Method ______ ☐ Preservation Completed

Sampler Preparer's Name ______

6. COMMENTS AND OBSERVATIONS (notes concerning well, samples, procedures, etc.)

Bruce Carter Associates, L.L.C.
ENVIRONMENTAL CONSULTANTS
AIR • WATER • SOLID WASTE • OSHA • REMEDIATION SERVICES

GROUND-WATER SAMPLING FIELD DATA LOGSHEET

FACILITY/SITE NAME Twigg Martinsville Well I.D. MW #4 P.N. ______

1. WATER LEVEL MEASUREMENTS (before purging)

Date 3/27/98 Time ______ Method (check one) ☐ steel tape ☒ electric meter ☐ well sounder ☐ other (specify)

Reference Point (check one) ☒ top of well casing ☐ top of protective casing Units (check one) ☐ feet ☐ meters
a. Depth to water from reference point ______
b. Height of reference point above ground surface ______
c. Depth to water from ground surface (a-b) ______

2. PURGING

Date 3/27/98 Time 1:30 Equipment (bailer or pump type) Electric Submersible Pump

Inside diameter of well 2 inches

3-well volumes = (30. feet) - (11.61 feet) x .5 = 10.95 gallons
(total depth of well from ground) (total to water from ground (c above)) (conversion factor*)

*conversion factors: for a 2-inch well = 0.5 -or- for a 4-inch well = 2.0 (rounded up to the nearest tenth)

Amount actually purged 12 gallons Well pumped dry? ☐ yes ☒ no

3. SAMPLING

Date 3/27/98 Time 1:45 Equipment (bailer or pump type) Electric Submersible Pump
Component materials (e.g. tubing, pump parts, bailer material) Stainless/ Plastic

List containers filled in the field:
(a) Unfiltered Samples (specify parameters)
3 x 40ml VOA

(b) Samples to be filtered (specifty container type, e.g., glass polyethylene, etc.)
8 Polyethylene tubeing

Sampler's Name John Kilner/ Jeff Korman

4. FIELD MEASUREMENTS

Temperature 57.7 F

pH __ . __ 4 Replicates
__ . __ if a hazardous
__ . __ waste site
__ . __

Conductivity 455
465
467
______

Meter Type Hydac ______
Time Completed ______ ______

5. SAMPLE PREPARATION

Date ______ Time ______ Filtering Method ______ ☐ Preservation Completed

Sampler Preparer's Name ______

6. COMMENTS AND OBSERVATIONS (notes concerning well, samples, procedures, etc.)

BCA™

Bruce Carter Associates, L.L.C.

ENVIRONMENTAL CONSULTANTS

AIR • WATER • SOLID WASTE • OSHA • REMEDIATION SERVICES

GROUND-WATER SAMPLING FIELD DATA LOGSHEET

FACILITY/SITE NAME TWIGG (MARTINSVILLE) Well I.D. MW-7 P.N. 7403

1. WATER LEVEL MEASUREMENTS (before purging)

Date 3/26 Time 8:55a Method (check one) ☐ steel tape ☒ electric meter ☐ well sounder ☐ other (specify)

Reference Point (check one) ☒ top of well casing TIC ☐ top of protective casing Units (check one) ☒ feet ☐ meters

a. Depth to water from reference point 17.05

b. Height of reference point above ground surface ______

c. Depth to water from ground surface (a-b) ______

2. PURGING

Date 3/26 Time 6:15 Equipment (bailer or pump type) electric submersible

Inside diameter of well 2 inches

3-well volumes = (40 feet) - (17.5 feet) x .5 = 11.25 gallons

(total depth of well from ground) (total to water from ground (c above)) (conversion factor*)

*conversion factors: for a 2-inch well = 0.5 -or- for a 4-inch well = 2.0 (rounded up to the nearest tenth)

Amount actually purged 25 gallons Well pumped dry? ☐ yes ☒ no

3. SAMPLING

Date 3/26 Time 6:45 Equipment (bailer or pump type) electric submersible

Component materials (e.g, tubing, pump parts, bailer material) stainless/plastic pump polyethylene tubing

List containers filled in the field:

(a) Unfiltered Samples (specify parameters)

3 x 40ml VOA

(b) Samples to be filtered (specifty container type, e.g., glass, polyethylene, etc.)

N/A

HCl added by lab

Sampler's Name J Kilmer / J. Korman

4. FIELD MEASUREMENTS

Temperature ______ °C

pH __ . __ 4 Replicates if a hazardous waste site

Conductivity 625 / 618 / 622 / stable

Meter Type Hydac

Time Completed 6:45

5. SAMPLE PREPARATION

Date ______ Time ______ Filtering Method ______ ☐ Preservation Completed

Sampler Preparer's Name ______

6. COMMENTS AND OBSERVATIONS (notes concerning well, samples, procedures, etc.)

Pumped 'til clear

BCA™

Bruce Carter Associates, L.L.C.

ENVIRONMENTAL CONSULTANTS

AIR • WATER • SOLID WASTE • OSHA • REMEDIATION SERVICES

GROUND-WATER SAMPLING FIELD DATA LOGSHEET

FACILITY/SITE NAME TWIGG Well I.D. MW-3 P.N. 7403

1. WATER LEVEL MEASUREMENTS (before purging)

Date_____ Time_____ Method (check one) ☐ steel tape ☐ electric meter ☐ well sounder ☐ other (specify)

Reference Point (check one) ☐ top of well casing ☐ top of protective casing Units (check one) ☐ feet ☐ meters

a. Depth to water from reference point _____
b. Height of reference point above ground surface _____
c. Depth to water from ground surface (a-b) _____

2. PURGING

Date 4/8/98 Time 12:30- 1:30 Equipment (bailer or pump type) teflon bailer w/ teflon coated cable

Inside diameter of well 2 inches

3-well volumes = (16.7 feet) - (11.8 feet) x 0.5 = 2.5 gallons
(total depth of well from ground) (total to water from ground (c above)) (conversion factor*)

*conversion factors: for a 2-inch well = 0.5 -or- for a 4-inch well = 2.0 (rounded up to the nearest tenth)

Amount actually purged 1.5 gallons Well pumped dry? ☒ yes ☐ no 3 times

3. SAMPLING

Date 4/8/98 Time 2:45 Equipment (bailer or pump type) teflon bailer
Component materials (e.g, tubing, pump parts, bailer material) teflon

List containers filled in the field:
(a) Unfiltered Samples (specify parameters)
3 x 40 ml VOA (HCl Preservative)

(b) Samples to be filtered (specifty container type, e.g., glass polyethylene, etc.)

Sampler's Name_____

4. FIELD MEASUREMENTS

Temperature_____ °C

pH __ . __ 4 Replicates
__ . __ if a hazardous
__ . __ waste site
__ . __

Conductivity _____

Meter Type _____ _____
Time Completed _____ _____

5. SAMPLE PREPARATION

Date_____ Time_____ Filtering Method_____ ☐ Preservation Completed

Sampler Preparer's Name_____

6. COMMENTS AND OBSERVATIONS (notes concerning well, samples, procedures, etc.)

Sample clear

BCA™

Bruce Carter Associates, L.L.C.

ENVIRONMENTAL CONSULTANTS

AIR • WATER • SOLID WASTE • OSHA • REMEDIATION SERVICES

July 20, 1998

Resident

Dear Sir/Madam:

Bruce Carter Associates, L.L.C. (BCA) is performing a groundwater survey in your neighborhood at the request of Twigg Corporation and in cooperation with the Indiana Department of Environmental Management (IDEM). According to Martinsville Water Department records, your household water is supplied by the City. However, some homeowners also maintain a private well on their property. If you have a private well on your property, we would like to collect a water sample from it. There will be no cost to you and a copy of the results will be provided free-of-charge. A representative of BCA will be in your neighborhood within a few days to collect samples. Please contact me immediately (317) 578-4233 if you have a private well and to let us know if we may collect a sample.

Very truly yours,
Bruce Carter Associates, L.L.C.

John W. Kilmer

John W. Kilmer
Senior Engineer

6330 E. 75th St., Suite 300
Indianapolis, IN 46250
Phone (317) 578-4233
Fax (317) 578-4250

733 Princeton St.
Elkhart, IN 46516
Phone (219) 522-1019
Fax (219) 522-0374

149 W. Main St.
New Albany, IN 47150
Phone (812) 944-3520
Fax (812) 944-3557

(800) 291-1019

BCA™

Bruce Carter Associates, L.L.C.

ENVIRONMENTAL CONSULTANTS

AIR • WATER • SOLID WASTE • OSHA • REMEDIATION SERVICES

August 6, 1998

FILE COPY

Ed Sheets
1139 Marilyn Street
Martinsville, IN. 46151

RE: Water Well Sample

Dear Mr. Sheets:

With your permission, on July 28, 1998 a sample of water was obtained from the faucet on the south side of your house. You indicated that the faucet is connected to a private well in your garage. The laboratory report is attached.

The results indicate that no chlorinated solvents are present in the well water. None-the-less, as a precaution the well water should not be used for drinking water. Please call me at 317- 578-4233 if you have any questions.

Very truly yours
Bruce Carter Associates, L.L.C.

John W. Kilmer

John W. Kilmer
Senior Engineer

attachment
cc: Ralph Heifner, TWIGG

c:\bcafiles\farlow\project\7403\sheets.ltr

6330 E. 75th St., Suite 300
Indianapolis, IN 46250
Phone (317) 578-4233
Fax (317) 578-4250

733 Princeton St.
Elkhart, IN 46516
Phone (219) 522-1019
Fax (219) 522-0374

149 W. Main St.
New Albany, IN 47150
Phone (812) 944-3520
Fax (812) 944-3557

(800) 291-1019

BCA™

Bruce Carter Associates, L.L.C.

ENVIRONMENTAL CONSULTANTS

AIR • WATER • SOLID WASTE • OSHA • REMEDIATION SERVICES

August 6, 1998

FILE COPY

Maurice Curtis
1060 South Ohio Street
Martinsville, IN. 46151

RE: Water Well Sample

Dear Mr. Curtis:

With your permission on July 28, 1998 a sample of water was obtained from the external faucet on the south side your house. In a previous conversation you indicated that the faucet is connected to a private well in your basement. The laboratory report is attached.

The results indicate that chlorinated solvents are present in the water above the Maximum Contaminant Levels (MCLs) allowed for drinking water by the U.S. Environmental Protection Agency (EPA) and the Indiana Department of Environmental Management (IDEM). The water from your well should not be used for drinking, cooking or showers, but may safely be used for watering plants or washing the car. City water should be used for drinking and other domestic use.

Please call me at 317 - 578-4233 if you have any questions.

Very truly yours
Bruce Carter Associates, L.L.C.

John W. Kilmer

John W. Kilmer
Senior Engineer

attachment
cc: Ralph Heifner, TWIGG

c:\bcafiles\farlow\project\7403\curtis.ltr

6330 E. 75th St., Suite 300
Indianapolis, IN 46250
Phone (317) 578-4233
Fax (317) 578-4250

733 Princeton St.
Elkhart, IN 46516
Phone (219) 522-1019
Fax (219) 522-0374

149 W. Main St.
New Albany, IN 47150
Phone (812) 944-3520
Fax (812) 944-3557

(800) 291-1019

NATIONAL ENVIRONMENTAL TESTING, INC.

Indianapolis Division
6964 Hillsdale Ct.
Indianapolis, IN 46250
Tel: (317) 842-4261
Fax: (317) 842-4286

ANALYTICAL REPORT

Mr. John Kilmer
BRUCE CARTER ASSOCIATES
6330 E. 75th St.
Suite 300
Indianapolis, IN 46250

08/03/1998

NET Job Number: 98.05167

Enclosed are the Analytical Results for the following samples submitted to NET, Inc. Indianapolis Division for analysis:

Project Description: TWIGG CORP.

Sample Number	Sample Description	Date Taken	Date Received
214055	1060 S OHIO	07/28/1998	07/28/1998
[redacted]	[redacted]	07/28/1998	07/28/1998

National Environmental Testing, Inc. certifies that the analytical results contained herein apply only to the specific samples analyzed.

Reproduction of this analytical report is permitted only in its entirety.

Project Representative

NATIONAL ENVIRONMENTAL TESTING, INC.

Indianapolis Division
6964 Hillsdale Ct.
Indianapolis, IN 46250
Tel: (317) 842-4261
Fax: (317) 842-4286

ANALYTICAL REPORT

Mr. John Kilmer
BRUCE CARTER ASSOCIATES
6330 E. 75th St.
Suite 300
Indianapolis, IN 46250

08/03/1998

Job No.: 98.05167

Date Received: 07/28/1998
Job Description: TWIGG CORP.

Sample Number / Sample I.D. Parameters	Result	Flag	Sample Date/ Units	Analyst & Date Analyzed	Method	Reporting Limit
214055 1060 S OHIO			07/28/1998			
VOLATILES-8260 (AQ)				/		
1,1-Dichloroethane	17.		ug/L	tjg / 08/01/1998	SW 8260B	<5.0
1,1-Dichloroethene	30.		ug/L	tjg / 08/01/1998	SW 8260B	<5.0
cis-1,2-Dichloroethene	210.		ug/L	tjg / 08/01/1998	SW 8260B	<5.0
trans-1,2-Dichloroethene	<5.0		ug/L	tjg / 08/01/1998	SW 8260B	<5.0
Tetrachloroethene	<5.0		ug/L	tjg / 08/01/1998	SW 8260B	<5.0
1,1,1-Trichloroethane	160.	d1x5	ug/L	tjg / 08/03/1998	SW 8260B	<5.0
Trichloroethene	41.		ug/L	tjg / 08/01/1998	SW 8260B	<5.0
SURR: Toluene-d8	96.		88-110%	tjg / 08/01/1998	SW 8260B	
SURR: Dibromofluoromethane	109.		86-118%	tjg / 08/01/1998	SW 8260B	
SURR: 4-Bromofluorobenzene	95.		86-115%	tjg / 08/01/1998	SW 8260B	

NET®

NATIONAL
ENVIRONMENTAL
TESTING, INC.

Indianapolis Division
6964 Hillsdale Ct.
Indianapolis, IN 46250

Tel: (317) 842-4261
Fax: (317) 842-4286

KEY TO ABBREVIATIONS

<	Less than; when appearing in the results column indicates the analyte was not detected at or above the reported value.
mg/L	Concentration in units of milligrams of analyte per Liter of sample. Measurement used for aqueous samples. Can also be expressed as parts per million (ppm).
ug/L	Concentration in units of micrograms of analyte per Liter of sample. Measurement used for aqueous samples. Can also be expressed as parts per billion (ppb).
mg/kg	Concentration in units of milligrams of analyte per kilogram of sample. Measurement used for non-aqueous samples. Can also be expressed as parts per million (ppm).
ug/kg	Concentration in units of micrograms of analyte per kilogram of sample. Measurement used for non-aqueous samples. Can also be expressed as parts per billion (ppb).
a	Indicates the sample concentration was quantitated using a diesel fuel standard.
b	Indicates the analyte of interest was also found in the method blank.
c	Samples resembles unknown Hydrocarbon.
d1	Indicates the analyte has elevated reporting limit due to high concentration.
d2	Indicates the analyte has elevated reporting limit due to matrix.
e	Indicates the reported concentration is estimated.
f	Indicates the sample concentration was quantitated using a fuel oil standard.
g	Indicates the sample concentration was quantitated using a gasoline standard.
h	Indicates the sample was analyzed past holding time.
i	Indicates the sample spike concentration was insufficient, due to high analyte concentration in the sample.
j	Indicates the reported concentration is below the Reporting Limit.
k	Indicates the sample concentration was quantitated using a kerosene standard.
l	Indicates an MS/MSD was not analyzed due to insufficient sample. An LCS duplicate has been provided.
m	Indicates the sample concentration was quantitated using a mineral spirits standard.
o	Indicates the sample concentration was quantitated using a motor oil standard.
p	Indicates the sample was post spiked due to sample matrix.
q	Indicates MS/MSD exceeded control limits. All other QCIs were in control.
r	Indicates the sample was received past holding time.
s	Indicates the sample concentration was quantitated using a stoddard solvent standard.
u	Indicates the sample was received improperly preserved and/or contained.
uj	Indicates the result is under the reporting limit and considered an estimated concentration.
TCLP	Indicates the Toxicity Characteristic Leaching Procedure was performed for this analysis.
ICP	Indicates the analysis was performed using Inductively Coupled Plasma Spectroscopy.
GFAA	Indicates the analysis was performed using Graphite Furnace Atomic Absorption Spectroscopy.
%	Percent; To convert ppm to %, divide the result by 10,000. To convert % to ppm, multiply the result by 10,000.
*	Reporting limits are elevated due to insufficient sample submitted by client.
Dry Weight	When indicated, the results are reported on a dry weight basis. The contribution of the moisture content in the sample is subtracted when calculating the concentration of the analyte.

BRUC[illegible] CAR[illegible]R [illegible]OCI[illegible]ES [illegible].C
6330 EAST 75TH STREET SUITE 300 INDIANAPOLIS, INDIANA 46250

CHAIN OF CUSTODY RECORD

NO.	PROJECT NAME
3	TWIGG

S: (Signature) [signature] W. Kilmer

DATE	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CONTAINERS	Chlorinated VOCs						REMARKS
7/28/98	5 pm		✓	1060 E Ohio	3	✓						PCE TCE c-DCE, t-DCE
"	[redacted]		✓	[redacted]	3	✓						TCA, DCA, 11-DCE

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
[signature] W. Kilmer	7/28/98 6:30				

Relinquished by: (Signature)	Date / Time	Received for Laboratory by: (Signature)	Date / Time	Remarks
	→	Nancy Nott	7/28/98 10:30	Hand Delivered Receipt temp 9.2°C NLS 7/28/98